Hunter Mesa Water Facility

Encana Oil & Gas (USA) Inc.

Form 28 Supplemental Information

July 2013

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1. 908.a: Applicability

1.1. Current COGCC Status

Hunter Mesa Water Facility (HTMWF) is currently operating under an existing Form 28, Permit #149011 issued in 2003 (see Appendix 1). The intent of this submittal is to update the existing Form 28 to meet the current standards set by the Colorado Oil & Gas Conservation Commission (COGCC).

There are five earthen pits associated with this facility, as listed in Table 1. A Form 4 and a Form 42 will be filed prior to construction of the Lower Pond (estimated to be between 2014 and 2016).

Table 1: Associated Earthen Pit Permits

COGCC Facility ID	Encana Name	Construction Date
TBD	North Pond	2003
TBD	Middle Pond	2003
TBD	South Pond	2003
433571	Upper Pond	2013
433572	Lower Pond (future)	2014 – 2016

1.2. Facility Objectives

HTMWF is a non-commercial, centralized E&P waste management facility for the treatment of E&P waste for Encana Oil & Gas (USA) Inc. (Encana) operations in the Piceance Basin area of Garfield County, Colorado. The objectives of HTMWF are to:

- Treat and recycle produced and flowback water within the Piceance Basin.
- Minimize environmental impact by:
  - Maximizing the use of recycled water;
  - Following Best Management Practices (BMPs);
  - Minimizing environmental liability by operating the facility in accordance with all permits; and
  - Minimizing the cost of managing water within the Piceance Basin.

This facility is authorized to receive the following influent:

- Flowback and produced water from Encana operated wells in the South and North Piceance Sub-Business Units (SBUs).

Flowback and produced water from other oil and gas operators may be received by this facility on a case-by-case basis, as authorized by Encana and the COGCC. No third-party influent will be accepted if doing so violates HTMWF's status as a non-commercial facility.

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

See attached Form 28 in Appendix 1. Written authorization from the surface owner is provided in Appendix 2. A survey plat is provided in Appendix 4, Figure 1.

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

3.1. General Site Description

The facility site lies southeast of the Colorado River on Hunter Mesa. The nearest municipality is the City of Rifle which is located approximately 5.4 miles northwest of the facility. The terrain is mostly rolling hills. The elevation at the site is approximately 6,070 feet above sea level. A vicinity topographic map is provided in Appendix 4: Figure 2, along with a location topographic and road map in Appendix 4: Figure 3.

3.2. Adjacent Land Use

Adjacent uses within a 1,500-foot radius of the site primarily consist of agricultural activities and natural gas extraction. There are no private residences within a one (1) mile radius of the site. An adjacent parcel map is provided in Appendix 4: Figure 4**.** The surrounding land uses are not adversely impacted by operation of the facility due to the remote location and the existing surrounding uses being similar to the water facility.

3.3. Topology

The HTMWF site is relatively flat with a gradual slope dipping to the north/northeast. The site consists of sage brush and native grasses surrounding the facility. Drainage from the facility and the surrounding area flows to the north.

3.4. Geology

The site is located within the Piceance Basin. The Piceance Basin is a large, deep structural basin formed during the Laramide orogenic event of late Cretaceous age. Present structural relief between the Piceance Basin and the White River uplift is about 30,000 feet. The site is located on what has been termed the Ohio Creek Formation. The Ohio Creek Formation occurs stratigraphically between the underlying Upper Cretaceous Mesaverde Group and the overlying Paleocene Wasatch Formation. An unconformity separates the two. The Ohio Creek Formation has been placed either just above or just below this unconformity, depending on the scientist. The white, slightly pebbly sandstone of the Ohio Creek is a deeply weathered zone in Mesaverde rocks beneath the unconformity. Overlying conglomerate, which has been mapped as Ohio Creek by some, is a basal conglomerate of the Wasatch Formation in some places. The Tertiary claystone, mudstone, sandstone, siltstone and shales of the Wasatch and Ohio Creek formations are the dominant formations at HTMWF.

3.5. Hydrology

Geotechnical analysis (See Section 10.1 and Appendix 8) completed in the Hunter Mesa area indicate that there is no shallow groundwater at, or in the vicinity of, the facility. Soil borings drilled in the area

were advanced to sandstone bedrock at 40 ft below ground surface (bgs), which is greater than 20 feet below the pond bottoms. Research indicates that a majority of water wells in the area are sourced from alluvial deposits closer to the Colorado River.

There are three (3) small creeks within one (1) mile of the Hunter Mesa facility: Dry Creek to the west, Mamm Creek to the east and West Mamm Creek to the south/southeast (Appendix 4: Figure 6).

3.6. Average annual precipitation

The average annual precipitation in the area is approximately 11.61 inches based on the Western Regional Climate Center records for Rifle, Colorado (Station #057031) (see Appendix 6).

3.7. Average annual evaporation

The average annual evaporation in the area is approximately 60 inches based on the National Weather Service Evaporation Map of the United States (see Appendix 6).

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

An overall site plan for the existing facility is provided in Appendix 3. Additional detail regarding the site structures and facilities is also provided in Appendix 3.

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

A site survey plan for the facility is shown in Appendix 4: Figure 1.

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

The facility is accessed via Garfield County Road 319 (West Mamm Creek Road) and a private road network, as shown in Appendix 4: Figure 3.

Access to the site by members of the public is restricted by an automatic gate on the South approach and a private road on the North approach to the facility.

HTMWF is manned 24 hours a day, 7 days a week.

Wildlife and domestic animal access to HTMWF are controlled through the following measures:

- Six (6) foot high chain link fence around three sides of the site perimeter
- Two (2) foot high rodent mesh at base of perimeter fence
- Cattle guard at entrance gate
- Mesh coverings on all tank or building openings including vents, stacks, etc.
- Wildlife fence around ponds
- No pets are allowed on-site.

No agricultural operations take place on Encana-owned property.

HTMWF complies with Encana's wildlife protection policies, as outlined in the Migratory Bird Treaty Act and Other Wildlife Protection Requirements document (see Appendix 13). Inspection and maintenance of these control measures is conducted regularly, as discussed in the HTMWF O&M Manual (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 3.

An additional buffer zone with a minimum width of ten (10) feet has been provided along the main access roads for the site.

Access roads are constructed with a four (4) inch course of Class 5 road base on top of a six (6) inch course of Class 2 road base. A Fugitive Dust Control Plan has been provided in Appendix 5.

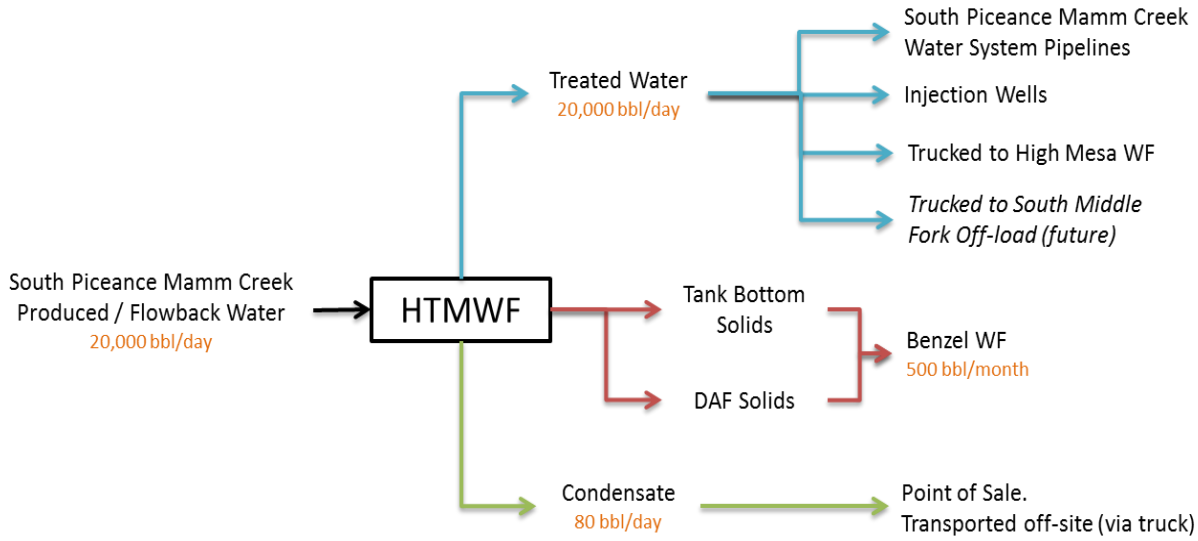
8. 908.b.(5).E: Surface Water Design

HTMWF has perimeter control BMPs that restrict run-on and eliminate the discharge of sediment and other pollutants. The BMPs include compacted earthen berms, dikes, and sediment basins. The BMPs surrounding the original facility (South Pond, Middle Pond, North Pond and tank farm area) were designed for an average annual precipitation of 14 inches and average annual evaporation of 45 inches, as shown on the Form 28 submitted in 2003 (see Appendix 1).

The surface water drainage design and erosion control plans for the Upper Pond are included in Appendix 3 (a). A similar approach will be taken with the Lower Pond. Additional surface water information is provided in Appendix 7: Stormwater Management Plan and Appendix 16: SPCC Plan.

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

9.1. Waste Streams Schematic



9.2. South Piceance Mamm Creek Produced / Flowback Water

9.2.1. Estimated Volume

HTMWF is sized to treat up to 20,000 barrels per day (bpd) of produced/flowback water from Encana-owned wells in the South Piceance Mamm Creek area (see Appendix 11 for a list of contributing wells). The maximum throughput currently allowed by the CDPHE APCD Operating Permit is 7,300,000 bbl per year.

New wells that are drilled within the boundaries of the map in Appendix 11 will also contribute to HTMWF.

9.2.2. Characteristic Waste Profile

A material safety data sheet (MSDS) for produced water is included in Appendix 15. HTMWF influent is sampled monthly (see paragraph 9.7). Typical characteristics of this fluid are shown in Table 2.

Table 2: Typical Produced/Flowback Water Quality

Component	Typical Range (mg/l)	Average Value (mg/l)
TPH-GRO (C6-C10)	1 – 300	110
TPH (C10-C28)	1 – 420	100
Methanol	5 – 600	130
Total Suspended Solids (TSS)	25 – 500	120
BTEX	1 – 75	35

9.3. Treated Water

9.3.1. Estimated Volume

HTMWF currently pumps approximately 14,400 bpd of treated water out of the treated water ponds although this number varies depending upon the water balance within the well field. The treated water is either pumped to support hydraulic fracturing operations in the field area, trucked to Encana's High Mesa Water Facility (HIMWF) or disposed of in Encana-owned injection wells (see Appendix 11 for a list of injection wells and their API/UIC numbers).

9.3.2. Characteristic Waste Profile

The treated water at HTMWF is sampled monthly (see paragraph 9.7). Typical characteristics of this fluid are shown in Table 3.

Table 3: Typical Treated Water Quality

Component	Typical Range (mg/l)	Average Value (mg/l)
TPH-GRO (C6-C10)	1 – 180	80
TPH (C10-C28)	1 – 50	20
Methanol	5 – 600	130
Total Suspended Solids (TSS)	20 – 150	65
BTEX	1 – 65	30

9.4. Tank Bottom and DAF Solids

9.4.1. Estimated Volume

The current sludge volume (without pressing) is estimated as 1200 barrels (bbl) of sludge per 100,000 bbl of treated water. Approximately 175 bpd of sludge is produced at the current throughput rate.

The maximum permitted throughput for the DAF units is 7,300,000 bbl per year. At that build out capacity the estimated sludge volume would be approximately 240 bpd.

9.4.2. Characteristic Waste Profile

A sampling and characterization analysis of Encana's solid waste stream at HTMWF was undertaken in June 2013, as documented in Appendix 10.

9.5. Condensate

9.5.1. Estimated Volume

Influent to HTMWF has already been flashed at the well pad. The condensate volume on-site is produced from skimming the off-load tanks. The average recent volume of condensate produced at HTMWF is approximately 35 bpd. The current maximum volume allowed by the CDPHE APCD Operating Permit is 80 bpd.

The condensate is stored in the Oil Sales Tanks prior to being sold and removed by truck. Although this material is included in the waste streams schematic it is not a "waste" as it is an industrial product that is sold for profit.

9.5.2. Characteristic Waste Profile

A condensate MSDS is included in Appendix 15.

9.6. Waste Disposal

All waste that is managed at HTMWF is E&P exempt. The waste characterization requirements for disposal depend on the waste profile criteria at each specific disposal facility. Encana transfers the waste from HTMWF to Encana's Benzel WF. Ultimately, the waste is disposed of at the two facilities described in Table 4, both of which are permitted to accept E&P Exempt Wastes.

Table 4: Waste Disposal Facilities

Disposal Facility	Address	Testing Parameters	Testing Rate
R N Industries	244 West Hwy 40 PO Box 98 Roosevelt, UT 84066 (435) 722-2800	8 RCRA Metals VOC's (8260) TPH (GRO/DRO 8015)	One composite sample per 1,000 cubic yards.
ECDC	1111 West Highway 123 PO Box 69 East Carbon City, Utah 94520 Phone: 435-888-4451	Generator must certify that it is RCRA exempt E&P Waste	None

9.7. Water Quality Testing Program

The produced / flowback water influent stream and the treated water effluent stream are sampled monthly for hydrocarbon, methanol and BTEX content in accordance with EPA Approved Methods 8015 and 8260. A rolling twelve (12) month average is kept by Encana. If requested, this data can be reported to the COGCC once per year in accordance with Rule 908.f.

9.8. Naturally Occurring Radioactive Material (NORM)

A NORM sampling and analysis was undertaken in June 2013 (see Appendix 10). This report demonstrates that there are low levels of naturally occurring radionuclides in the samples. There is no evidence of man-made radionuclides in the samples. The material was found to be not hazardous under NRC or other state rules and is acceptable in ordinary landfills.

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

10.1. Geotechnical Investigation

A geotechnical investigation was carried out in 2007 for HTMWF. This report is included as Appendix 8. The following geology is described by that report:

- 0 – 40 ft bgs: very stiff to hard fine-grained clay and siltstone
- 40 ft bgs: consolidated bedrock
- No groundwater was encountered during the investigation, which was completed to greater than 20 feet below the bottom of the impoundments

10.2. Structural Geology

See response to Rule 908.b.(4).

10.3. Geologic hazards

No geologic hazards have been mapped by Garfield County in this area and no faults or other hazards are evident on the Geologic Map of Colorado. No other hazards have been observed by Encana. A geologic hazards investigation was completed in 2012 for the Upper Pond area, which is adjacent to the main facility. This report is included as Appendix 9.

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

11.1. Surface water features

Local surface water features within two (2) miles are shown in Appendix 4: Figure 6. The site drains to the north east into Mamm Creek, which ultimately discharges to the Colorado River.

11.2. Shallow ground water

There is no shallow ground water at the site (see section 3.5).

11.3. Major aquifers

The aquifer underlying the proposed site is the Mesaverde Aquifer (Groundwater Atlas of Colorado – Colorado Geological Survey – 2005) which is not typically the source for water supply wells south of the Colorado River. Very few details are provided on the hydrologic characteristics of the Mesaverde aquifer, but the Williams Fork Formation (the upper most section of the Mesaverde Group) consists of lenticular, discontinuous sand bodies, as seen in out crop to the east and west of the basin.

11.4. Local water wells

There are four (4) water wells located within one (1) mile of the site boundary, as shown in Appendix 4: Figure 7. The nearest well is approximately one quarter (¼) mile away, and sources identify it as a monitoring well which is dry. Sampling of two (2) of the additional three (3) wells will be undertaken by Encana in 2013, assuming access is granted and the wells are not dry. Results of this sampling will be provided in accordance with Rule 908.f.

11.5. Local floodplains

The site is not located within a designated 100-year floodplain. The local floodplain for the Colorado River is shown in Appendix 4: Figure 5.

11.6. Shallow ground water quality

There is no shallow ground water at the site (see Section 3.5).

11.7. Impact potential

Potential impacts include increased runoff and degraded stormwater water quality due to development. Stormwater runoff quality is being addressed through the use of perimeter control BMPs such as check dams in ditches, revegetation, surface hardening, and sediment basins with outlet control (these perform like extended detention basins for low flows), among others specified within Encana's Stormwater Management Plan (SWMP), found in Appendix 7.

The current Spill Prevention, Control and Countermeasure (SPCC) Plan (Appendix 16) demonstrates that the existing secondary containment systems are designed to contain the volume of the largest tank plus precipitation from a 25 year, 24 hour storm event (based on NOAA Atlas 14 Volume 8). In addition to this design, two (2) feet of freeboard is maintained on all ponds. The SPCC plan also discusses some of the above listed controls and other measures taken to mitigate the potential impacts from a potential spill event. Stormwater and erosion control inspections are conducted at regular intervals during construction activities. The SPCC Plan is amended annually per EPA rules. Potential impacts to underground formations are mitigated through the use of pit liners.

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

This facility stores, treats and transfers produced / flowback water as well as residual hydrocarbons and solids. All solids are transferred to Benzel WF where they are pressed and then trucked off-site for land farm disposal. Drawings of the facility are located in Appendix 3.

12.1. Process Description

12.1.1. Influent

Untreated water enters the facility from the following areas of Mamm Creek:

- CBM Pipeline
- Grass Mesa Pipeline
- Rose Ranch Pipeline
- Benzel Pipeline
- Couey Pipeline
- Railsback Pipeline
- Truck off-loading on-site

A list of contributing wells and their API numbers is provided in Appendix 11.

Flowback or produced water that enters the site is directed into one of the Off-Load Tanks or the covered Middle Pond.

Fresh water enters the site via a pipeline from the Colorado River. Fresh water is directed into one of the Fresh Water Tanks.

12.1.2. Treatment Overview

Water is treated on-site by a dissolved air flotation (DAF) process. Untreated water enters the DAF by gravity flow or by pumping from the Off-Load Tanks.

Effluent from the DAF is directed through a series of filters to the North Pond or Upper Pond, depending upon available storage volumes and water balance requirements. Treated water can be transferred between the South Pond, North Pond, Upper Pond and Lower Pond by pumping. Water is stored in these ponds until it is pumped off-site to support hydraulic fracturing or to be disposed of via underground injection.

12.1.3. Discharge for Hydraulic Fracturing

Water used to support hydraulic fracturing is pumped out of the South Pond, North Pond, Upper Pond or Lower Pond via pipelines to:

- CBM
- Grass Mesa
- Rose Ranch
- Benzel
- Couey

12.1.4. Discharge to Injection Wells

Water which cannot be reused within the South Piceance Mamm Creek Water System due to the near-term water balance is disposed of via underground injection or hauled by truck to Encana's South Piceance Orchard Water System.

12.1.5. Solids Handling

Sludge that accumulates in the Off-Load Tanks is pumped into the Sludge Tanks. Sludge from the DAF unit is pumped into the DAF Sludge Tank. When the sludge tanks are full the contents are pumped out and transported off-site to Benzel WF for sludge pressing operations.

12.1.6. Condensate Handling

Condensate that accumulates in the Off-Load Tanks is pumped through an Oil-Water Separator to recover the oil. After separation, the oil flows into one of the Oil Sales Tanks while the produced water returns to one of the Off-Load Tanks. When the Oil Sales Tanks reach an appropriate level the condensate is sold and transported off-site.

12.2. Permanent Structures and Equipment

An overall site plan for the proposed facility is shown in Appendix 3.

12.2.1. Buildings

The following pre-engineered metal buildings are located at HTMWF:

- DAF Building
- MCC Building
- Office

All buildings comply with the relevant Garfield County Building Codes.

12.2.2. Engineered Steel Tanks

The following engineered steel tanks are located at HTMWF:

- Two (2) 5,000 bbl Off-Load Tanks

The tanks are constructed of stainless steel and are not internally coated. External coating of these tanks is per Encana's Specification for Internal Tank and Pressure Vessel Coating (see Appendix 12).

12.2.3. Standard Steel Tanks

The following standard steel tanks, which comply with API 12F: Specification for Shop Welded Tanks for Storage of Production Liquids, are located at HTMWF:

- Two (2) 500 bbl Oil Sales Tanks
- Three (3) 500 bbl Sludge Tanks
- Three (3) 500 bbl Fresh Water Tanks

Internal coating of these tanks is per Encana's Specification for Internal Tank and Pressure Vessel Coating (see Appendix 12).

12.3. Ponds

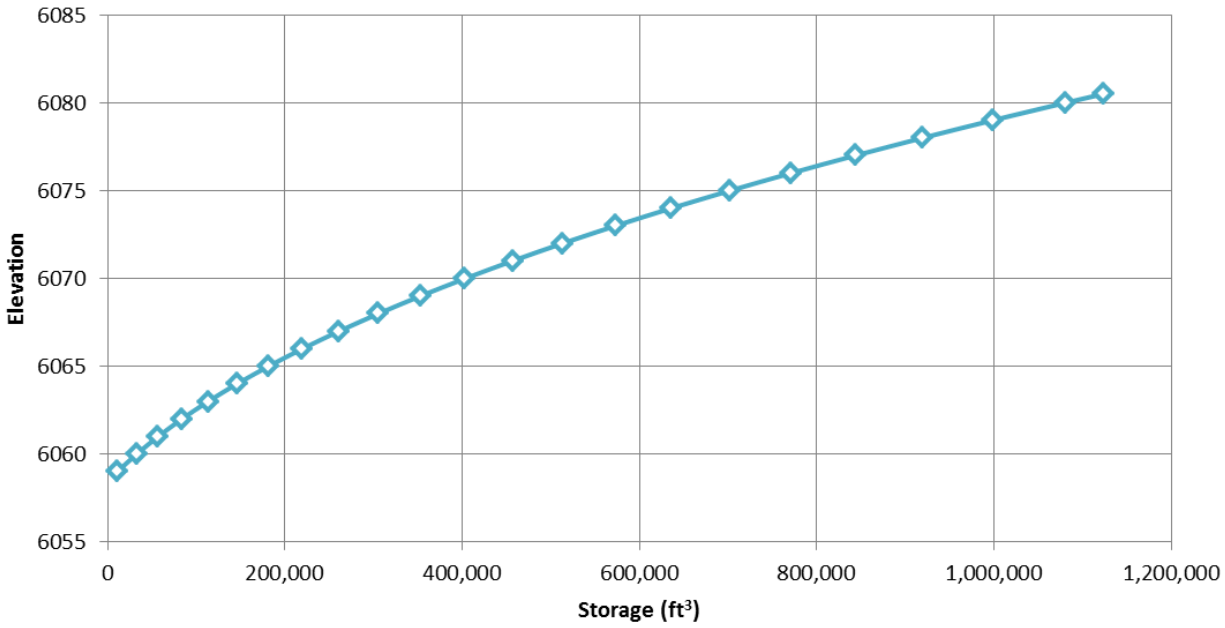
Storage volume details for each pond are shown in the following section. Details of the pond liners, covers, dimensions and leak detection system are included in Appendix 3 and in the Form 15 submission for the Upper and Lower Ponds.

12.3.1. Upper Pond

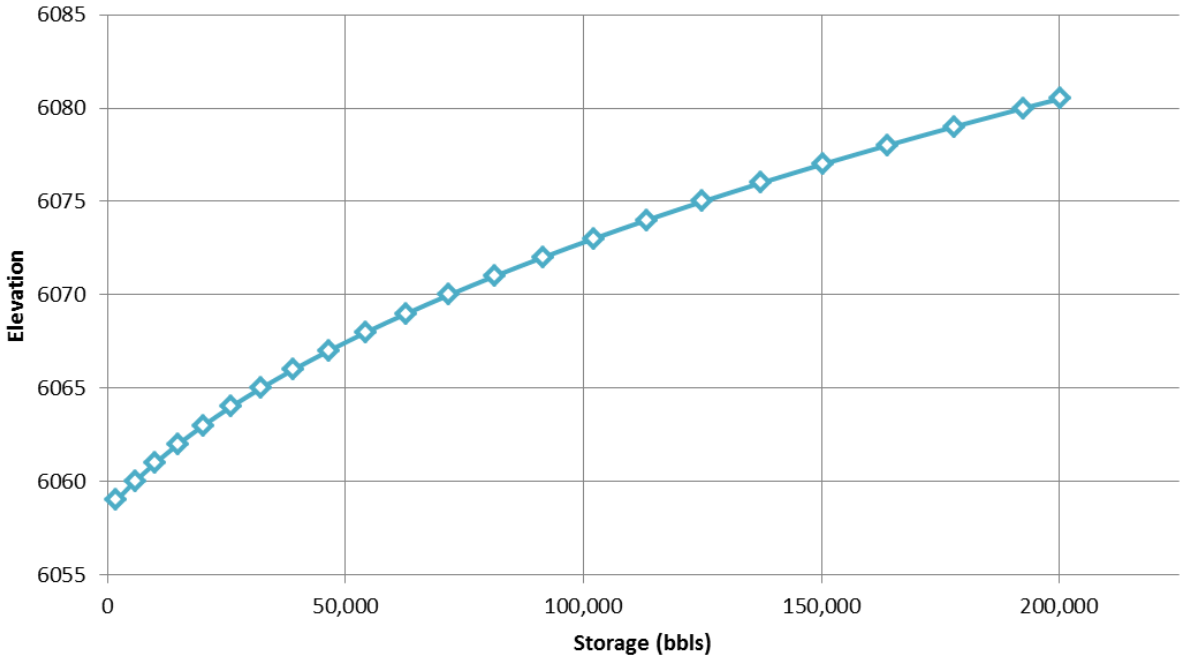
Table 5: Upper Pond Stage-Storage Data

Elevation (ft)	Area (ft^2)	Depth (ft)	Incremental Vol. (bbls)	Accumulated Vol. (bbls)	Accumulated Vol. (ft^3)
6059	8,643	1.2	1,847	1,847	10,371
6060	21,843	1.0	3,890	5,737	32,212
6061	24,322	1.0	4,332	10,069	56,532
6062	26,800	1.0	4,773	14,842	83,331
6063	29,672	1.0	5,284	20,126	113,001
6064	32,544	1.0	5,796	25,922	145,542
6065	35,480	1.0	6,319	32,241	181,020
6066	38,416	1.0	6,842	39,083	219,433
6067	41,401	1.0	7,373	46,456	260,831
6068	44,385	1.0	7,905	54,361	305,213
6069	47,422	1.0	8,446	62,806	352,632
6070	50,458	1.0	8,986	71,793	403,086
6071	53,545	1.0	9,536	81,329	456,628
6072	56,632	1.0	10,086	91,415	513,256
6073	59,769	1.0	10,645	102,059	573,021
6074	62,906	1.0	11,203	113,262	635,923
6075	66,093	1.0	11,771	125,033	702,011
6076	69,280	1.0	12,338	137,372	771,287
6077	72,518	1.0	12,915	150,287	843,800
6078	75,756	1.0	13,492	163,779	919,551
6079	79,044	1.0	14,077	177,856	998,589
6080	82,331	1.0	14,663	192,519	1,080,914
6080.5	85,618	0.5	7,624	200,143	1,123,720

Graph 1: Upper Pond Stage-Storage Curves (ft^3)



Graph 2: Upper Pond Stage-Storage Curves (bbls)

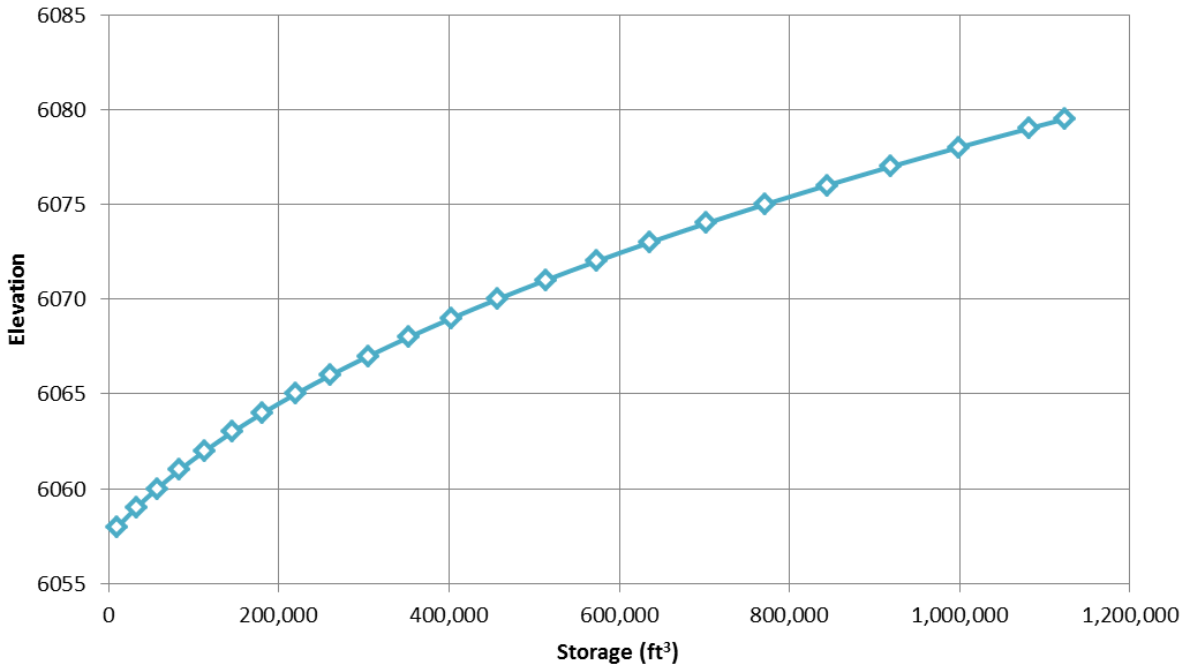


12.3.1. Lower Pond

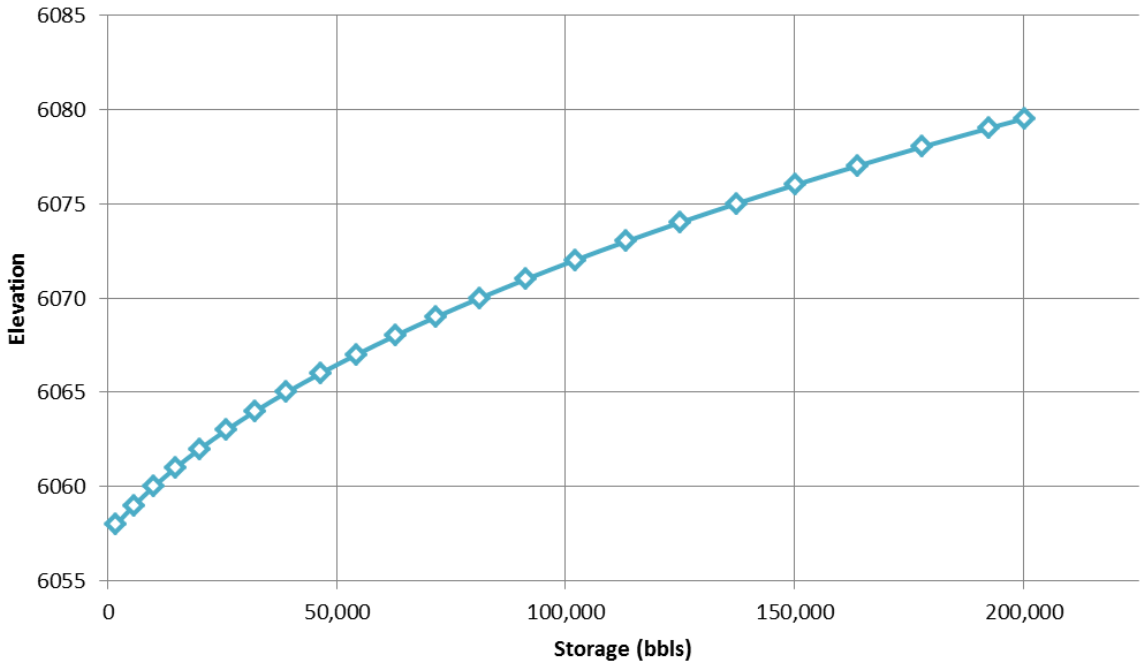
Table 6: Lower Pond Stage-Storage Data

Elevation (ft)	Area (ft^2)	Depth (ft)	Incremental Vol. (bbls)	Accumulated Vol. (bbls)	Accumulated Vol. (ft^3)
6058	8,643	1.2	1,847	1,847	10,371
6059	21,843	1.0	3,890	5,737	32,212
6060	24,322	1.0	4,332	10,069	56,532
6061	26,800	1.0	4,773	14,842	83,331
6062	29,672	1.0	5,284	20,126	113,001
6063	32,544	1.0	5,796	25,922	145,542
6064	35,480	1.0	6,319	32,241	181,020
6065	38,416	1.0	6,842	39,083	219,433
6066	41,401	1.0	7,373	46,456	260,831
6067	44,385	1.0	7,905	54,361	305,213
6068	47,422	1.0	8,446	62,806	352,632
6069	50,458	1.0	8,986	71,793	403,086
6070	53,545	1.0	9,536	81,329	456,628
6071	56,632	1.0	10,086	91,415	513,256
6072	59,769	1.0	10,645	102,059	573,021
6073	62,906	1.0	11,203	113,262	635,923
6074	66,093	1.0	11,771	125,033	702,011
6075	69,280	1.0	12,338	137,372	771,287
6076	72,518	1.0	12,915	150,287	843,800
6077	75,756	1.0	13,492	163,779	919,551
6078	79,044	1.0	14,077	177,856	998,589
6079	82,331	1.0	14,663	192,519	1,080,914
6079.5	85,618	0.5	7,624	200,143	1,123,720

Graph 3: Lower Pond Stage-Storage Curve (ft^3)



Graph 4: Lower Pond Stage-Storage Curve (bbls)

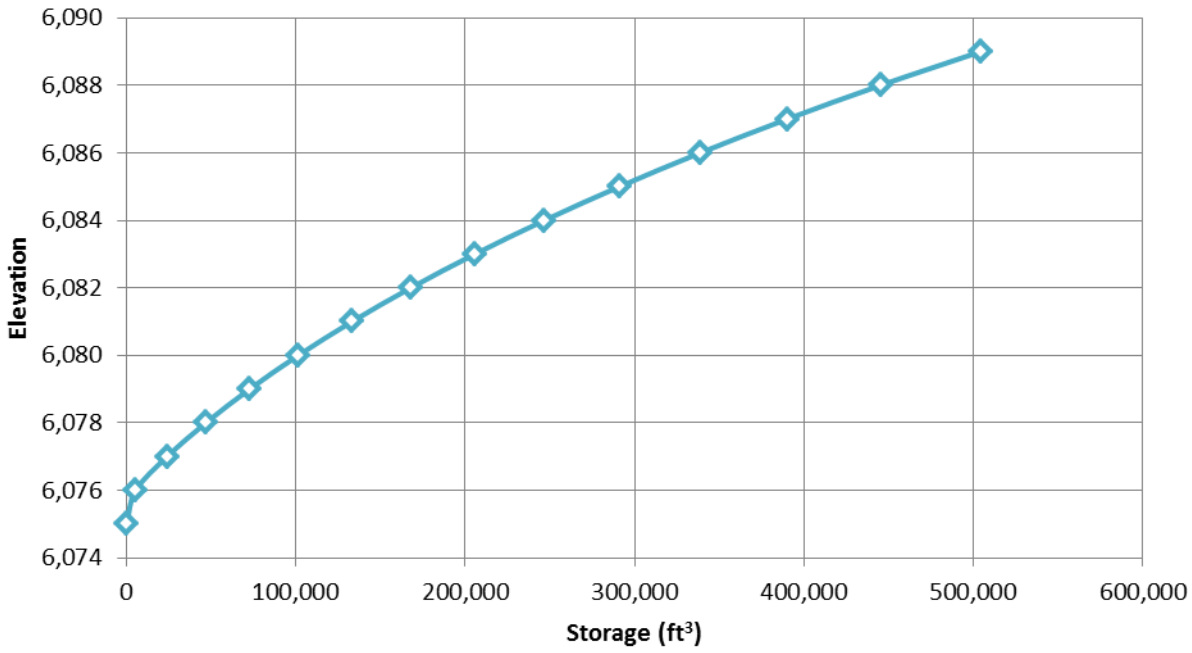


12.3.2. South Pond

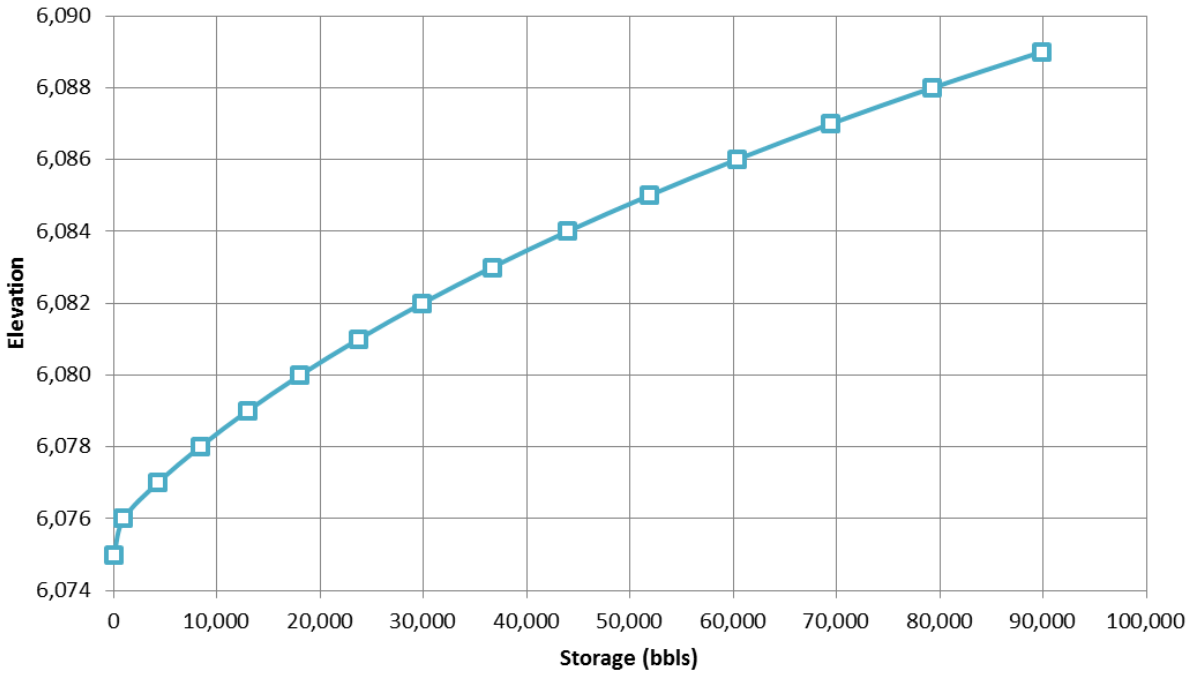
Table 7: South Pond Stage-Storage Data

Elevation (ft)	Area (ft^2)	Depth (ft)	Incremental Vol. (bbls)	Accumulated Vol. (bbls)	Accumulated Vol. (ft^3)
6,075	123	0	0	0	0
6,076	5,304	1	945	945	5,304
6,077	18,592	1	3,311	4,256	23,894
6,078	22,881	1	4,075	8,331	46,774
6,079	25,851	1	4,604	12,935	72,623
6,080	28,731	1	5,117	18,052	101,352
6,081	31,691	1	5,644	23,696	133,041
6,082	34,733	1	6,186	29,881	167,772
6,083	37,856	1	6,742	36,623	205,625
6,084	41,059	1	7,312	43,936	246,682
6,085	44,338	1	7,896	51,832	291,017
6,086	47,682	1	8,492	60,324	338,695
6,087	51,278	1	9,132	69,456	389,970
6,088	55,159	1	9,824	79,280	445,125
6,089	59,217	1	10,546	89,826	504,338

Graph 5: South Pond Stage-Storage Curve (ft^3)



Graph 6: South Pond Stage-Storage Curve (bbls)

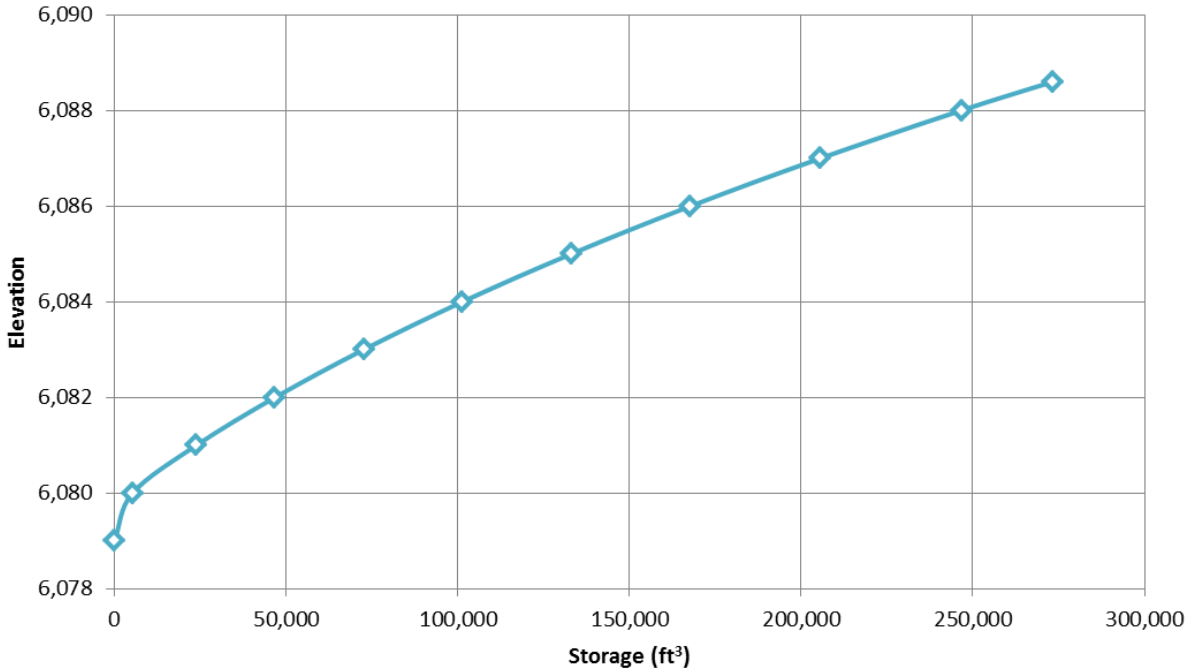


12.3.3. Middle Pond

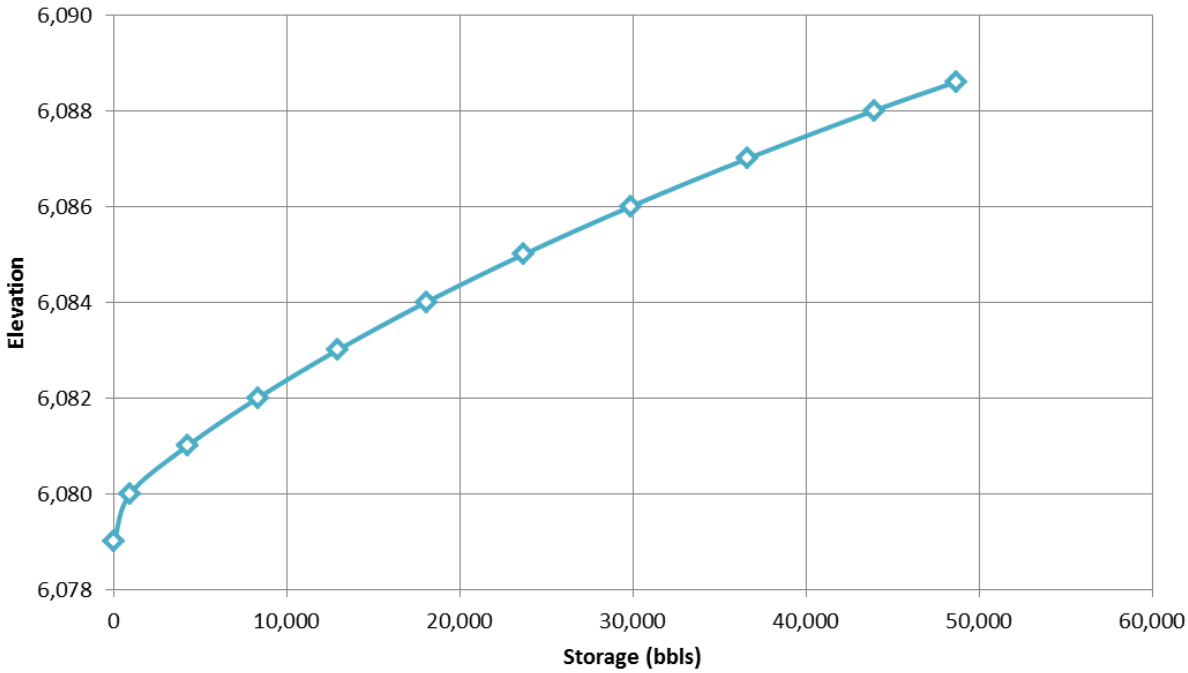
Table 8: Middle Pond Stage-Storage Data

Elevation (ft)	Area (ft^2)	Depth (ft)	Incremental Vol. (bbls)	Accumulated Vol. (bbls)	Accumulated Vol. (ft^3)
6,079	123	0	0	0	0
6,080	5,304	1	945	945	5,304
6,081	18,592	1	3,311	4,256	23,894
6,082	22,881	1	4,075	8,331	46,774
6,083	25,851	1	4,604	12,935	72,623
6,084	28,731	1	5,117	18,052	101,352
6,085	31,691	1	5,644	23,696	133,041
6,086	34,733	1	6,186	29,881	167,772
6,087	37,856	1	6,742	36,623	205,625
6,088	41,059	1	7,312	43,936	246,682
6,089	44,338	1	4,738	48,674	273,283

Graph 7: Middle Pond Stage-Storage Curve (ft^3)



Graph 8: Middle Pond Stage-Storage Curve (bbls)

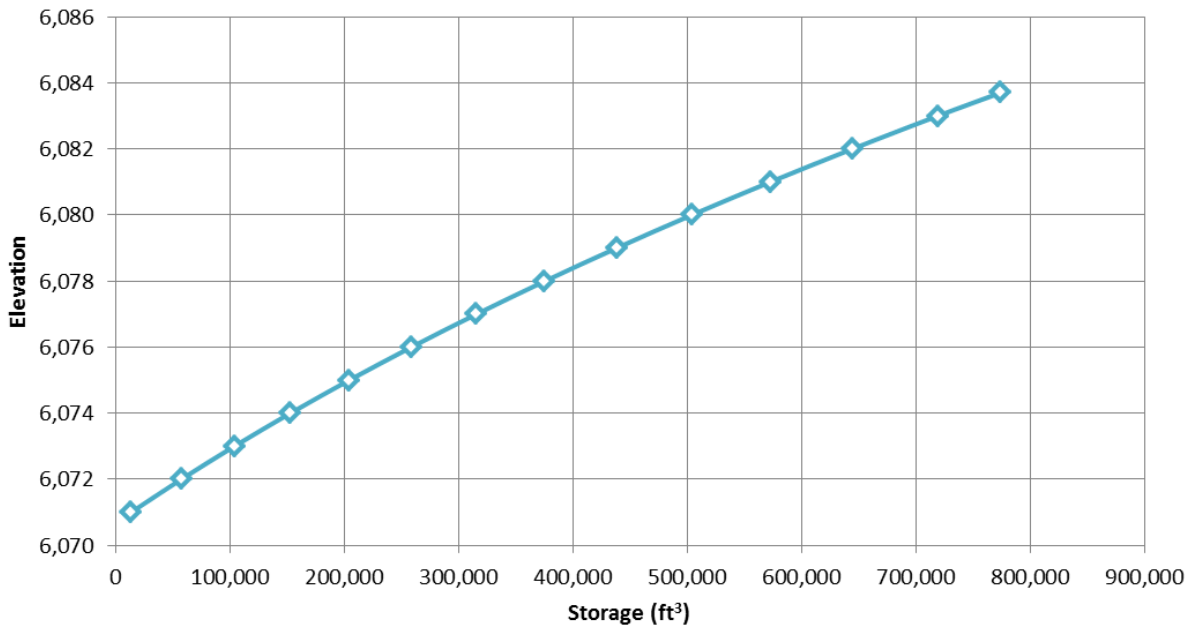


12.3.4. North Pond

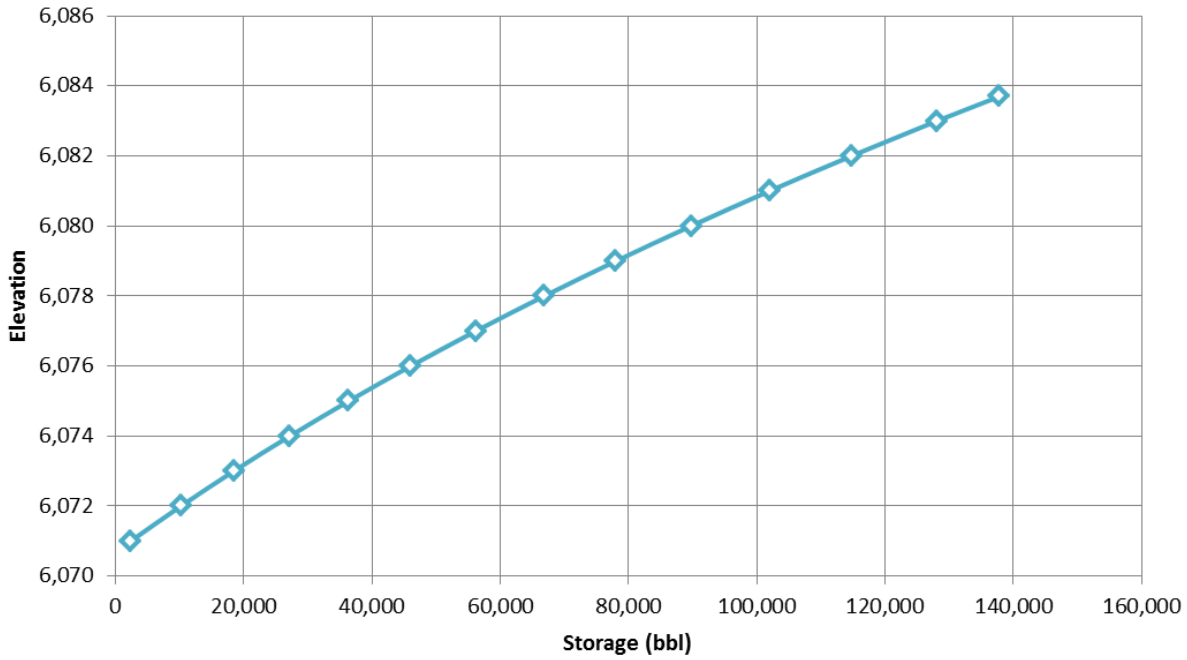
Table 9: North Pond Stage-Storage Data

Elevation (ft)	Area (ft^2)	Depth (ft)	Incremental Vol. (bbls)	Accumulated Vol. (bbls)	Accumulated Vol. (ft^3)
6,071	44,448	0	2,375	2,375	13,334
6,072	43,888	1	7,816	10,191	57,219
6,073	46,391	1	8,262	18,453	103,606
6,074	48,958	1	8,719	27,172	152,561
6,075	51,589	1	9,188	36,360	204,147
6,076	54,283	1	9,668	46,028	258,426
6,077	57,040	1	10,159	56,186	315,462
6,078	59,862	1	10,661	66,847	375,320
6,079	62,746	1	11,175	78,022	438,062
6,080	65,694	1	11,700	89,722	503,752
6,081	68,705	1	12,236	101,958	572,452
6,082	71,780	1	12,784	114,741	644,227
6,083	74,919	1	13,343	128,084	719,141
6,084	78,121	1	9,739	137,823	773,822

Graph 9: North Pond Stage-Storage Curve (ft^3)



Graph 10: North Pond Stage-Storage Curve (bbls)



12.4. Spill Containment

12.4.1. Secondary Containment Design

The majority of the storage provided at HTMWF is in below grade ponds. However, secondary containment structures have been provided around the site and around all tanks. The secondary containment structures surrounding the tanks are lined with HDPE. Details of the secondary containment locations, sizing and design are located in the SPCC Plan for the site (see Appendix 16). This plan is regularly updated to accommodate any changes to the site.

12.4.2. Truck off-load pad

The truck off-load pad consists of a concrete apron sloped into a trench drain. The proposed design has been used successfully at HTMWF as well as numerous other truck off-load pads throughout Encana's operations. A detail of this design is provided in Appendix 3 (b).

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

An active operations and maintenance (O&M) manual is available for HTMWF (see Appendix 13). Each subsection of Rule 908.b.(8) has been addressed within the HTMWF O&M Manual, as shown in Table 10, with the exception of Rule 908.b.(8).E: Emergency Response Plan. The Emergency Response and Evacuation Plans are included in this Form 28 update submittal as Appendix 14.

Table 10: Location of Rule 908.b.(8) Compliance Information in HTMWF O&M Manual

Subsection of Rule 908.b.8	Description of subsection requirement	Corresponding Section of HTMWF 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 and evacuation plans	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

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

See Section 11.4.

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

There is no shallow ground water at the site (see section 3.5) and therefore there are no site-specific monitoring wells.

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

There are no Classified Water Supply Segments within 2,640 feet of the facility therefore there has been no regular sampling program in place for this location.

To comply with COA 32 for the Upper Pond Form 15, one up-gradient and one down-gradient surface water sample will be taken from the unnamed intermittent stream located approximately 1250 feet to the northwest of the facility (if water is present). These samples will be collected prior to use of the Upper Pond and every 12 months thereafter until pit closure.

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

17.1. Site Safety / Evacuation Plan

A 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. This plan is kept on-site at all times.

17.2. Chemicals On-site

Limited quantities of polymer and coagulants used within the DAF process are stored on-site. These chemicals are detailed in Table 11. A Material Safety Data Sheet (MSDS) for each chemical is included in Appendix 15.

Table 11: Chemicals Stored On-Site

Category	Product Use	Product Name	Maximum On-site Volume
Coagulant	Water Clarification / Solids Conditioning Agent	ChemTreat P817E	2,350 gal
Polymer	Water Clarification Agent	ChemTreat P891L	425 gal

17.3. Spill Prevention, Control and Countermeasure Plan

A spill prevention plan is in place for the facility in accordance with EPA regulations. The latest version of the plan (updated in February 2013) is included in Appendix 16. The SPCC plan demonstrates that the secondary containment systems for the tanks are designed to contain the volume of the largest tank plus precipitation from a 25 year, 24 hour storm event (based on NOAA Atlas 14 Volume 8). In addition, the ponds are constructed below grade and two (2) feet of freeboard is maintained on them at all times.

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.

HTMWF is located in Encana's USA Division, South Rockies Business Unit (SRBU) and South Piceance Sub-Business Unit. The current Emergency Notification Chart for SRBU South Piceance is provided in Appendix 14 together with the USA Division Notification and Activation section of the USA Division ERP.

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, is included in Appendix 17 of this submittal.

19. 908.e: Facility Modifications

Any future major modifications to the facility design (including the Lower Pond), 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

An annual HTMWF report will be submitted to the COGCC which will include:

- Types and volumes of solid waste exiting the facility
- Volume of water entering and exiting the facility
- Source water well additions
- Injection well additions
- Surface and/or ground water sampling results
- Any facility modifications, per Rule 908.e.

A rolling twelve month average of the facility influent and effluent water quality is 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

HTMWF is expected to operate for twenty (20) years or greater. However, the facility could be closed earlier due to continuously changing natural gas market conditions.

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

- Removal of the following items:
  - Industrial waste and chemicals including bottom solids, polymer and coagulants
  - Equipment including pumps, pipelines, motor control center, etc.
  - Steel tanks
  - 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

A closure cost estimate of $50,000 was prepared in 2003, with a sundry and updated cost estimate of $1,000,000 filed in 2010 (Appendix 17). The closure cost for HTMWF is estimated to have increased by approximately $1,400,000 due to the addition of the Upper North and the Lower Pond. Details of this estimate are included in Appendix 19.

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 HTMWF.

24. 908.h: Other Permits and Notifications

The following permits and notifications to local governments and other agencies are provided as appendices to this submittal:

- Colorado Department of Public Health and Environment, Air Pollution Control Division

- Operating Permit 03OPGA267, Issued September 1, 2009, Revised May 4, 2012 (Appendix 20).

- Garfield County
  - Limited Impact Review for Upper and Lower Pond additions (Appendix 21)