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RECSILICON

April 19, 2024

Mr. Pat Hallinan
Washington State Department of Ecology
Water Quality Section
4601 N Monroe St
Spokane, WA 99205

Dear Mr. Hallinan,

Subject: 2024 Operations and Maintenance Manual Review

In accordance with the State Water Discharge Permit Number ST 8121 issued by the State of Washington Department of Ecology, Special Condition S4.A. Operation and maintenance, REC has conducted the annual review of their Operations and Maintenance Manual. This letter is being uploaded through the WQWebDMR. There were changes to appendix E – Scrubber Systems, there were 7 additional procedures added for our Silane plant 3&4.

REC reviews work procedures on an annual basis and the current copies are kept in electronic databases.

Best regards,



Cynthia Schultz
Health, Safety & Environmental Manager
REC Silicon LLC

Attachment.

Appendix E Scrubber Systems

Document/ Procedure #	Description	Action	Location
10-CN-18031	Metal Chloride Dryer Scrubber	Scrubber Dump	Attached
10-CN-18032	Metal Chloride Dryer Scrubber	Soft Water Recharge	Attached
10-CN-18033	Metal Chloride Dryer Scrubber	Caustic Recharge	Attached
11-CN-11100	Process Scrubber	Blowdown and Batching	Attached
11-CN-11300	Control Narrative - Warm Water System	N/A	Attached
11-CN-12100	Maintenance Scrubber	Blowdown and Batching	Attached
21-CN-13100	Control Narrative Emergency Scrubber	N/A	Attached
21-CN-14100	Silane Loading Scrubber	Operations and Blowdown	Attached
MSIP.5021	MCD Scrubber	Remove From Service	SAP
MSIP.5022	MCD Scrubber	Regeneration Drain/Fill	SAP
MSIP.5023	MCD Scrubber	Return to Service	SAP
MSIP.5024	MCD Scrubber Demister Pad	Packing and Changeout	SAP
MSIP.8000	Maintenance/Process Scrubber Macerator	Normal Operation	SAP
MSIP.8001	Maintenance/Process Scrubber Basket	Cleanout/RTS	SAP
MSIP.8061	Maintenance Scrubber	Normal Startup	SAP
MSIP.8062	Maintenance Scrubber	Emergency Shutdown	SAP
MSIP.8063	Maintenance Scrubber	Start After Emergency Shutdown	SAP
MSIP.8064	Maintenance Scrubber	Auto Regeneration	SAP
MSIP.8065	Maintenance Scrubber	Manual Regeneration	SAP
MSIP.8066	Maintenance Scrubber	Emergency Fill	SAP
MSIP.8067	Maintenance Scrubber	Shutdown/Cleanup	SAP
MSIP.8068	Maintenance Scrubber	Emergency Fill from EVS	SAP
MSIP.8069	Maintenance Scrubber	Manual Blowdown to Evap Pond #2	SAP
MSIP.8121	Process Scrubber	Manual Blowdown to Evap Pond #2	SAP
MSIP.8122	Process Scrubber	Emergency Fill From EVS	SAP
MSIP.8123	Process Scrubber	Emergency Fill	SAP
MSIP.8124	Process Scrubber	Manual Regeneration	SAP
MSIP.8125	Process Scrubber	Auto Regeneration	SAP
MSIP.8126	Process Scrubber	Emergency Shutdown	SAP
MSIP.8127	Process Scrubber	Shutdown/Cleanup	SAP

Process Finishing Column – Automatic Demister Pad Wash

Revised: 5/15/19

Printed:

Page 1 of 1

This procedure is valid for
24 hours when printed

MSIP.8142

Owner: Silane Unit
Manager

**Note: IF finishing column tank demister pad was down prerequisites are not met,
THEN refer to cause and effects.**

WHO	MAJOR STEPS	DETAILS
CRO	1. Place 11-HS-110135A in automatic	<ul style="list-style-type: none">The automatic wash down sequence will activate once per hour

-END-

**Process Finishing Column –
Manual Regeneration**

This procedure is valid for
24 hours when printed

MSIP.8141

Owner: Silane Unit
Manager

Note: IF finishing column tank drain and fill sequence prerequisites are not met, THEN refer to cause and effects.

WHO	MAJOR STEPS	DETAILS
CRO	1. OPEN 11-QV-110111	<ul style="list-style-type: none"> • Drain to HSHS EQ tank or pond #2
CRO	2. CLOSE 11-QV-110111	<ul style="list-style-type: none"> • At 28% tank level
CRO	3. OPEN 11-QV-110105 warm water makeup	
CRO	4. CLOSE 11-QV-110105	<ul style="list-style-type: none"> • At 70% tank level
CRO	5. OPEN 11-QV-110108 caustic makeup	
CRO	6. CLOSE 11-QV-110108	<ul style="list-style-type: none"> • At 80% tank level

-END-

This procedure is valid for
24 hours when printed

MSIP.8144

Owner: Silane Unit
Manager

WARNING: Finishing columns designed rating for venting Silane is 120 pounds per hour for a maximum of 3 hours (See table at end of document for maximum flow rate and temperature correlation). Only metered Silane may be vented to the process scrubber, i.e. flowmeter. IF a fire occurs, THEN an IR must be written with details of the event. Refer to COM.30.II.8.60 section 3 for reporting requirements.

WHO	MAJOR STEPS	DETAILS
FO1	1. Contact superintendent and waste water operator for permission to vent Silane to process scrubber	<ul style="list-style-type: none"> Finishing column will need to be checked for specific gravity and pH Normal specific gravity range 1.05 – 1.06 Normal pH range 13-11 Level 75% - 85% IF any of these parameters do not pass, THEN regenerate the column or add caustic to bring into proper range
CRO /FO1	2. CRO will communicate with waste water field operators that enough caustic supply is readily available for the venting activity being requested	
FO1	3. OPEN nitrogen bypass to scrubber stacks	<ul style="list-style-type: none"> Waste water operator will give permission to CRO for venting This is to inert excess H2 before leaving the stack to atmosphere
FO1	4. OPEN bypass to process scrubber	
CRO	5. CLOSE 11-PIC-110031 valve to maintenance scrubber	<ul style="list-style-type: none"> Note: Only vent through one scrubber at a time when venting Silane.
CRO	6. CRO will give permission for venting Silane	
FO1	7. Make sure valves are in the right position for the venting of Silane from desired location	<ul style="list-style-type: none"> WARNING: No additional Silane can be vented to the finishing column during

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MSIP.8144

Owner: Silane Unit
Manager

		metered venting.
CRO	8. Give instructions to all other units no Silane is allowed to be vented	<ul style="list-style-type: none"> CAUTION: Liquid Silane storage tanks must use common vent for flowmeter. Make sure all cross vented tanks are CLOSED.
CRO	9. Communicate to the waste water operator you are starting to vent Silane to the process finishing column	<ul style="list-style-type: none"> Field operator will take a grab sample from finishing column every hour during venting activities for specific gravity and pH IF any of the following conditions occur during the venting cycle, THEN all Silane venting needs to be STOPPED and the finishing column needs to be regenerated Refer to tables below for maximum Silane venting rates and maximum time between regens Specific gravity rises above 1.13 or pH drops to 10.5
CRO /FO1	10. Communicate with field operators to make sure valve positions are correct	<ul style="list-style-type: none"> Common vent for LSST is manually lined up All other LSST not venting need verified vent FV is CLOSED
CRO	11. START venting Silane by opening the common vent motor valve in 10% steps until the desired flow is met	
CRO	12. ONCE the desired lbs./hr. is met, THEN set the common vent motor valve in AUTO with desired lbs./hr. set point	
CRO	13. ONCE the allowed venting time is reached, THEN CLOSE vent valve	<ul style="list-style-type: none"> Or specific gravity reaches 1.13 or higher Or pH reaches 10.5 or lower

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MSIP.8144

Owner: Silane Unit
Manager

CRO	14. Communicate to field operators venting has stopped and column needs regenerated	
CRO	15. Repeat steps 1-13 until venting is complete	
FO1	16. CLOSE nitrogen bypass to scrubber stacks at the end of venting	

STEP ONE: Maximum Silane Venting Rates – Finishing Column Temperature Dependent

Caustic Solution Temperature [Degrees F]	Maximum Silane Venting Rate [lbs. /hr.]
120-140+	120
100-120	70
80-100	40
Below 80	Not Recommended

STEP TWO: Maximum Time Venting Before Regenerating for Different Venting Rates

Silane Vent Rate [lbs. /hr.]	Maximum Time Venting [HH:MM]
120	2:30
110	2:43
100	3:00
90	3:20
80	3:45
70	4:17
60	5:00
50	6:00
40	7:30

Process Finishing Column – Venting Silane

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MSIP.8144

Owner: Silane Unit
Manager

30	10:00
20	15:00
10	30:00
5	60:00

-END-

This procedure is valid for
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MSIP.8145

Owner: Silane Unit
Manager

CAUTION: Do not vent light chlorosilanes (DCS and MCS) and Silane to the process vent header when the finishing column is out of service. This will prevent the possibility of a fire at the process scrubber stack outlet.

WARNING: The process finishing column liquid has a Ph of 10.5 to 13.0. Use caution when handling or working around the liquid. The temperature of the liquid will be approximately 110 deg. F.

WHO	MAJOR STEPS	DETAILS
FO1	1. Make sure nitrogen sweep to the maintenance scrubber stack is in service	<ul style="list-style-type: none"> Read local flow at FI-0011
CRO	2. Make sure process vent header flow is diverted to the maintenance scrubber	
CRO	3. OPEN PV-110031	<ul style="list-style-type: none"> To the maintenance scrubber
CRO	4. CLOSE HV-110045	<ul style="list-style-type: none"> To the process scrubber
FO1	5. CLOSE three nitrogen purge block valves	<ul style="list-style-type: none"> Downstream of FI-0086
FO1	6. CLOSE 1.5 inch block valve upstream of QV-0108	<ul style="list-style-type: none"> Sodium hydroxide to the process finishing column
FO1	7. OPEN molecular seal drain	
FO1	8. CLOSE two 16" butterfly valves	<ul style="list-style-type: none"> Between the process scrubber to the finishing column
CRO	9. OPEN QV-110111 finishing column blowdown valve to the HSHS EQ tank	<ul style="list-style-type: none"> Initiate demister backwash during the drain and fill Run level down to low low 7% (pump trip)
CRO	10. CLOSE QV-110111 finishing column blowdown valve to the HSHS EQ tank	

Process Finishing Column- Removal from Service

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4/19/24 5/15/19
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This procedure is valid for
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MSIP.8145

Owner: Silane Unit
Manager

CRO	11. OPEN warm water make up valve QV-0105	<ul style="list-style-type: none"> Fill the process finishing column to 50% level
CRO	12. CLOSE warm water make up valve QV-0105	
FO1	13. START the process finishing column recirculation pump	<ul style="list-style-type: none"> Have the CRO enable the pump
CRO	14. Circulate for 30 minutes	<ul style="list-style-type: none"> Note: Check Ph IF it is between 8 and 9, THEN it is good to proceed. IF not, THEN repeat step 9 through 13 until the Ph is in range.
CRO	15. OPEN QV-110111 finishing column blowdown valve to the HSHS EQ tank	<ul style="list-style-type: none"> Run level down to low low 7% (pump trip)
FO1	16. OPEN low point drain valve on the process finishing column	<ul style="list-style-type: none"> Drain the remainder of the water to the scrubber pad
FO1	17. LOTO per EIP	

-END-

Process Finishing Column – Return to Service

This procedure is valid for
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MSIP.8146

Owner: Silane Unit
Manager

CAUTION: Inspect equipment, vessel, and piping to make sure that all work is complete. Ensure all personnel that have signed onto the master tag are signed off and that all maintenance locks have been removed.

WHO	MAJOR STEPS	DETAILS
FO1	1. Clear the master tag	<ul style="list-style-type: none"> Remove all locks and tags
FO1	2. Make sure the valve lineup is correct	
CRO	3. OPEN QV-0105 (warm water make-up valve to finishing column tank)	<ul style="list-style-type: none"> Fill to 30% level as indicated by LI-0098A
FO1	4. START finishing column circulation pump	<ul style="list-style-type: none"> Request an enable from the CRO
CRO	5. OPEN QV-0108 (sodium hydroxide addition to the finishing column tank)	<ul style="list-style-type: none"> Add 15% level to the finishing column as indicated by LI-0098A
CRO	6. OPEN QV-0105 to complete filling the finishing column	<ul style="list-style-type: none"> Fill to 80 % level as indicated by LI-0098A
CRO	7. Make sure the demister pad cleaning sequence is in automatic	
FO1	8. Make sure the molecular seal drain is CLOSED	
FO1	9. CLOSE the finishing column circulation heater breaker	<ul style="list-style-type: none"> Located in MCC 10
FO1	10. OPEN FI-0086 (nitrogen purge)	
FO1	11. OPEN the three manual block valves	<ul style="list-style-type: none"> Downstream of FI-0086 (nitrogen purge)
FO1	12. OPEN two 16" butterfly manual block valves	<ul style="list-style-type: none"> Between finishing column and process scrubber

-END-

**Process Finishing Column –
Manual Demister Pad Wash**

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4/19/24 5/15/19
Page 1 of 1

This procedure is valid for
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MSIP.8147

Owner: Silane Unit
Manager

NOTE: IF finishing column tank demister pad wash down prerequisites are not met, THEN refer to cause and effects.

WHO	MAJOR STEPS	DETAILS
CRO	1. Enable 11-HS-110135B	<ul style="list-style-type: none"> • Can be initiated while 11-HS-110135A is in Automatic
CRO	2. Disable 11-HS-110135B	<ul style="list-style-type: none"> • After 5 minutes

-END-

TRAINING REPORT FORM

RECSILICON

FACILITY: Moses Lake

DATE: 12/22/23

START TIME: _____

END TIME: _____

NUMBER OF HOURS: _____

NAME OF CLASS: Operations and Maintenance Manual

COURSE CODE: Appendix E Procedure List Update &

NOTES: MSIP.8144 Process Finishing Column - Venting Silane (Procedure Redline)

INSTRUCTOR(S): Roberto Hernandez
Instructor Signature

LOCATION & METHOD OF TRAINING: (select those that apply)

- CLASSROOM DEMONSTRATION SLIDE VIDEO
- FIELD MOCK EXERCISE DVD
- OTHER: _____

	NAME (please print clearly)	WORK LOCATION	EMP. ID #	SIGNATURE
1	Allen Dodgen	Silane	515	<i>Allen Dodgen</i>
2	Andre Fickler	Silane	533	<i>Andre Fickler</i>
3	TREY BAYBORS	SILANE	593	<i>Trey Baybors</i>
4	Chris Fuller	Silane	205644	<i>Chris D. Fuller</i>
5	Brian Whitehead	Silane	205672	<i>Brian Whitehead</i>
6	Charles Ward	Silane	205605	<i>Charles Ward</i>
7	Shawn Bowen	"	703	<i>Shawn Bowen</i>
8	DOUG SHELTON	SILANE	1044	<i>Doug Shelton</i>
9	BRANDON HUNTER	SILANE	957	<i>Brandon Hunter</i>
10	DJ Henderson	Silane	205316	<i>DJ Henderson</i>
11	Ishton Michelbeck	Silane	205701	<i>Ishton Michelbeck</i>
12	Nathan Bill	Silane	205718	<i>Nathan Bill</i>
13	Kodi Nierson	Silane	205320	<i>Kodi Nierson</i>
14	Garrett Crew	Silane	205696	<i>Garrett Crew</i>

RETURN COMPLETED FORMS TO THE TRAINING DEPARTMENT, TO COMPLETE THE DOCUMENTATION PROCESS

TRAINING REPORT FORM

RECSiLICON

	NAME (please print clearly)	WORK LOCATION	EMP. ID #	SIGNATURE
15	Jake Thomas	Silane	205632	[Signature]
16	Mike Dillman	Silane	339	[Signature]
17	Bryce Martinez	Silane	205678	[Signature]
18	Trinidad Pua - Deajar	Silane	205676	[Signature]
19	Geo DeLeon	Silane	717	[Signature]
20	Mike Shiffin	Silane	205704	[Signature]
21	Natun Alvarado	Silane	205737	[Signature]
22	James Alanis	Silane	205652	[Signature]
23	Lenny Serrano	Silane	205263	[Signature]
24	Steve Miller	Silane	205625	[Signature]
25	Bradly Ihsiz	Silane	205677	[Signature]
26	Paul T. Lee	Silane	939	[Signature]
27	Hyrum Hyman	Silane	1249	[Signature]
28	Jose Espinoza	Silane	1152	[Signature]
29	PAUL KOSTERKO	Silane	205631	[Signature]
30	Alex Coera	Silane	1250	[Signature]
31	Jessy Buchmann	Silane	205695	[Signature]
32	ERIC BANNER	Silane	984	[Signature]
33	Frankie Meza	Silane	205659	[Signature]
34	Seth Alvarado	Silane	205618	[Signature]
35	Anthony Longmire	Silane	205707	[Signature]
36	Abel Mendez	Silane	205755	[Signature]
37	Tacy Vanderschuer	Silane	205695	[Signature]
38	De Grijp Jr	Silane	688	[Signature]
39	Stephen Jensen	Silane	205636	[Signature]
40	Ed Romo-Ruiz	Silane	991	[Signature]
41	Edy Shipley	Silane	1339	[Signature]
42	Glen Miller	Silane	205641	[Signature]
43	Krist Devine	Silane	319	[Signature]
44	Alton Coleman	Silane	205620	[Signature]
45				

RETURN COMPLETED FORMS TO THE TRAINING DEPARTMENT, TO COMPLETE THE DOCUMENTATION PROCESS