U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, S.E.
Washington, D.C. 20590

MAY - 6 2015

Mr. Scott Bliss
Legacy Reserves Operating LP
P.O. Box 2850
Cody, WY 82414

Dear Mr. Bliss:

In a letter to the Pipeline and Hazardous Materials Safety Administration (PHMSA) dated August 8, 2014, you requested an interpretation on your Fourbear Gathering Pipeline System located in Park County, Wyoming and the applicability of 49 CFR Part 195 to this pipeline system. The system transports crude oil from production fields in Park County to the Oregon Basin Station where it enters a pipeline system operated by Marathon. You provided an Applicability Study detailing system specifications and operations.

You described the Fourbear Gathering Pipeline System as a low-stress system operating below 20 percent specified minimum yield strength (SMYS) and located in a rural area. You stated that the Fourbear Gathering Pipeline System is unique in design—telescoping from 6-inch to 8-inch, then 10-inch pipe as it travels between pumps. In addition, while the 6-inch and 8-inch segments of the pipeline are within a quarter mile of an unusually sensitive area (USA), the 10-inch segments of the pipeline system are not within a half mile of a USA. Therefore, you believe that the 6-inch and 8-inch segments of the system are rural, non-regulated gathering and the 10-inch segments of the pipeline are Category 3 low-stress pipeline.

Section 195.1(b)(4) states:

> § 195.1 Which pipelines are covered by this Part?
> ...
> (b) Excepted. This Part does not apply to any of the following:
> ...
> (4) Transportation of petroleum through an onshore rural gathering line that does not meet the definition of a ''regulated rural gathering line'' as provided in § 195.11. This exception does not apply to gathering lines in the inlets of the Gulf of Mexico subject to § 195.413;

Section 195.11(a) states:

> § 195.11 What is a regulated rural gathering line and what requirements apply?
> Each operator of a regulated rural gathering line, as defined in paragraph (a) of this section, must comply with the safety requirements described in paragraph (b) of this section.
> (a) Definition. As used in this section, a regulated rural gathering line means an onshore gathering line in a rural area that meets all of the following criteria—
> (1) Has a nominal diameter from 6⅝ inches (168 mm) to 8⅝ inches (219.1 mm);
> (2) Is located in or within one-quarter mile (.40 km) of an unusually sensitive area as defined in § 195.6; and
> (3) Operates at a maximum pressure established under §195.406 corresponding to—
> (i) A stress level greater than 20-percent of the specified minimum yield strength of the line pipe; or
> (ii) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure of more than 125 psi (861 kPa) gage.

Also, for low stress pipelines § 195.12 states:

> § 195.12 What requirements apply to low-stress pipelines in rural areas?
> (a) General. This Section sets forth the requirements for each category of low-stress pipeline in a rural area set forth in paragraph (b) of this Section. This Section does not apply to a rural low-stress pipeline regulated under this Part as a low-stress pipeline that crosses a waterway currently used for commercial navigation; these pipelines are regulated pursuant to § 195.1(a)(2).
> (b) Categories. An operator of a rural low-stress pipeline must meet the applicable requirements and compliance deadlines for the category of pipeline set forth in paragraph (c) of this Section. For purposes of this Section, a rural low-stress pipeline is a Category 1, 2, or 3 pipeline based on the following criteria:
> (1) A Category 1 rural low-stress pipeline:
> (i) Has a nominal diameter of 8⅝ inches (219.1 mm) or more;
> (ii) Is located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in § 195.6; and
> (iii) Operates at a maximum pressure established under § 195.406 corresponding to:

(A) A stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or
(B) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gauge.
(2) A Category 2 rural pipeline:
(i) Has a nominal diameter of less than 8⅝ inches (219.1mm);
(ii) Is located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in § 195.6; and
(iii) Operates at a maximum pressure established under § 195.406 corresponding to:
(A) A stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or
(B) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gage.
(3) A Category 3 rural low-stress pipeline:
(i) Has a nominal diameter of any size and is not located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in § 195.6; and
(ii) Operates at a maximum pressure established under § 195.406 corresponding to a stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or
(iii) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gage.

Based on the information you provided, it appears that you have correctly classified the 10-inch diameter portion of the Fourbear Gathering Pipeline System as a regulated low-stress Category 3 pipeline in accordance with § 195.12(b)(3). With respect to the 6-inch and 8-inch portions of the system, if they continue to meet all other criteria for classification as unregulated gathering lines, they can remain classified as unregulated gathering lines.[1] With respect to any line segment that has a diameter change in between pumps, while you would have the option of treating the 6-inch and/or 8-inch portion of that segment as unregulated, we would note that many requirements that would apply to the 10-inch portion, such as cathodic protection, may

[1] Nothing in this interpretation letter is intended to express any views about any other representations or conclusions in the August 8, 2014, Hazardous Liquid Pipeline Applicability Study provided with your request.

protect the entire segment and many operators treat an entire line segment running between pump stations as regulated for various purposes including mapping and incident reporting if any portion of the segment is regulated.

If we can be of further assistance, please contact Tewabe Asebe of my staff at 202-366-5523.

Sincerely,

John A. Gale
Director, Office of Standards
and Rulemaking

Delivered via USPS to PHMSA

August 8, 2014

Office of Pipeline Safety
Pipeline and Hazardous Materials Safety Administration (PHMSA)
Department of Transportation, PHP 30
1200 New Jersey Avenue, SE
Washington, DC 20590-0001
Attn: Interpretations

Re: Legacy Reserves Fourbear Gathering Pipeline System Interpretation Request

Dear Interpretations:

Legacy Reserves, LP (Legacy) is requesting an official Interpretation on its Fourbear Gathering Pipeline System and the applicability of 49 CFR 195 to the hazardous liquid system located in Park County, WY. Included with this letter is an Applicability Study detailing system specifications and operations.

The Fourbear Gathering Pipeline System is unique in design, telescoping from 6 inch, to 8 inch, then 10 inch pipe as it travels between pump stations. The system functions as a hazardous liquid gathering system from production fields in Park County, WY. The complexity of the system required evaluating the 6 inch and 8 inch pipe segments as gathering and the 10 inch segments as transmission pipeline. The Fourbear Gathering Pipeline System is a low stress system operating below 20% specified minimum yield strength (SMYS) and located in a rural area. Additionally, while the 6 inch and 8 inch segments of the pipeline are within a quarter mile of an unusually sensitive area (USA), the 10 inch segments of the pipeline system are not within a half mile of a USA. Therefore, Legacy concludes the 6 inch and 8 inch segments of the system are rural, non-regulated gathering and the 10 inch segments of the pipeline are Category 3 low stress pipeline.

Based on these conclusions, Legacy will implement programs to address the requirements for Category 3 low stress pipelines in accordance with 49 CFR 195.

If, after reading the enclosed Applicability Study, PHMSA disagrees with Legacy's determination, please contact me at 307- 527-8981 or sbliss@legacylp.com.

Sincerely,

Scott Bliss
Legacy Reserves, LP

Cc: Terry Larson, Western Region, PHMSA

Hazardous Liquid Pipeline Applicability Study

Fourbear Gathering Pipeline System

Prepared for:

1501 Stampede Ave., 3rd Floor, Suite 3170
Cody, WY 82414

Project Number: LEGRES-2014-0194
Date: August 8, 2014

RAISING YOUR
RETURN ON
INTEGRITY

Contents

1 Introduction

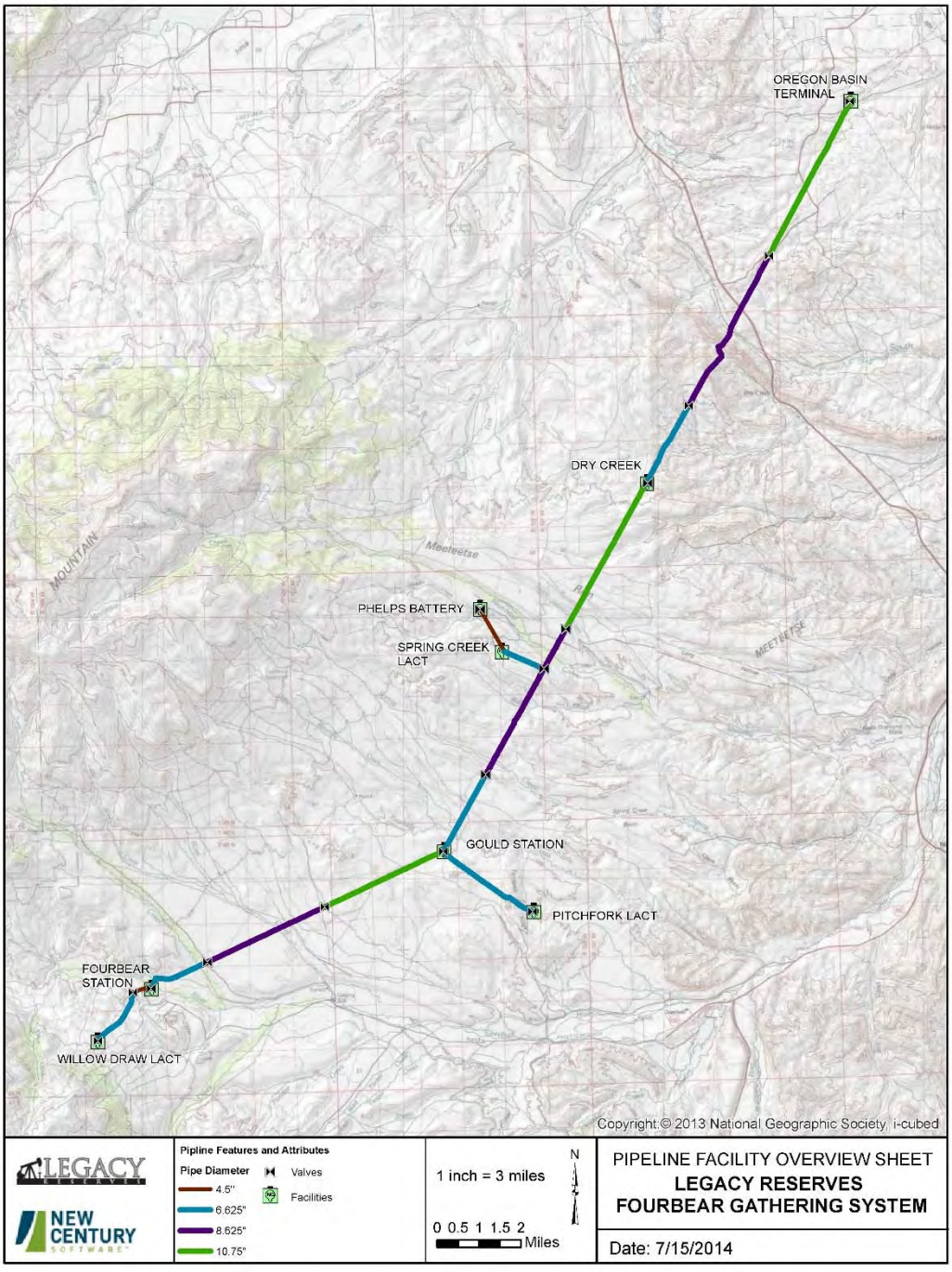
Consistent with regulations codified in 49 CFR 195 and Legacy Reserves' business practices, Legacy Reserves performs an Applicability Study of the Pipeline and Hazardous Materials Safety Administration's (PHMSA) regulations, in order to comply with the applicable sections of the Hazardous Liquid rule. In support of this effort, New Century Software (New Century) was contracted by Legacy Reserves to assist with this Applicability Study.

New Century's DOT Compliance Team performed an analysis on each subpart of the regulations listed in 49 CFR 195 to determine the applicability of that subsection. Rural regulated gathering, low stress pipeline categories, control room management and integrity management were evaluated for each segment of the pipeline. New Century also evaluated the Fourbear Gathering Pipeline System for 49 CFR 194 applicability.

2 Asset Description

Legacy Reserves operates a telescoping 6, 8, and 10-inch crude oil pipeline, constructed in 1958 and located in Park County, WY. The 35 mile Fourbear Gathering Pipeline System consists of three major segments between the Fourbear, Gould, Dry Creek and Oregon Basin Stations. Each segment telescopes through 6, 8 and 10-inch pipeline, beginning with the 6 inch segments on the discharge side of each station. Shown in Figure 1, *Map of Legacy Reserves Fourbear Gathering System,* is a map of the current asset.

Figure 1: Map of Legacy Reserves Fourbear Gathering System



The Fourbear Gathering Pipeline System is a jointly owned pipeline operated by Legacy Reserves. Ownership of the line includes Legacy Reserves, Marathon Oil Company (Marathon), PO&G Resources and Breitburn Energy Partners LP (Breitburn). The Fourbear Gathering Pipeline System collects oil produced from local production facilities and delivers the oil to custody transfer point

at Oregon Basin Station, where the oil enters a transmission/transportation system owned and operated by Marathon.

Despite the 10-inch segments of the Fourbear Gathering Pipeline System, the function of the pipeline is as a gathering pipeline with tie-ins from production operations occurring in a few locations along the pipeline. Accordingly, flow rates increase further downstream on the pipeline. Approximately 600 barrels per day of oil are pumped from the Fourbear Station, an additional 1200 barrels a day ties-in at the Gould Station, and another 3,100 barrels a day feeds the line between Gould and Dry Creek Station, totaling an approximate 4,900 barrels per day at the custody transfer point.

The oil is high in paraffin and maintains high viscosity values, which pose operational challenges to pumping it through a pipeline. Therefore, Legacy Reserves heats the oil at each pump station and injects up to 20 percent condensate at the Fourbear Station in order to bring viscosity values down and to facilitate delivery from production operations and transportation to Marathon's Red Butte Pipeline.

3 Applicability Determination

New Century SMEs analyzed each part of the following regulations in order to determine the applicability of the regulation to Legacy Reserves' asset.

3.1 49 CFR 195.1; General Applicability

The specific applicability requirements associated with part 49 CFR 195.1 are listed in Appendix A, *49 CFR 195 Applicability Questionnaire*. This spreadsheet provides a logic flow of questions, answered by the project team which determines the applicability of parts 49 CFR 195.1(a) and identifies any exceptions listed in 49 CFR 195.1(b).

When evaluated against 49 CFR 195.1(a) and 49 CFR 195.1(b), New Century concluded the Fourbear Gathering Pipeline System required additional evaluation under 49 CFR 195.11 and 49 CFR 195.12. Specifically, entire system serves as a rural gathering system, and the 6- and 8-inch segments required evaluation under 49 CFR 195.11 to determine regulated status. As provided in Section 3.1.1, *49 CFR 195.11; Regulated Rural Gathering Applicability*, the 6- and 8-inch segments are considered rural non-regulated gathering and therefore are not subject to the requirements of 49 CFR 195.

The 10" segments, while serving as rural gathering pipelines, do not meet the diameter restriction for a defined gathering line. These segments were identified as jurisdictional to 49 CFR 195.1 and were further evaluated for classification as rural low stress pipelines.

10-inch

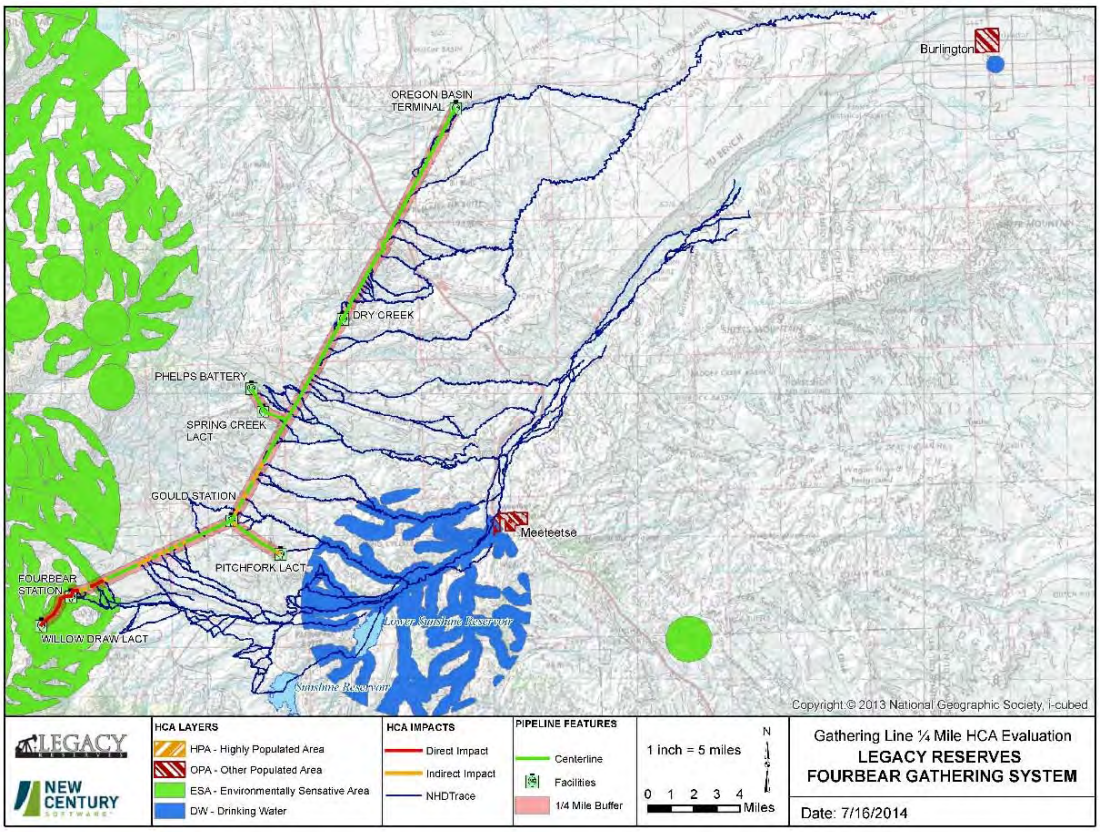
3.1.1 6- and 8-inch 10-inch 49 CFR 195.11; Regulated Rural Gathering Applicability

The applicability determination factors for regulated rural gathering lines are listed in 49 CFR 195.11. Appendix A, *49 CFR 195 Applicability Questionnaire*, provides a logic flow of questions,

answered by the project team which determines if the pipeline is considered to be a regulated rural gathering line, in accordance with the regulations codified in 49 CFR 195.11.

The 6- and 8-inch 6- and 8-inch segments of the pipeline are within one-quarter mile of an unusually sensitive area (USA), as shown in, Figure 2, *Gathering Line ¼ Mile USA Evaluation*. However, the entire pipeline, including the 6- and 8-inch segments, is located in a rural area and operates below 20% specified minimum yield strength (SMYS), as demonstrated in Appendix B, *Low Stress Documentation*. Therefore, the 6- and 8-inch segments do not meet the definition of regulated rural gathering line under 49 CFR 195.11, and are not subject to requirements of 49 CFR 195.

Figure 2: Gathering Line ¼ Mile USA Evaluation



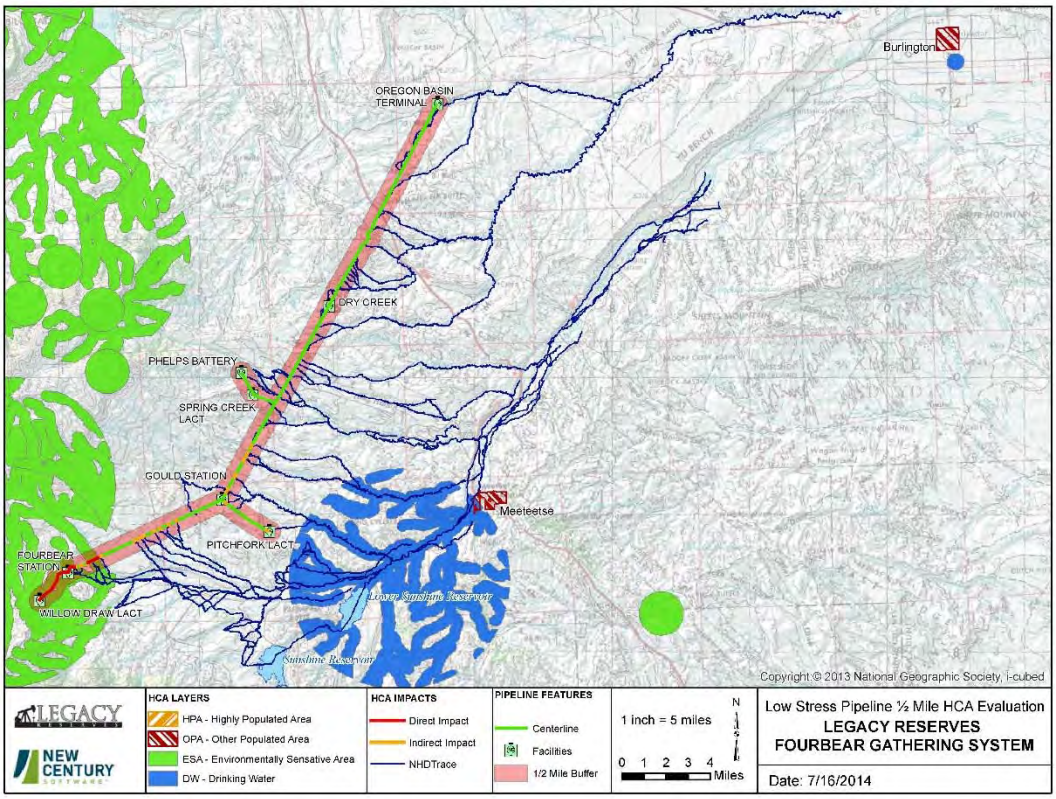
3.1.2 49 CFR 195.12; Low-Stress Rural Applicability

The applicability determination factors for rural, low-stress pipelines are listed in 49 CFR 195.12. Appendix A, *49 CFR 195 Applicability Questionnaire*, provides a logic flow of questions, answered by the project team which determines if the pipeline is considered to be a rural, low-stress pipeline, and its corresponding category, per the regulations.

The 10-inch segments of the pipeline are not within a half mile of an USA and the entire pipeline including the 10-inch segments is located in a rural area and operates below 20% SMYS, Figure 3,

Low Stress Pipeline ½ Mile HCA Evaluation and Appendix B, *Low Stress Documentation*. Thus, New Century classifies the 10-inch segments of the pipeline to be Category 3, low stress rural pipeline.

Figure 3: Low Stress Pipeline ½ Mile HCA Evaluation



3.1.3 Breakout Tanks

In addition to evaluating line pipe for applicability, New Century also evaluated stations and tanks along the Fourbear Gathering Pipeline System to determine jurisdictional status. The definition of a breakout tank is, "a tank used to (a) relieve surges in a hazardous liquid pipeline system or (b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation by pipeline." The Fourbear Gathering Pipeline System includes four pump stations with tanks, Fourbear Station, Gould Station, Dry Creek Station, and Oregon Basin Station. At the inlet of each station, the line enters a manifold capable of diverting the product to a tank or receiving product from the tank. The valves at the manifold are considered the delineation points between line pipe and station piping. Downstream of the inlet manifold, line heaters followed by shipping pumps prepare the product for continued transportation by pipeline. Valves at the outlet of the pumps are considered the delineation between end of station piping and beginning of line pipe.

While the tanks located at each of the stations appear to meet the definition of breakout tanks by receiving product from line pipe for continued transportation by line pipe, New Century has

concluded that the jurisdictional status of the incoming and outgoing pipelines affects the jurisdiction status of the stations and associated tankage. Due to the system design and the determination that only the 10-inch segments of the gathering system are jurisdictional under 49 CFR 195, New Century has concluded that the stations and tanks are not jurisdictional to 49 CFR 195, as they discharge into non-regulated rural pipelines.

3.2 49 CFR 195.446; Control Room Management Applicability

Following applicability determination and identifying portions of the Fourbear Gathering Pipeline System that are regulated under 49 CFR 195.12, New Century evaluated the Fourbear Gathering Pipeline System to determine if the pipeline system is subject to the control room regulations codified in 49 CFR 195.446.

Based on the applicability determination presented in Appendix C, *Control Room Determination Documentation*, which documents the lack of a SCADA system, New Century has concluded that Legacy does not operate a regulated control room for the Fourbear Gathering Pipeline System.

3.3 49 CFR 195.452; Integrity Management Applicability

New Century evaluated the Fourbear Gathering Pipeline System to determine if the pipeline system is subject to 49 CFR 195.452, the integrity management requirements. Given that New Century has determined the 6- and 8-inch segments are non-regulated rural gathering, those segments are not subject to the integrity management portion of the regulation. Additionally, New Century's determination the 10-inch segments of the pipeline are Category 3 low stress pipeline, those segments are not subject to 49 CFR 195.452. Therefore, the Integrity Management requirements do not apply to the Fourbear Gathering Pipeline System.

3.4 49 CFR 194; Onshore Response Plans Applicability

New Century performed an applicability study to determine if the Fourbear Gathering Pipeline System could reasonably be expected to cause substantial harm, or significant and substantial harm to the environment by releasing into navigable waters as defined in 49 CFR 194.

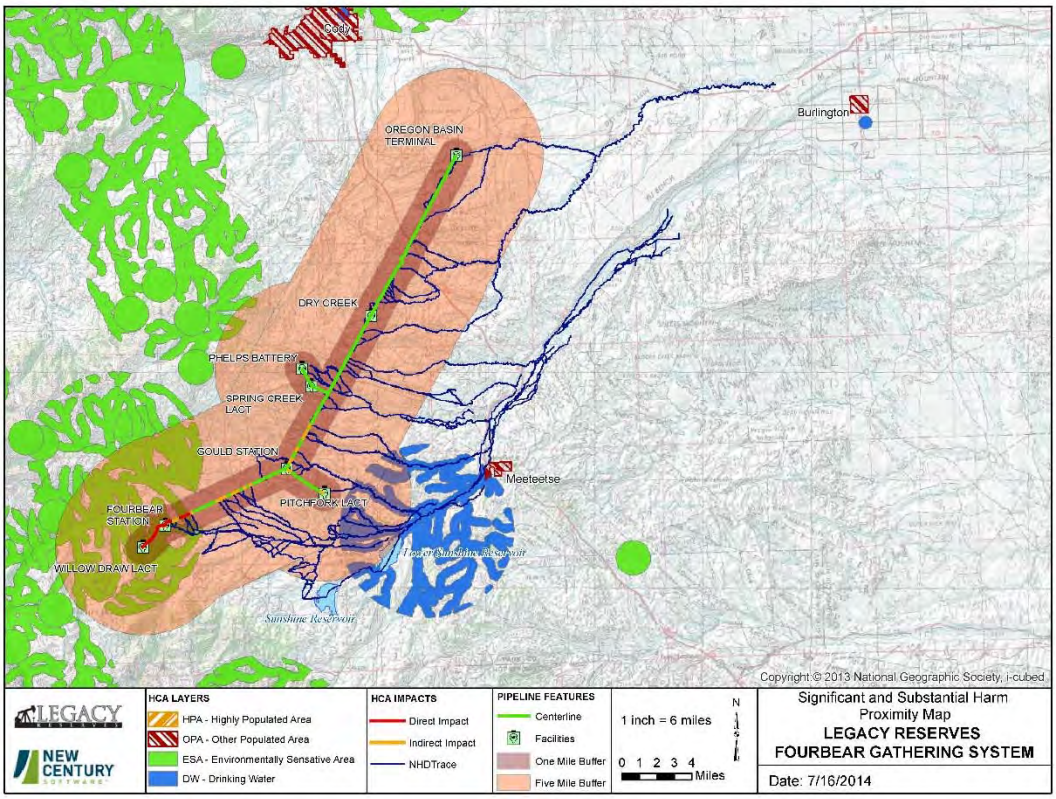
Asset input data was based on the Fourbear Gathering Pipeline System description in Section 2 and shown in Figure 1, *Map of Legacy Reserve's Fourbear Gathering System* is a map of the current asset.

National Pipeline Mapping System (NPMS) receptors intended for pipeline integrity management were used, focusing on Drinking Water sources.

The specific applicability requirements associated with part 49 CFR 194 are listed in Appendix D, *49 CFR 194 Applicability Flowcharts*. These flowcharts provide a logic flow of questions, answered by the project team which determines the applicability of 49 CFR 194.101(a), identifies any exceptions listed in 49 CFR 194.101(b), and determines if a pipeline discharge could cause substantial harm or significant and substantial harm as discussed in 49 CFR 194.103. New Century SMEs analyzed the regulations in order to determine the applicability of the regulation to Legacy Reserve's asset.

In accordance with the applicability statement in 49 CFR 194.3, "This part applies to an operator of an onshore oil pipeline that, because of its location, could reasonably be expected to cause substantial harm, or significant and substantial harm to the environment by discharging oil into or on any navigable waters of the United States or adjoining shorelines," New Century performed a buffering analysis to determine potential impacts. The results shown in Figure 4, *Significant and Substantial Harm Proximity Map* indicate a drinking water source within 5 miles of the Fourbear Gathering Pipeline System meeting the significant and substantial harm definition. Additionally, drainages in the area indicate the gathering system has the potential to cause substantial harm to the Middle Grey Bull Watershed. As a result, New Century has determined 49 CFR 194 is applicable to the Fourbear Gathering Pipeline System.

Figure 4: Release Modeling Map



3.5 State Specific Regulation Applicability

Legacy Reserves' pipeline operates in Park County in the state of Wyoming. The state of Wyoming does not regulate hazardous liquid pipeline under 49 CFR 195, only gas pipeline. Therefore, jurisdiction for 49 CFR 195 remains at the Federal level with the Pipeline and Hazardous Materials Safety Administration (PHMSA).

4 Regulatory Requirements

Based on the information and data provided during the course of this project, the 6- and 8-inch segments of pipeline were determined to be non-regulated rural gathering and the 10 segments of pipeline were determined to be Category 3 low stress pipeline. As of the date of this study, based on the applicability determination identified in section 3, the regulations require the following activities/programs. Should any new information become available that could alter the conclusions contained in this study, New Century recommends that Legacy Reserves reevaluate the Fourbear Gathering Pipeline System to identify any changes in regulatory applicability:

- Subpart A; General
  - This subsection encompasses the safety standards and reporting requirements for pipeline facilities used in the transportation of hazardous liquids or carbon dioxide. Part A identifies which pipelines are covered, definitions and incorporations by reference, non-steel pipelines, unusually sensitive areas (USAs), rural gathering, and low stress.
- Subpart B; Annual, Accident, and Safety-Related Condition Reporting
  - This subsection prescribes requirements for periodic reporting as well as reporting of accidents and safety-related conditions. Includes annual reports, accident reports, safety-related condition reports, abandonment/deactivation reports, and agency contact information.
- Subpart C; Design Requirements
  - This subsection identifies the minimum design standards that steel pipeline systems must meet as well as design requirements associated with relocating, replacing, or changing existing systems.
- Subpart D; Construction
  - This subsection identifies the minimum construction requirements that steel pipe systems must meet as well as construction requirements associated with relocating, replacing, or changing existing systems.
- Subpart E; Pressure Testing
  - This subsection delineates the conditions under which an operator must pressure test pipelines, risk-based alternatives to pressure testing, and minimum standards associated with performing pressure tests.
- Subpart F; Operation and Maintenance
  - This subsection governs the operations and maintenance of the pipeline. Includes activities such as normal, abnormal, and emergency operation of the pipeline. General maintenance and inspection activities, security requirements, public awareness, damage prevention, leak detection, control room management, and integrity management.
  - As previously determined regulations pertaining to control room management and integrity management do not apply to this pipeline system.

- Subpart G; Qualification of Pipeline Personnel
    - This subsection governs the minimum requirements of qualification individuals performing covered tasks on the pipeline must meet. It also mandates how the qualification program must function, and what records must be kept.
- Subpart H; Corrosion Control
    - This subsection provides minimum requirements for protecting steel pipeline against corrosion. It provides guidance on the design, installation, inspection, maintenance, and remediation of corrosion prevention technology.

Appendix A: 49 CFR 195 Applicability Questionnaire

Appendix A1: 49 CFR 195.1 6- and 8-inch Applicability Questionnaire

Appendix A2: 49 CFR 195.1 10-inch Applicability Questionnaire

Appendix A3: 49 CFR 195.11 6- and 8-inch Applicability Questionnaire for Gathering Pipelines

Appendix A4: 49 CFR 195.12 10-inch Applicability Questionnaire for Low Stress Pipelines

Appendix A1: 49 CFR 195.1 6- and 8-inch Applicability Questionnaire

Operator: Legacy Reserves
Pipeline ID: Fourbear Gathering System (10" segments only)
Date: August 8, 2014

49 CFR 195.1 - Applicability Questionnaire

Regulation	Question	Answer	Comments
This column is the actual language codified in 49 CFR 195.1 - this section is simply for reference	This column translates the regulatory language into easily answerable questions	This section contains drop down menus that offer Yes/No answers to the questions on the left.	This column includes miscellaneous items of note.
49 CFR 195.1(a) - COVERED			
(a) *Covered.* Except for the pipelines listed in paragraph (b) of this Section this Part applies to			
Pipeline facilities	Is the asset a pipeline facility?	Yes	
And the transportation of hazardous liquids	Does the pipeline transport hazardous liquids?	Yes	Crude Oil
Or carbon dioxide	Does the pipeline transport Carbon Dioxide?	No	
Associated with those facilities in or affecting interstate or foreign commerce,	Does the pipeline affect interstate or foreign commerce?	No	
Including pipeline facilities on the Outer Continental Shelf (OCS).	Is the pipeline facility on the Outer Continental Shelf (OCS)?	No	
Covered pipelines include, but are not limited to:			
(1) Any pipeline that transports a highly volatile liquid;	Does the pipeline transport a Highly Volatile Liquid (HVL)?	No	
(2) Any pipeline segment that crosses a waterway currently used for commercial navigation;	Does the pipeline segment cross a waterway currently used for commercial navigation?	No	
(3) Except for a gathering line not covered by paragraph (a)(4) of this Section, any pipeline located in a rural or non-rural area of any diameter regardless of operating pressure;	Except for a gathering line not covered by paragraph (a)(4) (the next question) of this Section, is the pipeline located in a rural or non-rural area, of any diameter, regardless of operating pressure?	No	Pipeline is a gathering line; applicability to 195.11 demonstrates non-regulated rural gathering.
(4) Any of the following onshore gathering lines used for transportation of petroleum:	Are any of the following onshore gathering lines used for transportation of petroleum?	No	
(i) A pipeline located in a non-rural area;	A pipeline located in a non-rural area	No	
(ii) A regulated rural gathering line as provided in §195.11; or	A regulated rural gathering line, as provided in 195.11	No	Pipeline is a gathering line; applicability to 195.11 demonstrates non-regulated rural gathering.
(iii) A pipeline located in an inlet of the Gulf of Mexico as provided in §195.413.	A pipeline located in an inlet of the gulf of Mexico, as provided in 195.413	No	
	DETERMINATION:	**Regulated Under 195.1(a)**	
49 CFR 195.1(b) - EXCEPTED			
This section identifies exceptions to the regulations codified in 49 CFR 195.1			
(b) *Excepted.* This Part does not apply to any of the following:			
(1) Transportation of a hazardous liquid transported in a gaseous state;	Does the pipeline transport hazardous liquid in a gaseous state?	No	
(2) Transportation of a hazardous liquid through a pipeline by gravity;	Does the pipeline transport hazardous liquid by gravity?	No	
(3) Transportation of a hazardous liquid through any of the following low-stress pipelines:			
(i) A pipeline subject to safety regulations of the U.S. Coast Guard; or	Is the pipeline subject to safety regulations of the U.S. Coast Guard?	No	
(ii) A pipeline that serves refining, manufacturing, or truck, rail, or vessel terminal facilities, if the pipeline is less than one mile long (measured outside facility grounds) and does not cross an offshore area or a waterway currently used for commercial navigation;	If the pipeline is less than one (1) mile long (measured outside facility grounds) and does not cross an offshore area or waterway currently used for commercial navigation, does the pipeline serve refining, manufacturing, or truck, rail, or vessel terminal facilities?	No	
(4) Transportation of petroleum through an onshore rural gathering line that does not meet the definition of a "regulated rural gathering line" as provided in §195.11. This exception does not apply to gathering lines in the inlets of the Gulf of Mexico subject to §195.413;	Does the pipeline transport petroleum through an onshore rural gathering line that does not meet the definition of a "regulated rural gathering line" as provided in 195.11? NOTE: This exception does not apply to gathering lines in the inlets of the Gulf of Mexico, subject to 195.413	Yes	Pipeline is a gathering line; applicability to 195.11 demonstrates non-regulated rural gathering.
(5) Transportation of hazardous liquid or carbon dioxide in an offshore pipeline in state waters where the pipeline is located upstream from the outlet flange of the following farthest downstream facility: The facility where hydrocarbons or carbon dioxide are produced or the facility where produced hydrocarbons or carbon dioxide are first separated, dehydrated, or otherwise processed;	Does the pipeline transport hazardous liquid or carbon dioxide in an offshore pipeline in state waters where the pipeline is located upstream from the outlet flange of the following farthest downstream facility: 1. The facility where hydrocarbons or carbon dioxide are produced? 2. The facility where produced hydrocarbons or carbon dioxide are first separated, dehydrated, or otherwise processed?	No	
(6) Transportation of hazardous liquid or carbon dioxide in a pipeline on the OCS where the pipeline is located upstream of the point at which operating responsibility transfers from a producing operator to a transporting operator;	Does the pipeline transport hazardous liquid or carbon dioxide in a pipeline on the Outer Continental Shelf (OCS) where the pipeline is located upstream of the point at which operating responsibility transfers from a producing operator to a transporting operator?	No	
(7) A pipeline segment upstream (generally seaward) of the last valve on the last production facility on the OCS where a pipeline on the OCS is producer-operated and crosses into state waters without first connecting to a transporting operator's facility on the OCS. Safety equipment protecting PHMSA-regulated pipeline segments is not excluded. A producing operator of a segment falling within this exception may petition the Administrator, under §190.9 of this chapter, for approval to operate under PHMSA regulations governing pipeline design, construction, operation, and maintenance;	Is the pipeline segment upstream (generally seaward) of the last valve on the last production facility on the Outer Continental Shelf (OCS) where a pipeline on the OCS is producer-operated and crosses into state waters without first connecting to a transporting operator's facility on the OCS? NOTE: Safety equipment protecting PHMSA-regulated pipeline segments is not excluded NOTE: A producing operator of a segment falling within this exception may petition the Administrator, under 190.9 of this chapter, for approval to operate under PHMSA regulations governing pipeline design, construction, operation, and maintenance	No	
(8) Transportation of hazardous liquid or carbon dioxide through onshore production (including flow lines), refining, or manufacturing facilities or storage or in-plant piping systems associated with such facilities;	Does the pipeline transport hazardous liquids or carbon dioxide through onshore production (including flow lines), refining, or manufacturing facilities or storage or in-plant piping systems associated with such facilities?	Yes	
(9) Transportation of hazardous liquid or carbon dioxide:			
(i) By vessel, aircraft, tank truck, tank car, or other non-pipeline mode of transportation; or	Is the hazardous liquid or carbon dioxide transported by vessel, aircraft, tank truck, tank car, or other non-pipeline mode of transportation	No	
(ii) Through facilities located on the grounds of a materials transportation terminal if the facilities are used exclusively to transfer hazardous liquid or carbon dioxide between non-pipeline modes of transportation or between a non-pipeline mode and a pipeline. These facilities do not include any device and associated piping that are necessary to control pressure in the pipeline under §195.406(b); or	Is the hazardous liquid or carbon dioxide transported through facilities located on the grounds of a materials transportation terminal and these facilities are exclusively used to transfer hazardous liquid or carbon dioxide between non-pipe modes of transportation or between a non-pipeline mode and a pipeline? NOTE: These facilities do not include any device and associated piping that are necessary to control pressure in the pipeline under 195.406(b)	No	
(10) Transportation of carbon dioxide downstream from the applicable following point:			
(i) The inlet of a compressor used in the injection of carbon dioxide for oil recovery operations, or the point where recycled carbon dioxide enters the injection system, whichever is farther upstream; or	Does the pipeline transport carbon dioxide downstream from the inlet of a compressor used in the injection of carbon dioxide for oil recovery operations or the point where recycled carbon dioxide enters the injection system (whichever is further upstream)?	No	
(ii) The connection of the first branch pipeline in the production field where the pipeline transports carbon dioxide to an injection well or to a header or manifold from which a pipeline branches to an injection well.	Does the pipeline transport carbon dioxide downstream from the connection of the first branch pipeline in the production field where the pipeline transports carbon dioxide to an injection well or to a header or manifold from which a pipeline branches to an injection well?	No	
	DETERMINATION:	**Excepted Under 195.1(b)**	
49 CFR 195.1(c) - BREAKOUT TANKS			
(c) *Breakout tanks.* Breakout tanks subject to this Part must comply with requirements that apply specifically to breakout tanks and, to the extent applicable, with requirements that apply to pipeline systems and pipeline facilities. If a conflict exists between a requirement that applies specifically to breakout tanks and a requirement that applies to pipeline systems or pipeline facilities, the requirement that applies specifically to breakout tanks prevails. Anhydrous ammonia breakout tanks need not comply with §§195.132(b), 195.205(b), 195.242(c) and (d), 195.264(b) and (e), 195.307, 195.428(c) and (d), and 195.432(b) and (c).	A tank with 49 CFR 195 regulated pipeline on inlet and outlet that is used to (a) relieve surges in a hazardous liquid pipeline system or (b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation by pipeline.	No	
	DETERMINATION:	**Not Regulated**	

Appendix A2: 49 CFR 195.1 10-inch Applicability Questionnaire

Operator: Legacy Reserves
Pipeline ID: Fourbear Gathering System (10" segments only)
Date: August 8, 2014

49 CFR 195.1 - Applicability Questionnaire

Regulation	Question	Answer	Comments
This column is the actual language codified in 49 CFR 195.1 - this section is simply for reference	This column translates the regulatory language into easily answerable questions	This section contains drop down menus that offer Yes/No answers to the questions on the left.	This column includes miscellaneous items of note.
49 CFR 195.1(a) - COVERED			
(a) *Covered.* Except for the pipelines listed in paragraph (b) of this Section this Part applies to			
Pipeline facilities	Is the asset a pipeline facility?	Yes	
And the transportation of hazardous liquids	Does the pipeline transport hazardous liquids?	Yes	Crude Oil
Or carbon dioxide	Does the pipeline transport Carbon Dioxide?	No	
Associated with those facilities in or affecting interstate or foreign commerce,	Does the pipeline affect interstate or foreign commerce?	No	
Including pipeline facilities on the Outer Continental Shelf (OCS).	Is the pipeline facility on the Outer Continental Shelf (OCS)?	No	
Covered pipelines include, but are not limited to:			
(1) Any pipeline that transports a highly volatile liquid;	Does the pipeline transport a Highly Volatile Liquid (HVL)?	No	
(2) Any pipeline segment that crosses a waterway currently used for commercial navigation;	Does the pipeline segment cross a waterway currently used for commercial navigation?	No	
(3) Except for a gathering line not covered by paragraph (a)(4) of this Section, any pipeline located in a rural or non-rural area of any diameter regardless of operating pressure;	Except for a gathering line not covered by paragraph (a)(4) (the next question) of this Section, is the pipeline located in a rural or non-rural area, of any diameter, regardless of operating pressure?	Yes	Pipeline serves as a gathering line; however, 10" is not defined as a gathering line. See 195.12 determination for status as a low stress pipeline.
(4) Any of the following onshore gathering lines used for transportation of petroleum:	Are any of the following onshore gathering lines used for transportation of petroleum?	No	
(i) A pipeline located in a non-rural area;	A pipeline located in a non-rural area	No	
(ii) A regulated rural gathering line as provided in §195.11; or	A regulated rural gathering line, as provided in 195.11	No	
(iii) A pipeline located in an inlet of the Gulf of Mexico as provided in §195.413.	A pipeline located in an inlet of the gulf of Mexico, as provided in 195.413	No	
	DETERMINATION:	**Regulated Under 195.1(a)**	
49 CFR 195.1(b) - EXCEPTED			
This section identifies exceptions to the regulations codified in 49 CFR 195.1			
(b) *Excepted.* This Part does not apply to any of the following:			
(1) Transportation of a hazardous liquid transported in a gaseous state;	Does the pipeline transport hazardous liquid in a gaseous state?	No	
(2) Transportation of a hazardous liquid through a pipeline by gravity;	Does the pipeline transport hazardous liquid by gravity?	No	Portions of the 10" segments have been determined to be transported by gravity. As a conservative approach, Legacy Reserves is treating the entire segment as being under pressure.
(3) Transportation of a hazardous liquid through any of the following low-stress pipelines:			
(i) A pipeline subject to safety regulations of the U.S. Coast Guard; or	Is the pipeline subject to safety regulations of the U.S. Coast Guard?	No	
(ii) A pipeline that serves refining, manufacturing, or truck, rail, or vessel terminal facilities, if the pipeline is less than one mile long (measured outside facility grounds) and does not cross an offshore area or a waterway currently used for commercial navigation;	If the pipeline is less than one (1) mile long (measured outside facility grounds) and does not cross an offshore area or waterway currently used for commercial navigation, does the pipeline serve refining, manufacturing, or truck, rail, or vessel terminal facilities?	No	
(4) Transportation of petroleum through an onshore rural gathering line that does not meet the definition of a "regulated rural gathering line" as provided in §195.11. This exception does not apply to gathering lines in the inlets of the Gulf of Mexico subject to §195.413;	Does the pipeline transport petroleum through an onshore rural gathering line that does not meet the definition of a "regulated rural gathering line" as provided in 195.11? NOTE: This exception does not apply to gathering lines in the inlets of the Gulf of Mexico, subject to 195.413	No	Pipeline serves as a gathering line; however, 10" is not defined as a gathering line.
(5) Transportation of hazardous liquid or carbon dioxide in an offshore pipeline in state waters where the pipeline is located upstream from the outlet flange of the following farthest downstream facility: The facility where hydrocarbons or carbon dioxide are produced or the facility where produced hydrocarbons or carbon dioxide are first separated, dehydrated, or otherwise processed;	Does the pipeline transport hazardous liquid or carbon dioxide in an offshore pipeline in state waters where the pipeline is located upstream from the outlet flange of the following farthest downstream facility: 1. The facility where hydrocarbons or carbon dioxide are produced? 2. The facility where produced hydrocarbons or carbon dioxide are first separated, dehydrated, or otherwise processed?	No	
(6) Transportation of hazardous liquid or carbon dioxide in a pipeline on the OCS where the pipeline is located upstream of the point at which operating responsibility transfers from a producing operator to a transporting operator;	Does the pipeline transport hazardous liquid or carbon dioxide in a pipeline on the Outer Continental Shelf (OCS) where the pipeline is located upstream of the point at which operating responsibility transfers from a producing operator to a transporting operator?	No	
(7) A pipeline segment upstream (generally seaward) of the last valve on the last production facility on the OCS where a pipeline on the OCS is producer-operated and crosses into state waters without first connecting to a transporting operator's facility on the OCS. Safety equipment protecting PHMSA-regulated pipeline segments is not excluded. A producing operator of a segment falling within this exception may petition the Administrator, under §190.9 of this chapter, for approval to operate under PHMSA regulations governing pipeline design, construction, operation, and maintenance;	Is the pipeline segment upstream (generally seaward) of the last valve on the last production facility on the Outer Continental Shelf (OCS) where a pipeline on the OCS is producer-operated and crosses into state waters without first connecting to a transporting operator's facility on the OCS? NOTE: Safety equipment protecting PHMSA-regulated pipeline segments is not excluded NOTE: A producing operator of a segment falling within this exception may petition the Administrator, under 190.9 of this chapter, for approval to operate under PHMSA regulations governing pipeline design, construction, operation, and maintenance	No	
(8) Transportation of hazardous liquid or carbon dioxide through onshore production (including flow lines), refining, or manufacturing facilities or storage or in-plant piping systems associated with such facilities;	Does the pipeline transport hazardous liquids or carbon dioxide through onshore production (including flow lines), refining, or manufacturing facilities or storage or in-plant piping systems associated with such facilities?	No	
(9) Transportation of hazardous liquid or carbon dioxide:			
(i) By vessel, aircraft, tank truck, tank car, or other non-pipeline mode of transportation; or	Is the hazardous liquid or carbon dioxide transported by vessel, aircraft, tank truck, tank car, or other non-pipeline mode of transportation	No	
(ii) Through facilities located on the grounds of a materials transportation terminal if the facilities are used exclusively to transfer hazardous liquid or carbon dioxide between non-pipeline modes of transportation or between a non-pipeline mode and a pipeline. These facilities do not include any device and associated piping that are necessary to control pressure in the pipeline under §195.406(b); or	Is the hazardous liquid or carbon dioxide transported through facilities located on the grounds of a materials transportation terminal and these facilities are exclusively used to transfer hazardous liquid or carbon dioxide between non-pipe modes of transportation or between a non-pipeline mode and a pipeline? NOTE: These facilities do not include any device and associated piping that are necessary to control pressure in the pipeline under 195.406(b)	No	
(10) Transportation of carbon dioxide downstream from the applicable following point:			
(i) The inlet of a compressor used in the injection of carbon dioxide for oil recovery operations, or the point where recycled carbon dioxide enters the injection system, whichever is farther upstream; or	Does the pipeline transport carbon dioxide downstream from the inlet of a compressor used in the injection of carbon dioxide for oil recovery operations or the point where recycled carbon dioxide enters the injection system (whichever is further upstream)?	No	
(ii) The connection of the first branch pipeline in the production field where the pipeline transports carbon dioxide to an injection well or to a header or manifold from which a pipeline branches to an injection well.	Does the pipeline transport carbon dioxide downstream from the connection of the first branch pipeline in the production field where the pipeline transports carbon dioxide to an injection well or to a header or manifold from which a pipeline branches to an injection well?	No	
	DETERMINATION:	**Not Excepted Under 195.1(b)**	
49 CFR 195.1(c) - BREAKOUT TANKS			
(c) *Breakout tanks.* Breakout tanks subject to this Part must comply with requirements that apply specifically to breakout tanks and, to the extent applicable, with requirements that apply to pipeline systems and pipeline facilities. If a conflict exists between a requirement that applies specifically to breakout tanks and a requirement that applies to pipeline systems or pipeline facilities, the requirement that applies specifically to breakout tanks prevails. Anhydrous ammonia breakout tanks need not comply with §§195.132(b), 195.205(b), 195.242(c) and (d), 195.264(b) and (e), 195.307, 195.428(c) and (d), and 195.432(b) and (c).	A tank with 49 CFR 195 regulated pipeline on inlet and outlet that is used to (a) relieve surges in a hazardous liquid pipeline system or (b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation by pipeline.	No	
	DETERMINATION:	**Not Regulated**	

Appendix A3: 49 CFR 195.11 6- and 8-inch Applicability Questionnaire for Gathering Pipelines

Operator: Legacy Reserves
Pipeline ID: Fourbear Gathering System (10" segments only)
Date: August 8, 2014

49 CFR 195.11 - Applicability Questionnaire

Regulation	Question	Answer	Comments
This column is the actual language codified in 49 CFR 195.11(a) - this section is simply for reference	This column translates the regulatory language into easily answerable questions	This section contains drop down menus that offer Yes/No answers to the questions on the left.	This column includes miscellaneous items of note.
Each operator of a regulated rural gathering line, as defined in paragraph (a) of this section, must comply with the safety requirements described in paragraph (b) of this section.			
(a) *Definition.* As used in this section, a regulated rural gathering line means an onshore gathering line in a rural area that meets all of the following criteria—	Is the line onshore?	Yes	
	Is the line gathering?	Yes	
	Is the line in a rural area?	Yes	
(1) Has a nominal diameter from $6\frac{5}{8}$ inches (168 mm) to $8\frac{5}{8}$ inches (219.1 mm);	Is the nominal diameter from 6 5⁄8 inches (168 mm) to 8 5⁄8 inches (219.1 mm)?	Yes	
(2) Is located in or within one-quarter mile (.40 km) of an unusually sensitive area as defined in §195.6; and	Is the line located within one-quarter mile (.40 km) of an usually sensistive area (defined in 195.6)?	Yes	
(3) Operates at a maximum pressure established under §195.406 corresponding to—			
(i) A stress level greater than 20-percent of the specified minimum yield strength of the line pipe; or	Does the pipeline operate at a maximum pressure corresponding to a stress level greater than 20% of the specified minimum yield strength (SMYS) of the line pipe?	No	
(ii) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure of more than 125 psi (861 kPa) gage.	If this stress level is unknown or the pipeline is not constructed with steel pipe, does the pipeline operate at a maximum pressure corresponding to a pressure of more than 125 psi (861 kPa) gage?	No	
	DETERMINATION:	**Not Regulated Under 195.11**	6" and 8" segments were evaluated in accordance with 195.11

NOTE: The line is only regulated if all parts are answered "Yes" in a1 and a2 and either a3i or a3ii.

Appendix A4: 49 CFR 195.12 10-inch Applicability Questionnaire for Low Stress Pipelines

Operator: Legacy Reserves
Pipeline ID: Fourbear Gathering System (10" segments only)
Date: August 8, 2014

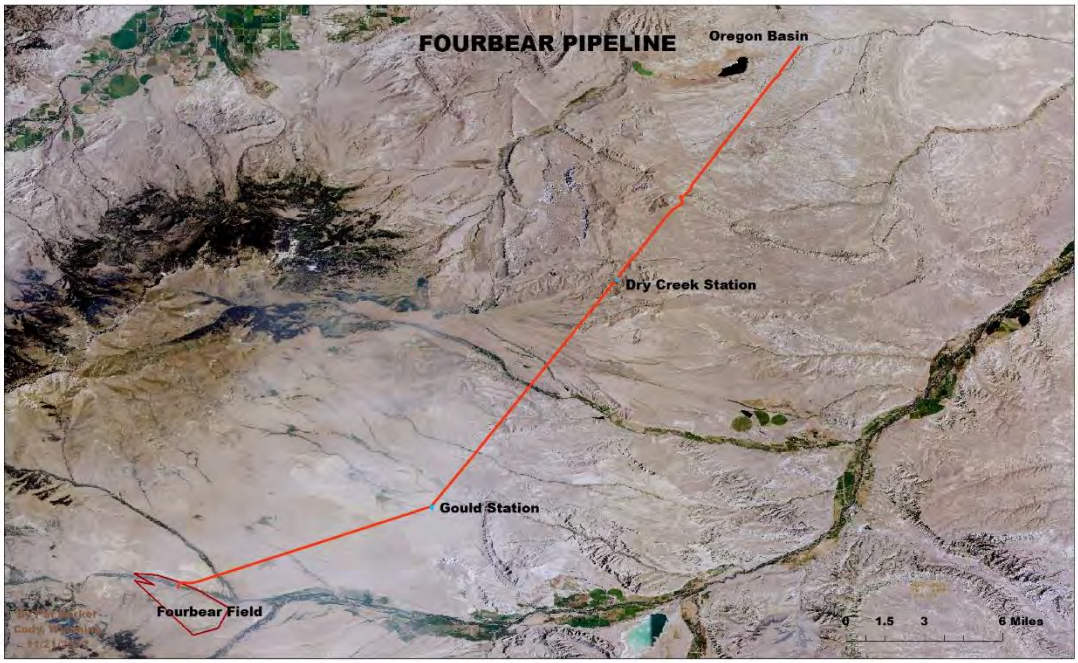
49 CFR 195.12 - Applicability Questionnaire

Regulation	Question	Answer	Comments
This column is the actual language codified in 49 CFR 195.12(a) & 195.12(b) - this section is simply for reference	This column translates the regulatory language into easily answerable questions	This section contains drop down menus that offer Yes/No answers to the questions on the left.	This column includes miscellaneous items of note.
(a) *General.* This Section sets forth the requirements for each category of low-stress pipeline in a rural area set forth in paragraph (b) of this Section. This Section does not apply to a rural low-stress pipeline regulated under this Part as a low-stress pipeline that crosses a waterway currently used for commercial navigation; these pipelines are regulated pursuant to §195.1(a)(2).			
(b) *Categories.* An operator of a rural low-stress pipeline must meet the applicable requirements and compliance deadlines for the category of pipeline set forth in paragraph (c) of this Section. For purposes of this Section, a rural low-stress pipeline is a Category 1, 2, or 3 pipeline based on the following criteria:			
(1) A Category 1 rural low-stress pipeline:			
(i) Has a nominal diameter of 8⅝ inches (219.1 mm) or more;	Does the pipeline have a nominal diameter of 8 5⁄8 inches (219.1mm) or more?	Yes	
(ii) Is located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in §195.6; and	Is the pipeline located within 1/2 mile (.80 km) of an unusually sensitive area (USA) as defined in 195.6?	No	
(iii) Operates at a maximum pressure established under §195.406 corresponding to:			
(A) A stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or	Does the pipeline operate at a maximum pressure corresponding to a stress level equal to or less than 20% of the specified minimum yield strenght (SMYS) of the line pipe?	Yes	
(B) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gauge.	If the stress level is unknown or the pipeline is not constructed with steel pipe, does the pipeline operate at a maximum pressure corresponding to a pressure equal to or less than 125 psi (861 kPa) gauge?	No	
	CATEGORY 1 DETERMINATION:	**Not Category 1**	
(2) A Category 2 rural pipeline:			
(i) Has a nominal diameter of less than 8⅝ inches (219.1mm);	Does the pipeline have a nominal diameter of less than 8 5/8 inches (219.1mm)?	No	
(ii) Is located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in §195.6; and	Is the pipeline located in or within 1/2 mile (.80 km) of an unusually sensitive area (USA) as defined in 195.6?	No	
(iii) Operates at a maximum pressure established under §195.406 corresponding to:			
(A) A stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or	Does the pipeline operate at a maximum pressure corresponding to a stress level equal to or less than 20% of the specified minimum yield strenght (SMYS) of the line pipe?	No	
(B) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gage.	If the stress level is unknown or the pipeline is not constructed with steel pipe, does the pipeline operate at a maximum pressure corresponding to a pressure equal to or less than 125 psi (861 kPa) gauge?	No	
	CATEGORY 2 DETERMINATION:	**Not Category 2**	
(3) A Category 3 rural low-stress pipeline:			
(i) Has a nominal diameter of any size and is not located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in §195.6; and	Is the pipeline, with a nominal diameter of any size, located in or within 1/2 mile (.80 km) of an unusually sensitive area (USA) as defined in 195.6?	No	
(ii) Operates at a maximum pressure established under §195.406 corresponding to a stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or	Does the pipeline operate at a maximum pressure corresponding to a stress level equal to or less than 20% of the specified minimum yield strenght (SMYS) of the line pipe?	Yes	
(iii) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gage.	If the stress level is unknown or the pipeline is not constructed with steel pipe, does the pipeline operate at a maximum pressure corresponding to a pressure equal to or less than 125 psi (861 kPa) gauge?	No	
	CATEGORY 3 DETERMINATION:	**Category 3**	
	FINAL DETERMINATION	**Regulated Under 195.12**	10" segments were evaluated in accordance with 195.12

Appendix B: Low Stress Documentation

The Fourbear Gathering Pipeline System presents unique characteristics that affect pressures and stress in various manners. First, the oil is highly viscous in nature so the product is heated at each pump station. The viscosity versus heat curves are relatively steep, so as the oil moves further away from each station and cools, viscosity increases significantly. This brings us to the second consideration in calculating stress, the telescoping nature of the pipeline. The further away from a pump station, the larger the pipe diameter is in order to compensate for the increased viscosity of the cooling oil. Lastly, the elevation of the Pipeline varies as traverses the hills and valleys of the area, Figure 1, *Fourbear Gathering Pipeline System Aerial Photograph*.

Figure 1: Fourbear Gathering Pipeline System Aerial Photograph



Legacy Reserves contracted Tom Fitzsimmons, P.E. of Fitzsimmons Energy, LLC (Fitzsimmons Energy) to model the Fourbear Pipeline Gathering System flow and pressures. However, the results indicated that after the first downstream hill following a pump station, the Pipeline pressures became negative. Negative pressures in these modeling results indicate the pipeline is in channel flow or gravity fed flow, rendering the remaining downstream model outputs corrupt. The decision was made to model the Pipeline in three separate segments starting at each pump station and continuing to the top of the first downstream hill. The remainder of the Pipeline is in channel flow with low pressure line packing on uphill segments. See Appendix B1: *Fitzsimmons Energy Letter* for a detailed methodology and conclusion.

The Fourbear Gathering Pipeline System maximum operating pressure (MOP) has been established to equal the 20% SMYS value for each respective segment. Based on hydraulic modeling, it has been determined that pressure drops due to pipe diameter changes ensure that operating pressure of the higher diameter segments is substantially below operating pressure of the 6 inch segments. Therefore, establishing set points at or below 20% SMYS based on pump discharge into the 6 inch segments will serve to protect the 8 and 10-inch segments well below their respective MOPs. In other words, the hydraulics show if the 6 inch do not exceed 20% SMYS, the 8 and 10-inch segments are not capable of exceeding 20% SMYS without additional pumps. Table 1, *SMYS and MOP Values* lists respective values for each pipeline segment.

Table 1:SMYS and MOP Values

P=2*S*t*E*F/D

FourBear Pipeline							100% SMYS	20% SMYS	DOT Design Pressure	MOP
						E	1	0.2	0.72	
		D	t			F	1	1	1	
Location	SIZE	OD	WT	Weight	Type	$				
Willow Draw to FourBear	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
	4	4.5	0.188	8.659	wt 0.188 A106B	35	2924	585	2106	585
	4	4.5	0.237	10.792	A106B sch 40	35	3687	737	2654	737
	6	6.625	0.432	28.577	5LX42 sch 40	46	5999	1200	4319	1200
Battery #1 to Fourbear	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
Battery #3 to Fourbear	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
Fourbear to Gould	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
	8	8.625	0.277	24.700	5LX42 sch 30	42	2698	540	1942	540
	10	10.75	0.279	31.205	5LX42	35	1817	363	1308	363
	10	10.75	0.25	28.039	5LX42 sch 20	42	1953	391	1407	391
Pitchfork to Gould	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
Gould to Dry Creek	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
	8	8.625	0.277	24.700	5LX42 sch 30	42	2698	540	1942	540
	8	8.625	0.277	24.700	5LX42 sch 30	42	2698	540	1942	540
	10	10.75	0.279	31.205	5LXGrB	35	1817	363	1308	363
Spring Creek to Mainline	6	6.625	0.28	18.977	5LX42	42	3550	710	2556	710
Dry Creek to Oregon Basin	6	6.625	0.28	18.977	5LX42 sch 40	42	3550	710	2556	710
	8	8.625	0.277	24.700	5LX42 sch 30	42	2698	540	1942	540
	10	10.75	0.279	31.205	5LXGrB	35	1817	363	1308	363
	10	10.75	0.25	28.039	5LX42 sch 20	42	1953	391	1407	391

Despite The Fourbear Gathering Pipeline System entailing intricate system dynamics, New Century is confident the 20% SMYS threshold is not exceeded for any given segment along the Pipeline at any time. Therefore, New Century has concluded the Fourbear Gathering Pipeline System is a low stress pipeline.

Appendix B1: Fitzsimmons Energy Letter

FITZSIMMONS ENERGY LLC

Monday, August 4, 2014

Mr. Jim Kysar
Production Superintendent
Legacy Reserves Operating, LP
PO Box 2850
Cody, WY 82414

Re: Fourbear Pipeline – Low Stress Gathering System
Park County, Wyoming

Executive Summary

Fitzsimmons Energy has completed its hydraulic modelling of the Fourbear crude oil system. Based on my analysis, I have concluded that operation of the system is being operated as a low stress pipeline under 49 CFR Part 195. Furthermore, the installation of Pressure Relief Valves (PRV) would ensure that the pipeline will not exceed 20% SMYS (Specified Minimum Yield Strength).

Evaluation of the Fourbear Crude Oil System – Park County, Wyoming

The Fourbear pipeline system (see Exhibit 'E' – System Map) was constructed and brought into operation in the early 1960s. The system was designed to ship more than 10,000 barrels of oil per day from the Fourbear field. Currently Fourbear field produces 410 BOPD and the pipeline ships approximately 5,000 BOPD from three additional oilfields which were added to the pipeline since its commissioning (see exhibit 'A' Field Statistics). The oil in this area is considered heavy oil due to the API gravity and high concentration of Asphaltene.

Initial evaluation of the system was based on the assumption that the system itself was fluid packed. Samples of crude oil were recovered from all 4 fields and sent to Energy Labs for analysis. Primary objective in this analysis was to determine the viscosity of crude oil at various temperatures within the range of operating conditions. Since Asphaltene (bitumen-like) being a significant constituent in the crude oil produced in this area, viscosity of the oil is highly sensitive to temperature. Prior to modelling the flow, several sets of crude oil were sent to Energy Labs in Billings to obtain viscosity versus temperature plots. Using the pipeline modelling software FluidFlow© (ver. 3.22.6), the field specific viscosity versus temperature crude oil data was inputted into the software to create algorithms to predict dynamic viscosity. With crude data inputted, the next step was to create a model that took into account the following properties:

- Fluid volume
- Fluid properties
- Temperature at field gates and pump stations
- Elevation of each node (sea level datum)
- Length of each segment of pipe
- Diameter of pipe
- Assumed pipe roughness

The model then aimed to history match operating pressures. Results when compared to field pressures clearly indicated that channel flow exists in several sections of the system. Most notable is the 10 in. section of pipe upstream of Goulds Station. This segment of the system has a peak elevation of 7,131, ft. and is located only 1.6 miles southwest of Goulds station located 390 feet lower. Yet, the suction pressure at Gould station is consistently running under 21 psi. Calculations

indicate that the pipe has close to 315 feet of channel flow (see exhibit 'B' Calculation of Fluid Pack). The supposition that this segment of the system was not fluid packed was tested by closing a valve at the inlet of Gould station. If the system was fluid packed we should have immediately witnessed a static pressure at a minimum equal to the elevation difference of 390 feet (roughly 165 psi). Instead, we witnessed slow pressure rise as the pipe filled confirming that the system was not fluid packed. This result validated the results the model FluidFlow model created.

The next approach was to create hydraulic head profiles with the assumption that pressure and temperature losses were independent of pipe diameter between points where energy input (pump and heat stations). Due to the significantly reduced amount of flow in the system relative to it's original design conditions, the above assumption seemed reasonable. The pipeline was then broken down to 1,900 segments that were each populated with the following:

- Fluid flow
- Composite API gravity and relative density of fluid
- Elevation
- Distance
- 20% SMYS for the given pipe size and grade of that segment.

Based on upstream discharge pressure and downstream suction pressure a hydraulic head profile was created and plotted against 20% SMYS as the Maximum Operating Pressure (see exhibit 'C' Pressure Profile).

Data used in this model were taken from trending data provided by the client for the first 7 days of July, 2014 (see exhibit 'D' Raw Pressure and Temperature Data).

Legal Disclaimer

The data presented herein were obtained through public available data located on the Wyoming Oil and Gas Conservation Commission website, or provided directly through data requests to Legacy Reserves Operating. Every attempt has been made to ensure that all pertinent data has been included, however no warranty is made as to its completeness. The statements in this report are the professional opinions of Fitzsimmons Energy and are prepared in accordance with industry-accepted standards. The maintenance of the PRV should be conducted on a regular interval as required by the manufacturer and 49 CFR Part 195. Re-sizing of the PRV should be conducted when flow conditions change.

Statement of Independence

Fitzsimmons Energy is an independent evaluator. Fitzsimmons Energy has no ownership or business relationship in the assets evaluated or the client's itself. There are no contingency fees involved in this evaluation.

If you have any questions or concerns, please call us or e-mail me any time to discuss them. I can be reached at (307) 586-4189 or tom@fitzsimmonsenergy.com .

Respectfully,

Tom Fitzsimmons, PE
Registered Professional Engineer
WY 8660

EXHIBIT 'A'

Fourbear Pipeline System
Park County, Wyoming

FIELD STATISTICS

Field	Average Rate (BOPD)	API Gravity	DISTANCE FROM TERMINUS OF PIPELINE (approx. miles)
Willow Draw	132	14.0	30
Fourbear Field	410	14.5	28
Pitchfork Field	1,200	16.8	23
Spring Creek Field	2,940	15.3	17

Total	4,682

EXHIBIT 'B'

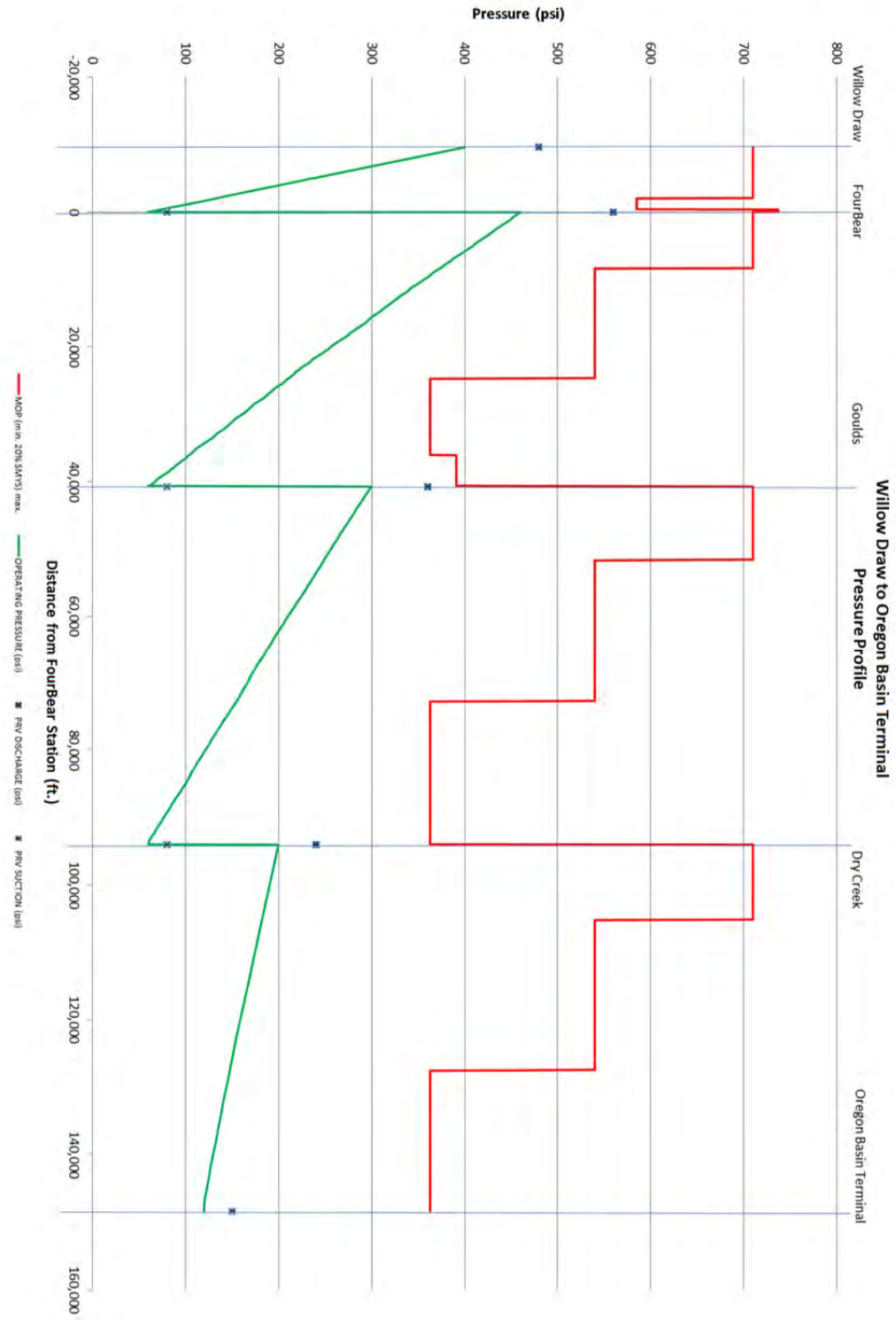
Fourbear Pipeline System
Park County, Wyoming

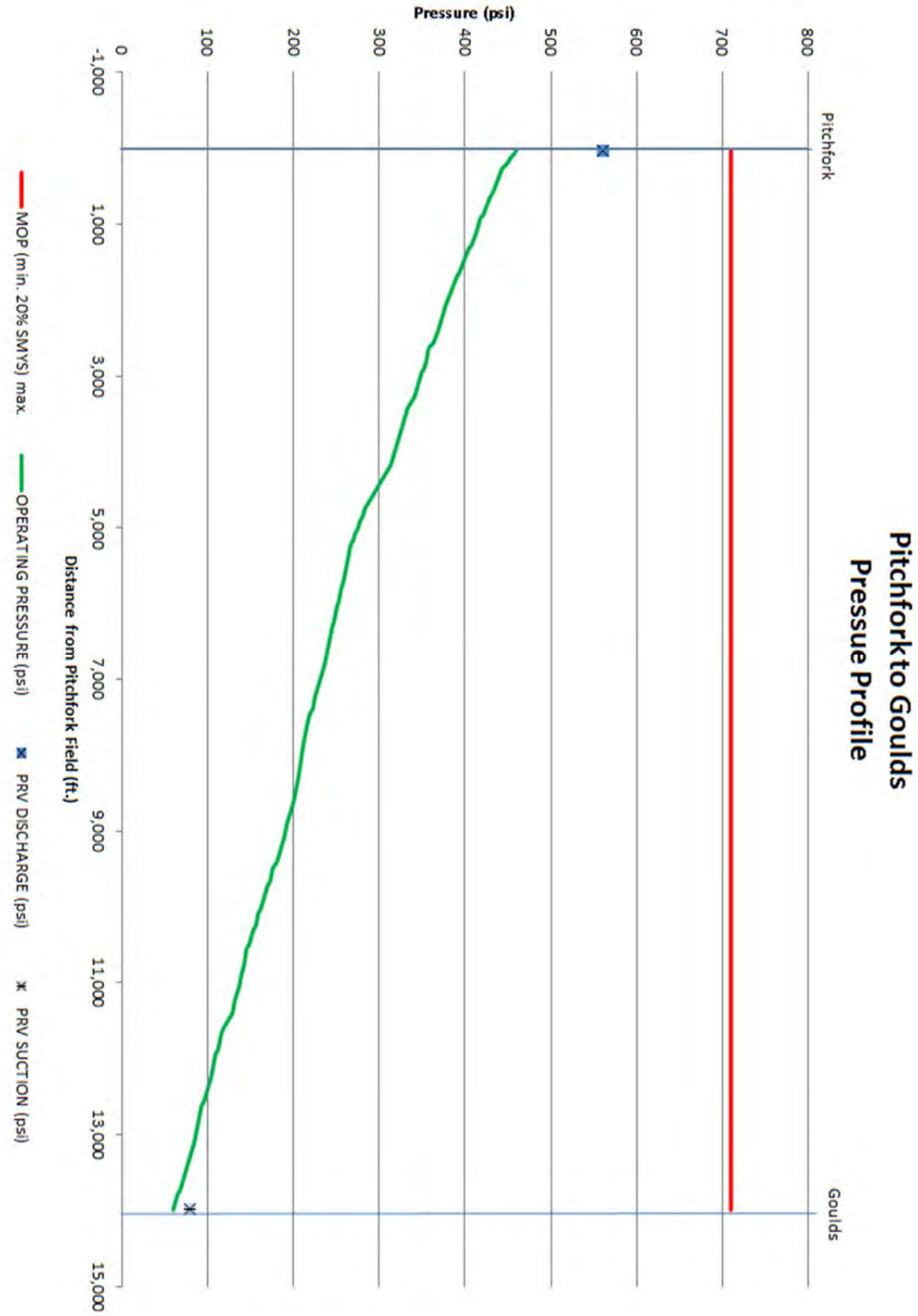
CALCULATION OF FLUID PACK

Gould Station Elevation	6741	feet
Goulds Station Suction (actual)	20	psi
Equivalent Suction Head	48.31	feet
Fluid packed level	6816	feet
Top of hill to SW	7131	feet
Elevation difference (channel flow)	315	feet
Suction pressure to fluid pack	130	psi

EXHIBIT 'C'

Fourbear Pipeline System
Park County, Wyoming




Pitchfork to Goulds
Pressue Profile
Pressure (psi)
800
700
600
500
400
300
200
100
0
-1,000
Pitchfork
Goulds
1,000
3,000
5,000
7,000
9,000
11,000
13,000
15,000
Distance from Pitchfork Field (ft.)
MOP (min. 20% SMYS) max.
OPERATING PRESSURE (psi)
PRV DISCHARGE (psi)
PRV SUCTION (psi)

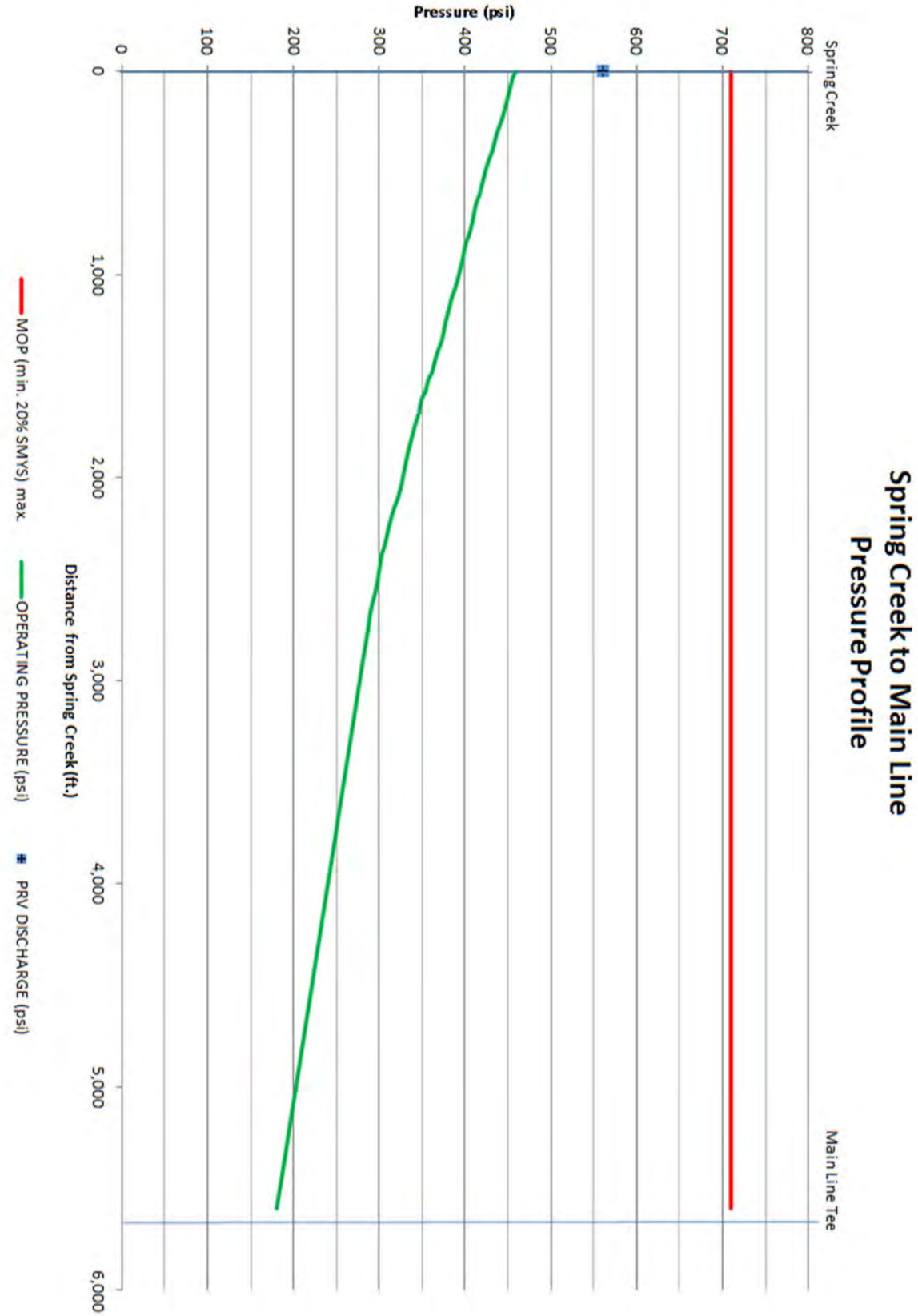
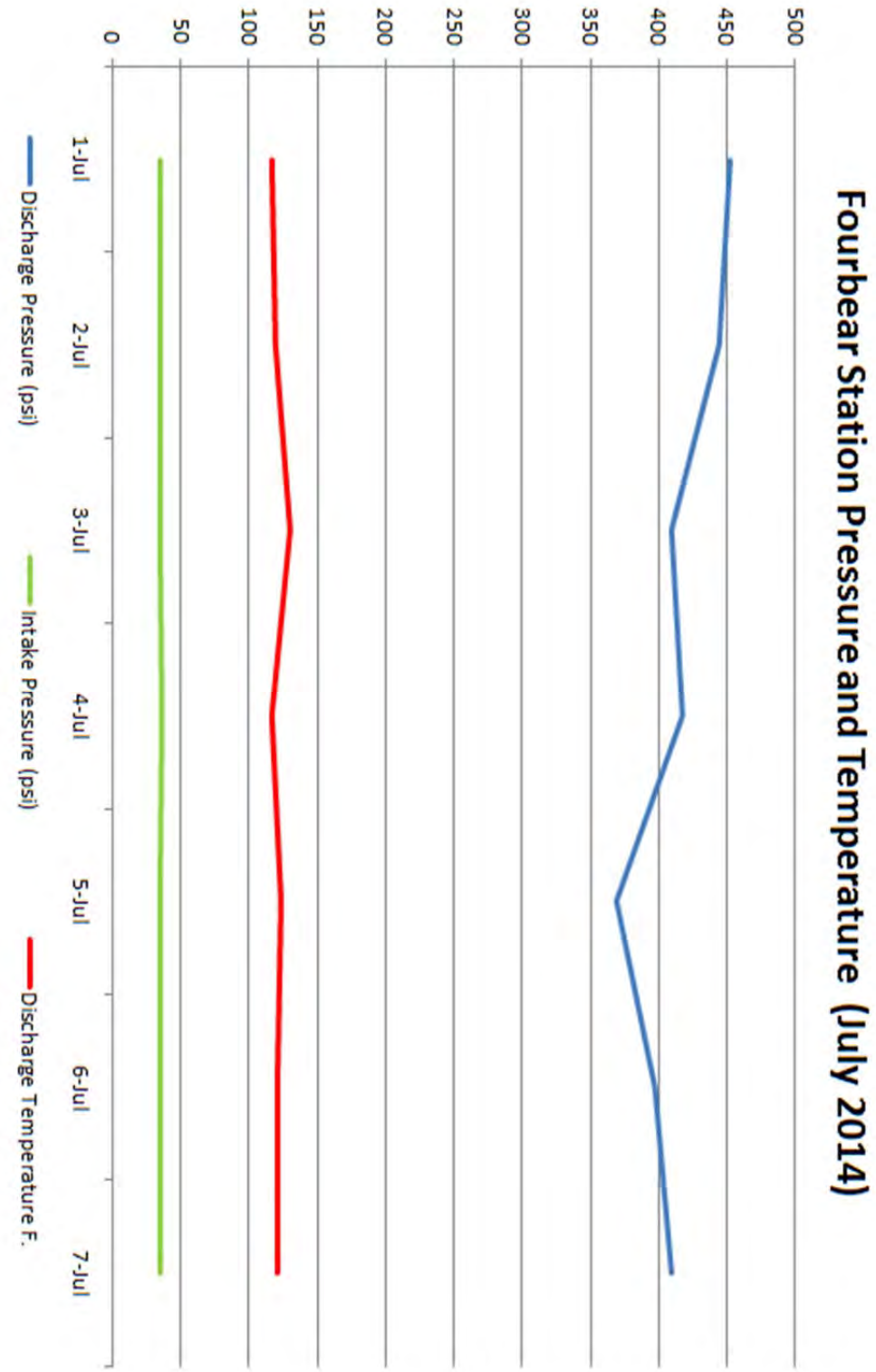
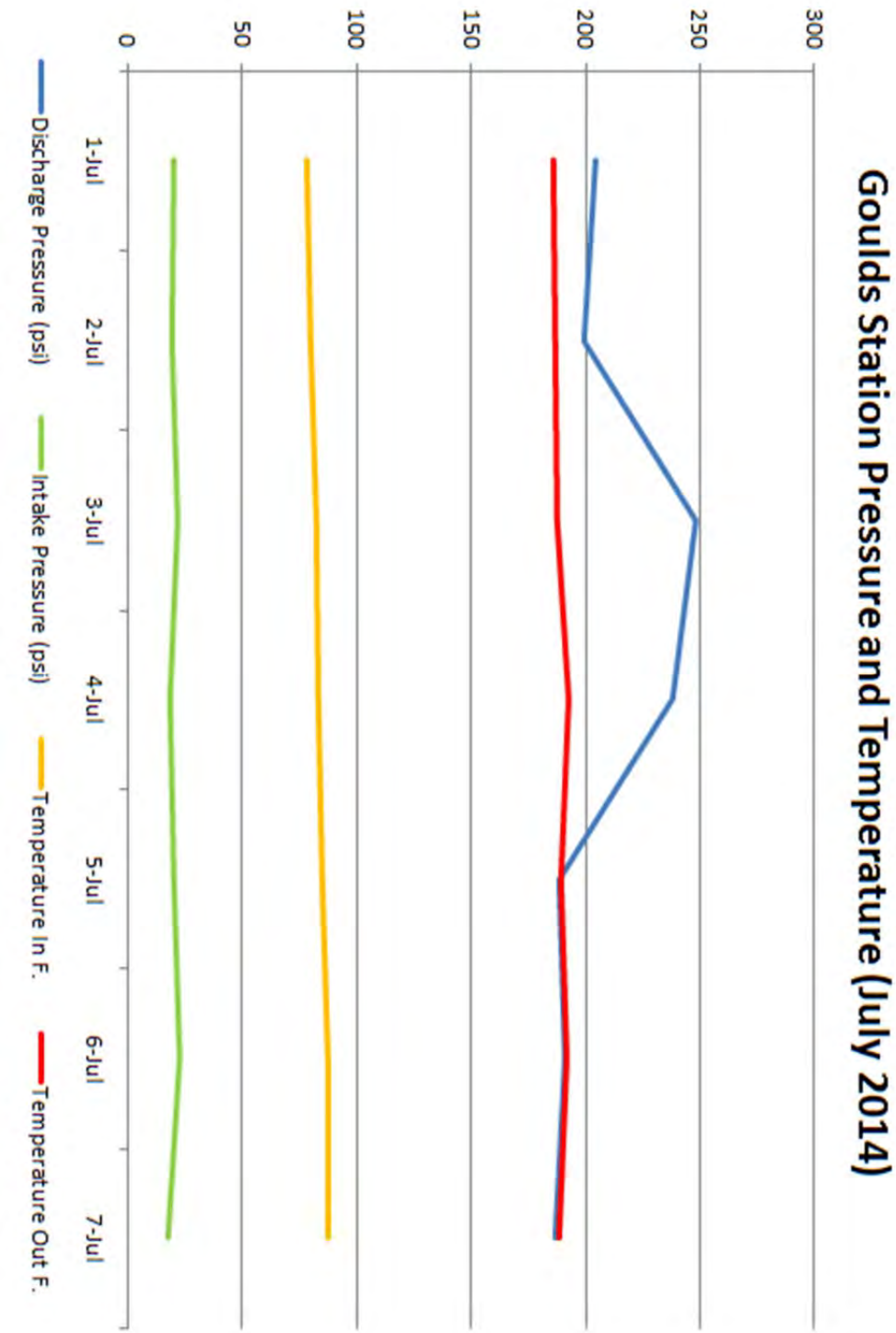

Spring Creek to Main Line
Pressure Profile
Pressure (psi)
0
100
200
300
400
500
600
700
800
Spring Creek
Main Line Tee
0
1,000
2,000
3,000
4,000
5,000
6,000
Distance from Spring Creek (ft.)
MOP (min. 20% SMYS) max.
OPERATING PRESSURE (psi)
PRV DISCHARGE (psi)

EXHIBIT 'D'

Fourbear Pipeline System
Park County, Wyoming




Goulds Station Pressure and Temperature (July 2014)
300
250
200
150
100
50
0
1-Jul
2-Jul
3-Jul
4-Jul
5-Jul
6-Jul
7-Jul
Discharge Pressure (psi)
Intake Pressure (psi)
Temperature In F.
Temperature Out F.

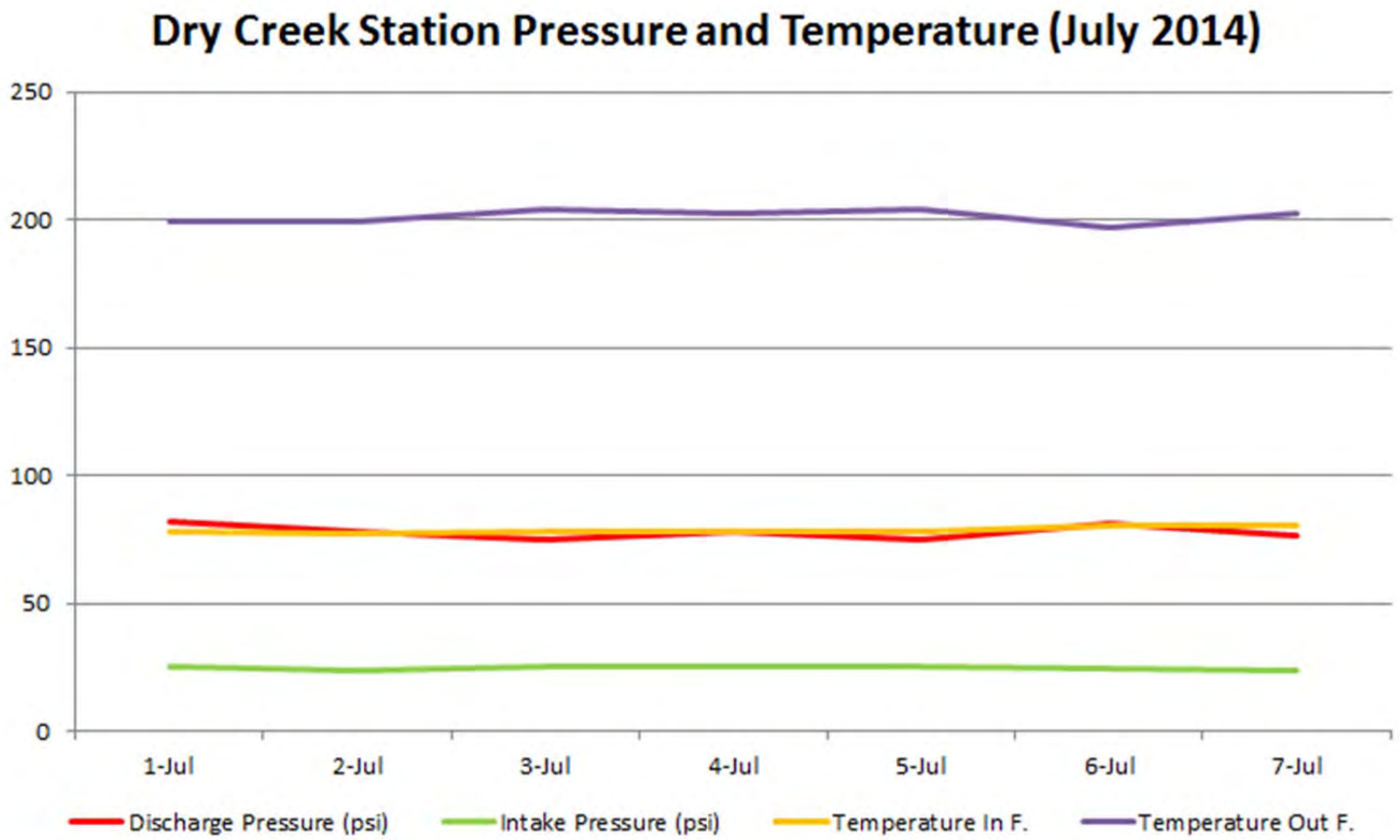

Dry Creek Station Pressure and Temperature (July 2014)
250
200
150
100
50
0
1-Jul
2-Jul
3-Jul
4-Jul
5-Jul
6-Jul
7-Jul
Discharge Pressure (psi)
Intake Pressure (psi)
Temperature In F.
Temperature Out F.

EXHIBIT 'E'

Fourbear Pipeline System
Park County, Wyoming

SYSTEM MAP

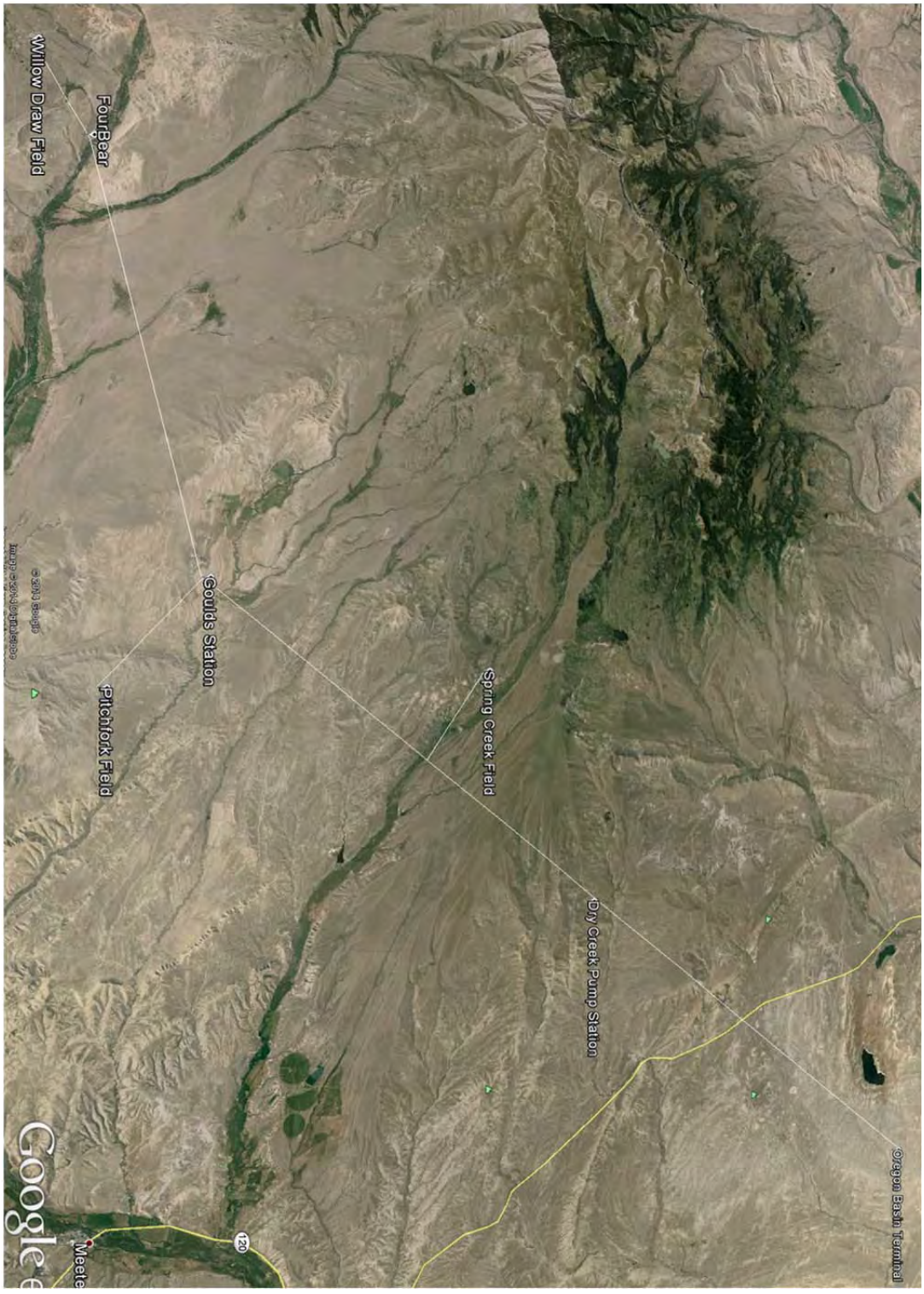


EXHIBIT 'F'

Fourbear Pipeline System
Park County, Wyoming

RATING AND SIZING OF PRESSURE RELIEF VALVES

	INLET			DISCHARGE		
	PRV Set pressure (psi)	20% SMYS of pipe (psi)	Diameter of PRV (in.)	PRV Set pressure (psi)	20% SMYS of pipe (psi)	Diameter of PRV (in.)
Willow Draw	N/A	N/A	N/A	480	710	1.28
Fourbear	80	585	1.84	560	710	1.84
Goulds	80	391	1.84	360	710	1.84
Pitchfork	N/A	N/A	N/A	560	710	2.85
Spring Creek	N/A	N/A	N/A	560	710	2.85
Dry Creek	80	363	2.85	240	710	2.85
Oregon Basin	150	363	2.85	N/A	N/A	N/A

$$A = \frac{Q * G^{1/2}}{27.2 * K_p * K_v * P^{1/2}}$$

Q = GPM required relief
G = Relative Density
K_p = Correction factor for overpressure relief capacity (assumed 0% over pressure above 20% SMYS)
K_v = Correction factor for viscosity of fluid
P = Upstream pressure psi
μ = viscocity at temperature

$$R_{ne} = \frac{2800 * Q * G^{1/2}}{\mu A}$$ if less than 200; compute K_v using;

$$K_v = 0.27 * (\ln R_{ne})^2 * 0.65$$

NOZZLE ORIFICE AREAS	
Size Designtion	**Orifice Area, in^2**
D	0.110
E	0.196
F	0.307
G	0.503
H	0.785
J	1.280
K	1.840
L	2.850
M	3.600
N	4.340
P	6.380
Q	11.050
R	16.000
T	26.000

Appendix C: Control Room Determination Documentation

Control Room Determination Documentation

On June 28th, 2014 New Century visited the Fourbear Pipeline Gathering System and examined pipeline system controls and interactions. Photos of the instrumentation and electronic (I&E) systems used to manage the Fourbear Pipeline Gathering System are included below. There is no dedicated control room along the pipeline or located off site that is staffed to monitor the pipeline system. While the overall pipeline system has a data logging system that can be remotely viewed and generates alarms, New Century confirmed the only way to affect change to pumps and equipment at each station is by manual operation on site in the instrument and electronics (I&E) room via the programmable logic controller (PLC) panel or manual shutoff. The I&E room at each station is an unstaffed, informal area where the local pump variable frequency drive (VFD) and PLC resides. Due to the complicated system dynamics caused by the high viscosity oil, Legacy Reserves uses VFDs to automatically regulate pumping rates according to station inlet pressures and flow rates. Safety shutdowns are programmed into the PLC and trip automatically, without human interactions.

The applicability statement codified in 49 CFR 195.446(a) stated, "This section applied to each operator of a pipeline facility with a controller working in a control room who monitors and controls all or part of a pipeline facility through a SCADA system." SCADA is defined as, "A computer-based system or systems used by a controller in a control room that collects and displays information about a pipeline facility and may have the ability to send commands back to the pipeline facility." New Century has evaluated each portion of the applicability as follows:

- *Controller working in a control room who monitors*: Legacy does not staff a control room facility. Remote data viewing capability is limited to pressure and temperature and does not provide sufficient information to make decisions pertaining to pipeline operations. In the event that the data logging system generates an alarm, local field personnel are required to investigate to determine necessary actions.
- *Controls all or part of a pipeline facility through a SCADA system*: Remote data viewing capability is limited to pressure and temperature and does not provide sufficient information to make decisions pertaining to pipeline operations. Control of the pipeline happens at individual stations and is done through manual valve configuration changes or PLC-based pump control changes.

Based on the above criteria, New Century concludes the pipeline system does not have a SCADA system. Therefore, New Century has determined the Fourbear Pipeline Gathering System is not subject to 49 CFR 195.446 for control room management requirements.

Fourbear Station

Fourbear pump variable frequency drives and shutdown

Fourbear pump variable frequency drives

Fourbear PLC setting

Fourbear electrical panel

Fourbear electrical panel and pump variable frequency drives

Fourbear PLC

Battery #1

Battery #1 pump variable frequency drive and shutdown

Battery #1 pump variable frequency drive and shutdown

Battery # 1 LACT PLC

Battery #1 PLC

Battery #1 shutdown

Gould

Gould electrical panel, variable frequency drive and PLC

Gould electrical panel and setting

Gould transfer station entrance from I&M room

Gould pump variable frequency drive and PLC

Dry Creek Station

Dry Creek pump variable frequency drive

Dry Creek electrical panels and PLC

Dry Creek variable frequency drive and electrical panels

Dry Creek variable frequency drive, electrical panels and PLC

Dry Creek remote terminal unit

Oregon Basin Station

Oregon Basin PLC

Oregon Basin PLC setting

Oregon Basin remote terminal unit

Oregon Basin tank gear pump variable frequency drive and shutdown

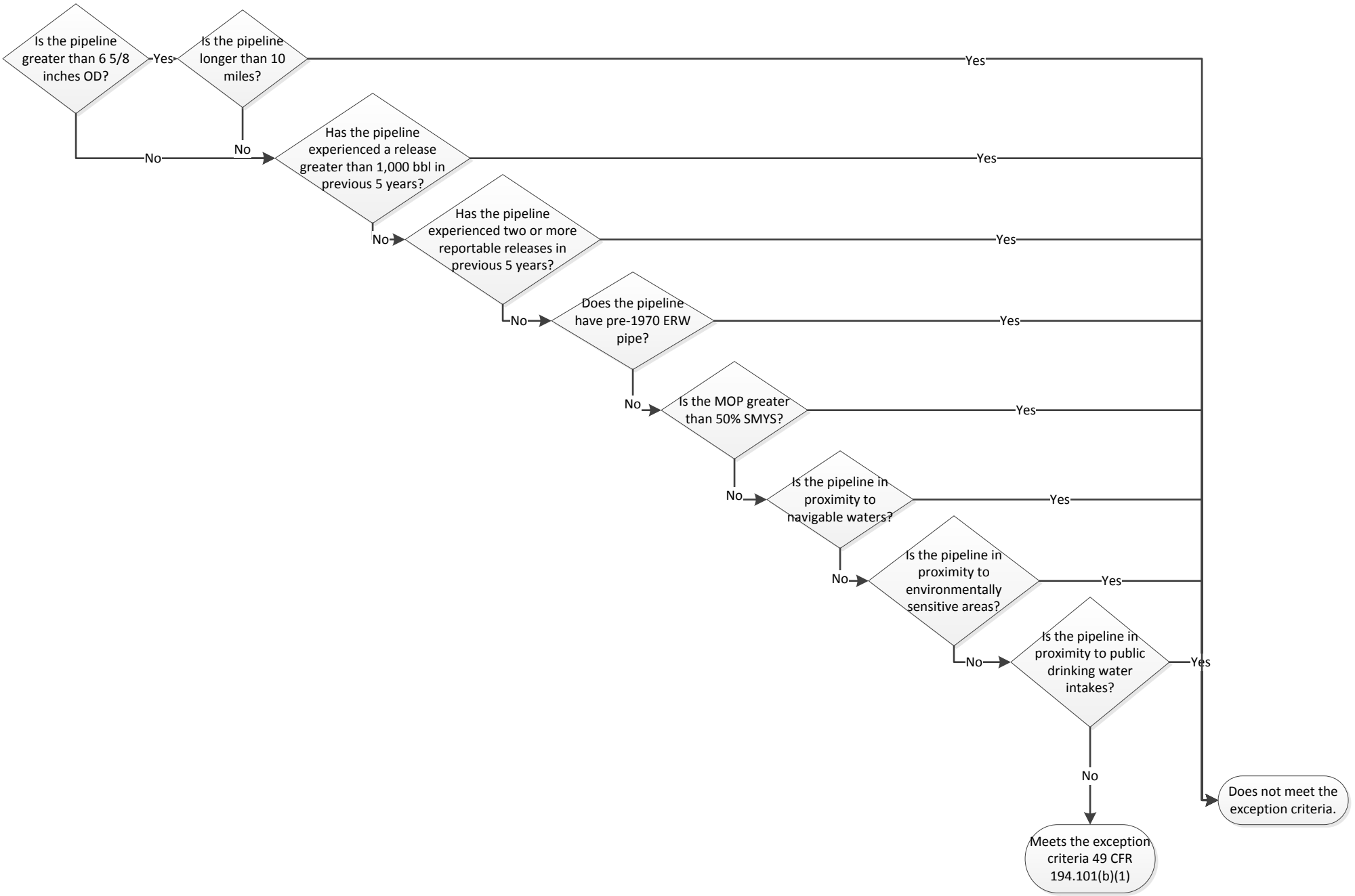
Oregon Basin inside electrical panel

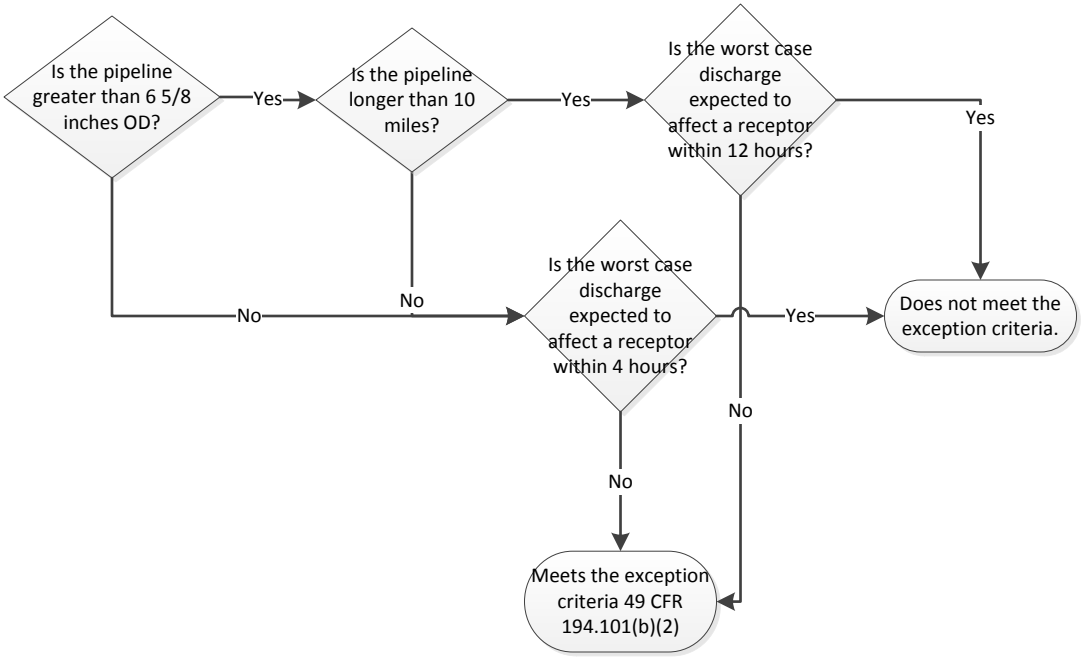
Oregon Basin inside electrical panel setting

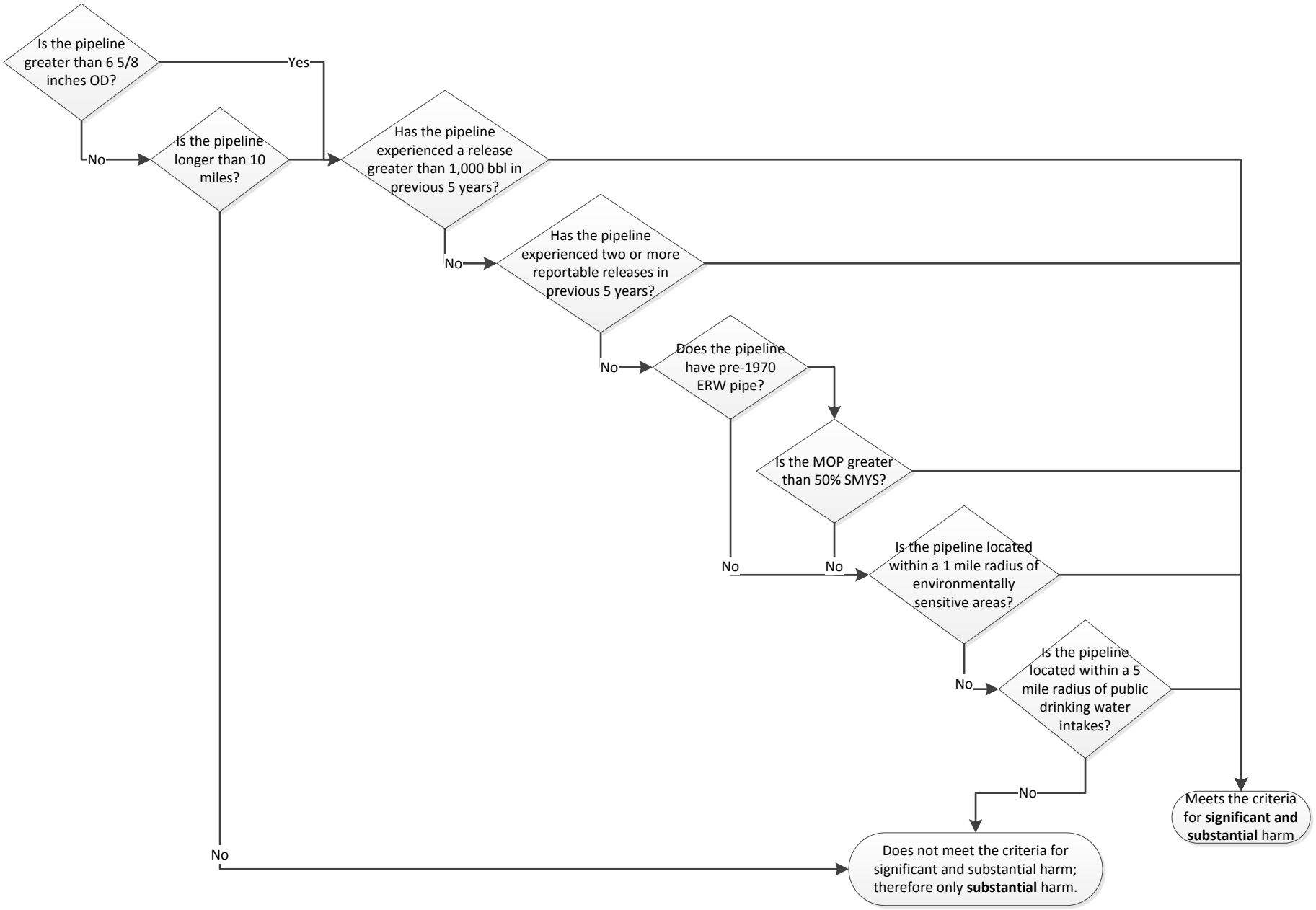
Oregon Basin outside electrical panel

Oregon Basin outside electrical panel setting

Appendix D: 49 CFR 194 Applicability Flowcharts


Is the pipeline greater than 6 5/8 inches OD?
Yes
Is the pipeline longer than 10 miles?
Yes
No
No
Has the pipeline experienced a release greater than 1,000 bbl in previous 5 years?
Yes
No
Has the pipeline experienced two or more reportable releases in previous 5 years?
Yes
No
Does the pipeline have pre-1970 ERW pipe?
Yes
No
Is the MOP greater than 50% SMYS?
Yes
No
Is the pipeline in proximity to navigable waters?
Yes
No
Is the pipeline in proximity to environmentally sensitive areas?
Yes
No
Is the pipeline in proximity to public drinking water intakes?
Yes
No
Does not meet the exception criteria.
Meets the exception criteria 49 CFR 194.101(b)(1)


Is the pipeline greater than 6 5/8 inches OD?
Yes
Is the pipeline longer than 10 miles?
Yes
Is the worst case discharge expected to affect a receptor within 12 hours?
Yes
Does not meet the exception criteria.
No
No
Is the worst case discharge expected to affect a receptor within 4 hours?
Yes
No
No
Meets the exception criteria 49 CFR 194.101(b)(2)


Is the pipeline greater than 6 5/8 inches OD?
Yes
No
Is the pipeline longer than 10 miles?
Has the pipeline experienced a release greater than 1,000 bbl in previous 5 years?
No
Has the pipeline experienced two or more reportable releases in previous 5 years?
No
Does the pipeline have pre-1970 ERW pipe?
No
Is the MOP greater than 50% SMYS?
No
Is the pipeline located within a 1 mile radius of environmentally sensitive areas?
No
Is the pipeline located within a 5 mile radius of public drinking water intakes?
No
No
Does not meet the criteria for significant and substantial harm; therefore only **substantial** harm.
Meets the criteria for **significant and substantial** harm