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Introduction

Encana Oil & Gas (USA), Inc. (Encana) is proposing to construct a centralized exploration and production (E&P) waste management facility that will be known as the Liquids Handling Hub (Hub). Encana will own and operate the facility.

This document is being provided to demonstrate compliance with the Colorado Oil & Gas Conservation Commission (COGCC) Rule 908 requirements for the construction of a centralized E&P waste management facility, supplementing the COGCC Form 28. This document addresses each requirement of Rule 908 that is presented in the Rule, with additional information provided in the appendices, as needed.

Construction of the Hub is scheduled to begin in July 2014. The facility is scheduled to be operational in December 2014.

1. 908.a: Applicability

The proposed facility is a non-commercial, centralized gathering facility that will handle produced liquids from a portion of Encana's operations in the Denver-Julesburg (DJ) Basin area in Weld County, Colorado.

The objectives of the Hub are to:

- Gather produced oil from wells
- Gather excess produced water that cannot be recycled within Encana's network
- Minimize community and environmental impact by:
 - Reducing equipment located in residential areas
 - Reducing truck traffic in residential areas
 - Controlling emissions of production equipment
 - Following Best Management Practices (BMPs)
 - Operating the facility in accordance with all permits

This facility will be authorized to receive the following influent:

- Produced oil and produced water from Encana-operated wells and wells with Encana interest in the DJ Basin

Produced water from other oil and gas operators may be received by this facility on a case-by-case basis through a Colorado Oil & Gas Conservation Commission (COGCC) Rule 502.b variance request and approval with a water sharing agreement in place. Any arrangements of this nature must be authorized by the Encana DJ Basin Team Lead and the COGCC. No third-party influent will be accepted if doing so violates the Hub's status as a non-commercial facility.

2. 908.b.(1), (2) & (3): Contact Information & Legal Site Description

See attached Form 28. The site will be located on a future Weld County Recorded Exemption lot.

3. 908.b.(4): Topography, Geology and Hydrology

3.1.General Site Description

The Hub is located east of Erie, Colorado in Weld County at the northwest corner of the intersection of Weld County Road 6 & Weld County Road 7. The site is located in the south half of Section 21, Township 1 North, Range 68 West of the 6th Principal Meridian, County of Weld, State of Colorado. Appendix 1 shows the general layout of the facility.

The site is located in unincorporated Weld County. However, the right-of-ways for the adjacent roads (Weld County Road 6 and Weld County Road 7) have been annexed to the Town of Erie.

3.2.Adjacent Land Use

Adjacent land uses within a 1,500-foot radius of the site are primarily agricultural activities, oil and natural gas extraction, and landfills (see Appendix 2, Figure LU-1). A cattle operation and mobile home are located to the northeast. There are two private residences within a 1,500-foot radius of the site. The surrounding areas will not be adversely impacted by construction and operation of the facility due to the removed location of the site and the existing surrounding uses being similar to the proposed facility.

3.3.Topography

As shown in Appendix 2, Figure 1: Topographic Map and Figure 2: Site Survey, the proposed site is undeveloped with elevations ranging from 5190 to 5235 feet. The site slopes from west to east with a natural drainage path flowing east towards Weld County Road 7. The Community Ditch is located directly north of the proposed Site. Existing ground cover for the on-site basin consists of native grasses and low brush and the fields have seen some alfalfa or hay production. Soil type is primarily Type B (Wiley-Colby complex – 3 to 5% slopes). Type C (Nunn Loam – 1 to 3% slopes) is also present.

3.4.Geology

The surficial geology of the site is mapped by Colton (1978) as Holocene to late Pleistocene-age Eolian Deposits (wind-blown) including dune sand and loess deposits, which were deposited in the post-glacial period. The mapped geology at the site is presented in Appendix 7, Figure 2. The Eolian Deposits are generally composed of silt and clay with varying amounts of sand. The underlying formational bedrock unit is mapped as the Upper Cretaceous-age Laramie Formation consisting of an upper and a lower part. The upper part is described as mostly gray claystone, shale, sandy shale, and lenticular beds of sandstone and lignite. The lower part is described as light gray to light yellowish gray sandstone and sandy shale interbedded with clay, shale, and several beds of coal.

3.5.Hydrology

Existing cover conditions within the major basin are primarily undeveloped. The development within the basin almost completely consists of dirt/gravel roads, pipeline right-of-way, and well pads. The predominant drainage pattern is characterized by overland flow sloping to the east.

Grades in the area are relatively flat ranging from 1 to 5%. Natural channels collect and concentrate surface runoff. Occasionally roads cross the slope also concentrating and diverting runoff. Flow from the site and areas up-basin from the site drain to Little Dry Creek and ultimately to the South Platte River.

The site currently contains some improvements. These improvements include an irrigation channel to the north that currently intercepts some drainage from the north along with a gravel road that accesses an existing well. Vegetation exists on the unimproved portions of the site. This vegetation was considered to be in poor condition for the drainage calculations, which is a conservative approach.

3.6.Average Annual Precipitation

The average annual precipitation in the area is approximately 13.53 inches based on the Western Regional Climate Center weather data records for Station 055116 in Longmont, Colorado (see Appendix 4).

3.7.Average Annual Evaporation

The average annual evaporation in the area is approximately 41.04 inches based on the Western Regional Climate Center weather data for Fort Collins (see Appendix 4).

4. 908.b.(5).A: Site Plan

An overall site plan for the proposed facility is provided in Appendix 1: Engineering Drawings.

5. 908.b.(5).B: Survey Drawings

A site survey plan for the proposed facility is shown in Appendix 2, Figure 2. Additional detail regarding the locations of site structures and facilities is provided in Appendix 1: Engineering Drawings.

6. 908.b.(5).C: Access Control Measures

The Hub is located on a parcel that is accessed off of Weld County Road 6 (Garfield Road), as shown on Figure V-1. Access to the site by members of the public will be limited by a security perimeter fence. The facility will be staffed by up to five (5) employees. An office will be located on-site. There will be two access points in and out of the facility limiting the direct approach to the facility.

There are no open water bodies at or around the Hub that would grant access to the site.

Wildlife and domestic access to the Hub will be controlled through the following measures:

- Perimeter fencing
- Mesh coverings on any tank or building openings including vents, stacks, etc.
- No dogs or other domestic animals will be kept or knowingly allowed on site

Agricultural operations are not permitted on Encana-owned land surrounding the Hub.

The Hub will comply with Encana's wildlife protection policies, as outlined in the Liquids Handling Hub Operations & Maintenance (O&M) Manual Appendix E: Migratory Bird Treaty Act and Other Wildlife Protection Requirements (see Appendix 13).

7. 908.b.(5).D: Fire Access

A continuous fire access road with a minimum width of ten (10) feet has been provided around the active treatment areas, as shown in Appendix 1. An additional buffer zone with a minimum width of ten (10) feet has been provided within the perimeter fire lane. Access roads will be surfaced with asphalt, crushed gravel, or concrete as shown in Appendix 1. A Fugitive Dust Control Plan has been provided in Appendix 3.

8. 908.b.(5).E: Surface Water Design

The proposed site is located within an existing drainage flow path. An engineered and stabilized drainage channel capable of conveying the 100-year duration storm is proposed to bypass existing offsite flows around the site. Drainage improvements will include earthen ditches, culverts, a stormwater detention pond and temporary BMPs. Water quality will also be protected by revegetation, check dams in the ditches, sediment basins, and surface stabilization.

Weld County Drainage Criteria, along with Urban Drainage and Flood Control Spreadsheets, and Hydraflow analysis software were used for the design of the site stormwater conveyance and management system. A SCS Type II storm with one hundred (100) year, twenty-four (24) hour storm (based off NOAA Atlas 2 Volume III – Colorado) was selected, with a corresponding rainfall value for Weld County of 4.88 inches.

The stormwater outfall from the site is designed to contain the water volume from the twenty-five (25) year, twenty-four (24) hour storm. Storms that are greater than the 25 year event will be released at a restricted rate that matches the historic release.

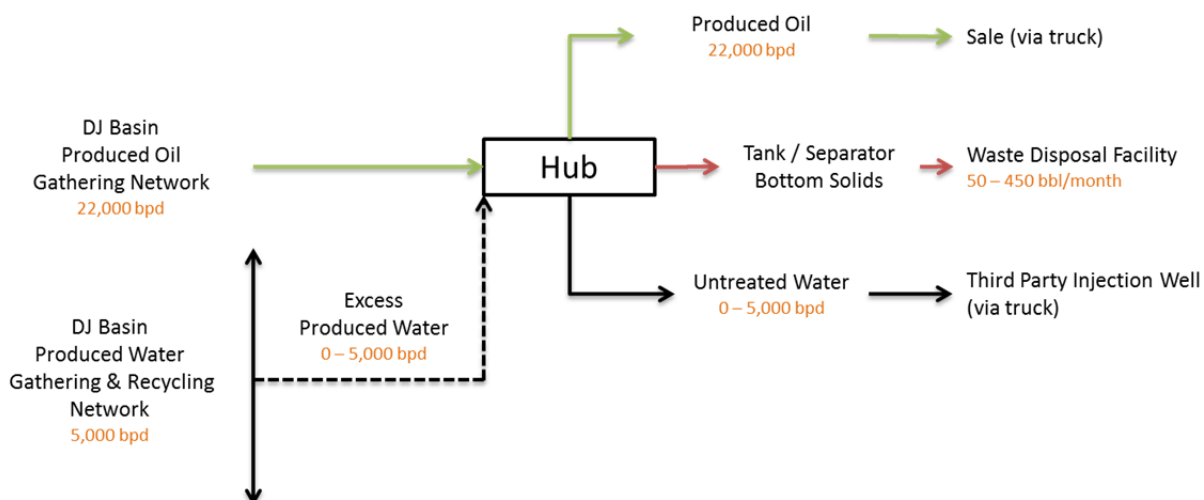
Erosion control plans are included in Appendix 1: Engineering Drawings. Additional surface water information is provided in Appendix 5: Stormwater Management Plan and Appendix 6: Drainage Report.

9. 908.b.(6): Waste Profile

9.1.Product / Waste Streams Schematic

Figure 9-1 schematically shows an overall summary of the basic Hub operations. An E&P product (produced oil) is included for completeness.

Figure 9-1: Product / Waste Stream Schematic



9.2. Produced Water

9.2.1. Estimated Volume

The Hub has been sized to receive 5,000 bpd of produced water from Encana-operated wells in the Denver-Julesburg (DJ) Basin, Wattenberg Field (see Appendix 10 for a list of contributing wells). Future wells that are drilled in the vicinity of the Hub could also contribute. Produced water will be recycled within Encana's gathering network to the extent possible prior to being routed to the Hub.

9.2.2. Characteristic Waste Profile

A Safety Data Sheet (SDS) for produced water is included in Appendix 15. Water samples at three existing wells in close proximity to the Hub were obtained to represent the produced water quality that will be received at the Hub. The expected characteristics are shown in Table 9-1. **Error! Reference source not found..** Maximum values for the anticipated range are based on samples collected at Encana's Middle Fork Water Treatment Facility (WTF) due to the limited sample size available for the Hub.

Table 9-1: Anticipated Produced Water Quality

Component	Anticipated Range (mg/l)	Average Value (mg/l)
TPH-GRO (C6-C10)	10-580	31
TPH (C10-C28)	12-440	26
Methanol	0-112	19
Total Suspended Solids (TSS)	120-670	137
BTEX	8-100	33



9.3. Tank Bottom Solids

9.3.1. Estimated Volume

Based on analytic results from other Encana facilities, the monthly volume of pressed solids at the Hub is anticipated to be between 50 - 450 bbl.

9.3.2. Characteristic Waste Profile

A sampling and characterization analysis of Encana's solid waste stream at Middle Fork WTF was undertaken in March 2013, as documented in Appendix 9. The solids leaving the Hub are assumed to be similar to those at Middle Fork WTF. This information will be updated with actual waste characteristics in future updates to the COGCC once the facility is operational.

9.4. Produced Oil

9.4.1. Estimated Volume

Produced oil is not classified as an E&P waste. However, it is included in this discussion for completeness.

The Hub will be designed to handle 22,000 bpd of single-phase produced oil which will be stored in the Produced Oil Storage Tanks before transportation to sale via truck. A process description is located in Section 12.1.

9.4.2. Characteristic Waste Profile

A produced oil SDS is included in Appendix 15.

9.5. Waste Disposal

All waste that will be managed at the Hub is E&P exempt. Encana plans to dispose of solid waste from the Hub at the landfill shown in Table 9-2. Produced water will be disposed at the facilities identified in Table 9-2, both of which are permitted to accept E&P Exempt Wastes.

Table 9-2: Solid Waste Disposal Facility

Disposal Facility	Address	Permit Number
Denver Regional Landfill	1441 Weld CR 6 PO Box 320 Erie CO 80516 Phone: (303) 673-9431	970PWE188

Table 9-3: Water Disposal Facilities

Disposal Facility	Address	Permit Number
High Sierra Water Services	8207 W. 20th St., Suite B Greeley, CO 80634 Phone: (877) 893-2466	150361
High Plains Disposal	3770 Puritan Way, Suite J, Frederick, CO 80516 Phone: (303) 800-1128	09WE0929

9.6. Water Quality Testing Program

The produced water influent stream will be sampled monthly for hydrocarbon, methanol and BTEX content in accordance with EPA Approved Methods 8015 and 8260. A rolling twelve (12) month average will be kept by Encana and reported to the COGCC once per year in accordance with Rule 908.f.

9.7. Naturally Occurring Radioactive Material (NORM)

Samples of solid waste produced by the Hub will not be available until the facility is operational. At that time, testing will be completed to ensure the waste is safe for disposal at a commercial landfill.

10. 908.b.(7).A: Facility Design and Engineering – Geology

A geotechnical report for the Hub was prepared in September 2013 (see Appendix 7). Six test holes were drilled throughout the proposed site. Highlights of this report which specifically address Rule 908.b.(7).A are described below. A geologic hazards report was also prepared for this site (see Appendix 8).

10.1. Unconsolidated Soils

Topsoil is present over the entire site at a depth of approximately six (6) to eight (8) inches. The topsoil consists of silty sand.

10.2. Consolidated Bedrock

Bedrock consists of medium to hard claystone and sandstone between ten (10) to (20) feet below all existing grades.

10.3. Geologic Structures

See response to Rule 908.b.(4) (Section 3.4 of this report).

10.4. Geologic Hazards

The subject site is considered suitable for the construction of the Hub, from a geotechnical perspective. Geologic hazards such as on-site faults, liquefaction, ground fissures, flood-prone areas, landslides or unstable slope hazards were not observed during site reconnaissance and were not indicated in the referenced publications.

The subject site is mapped in an area of low risk for mine subsidence. No evidence of abandoned mine workings was observed at the site and no subterranean mine workings are indicated beneath the site, based on our review of available documents. The site is mapped as being underlain by Eolian Deposits, underlain by bedrock of the Laramie Formation. The Eolian Deposits consist of wind-blown loess and dune deposits, composed of silt, clay, and sand. The Laramie Formation is expected to consist of gray claystone, shale, sandy shale, and lenticular beds of sandstone and lignite.

Some of the near-surface Eolian Deposits are potentially moisture-sensitive and may be prone to settlement from compressible or collapsible soil conditions. These soils will likely not be suitable for support of structures and improvements in their existing condition. Therefore shallow foundations, slabs-on-grade, exterior concrete flatwork, pavement sections, and other improvements will be founded on a zone of adequately placed and compacted engineered fill. The depth, lateral extent, and compaction levels are specified in the geotechnical report (see Appendix 7).

The site is mapped in an area of “High” risk of hazards from expansive soil and bedrock. This expansion potential has been evaluated and geotechnical recommendations for the mitigation of expansive soil and bedrock conditions are provided in the geotechnical report (see Appendix 7).

11. 908.b.(7).B: Facility Design and Engineering – Hydrology

A drainage report for the Hub development was prepared in September 2013 (see Appendix 6). Highlights of this report which specifically address Rule 908.b.(7).B are described below.

11.1. Surface Water Features

Appendix 2, Figure SW-1 illustrates the surface water features within a two (2)-mile radius of the proposed facility. With the exception of the *Little Dry Creek* and local irrigation ponds, the majority of surface water features are ephemeral, intermittent, or, in the case of the *Community Ditch*, flowing on a seasonal basis. The irrigation ditches generally flow from April through September. The draws and drainages may have standing or flowing water present after a major storm event or act as a catchment during local flood irrigation of cropland. Figure SW-1 shows that the draws and drainages flow to the north-northeast direction, consistent with regional topography.

The *Little Dry Creek* is approximately three-quarters ($\frac{3}{4}$) of a mile downgradient and east of the proposed facility. It meanders northeast approximately eleven (11) miles to the South Platte River just north of Fort Lupton. The *Community Ditch* is approximately one-eighth ($\frac{1}{8}$) of a mile upgradient and west and north of the proposed facility. It meanders through the adjacent agricultural property.

11.2. Shallow Ground Water

11.2.1. Shallow Ground Water Depth

Exploratory soil borings performed at the site as part of a site-specific geotechnical evaluation and a Phase II Subsurface Site Assessment (both in September 2013) demonstrate that the depth to ground water ranges between nine (9) and nineteen (19) feet below ground surface (bgs). It is noted that

ground water was not observed in some of the soil borings. A well record search of ground water monitoring wells within one (1) mile of the proposed facility corroborates the presence of ground water ranging from seven (7) feet to greater than fifty (50) feet bgs. Ninety-nine percent (99%) of the shallow ground water monitoring wells in the records search are associated with the operation and monitoring plans of the municipal landfills to the southwest (and upgradient) of the proposed facility (see Table 11-1 below).

The ground water potentiometric surface is influenced by seasonal precipitation events, agricultural irrigation, surficial topography and subsurface lithologic conditions. The six (6) proposed groundwater monitoring wells associated with the facility (see Section 15 below) will help in monitoring the fluctuations in ground water levels and water quality. It is anticipated that the local shallow ground water flow direction will be to the east. The data collected from the municipal landfills demonstrate shallow ground water direction is to the east – northeast.

11.2.2. Shallow Ground Water Quality

Records reviewed during the Phase II Subsurface Site Assessment confirm that the water quality in the vicinity of the site complies with the Colorado Department of Public Health and Environment's (CDPHE) Water Quality Control Division (WQCD) standards for ground water. The monitoring wells are associated with municipal landfills operating under permit jurisdiction with the CDPHE. The landfills are obligated to undergo quarterly and semiannual ground water monitoring and sampling and to report the results to the CDPHE on a semiannual basis.

Encana conducted the Phase II Subsurface Assessment because:

- The landfills are directly upgradient from the proposed site
- A records search on the COGCC database recorded two spill incidents related to nearby Noble Energy oil and gas production tank batteries.

Documentation for the spills associated with Noble notes that the spill incidents have been closed out. The results of the Phase II investigation confirm the absence of hydrocarbon impacts near the Noble Energy assets.

The limited ground water samples were analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), and total VOC's by EPA Method 8260. The ground water analytical data collected during the Phase II investigation shows that the shallow ground water on the proposed property exhibits no impacts and is below CDPHE and COGCC ground water standards.

11.3. Major Aquifers

The proposed facility is located near the western edge of the Greater Denver Basin ground water administration boundary (*Ground Water Atlas of Colorado – Colorado Geological Survey 2003*). The Laramie-Fox Hills Aquifer is the principal source of ground water in this area of the Denver Basin. Domestic water well permits within one (1) mile of the site record well depths of between 400 and 700 feet bgs. It is important to note that atop the Laramie Formation, there is a confining shale layer (100 to

600 feet in thickness) which separates the shallow ground water zone(s) from the targeted water-bearing sandstone of the Laramie-Fox Hills Aquifer.

The regional ground water flow direction for the Laramie-Fox Hills Aquifer trends to an east-southeast direction. The potentiometric surface of this mainly confining aquifer is dependent on precipitational recharge and pumping rates. Recorded pumping rates for the aquifer range from 10 to 350 gallons per minute (gpm).

11.4. Local Water Wells

Appendix 2, Figure GW-1 illustrates the registered water wells (State Engineer's Office) within a one (1) mile radius of the proposed facility. Well permit numbers, ownership, depth, depth to water, screened interval(s), yield(s), and aquifer name are provided in Table 11-1. The data is limited to the information provided by the State Engineer's Office and field reconnaissance.

A total of forty-three (43) well records were listed. Twenty-seven (27) of those are associated with the municipal landfills. Eight (8) of the records were part of a *Notice of Intent* to the State Engineer's Office as part of Encana's Phase II investigation for this site and were subsequently abandoned. Four (4) of the wells are listed as domestic use (within the Laramie-Fox Hills), one (1) of which was never installed. The remaining four (4) wells are installed monitoring wells with unknown use or purpose. The location of these monitoring wells are not related or influenced by the proposed facility.

Proposed baseline water quality sampling is discussed in Section 15 below.

Table 11-1: Local Water Wells

Permit Number	Status	Type	Aquifer	Well Depth (ft.)	Screened Interval (ft.)	Static Level (ft.)	Pump Rate (gpm)	Owner
80422	Expired	DOM	All Unnamed					Bill Maydew
170196	Constructed	MW	All Unnamed	29	Dry			Const. Recycling Inc.
223888	Constructed	DOM	All Unnamed	695	485-695	275	7	Daniel R. Horst
51864-MH	Abandoned**	MW	All Unnamed					Encana
51866-MH	Abandoned**	MW	All Unnamed					Encana
51868-MH	Abandoned**	MW	All Unnamed					Encana
51862-MH	Abandoned**	MW	All Unnamed					Encana
51863-MH	Abandoned**	MW	All Unnamed					Encana
51865-MH	Abandoned**	MW	All Unnamed					Encana

Permit Number	Status	Type	Aquifer	Well Depth (ft.)	Screened Interval (ft.)	Static Level (ft.)	Pump Rate (gpm)	Owner
51867-MH	Abandoned**	MW	All Unnamed					Encana
51869-MH	Abandoned**	MW	All Unnamed					Encana
67512-F	Extended	IRR	Laramie Fox Hills					Front Range Landfill Inc.
186554	Constructed	MW	All Unnamed	91	61-71			Laidlaw Waste Systems Inc.
19190-MH	Constructed	MW	All Unnamed	178	167-177			Laidlaw Waste Systems Inc.
186551	Constructed	MW	All Unnamed	100	95-100			Laidlaw Waste Systems Inc.
186552	Constructed	MW	All Unnamed	26	21-26			Laidlaw Waste Systems Inc.
168482	Constructed	MW	Laramie Fox Hills	178	168-178			Laidlaw Waste Systems Inc.
27996-F	Expired	COM	Laramie Fox Hills					Landfill Systems Inc.
903-WCB	Constructed	DOM	All Unnamed	751			10	N. V. Carney
13369-F	Constructed	COM	All Unnamed	675		200	25	Raymond/De borah Grant
194148	Constructed	MW	All Unnamed	52	42-52			Sanifill Inc.
46525-F	Constructed	IRR	Laramie Fox Hills	867		404	13	Sanifill Inc.
29149-MH	Abandoned	MW	All Unnamed	90	79-89			Sanifill Inc.
29150-MH	Abandoned	MW	All Unnamed	60	49-59			Sanifill Inc.
194145	Constructed	MW	All Unnamed	112	97-112	89		Sanifill Inc.
194151	Constructed	MW	All Unnamed	18	8-18	17		Sanifill Inc.
194152	Constructed	MW	All Unnamed	13	3-13	10		Sanifill Inc.

Permit Number	Status	Type	Aquifer	Well Depth (ft.)	Screened Interval (ft.)	Static Level (ft.)	Pump Rate (gpm)	Owner
194154	Constructed	MW	All Unnamed	18	8-10	12		Sanifill Inc.
194153	Constructed	MW	All Unnamed	48	26-46	23		Sanifill Inc.
194150	Constructed	MW	All Unnamed	53	43-53	24		Sanifill Inc.
194149	Constructed	MW	All Unnamed	47	37-47	46		Sanifill Inc.
194146	Constructed	MW	All Unnamed	172	141-172			Sanifill Inc.
194142	Constructed	MW	All Unnamed	32	14-32	31		Sanifill Inc.
194141	Constructed	MW	All Unnamed	46	36-46	18		Sanifill Inc.
27330-MH	Unknown	MW	All Unnamed					Sanifill Inc.
27373-MH	Unknown	MW	All Unnamed					Sanifill Inc.
194143	Constructed	MW	All Unnamed	37	17-37	22		Sanifill Inc.
194140	Constructed	MW	All Unnamed	31	17-31	8		Sanifill Inc.
194139	Constructed	MW	All Unnamed	15	6-15	11		Sanifill Inc.
194138	Constructed	MW	All Unnamed	61	30-61			Sanifill Inc.
228863	Expired	DOM	All Unnamed					Swink Family Farms
15823-MH	Unknown	MW	All Unnamed					Ted Zigan
35109-MH	Constructed	MW	All Unnamed	20	15-20	19		Town of Erie

Notes:

MW - Monitoring Water Well

DOM - Domestic Water Well

COM - Commercial Water Well

IRR - Irrigation Water Well

**All Information was collected from the Colorado Division of Water Resources.*

***Part of Phase II Subsurface Assessment (September 2013)*

11.5. Local Floodplains

The site is not located within a 100-year floodplain. The local floodplain map for the site is shown in Appendix 2, Figure F-1.

11.6. Impact Potential

The potential to impact surface water is present when any new construction or development is conducted. The possible impact(s) to surface water would mainly come from stormwater runoff. The potential impact(s) will be mitigated through careful design of the facility. A large portion of the facility will consist of sized secondary containments (per SPCC Rule) and will not discharge (i.e., precipitation falling in this area will be retained). Stormwater runoff quality is being addressed through the use of permanent BMPs such as retention ponds, revegetation, and water quality capture with outlet control in addition to those specified within Encana's Stormwater Management Plan (see Appendix 5).

The potential to impact shallow ground water is also present when new construction or development is conducted. There is no potential to impact the deeper *Laramie-Fox Hills Aquifer* because of the impermeable shale layer of the upper *Laramie Formation* separating the shallow ground water from the deeper water bearing zones. The possible impact(s) to shallow ground water would mainly be a result of a chemical or oil spill. The potential impact(s) will be removed or minimized through the design of the facility and implementation of the Spill Prevention, Control and Countermeasure (SPCC) plan (see Section 17.3). As mentioned above, a large portion of the facility will consist of sized secondary containments (see Section 12.3). The containments will be lined and engineered to be impervious. The aforementioned stormwater BMPs are also designed to contain potential spills and releases from leaving the facility boundary. Proposed ground water monitoring and sampling at the facility will track the presence/absence of impacts to ground water (see Section 15).

This project will have no impact on the surrounding drainage patterns and will comply with Weld County, Urban Drainage and Flood Control District and COGCC drainage criteria.

12. 908.b.(7).C: Facility Design and Engineering – Engineering Data

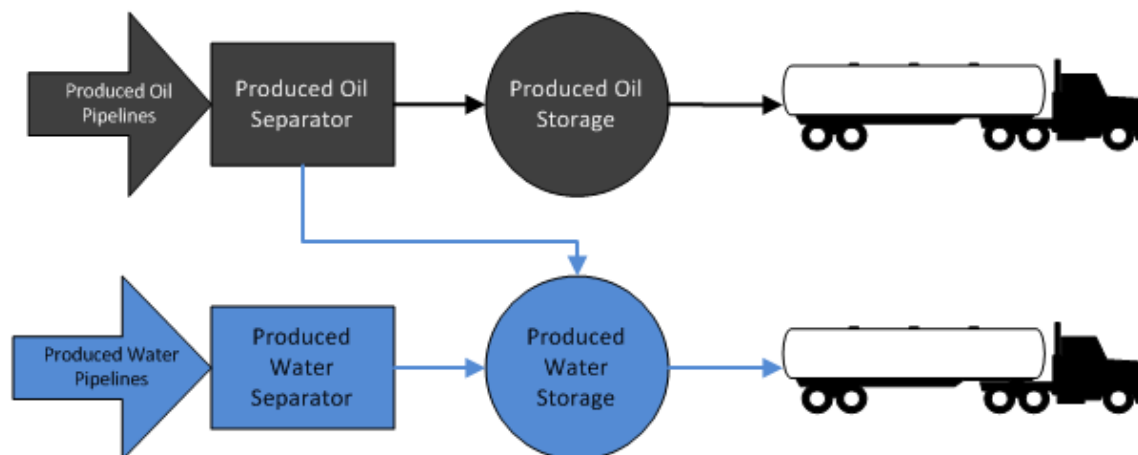
This facility stores produced oil, produced water and residual solids. All storage is in above ground steel tanks enclosed within secondary containment systems. All produced oil will be stabilized and sold. Produced water will be transported offsite via truck to disposal. All solids will be trucked offsite for landfill disposal.

Preliminary drawings for the facility are located in Appendix 1.

12.1. Process Description

Figure 12-1 shows the basic Hub process. Placement of the process equipment is shown in Appendix 1: Engineering Drawings.

Figure 12-1: Hub Process Diagram



12.1.1. Influent

Produced oil and water undergo primary separation at each Encana-operated well pad. They are then transported in separate pipelines to the Hub. The un-stabilized produced oil will enter the Hub from gathering pipelines which combine produced oil from multiple well pads. Produced water will also enter the Hub via separate gathering pipelines from multiple well pads.

12.1.2. Process Overview

Upon entering the Hub, the produced oil pipelines will pass into 100% redundant, heated 3-Phase Produced Oil Separators for secondary separation. The separated water will be transferred to the (2) two 5,000 bbl Produced Water Storage Tanks. The vapor recovered from the produced oil separators will be captured by a booster compressor unit and sold to others. The separated oil will be flashed to a vapor recovery tower (VRT). Overhead vapors from the VRT will be recovered by a vapor recovery unit (VRU). Oil leaving the VRT will be cooled with an aerial cooler before entering the Produced Oil Storage Tanks, which will be fitted with floating roofs. The purpose of the aerial cooler is to ensure the actual vapor pressure is sufficiently below atmospheric pressure. This protects the integrity of the floating roof and eliminates emissions from the floating roof vents.

After storage, the produced oil will be transported offsite via the truck load-out stations where the truck emissions will be captured and sent to an emission control device. The oil load-out stations are designed with produced oil custody transfer, ticketing, and remote Ethernet communications.

The produced water gathering pipelines will feed directly into 100% redundant, 3-phase Produced Water Separators to further separate any residual gas and oil from the water. The separated gas will be delivered to the vapor combustion unit (VCU), while the separated oil will be pumped to the Off-Spec Oil Surge Tank prior to being re-processed in the 3-Phase Produced Oil Separators. The produced water will flow into two (2) 5,000 bbl Produced Water Storage Tanks.

Bottom solids that accumulate in the Produced Water Storage Tanks, Produced Oil Separators and Produced Water Separators will be pumped to two (2) 500 bbl Solids Storage Tanks where they will be stored until pressed and trucked offsite for disposal.

Produced water that is not needed within Encana's system for well completions will be trucked from the Produced Water Storage Tanks to the disposal facilities defined in Table 9-3.

12.2. Permanent Structures and Equipment

An overall site plan for the proposed facility is shown in Appendix 1. All proposed structures and access roads are shown on this plan.

12.2.1. Buildings

The following pre-engineered metal buildings will be constructed at the Hub:

- MCC/PDC Building
- Office/Control Building

All buildings will comply with the relevant Weld County Building Codes.

12.2.2. Engineered Steel Tanks

The following engineered steel tanks will be constructed at the Hub:

- Three (3) 35,000 bbl Produced Oil Storage Tanks, three (3) reserved for future

General Design Criteria:

- API 650: Welded Tanks for Oil Storage
- Foundation design stamped by a Colorado Professional Engineer
- Tank design stamped by a Colorado Professional Engineer
- Concrete ring wall will be constructed around each of the large tank foundations

Internal coating of the tanks will be per Encana's Specification for Internal Tank and Pressure Vessel Coating (see Appendix 11):

- Sherwin Williams Dura-Plate UHS (20 to 24 mils thickness), or
- Sherwin Williams Phenicon HS/FF (10 to 12 mils thickness)

External coating of the tanks will be per Encana's Specification for Painting of New Equipment (see Appendix 11):

- Surface Prep SP6 (see Encana Specification Appendix C)
- Coating System 5 (see Encana Specification Appendix D)
- Color BLM "Desert Brown".

12.2.3. Standard Steel Tanks

The following small tanks which comply with API 12F: Specification for Shop Welded Tanks for Storage of Production Liquids will be located at the Hub:

- Two (2) 500 bbl Solids Storage Tanks
- One (1) 750 bbl Off-Spec Oil Surge Tank, two (2) reserved for future

12.2.4. Engineered Stainless Steel Tanks

The following engineered stainless steel tanks will be constructed at the Hub:

- Two (2) 5,000 bbl Produced Water Storage Tanks

General Design Criteria:

- API 650: Welded Tanks for Oil Storage
- Foundation design stamped by a Colorado Professional Engineer
- Tank design stamped by a Colorado Professional Engineer
- Concrete ring wall will be constructed around each of the large tank foundations

12.2.5. Other Process Equipment

Additional process equipment will be located at the Hub as follows:

- Two (2) Produced Oil Separators
- Two (2) Produced Water Separators
- Four (4) Vapor Recovery Towers
- Three (3) Vapor Recovery Unit Compressor Skids
- Three (3) Booster Compressor Skids
- Two (2) Air Coolers
- Two (2) Truck Vapor Combustion Units
- Two (2) Truck Vapor Combustion Blowers
- One (1) Pig Receiver Sump Tank
- One (1) Fuel Gas Skid
- One (1) Underground Slop Tank
- One (1) Sludge Processing Equipment (temporary)

12.3. Spill Containment

12.3.1. Secondary Containment Design

Two impervious secondary containment structures will be constructed at the Hub site, as follows:

- Containing the Produced Oil Storage Tanks and Off-Spec Oil Tanks
- Containing the Produced Water Storage Tanks and Solids Storage Tanks

All containment volumes have been sized using the volume of the largest tank, plus the 25 year, 24-hour storm event (per NOAA Atlas 14, Volume 8, Version 2), plus one (1) foot of freeboard. The displacement of future tanks or structures was incorporated into the calculated volume to verify that the height of the containment is sufficient for the ultimate build-out condition. Containment calculations are presented below.

Table 12-1: Secondary Containment Calculations

		Produced Oil Containment	Produced Water Containment	Notes
Gross Containment				
Width	ft	325	89.6	Width at half-depth w/o freeboard
Length	ft	440	204.6	Length at half-depth w/o freeboard
Depth	ft	4.2	3.3	Total depth of containment
Freeboard	ft	1	1	Required freeboard
Depth w/o freeboard	ft	3.2	2.3	Available depth of containment
Volume w/o freeboard	ft ³	457,600	42,164	Gross volume of containment without freeboard
Volume w/o freeboard	bbl	81,502	7,510	
Individual Tank Displacement				
		Produced Oil Storage Tanks	Produced Water Storage Tanks	
Diameter	ft	100	35	
Height	ft	32	32	
Area of tank	ft ²	7,854	962	Footprint of tank - used for displacement
Volume	ft ³	251,327	30,788	Volume of tank
Volume	bbl	44,763	5,484	
Number of Tanks		6	2	
		Off-Spec Oil Tanks	Solids Storage Tanks	
Diameter	ft	12	12	
Height	ft	25	25	
Area of tank	ft ²	113	113	Footprint of tank - used for displacement
Volume	ft ³	2,827	2,827	Volume of tank
Volume	bbl	504	504	
Number of Tanks		3	2	
Combined Tank Displacement				
Large Tank Displacement	ft ³	25,133	2,213	Volume displaced (area x depth w/o freeboard)
Remaining Tanks		5	1	Number of tanks not leaking

		Produced Oil Containment	Produced Water Containment	Notes
Small Tank Displacement	ft ³	362	260	Volume displaced (area x depth (w/o freeboard))
Number of Tanks		3	2	Number of tanks not leaking
Total Tank Displacement	ft ³	126,749	2,733	Remaining tanks x tank displacement (Large and Small)
Net Containment	ft ³	330,851	39,431	Total containment less displacement
Available Containment	bbl	58,927	7,023	Available volume in barrels
Rainfall				
Rain event	ft	0.305	0.305	25-Year, 24 hour storm event
Area at Top of Berm	ft ²	151551	20,936	
Rain Event Volume	ft ³	46,223	6,385	Total volume of rain event
Rain Event Volume	bbl	8,233	1,137	
Required Volume				
Largest Tank Liquid Volume	bbl	35,000	5,000	
Required Containment	bbl	43,233	6,137	Largest tank liquid volume + rain event

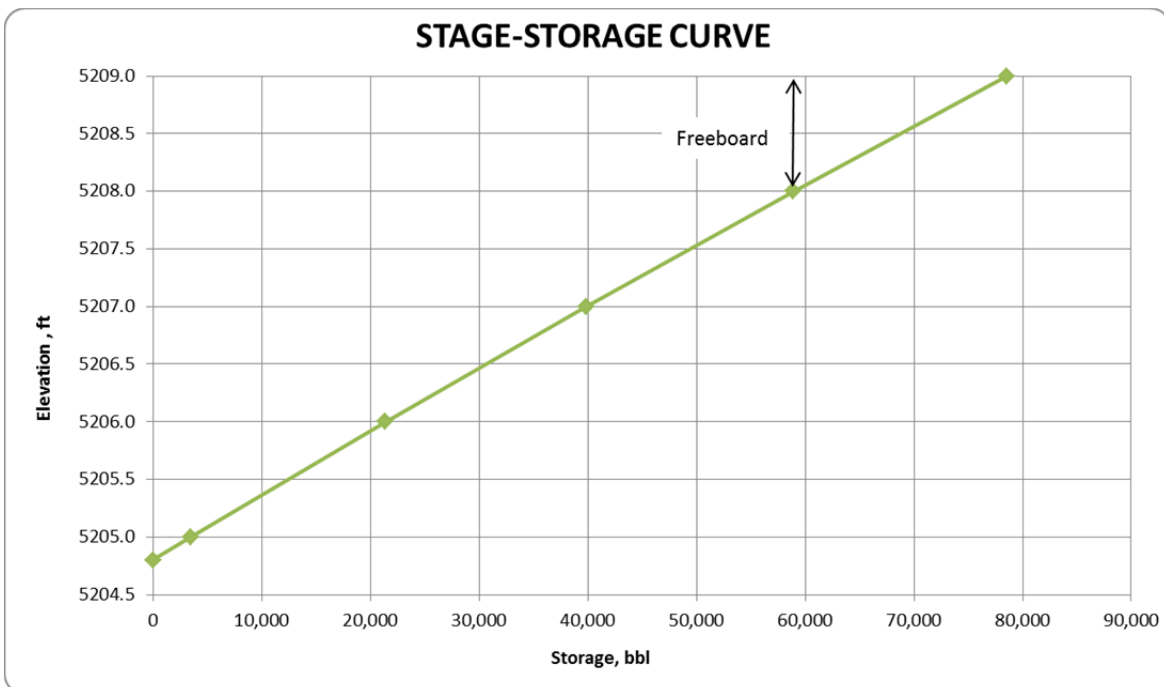
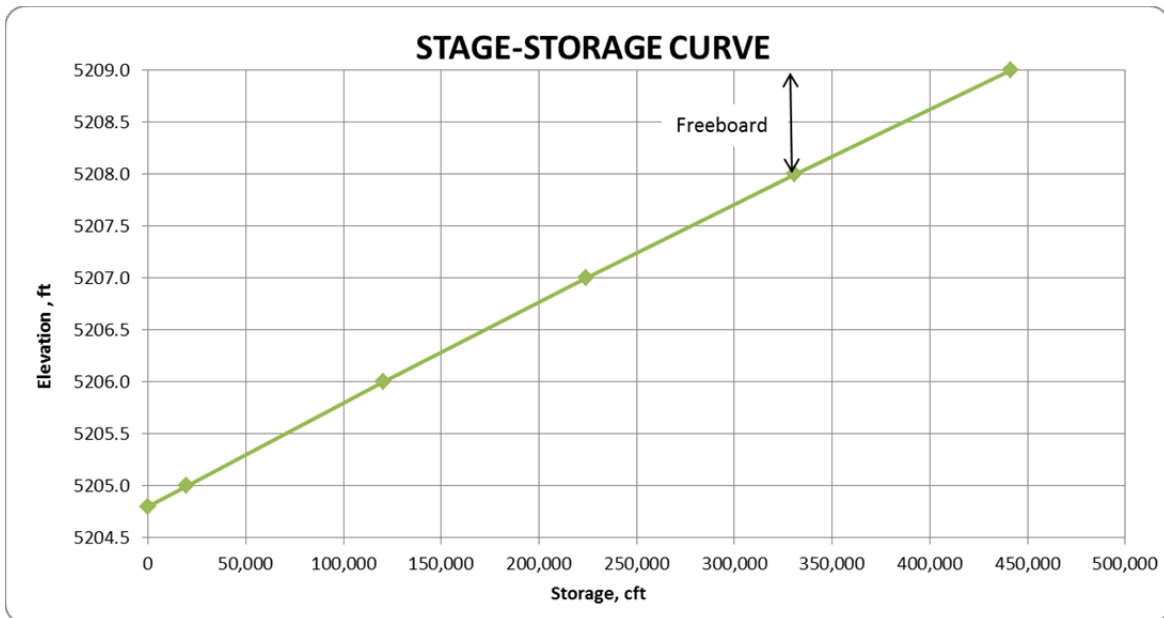
Both containment structures will be constructed from earth and lined on the upstream side with a spray-on liner. Specifications for this liner are included in Appendix 12. A spray-on liner was chosen over an HDPE-type system in order to:

- Eliminate seams and seam welding
- Provide an easy, quick and water-tight seal around pipe penetrations
- Improve application time
- Allow application in cold weather
- Improve integrity of repairs after inadvertent damage

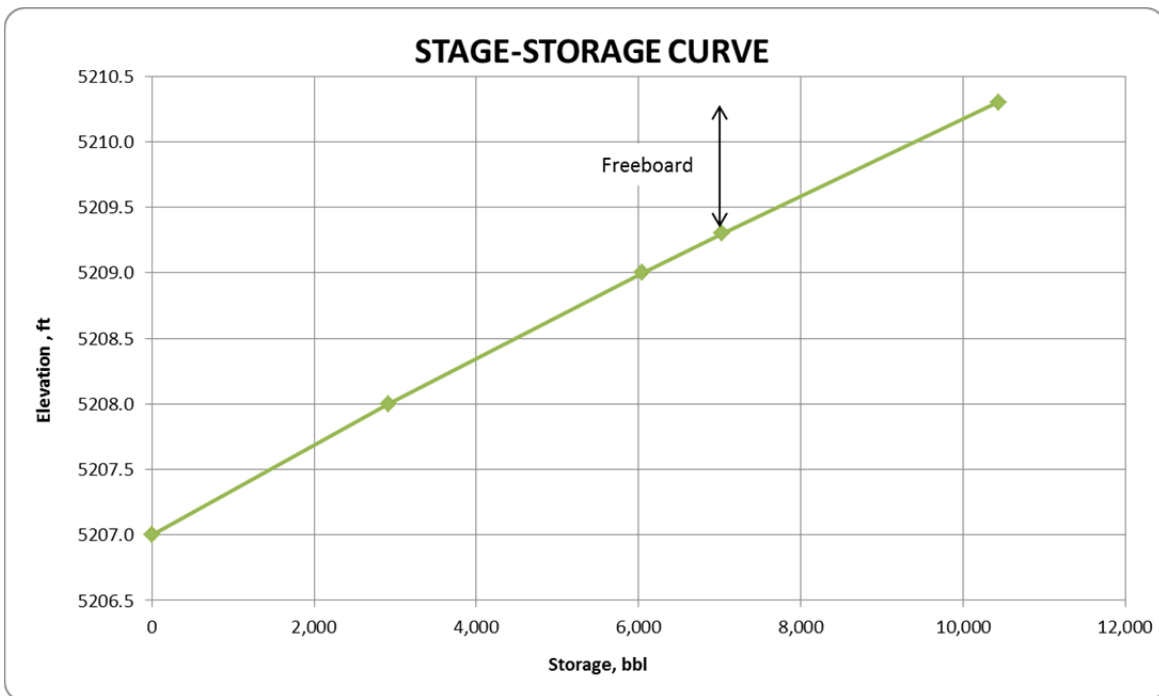
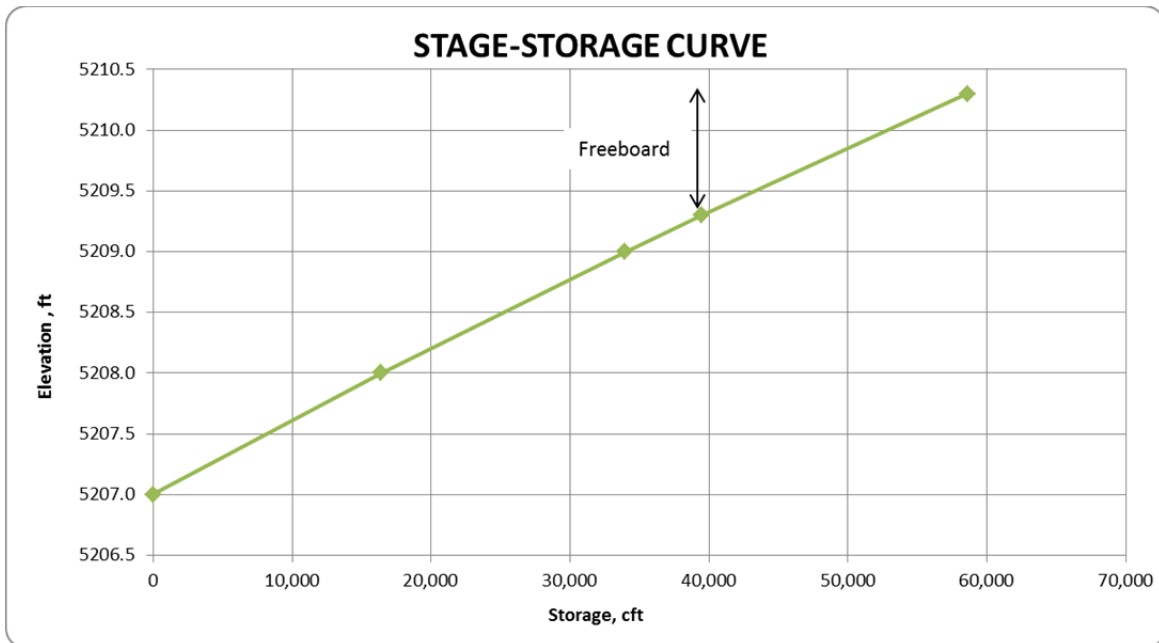
The tanks will be constructed on concrete foundations, each of which will have a ring wall. After the foundation has set, geotextile will be laid over it. The geotextile will then be sprayed with an impervious material. Cathodic protection will be installed over the coating prior to the construction of the tanks. This system mitigates the risk of tank bottom failure by containing the tank bottom and allowing minor leakage to be captured by the ring wall prior to entering the secondary containment.

Stage-storage curves for all containment areas are shown on the graphs below. The storage curves reflect the ultimate build-out condition and therefore account for the displacement of all future tanks.

**Graph 12-1: Produced Oil Storage Tank
Secondary Containment Stage-Storage Curves**



**Graph 12-2: Produced Water and Solids Storage Tanks
Secondary Containment Stage-Storage Curves**



12.3.2. Truck Loading Pad

A concrete apron sloped into a trench drain system will be provided at the truck loading stations. The trench drains will slope to an underground slop tank. This system has been designed to collect any spills and minimize the potential for diesel to leave the pad.

13. 908.b.(8): Operating Plan

A preliminary Operations and Maintenance (O&M) Manual has been developed for the Hub (see Appendix 13). Each subsection of Rule 908.b.(8) has been addressed within the O&M Manual, as shown in Table 13-1, with the exception of Rule 908.b.(8).E: Emergency Response Plan. The Emergency Response Plan is included in this Form 28 submittal as Appendix 14.

Table 13-1:
Location of Rule 908.b.(8) Compliance Information in the Hub O&M Manual

Subsection of Rule 908.b.8	Description of subsection requirement	Corresponding Section of the Hub O&M Manual
A	Method of treatment, loading rates, and application of nutrients and soil amendments	Section 2.4 Process Description
B	Dust and moisture control	Section 2.5 Dust Control
C	Sampling	Table 1.1 Measurement & Sampling Requirements
D	Inspection and maintenance	Section 6 Inspection & Maintenance Schedule
E	Emergency response	None. See Form 28 submittal Appendix 14
F	Record-keeping	Section 5.5 Monitoring & Reporting Section 7.0 Encana Internal Reporting
G	Site security	Section 2.2 Site Security (Facility Description) Section 5.1 Site Security (Operator Responsibilities)
H	Hours of operation	Section 5.1 Site Security
I	Noise and odor mitigation	Section 2.6 Noise and Odor Mitigation
J	Final disposition of waste	Section 2.4 Process Description

The O&M Manual included with this Form 28 submittal is preliminary. A final O&M Manual will be submitted to the COGCC in accordance with Rule 908.f upon completion of the facility.

14. 908.b.(9).A: Water Wells

As shown in Table 11-1 above, the majority of registered water wells within the one (1) mile radius of the proposed facility are related to the municipal landfills located to the southwest. The wells are for



ground water monitoring and installed to sample the shallow ground water. The municipal landfills are permitted and regulated by the CDPHE. Since the landfills are located upgradient from the site and are currently implementing a ground water monitoring program, Encana recommends foregoing establishing baseline water quality parameters from the wells associated with the landfills.

The proposed facility is located within COGCC's designated "Greater Wattenberg Area" (Rule 318A). With the oil and gas operators in the area (including Encana), there may be existing baseline groundwater analytical data present within the COGCC's database for the nearby domestic use wells. Although the COGCC Rule 318A does state:

iii. Nothing in this Rule is intended, and shall not be construed, to preclude or limit the Director from requiring groundwater sampling or monitoring at other Production Facilities consistent with other applicable Rules, including but not limited to the Oil and Gas Location Assessment process, and other processes in place under 900-series E&P Waste Management Rules (Form 15, Form 27, Form 28),

Upon approval of the Form 28 application, Encana will submit letters of intent to collect baseline water quality data from the three (3) domestic use well owners within the one (1) mile radius (permit numbers 223888, 80422, and 903-WCB). If access is granted, the wells will be sampled and data reported per Rule 908.b.(9).A. In the event that current baseline water quality data is available for any of the domestic wells and the fact that the impermeable shale layer within the upper Laramie Formation limits potential impact to the deeper water bearing zones shared by the domestic water wells, Encana would sample nearby domestic wells on an "as-needed" basis due to complaints, concerns, or spill investigation(s). Encana will be monitoring and sampling on a periodic basis the shallow ground water within the vicinity of the site as detailed below in Section 15.

15. 908.b.(9).B: Monitoring Wells

Encana proposes to install six (6) shallow ground water monitoring wells after the Hub construction activities are completed (see Appendix 2, Figure 3). The Phase II investigation conducted in September 2013 provided preliminary baseline water quality data. Encana proposes to sample and analyze for those constituents listed in Rule 908.b.(9).A for the initial baseline and then default to the ground water constituents listed in COGCC Table 910-1 for subsequent sampling events. The six (6) monitoring wells will be sampled on a semiannual basis (April and October). Additional sampling will occur on an "as-needed" basis (i.e. in response to a spill investigation or to confirm anomalous data reported). Encana will submit annual reports summarizing the groundwater monitoring and sampling data, including direction of ground water flow, ground water gradient, and water quality in accordance with Rule 908.f.

16. 908.b.(10): Surface Water Monitoring

Figure SW-1 (Appendix 2) illustrates the surface water features within a two (2) mile radius of the proposed facility. With the exception of *Little Dry Creek*, the remaining features are ephemeral, intermittent, or seasonal. Encana does not recommend baseline or periodic surface water monitoring or sampling at this time. The data and information which support this statement include:

- The closest surface water feature is the *Community Ditch*, which meanders around the site to the west and north. It flows during seasonal irrigation periods and is topographically upgradient. An attempt was made to collect water samples from the ditch in September 2013 as part of the Phase II investigation but access was not obtained.
- The nearest downgradient surface water feature is a section of *Little Dry Creek*. It is more than three-quarters (3/4) mile away located on agricultural property. The draw that bisects the proposed facility eventually drains to *Little Dry Creek*, but the ephemeral flow would have to cross two bar ditches along Weld County Road 7 and through approximately a half (½) mile of irrigated hay crop.
- The design of the facility includes the control of stormwater run-on and run-off. Diversion of run-on water around the facility and the retention of stormwater run-off will occur. The goal is to fully prevent run-off from leaving the location. In the scenario where a series of storm events fill the retention areas to capacity, the retention areas is designed to release run-off in a controlled and supervised approach.
- The retention areas of the facility will be inspected on a periodic basis. The inspections will note the presence or absence of an oily sheen. If there is an oily sheen, the water will be removed and recovered mechanically.
- The proposed shallow ground water monitoring program will aid in determining potential issues with the stormwater retention areas.

Encana does not anticipate the need to install a permanent surface water monitoring station at this location.

17. 908.b.(11): Contingency Plan

17.1. Site Safety / Evacuation Plan

A preliminary site specific safety and evacuation plan has been prepared for the facility (see Appendix 14). This plan includes directions to the site, emergency contact information, and designated muster points. An Emergency Shutdown Plan showing the location of all emergency isolation valves, ESD switches and fire extinguishers will be prepared prior to facility operation and will be kept on site thereafter. This plan will be incorporated into start-up and commissioning training for the facility.

17.2. Chemicals On-site

No chemicals will be stored on site. Safety Data Sheets (SDS) for crude oil and produced water are provided in Appendix 15.

17.3. Spill Prevention, Control and Countermeasure Plan

The Spill Prevention, Control and Countermeasure (SPCC) Plan for Encana's Middle Fork WTF is provided in Appendix 16 as a sample. A similar plan will be developed for the Hub and submitted to the COGCC within six (6) months of commissioning and start-up of the facility. This timeframe is consistent with the EPA guidelines for SPCC planning.

Emergency equipment will include four 96 gallon spill kits.

17.4. Emergency Response Plan

Encana requires that Emergency Preparedness and Emergency Response Plans (ERP) be in place at Division, Business Unit and Sub-Business Unit levels. These plans are kept current and are supported by training and resources to ensure decisive and effective incident response.

The Hub is located in Encana's USA Division, South Rockies Business Unit (SRBU) and DJ Basin Sub-Business Unit. A current copy of the Emergency Notification Chart for SRBU DJ Basin will be kept on-site together with the USA Division Notification and Activation section of the USA Division Emergency Response Plan (see Appendix 14 – Emergency Notification Chart not included, but can be provided upon request).

The USA Division ERP facilitates a coordinated response by Division personnel to any emergency situation related to seismic/exploration, construction, drilling, completion, workovers, operations, remediation, reclamation and support services. It describes the procedures which will be implemented, in whole or in part, if an emergency situation occurs during any phase of Encana USA Division operations including, but not limited to, the following types of incidents:

- Serious injury or fatality
- Vehicle related incident
- Major property or equipment damage
- Fire or explosion
- Spill, hazardous materials release, or product release
- Security threat or suspicious activity
- Natural occurrence

18. 908.d: Financial Assurance

Financial assurance, as required by Rule 904 and 907.d, will be included in Appendix 17 of this submittal upon COGCC approval of the closure cost estimate.

19. 908.e: Facility Modifications

Any proposed major modifications to the facility design, operations plan, permit data or permit conditions will be submitted to the COGCC for prior approval under a Form 4 Sundry notice and in accordance with Rule 908.e.

Any minor modifications to the facility design, operations plan, permit data or permit conditions (from entities other than the COGCC) will be included in the annual reports submitted to the COGCC per Rule 908.f.

20. 908.f: Annual Permit Review

The following data will be provided to the COGCC to supplement this application within six (6) months of facility start-up, as discussed throughout this document:

- Final Operations & Maintenance Manual
- Spill Prevention, Control and Countermeasure Plan
- Results of Surface Water Quality Monitoring Investigation

If requested, Encana can also provide the following information post-construction:

- As-built drawings showing final building locations and site characteristics
- Evacuation Plan

After the first year of operation an annual report on the Hub will be submitted to the COGCC which will include:

- Volume of solid waste exiting the facility
- Volume of water entering and exiting the facility
- Source water well additions
- Injection well additions
- Any facility modifications, per Rule 908.e

A rolling twelve month average of the facility water quality will be retained by Encana and reported to the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD) as required for permit compliance. These reports will be available to the COGCC upon request.

21. 908.g.(1).A: Preliminary Closure Plan

The Hub is expected to operate for thirty (30) years or greater. However, the facility could be closed earlier due to changing market conditions.

At closure, the following tasks will be undertaken at the Hub:

- Removal of the following items:
 - Industrial waste including bottom solids
 - Equipment including pumps, pipelines, electrical equipment, solids pressing equipment etc.
 - Steel tanks
 - Separators
 - Drainage controls
 - Other industrial components, as required by COGCC regulations at the time of closure
- Native soil sampling and analysis for Table 910-1 constituents
- Comparison of closure samples with baseline samples to determine if naturally occurring background concentrations have been exceeded.

- Completion of remediation activities required by soil sampling results.
- Site restoration to pre-facility conditions, including recontouring and revegetating the site, redistribution of topsoil and reseeding.
- Site monitoring to verify that seventy (70) percent of the preexisting vegetation is achieved.
- Final reclamation in accordance with COGCC regulations at the time of closure.

Additional details regarding the revegetation plan are located in Appendix 18: Closure and Reclamation Plan.

22. 908.g.(1).B: Preliminary Closure Cost

The preliminary closure cost for the Hub is estimated to be \$4,341,000. Details of this estimate are included in Appendix 19.

Due to the extended operating time of this facility the accuracy of this closure estimate is + 40 /- 30%. However, Encana believes that this is an adequate estimate for the following reasons:

- This cost is approximately 13% of the estimated construction cost
- A 20% contingency is included
- An allowance is included for sampling/testing to verify environmental compliance
- Soil remediation will be minimal due to the dual containment systems used onsite (steel tanks on lined, concrete foundations / ring walls located in lined, secondary containments).

23. 908.g.(2): Final Closure Plan

A detailed Site Investigation and Remediation Workplan Form 27 will be submitted to the COGCC for approval a minimum of sixty (60) days prior to closure of the Hub.

24. 908.h: Other Permits and Notifications

The following table provides a list of local, state and federal permits and notifications required for construction and operation of the Hub. Permit approvals for all applications are expected to be granted by June 1, 2014.

Table 24-1: Other Permits and Notifications

Agency	Permit	Application Date	Anticipated Approval Date	Location
CDPHE APCD	Construction Permit	August 2013	June 2014	Appendix 20
CDPHE WQCD	Construction Stormwater Permit	April 2014	June 2014	Not included in this application
Weld County	Use by Special Review	October 2013	June 2014	Appendix 21
Weld County	Grading and Erosion Control Permits	April 2014	June 2014	Not included in this application
Weld County	Building Permits	May 2014	June 2014	Not included in this application
COGCC	Form 2A	October 2013	November 2013	Appendix 22