

Appendix 6: MFWF – Operations and Maintenance Manual



MIDDLE FORK WF OPERATIONS AND MAINTENANCE MANUAL

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Table of Contents

1.0	Introduction	6
1.1	Facility Objectives	6
1.2	Authorized Influent	6
1.3	Permitted Capacity.....	6
1.3.1	Throughput	6
1.3.2	Emissions	7
1.4	Other Air Permit Requirements	7
1.4.1	Operations & Maintenance.....	7
1.4.2	Measurement & Sampling	7
1.4.3	Additional Requirements	7
1.4.4	Additional Equipment Requirements..... Error! Bookmark not defined.	
2.0	Facility Description	8
2.1	Site	8
2.2	Site Security	8
2.3	Storage Facilities	8
2.4	Process Description.....	10
2.4.1	Influent	11
2.4.2	Treatment Overview.....	11
2.4.3	Discharge for Hydraulic Fracturing or Underground Injection	11
2.4.4	Solids Handling.....	12
2.4.5	Condensate Handling.....	12
2.5	Dust Control	12
2.6	Noise and Odor Mitigation	12
3.0	Site Specific Hazards	17
4.0	Plant Operator Responsibilities.....	18
4.1	Site Security	18
4.2	Health & Safety	18
4.2.1	Facility Information	18
4.2.2	Visitor Preparedness.....	19
4.3	Environment	19
4.4	Facility Operation.....	19
4.4.1	Operating Within Permit Requirements and Design Capacity.....	19

4.4.2	Performing Work On-Site	19
4.4.3	Overseeing Work On-Site	20
4.4.4	Contract Work Expectations	20
4.5	Monitoring and Reporting	20
4.5.1	Purpose	20
4.5.2	Daily Reports	21
5.0	Inspection & Maintenance Schedule	22
6.0	Encana Internal Reporting	25

List of Tables

Table 1.1:	Measurement & Sampling Requirements	7
Table 2.1:	Emergency Contacts	13
Table 2.2:	Utilities	13
Table 2.3:	Trucking Companies	13
Table 2.4:	Encana Facilities	13
Table 2.5:	Other Contacts	13
Table 2.6:	CEO Operator Contact Information	14
Table 2.7:	Encana Contacts	15
Table 3.1:	Site Specific Hazards	17
Table 4.1:	Daily Reports	21
Table 5.1:	Site Inspection Schedule	22
Table 5.2:	Monitoring Schedule	23
Table 5.3:	Equipment Inspection Schedule	23
Table 5.4:	Equipment Maintenance Schedule	24

List of Figures

Figure 2.1:	Process Flow Diagram	10
Figure 2.2:	North Piceance Water Systems Facilities Organizational Chart	16
Figure 6.1:	Reporting Responsibilities	25
Figure 6.2:	Reporting Process	25

List of Appendices

- Appendix A Standard Operating Procedures *(not included in permitting submittals)*
- Appendix B Sample Plant Operator Reports *(not included in permitting submittals)*
- Appendix C Process & Instrumentation Drawings *(not included in permitting submittals)*
- Appendix D As-Built Drawings *(not included in permitting submittals)*
- Appendix E Air Permits *(not included in permitting submittals)*
- Appendix F Migratory Bird Treaty Act and Other Wildlife Protection Requirements *(not included in permitting submittals)*
- Appendix G DAF Manual *(not included in permitting submittals)*

List of Acronyms

APCD	Air Pollution Control Division
bbl	Barrel
BMP	Best Management Practice
BS&W	Basic Sediment and Water
BU	Business Unit
CDPHE	Colorado Department of Public Health and Environment
COGCC	Colorado Oil & Gas Conservation Commission
DAF	Dissolved Air Flotation
EH&S	Environmental, Health & Safety
ERP	Emergency Response Plan
FR	Fire Retardant
JSA	Job Safety Analysis
LOTO	Lock Out / Tag Out
MF	Middle Fork
MSDS	Material Safety Data Sheet
O&M	Operation & Maintenance
P&ID	Process & Instrumentation Diagram
PPE	Personal Protective Equipment
SBU	Sub-Business Unit
SOP	Standard Operating Procedure
SP	South Piceance
SPCC	Spill Prevention, Control & Countermeasure
SRBU	South Rockies Business Unit
TPY	Tons per year
VOC	Volatile Organic Carbon
WF	Water Treatment Facility

List of Reference Documents to be Maintained On-Site

Emergency Response Plan

Contractor Expectations Manual for Environmental, Health, Safety & Security

Oil Spill Contingency Plan for Parachute, Colorado

Middle Fork SPCC Plan

Middle Fork FRP Plan

MSDS Forms for all Chemicals On-Site

Middle Fork WF Equipment Manuals

1.0 Introduction

This Operation and Maintenance (O&M) manual covers the procedures and guidelines for Middle Fork Water Facility (WF). This facility receives, stores, treats, and transfers produced and flowback water and residual hydrocarbons and solids 24 hours per day, 365 days per year.

1.1 Facility Objectives

The objectives of this facility are to:

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

1.2 Authorized Influent

This facility is authorized to receive the following influent:

- Flowback and produced water from Encana operated wells in the North and South Piceance SBUs.

Flowback and 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 Piceance Basin Water Management Group Lead and the COGCC. No third-party influent will be accepted if doing so violates Middle Fork WF's status as a non-commercial facility.

1.3 Permitted Capacity

Middle Fork WF is subject to the following permitted capacity constraints, as per CDPHE Permit No. 05GA0081, 11GA3434, and 05GA0060 issued June 13, 2012:

1.3.1 Throughput

- Annual Limits.
 - 36,500,000 bbl through Produced Water Tank Flash Vessel
 - 365,000 bbl of Condensate Loadout
 - 365,000 bbl of condensate through Oil Sales Tanks

1.3.2 Emissions

- Annual Limits:
 - 0.4 tons VOC from Produced Water Tank Flash Vessel
 - 57.6 tons VOC from Condensate Loadout
 - 19.5 tons VOC, 6.5 tons CO from Oil Sales Tanks
 - 108.9 tons fugitive VOCs

1.4 Other Air Permit Requirements

1.4.1 Operations & Maintenance

- Any oil and foreign material on the DAF pond surface must be cleaned off within 24 hours
- Produced water flash tank
 - Combustor shall be closed and have no visible emissions
- Condensate tanks
 - Visible emissions shall not exceed 20% opacity during normal operation. During periods of startup, process modification, or adjustment of control equipment visible emissions shall not exceed 30% opacity for more than 6 minutes in any 60 consecutive minutes

1.4.2 Measurement & Sampling

- Regular measurement and sampling is required, as shown in Table 1.1

Table 1.1: Measurement & Sampling Requirements

Requirement	Frequency	Owner
Total water processed through flash vessel prior to storage tanks	Monthly	SRBU Air Quality Specialist
Total Liquids throughput for 2 nd -stage 3-phase separator	Monthly	SRBU Air Quality Specialist
Total Liquids throughput for 2 nd -stage 3-phase separator during downtime	Monthly	SRBU Air Quality Specialist
VRU downtime	Monthly	SRBU Air Quality Specialist
Condensate throughput	Monthly	SRBU Air Quality Specialist
Amount of condensate loaded	Monthly	SRBU Air Quality Specialist

1.4.3 Additional Requirements

- Permit number and AIRS ID MUST be on all subject equipment
- Records must be kept of any added or deleted components at the site

2.0 Facility Description

2.1 Site

Middle Fork WF is located north of Parachute, CO in Garfield County. The process flow diagram at the end of this Section shows the general layout of the facility.

All land in the immediate vicinity of the site is used for oil and natural gas exploration and production. All land that the WF resides on is owned by Encana.

2.2 Site Security

Middle Fork WF is a privately-owned, restricted-access facility. Access to the site by members of the public is restricted by a gate on the South approach from County Road 215.

Middle Fork WF is staffed 24-hours a day, 365 days a year.

Wildlife and domestic animal access are controlled at Middle Fork WF through the following measures:

- Chain link fence around open water body
- Two (2) foot high rodent mesh at base of perimeter fence
- Secondary containment around tanks
- Mesh coverings on any tank or building openings including vents, stacks, etc.
- No pets are allowed on site.

2.3 Storage Facilities

Table 2.1 details the above ground tanks used to store water at Middle Fork WF.

Table 2.1: Storage Tanks

SPCC & FRP Plan Tank IDs	Secondary Tank ID	Name	Capacity (bbl)	Contents
A	901	White Tank	15,000	Produced Water, Condensate
B	n/a	Green Tank	2,300	Produced Water
C	n/a	Condensate Tank	500	Condensate
D	n/a	Condensate Tank	500	Condensate
E	n/a	Condensate Tank	500	Condensate
F	n/a	Condensate Tank	500	Condensate
G	n/a	Condensate Tank	500	Condensate
H	n/a	Condensate Tank	500	Condensate
I	n/a	Condensate Tank	500	Condensate
J	n/a	Condensate Tank	500	Condensate
K	n/a	Condensate Tank	500	Condensate
L	n/a	Condensate Tank	500	Condensate
1	n/a	Fresh Water Tank	500	Fresh Water
2	n/a	Solids Tank	500	DAF Sludge
3	n/a	Spare Tank	500	Produced Water, Condensate, BSW
4	n/a	BSW Tank	500	BSW
5	n/a	BSW Tank	500	BSW
6	n/a	BSW Tank	500	BSW
7	n/a	Oil Tank	500	Condensate
8	910	DAF Treated Water Storage Tank	80,000	Treated Water
9	920	Produced Water Storage Tank	80,000	Produced Water, Condensate
10	930	Produced Water Storage Tank	80,000	Produced Water, Condensate

Figure 2.1: Process Flow Diagram



2.4.1 Influent

Untreated water enters the facility from the following areas:

- North Piceance Plateau
- East Fork
- West Fork
- South Piceance
- Truck off-loading on-site

Flowback or produced water that enters the site is directed into one of the three-phase separators.

Hydraulic fracturing water is delivered to the wells from the high pressure pump station at Middle Fork WF.

2.4.2 Treatment Overview

Water is treated on-site by a Dissolved Air Flotation (DAF) process. Untreated water is pumped into the coagulation chamber of the DAF.

2.4.3 Discharge for Hydraulic Fracturing or Underground Injection

Water used to support hydraulic fracturing is pumped out of the high pressure pump station via pipelines to:

- North Piceance Plateau
- East Fork
- West Fork
- South Piceance

Water which cannot be reused within the North Piceance Water System due to the near-term water balance is disposed of via underground injection or sent to the South Piceance water system via pipelines.

2.4.4 Solids Handling

Sludge from the DAF unit is pumped into the Sludge Tank. When the sludge tanks are full the contents are pumped out and transported off-site.

2.4.5 Condensate Handling

After separation, condensate is pumped to Condensate Tanks. When the Condensate Tanks reach an appropriate level the condensate is sold and transported off-site.

2.5 Dust Control

The dust control plan is outlined in the Fugitive Dust Control Plan.

2.6 Noise and Odor Mitigation

The following noise and odor mitigation measures are designed into Middle Fork WF:

- All permanent pumps are located within fully enclosed buildings
- DAF unit is located within a fully enclosed building
- All tanks are covered

Contact Lists

Table 2.1: Emergency Contacts

Emergency Type	Phone Number
Gas Control	970-285-2615
Safety On-Call	970-210-8755
Environmental On-Call (Spills)	970-319-9173

Table 2.2: Utilities

Utility	Phone Number	Utility	Phone Number
Xcel Energy	970-244-2682		

Table 2.3: Trucking Companies

Trucking Company	Phone Number	Trucking Company	Phone Number
Knowles	970-773-1224		
Stateline	970-270-5388		

Table 2.4: Encana Facilities

Facility	Phone Number	Facility	Phone Number
Hunter Mesa WF	970-274-9652	Middle Fork WF	970-285-9496
High Mesa WF	970-285-2881 970-987-3725		
Benzel WF	970-274-8594		

Table 2.5: Other Contacts

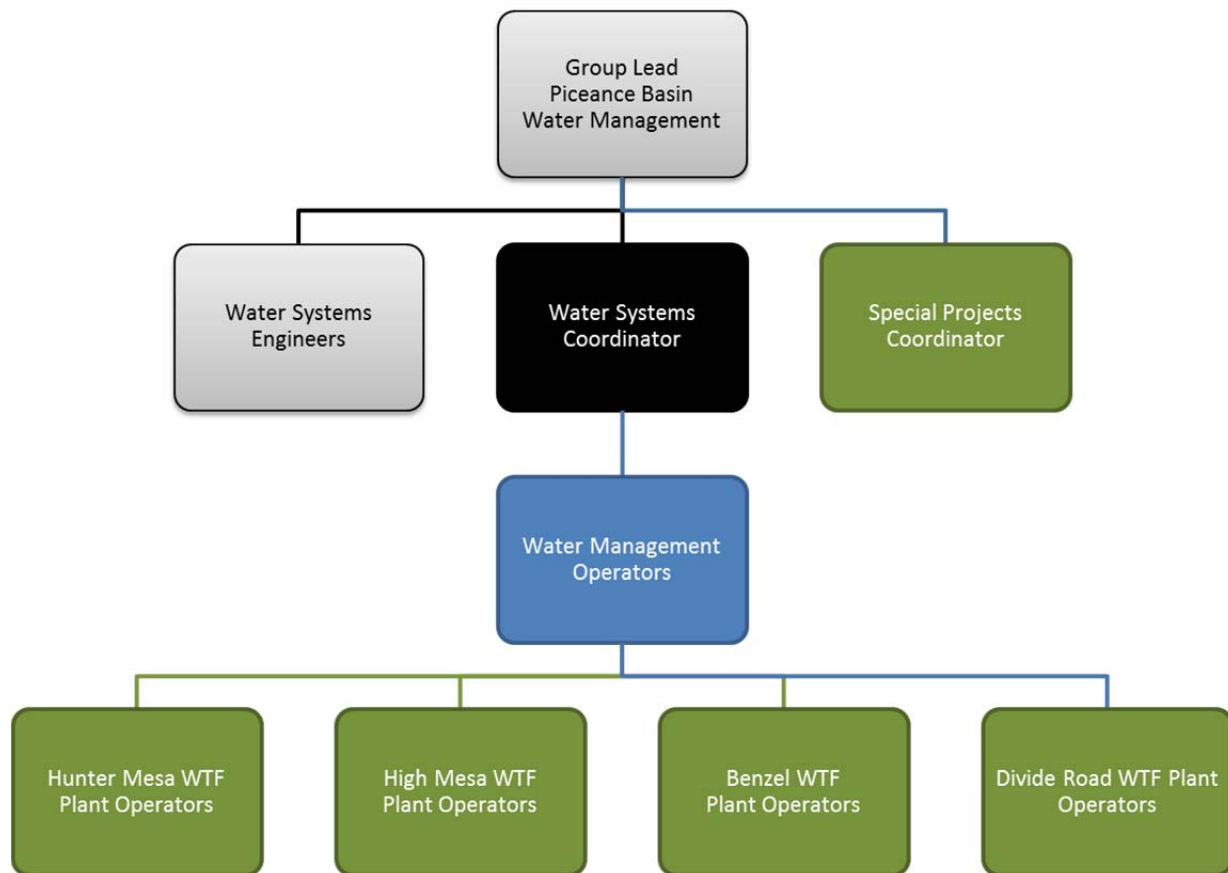
Name / Company	Phone Number	Name / Company	Phone Number

Table 2.6: CEO Operator Contact Information

[illegible]

Table 2.7: Encana Contacts

[illegible]

Figure 2.2: North Piceance Water Systems Facilities Organizational Chart

3.0 Site Specific Hazards

Encana is committed to providing a safe work environment for all employees and contractors. Failure to comply with safety programs may result in immediate removal from Encana properties.

This section provides a list of known, long-term hazards at Middle Fork WF. Intermittent, short-term hazards may not be listed here.

Detailed information for each hazard should be reviewed before undertaking any work in a hazardous area. Detailed information on each hazard is available in the following places:

- Encana Ethos Practices.
 - <http://ecn.encana.com/usa/EHS/managementsystems-byalphabet.shtml>
- Contractor Expectations Manual for Environmental, Health, Safety & Security
 - Hard copy on site

Site-specific hazards that may be encountered at Middle Fork WF are shown in Table 3.1.

Table 3.1: Site Specific Hazards

Hazard	Potentially Hazardous Area
Benzene	Tanks (interior) DAF
Hydrogen Sulfide	Tanks (interior) DAF
Confined Spaces	Tanks (interior)
Driving	Lengthy, narrow access roads with heavy truck traffic Winter conditions
Flammable / Restricted Hot Work areas (Class 1 Division 1 or Class 1 Division 2)	DAF Building Containment area around tanks
Walking and working surfaces	Site-wide potential for slips, trips and falls Site-wide use of ladders, scaffolding and harnesses
Working over water	Lake Rosa

4.0 Plant Operator Responsibilities

4.1 Site Security

Middle Fork WF is a restricted access, privately-owned facility. The facility is manned 24 hours per day, 365 days per year.

The Plant Operator is responsible for the following site security tasks:

- Controlling access by third parties.
- Immediately reporting any unusual or unauthorized use of the site to the Water Management Operator or the Encana Security team.

RIGHT TO REFUSE ENTRY – 3rd PARTY

The Plant Operator has the right to refuse entry to any non-Encana parties at any time while he contacts the Water Management Operator or the Encana Security team.

4.2 Health & Safety

Middle Fork WF is an active treatment facility with known hazards. Encana takes the health and safety of staff members, contractors and visitors seriously and has developed practices and procedures to minimize risk to everyone on-site.

The Plant Operator has an integral role in maintaining a safe work environment at the facility, as described in this section. The Plant Operator is responsible for knowing this information regardless of whether or not they have received official EH&S training from Encana or their contract operators.

Specific hazards at Middle Fork WF are listed in Section 3.0.

4.2.1 Facility Information

The Plant Operator is responsible for knowing, at a minimum, the following facility-specific health & safety information:

- Location of the Emergency Response Plan (ERP).
- Where to look in the ERP for instructions on how to handle an emergency.
- Location of the Material Safety Data Sheets (MSDS) files.
- What personal protective equipment (PPE) is required to handle the chemicals on-site.
- Location of all emergency shut-off valves.
- Any day-to-day work or conditions on-site that could impact the safety of *anyone*, even if they are not specifically involved in that task.

Plant Operators will be trained at a frequency set forth by Encana Water Management Operators (see Appendix B). At a minimum, Plant Operators will be required to review the O&M manual annually or within two weeks of starting a new job/role at an Encana facility. It is expected that Plant Operators will review and use the SOPs during daily operations; therefore training on the SOPs will be directed by Encana Water Management Operators.

4.2.2 Visitor Preparedness

The Plant Operator is responsible for protecting the safety of *all visitors* by:

- Requiring them to sign in and out at the site office.
- Requiring them to read and sign the general site JSA.
- Verifying that they are wearing appropriate FR clothing, hard hats, steel toed boots and safety glasses.
- Explaining any day-to-day work or conditions on-site that could impact their safety, even if they are not specifically involved in that task.

The Plant Operator is responsible for protecting the safety of *contractors* by:

- Requiring them to have a JSA for their planned work.
- Verifying they are wearing any additional PPE called for in their JSA.

RIGHT TO REFUSE ENTRY – PPE & JSA

The Plant Operator has the right to refuse entry to any visitors who are not wearing appropriate PPE or who do not have a JSA for their task.

4.3 Environment

The Plant Operator is responsible for knowing, at a minimum, the following environmental policies and procedures and communicating them to contractors on-site:

- Migratory Bird Treaty Act and Other Wildlife Protection Requirements (see Appendix F)
- Time limits and procedures for removing surface hydrocarbons from ponds
- Oil Spill Contingency Plan for Parachute, Colorado
- Middle Fork SPCC Plan
- Middle Fork Facility Response Plan

4.4 Facility Operation

4.4.1 Operating Within Permit Requirements and Design Capacity

The Plant Operator is responsible for operating the plant in accordance with all permits, as follows:

- Air Permit (rules are explained in Sections 1.3 and 1.4 of this Manual)

The Plant Operator is also responsible for operating the plant in accordance with the design capacity.

4.4.2 Performing Work On-Site

When performing work on-site, the Plant Operator must:

- Only perform work that is authorized by the Water Management Operator.

- Only perform work that has a written SOP unless authorized by the Water Management Operator. The SOPs are located in Appendix A of this O&M Manual.
- Follow the SOP when performing work. The Plant Operator should talk to the Water Management Operator if any of the following are true:
 - A SOP is incorrect, missing information or no longer relevant.
 - A new SOP is needed.
 - The Plant Operator is unsure of how to follow a SOP.
 - The Plant Operator thinks a SOP could be improved.
- Follow all Encana health and safety practices.

STOP WORK AUTHORITY

Any Encana employee, contractor, or sub-contractor has the authority and responsibility to stop work on any site for any suspected hazard or unsafe work.

The Plant Operator has the right to stop work without consequence if there is no written procedure for the task or if the operator feels the task is unsafe.

If the Plant Operator chooses to stop work, the operator must immediately contact the Water Management Operator to resolve the problem.

4.4.3 Overseeing Work On-Site

Regular on-site maintenance performed by contractors may be overseen by the Plant Operator. The Water Management Operator is responsible for checking and verifying completeness of the work performed.

4.4.4 Contract Work Expectations

Contractors and sub-contractors are expected to review and adhere to SOPs within this O&M manual as well as any other Encana SOPs as they pertain to the work being performed. It is the responsibility of the Plant Operators and Encana Water Management Operator to determine and supply the appropriate SOPs to contractors and sub-contractors. If an SOP is not present, Plant Operator will notify Encana Water Management Operator who will coordinate with a Water Systems Engineer to develop a SOP for such work and will include in future versions of this O&M manual.

4.5 Monitoring and Reporting

4.5.1 Purpose

Daily reports are completed by the Plant Operator for the following reasons:

- Many of the items contained in these reports are required for compliance with state and federal laws. Completing these reports ensures that Encana has a record of activity on its properties.
- The engineers and managers of your site are always working towards continuous improvement. Records help them identify what works well and what needs to be improved on-site. In addition, records help them obtain funding to fix the problem.

4.5.2 Daily Reports

Plant Operators are the “eyes and ears” for the entire Piceance Basin Water Management Group. It is the Plant Operator’s responsibility not only to complete their daily reports but also to notify the Water Management Operator if something of significance occurs. If there is any doubt whether something is “significant”, the Plant Operator should report the event.

The Plant Operator is responsible for completing the reports shown in Table 4.1. Sample report forms are included in Appendix B.

Table 4.1: Daily Reports

Report	Shift	Recording Time	Submission Method	Reviewed By
Daily Flow Report	Day	09:00	Email to Water Management Operator	Water Management Operator
Wildlife Protection Daily Report	Day	During shift	Hard copy filed at site	Water Management Operator
Daily Shift Log	Both	End of shift	Email to Water Management Operator	Water Management Operator
Site Inspection Checklist	Both	Approximately once per hour during each site walkthrough.	Hard copy filed at site	Water Management Operator
DAF Log	Both	06:00 18:00	Email to Water Management Operator	Water Management Operator

5.0 Inspection & Maintenance Schedule

Table 5.1: Site Inspection Schedule

Location	Action	Frequency	Report
Off-Load / On-Load Pads	Checked pad for spills, trash and any damage to pipes, valves, hoses or other equipment.	Minimum twice per shift	Site Inspection Checklist
Ingress / egress roads	Inspected roads for spills, safety hazards such as potholes or ice, and erosion or other damage to roadway or berms.		
Tanks (Exterior)	Checked for leaks, damage, or obstructions such as ice that may prevent proper functioning.		
Piping / Valves	Checked for leaks, damage, or obstructions (on outlets) such as ice that may prevent proper functioning. Checked for liquids in tank containments.		
Buildings (Exterior & Interior)	Checked for safety hazards, and any damage to exterior, interior, and electrical and phone lines.		
Lake Rosa	Checked that levels are acceptable and that animal escape ramps are in place. Removed trash, floating debris if required.		
Site Security	Checked on-site lights, cameras, and locks for proper functioning		
Drainage Ditches / Swales	Checked for spills, standing water, erosion or other damage.		
Fencing	Checked that perimeter fence and rodent mesh are intact with no holes or gaps.		
Wildlife Deterrents	Checked that the bird deterrents and predator decoys are in place and working.		

Note: All loose trash and debris should be cleaned up daily.

Table 5.2: Monitoring Schedule

Metric	Measurement	Frequency	Report
Tank Levels	Fresh water, oil sales, sludge	Daily	Daily Flow Report
Water Volumes In / Out	Water in, Truck load out, transports, bobtails		
DAF Injection Rates	Polymer, coagulant		
DAF System Pressures	MicroAire inlet, MicroAire discharge, Inlet Air, Rotometer	Every shift	DAF Log
Tank Levels	DAF Sludge		

Table 5.3: Equipment Inspection Schedule

Equipment	Inspection Schedule	Frequency	Report
DAF	Check effluent clarity	Every shift	DAF Log
	Visually inspect DAF float thickness and adjust skimmer speed if thicker than 6"		
	Check seals and latches on all hatches for decay/leaks		Site Inspection Checklist
	Inspect skimmer systems (chain, sprockets, alignment, wiper wear)		
	Check oil level in compressor		
	Check compressor belt tensioning		
	Check recycle pump and screen		
	Check chemical pump (hose condition, pumping rate, chemical level)		
	Check blue air dissolving tank (air flowrate, inlet air pressure, discharge air pressure)		

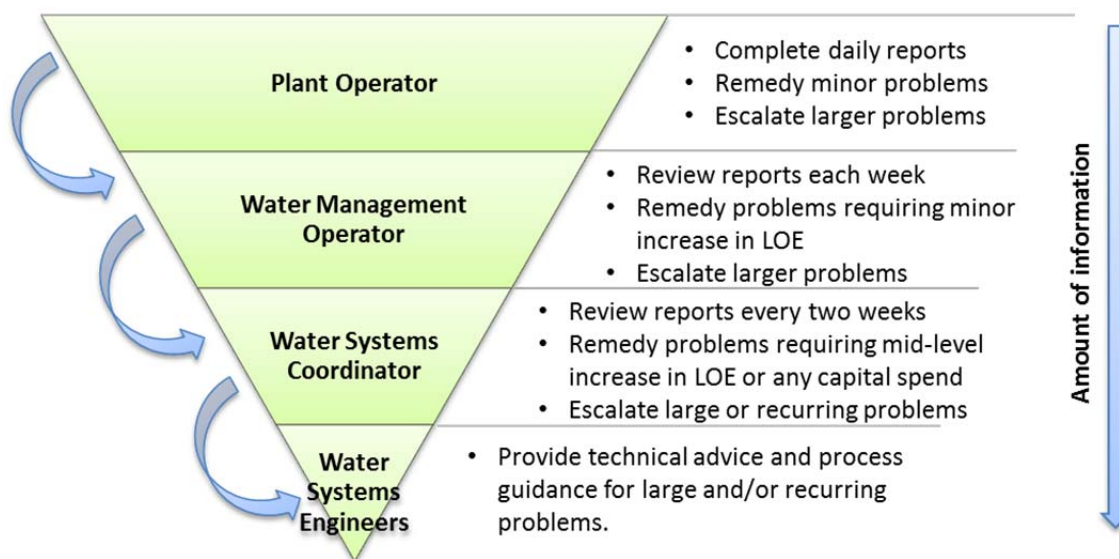
Table 5.4: Equipment Maintenance Schedule

Equipment	Maintenance Schedule	Minimum Frequency	Report
DAF	Pump bottom solids	Daily	Site Inspection Checklist
	Clean recycle pump screen		
	Drain water from air compressor tank		
	Grease DAF (pillow block bearing on skimmer shaft, skimmer shaft bearings, skimmer chain tracks)	Weekly	N/A
	Regular maintenance on recycle pump (call pump maintenance company)	Quarterly	
	Drain DAF and wash out tank		

6.0 Encana Internal Reporting

Each member of the group has specific reporting responsibilities, as shown in Figure 6.1.

Figure 6.1: Reporting Responsibilities



The reporting process is shown in Figure 6.2.

Figure 6.2: Reporting Process

