

k Komatsu Silicon America, Inc.	PW2, 3, And 4 Process Area Long Term Shut Down	Procedure Number: HVAC.0003
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A. Purpose

The purpose of this procedure is to shut down the PW2, 3, and 4 process area air handling systems for a long term outage. The make up air handling systems and exhaust systems are backed down first, followed by the recirculation systems. Pressurization and a one half air change per hour ventilation rate are maintained operating 3MAU101-2-1. The subfloor area exhaust fans remain in operation to assure the required ventilation rate is maintained through the Fab and the subfloor area. One exhaust fan on each of the acid scrubbers will also be operated at minimum speed to assure that the required ventilation rate is maintained below the PW2 subfloor and in the subfloor space below the acid room in PW4. The second make up air handling unit associated with this area (2MAU101-1-3) will be shut down. The manual dampers that cross connect this unit with 2 MAU101-1-2 will be opened to allow this unit to serve both duct systems

The first step of this procedure placards the PW2, 3, and 4 area and locks the doors to limit access. All access with they systems in this mode will require a Facilities Tie-in Permit (FTP),a Construction Incident Prevention Plan (CIPP), and/or Environmental Health And Safety (EHS) approval. An oxygen monitor will be required for entry. Entry for other than inspection purposes; i.e. to do work in the space, will require that the systems be restarted to minimize contamination. System restart is covered by a separate procedure. EH&S has developed a procedure to cover entry.

The general concept for ventilation and pressurization during the long term shut down is that 3MAU101-1-2 will be used to pressurize the supply duct systems. Operation of the equipment that exhausts the subfloor and exfiltration will be used to provide the required one half air change per hour with a uniform distribution through out the Fab and a flow pattern from the ceiling down through the floor. For this to happen, it will be necessary to disconnect and open the smoke dampers on the discharge of the units on the North side of the Fab. It will also be necessary to manually close the return dampers at the recirculation units to prevent the make up air from back flowing into the Fab through the sub floor. The final MAU speed setting will be determined by what is required to provide one half air change or to keep the Fab pressurized to .01 or .02 inches w.c.; which ever turns out to be the governing factor.

The air change rate was agreed to with the City as a rate that will provide sufficient dilution of any gas that leaks from the pressurized gas lines. A sudden rupture of a line could still cause a local concentration of gas that would be dangerous, which is why wearing an Oxygen monitor is required for entry into the Fab after it is shut down.

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If you study the air flow diagrams and compare them to the actual sheet metal drawings, you will discover that there are 10 large manual volume dampers that are shown in the return systems on the air flow diagrams that are not actually installed. For this reason, not all of the recirculation systems can be shut down; some locations keep one recirculation unit running to be sure the make up air is picked up and injected into the Fab instead of back-flowing down the return system into the subfloor. If these dampers are subsequently installed, we modify this procedure and shut down these units.

Completion of this procedure will significantly reduce the Fab operating costs during the shutdown. At 1998 energy rates we can potentially save \$12,000 to \$15,000 per month by shutting down these systems. (This cost is in comparison to the operating costs associated with running the systems for production.)

B. References And Supporting Information

Drawings - The following drawings depict the duct systems, air handling equipment, and fans associated with the PW2,3, and 4 Fab area.

Make up and supply air systems – These drawings are on the Archive or N: drive in the TKS folder under the hv subfolder.

C3HV1-B through D, C3HV1-F through H, C3HV2-B through D, C3HV2-F through H, C3HV3-B through D, C3HV3-F through H.

Process exhaust systems – These drawings are on the Archive or N: drive in the TKS folder under the he subfolder.

C3HE1-F through H, C3HE2-B through D, C3HE2-F through H.

Air Flow Diagrams – These drawings are on the Archive or N: drive in the TKS folder under the K-Drawings subfolder.

K3H-8002 through 8006, K3H-8011, through 8014.

General Fab Ventilation Concept Schematic Diagram – The Drawing Ventilation Plan located on the public drive in the Dave Sellers Shared Stuff subfolder illustrates the ventilation plan schematically.

The following systems and/or equipment will be affected or shut down by this procedure.

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1. Make up air handling units 3MAU101-1-2 and 3MAU101-1-3.
2. The VOC scrubber and its associated exhaust fans 3EF146-1-1, 3EF146-1-2, 3EF1436-1-3, and 3EF146-1-4.
3. The Ammonia scrubber and its associated exhaust fans 3EF149-1-1 and 3EF149-1-2.
4. The PW Acid Scrubber #1 and its associated exhaust fans 3EF133-1-1, 3EF133-1-2, and 3EF133-1-3.
5. The PW Acid Scrubber #2 and its associated exhaust fans 3EF133-2-1, 3EF133-2-2, and 3EF133-2-3.
6. The PW NOx Scrubber and its associated exhaust fans 3EF143-1-1 and 3EF143-1-2.
7. The PW CVD Exhaust Scrubber and its associated fans 3EF144-1-1 and 3EF144-1-2.
8. The #2 PW process general exhaust fans 3EF132-2-1, 3EF132-2-1, and 3EF132-2-3.
9. The #3 PW process general exhaust fans 3EF132-3-1, and 3EF132-3-2.
10. The PW3 subfloor exhaust fans 3EF131-10-4 and 3EF131-10-5.
11. Recirculation fans 3RAH102-1-7 through 3RAH102-1-43.

A. Prerequisites

The following items are required to perform this procedure.

1. It will be easiest to do this procedure with four operators, electricians or engineers with radios during the actual shut down process. This will allow for one person to work at the MAU (Make up Air handling Unit) locations while a second person works at the exhaust fan locations and a third person works at the Fab to monitor the static pressure. The forth person would work at the control room to issue commands and verify responses from the CMS (Central Monitoring System) and CCS (Commercial Control System or UltiVist). If four people are not available, then the

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procedure can be done with as few as 2 people, but a lot more running around will be required. The preliminary work associated with getting ready for the shut down can be accomplished by one or two people.

2. Shortridge pressure measurement instrument so that Fab pressure can be verified.
3. Red, laminated warning signs for all doors on PW2, 3, and 4.
4. Socket wrench and ratchet for setting the econo-disks on units where we need to make a flow adjustment.
5. A harness and lanyard to allow you to tie off for access to a volume damper in the interstitial area over PW4.

A. Precautions

The following precautions need to be taken while performing this procedure.

1. Protective equipment as required for work in and around the scrubbers.
2. Exercise caution while shutting down fans and changing fan speeds to assure that the Fab area is always held positive in relationship to the surrounding areas. This will assure that contamination of the fab during the procedure is minimized.
3. Tie-off as required to go out on the steel over PW-4 when adjusting the volume damper in the return system associated with 3RAH012-1-43.

E. Procedure

Initial each step as complete and indicate the date and time. All systems should be shut down using commands from the CMS and UltiVist if possible. Once the systems are shut down, the selector switches at the starters, drives, or control panels should be placed in the Off position. If a command fails from the CCS or CMS proceed with the shutdown work by using the local selector switches and controls. Note the problem and submit a work correct to have it corrected at a later date.

4. Verify that the fire shutters on all of the pass-through openings in the PW2, 3, and 4 Fabs are open. This is necessary to assure that the ventilation air is uniformly distributed through the Fab during the idle period.

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Completed by: _____ Date: _____ Time: _____

5. Open and lock open the automatic door between visual inspection and etching. This is necessary to assure that some ventilation air flows through the etching area.

Completed by: _____ Date: _____ Time: _____

6. Verify that subfloor exhaust fans 3EF131-10-4 and 3EF131-10-5 are in good operating condition and are in operation. These fans will remain in operation through-out the shut down to help assure that the minimum one half air change ventilation rate is maintained in the Fab.

Completed by: _____ Date: _____ Time: _____

7. Verify the proof of operation signals from 3EF131-10-4 and 3EF131-10-5. Alarms should be generated at the CMS if these fans are commanded on and fail to run.

Completed by: _____ Date: _____ Time: _____

8. Place the laminated red warning placards on all entrances to the PW2, 3, and 4 Fab and lock all of the doors. The preferred location for these placards is taped to the glass on the inside of the door so that they can be read from the outside through the glass. On doors not equipped with glass, tape the signs to the door with double sided tape on all 4 sides so they are securely fastened in place. A copy of the sign is attached at the end of this procedure. The sign should be copied on to red paper and laminated for use.

Completed by: _____ Date: _____ Time: _____

9. Set up the Shortridge pressure instrument to monitor the pressure between the PW2, 3, and 4 Fab and the corridor. Connect the high port to one port on the small diameter pitot tube and leave the low port vented to atmosphere. Slide the pitot tube under the door sweep so that it is inserted into the Fab at the location you want to monitor. Turn the Shortridge on and set it into the "Differential Pressure" mode and "Auto" so that it continuously takes and displays pressure readings. Set up to take the initial reading at the double doors labeled "Visual Inspection" in the north corridor between column lines J and K.

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Completed by: _____ Date: _____ Time: _____

10. Shut down the Ammonia Scrubber System – Fans 3EF149-1-1 and 3EF149-1-2. If more than one fan is operating, shut down one fan at a time. After each fan is shut down, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-2 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds. After both exhaust fans have been shut down work can proceed on shutting down the Ammonia scrubber itself. This is covered by a separate procedure.

Completed by: _____ Date: _____ Time: _____

11. If all other areas that use the VOC scrubber system are shut down, then shut down the VOC Scrubber System – Fans 3EF146-1-1, 3EF146-1-2, and 3EF146-1-3. If other areas that use the VOC scrubber system are still in operation, then skip this step and proceed to the next step. **Note that it will be necessary to verify the PW2, 3, and 4 Fab pressure after the other areas using the VOC scrubber are shut down and its associated fans are shut down because this system exhausts some air from the PW1 Fab.** If more than one fan is operating, shut down one fan at a time. After each fan is shut down, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-3 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds. After all 3 exhaust fans have been shut down work can proceed on shutting down the VOC scrubber itself. This is covered by a separate procedure.

Completed by: _____ Date: _____ Time: _____

12. Shut down the PW Acid Scrubber #1 System – Fans 3EF133-1-1, 3EF133-1-2, and 3EF133-1-3. If more than one fan is operating, shut down the constant speed fan and reduce the speed of the variable speed fan to 5 hz. We will run the variable speed fan at 5 hz during the time the plant is idle to assure that the subfloor under the PW2 etching and cleaning area is ventilated. After the constant speed fan is shut down and the variable speed fan is running at minimum speed, check the Fab

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pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-2 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds. After both exhaust fans have been shut down work can proceed on shutting down the Acid scrubber itself. This is covered by a separate procedure.

Completed by: _____ Date: _____ Time: _____

13. Shut down the Acid Exhaust Scrubber #2 System – Fans 3EF133-2-1 and 3EF133-2-2. If more than one fan is operating, shut down the constant speed fan and reduce the speed of the variable speed fan to 5 hz. We will run the variable speed fan at 5 hz during the time the plant is idle to assure that the subfloor under the PW4 Acid Room is ventilated. After the constant speed fan is shut down and the variable speed fan is running at minimum speed,, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-3 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds. After both exhaust fans have been shut down work can proceed on shutting down the Acid scrubber itself. This is covered by a separate procedure.

Completed by: _____ Date: _____ Time: _____

14. Shut down the NOx Scrubber #2 System – Fans 3EF143-1-1 and 3EF143-1-2. If more than one fan is operating, shut down one fan at a time. After each fan is shut down, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-2-1 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds. After both exhaust fans have been shut down work can proceed on shutting down the NOx scrubber itself. This is covered by a separate procedure.

Completed by: _____ Date: _____ Time: _____

15. Shut down the CVD Exhaust Scrubber System – Fans 3EF144-1-1 and 3EF144-1-2.

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If more than one fan is operating, shut down one fan at a time. After each fan is shut down, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-3 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds. After both exhaust fans have been shut down work can proceed on shutting down the mist scrubber itself. This is covered by a separate procedure.

Completed by: _____ Date: _____ Time: _____

16. Increase the fan speeds for any operating fans on 3MAU101-1-2 until the fab static pressure at the Visual Inspection doors is between .10 inches.w.c. and .15 inches w.c. If two fans are running, shut down one fan and increase the speed of the other fan to pick up the load as required based on the Fab static pressure reading. Record the fan speed that gives you a Fab static pressure of between .10 to .15 inches w.c. Fan speed - _____ hz Fab pressure - _____ in.w.c.

Completed by: _____ Date: _____ Time: _____

14. Gradually open the volume dampers where the discharge of 3MAU101-1-2 and 3MAU101-1-3 come together. These dampers are located on the North mechanical mezzanine over 3RAH102-1-43 near column line Y2 and can be found on drawing C3HV2-D. When you open these dampers, the 2 MAUs will be placed in parallel. There will probably be a pressure fluctuation in the Fab and it is more than likely that one MAU will assume the load.

Completed by: _____ Date: _____ Time: _____

1. Shut down the fans in 3MAU101-1-3. Adjust the fan speeds on 3MAU101-1-2 as required to keep the Fab static between .02 inches w.c. and .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds.

Completed by: _____ Date: _____ Time: _____

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2. Verify that the outdoor air dampers, backdraft dampers, humidifier valve and chilled water valve associated 3MAU101-1-3 all close after the fans are off.

Completed by: _____ Date: _____ Time: _____

3. Shut down the #2 PW General Process Exhaust System – Fans 3EF132-2-1, 3EF132-2-2, and 3EF132-2-3. If more than one fan is operating, shut down one fan at a time. After each fan is shut down, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-2 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds.

Completed by: _____ Date: _____ Time: _____

4. Shut down the #3 PW General Process Exhaust System – Fans 3EF132-3-1 and 3EF132-3-2. If more than one fan is operating, shut down one fan at a time. After each fan is shut down, check the Fab pressure relative to the corridor and reduce the speed of the fans on 3MAU101-1-2 as required to keep the Fab pressure above .02 inches w.c. but below .15 inches w.c. If there are 2 MAU fans running than reduce the speed of both fans the same amount and at the same time. Both fans should be running at the same speed at all times except when actual changes are being made to the fan speeds.

Completed by: _____ Date: _____ Time: _____

5. To achieve the required one half air change per hour in PW1, 2, and 3, we will need to bring in about 15,000 cfm through 3MAU101-1-2. This means that the minimum acceptable flow rate, as indicated on the photohelic at the unit will be 15,000 cfm. If there are two fans running on 3MAU101-1-2, then shut down one fan and adjust the speed of the other fan to achieve this flow rate. Record the fan speed and pressure that this provides in the Fab (continue measuring the pressure at the double doors to the Visual Inspection Area in the North Corridor). Fan speed (hz) - _____ Fab pressure (inches w.c.) - _____

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Completed by: _____ Date: _____ Time: _____

6. If the Fab static pressure measured at the Visual Inspection Area double doors is not a steady .02 inches w.c. or more with 15,000 cfm coming in through the MAU, increase the speed of the MAU fan until the indicated pressure is steady at .02 inches w.c. Record the fan speed and flow rate that provide this condition. Fan speed (hz) - _____ MAU flow rate (cfm) - _____

Completed by: _____ Date: _____ Time: _____

7. Measure the PW1 Fab static pressure at the door in the North West corner of the PW1 fab across from the door to the North Mezzanine stairs. If this pressure is at least a steady .005 inches w.c. proceed to the next step. If the pressure **is not** a steady .005 inches w.c. at the PW1 Fab door, increase the speed of the fan in 3MAU101-1-2 until this condition is reached. Record the fan speed, flow rate and Fab pressure at the double doors to Visual Inspection in this operating mode. Fan speed (hz) - _____ MAU flow rate (cfm) - _____

Completed by: _____ Date: _____ Time: _____

8. Shut down 3RAH102-1-7, the recirculation systems associated with the PW2 etching and cleaning area. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off.

Completed by: _____ Date: _____ Time: _____

9. Shut down recirculation system 3RAH102-1-8 associated with the PW2 Wafer Heat Treatment (WHT) area. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off. Recirculation system 3RAH102-1-14 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

Completed by: _____ Date: _____ Time: _____

10. Shut down recirculation systems 3RAH102-1-10 through 13 associated with the

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PW2 Visual Inspection Area. As each unit is shut down, verify that:

- the chilled water valve closes
- the discharge smoke damper closes
- the status indication changes to off after the fan goes off

Check off each unit as it is shut down.

3RAH102-1-10 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-11 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-12 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-13 (PW North Mezzanine) By: _____ Date: _____ Time: _____

3RAH102-1-9 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

1. This step reduces the flow on 3RAH102-1-9 and 3RAH102-1-14 to the minimum required to move the ventilation air we are supplying plus a slight safety factor. This is accomplished using the VFD on 2RAH102-1-9 and using the econo-disk on 3RAH102-1-14.

The econo-disk is a flow control device that is fitted in the eye of the fan wheel. It moves in and out and essentially varies the width of the wheel, thereby changing the fan's capacity. On our recirculation systems it is adjusted manually using a socket wrench. The adjustment is located under a round access port that has a yellow label over it and a screw in the center. Remove the access port by loosening the screw and then sliding the access port out of the hole. The arrangement is similar to a toggle bolt. To operate the econo-disk, put the socket wrench on the adjusting nut and gradually turn the nut as required to change the air flow.

Document the current speed setting of 3RAH102-1-9. Current 3RAH102-1-9 speed setting = _____.

Place an index mark on the econo-disc adjustment nut of 3RAH102-1-14 prior to making adjustments. Keep track of the number of turns of adjustment and the direction of adjustment and document them at the end of this step.

Adjust the air flow for these systems as follows. Crack open the filter access

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doors on 3RAH102-1-9 and 3RAH102-1-14. Gradually and simultaneously, reduce the speed of 3RAH102-1-9 (via the VFD) and the 3RAH102-1-14 flow rate (via the econo-disk) until air just starts being blown out of the units at the filter access doors rather than being drawn into the units. Then increase the speed of 3RAH102-1-9 by 2 hz and increase the flow of 3RAH102-1-14 by 2 turns.

The variable speed drives can be safely operated down to 5 hz with the type of fan and motor combination we have in the RAHs. If you get to 5 hz on 3RAH102-1-9 before air starts being blown out of the unit access doors, then stop. We can reduce the recirculation rate no further. Similarly, if the econo-disk for 3RAH102-1-14 goes fully closed before air is blown out the access door, then stop and open the disc up 2 turns. We can reduce the flow no further.

3RAH102-1-14 econo-disk adjustment = _____ turns in the _____ direction (clockwise or counter clock wise).

Completed by: _____ Date: _____ Time: _____

2. Shut down recirculation system 3RAH102-1-17 associated with the Mounting Area. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off. Recirculation system 3RAH102-1-16 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

Completed by: _____ Date: _____ Time: _____

3. Shut down recirculation systems 3RAH102-1-19 and 3RAH102-1-20 associated with the PW3 Polishing Area. As each unit is shut down, verify that:

- the chilled water valve closes
- the discharge smoke damper closes
- the status indication changes to off after the fan goes off

Check off each unit as it is shut down.

3RAH102-1-19 (PW South Mezzanine) By: _____ Date: _____ Time: _____

3RAH102-1-20 (PW South Mezzanine) By: _____ Date: _____ Time: _____

3RAH102-1-18 is also associated with this area, but must remain on line to assure

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that the ventilation air is properly distributed while the plant is idle.

1. This step reduces the flow on 3RAH102-1-15 (PW3 Polishing Slurry Room), 3RAH102-1-16 and 3RAH102-1-18 to the minimum required to move the ventilation air we are supplying plus a slight safety factor. This is accomplished using the VFDs on 2RAH102-1-16 and 18 and using the econo-disk on 3RAH102-1-15.

The econo-disk is a flow control device that is fitted in the eye of the fan wheel. It moves in and out and essentially varies the width of the wheel, thereby changing the fan's capacity. On our recirculation systems it is adjusted manually using a socket wrench. The adjustment is located under a round access port that has a yellow label over it and a screw in the center. Remove the access port by loosening the screw and then sliding the access port out of the hole. The arrangement is similar to a toggle bolt. To operate the econo-disk, put the socket wrench on the adjusting nut and gradually turn the nut as required to change the air flow.

Document the current speed setting of 3RAH102-1-16 and 18. Current 3RAH102-1-16 speed setting = _____. Current 3RAH102-1-18 speed setting = _____.

Place an index mark on the econo-disc adjustment nut of 3RAH102-1-15 prior to making adjustments. Keep track of the number of turns of adjustment and the direction of adjustment and document them at the end of this step.

Adjust the air flow for these systems as follows. Crack open the filter access doors on 3RAH102-1-15, 3RAH102-1-16, and 3RAH102-1-18. Gradually and simultaneously, reduce the speed of 3RAH102-1-16 and 18 (via the VFDs) and the 3RAH102-1-15 flow rate (via the econo-disk) until air just starts being blown out of the units at the filter access doors rather than being drawn into the units. Then increase the speed of 3RAH102-1-16 and 3RAH102-1-18 by 2 hz and increase the flow of 3RAH102-1-15 by 2 turns.

The variable speed drives can be safely operated down to 5 hz with the type of fan and motor combination we have in the RAHs. If you get to 5 hz on 3RAH102-1-16 and 3RAH102-1-18 before air starts being blown out of the unit access doors, then stop. We can reduce the recirculation rate no further. Similarly,

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if the econo-disk for 3RAH102-1-15 goes fully closed before air is blown out the access door, then stop and open the disc up 2 turns. We can reduce the flow no further.

3RAH102-1-15 econo-disk adjustment = _____ turns in the _____ direction (clockwise or counter clock wise).

Completed by: _____ Date: _____ Time: _____

2. Shut down recirculation system 3RAH102-1-24 associated with the PW4 Final Cleaning Area. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off. Recirculation system 3RAH102-1-23 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

Completed by: _____ Date: _____ Time: _____

3. Shut down recirculation systems 3RAH102-1-22 and 3RAH102-1-25 through 30 associated with the PW4 Cleaning and Flatness Measuring Areas. As each unit is shut down, verify that:

- the chilled water valve closes
- the discharge smoke damper closes
- the status indication changes to off after the fan goes off

Check off each unit as it is shut down.

3RAH102-1-22 (PW South Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-25 (PW South Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-26 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-27 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-28 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-29 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-30 (PW North Mezzanine) By: _____ Date: _____ Time: _____

3RAH102-1-21 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

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1. Close the manual return volume dampers on units 3RAH102-1-26 through 27. The dampers are located at floor level over the return chase at the South end of the units. The shaft is accessible from the exterior of the unit. Run a zip screw through the slot in the crank arm into the unit casing to secure the damper in the closed position.

Check off each unit as its damper is closed.

3RAH102-1-26 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-27 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-28 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-29 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-30 (PW North Mezzanine) By: _____ Date: _____ Time: _____

2. This step reduces the flow on 3RAH102-1-21 and 3RAH102-1-23 to the minimum required to move the ventilation air we are supplying plus a slight safety factor. This is accomplished using the VFDs on these units.

Document the current speed setting of 3RAH102-1-21 and 23. Current 3RAH102-1-21 speed setting = _____. Current 3RAH102-1-23 speed setting = _____.

Adjust the air flow for these systems as follows. Crack open the filter access doors on 3RAH102-1-21 and 3RAH102-1-23. Gradually and simultaneously, reduce the speed of 3RAH102-1-21 and 23 (via the VFDs) until air just starts being blown out of the units at the filter access doors rather than being drawn into the units. Then increase the speed of 3RAH102-1-21 and 3RAH102-1-23 by 2 hz.

The variable speed drives can be safely operated down to 5 hz with the type of fan and motor combination we have in the RAHs. If you get to 5 hz on 3RAH102-1-21 and 3RAH102-1-23 before air starts being blown out of the unit access doors, then stop. We can reduce the recirculation rate no further.

Completed by: _____ Date: _____ Time: _____

3. Shut down recirculation systems 3RAH102-1-38 and 3RAH102-1-39 associated with the PW4 Clean Case Area. . As each unit is shut down, verify that:

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- the chilled water valve closes
- the discharge smoke damper closes
- the status indication changes to off after the fan goes off

Check off each unit as it is shut down.

3RAH102-1-38 (PW South Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-39 (PW South Mezzanine) By: _____ Date: _____ Time: _____

3RAH102-1-37 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

1. Shut down recirculation systems 3RAH102-1-34 through 3RAH102-1-36 associated with the PW4 Inspection C Area. As each unit is shut down, verify that:

- the chilled water valve closes
- the discharge smoke damper closes
- the status indication changes to off after the fan goes off

Check off each unit as it is shut down.

3RAH102-1-34 (PW South Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-35 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-36 (PW North Mezzanine) By: _____ Date: _____ Time: _____

3RAH102-1-33 is also associated with this area, but must remain on line to assure that the ventilation air is properly distributed while the plant is idle.

1. Close the manual return volume dampers on units 3RAH102-1-35 and 36. The dampers are located at floor level over the return chase at the South end of the units. The shaft is accessible from the exterior of the unit. Run a zip screw through the slot in the crank arm into the unit casing to secure the damper in the closed position.

Check off each unit as its damper is closed.

3RAH102-1-35 (PW North Mezzanine) By: _____ Date: _____ Time: _____
3RAH102-1-36 (PW North Mezzanine) By: _____ Date: _____ Time: _____

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2. This step reduces the flow on 3RAH102-1-33 and 3RAH102-1-37 to the minimum required to move the ventilation air we are supplying plus a slight safety factor. This is accomplished using the VFDs on these units.

Document the current speed setting of 3RAH102-1-33 and 37. Current 3RAH102-1-33 speed setting = _____. Current 3RAH102-1-37 speed setting = _____.

Adjust the air flow for these systems as follows. Crack open the filter access doors on 3RAH102-1-33 and 3RAH102-1-37. Gradually and simultaneously, reduce the speed of 3RAH102-1-33 and 37 (via the VFDs) until air just starts being blown out of the units at the filter access doors rather than being drawn into the units. Then increase the speed of 3RAH102-1-33 and 3RAH102-1-37 by 2 hz.

The variable speed drives can be safely operated down to 5 hz with the type of fan and motor combination we have in the RAHs. If you get to 5 hz on 3RAH102-1-33 and 3RAH102-1-37 before air starts being blown out of the unit access doors, then stop. We can reduce the recirculation rate no further.

Completed by: _____ Date: _____ Time: _____

3. Shut down recirculation system 3RAH102-1-41 associated with the PW4 Product Storage Area. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off.

Completed by: _____ Date: _____ Time: _____

4. Close the manual return volume damper on 3RAH102-1-41. The damper is located in the return duct on the east side of the wall east of the unit..

Completed by: _____ Date: _____ Time: _____

5. Use a permanent marker to put alignment marks on the smoke damper linkage system on the discharge smoke damper associated with 3RAH102-1-41. Loosen the linkage and disconnect it from the smoke damper crank arm. Open the smoke damper and run a zip screw through the slot in the crank arm and into the duct so that the damper is locked open. Make sure the arrangement will allow the smoke damper actuator to operate with out binding up. This step will allow the make up

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air to flow into the supply duct systems via the recirculation air handling unit with out the unit running.

Completed by: _____ Date: _____ Time: _____

6. Shut down recirculation system 3RAH102-1-42 associated with the PW4 Case Packing, Gowning Room, And Wafer Repolishing Areas. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off.

Completed by: _____ Date: _____ Time: _____

7. Close the manual return volume damper on 3RAH102-1-42. The damper is located at floor level over the return chase at the South end of the unit. The shaft is accessible from the exterior of the unit. Run a zip screw through the slot in the crank arm into the unit casing to secure the damper in the closed position.

Completed by: _____ Date: _____ Time: _____

8. Use a permanent marker to put alignment marks on the smoke damper linkage system on the discharge smoke damper associated with 3RAH102-1-42. Loosen the linkage and disconnect it from the smoke damper crank arm. Open the smoke damper and run a zip screw through the slot in the crank arm and into the duct so that the damper is locked open. Make sure the arrangement will allow the smoke damper actuator to operate with out binding up. This step will allow the make up air to flow into the supply duct systems via the recirculation air handling unit with out the unit running.

Completed by: _____ Date: _____ Time: _____

9. Shut down recirculation system 3RAH102-1-43 associated with the PW4 Inspection C Area. Verify that the chilled water valve closes, the discharge smoke damper closes, and the status indication changes to off after the fan goes off.

Completed by: _____ Date: _____ Time: _____

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10. Close the manual return volume damper on 3RAH102-1-43. The damper is located at a Y in the return duct out in the interstitial area between columns Y and Z and 4.5 and 5.7 and is difficult to access. Drawing C3HV1-D depicts the location accurately. To access it, you will need a harness and a lanyard and have to go out on the steel from the PW4 interstitial cat walk system. If you walk on any of the large rectangular ducts or the flat oval ducts, but sure to only walk near the edges. If you walk on the center of the cut, you will collapse the duct and/or pull it apart at the joints. The flat oval duct is especially prone to this failure. This damper must be closed to prevent the make up air from short circuiting into the subfloor through the return duct system..

Completed by: _____ Date: _____ Time: _____

11. Use a permanent marker to put alignment marks on the smoke damper linkage system on the discharge smoke damper associated with 3RAH102-1-42. Loosen the linkage and disconnect it from the smoke damper crank arm. Open the smoke damper and run a zip screw through the slot in the crank arm and into the duct so that the damper is locked open. Make sure the arrangement will allow the smoke damper actuator to operate with out binding up. This step will allow the make up air to flow into the supply duct systems via the recirculation air handling unit with out the unit running.

Completed by: _____ Date: _____ Time: _____

12. Take the Shortridge instrument and measure and document the Fab pressure at the following locations:

North Corridor:

- a. Visual Inspection double doors between column lines J and K; pressure = _____ inches w.c.
- b. Wafer Polishing double doors between column lines S and T; pressure = _____ inches w.c.
- c. Flatness Measuring double doors between column lines V and W; pressure = _____ inches w.c.

East Corridor:

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- d. Door to Inspection at column lines 3.2; pressure = _____ inches w.c.
- e. Product Inspection double doors between column lines 3.2 and 4.5; pressure = _____ inches w.c.

South Corridor:

- f. Product Storage door between column lines Y and Z; pressure = _____ inches w.c.
 - g. Polishing door between column lines Q and R; pressure = _____ inches w.c.
 - h. Mounting door between column lines N and P; pressure = _____ inches w.c.
 - i. Polishing Slurry door between column lines M and N; pressure = _____ inches w.c.
 - j. HT Chase door between column lines K and L; pressure = _____ inches w.c.
 - k. HT Room door between column lines K and L; pressure = _____ inches w.c.
 - l. HT Chase door between column lines J and K; pressure = _____ inches w.c.
 - m. Etching/Cleaning door between column lines H and J; pressure = _____ inches w.c.
1. If any of the measured pressures are less than .02 inches w.c., then gradually speed up the fan in 3MAU101-1-2 until all of the pressures are at least .02 inches w.c.. Re-measure and document the Fab pressure at the following locations after this adjustment is complete:

North Corridor:

- a. Visual Inspection double doors between column lines J and K; pressure =

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- b. _____ inches w.c.
Wafer Polishing double doors between column lines S and T; pressure = _____ inches w.c.
- c. Flatness Measuring double doors between column lines V and W; pressure = _____ inches w.c.

East Corridor:

- d. Door to Inspection at column lines 3.2; pressure = _____ inches w.c.
- e. Product Inspection double doors between column lines 3.2 and 4.5; pressure = _____ inches w.c.

South Corridor:

- f. Product Storage door between column lines Y and Z; pressure = _____ inches w.c.
- g. Polishing door between column lines Q and R; pressure = _____ inches w.c.
- h. Mounting door between column lines N and P; pressure = _____ inches w.c.
- i. Polishing Slurry door between column lines M and N; pressure = _____ inches w.c.
- j. HT Chase door between column lines K and L; pressure = _____ inches w.c.
- k. HT Room door between column lines K and L; pressure = _____ inches w.c.
- l. HT Chase door between column lines J and K; pressure = _____ inches w.c.
- m. Etching/Cleaning door between column lines H and J; pressure = _____ inches w.c.

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1. Document the final speed setting and flow rate for 3MAU102-1-2. Fan speed = _____ hz. Fan flow rate = _____ cfm.

Completed by: _____ Date: _____ Time: _____

2. Take the Shortridge instrument and go into the PW1 Fab. Set the Shortridge up to measure velocity with the VelProbe assembly as an input. Measure and record the velocity across the two pass through openings. Verify the dimensions of the openings when you take the readings. Relay this information to the HVAC Engineer so that he can verify that the required ventilation air change rate is being maintained. If the rate is too low, it may be necessary to further adjust the systems. If this is necessary, the HVAC engineer will direct these adjustments as a separate operation from this procedure.

SOUTH OPENING - Height _____ Width _____ Flow Velocity _____

NORTH OPENING - Height _____ Width _____ Flow Velocity _____

Completed by: _____ Date: _____ Time: _____

3. Verify that all Hand-Off-Auto Selector switches have been placed in the "Off" position.

Completed by: _____ Date: _____ Time: _____

Notes:

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50. WARNING

50. **Production Area Out of Service**

Trace chemicals and inert gases may be present

50. **Check atmosphere before entering**

50. Oxygen level must be greater than 19.5% to enter

All chemical systems are filled with nitrogen

RODI water lines are filled with nitrogen

Hydrogen gas lines are still active

50. Oxygen gas lines are still active

Argon gas lines are still active

50. Silane lines are filled with nitrogen at 90 psi

Helium gas lines are still active

For access, contact KSA Security at
844-3125

and ask for Facility Operations

**Entrance can only be made under an FTP, CIPP,
or with approval by the KSA EHS Department**