

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

N763145292

FACILITY: Linn Energy - Clear Lake CPF		SRN / ID: N7631
LOCATION: NE NW NW Section 35, T32N, R2E, HILLMAN		DISTRICT: Gaylord
CITY: HILLMAN		COUNTY: MONTMORENCY
CONTACT: Diane Lundin , Senior Environmental Representative		ACTIVITY DATE: 07/23/2018
STAFF: Sharon LeBlanc	COMPLIANCE STATUS: Compliance	SOURCE CLASS: SM OPT OUT
SUBJECT: unannounced, scheduled site inspection of synthetic minor (opt-out). the referenced facility had notified AQD District Staff of engine swap out previous year.sgl		
RESOLVED COMPLAINTS:		

On Monday, July 23, 2018, AQD District Staff mobilized to the Linn Operating, LLC (Linn) Clear Lake Facility (N7631), located in T 32N, R2E, Section 35, Hillman, Montmorency County, Michigan to conduct an unannounced, scheduled compliance inspection of the facility. The referenced facility presently operates under Permit to Install No. 199-06A. A records request was made electronically on July 3, 2018, with the response received on July 20, 2018. The records consisted of copies of field logs as well as spreadsheets prepared by Gosling Czubak Engineering Sciences, Inc. (Gosling)

Previous site inspection activities were conducted on July 24, 2015. No violations were noted in the inspection report.

The site was operating, and the gate locked at the time of the inspection. Linn corporate staff answered questions regarding Facility operations and provided supplemental information required to determine Facility compliance.

FACILITY

The referenced facility is a fenced and unmanned CPF station operated by Linn and is located in the NE1/4 of NW1/4 of NW ¼ of Section 35, T32N, R2E, West Central Montmorency Township. The station is reported to service Antrim Formation wells in the area. Activities onsite include separation of gas and brine from the incoming Natural Gas (NG) stream and compression of the gas in the lines.

To reach the facility, Staff traveled north of Hillman on M-33 approximately nine miles, then make a right and traveled east on East Rod and Gun Road (unpaved) until you reach the fork in the road. At the fork in the road, stay on East Rod and Gun Road to the left (north) and travel approximately one-tenth of a mile to an unpaved drive on your left. Make a left, and travel approximately two-tenths of a mile (uphill and rutted) where the trail/drive makes a right, and travel approximately one-tenth of a mile. The drive ends at the gate to the Facility. It is heavily wooded from M-33 to the site, and in most cases, there is not extra room to make turn arounds.

The site is unmanned, and gated. Adjacent properties to the north, south and west are forested land owned by the State of Michigan. The NE1/4 of Section 35 consists of private small parcels and acreages.

REGULATORY

The Facility is considered a synthetic minor with respect to criteria pollutants due to limitation of NOx, CO through use of a catalyst. In addition, the Facility is a true minor with reference to Hazardous Air Pollutants (HAPs).

Permitting -The referenced facility operates under Permit to Install (PTI) No. 199-06A, which was issued to the Facility on November 30, 2008. The PTI was issued to Samson Resources, and the Facility was later purchased by Linn. The permit application identified the maximum single HAP for the facility as formaldehyde.

At the time of initial permitting (PTI 199-06, August 1, 2006) the facility consisted of two NG-fired compressors and one glycol dehydration unit. The permittee requested a federally enforceable limit of 40 tons NOx/year to limit emission rates to below Potential for Significant Deterioration (PSD).

In 2008, a permit modification was requested for removal of one engine (EUENGINE1) and its associated permit conditions. The application further indicated that Samson Resources would be installing a 145 Hp CAT 3306NA, but that the engine was exempt from permitting under Rule 285(g) which exempted engines of <10 million BTU/Hr maximum heat input from 201 permitting.

Though not identified in the permit, the facility may be subject to Federal Regulation. Subparts frequently associated with oil and gas facilities are identified below. Note however, that compliance with these subparts has not been determined as part of this inspection.

Federal Regulations - The referenced facility does not process or store petroleum liquids, nor store them onsite and is therefore appears to not be subject to 40 CFR Part 60 (New Source Performance Standards AKA NSPS) Subparts;

- K, Ka or Kb (Storage vessels for Petroleum Liquids);
- KKK (Equipment Leaks of VOC from onshore NG Processing Plants);
- VV (Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry);

40 CFR Part 60 Subpart OOOO (Standards of Performance for Crude Oil and NG Production, Transmission and Distribution) and Subpart OOOOa would apply to onshore affected facilities that are constructed, modified or reconstructed after August 23, 2011 and September 18, 2015, respectively. Based on available information it appears that the referenced subpart is not applicable at this time but that future changes may be subject to the referenced subpart. No compliance determination has been made with reference to the subparts.

40 CFR Part 60 (NSPS) Subparts IIII and Subpart JJJJ for Compression Ignition (CI) and Spark Ignition (SI) Reciprocating Internal Combustion Engines (RICE), respectively. Linn reports that the existing RICE are remote engines and are not subject to the referenced subparts. No compliance determination has been made with reference to the subparts.

With respect to 40 CFR Part 63 (Maximum Achievable Control Technology Standards A.K.A. MACT) the following Subparts may apply:

- Subpart HH (HAPS from Oil and NG Production Facilities)
- Subpart ZZZZ (Reciprocating Internal Combustion Engine aka RICE)
- Subpart JJJJJJ (Industrial, Commercial and Institutional Boilers and Process Heaters)

With respect to Subpart HH, at the time of initial permitting the application indicated that since the Facility did not produce NG liquids it did not meet the definition of an Oil and NG Production Facility and was not subject to the subpart. More recently, Gosling correspondence dated November 9, 2016, the contractor reports that the Clear Lake Facility has an actual annual NG flow rate of less than 3 million standard cubic feet per day (MMcf/d) or 85,000 cubic meters/day making the unit exempt from emission control requirements under 40 CFR Part 63 Subpart HH for minor sources of HAPs. Confirmation of this status was provided by the Facility in electronic correspondence dated July 20, 2018. A compliance determination has not been made with respect to this subpart, and at the time of report preparation AQD does not have authority to enforce the subpart.

With respect to Subpart ZZZZ (RICE MACT), the facility engines are subject to the referenced subpart. However, at the time of the site visit, AQD has not been delegated authority for subpart ZZZZ and no compliance determination with reference to the subpart has been made.

NESHAP subparts JJJJJJ pertain to Industrial, Commercial and Institutional Boilers and Process Heaters for Area source of HAPS, respectively. At the time of the site inspection, it appears that the reboiler of the glycol dehydration process would not be subject to the subpart, as a process heater is not subject for area sources.

EQUIPMENT

Permit No. 199-06A identifies the following Emission Units (EUs) and Flexible Groups (FGs):

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- EUDEHY,

The Trimethylene glycol dehydration system includes a 125,000 BTU/Hr gas-fired, reboiler burner. The permit application reports an operating recirculation rate of 0.25 gallon per minute (gpm) and a maximum glycol recirculation rate of 1.5 gpm. Emission sources for the system are reported to be the regenerator still column and the burner for the reboiler. No pollution control is reported present for the system.

- EUENGINE2,

This EU consists of one NG-fired RICE with 3-way catalyst and an Air to Fuel Ratio (AFRC) O2 sensor. Review of District Files and annual emissions reports submitted by the facility indicate that at the time of permitting, one exempt and one permitted compressor existed onsite. Historical records of permitting and change-outs provided the following information:

INSTALL DATE	MAERs ENGINE ID	TYPE	Dismantle Date	SOURCE
9/1/2006	EUENGINE01*	CAT G3408C LE, 425 Hp lean burn	apx. 2008	2008 PTI Application
9/1/2006	EUENGINE02**	CAT 398TA, 625 Hp, rich burn with reductive catalyst	swapped out with same model October 25, 2017	2008 PTI Application
8/21/2008	EUENGINE03*	CAT 3306NA, 145 Hp, rich burn	10/1/2017	2008 PTI Application
10/1/2017	EUENGINE03A*	CAT 3306TA, 203 Hp, rich burn	NA	October 31, 2017 e-mail

* Note- exempt engine

** Note NGS Field Maintenance Reports for October 25, 2017 document replacement of Cat 398TA S/N 73B01919 with S/N 73B01232.

A Preventative Maintenance/Malfunction Abatement Plan (PM/MAP) was prepared by Samson Resources Company on March 7, 2007. Revised PM/MAPs were prepared by Linn Energy and received by the District on January 10, 2012 and more recently on May 9, 2018. These later documents were approved by District Staff on January 26, 2012 and May 14, 2018, respectively. The referenced PM/MAP was completed in compliance Special Condition III.1 (SC III.1) for EUENGINE02. Natural Gas compression Systems (NGSG) is the present RICE subcontractor for the Facility and conducts much of the required maintenance activities.

- FGFACILITY, and

This FG consists of EUDEHY, EUENGINE2, as well as any exempt or grandfathered process equipment. In the case of this site, exempt equipment includes a second compressor engine (EUENGINE3A). This second RICE was installed in October 2017, replacing a previously existing exempt RICE (EUENGINE3).

In addition to the 300-gallon methanol tank located onsite, an approximately 300-gallon tank of RTO 150, and smaller tank of HDAX3200 low ash oil are located onsite. No grandfathered EUs are associated with the site.

- FGMETHANOL

This FG consists of methanol storage equipment totaling less than 5,000 gallons for all equipment. At the time of the July 23, 2018, site inspection, a total of one 300-gallon methanol tank was identified on the west entrance of the compressor building.

COMPLIANCE

At the time of the July 23, 2018, site visit, no visible emissions were noted to be coming from onsite stacks in the overcast skies, no heat shimmer could be seen in the cloudy skies or glycol odors noted. nor were there any liquids collected in the secondary containment of the brine tank.

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MAERS- Annual emissions estimates are reported annually for the Facility as part of the Michigan Air Emissions Reporting System (MAERS). A review of the most recent MAERS submittal for the facility (received on February 28, 2018 for emissions associated with the calendar year 2017) included emissions for two engines and one glycol dehydrator onsite.

Except for NOx and CO emissions for the two engines, the emissions for the facility were calculated using MAERS emission factors. Total emissions reported for the year 2017 included CO and NOx of emissions of 5.94 and 30.68 tons, respectively. VOC emissions for the facility were reported to be 0.92 tons/year.

Permit Conditions –

High Level citations to 40 CFR Part 63, Subpart HH are included within permit conditions for EUDEHY and FGAFACILITY. With respect to Subpart HH, as previously indicated the Facility reports not being subject to the referenced subpart based on NG flowrates of less than 3 MMcf/day. It should be noted that no conditions exist for FGMETHANOL, so the EU is not discussed further.

EUDEHY- No emission limits, material limits, equipment limits, stack restrictions or testing requirements exist for the EU. Monitoring and recordkeeping requirements of 199-06A includes documentation of actual annual average flow rates (SC VI.1 (a) or (b) & VI.2) and/or actual annual benzene emission rates (SC VI.1 (c) or (d) & VI.3) for EUDHY. Records provided by Linn reported actual average flow rates of <0.5 MMcf/day.

EUENGINE2- Permit conditions associated with EUENGINE2 do not include material limits. Emission limits associated with EUENGINE2, include 12-month rolling limits for both NOx and CO. The following table summarizes both the MAERS for the calendar years of 2015 and 2016, as well as the 12-month rolling time total as of June 2018. All reported emissions were below permit limits.

Reporting Period	NOX (12-Month Rolling)	CO (12-Month Rolling)
2014	4.28 tpy	4.47 tpy
2015	4.28 tpy	4.46 tpy
2016	4.34 tpy	4.53 tpy
2017	4.25 tpy	4.44 tpy
June 2017-2018	4.20 tpy	4.38 tpy
LIMIT	14.9 tpy	14.1 tpy

The above referenced emissions were calculated using manufacturer’s engine specific emission factors in compliance with Appendix A and SC VI.6 & 7.

Operational limits and design/equipment parameters associated with EUENGINE02 limit operation of the engine and it’s associated control device to no more than 200 hours without the control device per year. (SC III.2)(SC VI.4) Per records provided by Linn EUENGINE02 was not operated without the catalyst for the calendar years 2016 or 2017.

Engine operational data observed as part of the July 23, 2018, site visit was consistent with operational data documented on daily operational logs and spreadsheets. Operational data was also noted to be consistent between those reported in maintenance records and the company’s operational spreadsheets.

EUENGINE02, 625 HP CAT 398TA

Date	Engine	RPM	Source
September 9, 2016	625 HP Cat 398TA	864	NGSG Field Maintenance Report
February 10, 2017	625 HP Cat 398TA	903	NGSG Field Maintenance Report
April 21, 2017	625 HP Cat 398TA	888	NGSG Field Maintenance Report
		896	NGSG Field Maintenance Report

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September 8, 2017	625 HP Cat 398TA		
November 30, 2017	625 HP Cat 398TA	897	NGSG Field Maintenance Report
July 23, 2018	625 HP Cat 398TA	889	Onsite reading.

The permittee is also required to operate EUENGINE02 with it's add on control device installed, operated and maintained in a satisfactory manner (SC IV.1). Records provided by Linn indicated that catalyst maintenance activities were conducted on the following dates:

Date	Catalyst Maintenance	Field Analyzer Calibrations	NOx and CO Catalyst Efficiency Testing
February 24, 2015	Yes	Yes	>90%
May 27, 2016	Yes	Yes	>90%
May 11, 2017	Not Reported	Not Reported	>95 %
May 22 & 30, 2017*	Not Reported	Not Reported	Not Reported

* Note – Documentation provided by Linn included documentation of catalyst inspection and testing by Catalytic Combustion Corporation. But activities resulting from inspection and results of testing were not included with documentation for that event.

Per the approved PM/MAP, the below operational parameters are monitored. Catalyst temperatures are recorded daily on field operator logs, and differential pressure across the catalyst is reported monthly by other staff. Data reviewed indicated that pre-catalyst temperatures were below post catalyst temperatures.

Catalyst differential pressures are obtained by recording the difference of the pre and post catalyst pressures (recorded in inches of water column). Catalyst differential pressures for 2016 were reported to range from 0.5 – 1.9 inches of water. Catalyst differential pressures for 2017 were reported to range from 0.8 – 2.2 inches of water. Catalyst differential pressures to date for 2018 ranged from 0.4-1 inches of water. Data was missing for September 2017.

Date	Engine	Pre Catalyst Temp.	Post Catalyst Temp	Differential Pressure Across Catalyst ("water)	Source of Information
January 31, 2016	625 HP Cat 398TA	736	824	NR	Linn Operator Log
May 27, 2016	625 HP Cat 398TA	754 762	847 851	NR 0.9	Linn Operator Log NGSG Field Maintenance Log
November 11, 2016	625 HP Cat 398TA	738 722	870 836	NR 1.7	Linn Operator Log NGSG Field Maintenance Log
May 11, 2017	625 HP Cat 398TA	730 768	840 862	NR 0.9	Linn Operator Log
November 30, 2017	625 HP Cat 398TA	727 758	842 852	NR 1.1	NGSG Field Maintenance Log
July 23, 2018	625 HP Cat 398TA	716	831	Not Found	Onsite Reading
PM/MAP Operational Range		>700 degrees	>700 <1350 degrees	2" of water above baseline	NA

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Maintenance requirements under the approved PM/MAP are reported to meet the requirements of 40 CFR Part 63 Subpart ZZZZ (RICE MACT). Maintenance requirements include the following activities for >500 Hp, non-emergency, non-black start, 4-stroke rich burn, remote, stationary RICE every 2,160 hours (90 days) of operation or annually, whichever comes first (and replacement as necessary):

- Change oil and filters
- Inspect spark plugs
- Inspect all hoses and belts

Date of Oil and Filter Inspection/ Replacement	Date of Spark Plug Inspection/Replacement	Date of Hose & Belt Inspection/Replacement
2/18/2016	2/18/2016	2/18/2016
5/20/2016	5/20/2016	5/20/2016
12/7/2016	12/7/2016	12/7/2016
3/8/2017	3/8/2017	3/8/2017
6/9/2017	6/9/2017	6/9/2017
7/24/2017	7/24/2017	Not Reported
9/8/2017	9/8/2017	9/8/2017
11/21/2017	11/21/2017	11/21/2017

The PM/MAP AFRC sensor replacement schedule indicates that the oxygen sensors for the AFRC will be replaced when the emission checks occur or upon sensor failure. A review of maintenance records provided by Linn for 2016 and 2017 calendar years indicated that AFRC sensor activities were conducted by NGS Staff on:

- April 21, 2017 – sensor failure & replacement
- May 11, 2017 – sensor replacement
- October 25, 2017 – sensor replacement in conjunction with engine swing

Emission checks using a portable emissions analyzer per the PM/MAP are required when either a monitored parameter (temperature or differential pressure) are out of range, or when a cleaned catalyst is installed (typically every 12-18 months). Emission checks of records appear to have only been conducted in conjunction with catalyst evaluation/maintenance and includes the following dates:

- May 27, 2016
- May 11, 2017

Catalyst maintenance under the PM/MAP includes the following activities every 12-18 months, or when the operating variables are out of their respective ranges:

- Inspection, cleaning or replacement of the catalyst, 5/22/2017 and 5/30/2017
- Verification of catalyst control efficiency using a portable emissions analyzer, 5/27/16, 5/11/2017
- Replacement of catalyst gasket(s). 10/25/2017

SC IV.2 requires that the permittee install, calibrate, maintain and operate a device to monitor and record the natural gas usage for EUENGINE02 on a continuous basis. Records provided by the Facility as well as daily log sheets completed by Facility operators verified that the NG usage was being monitored continuously and was recorded on daily field log sheets.

A review of the onsite daily logs at the time of the site inspection indicated that daily hours of operation for EUENGINE02 are not recorded daily. This data is not required by permit, and therefore does not reflect a compliance issue.

Testing requirements associated with EUENGINE02 are limited to verification testing (SC V.1) to conditions when requested by the District supervisor. At the time of the site visit, no such request was of record on file.

Monitoring and recordkeeping requirements associated with EUENGINE02 include the following:

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- Monitor and record on a continuous basis EUENGINE02 NG usage (SC VI.2) and maintain records of monthly fuel usage for the referenced engine (SC VI.5)
- Log of all maintenance activities conducted according to the PM/MAP (SC VI.3)
- Monthly and 12-month rolling total hours of operation without pollution control device for EUENGINE02 (SC VI.4), and
- Monthly and 12-month rolling total NOx and CO emissions for EUENGINE02 (SC VI.6 & 7).

Fuel usage onsite is monitored and recorded continuously with a HIP Class I DIV1 advanced gas meter with a reported 0.025% accuracy. The data provided by Linn indicated that the Facility was maintaining monthly records of the fuel usage for the EUS onsite in compliance with their permit. The data is used to determine monthly and 12-month rolling NOx and CO emissions for EUENGINE02 in compliance with their permit.

As previously summarized, the facility maintains records of all maintenance activities conducted in accordance with the PM/MAP. Though not consistent in the level of detail, it appeared that NGCS records and daily operator logs were sufficient to verify that appropriate activities were being conducted in accordance with the PM/MAP.

As previously indicated, the records provided by Linn for EUENGINE02 was not operated without the catalyst for the calendar years 2016 or 2017.

Reporting requirements for EUENGINE02 includes notification to the AQD District Supervisor of a change out of the referenced engine with an engine of an equivalent or lower emitting engine. (SC VII.1) The exact wording of the condition is "Except as provided by Rule 336.1285, if the engine is replaced with an equivalent-emitting or lower-emitting engine, the permittee shall notify...." A review of records indicates that both a change out of EUENGINE02 and EUENGINE03 occurred in October 2017.

EUENGINE02 was replaced with the same make and model (CAT 398TA, 625 HP), and no notification was received by AQD District Staff for the activities. Subsequent communications with Linn Staff indicated that based on "except as provided by Rule 336.1285" the Facility interpreted the "engine swing" for EUENGINE02 to be exempt under Rule 285(c) which allows for "changes in a process or process equipment to the extent that such changes do not alter the quality and nature or increase the quantity, of the emission of the air contaminant beyond the level which has been described in and allowed by an approved permit to install, permit to operate, or order of the department." However, Rule 285(c) is only applicable to those changes which also do not include "installing, constructing, or reconstructing an emission unit" and would not apply to the activity.

Further evaluation of Rule 285 identified Rule 285(2)(a) (vi) which allows for "routine maintenance, part replacement or other repairs considered by the department to be minor...." Examples provided under the Rule include "replacement of engines, compressors, or turbines as part of a regular maintenance program". To avoid any future confusion, it has been recommended that notifications be sent for all engine changes.

EUENGINE03 was swapped out with EUENGINE03A, and AQD Staff was notified verbally and electronically of the swap. Data provided by Linn appears to verify that emissions from EUENGINE03A meet Rule 201 exemption requirements and verified that emissions were of an equivalent or lower emitting engine.

SC VIII.1 restricts the stack for EUENGINE02 to a maximum of 14-inches in diameter, and a minimum of 32 feet above land surface. As part of the recent engine change outs, the Facility confirmed the stack construction as 4-inches in diameter and 45 feet above land surface.

FGFACILITY - Source-wide Special conditions associated with FGFACILITY are limited to high level citations with respect to 40 CFR Part 63, Subpart HH (SC III.1) already addressed as well as testing (SC V.1) and material limits (SC II.1) with respect to hydrogen sulfide. The permittee is restricted from burning any sour natural gas in FGFACILITY (SC II.1) and is required to verify H₂S and/or sulfur content upon request of the AQD District supervisor (V.1). Information provided by Linn indicated that samples collected on July 20, 2018, were reported to have hydrogen sulfide concentrations below detection limits (1 ppm), well below permit limits of 1 grain of hydrogen sulfide per 100scf (16.5 ppm).

In addition to EUENGINE02, FGFACILITY includes an additional RICE (exempt from permitting) referred to EUENGINE03. As previously reported, EUENGINE03 was replaced by EUENGINE03A in October 2017.

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The units are included as part of the annual reporting. Reported emissions for these additional EUs are summarized below:

EUENGINE03-

Reporting Period	NOX (12-Month Rolling)	CO (12-Month Rolling)
2014	20.7 tpy	1.2 tpy
2015	22.23 tpy	1.29 tpy
2016	24.24 tpy	1.41 tpy
2017	17.98 tpy	1.04 tpy
LIMIT	NA	NA

EUENGINE03A-

Reporting Period	NOX	CO
2017	8.45 tpy	0.46 tpy
LIMIT	NA	NA

SUMMARY

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The referenced facility is a fenced and unmanned CPF station operated by Linn and is located in the NE1/4 of NW1/4 of NW ¼ of Section 35, T32N, R2E, West Central Montmorency Township. The station is reported to service Antrim Formation wells in the area. Activities onsite include separation of gas and brine from the incoming Natural Gas (NG) stream and compression of the gas in the lines.

The Facility is considered a synthetic minor with respect to criteria pollutants due to limitation of NO_x, CO through use of a catalyst. In addition, the Facility is a true minor with reference to Hazardous Air Pollutants (HAPs).

The referenced facility operates under Permit to Install (PTI) No. 199-06A, which was issued to the Facility on November 30, 2008. The PTI was issued to Samson Resources, and the Facility was later purchased by Linn. The permit application identified the maximum single HAP for the facility as formaldehyde.

At the time of initial permitting (PTI 199-06, August 1, 2006) the facility consisted of two NG-fired compressors and one glycol dehydration unit. The permittee requested a federally enforceable limit of 40 tons NO_x/year to limit emission rates to below Potential for Significant Deterioration (PSD).

Previous site inspection activities were conducted on July 24, 2015. No violations were noted in the inspection report.

The site was operating, and the gate locked at the time of the inspection. No visible emissions were noted from any stacks associated with the Facility. Linn corporate staff answered questions regarding Facility operations.

No compliance issues were noted as part of the July 23, 2018 site visit or subsequent data review. Review of maintenance records provided appeared to poorly document activities reported by field staff, but sufficient to indicate that the facility is operating in general compliance with the PM/MAP and permit conditions.

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NAME Sharon LeBlanc

DATE 8/2/2018

SUPERVISOR 