

Water Systems Operation and Maintenance Manual

**Vaagen Bros. Lumber, Inc
Colville Operations
Colville, WA**

March 2015

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Boiler/Kiln Supervisor
Vaagen Brothers Lumber, Inc.
June 4, 2015

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VAAGEN BROTHERS LUMBER COLVILLE, WASHINGTON

Purpose: To achieve efficient Steam Plant Operations. Our goal is to achieve total energy and water savings, coupled with continuous trouble-free equipment operations where water and process technology is involved by utilizing the following:

1. Clear, Concise Operations Goals.
2. Appropriate design and application technology to achieve Operations Goals.
3. Complete and thorough Operations Education.
4. Skillful Operations and Maintenance.
5. Operational Accountability.

Vaagen Bros. Lumber, Inc. is committed to achieving the purpose above.

Sincerely,

Robert Zyskowski
Boiler/Kiln Supervisor
Vaagen Bros. Lumber, Inc.
Colville, WA

INTRODUCTION

This manual was created to help us direct our water/energy management process. It is a guide of specific performance standards that are necessary to ensure stated goals are achieved.

This manual contains the following: General Plant Description, Process Flow Diagram, analytical procedures, analysis frequency/specification limit appendices, troubleshooting guides and log sheets for the performance and data keeping of the Vaagen Bros. Lumber, Inc. water management program.

The costs of failing to meet our quality standards are:

- ◆ *Not receiving the full value of the investment in a Nalco Company program.*
- ◆ *Experiencing unnecessary downtime.*
- ◆ *Limitations on productivity.*
- ◆ *Increased energy or maintenance costs.*
- ◆ *Increased risk and liability - both human and environmental.*

**THIS MANUAL MUST BE KEPT UPDATED AT ALL TIMES TO
MEET PERFORMANCE STANDARDS.**

VAAGEN COMPANY CONTACTS

The following personnel of Vaagen Bros. Lumber, Inc. are available for your assistance.

First Contact:

Name	Robert Zyskowski
Title	Boiler/Kiln Supervisor
Office	509-684-5071 ext 239

Second Contact:

Name	Daryl Evans
Title	Operations Manager
Office	509-684-5071

GENERAL PLANT DESCRIPTION

The physical plant for producing steam and electricity at the Colville sawmill consists of two boilers. The first is a one-cell Wellons with a 20,000 lb/hr steam rating, and a second, four-cell Wellons 60,000 lb/hr steam rated boiler. Steam produced by these boilers is used to dry lumber.

The plant makeup water source is City Water from the City of Colville, WA. This water undergoes an intensive on-site pretreatment process beginning with filtration through a multi-media filter (removes Total Suspended Solids), is softened using cation resin to remove scaling ions (calcium and magnesium), and the bulk of minerals are removed by Reverse Osmosis. This plant makeup water source is stored for use in two large make up water tanks.

Under Maximum Operation, (60,000 lb/hr steam flow, 75 cycles of concentration, 80% CR), approximately 60,000,000 +/- gallons per year of process water flows through this automated system. The make-up water volume of 13,450,000 gallons is required to replace system losses from the pretreatment process, deareator venting, boiler blowdown, and steam losses for wood conditioning.

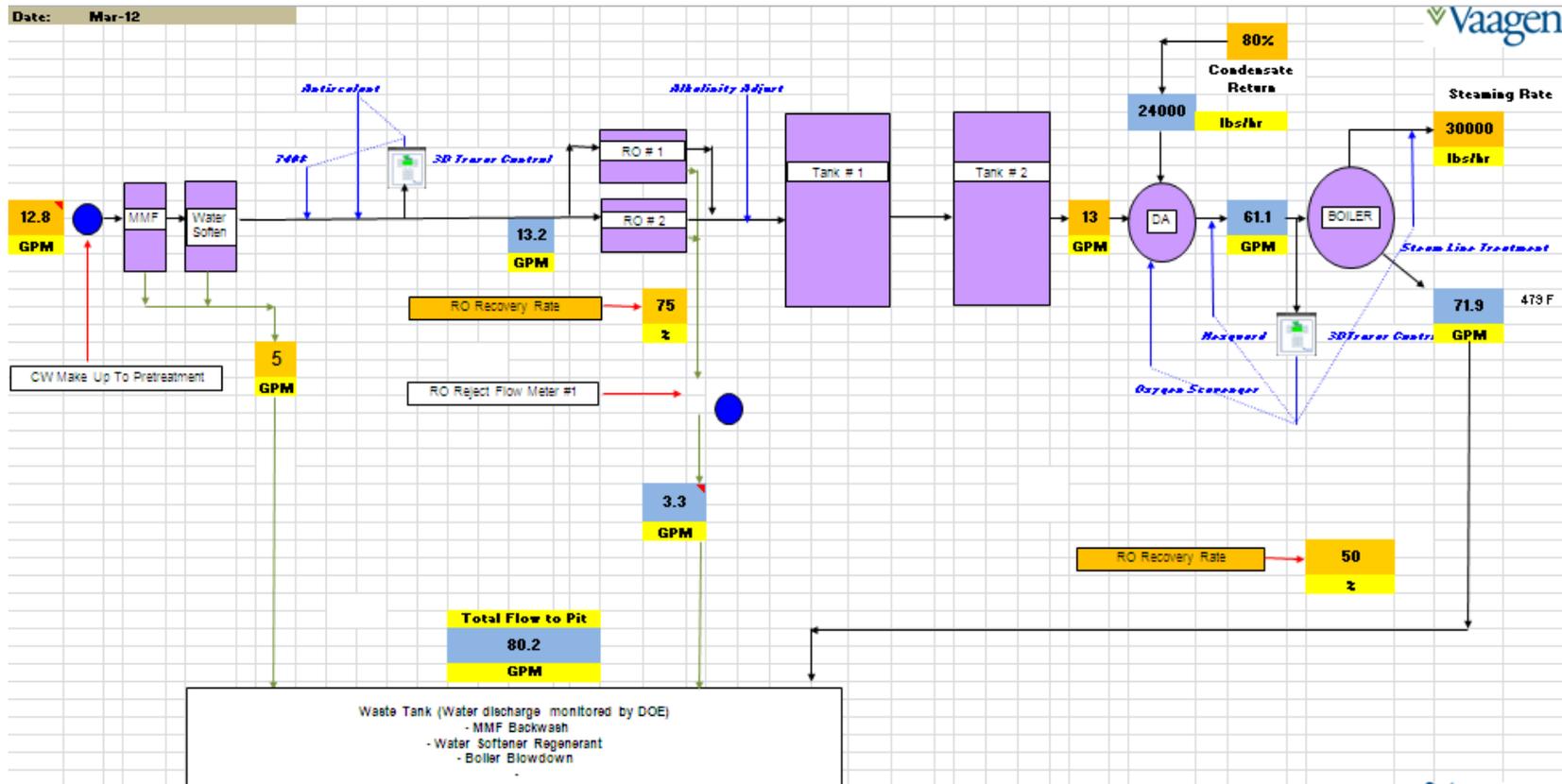
Vaagen Bros. Lumber boiler operators monitor the operation of the water treatment system as a component of their normal duties. A minimum of one boiler operators is on-site to operate and maintain the boiler and water treatment systems during all periods when the boiler is functioning. All water treatment systems are owned and operated by Vaagen Bros. Lumber.

All process water that is not lost due to evaporation is discharged to the process water waste tank. Sources of water discharged to the tank include: Multi Media filter Backwash, Water Softener Backwash and Regenerate, Reverse Osmosis Reject, and Boiler Blowdown.

Annual process water system volumes are greatly influenced by ambient climate conditions, incoming water quality, sawmill production schedules, planned annual system maintenance, unplanned annual system maintenance, and other minor factors. All calculations for this model were based on 365 Days of Operation for 24 hours per day at maximum plant production and generation.

PROCESS FLOW DIAGRAM

On the following page is a simple one line process flow diagram of the pretreatment, reverse osmosis, and boiler operations. The one line diagram is intended to be self-explanatory. More detailed descriptions of the system components are included in the following sections of this manual.



CHEMICAL USAGE

Due to the unique engineering properties of water, industrial water process control and maintenance is critical in achieving and maintaining optimal efficiency in your steam plant operation. The three primary concerns that need to be addressed with regards to chemistry are as follows: Scaling, Corrosion, and Fouling. If left unchecked, any one of these issues can drastically impact the overall operating efficiency of the facility and therefore directly impact the discharge rate of the system. The goals of our chemical treatment protocol are simple and straight forward:

- ◆ Achieve the greatest resource conversion possible. In short, use the least water, wood, and consumables, to produce high quality manufactured products.
- ◆ Reduce the production cost of energy by keeping steam generation equipment in clean, efficient, working order.
- ◆ Prevent or minimize scale and corrosion in the boiler, steam, and condensate systems.
- ◆ Extend equipment life span/reduce maintenance cost.
- ◆ Maximize Chemical Product Stewardship by minimizing any chemical risk associated to humans or the surrounding environment.

Following is a description of the program chemicals and their related functions.

<u>Chemical</u>	<u>Description</u>
Nalco 2195	Water Softener Resin Antiscalant
Nalco 7408	Chlorine Scavenger
Nalco PC 191T	Membrane Antiscalant
Nalco 8735	Boiler Alkalinity Adjustment
Nalco 1720	Oxygen Scavenger
Nalco 22310	Boiler Internal Treatment
Nalco 1820	Steam Treatment

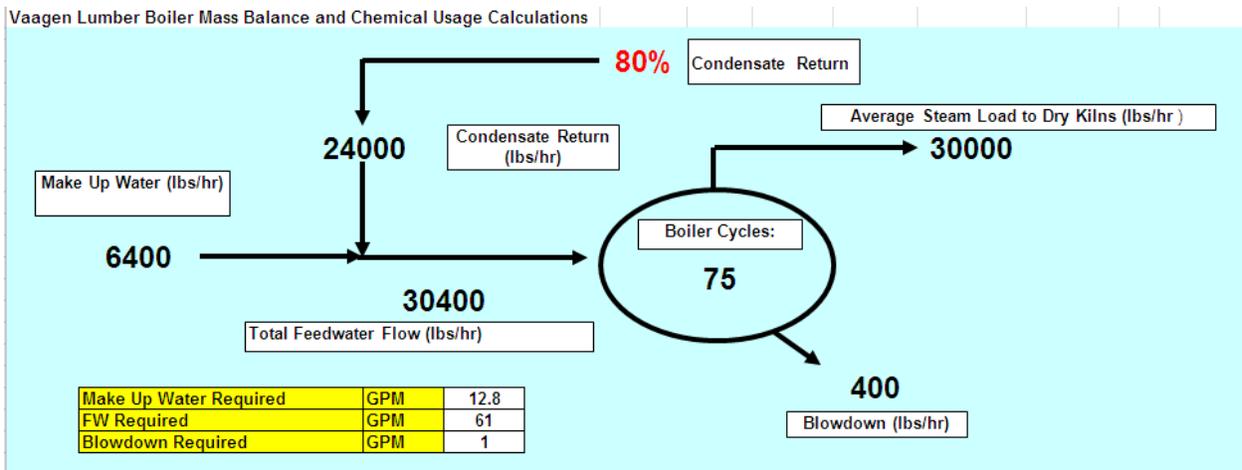
All chemicals will be delivered, handled, stored, and dosed in a manner that reduces the potential Product Stewardship challenges of human and environmental exposure to virtually zero. Vaagen is actively utilizing Nalco Company's unique Porta-Feed Chemical Containment System and Zero Defect Delivery process. This chemical handling protocol is recognized as the safest in the chemical manufacturing industry. The Nalco Porta-Feed/Zero Defect Delivery Process provides individual tanks with OSHA approved secondary containments, inventory site glasses, chemical pump containment, and deliveries completed by Nalco Certified Delivery Specialists. This combination virtually eliminates all hazards associated with the individual chemical feeds.

All chemical feeds will be controlled via the Nalco 3D Trasar Platform. The 3D Trasar Control Platform is a dynamic control system that basis chemical feeds based on real time needs not predetermined dosage levels. The Nalco 3D Trasar Platform allows for lower chemical dosages and better monitoring by placing all control and mass balance data on the internet for control purposes. The 3D Trasar Platform will be applied for the Reverse Osmosis (RO) System, and Boiler System.

<u>Chemical</u>	<u>Description</u>	<u>Annual Usage (gals)</u>
Nalco 2195	Water Softener Resin Antiscalant	40
Nalco 7408	Chlorine Scavenger	50
Nalco PC 191T	Membrane Antiscalant	40
Nalco 8735	Boiler Alkalinity Adjustment	55
Nalco 1720	Oxygen Scavenger	100
Nalco 22310	Boiler Internal Treatment	50
Nalco 1820	Steam Treatment	60

Chemical Usages:

Chemical volumes were calculated using the following baseline model for routine operations.



Boiler Chemical Costs					
Application	Product	Density	Dosage	lbs/year	gals/year
O2 Scavenger	1720	10.7	10	2534	237
Internal Treatment	22310	9.9	3	760	77
Steam Treatment	1820	8.15	5	1242	152
Alkalinity Adjust	8735	12.5	5	1267	101

RO Chemical Costs					
Application	Product	Density	Dosage	lbs/year	gals/year
Antiscalant	PC191T	11.33	8	437	39
Chlorine Scavenger	7408	11.4	14	765	67
Resin Cleaner	2195	9.34	Varies	280	30

QUALITY CONTROL

As stated in the prior section, Vaagen Bros. Lumber, Inc. will be implementing the Nalco 3D Trasar Control Platform on all chemical feed systems. The Nalco 3D Trasar system won the 2008 Presidential Green Chemistry Award. This system will insure that all chemical feeds are dosed properly at all times. It will also dynamically report this data to the Vaagen Operations Team via simple Data Dashboards. The 3D Trasar systems Detect, Determine, and Deliver all chemicals and pertinent system information to the Vaagen Operations team 24/7/365.

The 3D Trasar Systems will be maintained via the maintenance schedule outlined for each unit. In general, this specifies unit calibration and check out monthly. These calibration activities will be completed by Nalco Service Representatives.

System mass balance, wet chemistry, and other pertinent physical operational parameters will be tracked daily by the operations team and tracked in the Nalco Vantage 100 SPC software program. Data trends will be reviewed at a minimum on a monthly basis.

In addition to daily monitoring, weekly, quarterly, and annual inspections are completed by outside specialists so that component integrity of the process water treatment system can be maintained.

General Guidelines for tracking of individual component performance can be seen in the table below:

System	# Units	Controls	Monitoring Mechanism	Solution
Multi-Media Filter	2	Timer Based Backwash	Visual inspection	Notify Service Company
Water Softener System	3	Volume Based Regeneration	Daily Chemical Tests: Conductivity, Total Hardness	Notify Service Company
Reverse Osmosis	2	3DTrasar Control	Daily Chemical Tests: Conductivity, Chlorine, Total Iron Daily Mechanical Checks: Temperatures, Pressures, Flowrates	Notify Service Company
3D Trasar Controllers	2	Nalco	Monthly Calibration & Tuning	Notify Service Company

BOILER OPERATING PARAMETERS

Control Tests

Sample	Control Test	Test Frequency	Target Value	Minimum Value	Maximum Value
Softener	Total Hardness	Daily	0	0	.5
	Conductivity	Daily			
Feed Tank	Total Hardness	Daily	0	0	.5
	Conductivity	Daily			
	pH	Daily	>8.3	8.0	9.0
Boilers	Conductivity	Daily	6500	5000	7000
	TDS	Daily	4000	3000	5000
	Sulfite	Daily	20	10	30
	O Alkalinity	Daily			
	22310	Daily	150	100	200
Condensate	pH	Daily	8.5	8.3	8.8
	Conductivity	Daily		0	50

DISCHARGE SAMPLING PROCEDURE

Purpose:

Conduct monthly discharge monitoring in accordance with Ecology's NPDES Permit No. WA-013300-4.

Sampling Location:

Discharge outfall and mixing (also known as "waste") tank.

Sampling Frequency:

Both the mixing tank and the discharge outfall must be sampled monthly. Flow rate from the mixing tank is monitored daily via Flow-Captor 4114.30 Insertion Sensor.

Procedure:

1. Call Test America (509-924-9200) and request a sample kit which should include a cooler, ice packs, a chain of custody (COC) form, and all necessary sample bottles (which will be labeled and pre-preserved).
2. During the first week of the month, take samples from both the discharge outfall and the mixing tank as outlined under Condition S2.A of the NPDES permit. **Take caution when handling the sample bottles as to not lose the preservative that the lab has added to the bottles prior to sending them to Vaagen.**
3. Dry the bottles and labels. The preservation and analyte information is preprinted on the labels and the sampler will need to complete each label with a permanent marker as follows:
 - Samples obtained from the mixing tank are called "MT", and samples obtained from the discharge outfall are called "Outfall".
 - The person who pulls the samples should initial by "Sampled by".
 - Then note the date and time the samples were taken.
4. Obtain pH, temperature, and conductivity measurements from the discharge outfall and mixing tank using Vaagen's handheld Ultameter-6P. Follow the meter directions for use.
5. Obtain flow rate readings at the discharge outfall using Flo-Mate 2000 handheld meter and input into the "wateroutfall" spreadsheet to obtain an instantaneous flowrate reading.
6. Submit the analytical samples to the laboratory. In order to do so, complete the COC for all samples collected, make a copy of the COC, and send the samples with the original copy of the COC via traceable carrier or hand deliver to:

**Test America
11922 East 1st Avenue
Spokane Valley, WA 99206
(509) 924-9200**

7. Insert one copy of the COC in your binder, under the "DMR" tab.

Reporting:

Submit analytical results for the monthly monitoring period on a Discharge Monitoring Report (DMR) within 15 days following the end of the reporting period to:

**Department of Ecology
Water Quality Program
PO Box 47696
Olympia, Washington 98504-7696**

Recordkeeping (retain in the binder):

1. Permit – retain until this permit no longer applies to this facility.
2. Stormwater Pollution Prevention Plan – retain until the permit expires.
3. Monthly Sampling Documentation and analytical results – retain for a minimum of five (5) years.

Additional Resources:

1. Stormwater Pollution Prevention Plan
2. Spill Prevention Control and Countermeasure Plan
3. NPDES Permit No. WA-013300-4

SYSTEM COMPONENT DESCRIPTION

Multi-Media Filters: The purpose of the Multi-Media Filter is to remove any and all suspended solids above 10 microns in size from the city water for the purpose of providing proper make up water to the FILOX Green Sand Filtration System.

Number of Vessels:	2
Service Flow:	100 GPM
Peak Flow:	130 GPM
Backwash Flow:	70 GPM

The control scheme of the Multi-Media Filter system is to operate each vessel in a duplex arrangement. A duplex arrangement is one in which one vessel is in standby while the other is in service. The multi media filter controllers are set up to backwash each vessel based on a predetermined time limit. The Multi-Media Filters are set to backwash two times per week. System performance is monitored visually during backwash.

Reverse Osmosis(RO): The purpose of the RO units is to remove the remaining balance of the ions from the city water for the purpose of providing proper make up water to the steam system.

Number of Systems:	2
Service Flow:	50 - 70 GPM
Peak Flow:	70 GPM
Concentrate Flow:	20 GPM
% Recovery;	75%

The control scheme of the RO systems is to operate the units in parallel with one in service and the other laid up dry for emergency operation. RO units operate in auto start modes based on system water demand needed to supply two permeate supply tanks. System performance will be monitored with wet chemistry tests to verify conductivity, pH, silica, and total alkalinity removal efficiency.

The performance of the pretreatment systems, deareator, boilers, kilns, and discharge systems are all monitored daily via the 3D Trasar Systems, Operations Team Mechanical Checks, and wet chemistry tests. All critical mechanical, operational, and chemical control parameters are collected and logged in a statistical process control (SPC) software program. The SPC software is used to evaluate entered data to determine and verify proper system performance. This data will also be used to determine non-routine maintenance activities. All logs are reviewed daily by Vaagen Operations Staff. Data is reviewed on a monthly basis by consulting personnel (Nalco Company.) Key Performance Indicators (KPIs) are tracked, reported, and reviewed by the consulting company in order to assist in proper operation. A Program Administration Manual (PAM) is available to all plant personnel. The PAM is complete with specified operating parameters, wet chemistry test procedures, contingency plans, and troubleshooting guides in order to assist and guide the Vaagen Operations Team. At a minimum, the operations team undergoes 8

hours of formal class room training with regards to the above described equipment per year.

BOILER WET LAY-UP

Wet lay-up is preferable for short outages (30 days or less). It has the advantage of permitting the boiler to be returned to service on reasonably short notice. Wet lay-up involves forcing air out of the boiler by completely filling it to overflowing with water that has been specially treated. The following procedure should be followed for wet lay-up of your boilers:

1. Three to five days prior to shutdown, the blowdown rate should be increased. Maximum conductivity in the boiler should be 2,000 μmhos . The lower conductivity should be achieved through manual bottom blows rather than increasing continuous blowdown.
2. Maintain normal chemical residual levels. Chemical feed rates may need to be increased.
3. During manual blowdown, employ frequent short bottom blows (open three to five seconds every two to three hours) rather than infrequent lengthy blows.
4. When time does not allow for inspection or it is determined that the boiler will not be drained, add the following chemicals at least 30 minutes before the boiler comes off-line.

Sulfite - 400 ppm **Residual** in boiler water

5. When the boiler load is dropped, shut the valves to the steam header and fill the boiler to the top of the drum and into the overflow drum on top of the boiler. The water level should be maintained a minimum of 20 gallons in the overflow drum. This will ensure that all air is forced out of the boiler.
6. Test the boiler water weekly during the outage to make sure proper control levels are being maintained. pH control is the most critical factor in overall corrosion protection. Add more chemical as needed and recirculate.

SOFTENER UPSET FOR BOILER SYSTEM

Short-Term Softener Upset

- ◆ Increase NexGuard chemical feed to the boiler in order to keep it in proper operating range.
- ◆ Immediately regenerate the softener. Make sure the softener brine tank has salt.
- ◆ Shorten time or gallons between regeneration.
- ◆ Call your Nalco Company representative.

Long-Term Softener Upset

- ◆ Consult with your Nalco Company representative on how much boiler chemical to feed. You may be required to switch boiler chemical temporarily to reduce your chemical costs while softeners are being repaired.
- ◆ Nalco Company can perform a softener elution study to help determine the problem with your softener.

Caution

- ◆ Keep in mind that it is important that softener problems be resolved as soon as possible to avoid or at least minimize scale formation.
- ◆ If scale does form, consult your Nalco Company representative during the next boiler inspection on the costs and benefits of options to clean up the scale.

Additional Information

- ◆ One of the most critical parts of the boiler system is the softener. The softener exchanges calcium and magnesium for sodium ions. Calcium and magnesium, known as hardness ions, will quickly form scale in your boiler, but sodium does not. Scale acts as insulation on the boiler tubes and will lead to excessive energy costs. In addition, scale can lead to boiler tube overheating and rupture.
- ◆ Depending on your make-up water, your softener should produce between 0 - 5 ppm of hardness at all times so that you do not have scaling problems. Keep in mind that scale forms in the boiler almost instantaneously because of high heat conditions; therefore, carefully monitored softeners are critical to a scale-free boiler system.

PH UPSET FOR STEAM CONDENSATE/ NEUTRALIZING AMINE PROGRAM

- ◆ If pH is less than 8.2, increase the amine feed. Check the pH the next day and adjust amine feed as needed.
- ◆ If pH continually exceeds 9.2, decrease the amine feed.
- ◆ Please contact your Nalco Company representative if you need help!

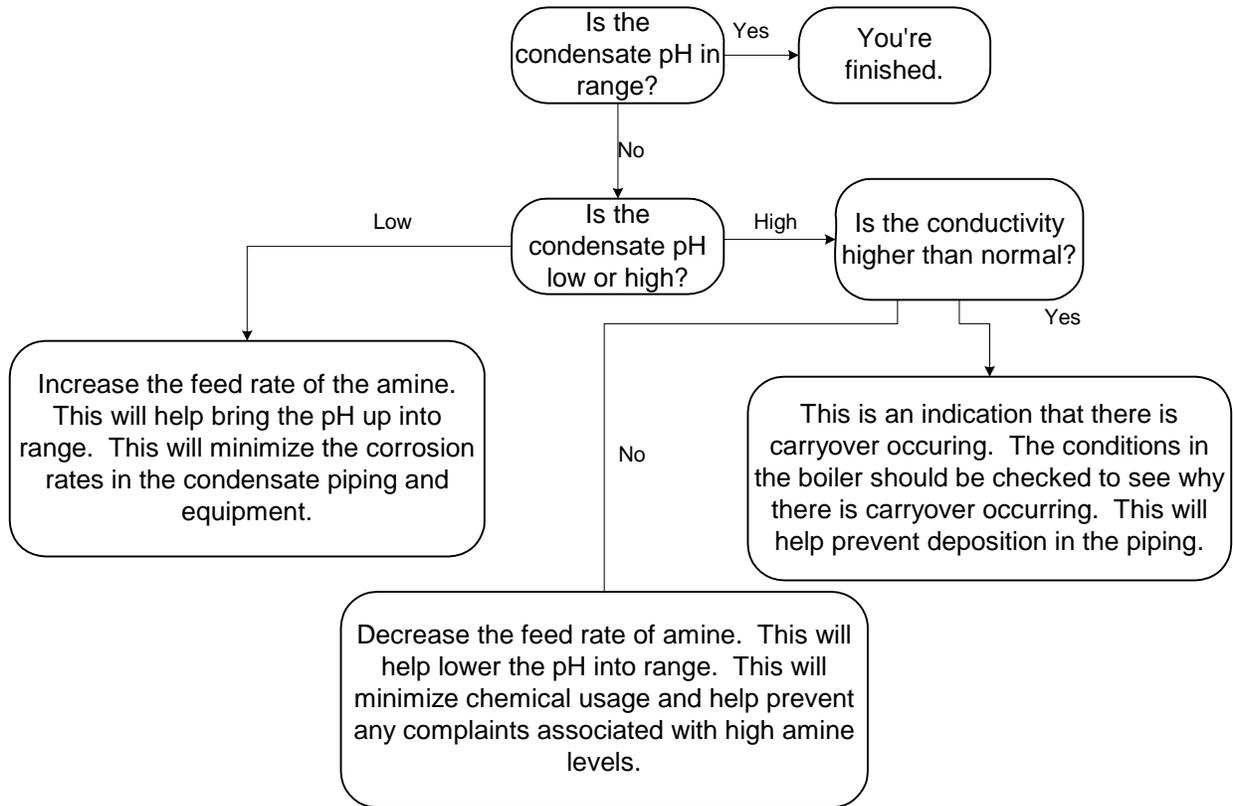
Caution

Too high or too low pH in the steam condensate can cause corrosion. Corrosion may lead to high levels of iron in the boiler, which can lead to iron scale and boiler inefficiencies and/or boiler failure.

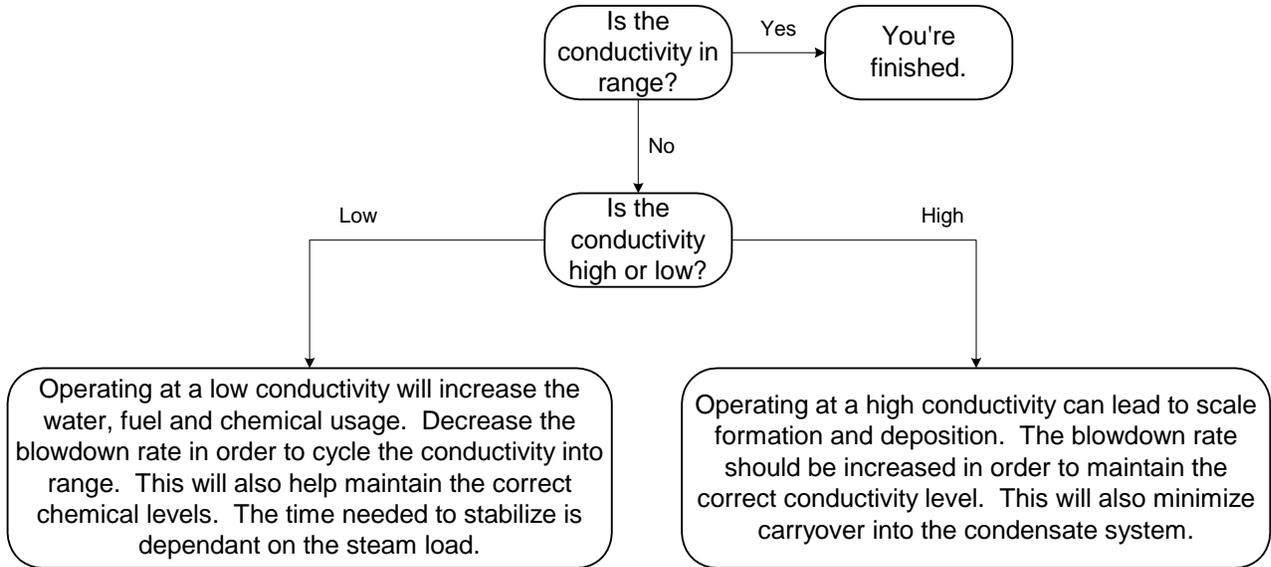
Additional Information

- ◆ The control level for your steam condensate is a minimum pH of 8.2. A pH less than 8.2 may begin to corrode the mild steel in the system. A high pH of greater than 9.5 can corrode the brass, copper and other yellow metal that may be in the system.
- ◆ Without any chemical treatment to your steam system, carbonic acid will form in the steam condensate and the pH will drop to below 8.0 and begin to corrode the mild steel in your system. Natural alkalinity in the boiler feedwater flashes off as carbon dioxide in the steam and dissolves in the steam condensate to form carbonic acid. Corrosion in the piping will lead to costly repairs and replacement costs. In addition, iron from the condensate lines will redeposit on the boiler tubes leading to scaling and wasted energy dollars.
- ◆ To control pH, you can feed a Nalco neutralizing amine product. A neutralizing amine volatilizes in the steam and condenses with the steam condensate to neutralize the carbonic acid.

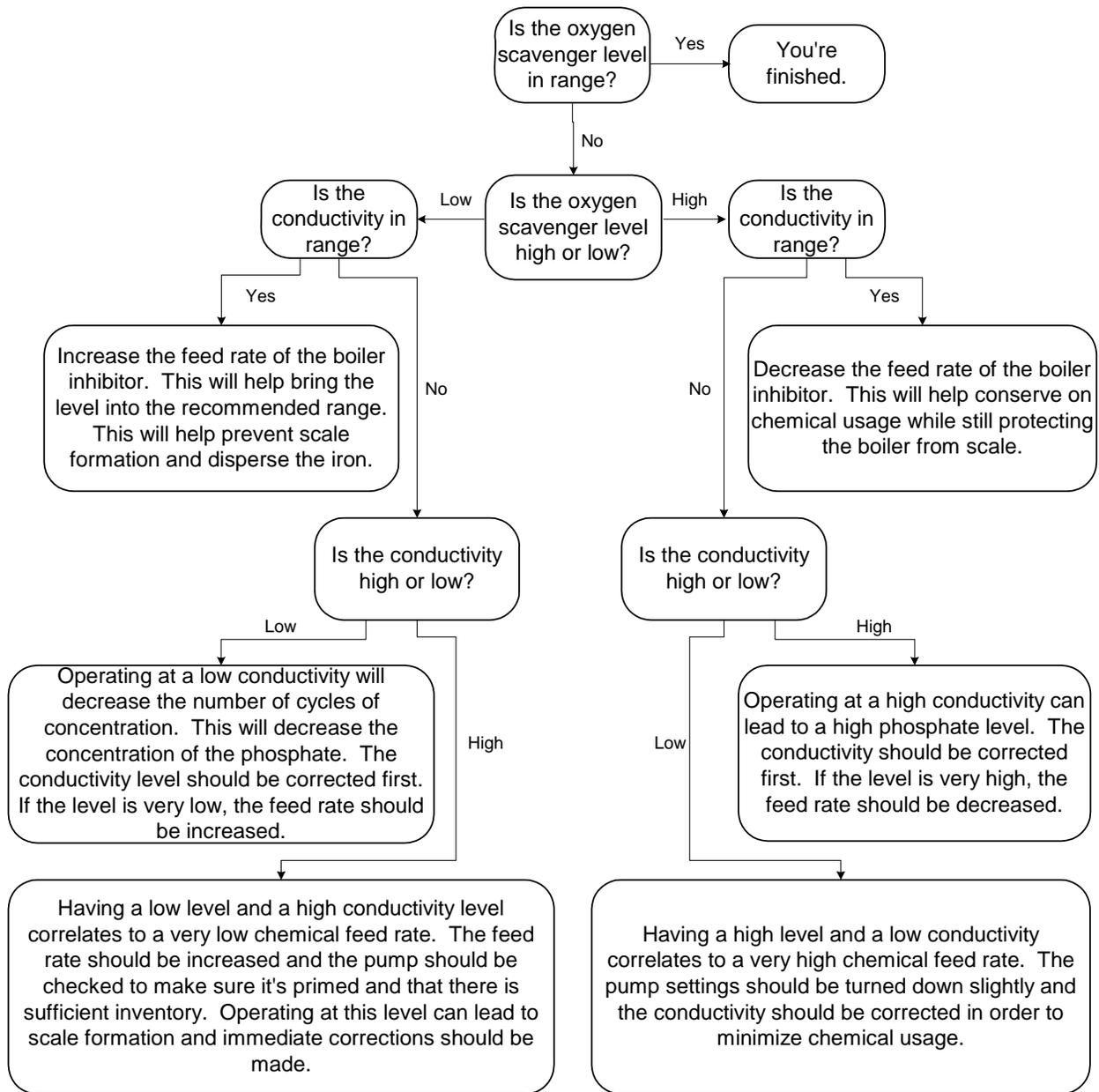
Steam Treatment Amine (1820) Troubleshooting



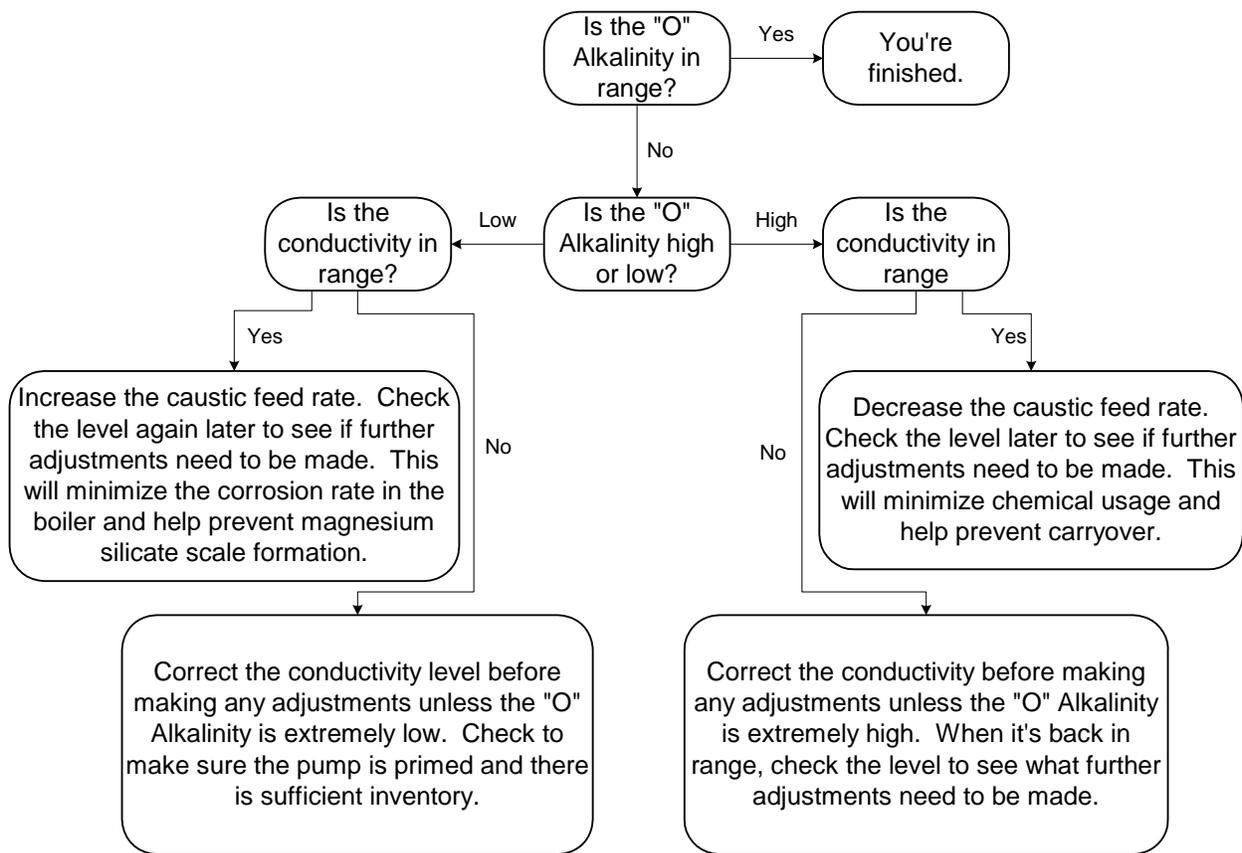
Boiler Conductivity (Blow Down) Troubleshooting



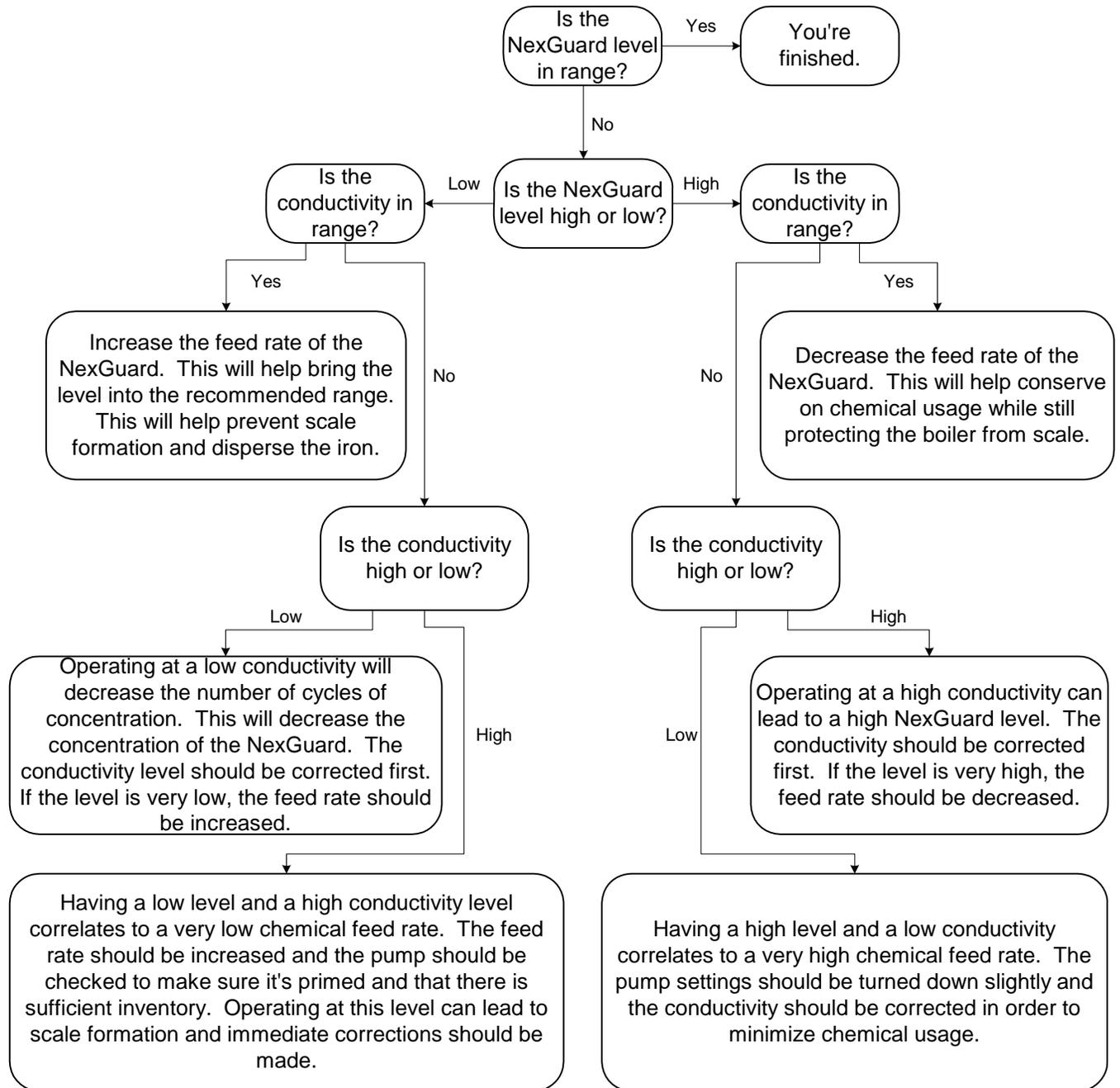
Boiler Oxygen Scavenger (1720) Troubleshooting



"O" Alkalinity Troubleshooting



NexGuard (22310) Troubleshooting



NALCO COMPANY TESTING AND SAMPLING PROCEDURES

Background

Water test results are used to verify the ability of the control equipment to maintain proper cycles and pH. They are also used to alert operators to developing problems.

If test results are inaccurate, time is wasted and improper actions may be taken. Follow sampling procedures carefully to obtain a representative sample. Follow test procedures exactly as written.

Flush sample line thoroughly to ensure a representative sample. Sample bottles must be completely filled when samples are taken.

Water Sample Testing

Obtaining reproducible tests for water sample testing is easy when procedures are followed:

- ◆ Keep worktable tops, glassware, stirring rods, sample bottles, graduated cylinders, casseroles, etc., very clean.
- ◆ **USE ONLY FRESH REAGENTS.** Discard outdated reagents. Place the new reagents behind those already on the shelf to ensure that old reagents are used first.
- ◆ Carefully measure the correct amount of test reagent to be used. Either an insufficient amount or an excessive amount of reagent will cause errors in test results.
- ◆ The test results in titrations are valid only if the endpoint is obtained using a dropwise addition of titrant. When you are close to the endpoint, one drop of titrant with sufficient stirring will produce the color change. If titrant is added too quickly, the test result will be erroneously high.
- ◆ Rinse all glassware thoroughly with distilled water after each use. A small amount of distilled water to wash the surface is sufficient. If distilled water is not available, rinse glassware three times with the next sample to be tested.

Hot Samples

Hot samples (>100°F) such as boiler water and condensate should be cooled via use of a cooling coil/sample cooler. Consult your Nalco Company Representative for proper hardware. Cooling to <100°F is necessary for proper test accuracy and safety. Cooling a hot sample after it is collected into a sample container may result in erroneous results.

The following test procedures are included in this section:

- ◆ Total Hardness
- ◆ Conductivity
- ◆ pH
- ◆ Sulfite
- ◆ O Alkalinity
- ◆ NexGuard

Boiler / Steam System Test Procedures:

Total Hardness:

Target = < 0.5 ppm

100 ml Sample of Softener Water, DA Water, or Condensate into Clean Casserole
Add 2 ml of H-2 Hardness Buffer
Add 3 Shakes of H-3 Total Hardness Buffer
If sample turns blue, record "0" in Log book
If sample turns purple, titrate with H-1 until sample turns blue
Multiply mls used reading by 1 and record in log.

Softener / Feed Tank / Boiler / Condensate Conductivity:

Boiler Target = <7000 µmhos

100 ml sample of sample Water.
Rinse Myron L Meter a minimum of 3X with sample and press button for reading.
Record conductivity in log.

Boiler TDS (Total Dissolved Solids):

Target = 3500 – 4000 µmhos

100 ml sample of Boiler Water.
Add TDS-1 and stir until sample turns from pink to clear.
Rinse Myron L Meter a minimum of 3X with sample and press button for reading.
Record TDS in log.

NexGuard 22310:

Target = 100 – 200 ppm

Hold T-8000 Fluorometer Horizontal
Rinse the sample cuvette 3X with the sample
Fill Sample Cuvette with Boiler Water and cover with cap.
Press "READ." And Record in log.

O Alkalinity:

Target = 300 – 1000 ppm

10 ml sample of Boiler Water into Clean Casserole
Add 1 Blue Scoop of Barium Chloride Crystals & Stir
Wait 5 Minutes
Add 2 Drops of P Indicator (Sample will turn Pink)
Titrate drop wise with N/50 H₂SO₄ until sample turns clear
Multiply buret reading by 100 and record in log.

Sulfite:

Target = 10 – 30 ppm

25 ml sample of Boiler Water into Clean Casserole
Add 1 Blue Scoop of ST-1 Crystals & Stir Gently
Holding dropper vertically, add ST-2 drop wise to sample.
Count number of drops it takes to turn sample brownish blue.
Multiply drops x 5 and record in log.

Feed Tank / Condensate pH:

Target = 8.3 – 8.8

Rinse Myron L Meter 3X with Sample
Press "pH."
Record in log.

FORMS

Please see sample form, included for reference purposes.



Washington State Department of Ecology **Discharge Monitoring Report (DMR)**

Permit Number: WA0133004

Permittee: VAAGEN BROS LUMBER INC COLVILLE

Facility County: Stevens

Receiving Waterbody: Colville River

Monitoring Period: 11/01/2014 - 11/30/2014

Outfall: 001 - WETLAND NEAR THE COLVILLE RIVER

Version: 1

Week	Monitoring Point	Flow Gallons/Day (gpd) 1/Day Metered/Recorded	pH Standard Units Monthly Measurement	Conductivity (Specific Conductance) Micromhos/cm Monthly Measurement	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) Monthly Measurement	Chloride Total Milligrams/L (mg/L) Monthly Measurement	Calcium Total Milligrams/L (mg/L) Monthly Measurement	Temperature Measured Degrees C Monthly Measurement	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) Monthly Measurement	Volume Monthly Gallons Summary Only Metered/Recorded
		001	002	002	002	002	002	003	003	004
1-Sa	11/1/14	1830								
2-Su	11/2/14	2550								
2-M	11/3/14	1080								
2-T	11/4/14	900								
2-W	11/5/14	2150								
2-Th	11/6/14	1060	8.1	1539	895	27.1	6.51	11	720	0
2-F	11/7/14	1220								
2-Sa	11/8/14	2860								
3-Su	11/9/14	4330								
3-M	11/10/14	3570								
3-T	11/11/14	3080								
3-W	11/12/14	1830								
3-Th	11/13/14	2240								
3-F	11/14/14	1620								
3-Sa	11/15/14	2180								
4-Su	11/16/14	3720								
4-M	11/17/14	4360								
4-T	11/18/14	2400								
4-W	11/19/14	1500								
4-Th	11/20/14	2000								
4-F	11/21/14	1740								
4-Sa	11/22/14	1810								
5-Su	11/23/14	1480								
5-M	11/24/14	1260								
5-T	11/25/14	1800								
5-W	11/26/14	2020								
5-Th	11/27/14	1710								
5-F	11/28/14	1200								
5-Sa	11/29/14	1780								
6-Su	11/30/14	2000								
Minimum			8.1 >= 6.0							
Average		2109.33 <= 39000								
Maximum		4360 <= 45000	8.1 <= 9.0	1539 Report Only	895 Report Only	27.1 Report Only	6.51 Report Only	11 Report Only	720 Report Only	
Total, Monthly										0 Report Only



I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Robert Zyskowski

Signature

12/10/2014 11:15:44 AM

Date

MATERIAL SAFETY DATA SHEETS

All pertinent Nalco Material Safety Data Sheets are located in the boiler room.

In the event of a mishap involving one of the Nalco products, refer immediately to the applicable product safety data sheet for proper treatment of the person involved.

In the event that additional assistance is required, have the attending physician or nurse contact the following emergency 24-hour per day answering service:

Action Link Emergency Response Team

1 – 800 – 424 – 9300

EMERGENCY NUMBER

24 HOURS/DAY