New Mexico Oil and Gas Liability Assessment

Prepared for:
New Mexico State Land Office

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FINAL

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Version Control Log

Version	Date	Description of Changes
IFR	July 31, 2020	Draft Issued for Review
IFR Rev 1	September 30, 2020	Updated counts to reflect all wells in New Mexico (on State Lands and otherwise)
IFR Rev 2	October 14, 2020	Updated Surface Reclamation sections and removed discussion of expanded scope
IFR Rev 3	November 2020	Updated plugging and abandonment costs to reflect New Mexico-specific rates
IFR Rev 4	March 2021	Updated all formatting, completed data gap discussions and included section for Commercial Lease liabilities

1.0 Introduction

Vertex Resource Services Inc. (Vertex) completed an assessment of oil and gas assets to determine a liability estimate for all assets located within lands owned by the New Mexico State Land Office (SLO). The SLO owns lands throughout the state of New Mexico, with landholdings directly or indirectly related to oil and gas production concentrated within the Permian and San Juan Basins. Figures 1 and 2 below indicate the locations of lands owned by the SLO; Figure 1 presents the entire boundary of State lands and Figure 2 presents the locations of participating areas within those boundaries.

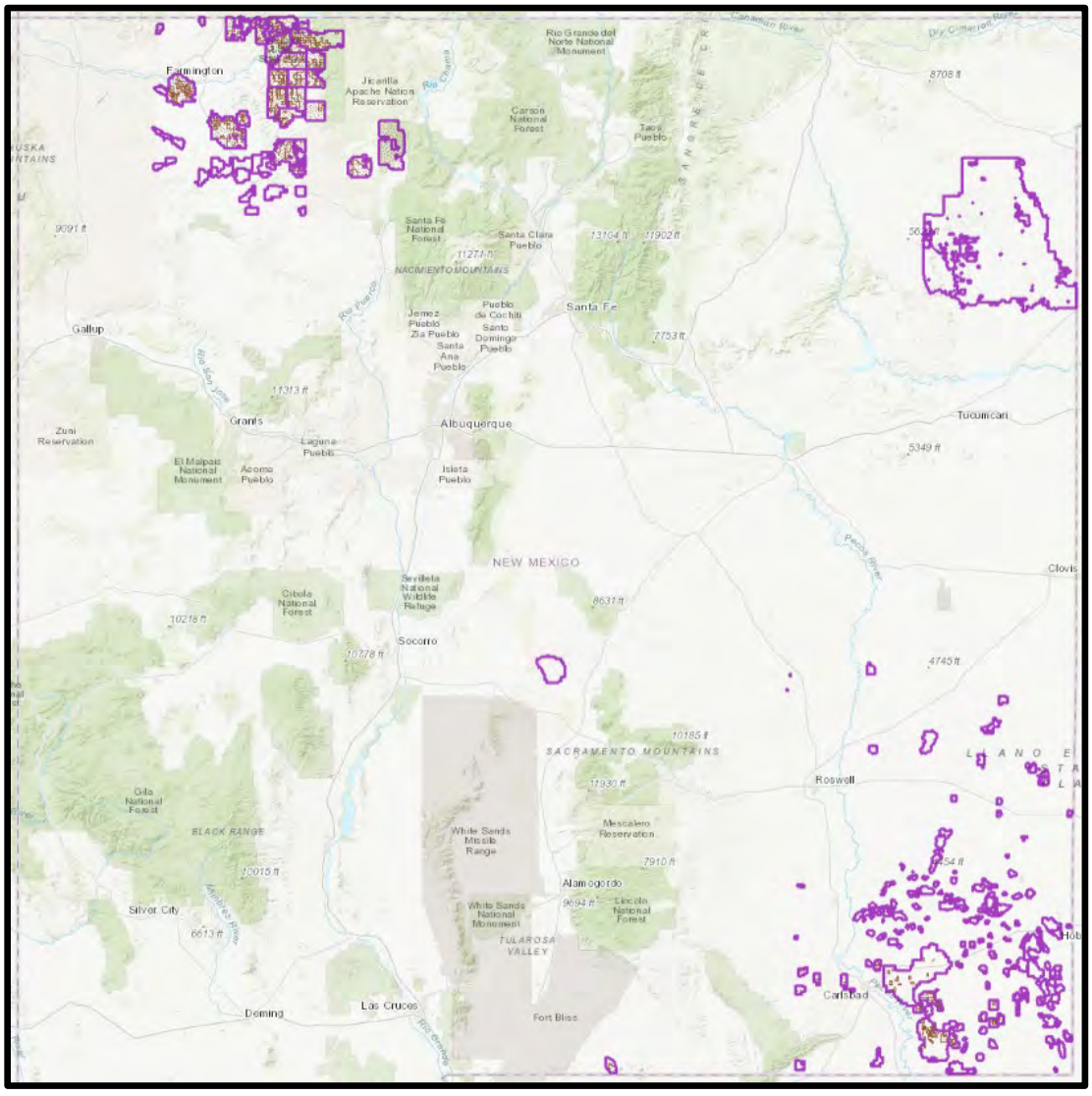

Figure 1. Map of Boundary Areas (Source: New Mexico State Land Office)

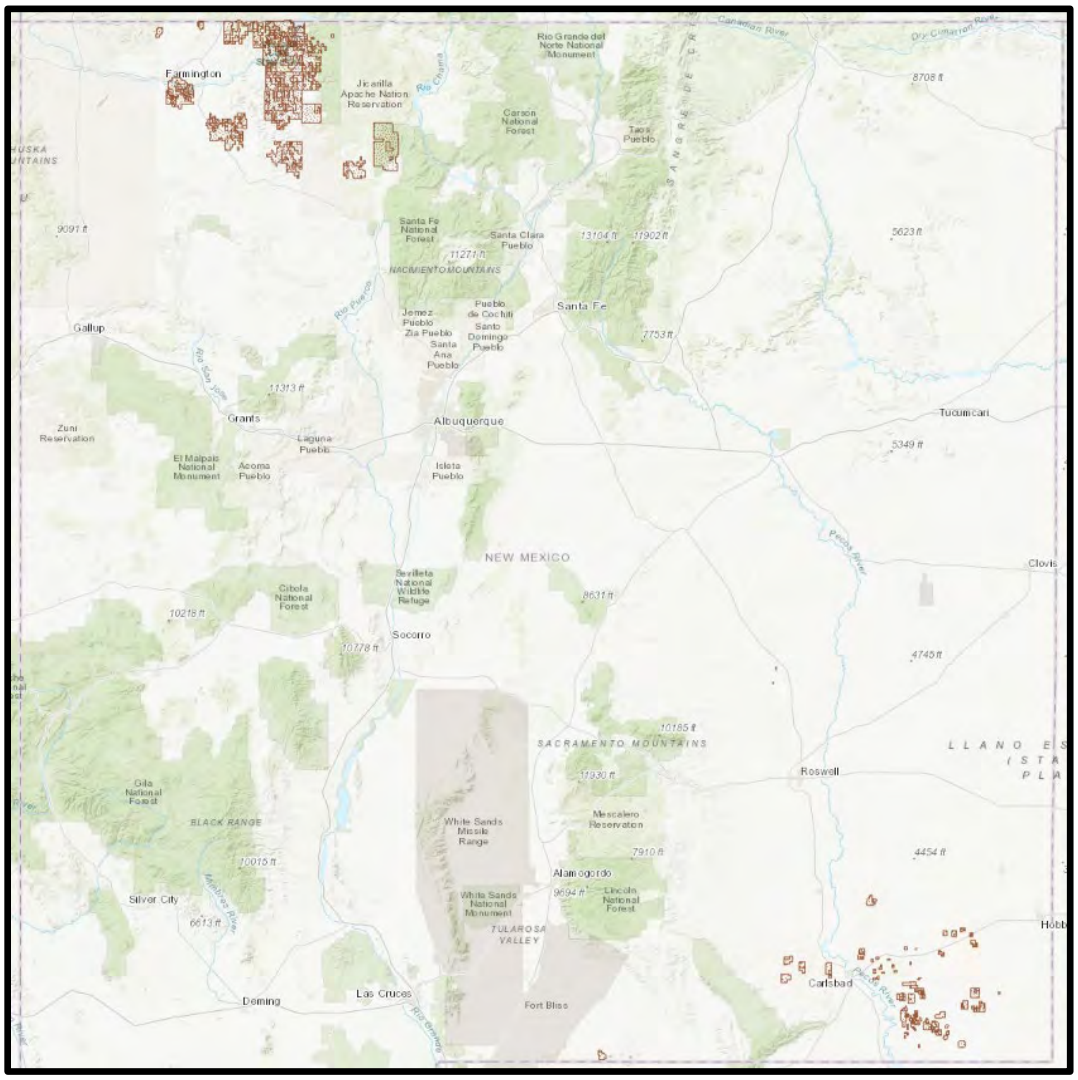

Figure 2. Map of Participating Areas (Source: New Mexico State Land Office)

A review of state-owned assets indicates that there are three primary types of oil and gas-related activities associated with SLO lands:

- Oil and gas well leases
- Oil and gas pipeline rights-of-way (ROW)
- Oil and gas-related commercial leases

1.1 Oil and Gas Well Leases

A review of asset inventory from data provided indicates that there is a total of 14,061 wells located on SLO lands. Of this total, 14,051 will require plugging, abandonment and reclamation activity; the remainder are classified as "Abandoned" and "Never Drilled". Table 1 presents a breakdown of well status.

For comparison purposes, a secondary review was completed to include all wells in the State, on state land or otherwise. A review of asset inventory from data obtained from the New Mexico Oil Conservation Division (OCD) as of July 23, 2020, indicates that there is a total of 123,223 wells located across the State. Of this total, 66,128 wells will require plugging, abandonment and reclamation activity; the remainder are classified as "Cancelled", "Never Drilled" and "Plugged (site released)". Table 2 presents a breakdown of the status of all wells within New Mexico.

Table 1. Status Breakdown of Wells on State Lands

Well Status	Well Count	Required to be Plugged and Abandoned?
Abandoned	1	No
Active	12,480	Yes
Dry Hole	1	Yes
Never Drilled	9	No
New	1,211	Yes
Shut In	10	Yes
Temporary Abandonment	276	Yes
Temporary Abandonment (Expired)	71	Yes
Zone Plugged (Permanent)	1	Yes
Zone Plugged (Temporary)	1	Yes
Total	**14,050 wells**	

Table 2. Status Breakdown of All Wells in New Mexico (includes wells on State Lands)

Well Status	Well Count	Required to be Plugged & Abandoned?
Active	57,431	Yes
Cancelled	13,664	No
Dry Hole	11	Yes
Never Drilled	22	No
New	6,290	Yes
Plugged (Not Released)[1]	1,202	Yes
Plugged (Site Released)[2]	43,409	No
Shut In	128	Yes
Temporary Abandonment	751	Yes
Temporary Abandonment (Expired)	272	Yes
Zone Plugged (Permanent)	28	Yes
Zone Plugged (Temporary)	14	Yes
Observation	1	Yes
Total	**64,915 wells**	

[1] Wells have had some downhole plugging work completed but have yet to be cut and capped

[2] Wells have been plugged, cut and capped, and sites reclaimed

1.2 Pipeline Rights-of-Way

Pipeline inventory for the entire state of New Mexico was obtained utilizing data from S&P Global Platts, 2020. The pipeline inventory data was used in conjunction with geographical information system (GIS) data for SLO lands to

approximate the total length of pipeline located on SLO-managed lands, or roughly 15% of the pipelines in the state. A similar analysis was completed for all pipelines within the state, whether SLO managed or not, for a total calculation of approximately 16,087 miles of pipeline within the state of New Mexico.

1.3 Oil and Gas-Related Commercial Leases

A final component of oil and gas-related activities occurring on SLO-managed lands is broadly defined as oil and gas commercial leases. This designation covers a wide range of activities that can be tied to oil and gas production but, in some instances, may include midstream or final processing facilities. While detailed information and inventory data for this subsection of oil and gas-related activity is not currently available to the public, a thorough evaluation of the potential SLO liabilities arising from oil and natural gas activities would not be complete with discussing this commercial lease aspect.

1.4 Total Liability Assessment

The total liability assessment for New Mexico SLO related to oil and gas interests on SLO lands is a summation of the estimated liabilities for each type of activity occurring on those lands.

The total liability assessment for all oil and gas activities includes estimated costs for:

- Downhole Abandonment
- Wellpad Surface Facility Decommissioning
- Pipeline Decommissioning
- Commercial Lease Surface Facility Decommissioning
- Surface Reclamation

2.0 Downhole Abandonment – Basis of Estimate

2.1 Scope

Per the OCD, plugging and abandonment of wells is regulated by 19.15.25 of the New Mexico Administrative Code (NMAC). Section 10A states:

- Before an operator abandons a well, the operator shall plug the well in a manner that permanently confines all oil, gas and water in the separate strata in which they are originally found. The operator may accomplish this by using mud-laden fluid, cement and plugs singly or in combination as approved by the division on the notice of intention to plug

Conditions for Plugging and Abandonment according to the OCD – Southern District (Appendix A) have been developed to ensure the above Regulation is maintained. This document defines the following downhole conditions to be met:

- A cement evaluation tool is required to ensure isolation of producing formations, protection of water and correlative rights. A cement bond log or other accepted cement evaluation tool is to be provided to the division for evaluation if one has not been previously run or if the well did not have cement circulated to surface during

the original casing cementing job or subsequent cementing jobs

- Mud laden fluids must be placed between all cement plugs mixed at 25 sacks per 100 bbls of water
- All cement plugs will be a minimum 100 ft in length or a minimum of 25 sacks of cement, whichever is greater
- Class 'C' cement will be used above 7,500 ft; Class 'H' cement will be used below 7,500 ft
- A cement plug is required to be set 50 ft above and 50 ft below:
    - Casing stubs
    - DV tools
    - Attempted casing cut offs
    - Cement tops outside casing
    - Salt sections
    - Anywhere the casing is perforated
- All casing shoes will be perforated 50 ft below shoe depth and attempted to be squeezed; cement needs to be 50 ft above and 50 ft below casing shoe inside the production casing
- A Cast Iron Bridge Plug (CIBP) is to be set within 100 ft of production perforations and capped with 100' of cement (35 ft of cement may be used if set with a bailer within 100 ft of the top perforation)
- No more than 3,000 ft is allowed between cement plugs in cased hole and 2,000 ft in open hole
- Formations to be isolated with cement plugs are:
    - Fusselman
    - Devonian
    - Morrow
    - Wolfcamp
    - Bone Springs
    - Delaware
    - Any salt sections
    - Abo
    - Glorieta
    - Yates
    - Potash (in the R-111-P Potash Mine Area) – a salt saturated cement plug must be set across the section, solid from 50 ft below formation bottom to 50ft above formation top

  If cement does not exist behind casing at these formation depths, perforations will be shot and cement squeezed behind the casing. These plugs will be set 50 ft below formation bottom to 50 ft above formation top inside the casing

It is the intent of this evaluation to present a realistic range of cost values to be expected for downhole plugging and abandonment of the wells in the State. A range is provided to allow for reasonable assumptions to be made on a smaller scale that is representative of the larger magnitude of wells.

All wells were grouped according to the following criteria:

- District
- Fluid (oil, gas, saltwater disposal)
- Profile (vertical/directional, horizontal)

- Depth (shallower than 5,000 ft; 5,000 ft to 10,000 ft; deeper than 10,000 ft)

Wells were randomly selected from each grouping and the well files from the OCD web database were reviewed to determine the following information, and to assign the groupings into an estimate category per Table 1.

- Well type (flowing, pumping, injection)
- Completion type (cased and perforated, open hole)
- Number of producing zones / pools
- Casing profiles (surface, intermediate, production, liners)
- Record of Cement Bond Logs
- Cement Tops

Table 3. Well Abandonment Cost Estimate Categories

Estimate Name	Well Total Measured	Downhole Equipment	Producing Pools
ST1	<5,000 ft	Tubing	1 zone
ST2	<5,000 ft	Tubing	2 zones
MT1	5,000ft – 10,000ft	Tubing	1 zone
MT2	5,000ft – 10,000ft	Tubing	2 zones
DT1	>10,000 ft	Tubing	1 zone
DT2	>10,000 ft	Tubing	2 zones
SR1	<5,000 ft	Pump and Rods	1 zone
SR2	<5,000 ft	Pump and Rods	2 zones
MR1	5,000ft – 10,000ft	Tubing	1 zone
MR2	5,000ft – 10,000ft	Tubing	2 zones
DR1	>10,000 ft	Pump and Rods	1 zone
DR2	>10,000 ft	Pump and Rods	2 zones
E	All depths	Empty wellbore	Dry hole / plugged well

Each grouping was then assigned abandonment requirements, per downhole well abandonment activities consisting of:

- Removal of all downhole equipment including, but not limited to:
  - Pump and rods
  - Tubing
  - Packers
- If a cement evaluation is not available in the well file or cement was not circulated to surface during the original casing cementing job or subsequent cementing jobs, run a Cement Bond Log (does not apply to all wells)
- Set a CIBP within 100 ft of perforations and dump bail 35 ft of cement on the plug. Repeat for each producing zone, ensuring no more than 3,000 ft between plugs
- If an intermediate string is installed, perforate 50 ft below shoe depth. Run a Cast Iron Cement Retainer (CICR), set within 50 ft of perforations and squeeze (does not apply to all wells)
- If a low cement top is known and/or calculated and/or cement does not exist behind casing at the above noted formations, perforate 50 ft below the flagged formation bottom. Run a CICR, set within 50 ft of perforations

and squeeze. Perforate 50 ft above the formation top. Run a CICR, set within 50 ft of the perforations and squeeze. Repeat for each exposed formation (does not apply to all wells)

- Perforate 50 ft below surface casing shoe depth. Run a CICR, set within 50 ft of perforations and squeeze
- Excavate the wellhead area to cut the casing 3 ft below ground level. Install and weld on casing cap with information marker plate
- If a well was recorded as previously plugged or dry hole, it was assumed that no downhole equipment requiring removal was in place and the well had been appropriately plugged per the abandonment requirements set above. These wells were designated Empty (cost estimate type E) and require only wellhead cut and cap procedures

2.1.1 Wells on State Lands

A map of the wells on state lands in New Mexico according to District is presented on Figure 3.

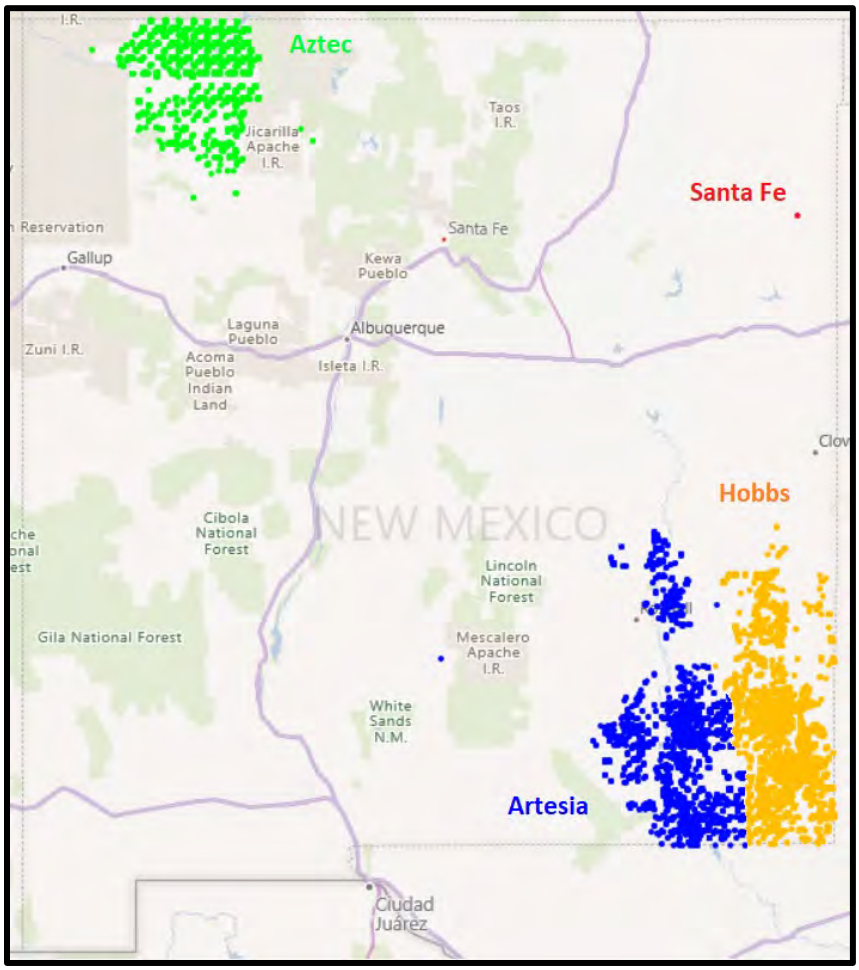

Figure 3. Map of Wells on State Lands by District (Source: Cartofact, August 2020)

Of the 14,061 wells located on State Lands, 14,051 wells will require plugging, abandonment and reclamation activity. Of this total, 1,300 wells do not have a public record of a final measured well depth. If an actual drill depth was not

available in the data pull, the Well Target Depth (as assigned by the operator) was used in order to assign each well a category. For the 148 wells that did not have record of a Well Target Depth, the category was assumed based on offset well information. A summary of the well grouping per the scope requirements in Section 2.1 and well file inspection results is included in Appendix B**.**

2.1.2 All Wells in New Mexico

The extended scope includes all wells in New Mexico; the wells requiring abandonment activities are mapped according to District on Figure 4.

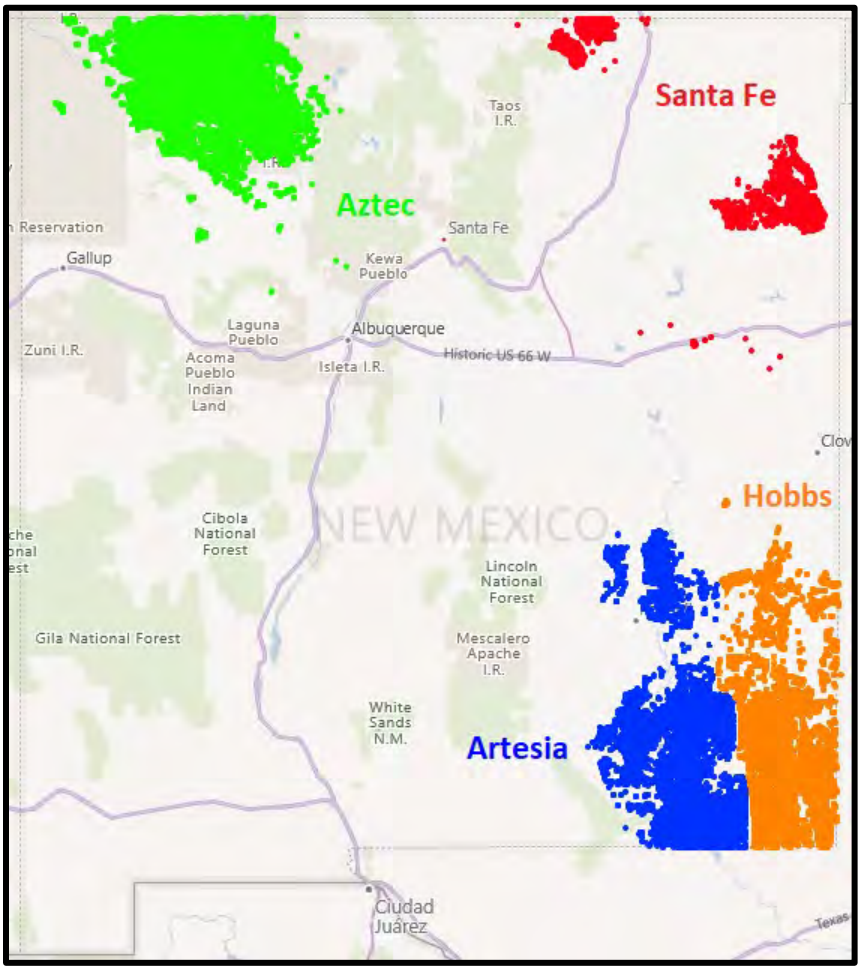

Figure 4. Map of All Wells in New Mexico by District (Source: Cartofact, September 2020)

Of the 123,223 total wells located across the State, 64,915 wells will require plugging, abandonment and reclamation activity. Over 7,300 of these wells do not have public record of a final measured well depth; therefore, the assumption was made to use the Well Target Depth to assign each well a category. For the approximately 1,300 wells that did not have a Well Target Depth, the category was assumed based on offset well information. A summary of the well grouping per the scope requirements in Section 2.1 and well file inspection results is included in Appendix B.

2.2 Cost Estimate Details

Abandonment activities were determined for each category in Table 3 per scope requirements in Section 2.1. Cost estimates were generated according to the standard abandonment activities required for each well type that would apply to all wells in the category. Activities and time required were determined based on Vertex abandonment experience across North America. Rates local to the state of New Mexico were included in the estimates, according to the actual invoices received from the SLO for recent abandonment activities (see additional details in Section 2.3).

Table 4. Standard Well Abandonment Activities and Cost

	Abandonment Activities (number of days)						
Estimate Name	**MIRU, hot-wash rods and pull BHP**	**Pull tubing, bit and scraper**	**Set plug to isolate perfs**	**Balance cement plug**	**Perf shoes, run retainer, cement squeeze**	**Total Days**	**Total Cost**
ST1		1.0	0.5	0.5	1.0	3.0	$50,400
ST2		1.0	1.0	0.5	1.0	3.5	$59,900
MT1		1.0	0.5	1.0	1.0	3.5	$57,000
MT2		1.0	1.0	1.0	1.0	4.0	$66,500
DT1		1.5	0.5	1.0	1.5	4.5	$70,400
DT2		1.5	1.0	1.0	1.5	5.0	$79,800
SR1	1.0	1.0	0.5	0.5	1.0	4.0	$64,300
SR2	1.0	1.0	1.0	0.5	1.0	4.5	$73,800
MR1	1.0	1.0	0.5	1.0	1.0	4.5	$71,000
MR2	1.0	1.0	1.0	1.0	1.0	5.0	$82,000
DR1	1.0	1.5	0.5	1.0	1.5	5.5	$84,300
DR2	1.0	1.5	1.0	1.0	1.5	6.0	$93,800

A portion of the wells in each category will require additional activities per the regulatory standards.

- If a Cement Bond Log (CBL) does not exist in State records, a log must be conducted
- If an intermediate casing string is installed, the casing shoe must be perforated and squeezed
- If the cement top is low and a flagged zone (per Section 3.1) is not isolated, the casing must be perforated and squeezed

Table 5. Additional Well Abandonment Activities and Cost

Abandonment Activity	Total Days	Total Cost
Run CBL	0.5	$8,500
Intermediate shoe: perf, run retainer, cement squeeze	1.0	$18,500
Low cement top: perf, run retainer, cement squeeze	1.5	$30,200

The portion of wells in each grouping requiring additional activities per the regulatory standards was estimated based on a review of randomly selected well files. These percentages are assumed to be relative to the investigation sampling but could change with additional study. To account for potential discrepancies in the assumptions made regarding the

areas with higher well counts, variances are presented.

- Cement Bond Logs:
  - Based on the limited number of logs found in the public database, the number of wells requiring a cement evaluation to be completed is estimated. This value could be reduced should existing evaluations be presented, so this count is adjusted down for the lower boundary of the estimate range
- Low Cement Top:
  - If a Cement Bond Log was not available, the cement top was calculated for the sampling of wells investigated; however, results are dependent on the limited information provided in the drilling reports. The remedial cement work required to protect the flagged zones noted in Section 3.1 could be much higher, so this count is adjusted up for the higher boundary of the estimate range

2.2.1 Wells on State Lands

Based on the well count, a summary of the total costs for the standard abandonment activities is presented in Table 6.

Table 6. Standard Well Abandonment Cost Summary for Wells on State Lands

Estimate Name	Well Count	Cost Estimate	Cost Total
ST1	697	$50,400	$35,129,000
ST2	404	$59,900	$24,200,000
MT1	736	$57,000	$41,952,000
MT2	676	$66,500	$44,954,000
DT1	1,659	$70,400	$116,794,000
DT2	1,179	$79,800	$94,084,000
SR1	3,554	$64,300	$228,522,000
SR2	234	$73,800	$17,269,000
MR1	1,348	$71,000	$95,708,000
MR2	1,452	$82,000	$119,064,000
DR1	978	$84,300	$82,445,000
DR2	1,133	$93,800	$106,275,000
Total	**14,050**		**$1,006,426,000**

The portion of wells in each grouping requiring additional activities per the regulatory standards was estimated based on a review of selected well files and an estimated adjusted value to account for discrepancies due to the sample size.

Table 7. Additional Well Abandonment Cost Summary for Wells on State Lands

Estimate Name	Well Count		Cost Estimate	Cost Total	
	Expected	Adjusted		Expected	Adjusted
CBL	11,857	5,876	$8,500	$100,785,000	$49,946,000
Intermediate shoe	8,246	-	$18,500	$152,551,000	-
Low cement top	3,508	9,161	$30,200	$105,942,000	$276,662,000

2.2.2 All Wells In New Mexico

Based on the well count, a summary of the total costs for the standard abandonment activities is presented in Table 8.

Table 8. Standard Well Abandonment Cost Summary for All Wells in New Mexico

Estimate Name	Well Count	Cost Estimate	Cost Total
ST1	10,283	$50,400	$518,263,000
ST2	3,688	$59,900	$220,911,000
MT1	7,703	$57,000	$439,071,000
MT2	6,799	$66,500	$452,134,000
DT1	4,229	$70,400	$297,755,000
DT2	4,773	$79,800	$380,885,000
SR1	10,633	$64,300	$683,702,000
SR2	660	$73,800	$48,708,000
MR1	4,694	$71,000	$333,274,000
MR2	5,126	$82,000	$420,332,000
DR1	3,830	$84,300	$322,869,000
DR2	2,468	$93,800	$231,498,000
E[1]	29		$0
Total	**66,128**		**$4,349,369,000**

[3] Cost for cut and cap are capture in surface decommissioning estimates.

The portion of wells in each group requiring additional activities per the regulatory standards was estimated based on a review of selected well files and an estimated adjusted value to account for discrepancies due to the sample size.

Table 9. Additional Well Abandonment Cost Summary for All Wells in New Mexico

Estimate Name	Well Count		Cost Estimate	Cost Total	
	Expected	Adjusted		Expected	Adjusted
CBL	52,052	25,848	$8,500	$442,442,000	$219,708,000
Intermediate shoe	29,861	-	$18,500	$552,429,000	
Low cement top	18,188	39,595	$30,200	$549,278,000	$1,195,769,000

2.3 Offsetting and Historical Abandonment Cost Consideration

Consideration was given to historical spending on abandonment by reviewing a publication by the Railroad Commission of Texas (RRC) regarding plugging costs prior to 2020. These costs are calculated by the RRC or its delegate for each foot of well depth plugged based on average actual plugging costs for wells plugged by the RRC for the preceding State fiscal year based on the Commission Oil and Gas Division district in which the inactive well is located. Per the map of Texas in Figure 5, District 8 and 8A are representative of wells in the Permian Basin. These costs can be considered comparable to plugging costs for wells in Southeast New Mexico, within the Hobbs and Artesia fields.

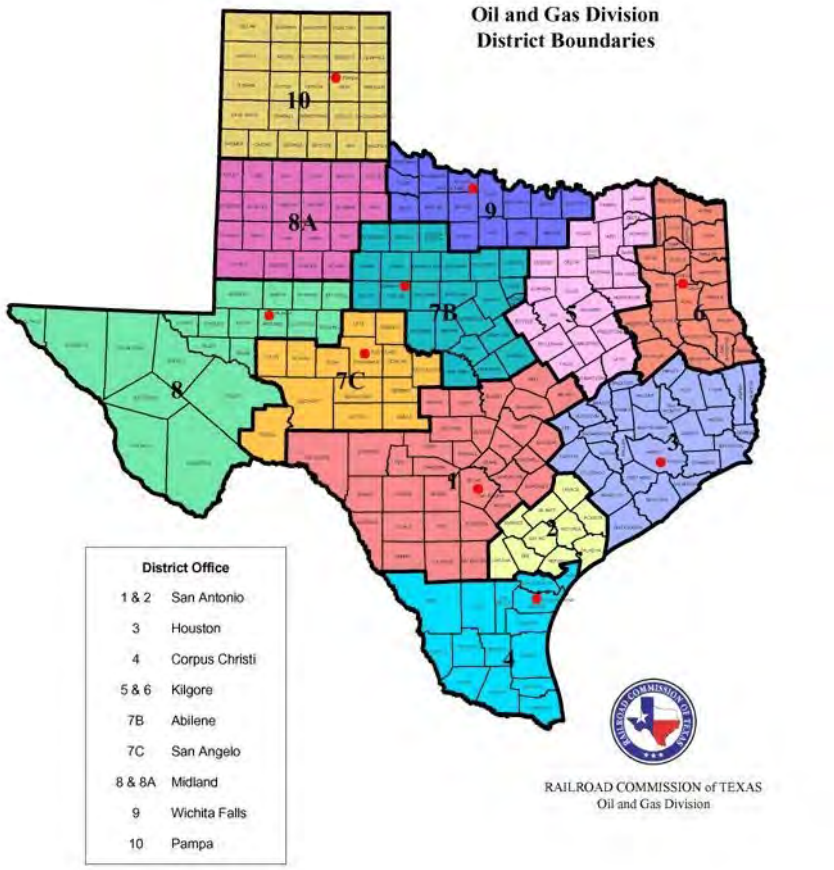

Figure 5. Map of Texas Railroad Commission Oil and Gas Division District Boundaries (Source: Texas RRC)

The calculated per foot costs in Fiscal Year 2019 were $10.29 and $10.62 for Texas RRC Districtss 8 and 8A, respectively, averaging $10.46 per foot. This value likely is not as applicable to New Mexico's Northwest operations as the San Juan Basin wells are typically shallower and will, on average, cost less to abandon. However, for the purposes of this study, the rate will be used across the State.

Actual cost records for recent abandonments in New Mexico were reviewed for six wells in the Artesia district[4]. The relevance of these limited cost summaries may be minimal considering the scope of this project, but as most operators and service providers in the state are hesitant to provide access to their historical cost records, the expenditures will be documented. Note that all six wells were vertical. The well files for these abandonments were reviewed to determine potential problems encountered during plugging operations.

[4] N. Khalsa (personal communication re: J&B Well Service for Reclamation Fund well plugging for Artesia Metex Unit, September 18, 2020)

Table 10. State of New Mexico Abandonment Well Cost Actuals

Well Name	Spud Year	Depth	Total Cost	Cost per foot	Comments
30-015-00956	1951	2,014 ft	$26,975	$13.39	No wellhead, casing broke off, parted tubing had to be fished from wellbore
30-015-00986	1955	1,939 ft	$26,004	$13.41	Pump and rods in wellbore, no issues
30-015-00990	1952	2,025 ft	$23,945	$11.82	Pump and rods in wellbore, well on vacuum issues during cementing
30-015-00991	1952	2,020 ft	$23,513	$11.64	Parted tubing had to be fished from wellbore
30-015-27192	1992	2,180 ft	$20,596	$9.45	Pump and rods in wellbore, no issues
30-015-27196	1992	2,200 ft	$19,590	$8.90	Pump and rods in wellbore, no issues
Average Well Abandonment Cost Per Foot Based on Actuals				**$11.44/ft**	

Review of the cost per foot to plug and abandon these wells indicates that the older wells (pre-1980) cost approximately 25% more to plug. This can be expected due to possible casing integrity issues in older wells, potential gas migration issues due to poor cement isolation, and often unexpected wellbore schematics due to a poor record history or a situation where a well has been left unsecured for a long period. Approximately 40% of the total wells to be abandoned in New Mexico were drilled prior to 1980. An incremental cost has not been applied to this scope as the individual cost estimates include a 5% contingency, regardless of well age.

2.4 Liability Summary

The total costs estimated to plug and abandon the wells in the inventory are summarized below.

Table 11. Overall Well Abandonment Cost Comparison: Wells on State Lands

Description	Cost Total, $MM
High Range Cost Estimate	**$1,536**
Standard Well Abandonment Costs	$1,006
Cement Bond Log Costs (high end)	$101
Intermediate Shoe Isolation	$153
Remedial Work to Isolate Formations due to Low Cement Top (high end)	$277
Low Range Cost Estimate	**$1,315**
Standard Well Abandonment Costs	$1,006
Cement Bond Log Costs (low end)	$50
Intermediate Shoe Isolation	$153
Remedial Work to Isolate Formations due to Low Cement Top (low end)	$106
Cost Estimate based on Recent SLO Plugging Actuals[5]	**$1,352**
Texas RRC Plugging Cost Estimate (Historical) [5]	**$1,233**

[5] This value is based on the summary of an average rate multiplied by the measured depth of each well. A number of wells do not have measured depths recorded; therefore, this value will be conservative.

Table 12. Overall Well Abandonment Cost Comparison: All Wells in New Mexico

Description	Cost Total, $MM	Cost per foot, $ / ft
High Range Cost Estimate	**$6,540**	**$13.48**
Standard Well Abandonment Costs	$4,349	
Cement Bond Log Costs (high end)	$442	
Intermediate Shoe Isolation	$552	
Remedial Work to Isolate Formations due to Low Cement Top (high end)	$1,196	
Low Range Cost Estimate	**$5,671**	**$11.69**
Standard Well Abandonment Costs	$4,349	
Cement Bond Log Costs (low end)	$220	
Intermediate Shoe Isolation	$552	
Remedial Work to Isolate Formations due to Low Cement Top (low end)	$549	
Cost Estimate based on Recent SLO Plugging Actuals [5]	**$5,549**	**$11.44**
Texas RRC Plugging Cost Estimate (Historical) [5]	**$5,074**	**$10.46**

[5] This value is based on the summary of an average rate multiplied by the measured depth of each well. A number of wells do not have measured depths recorded; therefore, this value will be conservative.

2.5 Assumptions

For the purposes of this assessment the following assumptions have been made:

- Well Categorization Review
  - Wells were initially grouped according to County, fluid, profile and total measured depth. Random selections were made through the lists to further identify abandonment requirements, but not all the wells were reviewed within in grouping. Additional review is recommended to confirm assumptions made on downhole equipment and casing profiles
  - If an actual drill depth was not available in the data pull, the assumption was made to use the Well Target Depth (as assigned by the operator) to assign each well a category. For the wells that did not have record of a Well Target Depth, the category was assumed based on offset well information
- Producing Perforations
  - The isolation of each producing pool is assumed to be accomplished by setting a single CIBP at the top of the perforations. If multiple sets of perforations within a wellbore in the same pool are encountered over ranges larger than 2,000 ft, multiple plugs must be set, which will increase the cost estimates
- Low Cement Top
  - The regulations found for the Southern District do not represent formations in the Northern District that require isolation. As such, if a cement top is known to be low for wells in the San Juan Basin (per calculation or available CBL), it will be assumed that similar remedial work will be required as in the Southern District (i.e, perforate production casing, run a CICR, set within 50 ft of perforations and squeeze to achieve isolation)
  - If a Cement Bond Log was not available, the cement top was calculated for the sampling of wells investigated; however, results are dependent on the limited information provided in the drilling reports. The remedial cement work that would be required to protect the flagged zones noted in

Section 3.1 could be much higher

- Cement Bond Logs:
  - Based on the limited number of logs found in the public database, the count of wells assumed to require a cement evaluation to be completed could be reduced should existing evaluations be presented
- Access
  - All sites are accessible by workover rigs and auxiliary equipment. No costs are estimated for access remediation
- Orphan Wells
  - Orphan wells refer to well sites that have been permanently taken out of production that do not have any party legally or financially responsible to deal with decommissioning and reclamation obligations
  - Currently, New Mexico has 708 known orphaned wells [6]

2.6 Data Sources and Limitations

Data used to determine well counts were obtained from state regulatory and lease data. The grouping criteria used to divide wells into categories were based on a limited review of well file data available on publicly accessible New Mexico Oil and Gas websites. Per well type costs were generated according to the standard abandonment activities required for each well type that would apply to all wells in the category. Some limited well cost information was available from recently plugged and abandoned wells in New Mexico, as well as information provided by the RRC outlining historical costs in parts of that state. The majority of well costs were developed from historical and/or typical estimates for similar types of work completed in Canada and North Dakota, with respect to budgeting for duration to complete and equipment/services required. Hourly rate quotes from various service providers in the state of New Mexico, as well as typicals seen in other regions for similar work, were applied to the duration and equipment/services estimates to develop locally applicable costs.

Some data gaps that were encountered when developing this liability assessment include: limited information on specific abandonment requirements and, when average abandonment costs were available, those sources did not include what regulations were applied to those abandonments. Standardized regulatory requirements for well abandonment, applicable across the state, would streamline efforts at liability assessments by reducing the variables that can be involved in the well abandonment process. During the well file review that was used to extrapolate well data across the types of wells, missing depth data and other well data resulted in assumptions made based on offsets rather than actual depths. The depth of a well directly affects abandonment costs so the lack of clear data can greatly affect liability assessments.

Additionally, a lack of cement evaluation logs in the well files could be the result of incomplete information upload to the public database, or it could be an indicator that cement evaluation logs have not been run in large numbers of wells. The availability of cement evaluation log data can reduce abandonment costs significantly.

[6] Adrienne Sandoval, June 2020.

3.0 Wellpad Surface Facility Decommissioning – Basis of Estimate

3.1 Scope

Surface facility decommissioning on wellpads consists of:

- Removal of all surface facilities including, but not limited to
  - Pumps and pump jacks
  - Process buildings
  - Compressors
  - Storage tanks and containment
  - Chemical tanks
  - Wellhead shacks and temporary fencing and barricades
- Disconnection and removal of wellhead
- Cutting and capping of the well below grade
- Disconnection and isolation of flowlines from surface infrastructure
- Removal of foundations including, but not limited to:
  - Concrete pads
  - Driven or screw piles (cut off below grade or removed)
- Equipment will be transported to a central location for storage or disposal
  - Costs for disposal of equipment (except scrap steel) are not included
  - Recovery of costs from sale of equipment is not included

Wellpad surface facility decommissioning does not include the following items, these are included in Section 6.0 as part of Surface Reclamation:

- Removal of wellsite or facility fencing
- Removal of roads and pads
- Environmental testing and assessment
- Reclamation of land to pre-oil and gas use

3.2 Cost Estimate Details

The cost estimate consists of a unit rate cost on a per well basis for:

- Oil Well – Flowing
  - With Flowline: $13,363/site
- Oil Well – Pumping
  - With Storage: $27,523/site
  - With Flowline: $20,319/site
- Gas Well – Flowing
  - With Storage: $12,157/site
  - With Flowline: $5,500/site

- Gas Well – Pumping
  - With Storage: $12,769/site
  - With Flowline: $6,418/site
- Disposal Wells
  - All: $3,226/site

These rates have been applied to an estimated quantity, discussed in Section 3.3, for each well type to develop the overall estimate for wellpad surface facility decommissioning. For gas sites, additional cost estimates were developed for sites with and without process equipment (i.e., separators) and the pricing presented reflects the average of the two costs for each scenario. It is assumed that there is no additional process equipment for the oil well sites.

Table 13. Cost Estimate for Surface Facility Decommissioning: Wells on State Lands

Well Type	Total Count	With Storage				With Flowline				Total Cost
		%	Count	$ / Site	SubTotal	%	Count	$ / Site	SubTotal	
Oil - Flowing	1,874					100%	1,874	$13,363	$25,043,012	$25,043,012
Oil - Pumping	8,088	50%	4,044	$27,523	$111,304,629	50%	4,044	$20,319	$82,171,653	$193,476,282
Gas - Flowing	3,166	10%	317	$12,157	$3,848,906	90%	2,849	$5,500	$15,672,441	$19,521,347
Gas - Pumping	605	50%	303	$12,769	$3,862,471	50%	303	$6,418	$1,941,297	$5,803,768
Disposal	317					100%	317	$3,226	$1,022,648	$1,022,648
Total Estimated Cost										**$244,867,057**

Table 14. Cost Estimate for Surface Facility Decommissioning: All Wells in New Mexico

Well Type	Total Count[6]	With Storage				With Flowline				Total Cost
		%	Count	$ / Site	SubTotal	%	Count	$ / Site	SubTotal	
Oil - Flowing	5,292					100%	5,292	$13,363	$70,719,113	$70,719,113
Oil - Pumping	26,352	50%	13,176	$27,523	$362,648,318	50%	13,176	$20,319	$267,728,414	$630,376,733
Gas - Flowing	28,050	10%	2,805	$12,157	$34,100,385	90%	25,245	$5,500	$138,854,064	$172,954,449
Gas – Pumping	1,052	50%	526	$12,769	$6,716,231	50%	526	$6,418	$3,375,610	$10,091,841
Disposal	4,155					100%	4,155	$3,226	$13,404,113	$13,404,113
Total Estimated Cost										**$897,546,249**

[6] Total count does not include those wells classified as "Empty" during Well Categorization Activities.

3.3 Assumptions

For the purposes of this assessment the following assumptions have been made:

- All costs should be considered Class 5 (+50/-30%)
- All counts (oil, gas and disposal, flowing vs pumping) are based on the same representative sample used for

the Downhole Abandonment Well Categorization

- Oil Wells
  - All flowing wells have direct connections to flowlines and are not utilizing breakout tankage for storage
  - 50% of pumping wells have on-site storage with the remaining pumping directly to flowlines
- Gas Wells
  - 10% of flowing wells and 50% of pumping wells have on-site storage, with the remaining wells pumping/flowing directly to flowlines
  - 50% of wells have additional process equipment (dehy towers, compressors, chemical injection, etc.)
- Disposal Wells
  - All have flowline connections
- Wells classified as Empty have not been included in surface decommissioning account as it is assumed that no surface improvements were made for these locations
- Storage consists of one (1) 400 bbl tank in containment
- Flowline includes a single riser connection with no pigging facilities
- Wells will be cut and capped below grade
- Pipeline risers will be cut and capped below grade
- Piles will be removed or cut and capped below grade
- Internal water jet cutters will be used where possible to avoid need for excavation
- Excavations will be backfilled with excavated material where possible
- All equipment will be staged at a central location to reduce shipping costs during decommissioning activities
- No costs are included for third-party equipment removal, electrical disconnect or power pole removal along with any associated legal or administrative charges

3.4 Data Sources and Limitations

The initial well sample assessments and totals used in developing abandonment costs in Section 2.0 were used in the facility decommissioning cost assessment. Any data gaps pertaining to the well abandonment work would have transferred to this portion of the liability assessment, such as a lack of, or incomplete, standardized regulatory requirements for site decommissioning, applicable across the state, which would streamline efforts at liability assessments by reducing the variables that can be involved in the well abandonment and site decommissioning process.

A shortage of information regarding wellsite surface equipment and utilization of flowline connections versus tankage resulted in multiple and significant assumptions about the numbers of sites with flowline connections and those with tankage on-site.

4.0 Pipeline – Basis of Estimate

4.1 Scope

Pipeline abandonment consists of:

- Cleaning/Purging all hydrocarbons from the line with air or other inert fluid
- Removal and disposal of fluids

- Cutting and capping the ends of the flowlines below grade
    - All attempts should be made to the abandon an entire system and not leave dead legs on operating lines
- Removal of all surface piping and risers where applicable
- Disconnection of any cathodic protect systems that may be in place

Pipeline abandonment typically does not include the following items as this is generally considered cost prohibitive:

- Physical removal of buried pipe
- Physical remove of cathodic protection infrastructure (i.e., anode beds)

For the purposes of this assessment, a secondary cost will be presented in the next section for the physical removal of pipelines based on average metrics.

4.2 Cost Estimate Details – Typical Decommissioning

The cost estimate consists of a unit rate cost on a per mile basis for:

- Buried Pipe – Less than 8" diameter: $5,430/mile
- Buried Pipe – 10" to 16" diameter: $10,010/mile
- Buried Pipe – 18" to 24" diameter: $16,275/mile
- Buried Pipe – Over 24" diameter: $37,455/mile
- Surface Pipe – Less than 8" diameter: $6,455 /mile
- Surface Pipe – 10" to 16" diameter: $11,935/mile
- Surface Pipe – 18" to 24" diameter: $19,725/mile
- Surface Pipe – Over 24" diameter: $32,055/mile

Pipeline inventory for the entire state of New Mexico was obtained utilizing data from S&P Global Platts, 2020. Of this total inventory, roughly 15% of the pipelines are located on lands managed by the SLO.

The following table presents the inventory quantity broken down by pipeline diameter. This inventory was then utilized to determine the total program cost.

Table 15. Inventory of Pipelines: Pipelines on State Lands

Diameter (")	Measured from Database		Calculated	Total
	Length (miles)	% of Known	Length (miles)	Length (miles)
Under 8	253	30%	435	688
10 through 16	205	24%	353	559
18 through 24	242	28%	417	659
Over 24	151	18%	260	411
Total	**852**		**1,465**	**2,317**

Table 16. Inventory of Pipelines: All Pipelines in New Mexico

Diameter (")	Measured from Database		Calculated	Total
	Length (miles)	% of Known	Length (miles)	Length (miles)
Under 8	2,731	25%	1,354	4,085
10 through 16	3,135	29%	1,554	4,689
18 through 24	1,725	16%	855	2,581
Over 24	3,164	29%	1,569	4,733
Total	**10,755**		**5,332**	**16,087**

These rates have been applied to an estimated quantity, discussed in Section 4.3, for each line type to develop the overall estimate for the pipeline abandonment portion of this assessment.

Table 17. Cost Estimate for Typical Decom of Pipelines: Pipelines on State Lands

Diameter (")	Location	% of total	Length (mile)	$ / Mile	Sub Total
Under 8	Buried	50%	918	$5,430	$4,983,750
10 through 16		50%	746	$10,010	$7,465,971
18 through 24		80%	1,407	$16,275	$22,898,306
Over 24		90%	988	$27,455	$27,128,957
Under 8	Surface	50%	918	$6,455	$5,924,513
10 through 16		50%	746	$11,935	$8,901,735
18 through 24		20%	352	$19,725	$6,938,081
Over 24		10%	110	$32,055	$3,519,370
				Total Estimated Cost	**$87,760,684**

Table 18. Cost Estimate for Typical Decom of Pipelines: All Pipelines in New Mexico

Diameter (")	Location	% of total	Length (mile)	$ / Mile	Sub Total
Under 8	Buried	50%	2,042	$5,430	$11,090,393
10 through 16		50%	2,345	$10,010	$23,469,782
18 through 24		80%	2,064	$16,275	$33,599,289
Over 24		90%	4,259	$27,455	$116,938,182
Under 8	Surface	50%	2,042	$6,455	$13,183,884
10 through 16		50%	2,345	$11,935	$27,983,202
18 through 24		20%	516	$19,725	$10,180,430
Over 24		10%	473	$32,055	$15,170,090
				Total Estimated Cost	**$251,615,253**

4.3 Assumptions – Typical Decommissioning

For the purposes of this assessment, the following assumptions have been made:

- All costs should be considered Class 5 (+50/-30%)
- Approximately 58% of the pipelines contained in the available GIS database had diameter information included in the metadata. The ratio of pipeline sizes from these known datapoints was applied to the entire

pipeline inventory

- Mix of steel and HDPE pipe throughout the system (50/50)
- Mix of buried and surface lines through the system at ratios deemed reasonable based on size (the larger the pipe the more likely it is to be buried)
    - Under 16": 50/50
    - 18 through 24": 80/20
    - Over 24": 90/10
- No costs to reclaim the surface of the pipeline ROWs have been included
- No excavation or disturbance will be required along length of ROW for buried pipelines
    - All work can be completed within the limits of existing surface leases
- Surface flow lines will be cut up, removed from location and disposed of
    - Access to the entire pipeline rOW will be required

4.4 Cost Estimate Details – Full Removal

As mentioned in Section 4.1, cost estimates are generally not provided for the full removed of buried pipelines as this is a cost prohibitive process that effectively replicates the construction process. A typical metric for estimating the construction of a buried pipeline is to utilize a $/inch·mile cost. The costs used for this assessment are:

- Buried Pipe – Less than 8" diameter: $140,000/mile
- Buried Pipe – 10" to 16" diameter: $544,000/mile
- Buried Pipe – 18" to 24" diameter: $1,620,000/mile
- Buried Pipe – Over 24" diameter: $2,880,000/mile

This results in the following total costs for complete removal of the buried pipelines in the state of New Mexico. Surface pipeline removal will remain as presented in Section 4.2.

Table 19. Cost Estimate for Full Removal of Pipelines: Pipelines on State Lands

Diameter (")	Buried			
	% of total	Length (mile)	$ / Mile	Sub Total
Under 8	50%	918	$140,000	$128,494,482
10 through 16	50%	746	$761,600	$568,040,345
18 through 24	80%	1407	$2,268,000	$3,190,989,772
Over 24	90%	988	$4,032,000	$3,984,117,752
			Total Estimated Cost	**$7,871,642,351**

Table 20. Cost Estimate for Full Removal of Pipelines: All Pipelines in New Mexico

Diameter (")	Buried			
	% of total	Length (mile)	$ / Mile	Sub Total
Under 8	50%	2042	$100,000	$204,242,974
10 through 16	50%	2345	$544,000	$1,275,480,682
18 through 24	80%	2064	$1,620,000	$3,344,445,399
Over 24	90%	4259	$2,880,000	$12,266,689,655
			Total Estimated Cost	**$17,090,858,710**

4.5 Assumptions – Full Removal

For the purposes of this assessment, the following assumptions have been made:

- All costs should be considered Class 5 (+50/-30%)
- All surface pipeline will follow the costing provided in Section 4.2
- Cost per mile derived from 2014 study completed by the Interstate Natural Gas Association of America (INGAA, 2014) which determined the $/inch·mile of all natural gas pipeline construction in North America in 2012. These values have been reduced by 50% to account for:
    - Industry benchmarks have reduced from peak in 2012 by up to 20% due to overall market downturn
    - Reduction in scope vs construction (i.e., no land acquisition, engineering and design, reduced regulatory and environmental consulting scope, no line pipe coating etc.)
    - Study metrics up to 16” only, larger diameter metric inferred based on trend
- The per mile costs are based on the largest pipe diameter in the range
- No significant difference in the costs of natural gas vs oil pipelines
- Complete removal of the buried pipeline by:
    - Open trenching: the line would be purged and cleaned, excavated, cut into sections, removed, backfilled and the surface reclaimed to natural state
    - Trenchless: pipeline is cut into segments at bellhole locations and a specialized rig utilized to pull the pipe out one end
    - Both options have pros and cons related to cost, surface impacts and feasibility which would need to be assessed independently for each pipeline project

4.6 Data Sources and Limitations

Pipeline inventory for the entire state of New Mexico was obtained utilizing data from S&P Global Platts, 2020 (S&P Global). The GIS for the state total pipeline inventory was intersected with GIS data for SLO lands obtained from the SLO (Figure 2), to determine the estimated length of pipeline located on SLO lands. Using this method, roughly 15% of the total pipeline lengths in the state of New Mexico are located on lands managed by the SLO.

Data gaps are expected to exist in the pipeline length estimates. S&P Global provides high quality data; however, as conditions are constantly changing on the ground, there will always be a lag between known and recorded pipeline data and updates regarding the construction of new pipeline or decommissioning or removal of existing pipeline. The S&P Global data presented in this report should be viewed as a snapshot of existing pipeline at a singular point in time rather

than a consistent measure of current pipeline infrastructure and condition. Additionally, smaller surface pipelines or surface pipelines that are intended to be temporary, such as lay-flat or poly lines, may not be recorded due to different permitting requirements. Accordingly, the actual quantity of surface lines shown in this report is expected to be an underestimation of actual pipelines present within the more active portions of the San Juan and Permian basins.

Finally, challenges with estimating decommissioning and full removal costs for pipelines throughout the state can be attributed to a lack of standardized regulatory requirements for pipeline decommissioning applicable across the state, which would streamline efforts at liability assessments by reducing the variables that may be involved in the pipeline decommissioning and/or removal process.

5.0 Commercial Lease Site Decommissioning

5.1 Scope

Data obtained from the SLO regarding its Commercial Lease – Oil and Gas Portfolio showed a total of 616 commercial lease sites covering a broad range of oil and gas activities, including but not limited to:

- Compressor Sites
- Frac Ponds
- Storage Sites and Storage Tanks
- Processing/Dehydration Facilities
- Maintenance/Metering Sites
- Rule 34 Recycling Facilities
- Truck Stops

Limited data regarding SLO commercial lease sites are publicly available; no information could be obtained regarding standard equipment present on each type of lease, year each site was developed, or historical site closure and reclamation costs. Commercial lease site data was limited to:

- Type of site
- Site size (in acres)
- Number of sites by type

Commercial lease site decommissioning consists of:

- Removal of all surface facilities including, but not limited to
    - Buildings and equipment storage structures
    - Compressors, dehydration facilities and other processing equipment
    - Transfer stations and truck staging areas
    - Frac ponds, storage tanks and containments
    - Chemical tanks
    - Water, electrical or other lines not included in the pipeline decommissioning discussion in Section 4.0
- Removal of foundations including, but not limited to:

  - Concrete pads
  - Driven or screw piles (cut off below grade or removed)
  - Parking areas or runways
- Equipment will be transported to a central location for storage or disposal
  - Costs for disposal of equipment are not included
  - Recovery of costs from sale of equipment is not included

Commercial lease site decommissioning does not include the following items; these are included in Section 6.0 as part of Surface Reclamation:

- Removal of facility fencing
- Removal of roads and pads
- Environmental testing and assessment
- Reclamation of land to pre-facility use

5.2 Cost Estimate Details

The basis for developing cost estimates for commercial lease site decommissioning was drawn from the cost estimates developed for wellpad surface facility decommissioning as shown in Section 3.0. The estimated costs for wellpad surface facility decommissioning are broken down to a per/acre cost as shown in Table 21.

Table 21. Average Per Acre Surface Facility Decommissioning Costs for Commercial Lease Sites on State Lands

Total Decommissioning Cost for Wells on State Lands	Total Well Count on State Lands	Average Per Well Decommissioning Cost	Average Wellpad Size for Wells on State Lands	Average Per Acre Decommissioning Cost
$244,867,057	14,051	$17,427.22	1.89	$9,220.65

The average per acre decommissioning cost was applied to the average site size for each type of commercial site, multiplied by the total number for each type of commercial site, and summed to obtain a total estimated decommissioning cost for all oil and gas commercial leases on SLO lands.

Table 22. Cost Estimate for Surface Decommissioning: Commercial Lease Sites on State Lands

Type of Commercial Site	Number of Sites	Average Site Size (Acres)	Estimated Decommissioning Cost per Site	Total Estimated Commercial Lease Surface Decommissioning Costs (By Type)
Compressor Site	135	3.73	$ 34,363.64	$ 4,639,091.15
Electrical Power Related	29	11.35	$ 104,676.58	$ 14,131,338.67
Frac Pond	80	5.39	$ 49,724.64	$ 6,712,825.84
Land Strip/ Airport	1	9.52	$ 87,780.54	$ 11,850,373.55
Maintenance / Metering site	36	2.36	$ 21,801.70	$ 2,943,230.03
Private Mobile Radio	11	4.47	$ 41,233.05	$ 5,566,461.75

Office Building/Maintenance Yard	5	9.83	$ 90,602.06	$ 12,231,278.41
Oil and Gas Related	3	11.30	$ 104,162.56	$ 14,061,945.37
Other Oil and Gas Related	28	85.78	$ 790,923.92	$ 106,774,728,70
Processing / Dehydration Facility	26	9.97	$ 91,887.28	$ 12,404,782.59
Reclamation	4	1.47	$ 13,531.30	$ 1,826,725.12
Residential	1	0.23	$ 2,120.75	$ 286,301.04
Rule 34 Recycling Facility	25	18.16	$ 167,487.49	$ 22,610,811.48
Storage Site	44	12.54	$ 115,631.09	$ 15,610,196.52
Storage Tank	55	153.96	$ 1,419,645.78	$ 191,652,180.54
Transfer Site	2	6.20	$ 57,168.00	$ 7,717,680.25
Telemetry Paging	23	2.84	$ 26,142.53	$ 3,529,242.14
Truck Stop	20	12.84	$ 118,360.82	$ 15,978,710.09
Storage/Warehouse	7	9.34	$ 86,160.35	$ 11,631,646.67
Well Pad Lease	75	6.24	$ 57,515.93	$ 7,764,650.22
Water Related	6	17.74	$ 163,589.62	$ 22,084,598.47
			Total	**$ 492,008,798.62**

5.3 Assumptions

For the purposes of this assessment the following assumptions have been made:

- All costs should be considered Class 5 (+50/-30%)
- All counts are based on the same representative sample and costs used for the Wellpad Surface Facility Decommissioning for wells on state lands
- There is minimal variation in safety requirements, removal methods, transport, and handling of equipment present on the various types of commercial lease sites, and any variations are deemed insignificant to affect overall cost estimates
- Pipeline risers will be cut and capped below grade
- Piles will be removed or cut and capped below grade
- Internal water jet cutters will be used where possible to avoid need for excavation
- Excavations will be backfilled with excavated material where possible
- All equipment will be staged at a central location to reduce shipping costs during decommissioning activities
- No costs are included for third-party equipment removal, electrical disconnect or power pole removal along with any associated legal or administrative charges

5.4 Data Sources and Limitations

The initial well sample assessments and totals used in developing wellpad surface facility decommissioning costs in Section 3.0 were used in the commercial lease site decommissioning cost assessment. Any data gaps pertaining to the well abandonment work would have transferred to this portion of the liability assessment, such as a lack of, or incomplete, standardized regulatory requirements for site decommissioning, applicable across the state, which would streamline efforts at liability assessments by reducing the variables that can be involved in the site decommissioning process.

Ill-defined definitions for each type of commercial lease site and a shortage of publicly available information regarding commercial lease site surface equipment, and the broad array of possible equipment and configurations that could be present at each type of site, resulted in multiple and significant assumptions about the standardization possibilities between types of commercial lease sites and even amongst different sites of the same type.

6.0 Surface Reclamation – Basis of Estimate

6.1 Scope

Per the OCD, Surface Reclamation must be conducted on all sites associated with oil and gas exploration and production (E&P) activities, including lease access ROWs, supporting mid-stream facilities and transmission pipeline ROWs, once no longer in use. Unless a site closure and reclamation plan are included in the well permit or lease, surface reclamation of a site is generally regulated by 19.15.29.12 and 19.15.29.13 of the NMAC. Section 13D states:

> ***Reclamation of areas no longer in use.*** *The responsible party shall reclaim all areas disturbed by the remediation and closure, except areas reasonably needed for production operations or for subsequent drilling operations, as early and as nearly as practical to their original condition or their final land use and maintain those areas to control dust and minimize erosion to the extent practical.*

Surface reclamation activities are usually conducted immediately following facility and/or pipeline decommissioning, as outlined in Sections 3.0 thru 5.0 of this report. Surface reclamation consists of:

- Environmental testing and assessment
- Removal and disposal of wellsite or facility fencing
- Excavation and removal of contaminated soils, such that constituents of concern remaining onsite meet the closure criteria requirements outlined in Table I of 19.15.29.12 NMAC (Appendix D)
- Ripping and turning of all compacted soils to approximate depths of 2 to 4 ft below ground surface
- Emplacement of backfill material, as needed, to reconstruct the site to its naturally occurring grade
- Contouring the site to achieve erosion control, long-term stability and preservation of surface water flow patterns commiserate with the surrounding undisturbed areas
- Re-establishing vegetation, typically through seeding the restored site with a native seed-mix appropriate for the area

Surface reclamation does not include the following items; these are included in Section 2.0, as part of Downhole Abandonment, and Sections 3.0 thru 5.0 as part of Surface Facility and Pipeline Decommissioning:

- Removal of downhole equipment
- Plugging the abandoned well
- Disconnection or isolation of flowlines
- Removal or disposal of facility surface or subsurface infrastructure, including concrete foundations/pads

6.2 Cost Estimate Details – Wellpad Reclamation

The cost estimate for surface reclamation of well sites consists of a unit rate cost on a per well basis using an average site size for categories defined by the following variables:

- Age of well by drilling date (pre-2012, post-2012)
- Well type (oil, gas, salt-water disposal [SWD])
- Basin

Average per-well reclamation cost for each category, as well as totals for all wells in the category, are shown in Table 23 for well sites on SLO land and Table 24 for all wells in New Mexico.

Table 23. Cost Estimate for Surface Reclamation: Wells on State Lands

Basin	Well Type	Age of Well	Average Per Well Cost	Well Count[7]	Estimated Cost
Permian	Oil	Pre-2012	$78,280.13	5,737	$ 449,093,078.60
		> 2012	$176,140.65	3,964	$ 698,221,520.37
	Gas	Pre-2012	$90,836.13	1,664	$ 151,151,319.84
		> 2012	$225,285.14	610	$ 137,423,933.15
	SWD	All Years	$193,037.75	300	$ 57,911,324.21
			Sub-Total	**12,275**	**$ 1,493,801,176.17**
San Juan	Oil	Pre-2012	$ 55,743.41	93	$ 5,184,137.55
		> 2012	$203,252.28	56	$ 11,382,127.95
	Gas	Pre-2012	$ 66,600.28	1,465	$ 97,569,403.28
		> 2012	$220,010.65	29	$ 6,380,308.96
	SWD	All Years	$132,770.38	16	$ 2,124,326.10
			Sub-Total	**1,659**	**$ 122,640,303.84**
Other	Oil	Pre-2012	$ 40,783.50	108	$ 4,404,618.45
		> 2012	$ 33,479.11	13	$ 435,228.37
	Gas	Pre-2012	$ 99,903.56	3	$ 299,710.69
		> 2012	N/A	1	N/A
	SWD	All Years	$ 27,195.84	2	$ 54,391.68
			Sub-Total	**127**	**$ 5,193,949.18**
			Total	**14,061**	**$ 1,621,635,429.19**

[7] Total count DOES include those wells classified as "Empty" during Well Categorization Activities.

Table 24. Cost Estimate for Surface Reclamation: All Wells in New Mexico

Basin	Well Type	Age of Well	Average Per Well Cost	Well Count[7]	Estimated Cost
Permian	Oil	Pre-2012	$ 99,705.12	17,658	$ 1,760,593,008.96
		> 2012	$116,899.84	12,033	$ 1,406,655,756.54
	Gas	Pre-2012	$ 78,544.84	5,252	$ 412,517,494.07
		> 2012	$195,698.03	2,460	$ 481,417,152.21
	SWD	All Years	$ 80,198.86	857	$ 68,730,421.65
			Sub-Total	**38,260**	**$ 4,129,913,833.43**
San Juan	Oil	Pre-2012	$ 53,893.73	1,664	$ 89,679,160.87
		> 2012	$164,304.82	539	$ 88,560,299.55
	Gas	Pre-2012	$ 53,866.22	19,595	$1,055,508,631.43
		> 2012	$ 39,761.69	385	$ 15,308,249.01
	SWD	All Years	$136,567.88	104	$ 14,192,659.45
			Sub-Total	**22,287**	**$ 1,263,249,000.31**
Other	Oil	Pre-2012	$ 28,675.56	299	$ 8,573,992.18
		> 2012	$ 33,973.52	79	$ 2,683,908.26
	Gas	Pre-2012	$ 29,732.72	888	$ 26,402,655.10
		> 2012	$ 29,712.22	27	$ 802,229.89
	SWD	All Years	$105,993.76	23	$ 2,437,856.50
			Sub-Total	**1,316**	**$ 40,900,641.93**
			Total	**61,863**	**$5,434,063,475.67**

[7] Total count DOES include those wells classified as "Empty" during Well Categorization Activities.

These rates have been applied to an estimated quantity, discussed in Section 6.5, for each well type to develop the overall estimate totals for surface reclamation of all wells on New Mexico State-owned lands and for all wells in New Mexico.

6.3 Cost Estimate Details – Pipeline Right of Way Reclamation

The cost estimate for surface reclamation of pipeline ROWs consists of a unit rate cost on a per pipeline mile basis using an average ROW size for the following categories.

Table 25. Cost Estimate for Surface Reclamation: Pipelines on State Lands

Buried Pipelines				
Diameter (")	**% of total**	**Length (mile)**	**$ / Mile**	**Sub Total**
Under 8	50%	918	$180,625.68	$ 165,814,370.07
10 through 16	50%	746		$ 134,746,753.89
18 through 24	80%	1,407		$ 254,140,325.36
Over 24	90%	988		$ 178,458,167.35
			Total Estimated Cost	**$ 733,159,616.67**
Diameter (")	**% of total**	**Length (mile)**	**$ / Mile**	**Sub Total**
Under 8	50%	918	$229,916.40	$ 211,063,250.75
10 through 16	50%	746		$ 171,517,630.78
18 through 24	80%	352		$ 80,930,571.09
Over 24	90%	110		$ 25,290,803.47
			Total Estimated Cost	**$ 488,802,256.09**

Table 26. Cost Estimate for Surface Reclamation: All Pipelines in New Mexico

Buried Pipelines				
Diameter (")	**% of total**	**Length (mile)**	**$ / Mile**	**Sub Total**
Under 8	50%	2,042	$180,625.68	$ 368,837,629.28
10 through 16	50%	2,345		$ 423,567,208.94
18 through 24	80%	2,064		$ 372,811,394.14
Over 24	90%	4,259		$ 769,284,751.76
			Total Estimated Cost	**$ 1,934,500,984.12**
Surface Pipelines				
Diameter (")	**% of total**	**Length (mile)**	**$ / Mile**	**Sub Total**
Under 8	50%	2,042	$229,916.40	$ 469,489,278.90
10 through 16	50%	2,345		$ 539,153,946.63
18 through 24	80%	516		$ 118,636,859.90
Over 24	90%	473		$ 108,750,454.91
			Total Estimated Cost	**$ 1,236,030,540.33**

These rates have been applied to an estimated quantity, discussed in Section 6.5, for each pipeline to develop the overall estimate totals for surface reclamation of all pipeline ROWs on New Mexico State-owned lands and for all pipeline ROWs in New Mexico.

6.4 Cost Estimate Details – Commercial Lease Site Reclamation

The cost estimate for commercial lease site surface reclamation is drawn from the cost estimates developed for wellpad surface reclamation as shown in Section 6.2. The estimated costs for wellpad surface reclamation were broken down to a per acre cost as shown in Table 27.

Table 27. Average Per Acre Decommissioning Costs for Commercial Lease Sites on State Lands

Total Surface Reclamation Cost for All Wells on State Lands (Across All Wells, All Counties, All Years)	Total Well Count on State Lands	Average Per Well Decommissioning Cost	Average Wellpad Size for Wells on State Lands	Average Per Acre Decommissioning Cost
$1,401,061,638.30	14,051	$99,713	1.89	$52,758

The average per acre surface reclamation cost was applied to the average site size for each type of commercial site, multiplied by the total number for each type of commercial site, and summed to obtain a total estimated surface reclamation cost for all oil and gas commercial leases on SLO lands.

Table 28. Cost Estimate for Surface Reclamation: Commercial Lease Sites on State Lands

Type of Commercial Site	Number of Sites	Average Site Size (Acres)	Estimated Surface Reclamation Cost per Site	Total Estimated Commercial Lease Surface Reclamation Costs (By Type)
Compressor Site	135	3.73	$ 196,620.05	$ 26,543,706.12
Electrical Power Related	29	11.35	$ 598,932.93	$ 80,855,945.47
Frac Pond	80	5.39	$ 284,511.79	$ 38,409,091.48
Land Strip/ Airport	1	9.52	$ 502,258.07	$ 67,804,840.00
Maintenance / Metering site	36	2.36	$ 124,743.84	$ 16,840,417.78
Private Mobile Radio	11	4.47	$ 235,925.08	$ 31,849,886.17
Office Building/Maintenance Yard	5	9.83	$ 518,402.08	$ 69,984,281.29
Oil and Gas Related	3	11.30	$ 595,991.81	$ 80,458,894.52
Other Oil and Gas Related	28	85.78	$ 4,525,466.59	$ 610,937,989.82
Processing / Dehydration Facility	26	9.97	$ 525,755.77	$ 70,977,028.30
Reclamation	4	1.47	$ 77,422.66	$ 10,452,059.11
Residential	1	0.23	$ 12,134.39	$ 1,638,142.14
Rule 34 Recycling Facility	25	18.16	$ 958,321.07	$ 129,373,344.09
Storage Site	44	12.54	$ 661,611.82	$ 89,317,596.01
Storage Tank	55	153.96	$ 8,122,854.08	$ 1,096,585,300.17
Transfer Site	2	6.20	$ 327,100.85	$ 44,158,614.29
Telemetry Paging	23	2.84	$ 149,580.97	$ 20,193,430.84
Truck Stop	20	12.84	$ 677,230.65	$ 91,426,137.46
Storage/Warehouse	7	9.34	$ 492,987.70	$ 66,553,340.10
Well Pad Lease	75	6.24	$ 329,091.59	$ 44,427,364.56
Water Related	6	17.74	$ 936,018.42	$ 126,362,486.31
			TOTAL	**$ 2,815,149,896.01**

6.5 Assumptions

For purposes of the surface reclamation cost assessments the following assumptions have been made:

6.5.1 Wellpad Reclamation

- Surface reclamation costs are directly correlated to the size of the site being reclaimed
    - To find the average wellpad size, a random selection of wells across all counties, well types, drilling directions and years were measured using aerial photos to determine, in acres, the size of the reclamation area (wellpad)
- Well locations were divided into groups by production basin, well type, and year brought into production
    - Each production basin may have different production methods, drilling and access challenges, and may even have different specifications for pad sizes
    - Each well type is assumed to have varying levels of contamination based on the commodity produced
    - Pad development and drilling methods began to change drastically around 2012, resulting in larger pads, better environmental protection controls, and better best management practices to reduce potential long-term contamination issues, all of which could affect the final remediation levels needed at each site
- Wells with the status of "Cancelled" and "Never-drilled" are not included in the estimated costs; wells with the status of "Dry" or "Empty" are included
- Multi-well pads are a relatively new approach to oil and gas drilling. The extremely small number of sites containing multiple wells is insignificant enough to distinguish well and pad numbers differently
- Current un-remediated pits and frac ponds are NOT included in estimated reclamation costs due to the infrequency of occurrence, as well as because these types of facilities are associated with new well development and are often remediated by the producers shortly after production begins
- Remediation requirements include excavation and disposal of contaminated soils to a depth of approximately 4 ft below ground surface (bgs) based on NM OCD restoration and reclamation guidance provided in 19.15.29.13 NMAC. Contaminated soil removal volumes can drastically affect reclamation costs. To provide a range of costs, per pad estimated contaminated soil removal volumes are based on four contamination levels
    - Low contamination – approximately 10% of pad needs to be excavated and disposed
    - Medium-low contamination – approximately 25% of the pad needs to be excavated and disposed
    - Medium-high contamination – approximately 40% of the pad needs to be excavated and disposed
    - High contamination – approximately 60% of the pad needs to be excavated and disposed
- Contamination levels are not going to be the same at all pads in a category, thus it is assumed that a percentage of all well pads in a group will fall into the low, medium-low, medium-high and high contamination range. This is referred to as the contamination rate
- Contamination rates at gas well pads are expected to be different than those at oil well pads and SWD pads, due to the volatile, gaseous state of the resource being handled. When a release occurs at a gas well, the released material tends to dissipate into the air rather than soak into the soil. To capture this disparity, the following breakdown of total wells within each contamination level was used
    - Gas Well Contamination Rates
        - 25% of all wells have a low level of contamination
        - 60% of all wells have a medium-low level of contamination

- 10% of all wells have a medium-high level of contamination
- 5% of all wells have a high level of contamination

- Oil Wells and SWDs Contamination Rates
  - 15% of all wells have a low level of contamination
  - 60% of all wells have a medium-low level of contamination
  - 20% of all wells have a medium-high level of contamination
  - 5% of all wells have a high level of contamination

6.5.2 Pipeline Right-of-Way Reclamation

- Surface reclamation costs are directly correlated to the size of the site surface being reclaimed
  - To find the average surface area of a pipeline ROW to be reclaimed, the standard New Mexico ROW width of 30 ft was used in conjunction with the pipeline lengths presented in Section 4
- Pipeline ROWs were divided into two groups: buried and surface
  - The potential for pipeline leaks may be greater for surface pipelines exposed to the elements, vandalism and oilfield traffic, compared to buried pipelines
  - Leaks from surface pipelines may have been recognized and addressed in a timely manner
  - Vegetation around surface lines may not recover as quickly due to continued access along the pipeline ROW, e.g. visual inspections, thus surface pipeline ROWs may require a greater proportion of revegetation efforts
- Remediation requirements include excavation and disposal of contaminated soils to a depth of approximately 4 ft bgs based on NM OCD restoration and reclamation guidance provided in 19.15.29.13 NMAC. Contaminated soil removal volumes can drastically affect reclamation costs. To provide a range of costs, estimated pipeline ROW reclamation costs were grouped into three Reclamation Effort Levels.

Table 29. Reclamation Effort Categories

	Buried Pipeline ROWs		**Surface Pipeline ROWs**	
	% of ROW contaminated	% of ROW requiring revegetation	% of ROW contaminated	% of ROW requiring revegetation
Low Effort	10%	20%	15%	40%
Medium Effort	20%	40%	30%	40%
High Effort	40%	40%	50%	50%

- Pipeline ROW estimated contaminated soils removal volumes are based on a percentage of the total ROW that is expected to fall under each contamination level to the NM OCD reclamation depths of 4 ft bgs
- The total surface area of the pipeline ROWs requiring re-seeding is expected to differ slightly by contamination category, as shown in Table 29
- The level of reclamation effort required for buried pipeline ROWs are expected to be slightly lower than those for surface pipeline ROWs. To capture this disparity, the following breakdown of total pipeline miles within each reclamation effort level was used.
  - Buried Pipelines
    - 60% of all pipelines require low effort reclamation

        - 30% of all pipelines require medium effort reclamation
        - 10% of all pipelines require high effort reclamation
    - Surface Pipelines
        - 70% of all pipelines require low effort reclamation
        - 25% of all pipelines require medium effort reclamation
        - 5% of all pipelines require high effort reclamation

6.5.3 Commercial Lease Surface Reclamation

- Surface reclamation costs are directly correlated to the size of the site being reclaimed.
    - To find the average wellpad size, a random selection of wells across all counties, well types, drilling directions and years were measured using aerial photos to determine, in acres, the size of the reclamation area (wellpad)
- Well locations were divided into groups by production basin, by well type, and by year brought into production
    - Each production basin may have different production methods, drilling and access challenges, and may even have different specifications for pad sizes
    - Each well type is assumed to have varying levels of contamination based on the commodity produced
    - Pad development and drilling methods began to change drastically around 2012, resulting in larger pads, better environmental protection controls, and better best management practices to reduce potential long-term contamination issues, all of which could affect the final remediation levels needed at each site
- Wells with the status of "Cancelled" and "Never-drilled" are not included in the estimated costs
- Multi-well pads are a relatively new approach to oil and gas drilling. The extremely small number of sites containing multiple wells is insignificant enough to distinguish well and pad numbers differently
- Current un-remediated pits and frac ponds are NOT included in estimated reclamation costs due to the infrequency of occurrence, as well as because these types of facilities are associated with new well development and are often remediated by the producers shortly after production begins.
- Remediation requirements include excavation and disposal of contaminated soils to a depth of approximately 4 ft bgs based on NM OCD restoration and reclamation guidance provided in 19.15.29.13 NMAC. Contaminated soil removal volumes can drastically affect reclamation costs. To provide a range of costs, per pad estimated contaminated soil removal volumes are based on four contamination levels
    - Low contamination – approximately 10% of pad needs to be excavated and disposed
    - Medium-low contamination – approximately 25% of the pad needs to be excavated and disposed
    - Medium-high contamination – approximately 40% of the pad needs to be excavated and disposed
    - High contamination – approximately 60% of the pad needs to be excavated and disposed
- Contamination levels are not going to be the same at all pads in a category, thus it is assumed that a percentage of all well pads in a group will fall into the low, medium-low, medium-high and high contamination range. This is referred to as the contamination rate
- Contamination rates at gas well pads are expected to be different than those at oil well pads and SWD pads, due to the volatile, gaseous state of the resource being handled. When a release occurs at a gas well, the released material tends to dissipate into the air rather than soak into the soil. To capture this disparity, the following breakdown of total wells within each contamination level was used
    - Gas Well Contamination Rates

- 25% of all wells have a low level of contamination
- 60% of all wells have a medium-low level of contamination
- 10% of all wells have a medium-high level of contamination
- 5% of all wells have a high level of contamination

- Oil Wells and SWDs Contamination Rates
  - 15% of all wells have a low level of contamination
  - 60% of all wells have a medium-low level of contamination
  - 20% of all wells have a medium-high level of contamination
  - 5% of all wells have a high level of contamination

6.5.4 All Reclamations

- Because trucking is typically charged by the hour, the distance from each site to an appropriate disposal location can have a dramatic impact on final reclamation costs. To account for this, trucking times are broken into three average round trip times with one-third of all wells from each basin and well-type falling into each range and one-third of each reclamation effort level for each category of pipeline falling into each range
  - Short-duration trucking is an average round trip time of approximately 1.5 hours
  - Medium-duration trucking is an average round trip time of approximately 3 hours
  - Long-duration trucking is an average round trip time of approximately 5.5 hours
- To avoid additional field crew mobilization and demobilization costs, it is assumed that the same companies who are completing surface decommissioning activities will be conducting surface reclamation concurrent with, or immediately subsequent to, final surface decommissioning or pipeline decommissioning
- The surface reclamation costs presented here DO include environmental assessment and testing via field screening methods as part of the overall contaminated soil excavation costs
- It is assumed that full laboratory analysis and closure reporting will not be required. If laboratory analysis and closure reporting are required, those costs would be in addition to the surface reclamation estimates presented in this report
- The costs for purchase and emplacement of topsoil and initial re-seeding of the reclaimed areas with a native seed mix are included. The cost of follow-on watering, re-seeding or long-term revegetation monitoring activities are not included as these activities would likely be provided by state experts

6.6 Data Sources and Limitations

The initial well sample assessments and totals used in developing abandonment costs in Section 2.0, decommissioning costs in Section 3.0. pipeline decommissioning and removal costs in Section 4.0, and commercial lease site facility decommissioning costs in Section 5.0 were used in the surface reclamation cost assessment. Any data gaps pertaining to the well abandonment, decommissioning and pipeline work would have transferred to this portion of the liability assessment.

Information on well types, locations and wellpad sizes was gleaned from asset lists obtained from the SLO and OCD. Trucking, disposal and backfill costs were obtained from Vertex records for previous spill remediation and site reclamation work conducted within the Permian and San Juan Basins.

Data gaps in wellsite and pipeline reclamation costs largely stem from a lack of, or incomplete, standardized regulatory requirements for full site reclamation, applicable across the state, which would streamline efforts at liability assessments by reducing the variables that can be involved in site reclamation activities.

7.0 Total Liabilities Summary

Table 30. Total Well Abandonment, Decommissioning and Reclamation Costs

Activity	New Mexico State Lands			All New Mexico Wells	
	High	Low		High	Low
Downhole Abandonment	$1,536,000,000	$1,315,000,000		$6,540,000,000	$5,671,000,000
Surface Facility Decommissioning	$244,867,057	$244,867,057		$897,546,249	$897,546,249
Surface Reclamation	$1,621,635,429	$1,621,635,429		$5,434,063,476	$5,434,063,476
Total Liabilities	**$3,402,502,486**	**$3,181,502,486**		**$12,871,609,725**	**$12,002,609,725**

Table 31. Pipeline Decommissioning and Reclamation Costs

Activity	New Mexico State Lands			All New Mexico Wells	
	Typical Decommissioning	Full Removal		Typical Decommissioning	Full Removal
Pipeline	$87,760,684	$7,871,642,351		$251,615,253	$17,090,858,710
Pipeline Surface Reclamation	$1,221,961,873	$1,221,961,873		$3,170,531,524	$3,170,531,524
Total Liabilities	**$1,309,722,557**	**$9,093,604,224**		**$3,422,146,777**	**$20,261,390,234**

Table 32. Commercial Lease Site Decommissioning and Reclamation Costs

Activity	New Mexico State Lands		All New Mexico Wells	
	Estimated		High	Low
Commercial Lease Site Decommissioning	$492,008,798.62		N/A	N/A
Commercial Lease Site Surface Reclamation	$2,815,149,896.01		N/A	N/A
Total Liabilities	**$3,307,158,694.63**		**N/A**	**N/A**

8.0 References

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9.0 Disclosure

This report has been prepared as a result of Vertex Resource Services Inc (Vertex) research and interest in the potential availability of remediation and reclamation work in the state of New Mexico. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered as a result of the use of this report are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgement of Vertex based on the data available during the assessment. Due to the nature of the assessment and the data available, Vertex cannot warrant against undiscovered environmental liabilities. Conclusions presented in this report should not be considered legal advice.

Sincerely,

Natalie Gordon, M.Sc., BA, B.Acc., P.Biol.
PROJECT MANAGER – US OPERATIONS

APPENDIX A

CONDITIONS FOR PLUGGING AND ABANDONMENT

OCD - Southern District

The following is a guide or checklist in preparation of a plugging program, this is not all inclusive and care must be exercised in establishing special plugging programs in unique and unusual cases, **Notify NMOCD District Office II at (575)-748-1283 at least 24 hours before beginning work. After MIRU rig will remain on well until it is plugged to surface. OCD is to be notified before rig down. Company representative will be on location during plugging procedures.**

1. A notice of intent to plug and abandon a wellbore is required to be approved before plugging operations are conducted. A cement evaluation tool is required in order to ensure isolation of producing formations, protection of water and correlative rights. A cement bond log or other accepted cement evaluation tool is to be provided to the division for evaluation if one has not been previously run or if the well did not have cement circulated to surface during the original casing cementing job or subsequent cementing jobs.
2. Closed loop system is to be used for entire plugging operation. Upon completion, contents of steel pits are to be hauled to a permitted disposal location.
3. Trucking companies being used to haul oilfield waste fluids to a disposal – commercial or private – shall have an approved NMOCD C-133 permit. A copy of this permit shall be available in each truck used to haul waste products. It is the responsibility of the operator as well as the contractor, to verify that this permit is in place prior to performing work. Drivers shall be able to produce a copy upon request of an NMOCD Field inspector.
4. Filing a subsequent C-103 will serve as notification that the well has been plugged.
5. A final C-103 shall be filed (and a site inspection by NMOCD Inspector to determine if the location is satisfactorily cleaned, all equipment, electric poles and trash has been removed to Meet NMOCD standards) before bonding can be released.
6. If work has not begun within 1 Year of the approval of this procedure, an extension request must be file stating the reason the well has not been plugged.
7. **Squeeze pressures are not to exceed 500 psi, unless approval is given by NMOCD.**
8. Produced water **will not** be used during any part of the plugging operation.
9. Mud laden fluids must be placed between all cement plugs mixed at 25 sacks per 100 bbls of water.
10. All cement plugs will be a minimum of 100' in length or a minimum of 25 sacks of cement, whichever is greater. 50' of calculated cement excess required for inside casing plugs and 100% calculated cement excess required on outside casing plugs.
11. **Class 'C' cement will be used above 7500 feet.**
12. **Class 'H' cement will be used below 7500 feet.**
13. **A cement plug is required to be set 50' above and 50' below, casing stubs, DV tools, attempted casing cut offs, cement tops outside casing, salt sections and anywhere the casing is perforated, these plugs require a 4 hour WOC and then will be tagged**
14. **All Casing Shoes Will Be Perforated 50' below shoe depth and Attempted to be Squeezed, cement needs to be 50' above and 50' Below Casing Shoe inside the Production Casing.**

16. When setting the top out cement plug in production, intermediate and surface casing, wellbores should remain full at least 30 minutes after plugs are set
17. **A CIBP is to be set within 100' of production perforations, capped with 100' of cement, WOC 4 hours and tag.**
18. A CIBP with 35' of cement may be used in lieu of the 100' plug if set with a bailer. This plug will be placed within 100' of the top perforation, **(WOC 4 hrs and tag).**
19. No more than **3000' is allowed between cement plugs in cased hole and 2000' in open hole.**
20. Some of the Formations to be isolated with cement plugs are: These plugs to be set to isolate formation tops
    A) Fusselman
    B) Devonian
    C) Morrow
    D) Wolfcamp
    E)Bone Springs
    F) Delaware
    G) Any salt sections
    H) Abo
    I) Glorieta
    J) Yates.
    K) **Potash---** (In the R-111-P Area (Potash Mine Area), a solid cement plug must be set across the salt section. Fluid used to mix the cement shall be saturated with the salts that are common to the section penetrated and in suitable proportions, not more than 3% calcium chloride (by weight of cement) will be considered the desired mixture whenever possible, **WOC 4 hours and tag, this plug will be 50' below the bottom and 50' above the top of the Formation.**
21. **If cement does not exist behind casing strings at recommended formation depths,** the casing can be cut and pulled with plugs set at recommended depths. If casing is not pulled, perforations will be shot and cement squeezed behind casing, WOC and tagged. These plugs will be set 50' below formation bottom to 50' above formation top inside the casing

DRY HOLE MARKER REQUIRMENTS

The operator shall mark the exact location of the plugged and abandoned well with a steel marker not less than four inches in diameter, 3' below ground level with a plate of at least ¼" welded to the top of the casing and the dry hole marker welded on the plate with the following information welded on the dry hole marker:

1. Operator name 2. Lease and Well Number 3.API Number 4. Unit Letter 5. Quarter Section (feet from the North, South, East or West) 6. Section, Township and Range 7. Plugging Date 8. County (SPECIAL CASES)-------AGRICULTURE OR PRARIE CHICKEN BREEDING AREAS

In these areas, a below ground marker is required with all pertinent information mentioned above on a plate, set 3' below ground level, a picture of the plate will be supplied to NMOCD for record, the exact location of the marker (longitude and latitude by GPS) will be provided to NMOCD (We typically require a current survey to verify the GPS)

APPENDIX B

New Mexico Well Categorization and Wellfile Review Summary - All Wells In New Mexico

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing %	Intermediate Casing Count	CBL Req'd %	CBL Req'd Count	Flagged Zones Low Cement Top %	Flagged Zones Low Cement Top Count
Chaves	Gas	Vertical / Directional	<5,000'	749	11	1%	Flow	Perforated	1	749	ST1		0	75%	562	50%	375
			5,000-10,000'	486	8	2%	Flow	Perforated	1	486	MT1	75%	0	75%	365	50%	243
			>10,000'	19	6	32%	Flow	Perforated	2	19	DT2	100%	19	100%	19	50%	10
		Horizontal	<5,000'														
			5,000-10,000'	36	3	8%	Flow	Perforated	2	36	MT2		0	100%	36	0%	0
			>10,000'														
	Oil	Vertical / Directional	<5,000'	1018	23	2%	Pump	Perforated	1	1018	SR1		0	100%	1018	50%	509
			5,000-10,000'	54	3	6%	Pump	Perforated	2	54	MR2	100%	54	100%	54	0%	0
			>10,000'	23	6	26%	Pump	Perforated	2	23	DR2	100%	23	100%	23	0%	0
		Horizontal	<5,000'	6	1	17%	Pump	Perforated	2	6	SR2		0	0%	0	0%	0
			5,000-10,000'	62	5	8%	Flow	Perforated	2	28	MT2	100%	28	100%	28	0%	0
							Pump	Frac port liner	2	34	MR2	100%	34	100%	34	0%	0
			>10,000'	53	4	8%	Pump	Frac port liner	2	53	DR2	100%	53	100%	53	0%	0
	SWD	Vertical / Directional	<5,000'	162	3	2%	Injection	Perforated	2	162	ST2	100%	162	25%	41	50%	81
			5,000-10,000'	13	5	38%	Injection	Perforated	2	13	MT2	100%	13	25%	3	50%	7
			>10,000'	7	3	43%	Injection	Perforated	2	7	DT2	100%	7	25%	2	0%	0
		Horizontal	<5,000'														
			5,000-10,000'	7	1	14%	Injection	Perforated	2	7	MT2		0	25%	2	0%	0
			>10,000'														
	Empty			138						138	E						
Catron	Empty			1						1	E						
Colfax	Gas	Vertical / Directional	<5,000'	846		0%	Flow	Perforated	1	846	ST1	50%	423	50%	423	50%	423
			5,000-10,000'	12		0%	Flow	Perforated	1	12	MT1	50%	6	50%	6	50%	6
			>10,000'														
Curry	Empty			1						1	E						
Lea	Gas	Vertical / Directional	<5,000'	978	27	3%	Flow	Perforated	2	380	ST2	50%	190	100%	380	50%	190
							Pump	Perforated	2	598	SR2	0%	0	100%	598	50%	299
			5,000-10,000'	245	1	0%	Flow	Perforated	2	245	MT2	0%	0	100%	245	75%	184
			>10,000'	666	4	1%	Flow	Perforated	2	333	DR2	100%	333	50%	167	0%	0
							Pump	Perforated	2	333	SR2	0%	0	100%	333	50%	167
		Horizontal	<5,000'	1	0	0%	Flow		2	1	ST2	0%	0	100%	1	50%	1
			5,000-10,000'	2	0	0%	Flow		2	2	MT2	0%	0	100%	2	50%	1
			>10,000'	85		0%	Flow	Perforated	2	36	DT2	50%	18	75%	27	50%	18
							Pump	Perforated	2	49	DR2	50%	25	75%	37	50%	25
	Oil	Vertical / Directional	<5,000'	4045	14	0%	Pump	Perforated	1	4045	SR1	50%	2023	25%	1011	25%	1011
			5,000-10,000'	4575	12	0%	Pump	Perforated	2	4575	MR2	75%	3431	75%	3431	25%	1144
			>10,000'	1236	4	0%	Pump	Perforated	2	1236	DR2	100%	1236	100%	1236	0%	0
		Horizontal	<5,000'	2	1	50%	Pump	Perforated	1	2	SR1		0	100%	2	0%	0
			5,000-10,000'	165	1	1%	Pump	Perforated	1	165	MR1		0	100%	165	0%	0
			>10,000'	5048	25	0%	Flow	Perforated	1	2615	DT1	100%	2615	100%	2615	25%	654
							Pump	Perforated	1	2433	DR1	100%	2433	25%	608	25%	608
	SWD	Vertical / Directional	<5,000'	1522	4	0%	Injection	Perforated	1	761	ST1		0	25%	190	0%	0
							Injection	OH	1	761	ST1		0	25%	190	0%	0
			5,000-10,000'	849	4	0%	Injection	Perforated	1	849	MT1		0	25%	212	50%	425
			>10,000'	237	2	1%	Injection	Perforated	1	237	DT1	100%	237	25%	59	50%	119
		Horizontal	<5,000'														
			5,000-10,000'	4	0	0%	Injection	Perforated	1	4	MT1	0%	0	25%	1	50%	2
			>10,000'	2	0	0%	Injection	Perforated	1	2	DT1	0%	0	25%	1	50%	1
	Empty			540						540	E						
Luna	Empty			1						1	E						

New Mexico Well Categorization and Wellfile Review Summary - All Wells In New Mexico

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing		CBL Req'd		Flagged Zones Low Cement Top	
												%	Count	%	Count	%	Count
Roosevelt	Gas	Vertical / Directional	<5,000'	23	1	4%	Flow	OH	1	23	ST1	0%	0	100%	23	0%	0
			5,000-10,000'	27	2	7%	Flow	Perforated	2	18	MT2	0%	0	100%	18	0%	0
							Pump	Perforated	2	9	MR2	0%	0	100%	9	0%	0
			>10,000'	1	0	0%	Pump	Perforated	2	1	DR2	0%	0	100%	1	0%	0
		Horizontal	<5,000'														
			5,000-10,000'	2	1	50%	Pump	Perforated	2	2	MR2	100%	2	100%	2	0%	0
			>10,000'														
	Oil	Vertical / Directional	<5,000'	289	9	3%	Flow	Perforated	1	172	ST1		0	100%	172	0%	0
							Pump	Perforated	1	117	SR1		0	100%	117	0%	0
			5,000-10,000'	51	3	6%	Pump	Perforated	2	51	MR2	100%	51	100%	51	0%	0
			>10,000'	3	1	33%	Pump	Perforated	2	3	DR2	100%	3	100%	3	0%	0
		Horizontal	<5,000'	2	1	50%	Flow	Perforated	1	2	ST1		0	100%	2	0%	0
			5,000-10,000'	8	3	38%	Flow	Perforated	1	8	MR1		0	100%	8	0%	0
			>10,000'	8	2	25%	Pump	Perforated	1	8	DR1		0	100%	8	0%	0
	SWD	Vertical / Directional	<5,000'	39	1	3%	Injection	Perforated	2%	39	ST2	0%	0	25%	10	0%	0
			5,000-10,000'	12	1	8%	Injection	Perforated	2%	12	MT2	50%	6	25%	3	0%	0
			>10,000'	3	1	33%	Injection	Perforated	2%	3	DT2	100%	3	25%	1	0%	0
	Empty			10						10	E						
Eddy	Gas	Vertical / Directional	<5,000'	48	2	4%	Flow	Perforated	2	48	ST2	100%	48	100%	48	0%	0
			5,000-10,000'	816	8	1%	Flow	Perforated	2	816	MT2	100%	816	100%	816	50%	408
			>10,000'	1577	28	2%	Flow	Perforated	2	1577	DT2	100%	1577	50%	789	50%	789
		Horizontal	<5,000'	3	1	33%	Flow	Perforated	1	3	ST1	100%	3	100%	3	0%	0
			5,000-10,000'	58	4	7%	Flow	Perforated	1	58	MT1	100%	58	75%	44	0%	0
			>10,000'	1719	75	4%	Flow	Perf / frac port liner	2	1719	DT2	100%	1719	75%	1289	50%	860
	Oil	Vertical / Directional	<5,000'	4859	24	0%	Pump	Perforated	1	4859	SR1		0	100%	4859	25%	1215
			5,000-10,000'	3749	27	1%	Pump	Perforated	1	3749	MR1	75%	2812	75%	2812	25%	937
			>10,000'	1159	13	1%	Flow	Perforated	2	583	DT2	100%	583	100%	583	25%	146
							Pump	Perforated	2	576	DR2	100%	576	100%	576	25%	144
		Horizontal	<5,000'	19	2	11%	Pump	Perforated	1	19	SR1	0%	0	100%	19	0%	0
			5,000-10,000'	506	2	0%	Pump	Perforated	1	506	MR1		0				
			>10,000'	2467	15	1%	Flow	Perforated	1	1218	DT1	100%	1218	100%	1218	25%	305
							Pump	Perforated	1	1249	DR1	100%	1249	100%	1249	25%	312
	SWD	Vertical / Directional	<5,000'	620	5	1%	Injection	Perforated	2	620	ST2	0%	0	25%	155	0%	0
			5,000-10,000'	141	2	1%	Injection	Perforated	2	141	MT2	50%	71	25%	35	0%	0
			>10,000'	391	7	2%	Injection	Perf / frac port liner	2	391	DT2	50%	196	25%	98	0%	0
	Empty			480						480	E						
Otero	Oil	Vertical / Directional	<5,000'	1	0	0%	Flow		1	1	ST1	0%	0	100%	1	25%	0
			5,000-10,000'	2	0	0%	Flow		1	2	MT1	0%	0	100%	2	25%	1
			>10,000'														
Guadalupe	Gas	Vertical / Directional	<5,000'														
			5,000-10,000'														
			>10,000'	1	0	0%	Flow		1	1	DT1	0%	0	100%	1	0%	0
	Oil	Vertical / Directional	<5,000'	1	0	0%	Pump		1	1	SR1	0%	0	100%	1	0%	0
			5,000-10,000'														
			>10,000'														
Harding	CO2	Vertical / Directional	<5,000'	385	0	0%	Flow		1	385	ST1	0%	0	100%	385	0%	0
			5,000-10,000'														
			>10,000'														
	SWD	Vertical / Directional	<5,000'	3	0	0%	Injection		1	3	ST1	0%	0	25%	1	0%	0
			5,000-10,000'														
			>10,000'														

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing		CBL Req'd		Flagged Zones Low Cement Top	
												%	Count	%	Count	%	Count
McKinley	Gas	Vertical / Directional	<5,000'	18	2	11%	Pump	Perforated	1	18	SR1	0%	0	100%	18	0%	0
			5,000-10,000'														
			>10,000'														
	Oil	Vertical / Directional	<5,000'	153	3	2%	Pump	OH	1	153	SR1	0%	0	100%	153	0%	0
			5,000-10,000'	4	0		Pump		1	4	MR1	0%	0	100%	4	0%	0
			>10,000'														
	SWD	Vertical / Directional	<5,000'	20	0	0%	Injection		1	20	ST1	0%	0	25%	5	0%	0
			5,000-10,000'	2	0	0%	Injection		1	2	MT1	0%	0	25%	1	0%	0
			>10,000'														
	Empty			7						7	E						
Quay	Gas	Vertical / Directional	<5,000'														
			5,000-10,000'	11	0	0%	Flow	Perforated	1	11	MT1						
			>10,000'														
	Oil	Vertical / Directional	<5,000'	1	0	0%	Pump		1	1	SR1	0%	0	100%	1	0%	0
			5,000-10,000'	1	0	0%	Flow		1	1	MT1	0%	0	100%	1	0%	0
			>10,000'														
Rio Arriba	Gas	Vertical / Directional	<5,000'	2438	6	0%	Flow	Perforated	2	2438	ST2	25%	610	100%	2438	0%	0
			5,000-10,000'	4880	15	0%	Flow	Perforated	2	4880	MT2	25%	1220	100%	4880	0%	0
			>10,000'	2	0	0%	Flow	Perforated	2	2	DT2	25%	1	100%	2	0%	0
		Horizontal	<5,000'	43	1	2%	Pump	Perforated	1	43	SR1	100%	43	100%	43	0%	0
			5,000-10,000'	372	6	2%	Flow	Perforated	1	372	MT1	100%	372	100%	372	0%	0
			>10,000'	42	0	0%	Flow	Perforated	1	42	DT1	100%	42	100%	42	0%	0
	Oil	Vertical / Directional	<5,000'	56	0	0%	Pump	Perforated	2	56	SR2	0%	0	100%	56	0%	0
			5,000-10,000'	741	10	1%	Pump	Perforated	2	372	MR2	0%	0	100%	372	0%	0
							Flow	Perforated	2	369	MT2	0%	0	100%	369	0%	0
			>10,000'														
		Horizontal	<5,000'														
			5,000-10,000'	6	1	17%	Pump	Perforated	1	6	MR1	100%	6	100%	6	0%	0
			>10,000'	92	2	2%	Flow	Perforated	1	92	DT1	100%	92	100%	92	0%	0
	SWD	Vertical / Directional	<5,000'	2			Injection	Perforated	1	2	ST1	100%	2	25%	1	0%	0
			5,000-10,000'	16	1		Injection	Perforated	1	16	MT1	100%	16	25%	4	0%	0
			>10,000'	2			Injection	Perforated	1	2	DT1	100%	2	25%	1	0%	0
	Empty			5						5	E						
San Juan	Gas	Vertical / Directional	<5,000'	5896	25	0%	Flow	Perforated	1	5896	ST1	25%	1474	100%	5896	50%	2948
			5,000-10,000'	5621	19	0%	Flow	Perforated	1	5621	MT1	25%	1405	100%	5621	50%	2811
			>10,000'	5	0	0%	Flow	Perforated	1	5	DT1	25%	1	100%	5	50%	3
		Horizontal	<5,000'	72	1	1%	Flow	Frac port liner	1	72	ST1	0%	0	100%	72	0%	0
			5,000-10,000'	233	4	2%	Flow	Perf / frac port liner	2	233	MT2	0%	0	100%	233	0%	0
			>10,000'	105	2	2%	Flow	Perf / frac port liner	2	105	DT2	0%	0	100%	105	0%	0
	Oil	Vertical / Directional	<5,000'	326	2	1%	Pump	Perforated	1	326	SR1	0%	0	100%	326	100%	326
			5,000-10,000'	297	8	3%	Flow	Perforated	1	198	MT1	0%	0	100%	198	100%	198
							Pump	Perforated	1	99	MR1	0%	0	100%	99	100%	99
			>10,000'	3	1	33%	Flow	Perforated	1	3	DT1	0%	0	100%	3	0%	0
		Horizontal	<5,000'	1	0		Pump	Frac port liner	2	1	SR1	0%	0	50%	1	0%	0
			5,000-10,000'	29	3		Pump	Frac port liner	2	29	MR2	100%	29	50%	15	0%	0
			>10,000'	194	1	1%	Pump	Frac port liner	2	194	DR2	100%	194	50%	97	0%	0
	SWD	Vertical / Directional	<5,000'	33	2	6%	Injection	Perforated	1	33	ST1	0%	0	25%	8	50%	17
			5,000-10,000'	59	2	3%	Injection	Perforated	1	59	MT1	0%	0	25%	15	50%	30
			>10,000'	2	0	0%	Injection	Perforated	1	2	MT1	0%	0	25%	1	50%	1
	Empty			40						40	E						

New Mexico Well Categorization and Wellfile Review Summary - All Wells In New Mexico

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing %	Intermediate Casing Count	CBL Req'd %	CBL Req'd Count	Flagged Zones Low Cement Top %	Flagged Zones Low Cement Top Count
Sandoval	Gas	Vertical / Directional	<5,000'	198	2	1%	Flow	Perforated	1	198	ST1	0%	0	100%	198	25%	50
			5,000-10,000'	8	0	0%	Flow	Perforated	1	8	MT1	0%	0	100%	8	0%	0
			>10,000'														
		Horizontal	<5,000'														
			5,000-10,000'	1		0%	Flow	Perforated	1	1	MT1	0%	0	100%	1	0%	0
			>10,000'	8		0%	Flow	Perforated	1	8	DT1	0%	0	100%	8	0%	0
	Oil	Vertical / Directional	<5,000'	31	0	0%	Pump	Perforated	1	31	SR1	0%	0	100%	31	0%	0
			5,000-10,000'	135	2	1%	Pump	Perforated	1	135	MR1	0%	0	100%	135	0%	0
			>10,000'	2	1	50%	Pump	Perforated	1	2	DR1	0%	0	100%	2	0%	0
		Horizontal	<5,000'	1	0	0%	Pump	Perforated	1	1	SR1	0%	0	100%	1	0%	0
			5,000-10,000'	22	2	9%	Pump	Frac port liner	1	22	MR1	0%	0	100%	22	0%	0
			>10,000'	138	4	3%	Pump	Frac port liner	1	138	DR1	0%	0	100%	138	0%	0
	SWD	Vertical / Directional	<5,000'	4		0%	Injection	Perforated	1	4	ST1	0%	0	25%	1	50%	2
			5,000-10,000'	1		0%	Injection	Perforated	1	1	MT1	0%	0	25%	0	50%	1
			>10,000'														
Socorro	Gas	Vertical / Directional	<5,000'	1		0%	Pump	Perforated	1	1	SR1	0%	0	100%	1	25%	0
			5,000-10,000'														
			>10,000'	2	0	0%	Flow	Perforated	1	2	DT1	0%	0	100%	2	0%	0
Union	Gas	Vertical / Directional	<5,000'	361		0%	Flow	Perforated	1	361	ST1	0%	0	100%	361	25%	90
			5,000-10,000'														
			>10,000'														
	SWD	Vertical / Directional	<5,000'	2	1	50%	Injection	Tubing	1	2	ST1		0	25%	1	0%	0
			5,000-10,000'														
			>10,000'														
	Empty			4						4	E						
													29861		**52052**		**18188**

New Mexico Well Categorization and Wellfile Review Summary - Wells on State Lands

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing %	Intermediate Casing Count	CBL Req'd %	CBL Req'd Count	Flagged Zones Low Cement Top %	Flagged Zones Low Cement Top Count
Chaves	Gas	Vertical / Directional	<5,000'	104	9	9%	Flow	Perforated	1	104	ST1		0	100%	104	50%	52
			5,000-10,000'	168	7	4%	Flow	Perforated	1	168	MT1		0	100%	168	50%	84
			>10,000'	9	6	67%	Flow	Perforated	2	9	DT2	100%	9	100%	9	50%	5
		Horizontal	<5,000'														
			5,000-10,000'	5	3	60%	Flow	Perforated	2	5	MT2		0	100%	5	0%	0
			>10,000'														
	Oil	Vertical / Directional	<5,000'	291	25	9%	Pump	Perforated	1	291	SR1		0	100%	291	50%	146
			5,000-10,000'	21	3	14%	Pump	Perforated	2	21	MR2	100%	21	100%	21	0%	0
			>10,000'	7	5	71%	Pump	Perforated	2	7	DR2	100%	7	100%	7	0%	0
		Horizontal	<5,000'	1	1	100%	Pump	Perforated	2	1	SR2		0	0%	0	0%	0
			5,000-10,000'	16	5	31%	Flow	Perforated	2	10	MT2	100%	10	100%	10	0%	0
							Pump	Frac port liner	2	6	MR2	100%	6	100%	6	0%	0
			>10,000'	22	5	23%	Pump	Frac port liner	2	22	DR2	100%	22	100%	22	0%	0
	SWD	Vertical / Directional	<5,000'	3	1	33%	Injection	Perforated	2	3	ST2	100%	3	25%	1	50%	2
			5,000-10,000'	8	4	50%	Injection	Perforated	2	8	MT2	100%	8	25%	2	50%	4
			>10,000'	3	3	100%	Injection	Perforated	2	3	DT2	100%	3	25%	1	0%	0
		Horizontal	<5,000'														
			5,000-10,000'	1	1	100%	Injection	Perforated	2	1	MT2		0	25%	0	0%	0
			>10,000'														
Lea	Gas	Vertical / Directional	<5,000'	466	27	6%	Flow	Perforated	2	233	ST2	50%	117	100%	233	50%	117
							Pump	Perforated	2	233	SR2		0	100%	233	50%	117
			5,000-10,000'	37	1	3%	Flow	Perforated	2	37	MT2	0%	0	100%	37	75%	28
			>10,000'	366	2	1%	Pump	Perforated	2	366	DR2	100%	366	50%	183	0%	0
		Horizontal	<5,000'														
			5,000-10,000'														
			>10,000'	16	1	6%	Flow	Perforated	2	16	DT2	100%	16	100%	16	25%	4
	Oil	Vertical / Directional	<5,000'	1660	14	1%	Pump	Perforated	1	1660	SR1		0	25%	415	25%	415
			5,000-10,000'	1388	12	1%	Pump	Perforated	2	1388	MR2	100%	1388	100%	1388	0%	0
			>10,000'	539	4	1%	Pump	Perforated	2	539	DR2	100%	539	100%	539	0%	0
		Horizontal	<5,000'	1	1	100%	Pump	Perforated	1	1	SR1		0	100%	1	0%	0
			5,000-10,000'	74	1	1%	Pump	Perforated	1	74	MR1		0	100%	74	0%	0
			>10,000'	1770	15	1%	Flow	Perforated	1	1193	DT1	100%	1193	100%	1193	25%	298
							Pump	Perforated	1	577	DR1	100%	577	25%	144	25%	144
	SWD	Vertical / Directional	<5,000'	19	3	16%	Injection	Perforated	1	10	ST1		0	25%	3	0%	0
							Injection	OH	1	9	ST1		0	25%	2	0%	0
			5,000-10,000'	57	3	5%	Injection	Perforated	1	57	MT1		0	25%	14	50%	29
			>10,000'	71	2	3%	Injection	Perforated	1	71	DT1	100%	71	25%	18	50%	36
Roosevelt	Gas	Vertical / Directional	<5,000'	1	1	100%	Flow	OH	1	1	ST1		0	100%	1	0%	0
			5,000-10,000'	2	2	100%	Flow	Perforated	2	2	MT2		0	100%	2	0%	0
			>10,000'														
		Horizontal	<5,000'														
			5,000-10,000'	1	1	100%	Pump	Perforated	2	1	MR2	100%	1	100%	1	0%	0
			>10,000'														
	Oil	Vertical / Directional	<5,000'	104	9	9%	Flow	Perforated	1	52	ST1		0	100%	52	0%	0
							Pump	Perforated	1	52	SR1		0	100%	52	0%	0
			5,000-10,000'	6	3	50%	Pump	Perforated	2	6	MR2	100%	6	100%	6	0%	0
			>10,000'	1	1	100%	Pump	Perforated	2	1	DR2	100%	1	100%	1	0%	0
		Horizontal	<5,000'	2	1	50%	Flow	Perforated	1	2	ST1		0	100%	2	0%	0
			5,000-10,000'	5	3	60%	Flow	Perforated	1	5	MR1		0	100%	5	0%	0
			>10,000'	2	2	100%	Pump	Perforated	1	2	DR1		0	100%	2	0%	0
	SWD	Vertical / Directional	<5,000'														
			5,000-10,000'	1	1	100%	Injection	Perforated	2	1	MT2	100%	1	25%	0	0%	0
			>10,000'														

New Mexico Well Categorization and Wellfile Review Summary - Wells on State Lands

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing %	Intermediate Casing Count	CBL Req'd %	CBL Req'd Count	Flagged Zones Low Cement Top %	Flagged Zones Low Cement Top Count
Eddy	Gas	Vertical / Directional	<5,000'	14	1	7%	Flow	Perforated	2	14	ST2	100%	14	100%	14	0%	0
			5,000-10,000'	213	8	4%	Flow	Perforated	2	213	MT2	100%	213	100%	213	50%	107
			>10,000'	518	18	3%	Flow	Perforated	2	518	DT2	100%	518	100%	518	50%	259
		Horizontal	<5,000'	2	1	50%	Flow	Perforated	1	2	ST1	100%	2	100%	2	0%	0
			5,000-10,000'	8	1	13%	Flow	Perforated	1	8	MT1	100%	8	100%	8	0%	0
			>10,000'	347	12	3%	Flow	Perf / frac port liner	2	347	DT2	100%	347	100%	347	50%	174
	Oil	Vertical / Directional	<5,000'	1518	14	1%	Pump	Perforated	1	1518	SR1		0	100%	1518	25%	380
			5,000-10,000'	1167	18	2%	Pump	Perforated	1	1167	MR1	100%	1167	100%	1167	25%	292
			>10,000'	358	25	7%	Flow	Perforated	2	179	DT2	100%	179	100%	179	25%	45
							Pump	Perforated	2	179	DR2	100%	179	100%	179	25%	45
		Horizontal	<5,000'	5	2	40%	Pump	Perforated	1	5	SR1		0	100%	5	0%	0
			5,000-10,000'	80	1	1%	Pump	Perforated	1	80	MR1		0				
			>10,000'	776	14	2%	Flow	Perforated	1	388	DT1	100%	388	100%	388	25%	97
							Pump	Perforated	1	388	DR1	100%	388	100%	388	25%	97
	SWD	Vertical / Directional	<5,000'	12	3	25%	Injection	Perforated	2	12	ST2		0	25%	3	0%	0
			5,000-10,000'	31	2	6%	Injection	Perforated	2	31	MT2	50%	16	25%	8	0%	0
			>10,000'	94	9	10%	Injection	Perf / frac port liner	2	94	DT2	50%	47	25%	24	0%	0
Otero	Oil	Vertical / Directional	<5,000'	1	1	100%	Abandoned	Abandoned	-	0		0%	0	0%	0	0%	0
			5,000-10,000'														
			>10,000'														
McKinley	Gas	Vertical / Directional	<5,000'	2	2	100%	Pump	Perforated	1	2	SR1		0	100%	2	0%	0
			5,000-10,000'														
			>10,000'														
	Oil	Vertical / Directional	<5,000'	5	3	60%	Pump	OH	1	5	SR1		0	100%	5	0%	0
			5,000-10,000'														
			>10,000'														
Rio Arriba	Gas	Vertical / Directional	<5,000'	142	6	4%	Flow	Perforated	2	142	ST2	25%	36	100%	142	0%	0
			5,000-10,000'	333	15	5%	Flow	Perforated	2	333	MT2	25%	83	100%	333	0%	0
			>10,000'														
		Horizontal	<5,000'	3	1	33%	Pump	Perforated	1	3	SR1	100%	3	100%	3	0%	0
			5,000-10,000'	17	6	35%	Flow	Perforated	1	17	MT1	100%	17	100%	17	0%	0
			>10,000'														
	Oil	Vertical / Directional	<5,000'														
			5,000-10,000'	37	10	27%	Pump	Perforated	2	19	MR2		0	100%	19	0%	0
							Flow	Perforated	2	18	MT2		0	100%	18	0%	0
			>10,000'														
		Horizontal	<5,000'														
			5,000-10,000'	1	1	100%	Pump	Perforated	1	1	MR1	100%	1	100%	1	0%	0
			>10,000'	5	2	40%	Flow	Perforated	1	5	DT1	100%	5	100%	5	0%	0
	SWD	Vertical / Directional	<5,000'														
			5,000-10,000'	1	1		Injection	Perforated	1	1	MT1	100%	1	25%	0	0%	0
			>10,000'														

New Mexico Well Categorization and Wellfile Review Summary - Wells on State Lands

County	Fluid	Profile	Depth	Count	File Reviews	% Reviewed	Type	Completion	Pools	Type Count	ABD Estimate	Intermediate Casing %	Intermediate Casing Count	CBL Req'd %	CBL Req'd Count	Flagged Zones Low Cement Top %	Flagged Zones Low Cement Top Count
San Juan	Gas	Vertical / Directional	<5,000'	503	25	5%	Flow	Perforated	1	503	ST1	25%	126	100%	503	50%	252
			5,000-10,000'	457	19	4%	Flow	Perforated	1	457	MT1	25%	114	100%	457	50%	229
			>10,000'														
		Horizontal	<5,000'	4	1	25%	Flow	Frac port liner	1	4	ST1		0	100%	4	0%	0
			5,000-10,000'	17	4	24%	Flow	Perf / frac port liner	2	17	MT2		0	100%	17	0%	0
			>10,000'	13	2	15%	Flow	Perf / frac port liner	2	13	DT2		0	100%	13	0%	0
	Oil	Vertical / Directional	<5,000'	17	2	12%	Pump	Perforated	1	17	SR1		0	100%	17	100%	17
			5,000-10,000'	32	8	25%	Flow	Perforated	1	20	MT1		0	100%	20	100%	20
							Pump	Perforated	1	12	MR1		0	100%	12	100%	12
			>10,000'	2	1	50%	Flow	Perforated	1	2	DT1		0	100%	2	0%	0
		Horizontal	<5,000'														
			5,000-10,000'	11	3		Pump	Frac port liner	2	11	MR2	100%	11	50%	6	0%	0
			>10,000'	19	1	5%	Pump	Frac port liner	2	19	DR2	100%	19	50%	10	0%	0
	SWD	Vertical / Directional	<5,000'	7	2	29%	Injection	Perforated	1	7	ST1		0	25%	2	50%	4
			5,000-10,000'	8	2	25%	Injection	Perforated	1	8	MT1		0	25%	2	50%	4
			>10,000'														
Sandoval	Gas	Vertical / Directional	<5,000'	3	2	67%	Flow	Perforated	1	3	ST1		0	100%	3	0%	0
			5,000-10,000'														
			>10,000'														
	Oil	Vertical / Directional	<5,000'														
			5,000-10,000'	6	2	33%	Pump	Perforated	1	6	MR1		0	100%	6	0%	0
			>10,000'	2	1	50%	Pump	Perforated	1	2	DR1		0	100%	2	0%	0
		Horizontal	<5,000'														
			5,000-10,000'	3	1	33%	Pump	Frac port liner	1	3	MR1		0	100%	3	0%	0
			>10,000'	9	2	22%	Pump	Frac port liner	1	9	DR1		0	100%	9	0%	0
Union	SWD	Vertical / Directional	<5,000'	1	1	100%	Injection	Tubing	1	1	ST1		0	25%	0	0%	0
			5,000-10,000'														
			>10,000'														

APPENDIX C

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type ST1

Well Data:

1. Tubing only
2. TMD < 5000 ft
3. 1 Producing Pool

Program:

1. Move in workover rig and support equipment.
2. Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
3. Run bit and scraper, reciprocate scraper over perforated interval.
4. Pull and stand tubing, lay down bit and scraper.
5. Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug.
6. Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
7. With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
8. Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
9. Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
10. Move out workover rig and support equipment.
11. Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type ST1 OPERATION: Abandonment

Days:	1.0	0.5	0.5	1.0	1.0					4.00
Activity Description:	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Balance cement plug	Shoes: perf / run retainer / cement squeeze	Cut and cap					**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap					2000					2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	3750	3750	7500						22,500
Coiled Tubing										-
Cementing			2500	6500						9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250						5,000
Tank Truck		1000	1000	1000						3,000
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL		3500		1500						5,000
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	175	175	350	350					1,400
Packers, Plugs, Cutting tools	500	1500		1500						3,500
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking		1500			1500					3,000
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	148	148	295	295					1,180
Wellsite Supervisor	1200	600	600	1200	1200					4,800
Wellsite Unit	125	63	63	125	125					500
Vehicle	100	50	50	100	100					400
Subsistence										-
SUBTOTALS:	11,320	13,535	9,535	21,320	5,570					61,280

OVERHEAD (3, 2, 1):		
COST +	5%	$ 2,740
COST ESTIMATE TOTAL:		$ 64,020

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type ST2

Well Data:

1. Tubing only
2. TMD < 5000 ft
3. 2 Producing Pools

Program:

1. Move in workover rig and support equipment.
2. Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
3. Run bit and scraper, reciprocate scraper over perforated interval.
4. Pull and stand tubing, lay down bit and scraper.
5. Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug. Repeat for next set of perforations.
6. Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
7. With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
8. Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
9. Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
10. Move out workover rig and support equipment.
11. Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type ST2 OPERATION: Abandonment

Days:	1.0	0.5	0.5	0.5	1.0	1.0				4.50
Activity Description:	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Set plug to isolate perfs and dump cement	Balance Cement Plug	Shoes: perf / run retainer / cement squeeze	Cut and cap				Total Days
LOCATION										TOTAL
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap						2000				2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	3750	3750	3750	7500					26,250
Coiled Tubing										-
Cementing				2500	6500					9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250					6,250
Tank Truck		1000	1000	1000	1000					4,000
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL		3500	3500		1500					8,500
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	175	175	175	350	350				1,575
Packers, Plugs, Cutting tools	500	1500	1500		1500					5,000
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking		1500	1500			1500				4,500
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	148	148	148	295	295				1,328
Wellsite Supervisor	1200	600	600	600	1200	1200				5,400
Wellsite Unit	125	63	63	63	125	125				563
Vehicle	100	50	50	50	100	100				450
Subsistence										-
SUBTOTALS:	11,320	13,535	13,535	9,535	21,320	5,570				74,815

OVERHEAD (3, 2, 1):		
COST +	5%	$ 3,376
COST ESTIMATE TOTAL:		$ 78,191

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type MT1

Well Data:	**1**	Tubing only
	2	TMD 5000 ft to 10,000 ft
	3	1 Producing Pool

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

2020-07-07

VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type MT1 OPERATION: Abandonment

Days:	1.0	0.5	1.0	1.0	1.0					4.50
Activity Description:	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Balance cement plug	Shoes: perf / run retainer / cement squeeze	Cut and cap					**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap					**2000**					**2,000**
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	**7500**	**3750**	**7500**	**7500**						**26,250**
Coiled Tubing										-
Cementing			**2500**	**6500**						**9,000**
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	**1250**	**1250**	**1250**	**1250**						**5,000**
Tank Truck		**1000**	**1000**	**1000**						**3,000**
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL		**3500**		**1500**						**5,000**
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	**350**	**175**	**350**	**350**	**350**					**1,575**
Packers, Plugs, Cutting tools	**500**	**1500**		**1500**						**3,500**
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking		**1500**			**1500**					**3,000**
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	**295**	**148**	**295**	**295**	**295**					**1,328**
Wellsite Supervisor	**1200**	**600**	**1200**	**1200**	**1200**					**5,400**
Wellsite Unit	**125**	**63**	**125**	**125**	**125**					**563**
Vehicle	**100**	**50**	**100**	**100**	**100**					**450**
Subsistence										-
SUBTOTALS:	**11,320**	**13,535**	**14,320**	**21,320**	**5,570**					**66,065**

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 2,939**
COST ESTIMATE TOTAL:		**$ 69,004**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type MT2

Well Data:	**1**	Tubing only
	2	TMD 5000 ft to 10,000 ft
	3	2 Producing Pools

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug. Repeat for next set of perforations.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

2020-07-07

VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type MT2 OPERATION: Abandonment

Days:	1.0	0.5	0.5	1.0	1.0	1.0				5.00
Activity Description:	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Set plug to isolate perfs and dump cement	Balance Cement Plug	Shoes: perf / run retainer / cement squeeze	Cut and cap				**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap						2000				2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	3750	3750	7500	7500					30,000
Coiled Tubing										-
Cementing				2500	6500					9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250					6,250
Tank Truck		1000	1000	1000	1000					4,000
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL		3500	3500		1500					8,500
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	175	175	350	350	350				1,750
Packers, Plugs, Cutting tools	500	1500	1500		1500					5,000
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking		1500	1500			1500				4,500
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	148	148	295	295	295				1,475
Wellsite Supervisor	1200	600	600	1200	1200	1200				6,000
Wellsite Unit	125	63	63	125	125	125				625
Vehicle	100	50	50	100	100	100				500
Subsistence										-
SUBTOTALS:	11,320	13,535	13,535	14,320	21,320	5,570				79,600

OVERHEAD (3, 2, 1):		
COST +	5%	$ 3,575
COST ESTIMATE TOTAL:		$ 83,175

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type DT1

Well Data:

1. Tubing only
2. TMD > 10,000 ft
3. 1 Producing Pool

Program:

1. Move in workover rig and support equipment.
2. Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
3. Run bit and scraper, reciprocate scraper over perforated interval.
4. Pull and stand tubing, lay down bit and scraper.
5. Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug.
6. Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
7. With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
8. Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
9. Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
10. Move out workover rig and support equipment.
11. Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type DT1 OPERATION: Abandonment

Days:	1.5	0.5	1.0	1.5	1.0					5.50
Activity Description:	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Balance Cement Plugs	Shoes: perf / run retainer / cement squeeze	Cut and cap					**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap					**2000**					**2,000**
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	**11250**	**3750**	**7500**	**11250**						**33,750**
Coiled Tubing										-
Cementing			**5000**	**6500**						**11,500**
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	**1250**	**1250**	**1250**	**1250**						**5,000**
Tank Truck		**1000**	**1000**	**1000**						**3,000**
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL		**3500**		**1500**						**5,000**
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	**525**	**175**	**350**	**525**	**350**					**1,925**
Packers, Plugs, Cutting tools	**500**	**1500**		**1500**						**3,500**
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking		**1500**			**1500**					**3,000**
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	**443**	**148**	**295**	**443**	**295**					**1,623**
Wellsite Supervisor	**1800**	**600**	**1200**	**1800**	**1200**					**6,600**
Wellsite Unit	**188**	**63**	**125**	**188**	**125**					**688**
Vehicle	**150**	**50**	**100**	**150**	**100**					**550**
Subsistence										-
SUBTOTALS:	**16,105**	**13,535**	**16,820**	**26,105**	**5,570**					**78,135**

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 3,461**
COST ESTIMATE TOTAL:		**$ 81,596**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type DT2

Well Data:	**1**	Tubing only
	2	TMD > 10,000 ft
	3	2 Producing Pools

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug. Repeat for next set of perforations.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type DT2 OPERATION: Abandonment

Days:	1.5	0.5	0.5	1.0	1.5	1.0				6.00
Activity Description:	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Set plug to isolate perfs and dump cement	Balance Cement Plugs	Shoes: perf / run retainer / cement squeeze	Cut and cap				**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap						**2000**				**2,000**
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	**11250**	**3750**	**3750**	**7500**	**11250**					**37,500**
Coiled Tubing										-
Cementing				**5000**	**6500**					**11,500**
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	**1250**	**1250**	**1250**	**1250**	**1250**					**6,250**
Tank Truck		**1000**	**1000**	**1000**	**1000**					**4,000**
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL		**3500**	**3500**		**1500**					**8,500**
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	**525**	**175**	**175**	**350**	**525**	**350**				**2,100**
Packers, Plugs, Cutting tools	**500**	**1500**	**1500**		**1500**					**5,000**
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking		**1500**	**1500**			**1500**				**4,500**
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	**443**	**148**	**148**	**295**	**443**	**295**				**1,770**
Wellsite Supervisor	**1800**	**600**	**600**	**1200**	**1800**	**1200**				**7,200**
Wellsite Unit	**188**	**63**	**63**	**125**	**188**	**125**				**750**
Vehicle	**150**	**50**	**50**	**100**	**150**	**100**				**600**
Subsistence										-
SUBTOTALS:	**16,105**	**13,535**	**13,535**	**16,820**	**26,105**	**5,570**				**91,670**

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 4,098**
COST ESTIMATE TOTAL:		**$ 95,768**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type SR1

Well Data:	**1**	Tubing & rods
	2	TMD < 5000 ft
	3	1 Producing Pool

Program:	**1**	Move in workover rig and support equipment.
	2	Unseat bottom-hole pump, hot-wash tubing and rods, pull and lay down rods.
		Nipple down wellhead and install blow out preventer (BOP), pull and
	3	stand tubing in derrick.
	4	Run bit and scraper, reciprocate scraper over perforated interval.
	5	Pull and stand tubing, lay down bit and scraper.
		Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top.
		Pressure test retainer and casing to 1,000 psi for 10 minutes.
	6	Dump bail 35' cement on top of the plug.
		Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug.
	7	Repeat as necessary to ensure no more than 3000' between plugs.
	8	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
		Run hydraulic set CICR , set retainer within 50 ft of upper perforations.
	9	Pressure test retainer and casing to 1,000 psi for 10 minutes.
		Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe.
		Apply positive pressure until achieving a stabilized flatline pressure.
		Sting out of retainer and place remaining cement atop retainer (at min.
	10	10 sacks cement), pull and lay down tubing.
	11	Move out workover rig and support equipment.
		Excavate wellhead area to cut casing 6 ft below ground level. Install
		and weld on casing cap, mark the cap using the wells file number and
		document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type SR1 OPERATION: Abandonment

Days:	1.0	1.0	0.5	0.5	1.0	1.0				5.00
Activity Description:	Move in, hot-wash rods and pull	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Balance Cement Plug	Shoes: perf / run retainer / cement squeeze	Cut and cap				**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap						2000				2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	7500	3750	3750	7500					30,000
Coiled Tubing										-
Cementing				2500	6500					9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250					6,250
Tank Truck			1000	1000	1000					3,000
Hot Oiling	1600									1,600
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid	2000									2,000
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL			3500		1500					5,000
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	350	175	175	350	350				1,750
Packers, Plugs, Cutting tools		500	1500		1500					3,500
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500		1500			1500				4,500
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	295	148	148	295	295				1,475
Wellsite Supervisor	1200	1200	600	600	1200	1200				6,000
Wellsite Unit	125	125	63	63	125	125				625
Vehicle	100	100	50	50	100	100				500
Subsistence										-
SUBTOTALS:	15,920	11,320	13,535	9,535	21,320	5,570				77,200

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 3,455**
COST ESTIMATE TOTAL:		**$ 80,655**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type SR2

Well Data:	**1**	Tubing & rods
	2	TMD < 5000 ft
	3	2 Producing Pools

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug. Repeat for next set of perforations.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type SR2 OPERATION: Abandonment

Days:	1.0	1.0	0.5	0.5	0.5	1.0	1.0			5.50
Activity Description:	Move in, hot-wash rods and pull	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Set plug to isolate perfs and dump cement	Balance Cement Plug	Shoes: perf / run retainer / cement squeeze	Cut and cap			**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap							2000			2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	7500	3750	3750	3750	7500				33,750
Coiled Tubing										-
Cementing					2500	6500				9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250	1250				7,500
Tank Truck			1000	1000	1000	1000				4,000
Hot Oiling	1600									1,600
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid	2000									2,000
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL			3500	3500		1500				8,500
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	350	175	175	175	350	350			1,925
Packers, Plugs, Cutting tools		500	1500	1500		1500				5,000
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500		1500	1500			1500			6,000
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	295	148	148	148	295	295			1,623
Wellsite Supervisor	1200	1200	600	600	600	1200	1200			6,600
Wellsite Unit	125	125	63	63	63	125	125			688
Vehicle	100	100	50	50	50	100	100			550
Subsistence										-
SUBTOTALS:	15,920	11,320	13,535	13,535	9,535	21,320	5,570			90,735

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 4,091**
COST ESTIMATE TOTAL:		**$ 94,826**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type MR1

Well Data:	**1**	Tubing & rods
	2	TMD 5000 ft to 10,000 ft
	3	1 Producing Pool

Program:	**1**	Move in workover rig and support equipment.
	2	Unseat bottom-hole pump, hot-wash tubing and rods, pull and lay down rods.
	3	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	4	Run bit and scraper, reciprocate scraper over perforated interval.
	5	Pull and stand tubing, lay down bit and scraper. Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	6	Dump bail 35' cement on top of the plug. Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug.
	7	Repeat as necessary to ensure no more than 3000' between plugs.
	8	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP. Run hydraulic set CICR , set retainer within 50 ft of upper perforations.
	9	Pressure test retainer and casing to 1,000 psi for 10 minutes. Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min.
	10	10 sacks cement), pull and lay down tubing.
	11	Move out workover rig and support equipment. Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type MR1 OPERATION: Abandonment

Days:	1.0	1.0	0.5	1.0	1.0	1.0				5.50
Activity Description:	Move in, hot-wash rods and pull	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Balance Cement Plug	Shoes: perf / run retainer / cement squeeze	Cut and cap				**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap						2000				2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	7500	3750	7500	7500					33,750
Coiled Tubing										-
Cementing				2500	6500					9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250					6,250
Tank Truck			1000	1000	1000					3,000
Hot Oiling	1600									1,600
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid	2000									2,000
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL			3500		1500					5,000
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	350	175	350	350	350				1,925
Packers, Plugs, Cutting tools		500	1500		1500					3,500
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500		1500			1500				4,500
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	295	148	295	295	295				1,623
Wellsite Supervisor	1200	1200	600	1200	1200	1200				6,600
Wellsite Unit	125	125	63	125	125	125				688
Vehicle	100	100	50	100	100	100				550
Subsistence										-
SUBTOTALS:	15,920	11,320	13,535	14,320	21,320	5,570				81,985

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 3,654**
COST ESTIMATE TOTAL:		**$ 85,639**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type MR2

Well Data:	**1**	Tubing & rods
	2	TMD 5000 ft to 10,000 ft
	3	2 Producing Pools

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug. Repeat for next set of perforations.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type MR2 OPERATION: Abandonment

Days:	1.0	1.0	0.5	0.5	1.0	1.0	1.0			6.00
Activity Description:	Move in, hot-wash rods and pull	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Set plug to isolate perfs and dump cement	Balance Cement Plug	Shoes: perf / run retainer / cement squeeze	Cut and cap			**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap							2000			2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	7500	3750	3750	7500	7500				37,500
Coiled Tubing										-
Cementing					2500	6500				9,000
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250	1250				7,500
Tank Truck			1000	1000	1000	1000				4,000
Hot Oiling	1600									1,600
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid	2000									2,000
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL			3500	3500		1500				8,500
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	350	175	175	350	350	350			2,100
Packers, Plugs, Cutting tools		500	1500	1500		1500				5,000
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500		1500	1500			1500			6,000
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	295	148	148	295	295	295			1,770
Wellsite Supervisor	1200	1200	600	600	1200	1200	1200			7,200
Wellsite Unit	125	125	63	63	125	125	125			750
Vehicle	100	100	50	50	100	100	100			600
Subsistence										-
SUBTOTALS:	15,920	11,320	13,535	13,535	14,320	21,320	5,570			95,520

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 4,290**
COST ESTIMATE TOTAL:		**$ 99,810**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type DR1

Well Data:	**1**	Tubing & rods
	2	TMD > 10000 ft
	3	1 Producing Pool

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type DR1 OPERATION: Abandonment

Days:	1.0	1.5	0.5	1.0	1.5	1.0				6.50
Activity Description:	Move in, hot-wash rods and pull	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Balance Cement Plugs	Shoes: perf / run retainer / cement squeeze	Cut and cap				**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap						2000				2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	11250	3750	7500	11250					41,250
Coiled Tubing										-
Cementing				5000	6500					11,500
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250					6,250
Tank Truck			1000	1000	1000					3,000
Hot Oiling	1600									1,600
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid	2000									2,000
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL			3500		1500					5,000
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	525	175	350	525	350				2,275
Packers, Plugs, Cutting tools		500	1500		1500					3,500
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500		1500			1500				4,500
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	443	148	295	443	295				1,918
Wellsite Supervisor	1200	1800	600	1200	1800	1200				7,800
Wellsite Unit	125	188	63	125	188	125				813
Vehicle	100	150	50	100	150	100				650
Subsistence										-
SUBTOTALS:	15,920	16,105	13,535	16,820	26,105	5,570				94,055

OVERHEAD (3, 2, 1):		
COST +	5%	$ 4,176
COST ESTIMATE TOTAL:		$ 98,231

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type DR2

Well Data:	**1**	Tubing & rods
	2	TMD > 10000 ft
	3	2 Producing Pools

Program:	**1**	Move in workover rig and support equipment.
	2	Nipple down wellhead and install blow out preventer (BOP), pull and stand tubing in derrick.
	3	Run bit and scraper, reciprocate scraper over perforated interval.
	4	Pull and stand tubing, lay down bit and scraper.
	5	Run hydraulic set Cast Iron Bridge Plug (CIBP), set within 100' of perforation top. Pressure test retainer and casing to 1,000 psi for 10 minutes. Dump bail 35' cement on top of the plug. Repeat for next set of perforations.
	6	Run tubing to land no more than 3000' from CIBP. Conduct a 100' balanced cement plug. Repeat as necessary to ensure no more than 3000' between plugs.
	7	With wireline, perforate 50 ft below the surface casing shoe, conduct injection test and record ISIP.
	8	Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes.
	9	Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	10	Move out workover rig and support equipment.
	11	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type DR2 OPERATION: Abandonment

Days:	1.0	1.5	0.5	0.5	1.0	1.5	1.0			7.00
Activity Description:	Move in, hot-wash rods and pull	Pull tubing / bit and scraper	Set plug to isolate perfs and dump cement	Set plug to isolate perfs and dump cement	Balance Cement Plugs	Shoes: perf / run retainer / cement squeeze	Cut and cap			**Total Days**
LOCATION										**TOTAL**
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap							2000			2,000
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	7500	11250	3750	3750	7500	11250				45,000
Coiled Tubing										-
Cementing					5000	6500				11,500
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck	1250	1250	1250	1250	1250	1250				7,500
Tank Truck			1000	1000	1000	1000				4,000
Hot Oiling	1600									1,600
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid	2000									2,000
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL			3500	3500		1500				8,500
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350	525	175	175	350	525	350			2,450
Packers, Plugs, Cutting tools		500	1500	1500		1500				5,000
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500		1500	1500			1500			6,000
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	295	443	148	148	295	443	295			2,065
Wellsite Supervisor	1200	1800	600	600	1200	1800	1200			8,400
Wellsite Unit	125	188	63	63	125	188	125			875
Vehicle	100	150	50	50	100	150	100			700
Subsistence										-
SUBTOTALS:	15,920	16,105	13,535	13,535	16,820	26,105	5,570			107,590

OVERHEAD (3, 2, 1):		
COST +	**5%**	**$ 4,813**
COST ESTIMATE TOTAL:		**$ 112,403**

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Type E

Well Data:	**1**	Empty wellbore (dry hole or plugged)
Program:	**1**	Excavate wellhead area to cut casing 6 ft below ground level. Install and weld on casing cap, mark the cap using the wells file number and document each step in the tour report and include photos.

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VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Type E OPERATION: Abandonment

Days:	1.0									1.00
Activity Description:	Cut and cap									Total Days

LOCATION										TOTAL
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap	2000									2,000
Crop Compensation, Equipment Washing										-

SERVICES										
Service Rig (includes swabbing)										-
Coiled Tubing										-
Cementing										-
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-

SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck										-
Tank Truck										-
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-

FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-

WIRELINE										
Cement Bond Log										-
Plug Setting, Perforating, CCL										-
Specialty Logging (noise-temp/inspection)										-
Slickline										-

EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	350									350
Packers, Plugs, Cutting tools										-
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-

DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking	1500									1,500

ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-

SUPERVISION & ENGINEERING										
Engineering	295									295
Wellsite Supervisor	1200									1,200
Wellsite Unit	125									125
Vehicle	100									100
Subsistence										-

SUBTOTALS:	5,570									5,570

OVERHEAD (3, 2, 1):		
COST +	5%	$ 198
COST ESTIMATE TOTAL:		$ 5,768

COST ESTIMATE TO ABANDON WELL

New Mexico State Land Office
Additional Abandonment Work

Activity:	**1**	Run CBL
	2	Intermediate casing shoes: perf / run retainer / cement squeeze
	3	Low cement top (unisolated flagged formations): perf / run retainer / cement squeeze

Program:	**1**	MIRU wireline unit, run CBL.
	2	With wireline, perforate 50 ft below the intermediate casing shoe, conduct injection test and record ISIP. Run hydraulic set CICR , set retainer within 50 ft of upper perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes. Conduct a squeeze to ensure cement inside the casing minimum 50' above and 50' below shoe. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.
	3	With wireline, perforate 50 ft below the bottom of the zone to be isolated, conduct injection test and record ISIP. Run hydraulic set CICR , set retainer within 50 ft of perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes. Conduct a squeeze to ensure cement inside the casing minimum 50' below formation bottom. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing. With wireline, perforate 50 ft above the top of the zone to be isolated, conduct injection test and record ISIP. Run hydraulic set CICR , set retainer within 50 ft of perforations. Pressure test retainer and casing to 1,000 psi for 10 minutes. Conduct a squeeze to ensure cement inside the casing minimum 50' above formation top. Apply positive pressure until achieving a stabilized flatline pressure. Sting out of retainer and place remaining cement atop retainer (at min. 10 sacks cement), pull and lay down tubing.

VERTEX

COST ESTIMATE

CLIENT: New Mexico State Land Office WELL: Additional Abandonment Work OPERATION: Abandonment

Days:	0.50	1.0	1.5							3.00
Activity Description:	Run CBL	Shoes: perf / run retainer / cement squeeze	Low top: perf / run retainer / cement squeeze							Total Days

LOCATION										TOTAL
Grading, Plowing, Towing										-
Back Hoe, Excavating, Cut and Cap										-
Crop Compensation, Equipment Washing										-
SERVICES										
Service Rig (includes swabbing)	3750	7500	11250							22,500
Coiled Tubing										-
Cementing		6500	13000							19,500
Acidizing										-
Fracturing										-
Snubbing										-
Fishing										-
Boiler / Steamer										-
Safety (SABA, shower unit, air monitoring)										-
Safety (medic and MTC)										-
Production Testing										-
Gas & Fluid Analysis										-
Wellhead Equipment / Service										-
SERVICE TRUCKS										
Vacuum Truck										-
Pressure Truck		1250	1250							2,500
Tank Truck		1000	1000							2,000
Hot Oiling										-
Hot Shot										-
Equipment Hauling										-
FLUIDS & MATERIALS										
Completion / Stimulation Fluid										-
Water Management										-
Chemical (de-waxing, H2S scrubber, inhibitor)										-
Disposal										-
WIRELINE										
Cement Bond Log	4500									4,500
Plug Setting, Perforating, CCL		1500	3000							4,500
Specialty Logging (noise-temp/inspection)										-
Slickline										-
EQUIPMENT RENTAL										
Tubing, Collars, Handling Tools										-
Inspection and Repair										-
Motor, Casing Scraper, Bits, Power Swivel										-
Communication, Light Tower										-
Wellhead (isolation tool, valves, etc.)	175	350	525							1,050
Packers, Plugs, Cutting tools		1500	3000							4,500
Matting, Pipe Racks										-
Tanks, Garbage, Toilet etc.										-
Trucking										-
DOWNHOLE EQUIPMENT										
Tubing										-
Packer, Anchor, Profiles										-
Trucking										-
ARTIFICIAL LIFT										
Rod String										-
Downhole Pump										-
Fittings, Piping, etc. (includes installation)										-
Surface Equipment (pump jack, tanks, lines)										-
Trucking										-
SUPERVISION & ENGINEERING										
Engineering	148	295	443							885
Wellsite Supervisor	600	1200	1800							3,600
Wellsite Unit	63	125	188							375
Vehicle	50	100	150							300
Subsistence										-
SUBTOTALS:	9,285	21,320	35,605							66,210

OVERHEAD (3, 2, 1):		
COST +	5%	$ 3,068
COST ESTIMATE TOTAL:		$ 69,278

APPENDIX D

TITLE 19 NATURAL RESOURCES AND WILDLIFE
CHAPTER 15 OIL AND GAS
PART 29 RELEASES

19.15.29.1 ISSUING AGENCY: Oil Conservation Commission.
[19.15.29.1 NMAC - Rp, 19.15.29.1 NMAC, 8/14/2018]

19.15.29.2 SCOPE: 19.15.29 NMAC applies to persons engaged in oil and gas development and production within New Mexico.
[19.15.29.2 NMAC - Rp, 19.15.29.2 NMAC, 8/14/2018]

19.15.29.3 STATUTORY AUTHORITY: 19.15.29 NMAC is adopted pursuant to the Oil and Gas Act, Section 70-2-11 NMSA 1978 (1977) and Section 70-2-12 NMSA 1978 (2004).
[19.15.29.3 NMAC - Rp, 19.15.29.3 NMAC, 8/14/2018]

19.15.29.4 DURATION: Permanent.
[19.15.29.4 NMAC - Rp, 19.15.29.4 NMAC, 8/14/2018]

19.15.29.5 EFFECTIVE DATE: August 14, 2018, unless a later date is cited at the end of a section.
[19.15.29.5 NMAC - Rp, 19.15.29.5 NMAC, 8/14/2018]

19.15.29.6 OBJECTIVE: To require persons who operate or control the release or the location of the release to report the unauthorized release of oil, gases, produced water, condensate or oil field waste including regulated NORM or other oil field related chemicals, contaminants or mixtures of those chemicals or contaminants that occur during drilling, producing, storing, disposing, injecting, transporting, servicing or processing and to establish reporting, site assessment, remediation, closure, variance and enforcement procedures.
[19.15.29.6 NMAC - Rp, 19.15.29.6 NMAC, 8/14/2018]

19.15.29.7 DEFINITIONS:

A. "Major release" means:

(1) an unauthorized release of a volume, excluding gases, of 25 barrels or more;

(2) an unauthorized release of a volume that:

(a) results in a fire or is the result of a fire;

(b) may with reasonable probability reach a watercourse;

(c) may with reasonable probability endanger public health; or

(d) substantially damages property or the environment;

(3) an unauthorized release of gases exceeding 500 MCF; or

(4) a release of a volume that may with reasonable probability be detrimental to fresh water.

B. "Minor release" means an unauthorized release, which is not a major release and is a volume greater than five barrels but less than 25 barrels; or for gases, greater than 50 MCF but less than 500 MCF.

C. "Responsible party" means the operator, as defined in 19.15.2 NMAC. Notwithstanding the foregoing, the division, in its sole discretion, may also consider a person causing the release, or controlling the location of the release as the responsible party.

D. "Wellstream" means the gas, oil, water, suspended constituents, or any combination thereof, which comes from the wellbore.
[19.15.29.7 NMAC - Rp, 19.15.29.7 NMAC, 8/14/2018]

19.15.29.8 RELEASES:

A. Requirements. For all releases regardless of volume, the responsible party shall comply with 19.15.29.8 NMAC and shall remediate the release. For major and minor releases, the responsible party shall also comply with 19.15.29.9, 19.15.29.10, 19.15.29.11, 19.15.29.12 and 19.15.29.13 NMAC.

B. Initial response. The responsible party must take the following immediate actions unless the actions could create a safety hazard that would result in injury.

(1) Source elimination and site security. The responsible party must take appropriate measures to stop the source of the release and limit access to the site as necessary to protect human health and the environment.

(2) Containment. Once the site is secure, the responsible party must contain the materials released by construction of berms or dikes, the use of absorbent pads or other containment actions to limit the area affected by the release and prevent potential fresh water contaminants from migrating to watercourses or areas that could pose a threat to public health and environment. The responsible party must monitor the containment to ensure that it is effectively containing the material and not being degraded by weather or onsite activity.

(3) Site stabilization. After containment, the responsible party must recover any free liquids and recoverable materials that can be physically removed from the surface within the containment area. The responsible party must deliver material removed from the site to a division-approved facility.

(4) Remediation. The responsible party may commence remediation immediately.

[19.15.29.8 NMAC - Rp, 19.15.29.8 NMAC, 8/14/2018]

19.15.29.9 RELEASE NOTIFICATION:

A. The responsible party must notify the division on form C-141 of a major or minor release occurring during the drilling, producing, storing, disposing, injecting, transporting, servicing or processing of oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixture of the chemicals or contaminants, in accordance with the requirements of 19.15.29 NMAC.

B. If state, federal or tribal lands are involved, the responsible party must send a copy of the form C-141 to the appropriate land managing agency including the state land office, the BLM or tribal authority, as applicable.

[19.15.29.9 NMAC - Rp, 19.15.29.9 NMAC, 8/14/2018]

19.15.29.10 RELEASE NOTIFICATION REPORTING REQUIREMENTS: The responsible party must notify the division of releases in 19.15.29.9 NMAC as follows.

A. Reporting a major release.

(1) The responsible party must notify the division's environmental bureau chief and the appropriate division district office verbally or by e-mail within 24 hours of discovery of the release. The notification must provide the information required on form C-141.

(2) The responsible party must also notify the appropriate division district office in writing within 15 days of discovering the release by completing and filing form C-141. The written notification must verify the prior verbal or e-mail notification and include additions or corrections to the information contained in the prior verbal or e-mail notification.

B. Reporting a minor release. The responsible party must notify the appropriate division district office in writing within 15 days of discovery of the release by completing and filing form C-141.

[19.15.29.10 NMAC - Rp, 19.15.29.10 NMAC, 8/14/2018]

19.15.29.11 SITE ASSESSMENT/CHARACTERIZATION: After the responsible party has removed all free liquids and recoverable materials, the responsible party must assess soils both vertically and horizontally for potential environmental impacts from any major or minor release containing liquids.

A. Characterization requirements. The responsible party must submit information characterizing the release to the appropriate division district office within 90 days of discovery of the release or characterize the release by submitting a final closure report within 90 days of discovery of the release in accordance with Subsection E of 19.15.29.12 NMAC. The responsible party may seek an extension of time to submit characterization information for good cause as determined by the division. The responsible party must submit the following information to the division.

(1) Site map. The responsible party must provide a scaled diagram that shows the potentially impacted area, significant surface features including roads and site infrastructure, location of borings, sample points, monitoring wells and subsurface features such as known pipelines to the extent known at the time of submittal including the source of information regarding subsurface features.

(2) Depth to ground water. The responsible party must determine the depth to ground water where the release occurred. If the exact depth to ground water is unknown, the responsible party must provide a reasonable determination of probable ground water depth using data generated by numeric models, cathodic well lithology, water well data, published information or other tools as approved by the appropriate division district office. If the responsible party uses water well data, the responsible party must provide all pertinent well information.

(3) Wellhead protection area. The responsible party must determine the horizontal distance from all known water sources within a half mile of the release including private and domestic water sources. Water

sources are wells, springs or other sources of fresh water extraction. Private and domestic water sources are those water sources used by less than five households for domestic or stock purposes.

(4) Distance to nearest significant watercourse. The responsible party must determine the horizontal distance to the nearest significant watercourse as defined in Subsection P of 19.15.17.7 NMAC within a half mile of any horizontal boundary of the release.

(5) Soil/waste characteristics. The responsible party must determine the lateral and vertical extents of soil contamination, as follows.

(a) If the release occurred within a lined containment area, the responsible party must demonstrate liner integrity after affected material is removed and the affected area of the liner is exposed and provide:

(i) certification on form C-141 that the responsible party has visually inspected the liner where the release occurred and the liner remains intact and had the ability to contain the leak in question; and

(ii) at least two business days' notice to the appropriate division district office before conducting the liner inspection.

(b) If the responsible party is unable to demonstrate liner integrity or the release occurred outside of a lined containment area, the responsible party must delineate the release horizontally and vertically using Table I of 19.15.29.12 NMAC constituents or as required by Subparagraph (e) of Paragraph (5) of Subsection A of 19.15.29.11 NMAC based on the type of release. The responsible party shall use one or more of the following soil sampling methods for characterization:

(i) NRCS Field Guide;

(ii) EPA SW-846;

(iii) ASTM Method 4547;

(iv) EPA 600; or

(v) or other division-approved methods.

(c) In addition to Subparagraph (b) of Paragraph (5) of Subsection A of 19.15.29.11 NMAC, if the release occurred outside of a lined containment area and is in an area where depth to ground water is greater than 50 feet and less than or equal to 100 feet, the responsible party must delineate the vertical extent of the release to the greater of 600 mg/kg chloride or background chloride level, if:

(i) the release contains produced water that exceeds 10,000 mg/l of chloride (if the responsible party contends the fluid is less than 10,000 mg/l, the responsible party must provide current sample results to the division); and

(ii) the release is of an unknown quantity or results in greater than 200 barrels of unrecovered produced water.

(d) If the conditions are met in Subparagraph (c) of Paragraph (5) of Subsection A of 19.15.29.11 NMAC, the responsible party must submit at least two soil samples for laboratory analysis from each borehole or sample point (highest observed contamination and deepest depth investigated). Field screening and assessment techniques are acceptable (headspace, titration, electrical conductivity [include algorithm for validation purposes], electromagnetics, etc.), but the sampling procedures must be clearly defined. The responsible party must submit copies of field notes attributable to field sampling and provide copies of the actual laboratory results including chain of custody documentation.

(e) If a known release of other oil field related chemicals occurs that is not included in Table I of 19.15.29.12 NMAC, and does not include oil, gas, produced water or other fluids from the wellstream, the standards for remediation shall be as follows:

(i) if the constituent appears on Table 1 of 40 C.F.R. 261.24(b), then that constituent shall be remediated according to 40 C.F.R. 261.24;

(ii) if the constituent is not identified in Table 1 of 40 C.F.R. 261.24(b), but is identified in the New Mexico environment department's Risk Assessment Guidance for Site Investigations and Remediation Volumes I and II (assessment), the division will determine the appropriate Assessment Volume and remediation shall occur pursuant to the assessment;

(iii) if the constituent is not identified in Items (i) or (ii) of Subparagraph (e) of Paragraph (5) of Subsection A of 19.15.29.11 NMAC, the division shall consult with the responsible party to determine appropriate remediation of the release.

B. Unless the site characterization report includes completed efforts at remediation, the report must include a proposed remediation plan in accordance with 19.15.29.12 NMAC, which includes the anticipated timelines for beginning and completing the remediation.

C. If the division determines that more information is needed to understand the character of the release and its potential impact on fresh water, public health and the environment, the division may request the responsible party submit additional information. Should the division request additional information, it must do so in writing to the responsible party within 30 days from receipt of the characterization report or remediation plan with what specific information the division is requesting and reasons why the additional information is needed. The responsible party has 14 days to respond to a written request for additional information. If the responsible party disagrees with the request for additional information, it may consult with the division, or file an application for hearing pursuant to 19.15.4 NMAC within 30 days of the issuance of the request for additional information. [19.15.29.11 NMAC - Rp, 19.15.29.11 NMAC, 8/14/2018]

19.15.29.12 REMEDIATION AND CLOSURE:

A. The responsible party must remediate all releases regardless of volume.

B. Remediation requirements.

(1) Unless remediation is completed, and a final closure report submitted, within 90 days of discovery of the release, the responsible party must complete division-approved remediation for releases either pursuant to a remediation plan approved pursuant to 19.15.29.12 NMAC or pursuant to an abatement plan in accordance with 19.15.30 NMAC. If the director determines that the release has caused water pollution in excess of the standards and requirements of 19.15.30 NMAC, the director may notify the responsible party that an abatement plan may be required pursuant to 19.15.30 NMAC.

(2) Any remediation under 19.15.29 NMAC should be completed as soon as practicable. Any remediation that exceeds 90 days must follow the division-approved timeline in the remediation plan. The responsible party may request an extension of time to remediate upon a showing of good cause as determined by the division.

C. Remediation plan requirements. The responsible party must take the following action for any major or minor release containing liquids.

(1) The responsible party must submit a detailed description of proposed remediation measures in accordance with the findings of the site assessment/characterization plan that includes:

(a) delineation results, including laboratory analysis;

(b) a scaled sitemap showing release area with horizontal and vertical delineation points;

(c) estimated volume of impacted material to be remediated;

(d) proposed remediation technique; and

(e) proposed timeline for remediation activities.

(2) The responsible party shall restore the impacted surface area of a release occurring on a developed well pad, central tank battery, drilling site, compressor site or other exploration, development, production or storage sites to meet the standards of Table I of 19.15.29.12 NMAC or other applicable remediation standards and restore and reclaim the area pursuant to 19.15.29.13 NMAC. If contamination is located in areas immediately under or around production equipment such as production tanks, wellheads and pipelines where remediation could cause a major facility deconstruction, the remediation, restoration and reclamation may be deferred with division written approval until the equipment is removed during other operations, or when the well or facility is plugged or abandoned, whichever comes first. The deferral may be granted so long as the contamination is fully delineated and does not cause an imminent risk to human health, the environment, or ground water. Final remediation and reclamation shall take place in accordance with 19.15.29.12 and 19.15.29.13 NMAC once the site is no longer being used for oil and gas operations.

(3) The responsible party shall remediate the impacted surface area of a release not occurring on a lined, bermed or otherwise contained exploration, development, production or storage site to meet the standards of Table I of 19.15.29.12 NMAC or other applicable remediation standards and restore and reclaim the area pursuant to 19.15.29.13 NMAC.

(4) If a release occurs within the following areas, the responsible party must treat the release as if it occurred less than 50 feet to ground water in Table I of 19.15.29.12 NMAC:

(a) within

(i) 300 feet of any continuously flowing watercourse or any other significant watercourse, or

(ii) 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark);

(b) within 300 feet from an occupied permanent residence, school, hospital, institution or church;

(c) within

(i) 500 feet of a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes, or

(ii) 1000 feet of any fresh water well or spring;

(d) within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to Section 3-27-3 NMSA 1978 as amended, unless the municipality specifically approves;

(e) within 300 feet of a wetland;

(f) within the area overlying a subsurface mine;

(g) within an unstable area; or

(h) within a 100-year floodplain.

(5) The division has 60 days from receipt of the proposed remediation plan to review and approve, approve with conditions or deny the remediation plan. If 60 days have lapsed without response from the division, then the plan is deemed denied. If the plan is approved with conditions or affirmatively denied, the division shall provide a written summary of deficiencies on which the decision is based. If the responsible party disagrees with any conditions of approval or denial of the plan, it shall consult with the division or file an application for hearing pursuant to 19.15.4 NMAC within 30 days of the denial or issuance of the conditions.

D. Closure requirements. The responsible party must take the following action for any major or minor release containing liquids.

(1) The responsible party must test the remediated areas for contamination with representative five-point composite samples from the walls and base, and individual grab samples from any wet or discolored areas. The samples must be analyzed for the constituents listed in Table I of 19.15.29.12 NMAC or constituents from other applicable remediation standards.

(a) The responsible party must verbally notify the appropriate division district office two business days prior to conducting final sampling. If the division district office does not respond to the notice within the two business days, the responsible party may proceed with final sampling. The responsible party may request a variance from this requirement upon a showing of good cause as determined by the division.

(b) The responsible party may submit a composite and grab sample plan for the division's review and approval separately or with the remediation plan.

(c) Alternately, without division approval, the responsible party may elect to perform a composite and grab sample plan of the remediated area where each composite sample is not representative of more than 200 square feet.

(2) If all composite and grab sample concentrations are less than or equal to the parameters listed in Table I of 19.15.29.12 NMAC or any conditions of approval, then the responsible party may proceed to backfill any excavated areas.

E. Closure reporting. The responsible party must take the following action for any major or minor release containing liquids.

(1) The responsible party must submit to the division a closure report on form C-141, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The responsible party must certify that all information in the closure report and attachments is correct and that the responsible party has complied with all applicable closure requirements and conditions specified in division rules or directives. The responsible party must submit closure report along with form C-141 to the division within 90 days of the remediation plan approval. The responsible party may apply for additional time to submit the final closure report upon a showing of good cause as determined by the division. The final report must include:

(a) a scaled site and sampling diagram;

(b) photographs of the remediated site prior to backfill;

(c) laboratory analyses of final sampling; and

(d) a description of all remedial activities.

(2) The division district office has 60 days to review and approve or deny the closure report. If 60 days have lapsed without response from the division, then the report is deemed denied. If the report is affirmatively denied, the division shall provide a written summary of deficiencies on which the decision is based. If the responsible party disagrees with denial of the closure report, it may consult with the division or file an application for hearing pursuant to 19.15.4 NMAC within 30 days of the denial.

Table I Closure Criteria for Soils Impacted by a Release			
Minimum depth below any point within the horizontal boundary of the release to ground water less than 10,000 mg/l TDS	Constituent	Method*	Limit**
≤ 50 feet	Chloride***	EPA 300.0 or SM4500 Cl B	600 mg/kg
	TPH (GRO+DRO+MRO)	EPA SW-846 Method 8015M	100 mg/kg
	BTEX	EPA SW-846 Method 8021B or 8260B	50 mg/kg
	Benzene	EPA SW-846 Method 8021B or 8260B	10 mg/kg
51 feet-100 feet	Chloride***	EPA 300.0 or SM4500 Cl B	10,000 mg/kg
	TPH (GRO+DRO+MRO)	EPA SW-846 Method 8015M	2,500 mg/kg
	GRO+DRO	EPA SW-846 Method 8015M	1,000 mg/kg
	BTEX	EPA SW-846 Method 8021B or 8260B	50 mg/kg
	Benzene	EPA SW-846 Method 8021B or 8260B	10 mg/kg
>100 feet	Chloride***	EPA 300.0 or SM4500 Cl B	20,000 mg/kg
	TPH (GRO+DRO+MRO)	EPA SW-846 Method 8015M	2,500 mg/kg
	GRO+DRO	EPA SW-846 Method 8015M	1,000 mg/kg
	BTEX	EPA SW-846 Method 8021B or 8260B	50 mg/kg
	Benzene	EPA SW-846 Method 8021B or 8260B	10 mg/kg

*Or other test methods approved by the division.
**Numerical limits or natural background level, whichever is greater.
***This applies to releases of produced water or other fluids, which may contain chloride.
[19.15.29.12 NMAC - N, 8/14/2018]

19.15.29.13 RESTORATION, RECLAMATION AND RE-VEGETATION:

A. The responsible party must substantially restore the impacted surface areas to the condition that existed prior to the release or their final land use. Restoration of the site must include the replacement of removed material and must be replaced to the near original relative positions and contoured to achieve erosion control, long-term stability and preservation of surface water flow patterns.

B. Areas reasonably needed for production operations or for subsequent drilling operations must be compacted, covered, paved or otherwise stabilized and maintained in such a way as to minimize dust and erosion to the extent practical.

C. The responsible party must construct the soil cover to the site's existing grade and prevent ponding of water and erosion of the cover material.

D. Reclamation of areas no longer in use. The responsible party shall reclaim all areas disturbed by the remediation and closure, except areas reasonably needed for production operations or for subsequent drilling

operations, as early and as nearly as practical to their original condition or their final land use and maintain those areas to control dust and minimize erosion to the extent practical.

(1) The reclamation must contain a minimum of four feet of non-waste containing, uncontaminated, earthen material with chloride concentrations less than 600 mg/kg as analyzed by EPA Method 300.0, or other test methods approved by the division. The soil cover must include a top layer, which is either the background thickness of topsoil or one foot of suitable material to establish vegetation at the site, whichever is greater.

(2) The responsible party must reseed disturbed area in the first favorable growing season following closure of the site.

(3) The division will consider reclamation of all disturbed areas complete when uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent of pre-disturbance levels and a total percent plant cover of at least seventy percent of pre-disturbance levels, excluding noxious weeds.

(4) For any major or minor release containing liquids, the responsible party must notify the division when reclamation and re-vegetation are complete.

E. The surface restoration, reclamation and re-vegetation obligations imposed by federal or state agencies or tribes on lands managed or owned by those agencies supersede these provisions and govern the obligations of any responsible party subject to those provisions, provided that the other requirements provide equal or better protection of fresh water, human health and the environment.

[19.15.29.13 NMAC - N, 8/14/2018]

19.15.29.14 VARIANCES:

A. A responsible party may file a written request for a variance from any requirement of 19.15.29 NMAC with the appropriate division district office. The variance request must include:

(1) a detailed statement explaining the need for a variance; and

(2) a detailed written demonstration that the variance will provide equal or better protection of fresh water, public health and the environment.

B. The division district office must approve or deny the variance in writing within 60 days of receipt. If the division district office denies the variance, it must provide the responsible party with the reasons for denial.

C. If the division district office does not approve or deny a request for variance from the requirements of 19.15.29 NMAC within 60 days of the date the request for variance is received by the division district office, then the request for variance is deemed denied and the responsible party may file an application for a hearing pursuant to 19.15.4 NMAC within 30 days of the denial.

D. If the responsible party requests a hearing pursuant to 19.15.4 NMAC within 30 days after receipt of notice, the division must set the matter for hearing with notice to the responsible party and appropriate division district office.

E. In addition to the notice provisions in 19.15.4 NMAC, the responsible party must provide notice of the hearing on the request for variance to the surface owner of the site by certified mail, return receipt requested, at least 20 days prior to the date of the hearing.

F. Variances must receive division approval prior to implementation.

[19.15.29.14 NMAC - N, 8/14/2018]

19.15.29.15 ENFORCEMENT:

A. The responsible party must comply with all the requirements of 19.15.29 NMAC. The division may take enforcement action against any responsible party who does not comply with 19.15.29 NMAC pursuant to 19.15.5.10 NMAC.

B. A responsible party may enter an agreed compliance order with the division for any violation of 19.15.29 NMAC, except for 19.15.29.9 NMAC. An agreed compliance order may be entered prior to or after the filing of an application by the division or any other party for an administrative compliance proceeding. Any administrative compliance order will have the same force and effect as a compliance order issued after an adjudicatory hearing.

C. The director or the director's designee may deny any application or permit, including but not limited to, a permit to drill, deepen or plug back a well if the responsible party is not in compliance with a court order, agreed compliance order or administrative compliance order arising from 19.15.29 NMAC.

D. If the division or other party files an administrative enforcement application, the provisions of 19.15.4 NMAC apply to the enforcement proceeding, unless altered or amended by 19.15.5.10 NMAC or 19.15.29 NMAC.

[19.15.29.15 NMAC - N, 8/14/2018]

19.15.29.16 TRANSITIONAL PROVISIONS:

A. Responsible parties with current ongoing corrective actions/remediation with approved plans and timelines as of August 14, 2018 do not have to submit revised plans.

B. Responsible parties with ongoing corrective actions/remediation without approved timelines or plans as of August 14, 2018 must submit a characterization plan or corrective action/remediation plan with proposed timeframes within 90 days of August 14, 2018.

[19.15.29.16 NMAC - N, 8/14/2018]

HISTORY of 19.15.29 NMAC:

History of Repealed Material:

19.15.3 NMAC, Drilling (filed 10/29/2001) repealed 12/1/2008.

19.15.29 NMAC, Release Notification (filed 12/1/2008) was repealed effective 8/14/2018.

NMAC History:

That applicable portion of 19.15.3 NMAC, Drilling (Section 116) (filed 10/29/2001) was replaced by 19.15.29 NMAC, Release Notification, effective 12/1/2008.

19.15.29 NMAC, Release Notification (filed 12/1/2008) was repealed and replaced by 19.15.29, Releases, effective 8/14/2018.