Navy Guidance and Tips for Using DOEHRS-IH Ventilation

NAVY & MARINE CORPS PUBLIC HEALTH CENTER

October 2010

Purpose

This document is a supplemental Navy guide to the DOEHRS Student Guide/User Manual Version 2.0.5.0. It provides user assistance specifically for the Ventilation System area of DOEHRS-IH deployed in October 2009. This guide includes the Ventilation System sections from the DOEHRS Student Guide/User Manual Version 2.0.5.0 (*see page 7)*, with specific guidance and comments provided by the Navy presented either in bold text or explicitly annotated. Information from both guides is presented here so the user will have all of the guidance in one location in a logical sequence.

For questions regarding this guide, users can contact Mr. Robert Edwards, CIH, Navy and Marine Corps Public Health Center, Industrial Hygiene Department, (757) 953-0736, DSN 377-0736, e-mail robert.edwards@med.navy.mil.

New Ventilation System – Overview*

The Ventilation System area in DOEHRS was developed so ventilation survey measurements could be captured and stored. Ventilation systems are created in DOEHRS and are location centric. The location name and the ventilation system name are tied together, as seen below in Figure 1-1. Note in this example the location is Building 3 and the ventilation system name is Flammable Storage Locker #1. The location Building 3 is tied to an installation, not a command. The ventilation system may consist of supply and/or exhaust components. Under the ventilation system, components of the system will be added. There are 5 component types to choose from in DOEHRS: (1) Stack, (2) Fan, (3) Air Cleaner, (4) Duct and (5) Hood/Booth. Note from the example below in Figure 1-1 for the Flammable Storage Locker #1 there are exhaust components and supply components. Each component in this case has the preceding component as its parent. The Exhaust Stack is the parent for the Fan and the Fan is the parent for the Air Cleaner, etc.

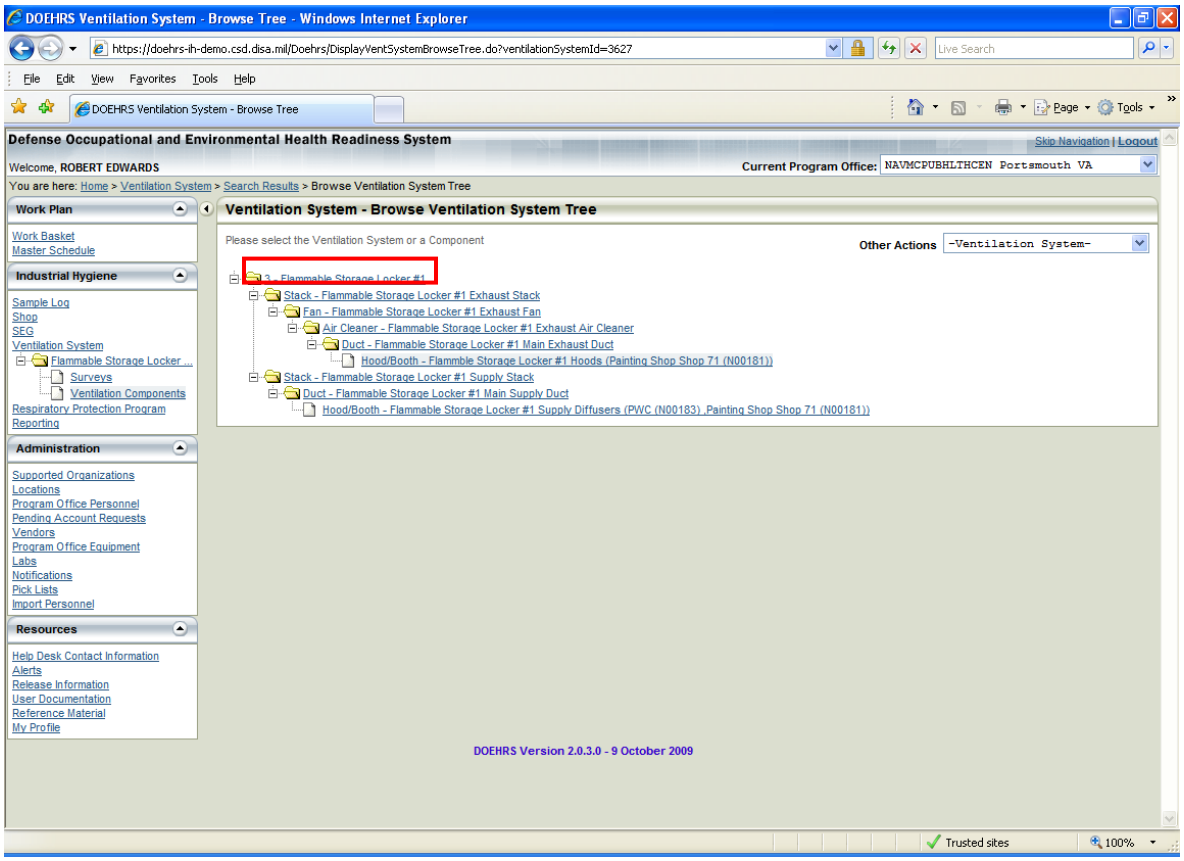


Figure 1-1. Ventilation System – Browse Ventilation System Tree

The component can be a control for a hazard(s) in a process. **<u>The control is always at the component level.</u>** Usually a Hood/Booth will be selected as the control. That same

* This section provided by Navy.

component can be a control for multiple processes and for multiple shops which may consists of multiple commands. For example a paint booth may be used to control exposures to solvents from chemical paint stripping, wipe cleaning and compressed air spray painting. This same booth may also be used by different shops that perform these processes. Personnel may elect only to enter components that are controls. However, if you plan to take measurements on a particular component, it must be added to the ventilation system first. There are preset types of survey measurements that can be performed on a component based on the component type. For Stacks and Ducts, only Pitot Traverse and Velocity Traverse measurements can be performed along with Static Pressure measurements. Fan Speed can only be captured for Fan measurements. Only Static Pressure Differential across the Air Cleaning Device can be captured for the Air Cleaner. For Hood/Booth measurements, face velocity and capture velocity measurements can be performed as well as static pressure measurements. Dilution measurements can be performed for Ducts and Hoods/Booths only. All of these measurement types will be discussed later in more detail.

Ventilation Migration/Conversion*

For each existing ventilation system in migrated data, DOEHRS created a ventilation system in the new data structure. Since the ventilation system was stored as a control, DOEHRS created a component (as a control) whose parent is the newly created ventilation system. The name of the newly created ventilation system, as well as the newly created component, was the name of the control in the existing data. When the components were created from the data migration, the component type, shape, and information as to whether the component is a supply or exhaust component is forced into the system based on the existing information about a ventilation system. All rooms with mechanical dilution would be considered "Booths." Unless duly noted, all entries would be considered "Exhaust." Booths, Boxes, Lab Hoods and slots are considered "Square/Rectangular" for shape. The location of the shop became the location of the ventilation system. However, the ventilation system may be in a different location. For each existing ventilation subsystem in DOEHRS, a component will be created (as a control). The name of the newly created component will be the name of the existing subsystem (control). Each subsystem in DOEHRS had a parent ventilation system. The parent of the newly created component (control) will be the ventilation system created as part of the ventilation system migration. For IHIMS users, when their sampling data migrates into DOEHRS, a ventilation system will be created for that process if it has ventilation as a control. Note in Figure 2-1, the location is BLDG 4E and the ventilation system and the control name is Main System.

* This section provided by Navy

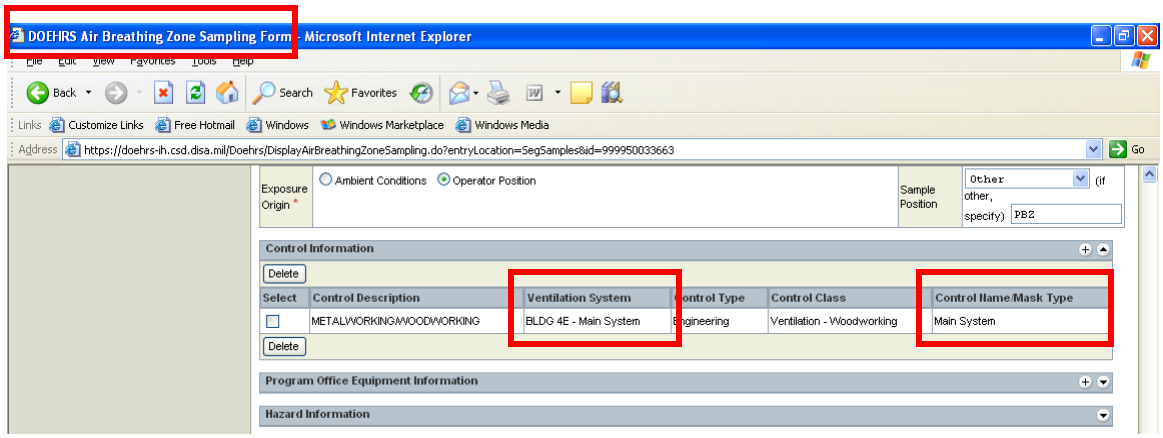
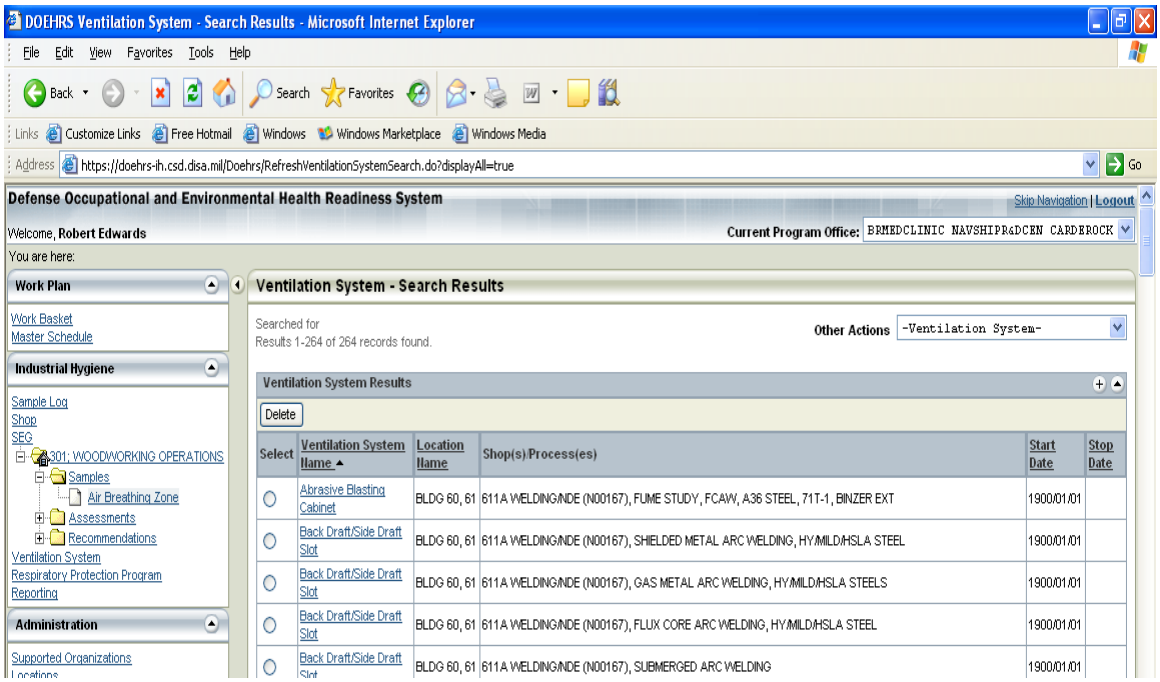


Figure 2-1. Air Breathing Zone Sampling Form

The Control Name for the ventilation control will become the name of the ventilation system for that process (Figure 2-2) and a component with that same name will be created as the control. In Figure 2-3, the Ventilation System and Control Name are Main System and the system is located in BLDG 4E. Note that there are three ventilation systems named Main System in this example due to the data migration.



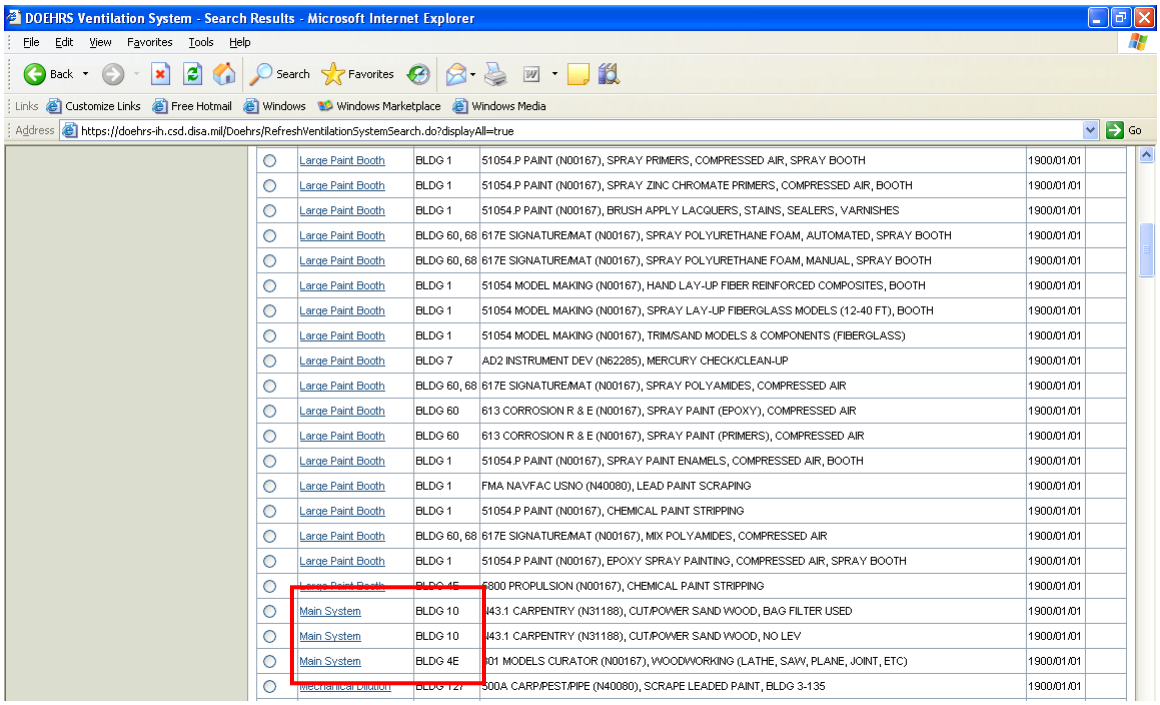


Figure 2-2. Ventilation System Name Search

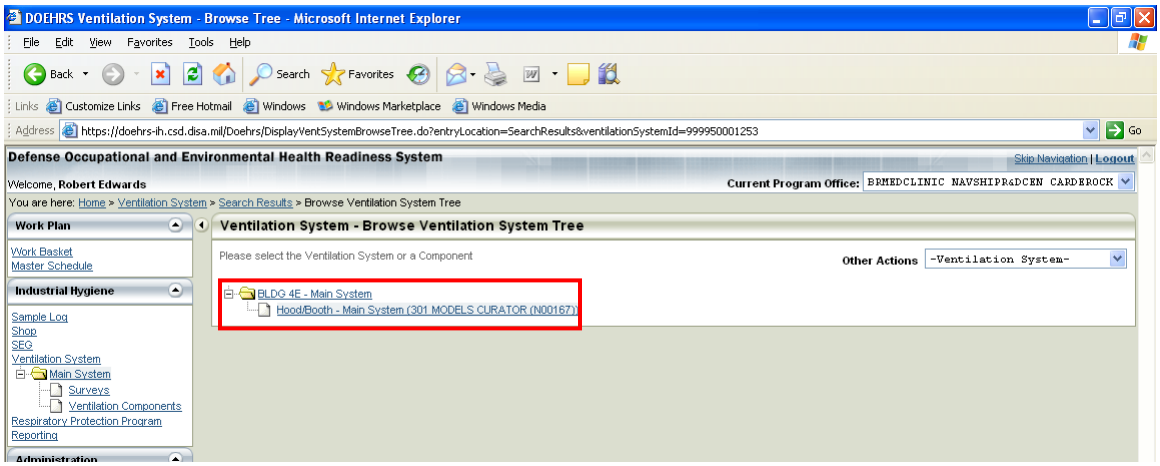


Figure 2-3. Ventilation System – Browse Ventilation System Tree

Note that a ventilation system will not be created if the system is Natural Dilution. This is because only systems with mechanical ventilation will be created since these are systems that will be measured.

A new ventilation system (Figure 2-4) with its associated component control (Figure 2-5) will be created for each shop/process where sampling data is migrated from IHIMS user's data. Note the component type will be migrated as a Hood/Booth.

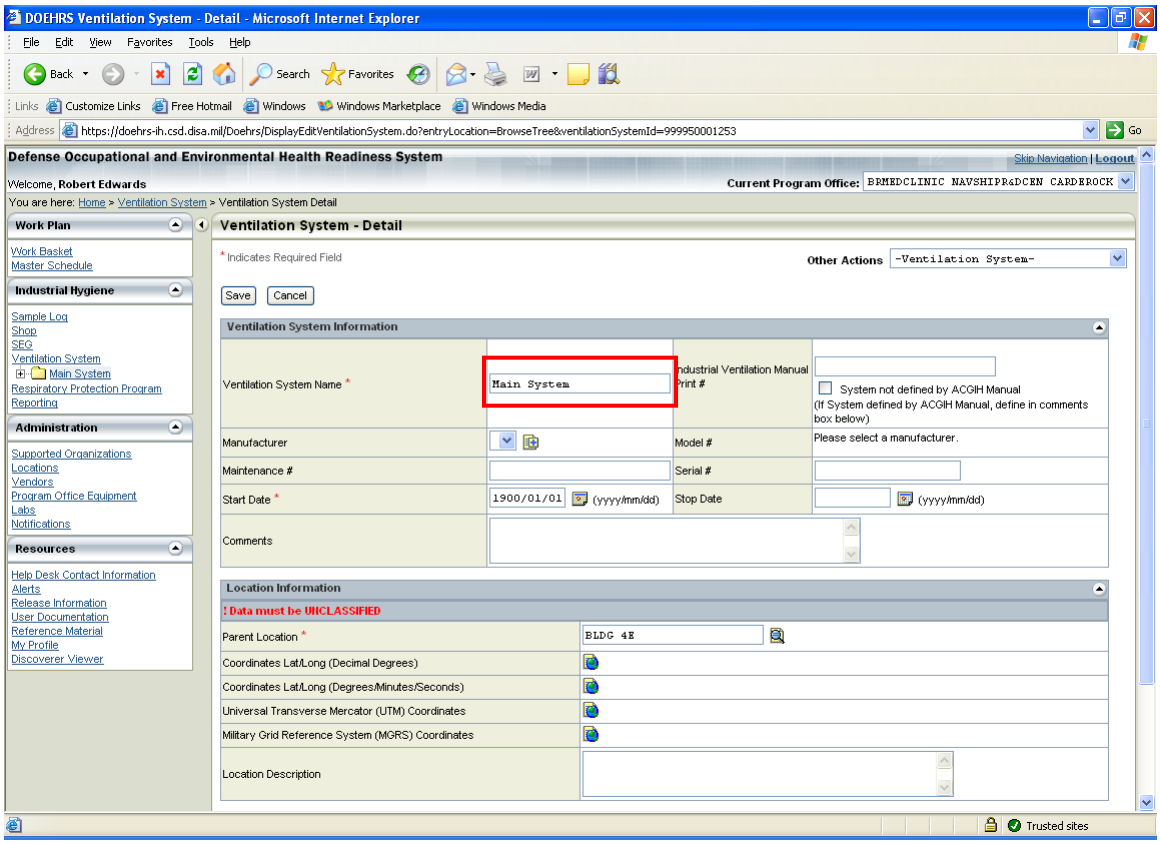


Figure 2-4. Ventilation System Detail

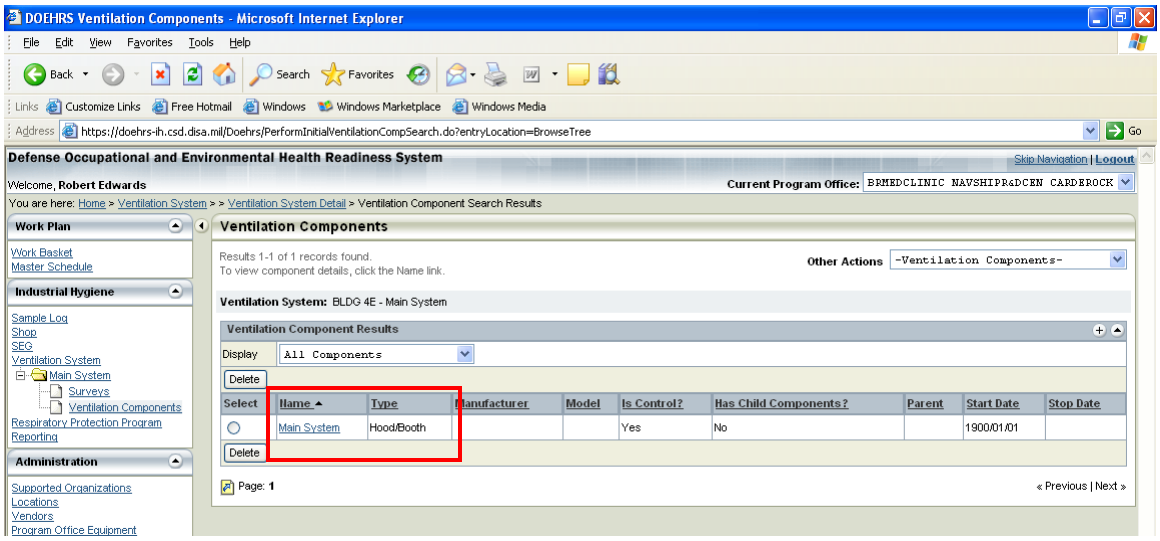


Figure 2-5. Ventilation Components

It's possible to have multiple instances of the same ventilation system. You may also have different ventilation systems with the same name and may not be able to distinguish these systems. Further, there can be more than one component associated with a system that may be a control. **Because of these uncertainties, it is recommended that these ventilation systems be stop-dated and new ventilation systems be created. Do not**

delete these systems because they may be associated with sampling data. It is recommended that these system be stop-dated at the time you are going to enter the ventilation survey measurement data into DOEHRS.

Follow the instructions below from the "DOEHRS Student Guide/User Manual Version 2.0.5.0, Chapter 12. INDUSTRIAL HYGIENE-HAZARDOUS MATERIALS (HAZMAT), HAZARDS, CONTROLS" to get started by adding a ventilation system. Starting on page 12-21, Section 12.4, VENTILATION SYSTEMS*.

12.4 VENTILATION SYSTEMS

Although ventilation systems are typically engineering controls, the ventilation system and its associated components are added separately in the DOEHRS Ventilation System area. The components may or may not be added as controls to a process hazard. The user must add the ventilation system before adding any components of the system. Ventilation components must be associated to a ventilation system. If a component is designated as a control, it must be associated to at least one shop and process. To add a ventilation system, the user will click on the Ventilation System link in the Industrial Hygiene menu tile. The user will select the 'Add Ventilation Systems' hyperlink from the bottom left corner of the Ventilation System – Search screen. (Figure 12-27)

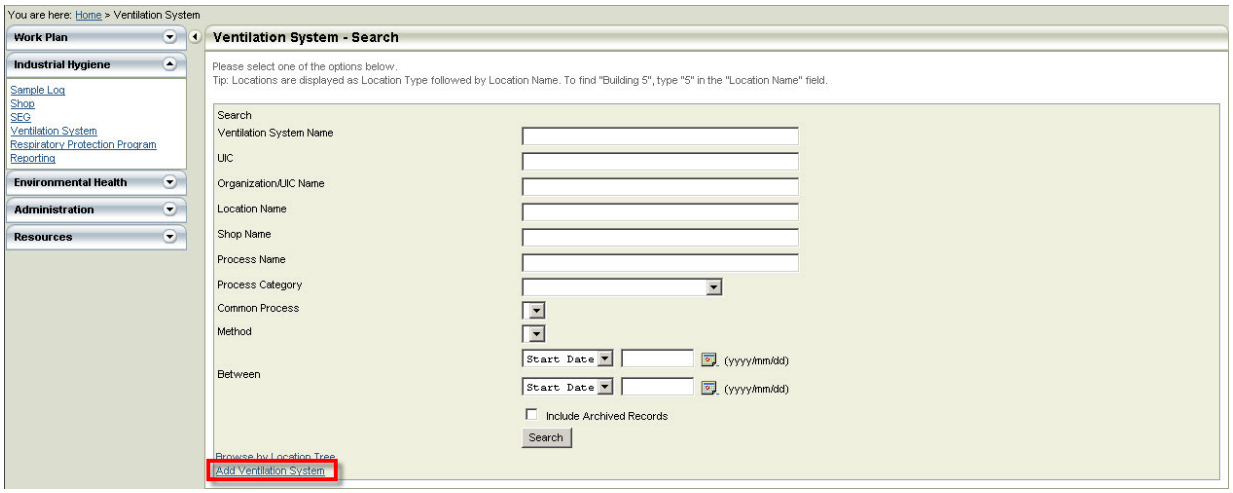


Figure 12-27. Add Ventilation System

The user will need to enter a Ventilation System Name, Start Date and select a Parent Location. (Figure 12-28)

* Note text in bold provided by Navy,

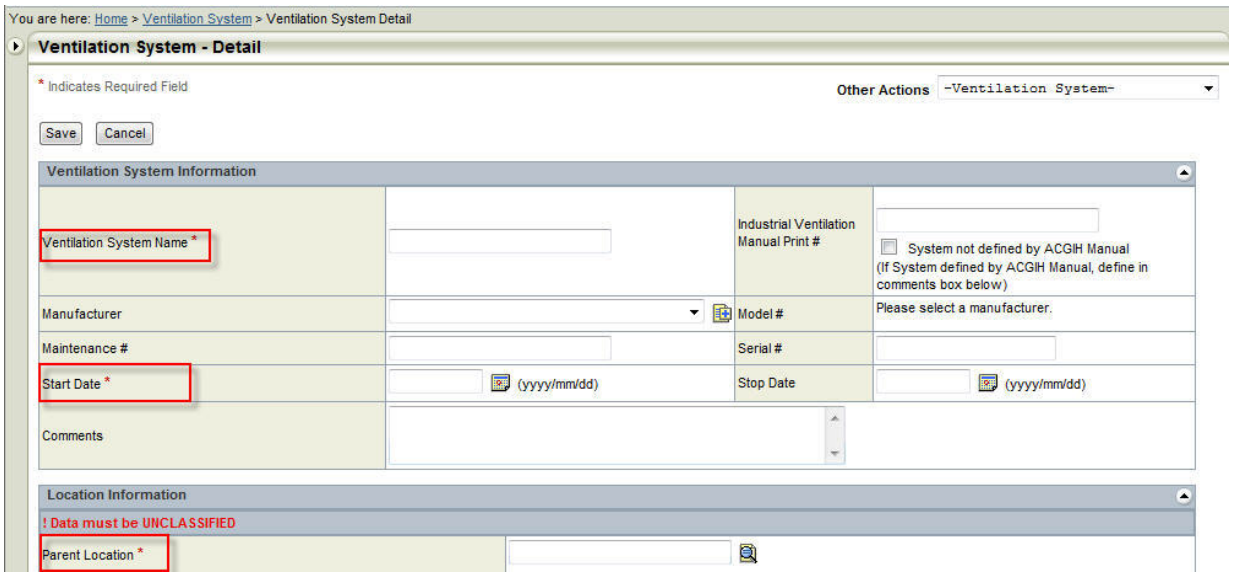


Figure 12-28. Ventilation System - Detail

The user now enters components that make up the ventilation system from the 'Other Actions' drop-down menu. User will select the desired component from the provided Ventilation Component Type drop down list and indicate if the component is a control or not. (Figure 12-29)

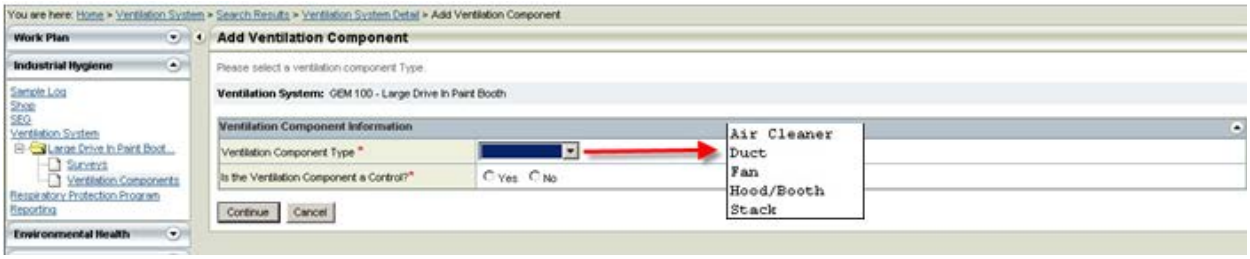


Figure 12-29. Add Ventilation Component

If the user answers yes to the control question, then the Shop will be selected and entered so that the component can be added as a control for the appropriate process or processes. (Figure 12-30)

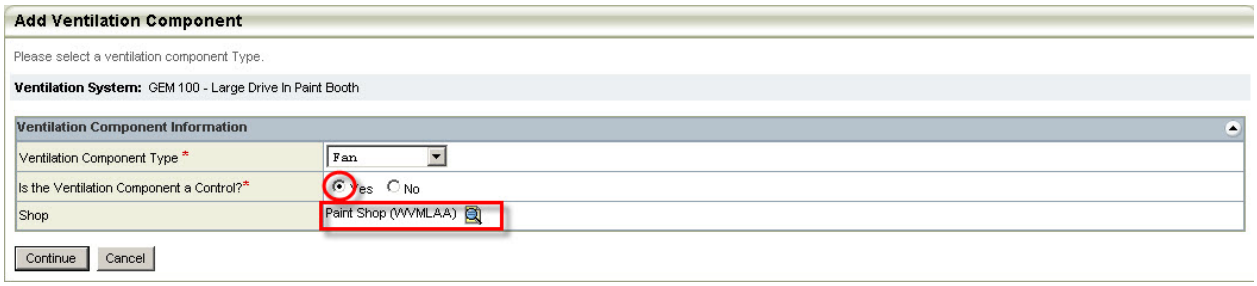


Figure 12-30. Adding the Shop

The user will complete the fields on the Ventilation Component – Detail Screen. Users must provide a unique name for each component added. They must also verify the Ventilation System and select a parent location, and enter a start date, and must also enter

values in all required fields, **including whether the component is an exhaust or supply component.** At least one process must be selected, but, the user may choose to add this control to other processes by entering a start date for them also. **(Figure 12-31)**

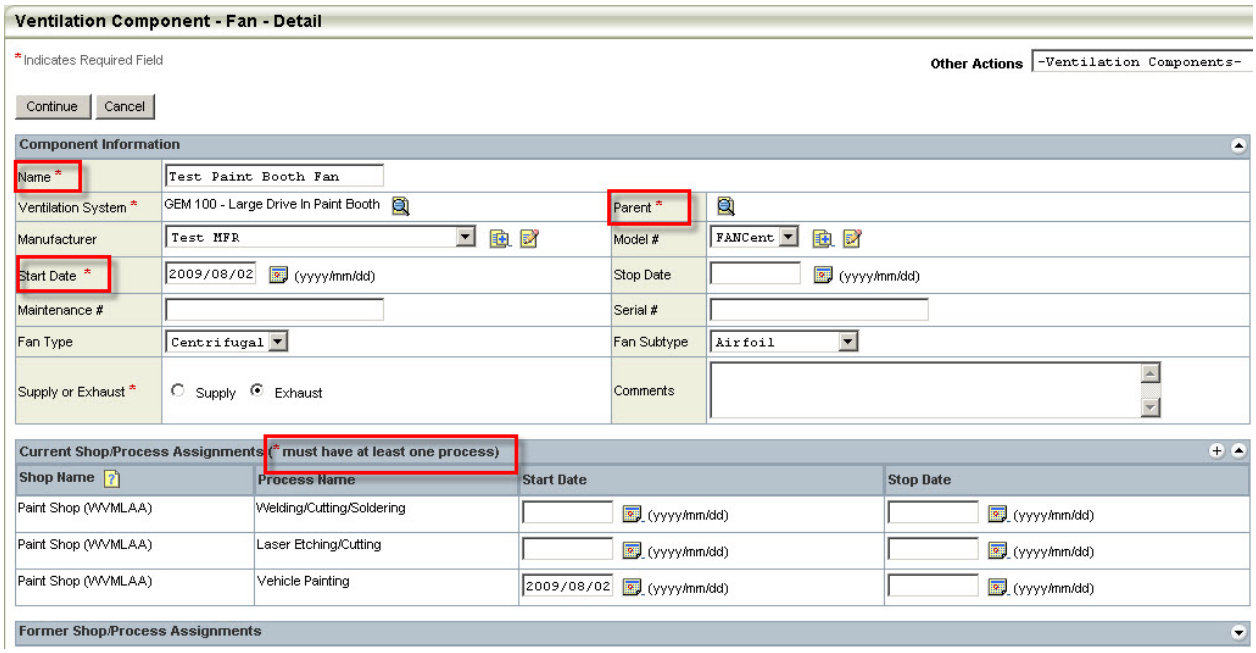


Figure 12-31. Ventilation Component – Detail (Top of Screen)

The system design criteria can be entered at the Design Criteria Menu tile. If the user clicks the + icon the Design Criteria Pop-up Menu will allow the user to select design criteria. (Figure 12-32)

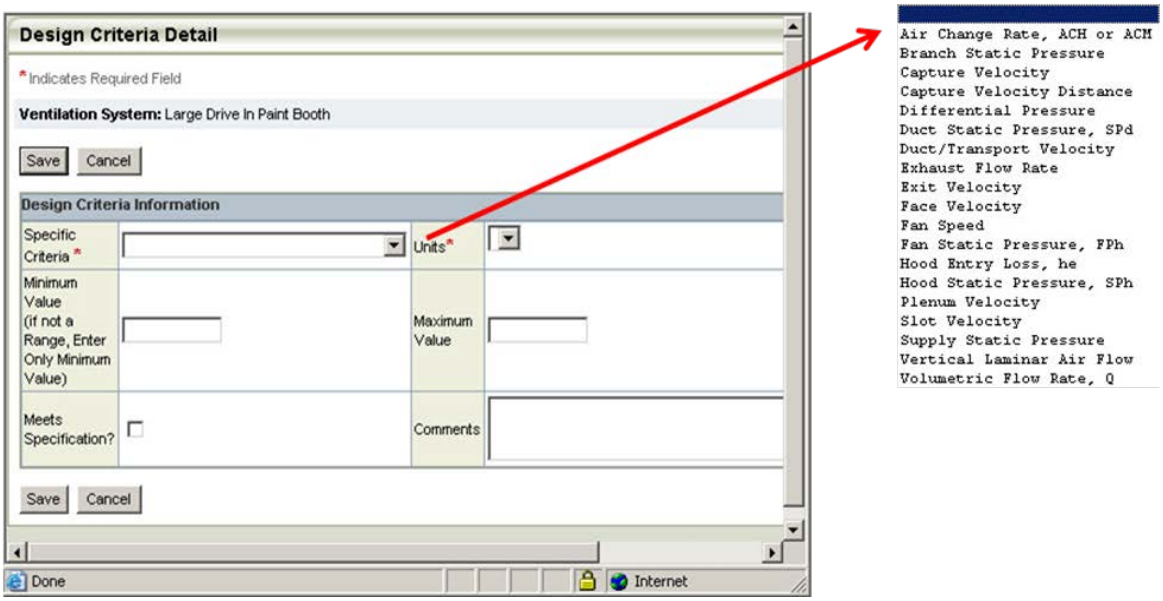


Figure 12-32. Design Criteria Detail

On the Control Information menu tile, the control description is pre-populated, but may be modified by the user. The user will select the control class and control name from the

pick lists. The user must also complete the Requirement Information menu tile. Select whether the control is Adequate and if the Use is required, recommended, or elective. If the use is required, the user may also check the reasons why and enter comments if applicable. (Figure 12-33)

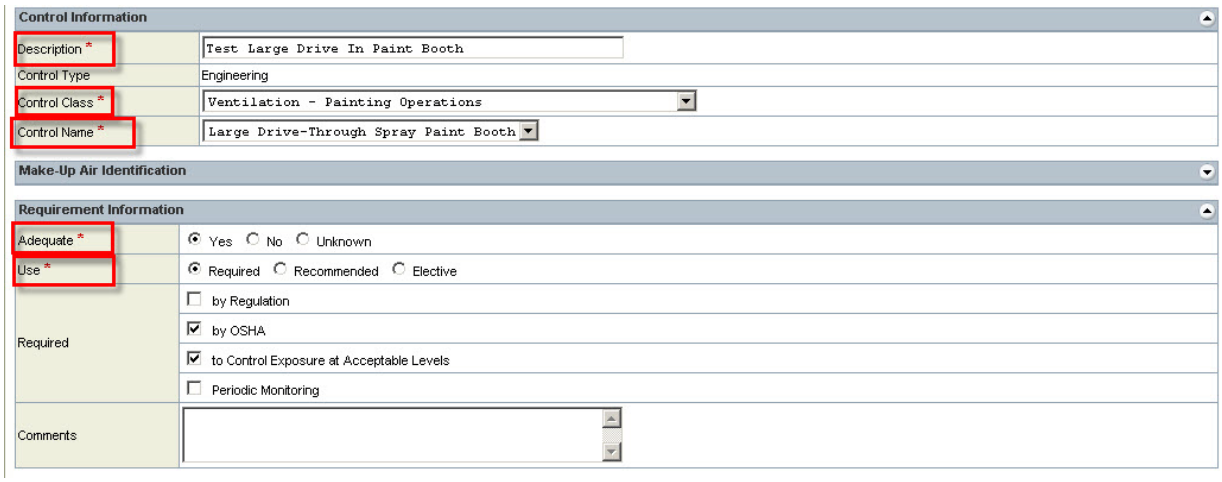


Figure 12-33. Bottom of Ventilation Component – Detail Screen

As with all other controls in DOEHRS, the user must select the potential hazard that is being controlled. When adding an engineering control, the user may also elect to identify if the ventilation system component is also creating a hazard (i.e. noise). **Note that in DOEHRS, hazards are selected from the list of hazards already entered for the process in the Shop section. It is important to enter all hazards from a process prior to entering ventilation systems. Do not forget to add hazards that may be created by the ventilation system, such as noise. A System Change Request has been submitted so hazards may be entered in the Ventilation Component – Detail Screen Select Hazards tile, instead of having to go back to the Shop section to add a hazard.** Once the selections have been made the record may be saved and the ventilation system will now be associated with the shop/process as a control and possibly as a potential hazard.

Once added, the component will be listed in the Ventilation System – Browse Ventilation System Tree. Users can add another component from the Other Actions drop-down menu. (Figure 12-34)

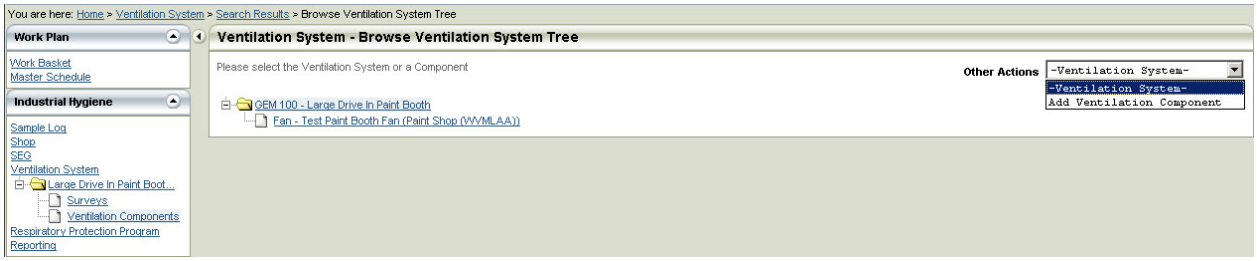


Figure 12-34. Ventilation System – Browse Ventilation System Tree

If the ventilation component was not identified as a control then the option to select a Shop will not appear. The Ventilation Component – Detail screen will not have additional control menu tiles on them when not adding as a control. (Figure 12-35)

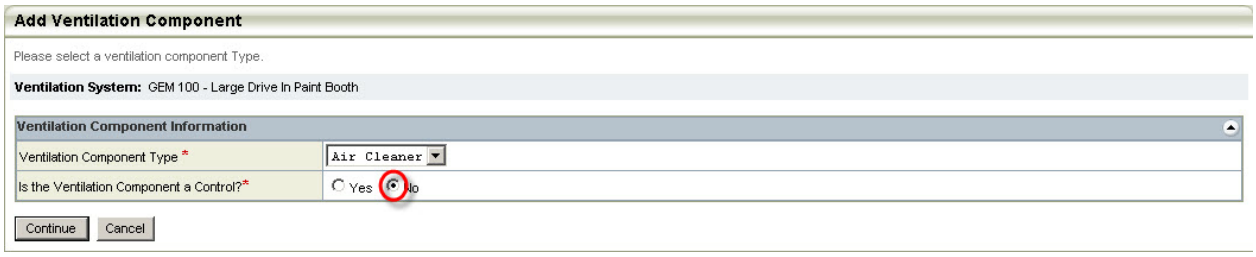


Figure 12-35. Add Ventilation Component

The Ventilation Component – Detail screen will not have additional control menu tiles on them when not adding as a control. The user will need to complete the required fields as previously described. (Figure 12-36)

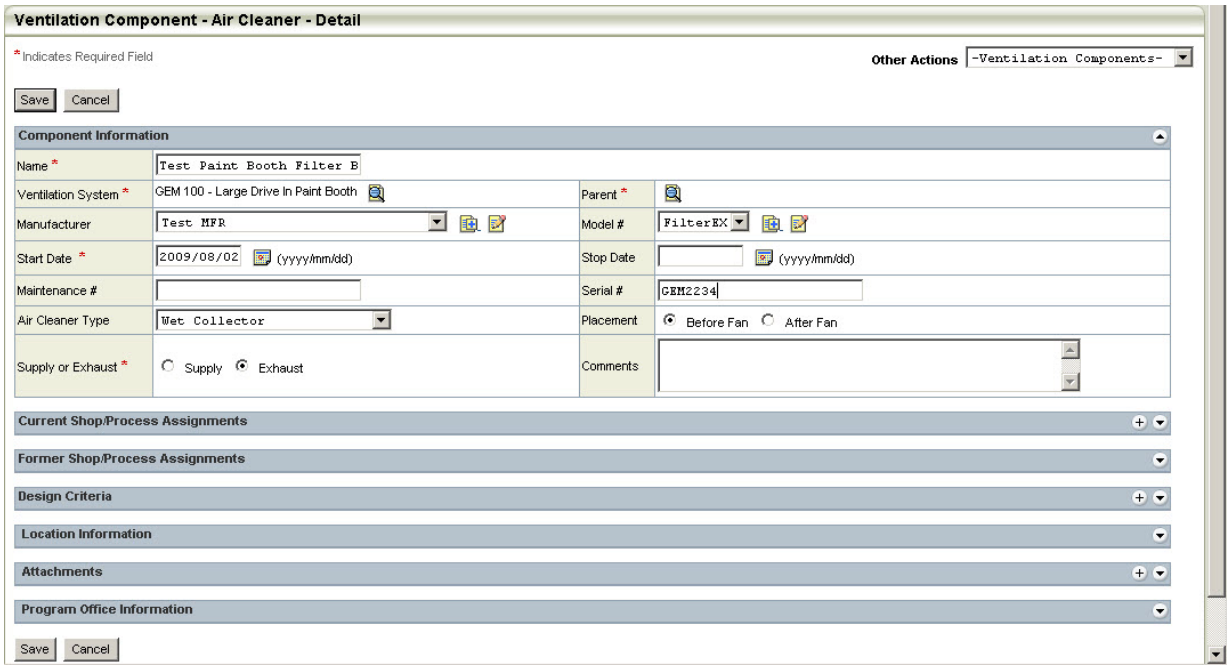


Figure 12-36. Ventilation Component – Detail Screen

Searching for a ventilation system is accomplished by clicking on the Ventilation System hyperlink in the Industrial Hygiene navigational menu to bring up the Ventilation System – Search screen. Enter the desired search criteria to find the ventilation system. (Figure 12-37)

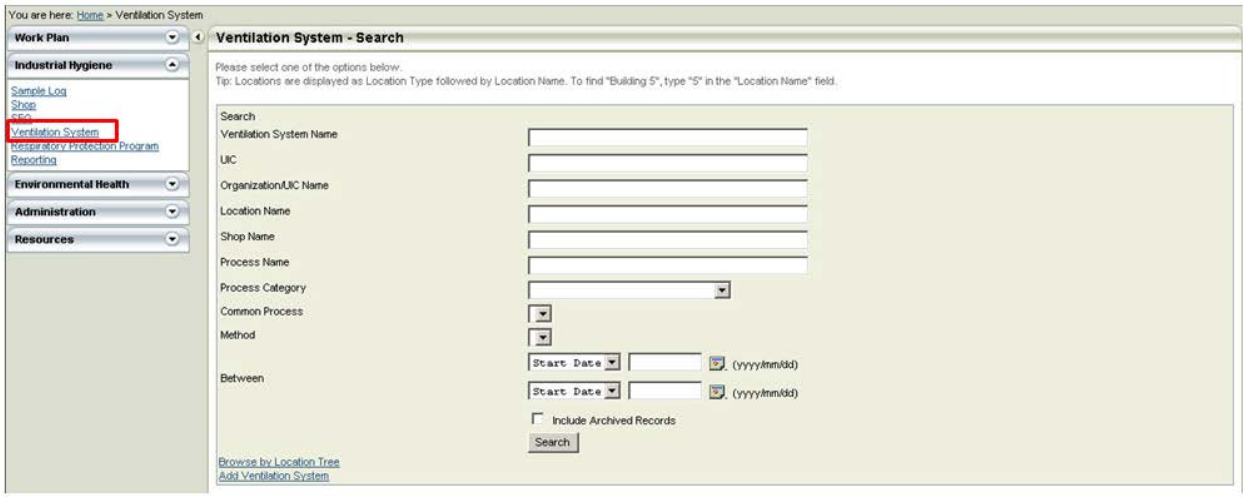


Figure 12-37. Ventilation System – Search

The Ventilation System – Search results will list the ventilation systems that match the criteria used in the search. The user will select the hyperlink for the desired ventilation system. (Figure 12-38)

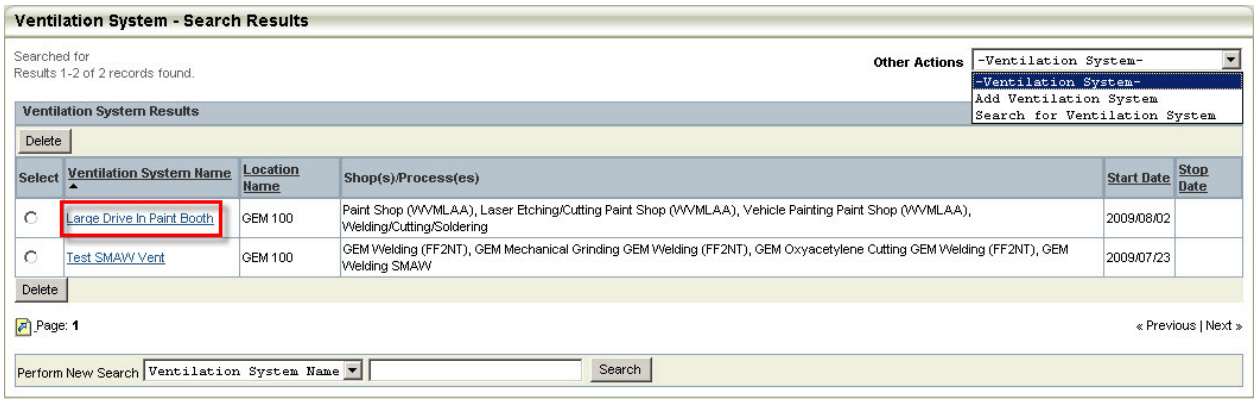


Figure 12-38. Ventilation System – Search Results

From the example below (Figure 12-39 and 12-40), note that all of the processes for the shop are displayed in the Ventilation System – Search Results, not just the processes the ventilation system component(s) are controlling. A System Change Request has been submitted to correct this issue.

When adding a process that a component controls the user selects a shop and all of the processes are displayed under the Current Shop/Process Assignment tile. (Figure 12-39) The user then enters a Start Date for the processes that are controlled by the component.

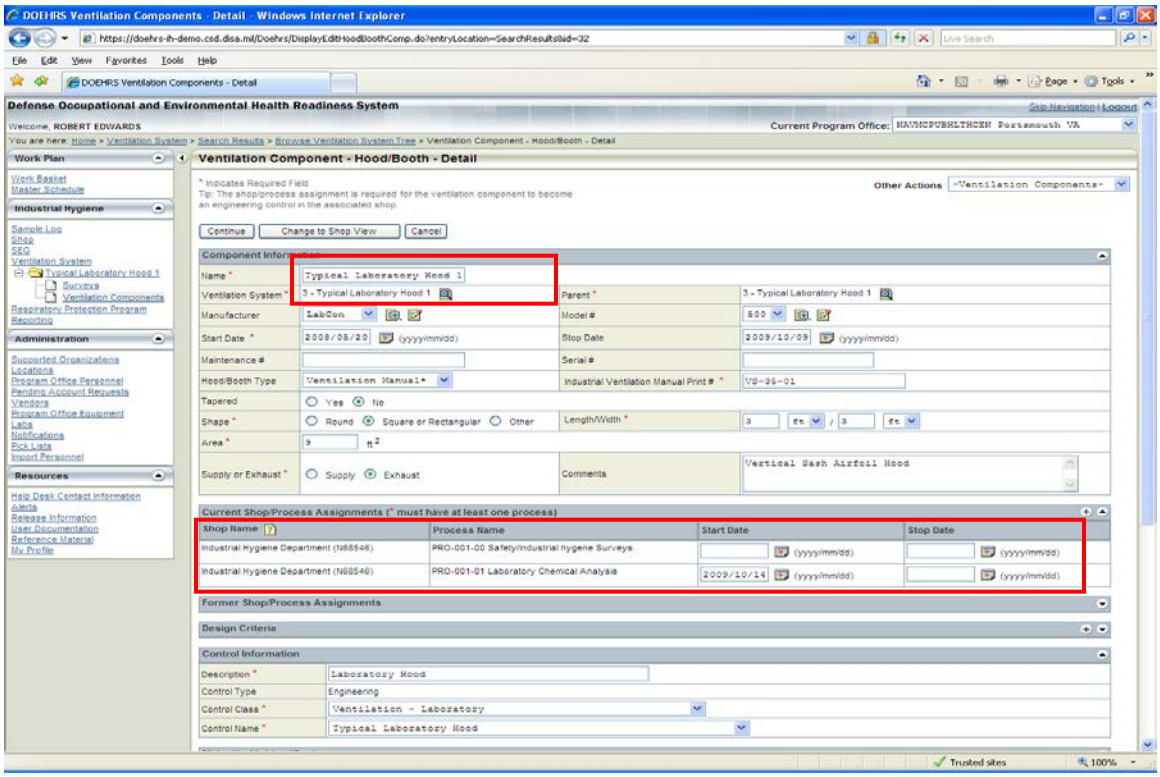


Figure 12-39. Ventilation Component – Hood/Booth - Detail

Note in Figure 12-40 that all of the Processes for the shop are displayed in the Ventilation System – Search Results, not just the processes the ventilation system is controlling. This can be confusing to the user. Only the processes the ventilation system component(s) are controlling should be displayed.

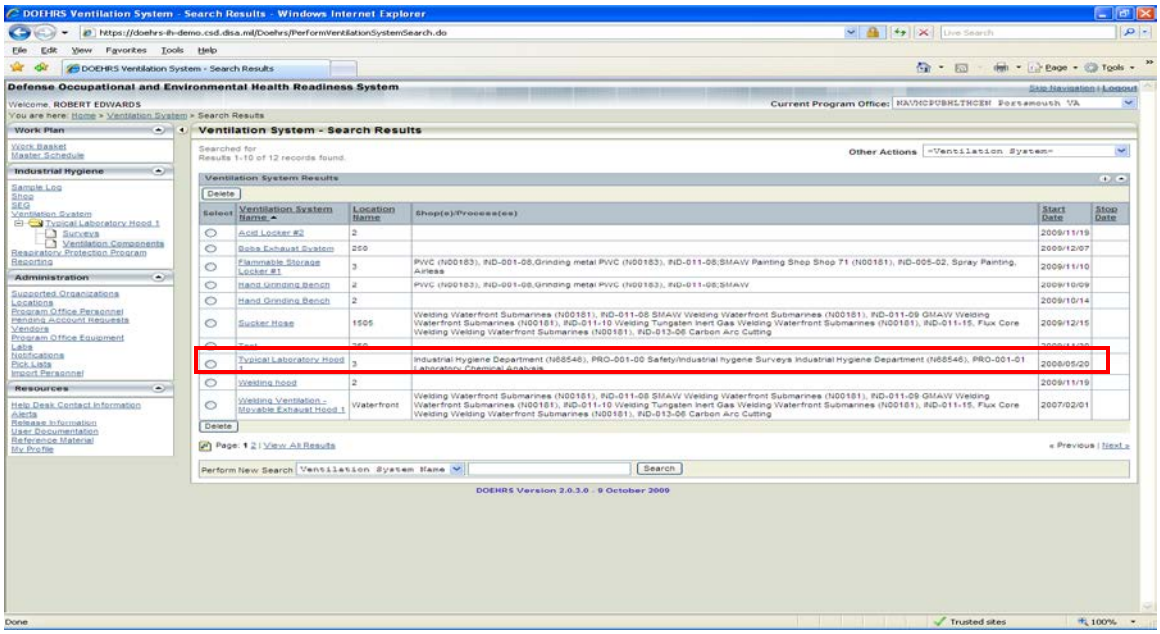


Figure 12-40. Ventilation System – Search Results

Follow the instructions below from the "DOEHRS Student Guide/User Manual Version 2.0.5.0, Chapter 14. MASTER SCHEDULE" to SCHEDULE A VENTILATION SURVEY, starting on page 14-11, Section 14.3, SCHEDULING A VENTILATION SURVEY*.

14.3 SCHEDULING A VENTILATION SURVEY

To schedule a ventilation survey, the user will click on the Master Schedule hyperlink under the Work Plan Menu tile and click the "Add Master Schedule Task" hyperlink. The user will select the Ventilation Survey from the Task Type drop down menu list.

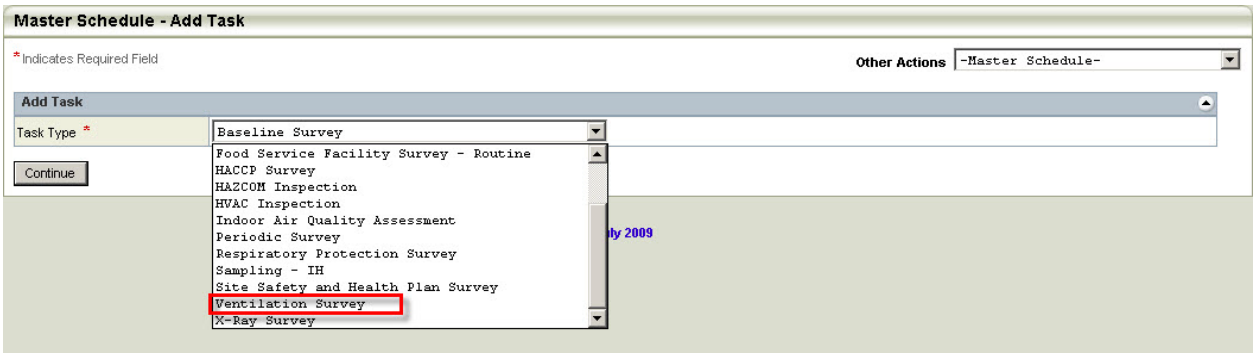


Figure 14-19. Master Schedule – Add Task

Step 1 of creating the Ventilation task asks the user to search for the ventilation system that the survey will be conducted against.

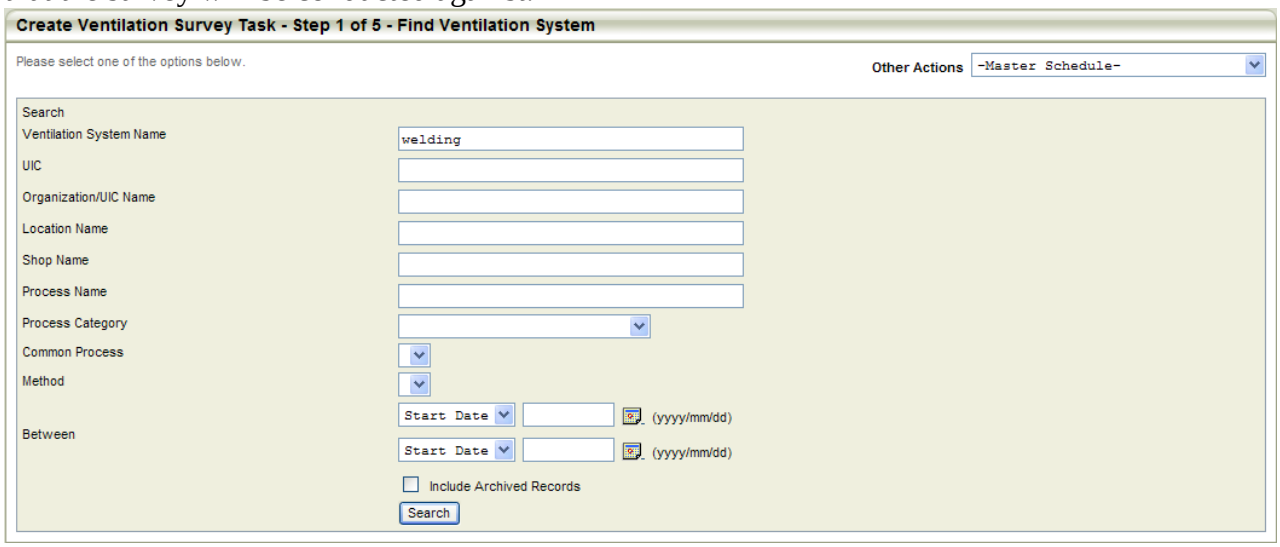


Figure 14-20. Create Ventilation Survey Task – Step 1 of 5 – Find Ventilation System

In step 2 the user will search for and select the desired ventilation system from the search results and press the continue button.

* Note text in bold provided by Navy.

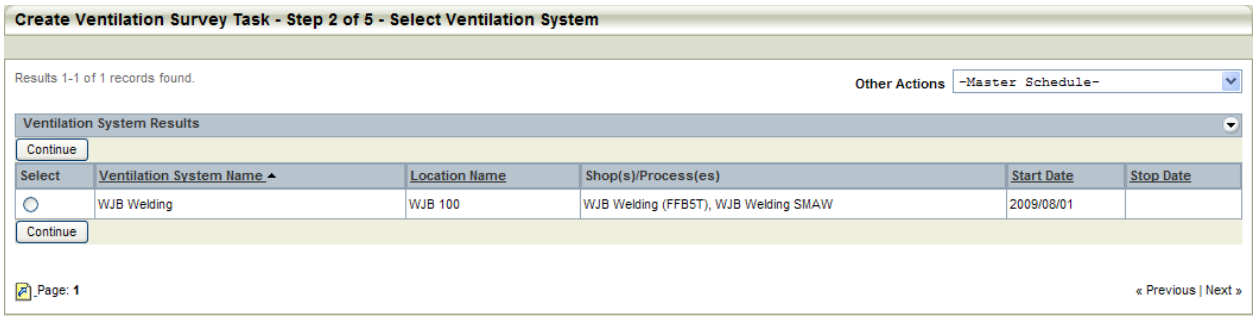


Figure 14-21. Create Ventilation Survey Task – Step 2 of 5 – Select Ventilation System

In step 3 the user will select those components of the system that will be included for survey measurements.

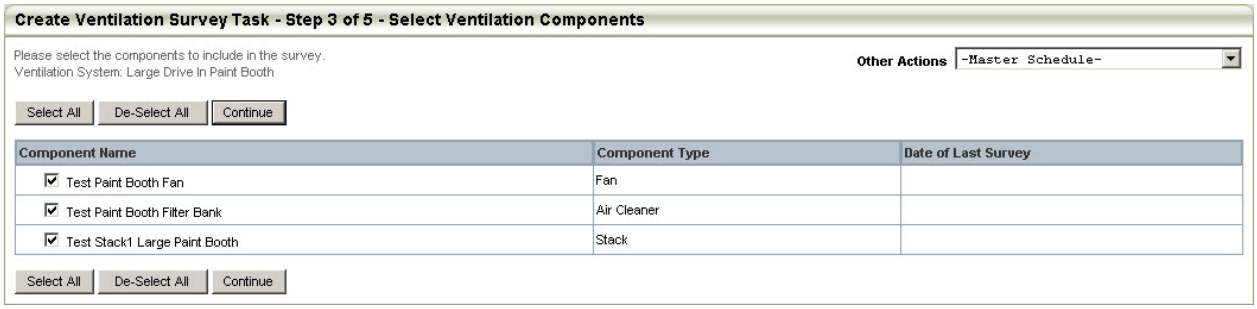


Figure 14-22. Create Ventilation Survey Task – Step 3 of 5 - Selecting Ventilation Components

Step 4 allows the user to select measurement types for the survey of the selected ventilation system components (i.e. Face/Capture Velocity, Pitot Traverse, Velocity Traverse, etc). The user is required to enter the number of measurement types to include on the survey. The number of measurements entered below sets up the ventilation calculations. **The user selects the Number of Measurement Locations. For example, when measuring walk-in paint booths, personnel may want to conduct measurements at several locations (cross sectional areas) within the booth. Personnel may want to conduct face velocity (cross sectional area) measurements across the front of the booth, middle of the booth and back of the booth. In this case, personnel will select "3" for the Number of Face/Capture Velocity Measurement Locations.**

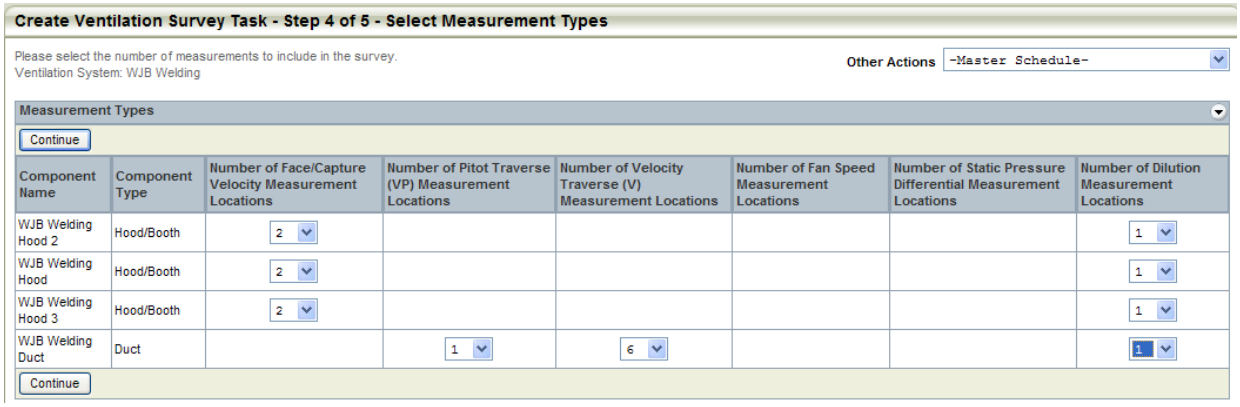


Figure 14-23. Create Ventilation Survey Task – Step 4 of 5 - Selecting Measurement Types

A Master Schedule Detail screen displays for the user as it does with all tasks scheduled via the Master Schedule. In Step 5 complete the Master Schedule – Detail – Ventilation Survey.

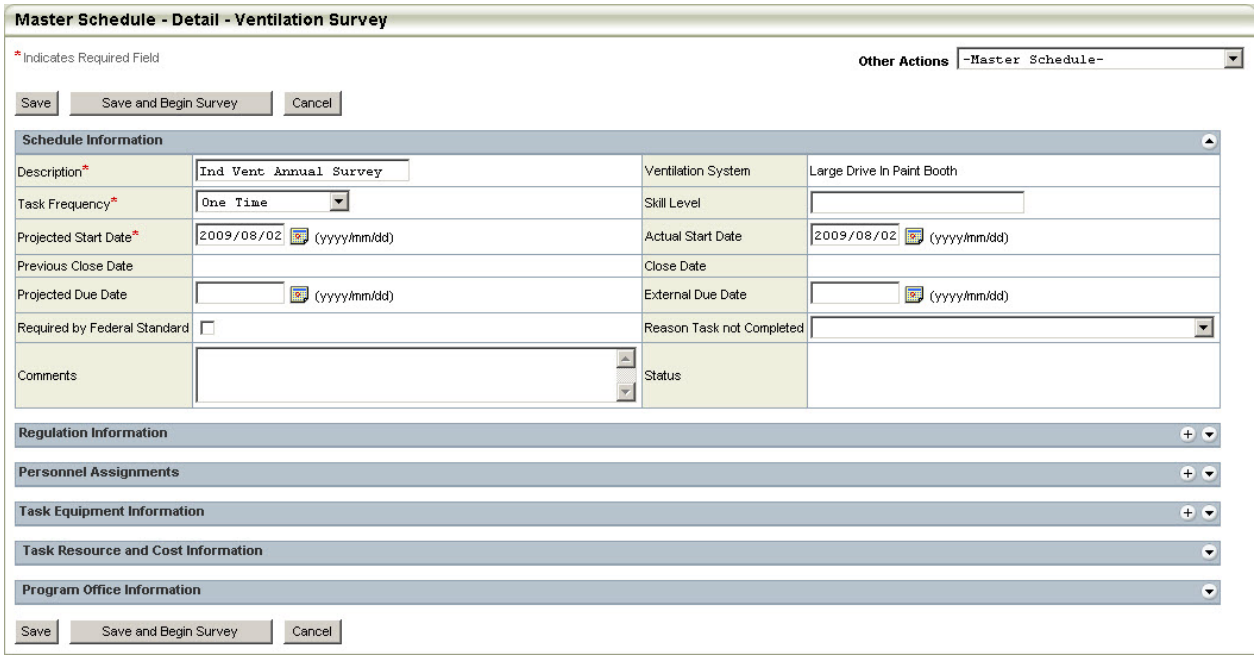


Figure 14-24. Master Schedule – Detail – Ventilation Survey

The user will complete the schedule form by filling in the description, task frequency, and projected start date. They may also enter a regulation, personnel assignments, task equipment information, and cost information. This form may be saved if the task is scheduled for a future date or the user may select the save and begin survey option to complete the survey forms immediately.

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Follow the instructions below from the "DOEHRS Student Guide/User Manual Version 2.0.5.0, Chapter 15. INDUSTRIAL HYGIENE SHOP SURVEYS " to CONDUCT A VENTILATION SURVEY, starting on page 15-10, Section 15.2, VENTILATION SURVEYS.

Additional instructions for Air Cleaner (Static Pressure Differential), Pitot Traverse, Face/Capture and Dilution measurements are provided by the Navy.

15.2 VENTILATION SURVEYS

Ventilation surveys may be entered by selecting a ventilation system, then clicking on the Surveys link under the ventilation system name, and finding the scheduled survey in the list of surveys that have been completed and are in progress or through the master schedule task. Regardless of how the survey form is found, it is completed the same way. The actual ventilation survey is displayed when entering data for the survey. (Figure 15-15)

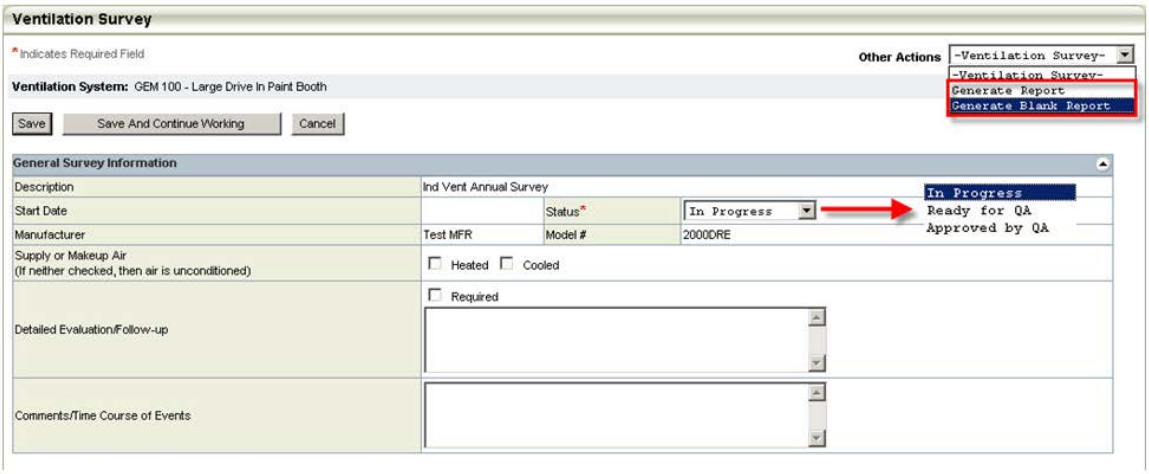

Figure 15-15. Ventilation Survey (top of form)

FAN SPEED MEASUREMENTS*

The bottom part of the survey form allows for the recording of component reading. In this example the hyperlink for Fan measurements is selected to enter measurements for that component. Ensure the Program Office Equipment is added by clicking the '+' on the Program Office Equipment tile. (Figure 15-16)

Note when adding the Program Office Equipment, all of the equipment currently in DOEHRS for a particular Program Office Equipment Type is listed to choose from, even equipment outside your Program Office. This defect has been reported and will be fixed.

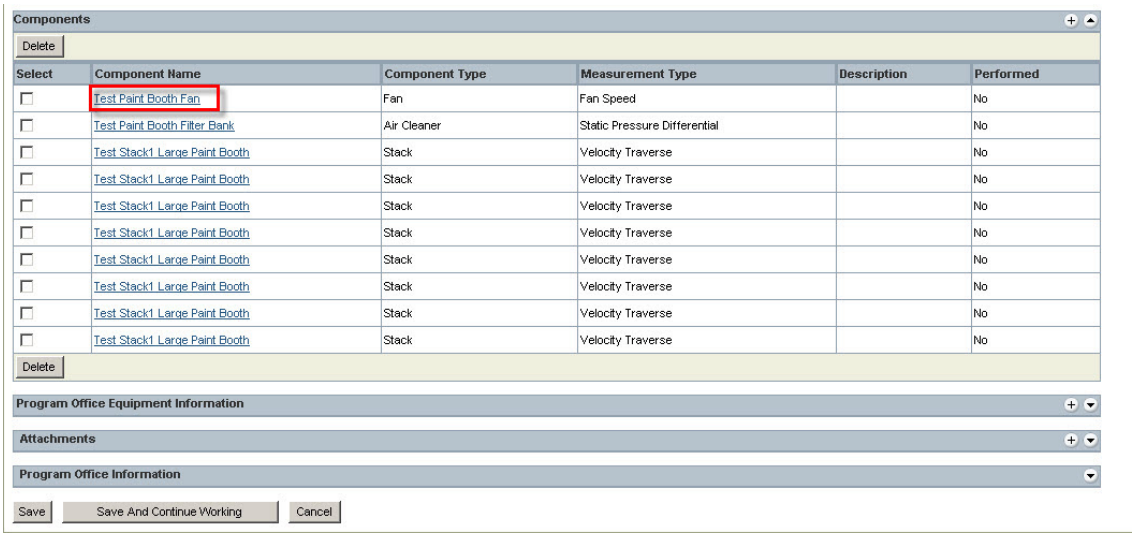

Figure 15-16. Ventilation Survey (Bottom of form)

A description of the measurement information is entered and the user clicks on the 'New' hyperlink to enter measurement information. (Figure 15-17)

* Note text in bold provided by Navy.

Note the Program Office Field Ventilation Survey Measurement Form (in pdf format) when filled out completely with the ventilation measurements may be downloaded by clicking on the '+' on the Attachments tile.

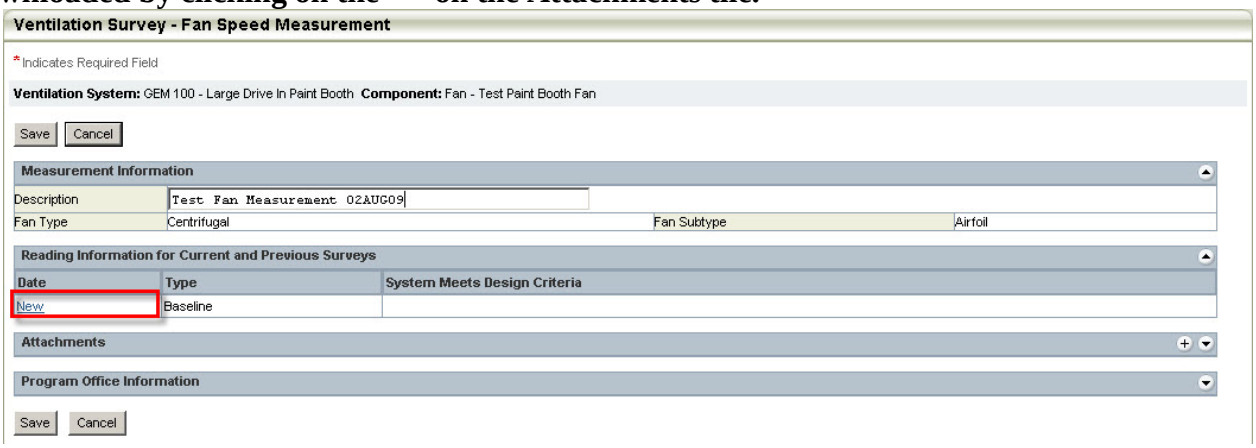

Figure 15-17. Ventilation Survey – Fan Speed Measurement

The Ventilation Survey – Readings Information screen will appear. The user will enter a date and identify the program office equipment used for the survey in the General Information tile. The Design Criteria tile can be used to reference the minimum and maximum criteria for the ventilation component periodic check. **Note the units displayed in the Design Criteria are always in FPM no matter which units you chose in the Ventilation Component Detail tile. This defect has been submitted as a System Change Request.** The user will need to enter the measurement reading in the Reading Information tile and select the radio button to denote whether the systems meets the design criteria in the Periodic Check Criteria Information tile. (Figure 15-18) **A System Change Request has been submitted to insert Minimum and Maximum Acceptable tile under the Periodic Check Criteria Information with the Item being Fan Speed and the units under the Minimum Acceptable and Maximum Acceptable as RPM. This should be inserted after 'System Meets Design Criteria'.**

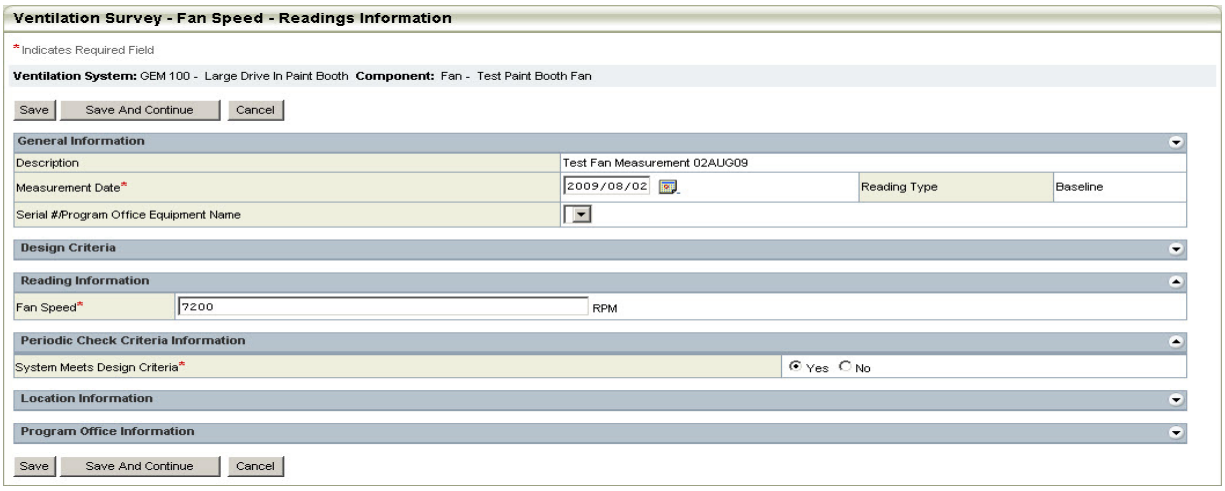

Figure 15-18 Ventilation Survey – Fan Speed – Readings Information

Hit the "Save and Continue" button if you are going to be working in the system longer than 15 minutes. Hit the "Save" button when all the information has been entered. Once saved, the measurement information is stored against the date the readings were taken and entered into DOEHRS. (Figure 15-19)

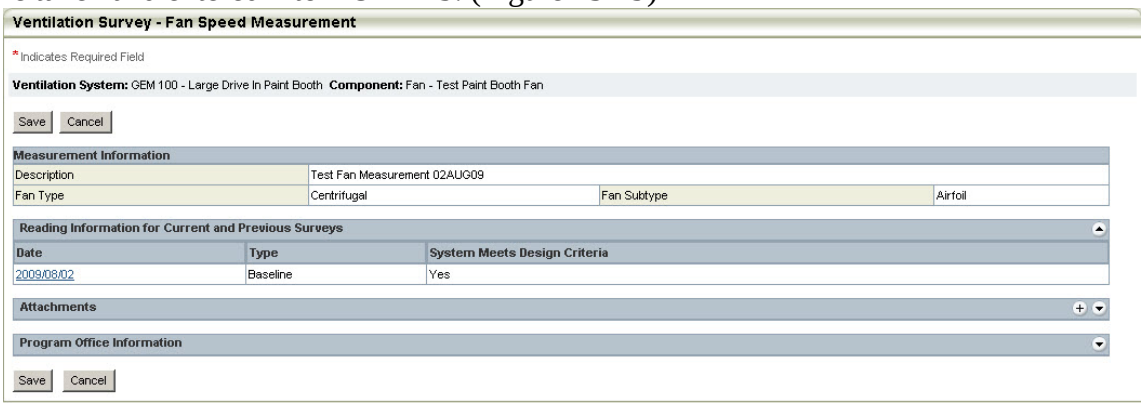

Figure 15-19. Ventilation Survey – Fan Speed Measurement

AIR CLEANER (STATIC PRESSURE DIFFERENTIAL)*

Static Pressure Differential measurements across an air cleaning device are recorded similarly as Fan Speed. After finding the appropriate Ventilation Survey, the hyperlink for Air Cleaner measurements is selected to enter measurements for that component. (Figure 15-20)

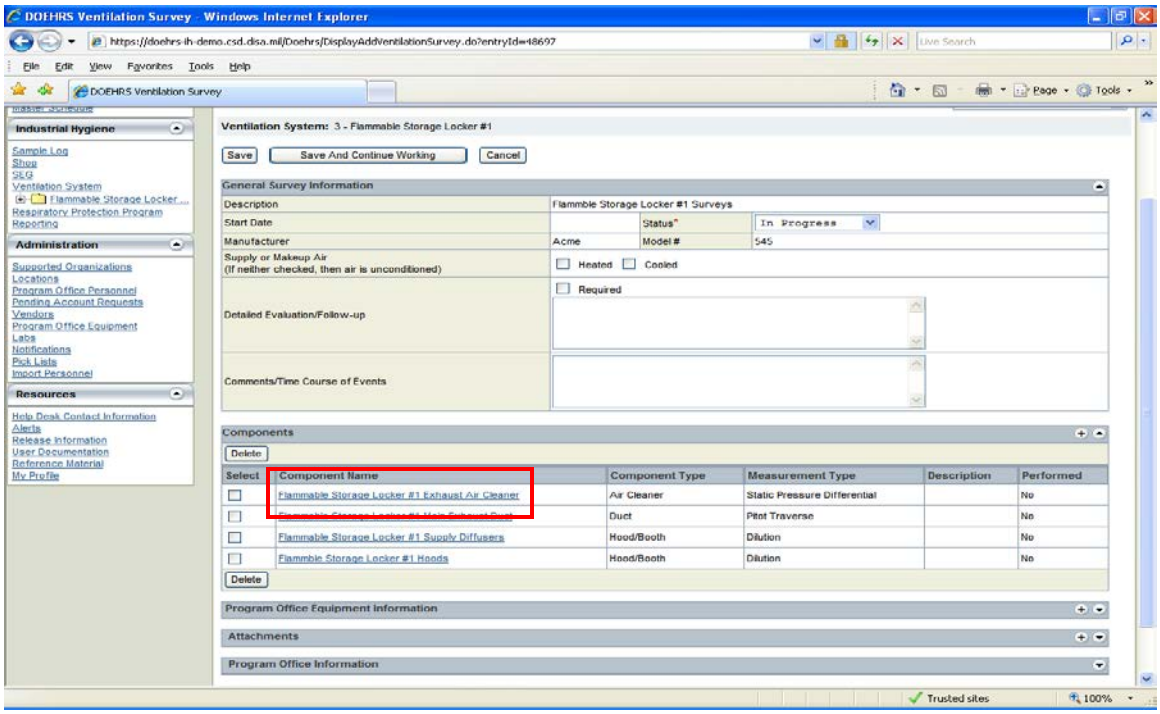

Figure 15-20. Ventilation Survey

* This section provided by Navy.

Ensure the Program Office Equipment is added by clicking the '+' on the Program Office Equipment tile and then selecting the Program Office Equipment Type and Serial #. (Figure 15-21)

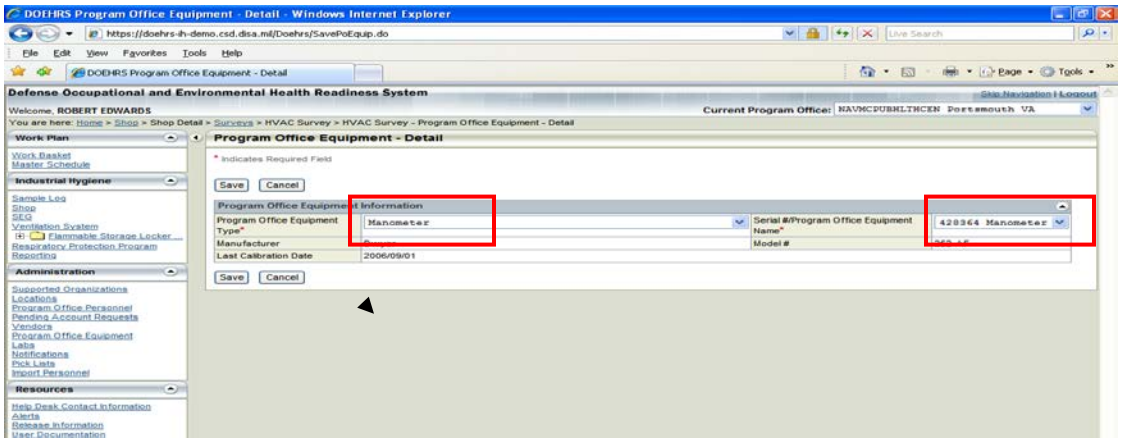

Figure 15-21. Program Office Equipment – Detail

Note the Program Office Equipment Information is now displayed in the Ventilation Survey, however the Last Calibration Date is not displayed. (Figure 15-22) A System Change Request has been submitted to correct this defect.

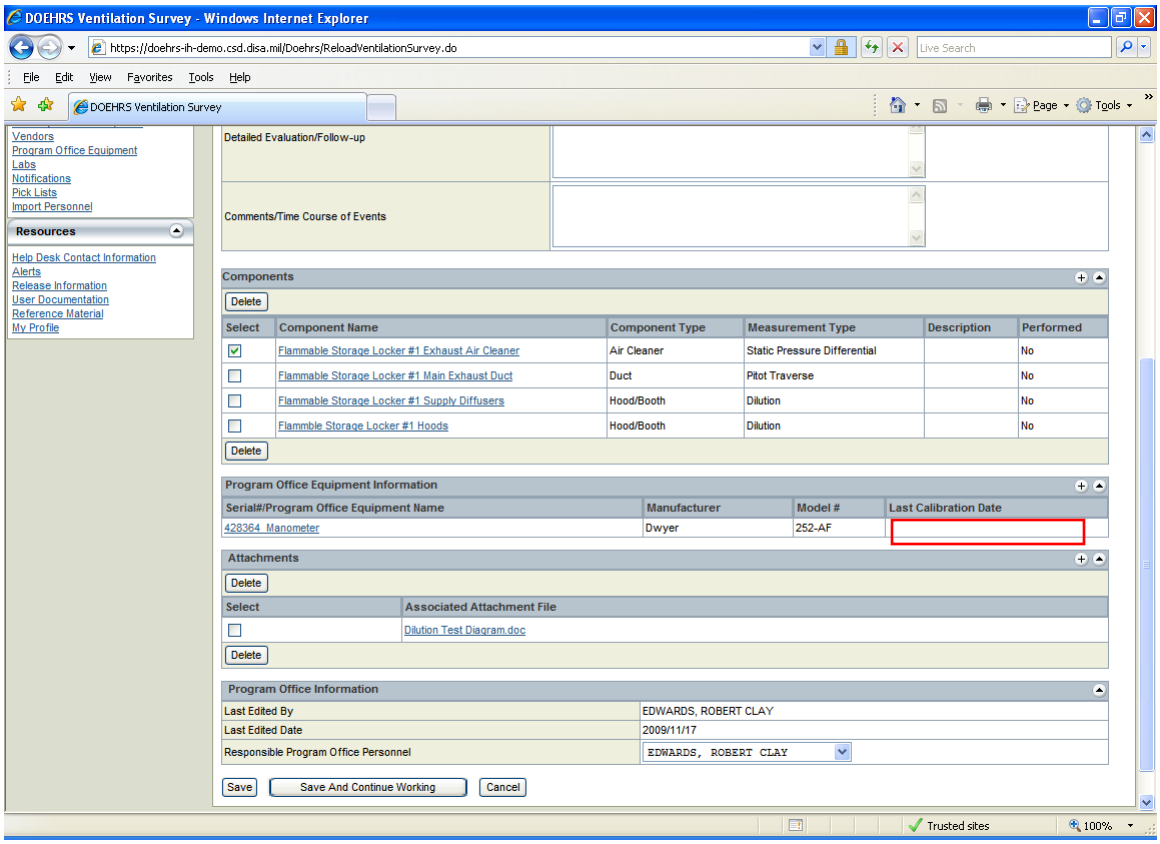

Figure 15-22. Ventilation Survey

A description of the measurement information is entered and the user clicks on the 'New" hyperlink to enter measurement information. (Figure 15-23)

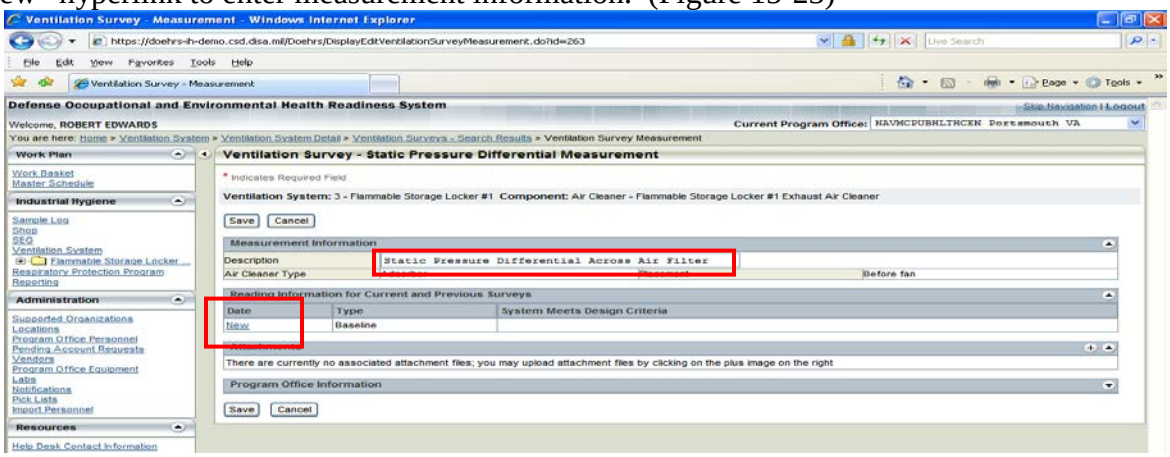

Figure 15-23. Ventilation Survey – Static Pressure Differential Measurement

The Ventilation Survey – Readings Information screen will appear. The user will enter the measurement date and identify the program office equipment used for the survey in the General Information tile. The Design Criteria tile can be used to reference the minimum and maximum criteria for the ventilation component periodic check. The user will need to enter the measurement reading in the Reading Information tile and select the radio button to denote whether the system meets the design criteria in the Periodic Check Criteria Information tile. (Figure 15-24) A System Change Request has been submitted to insert Minimum and Maximum Acceptable tile under the Periodic Check Information with the Item being Static Pressure Differential and the units under the Minimum Acceptable and the Maximum Acceptable as H2O. This should be inserted after 'System Meets Design Criteria'.

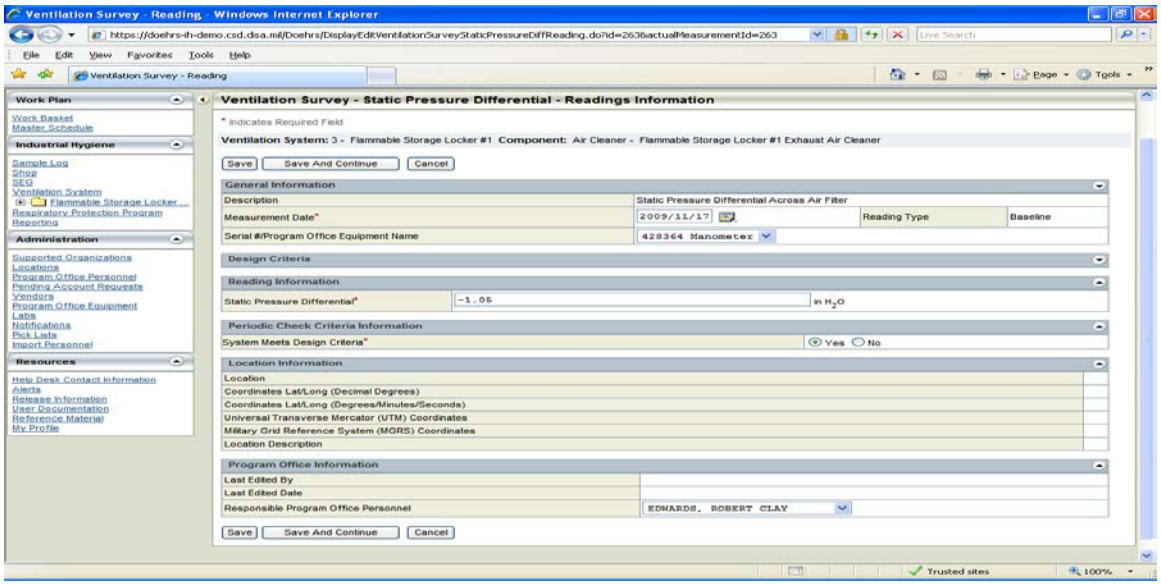

Figure 15-24. Ventilation Survey – Static Pressure Differential – Readings Information

Again once saved, the measurement information is stored against the date the readings were taken and entered into DOEHRS. (Figure 15-25)

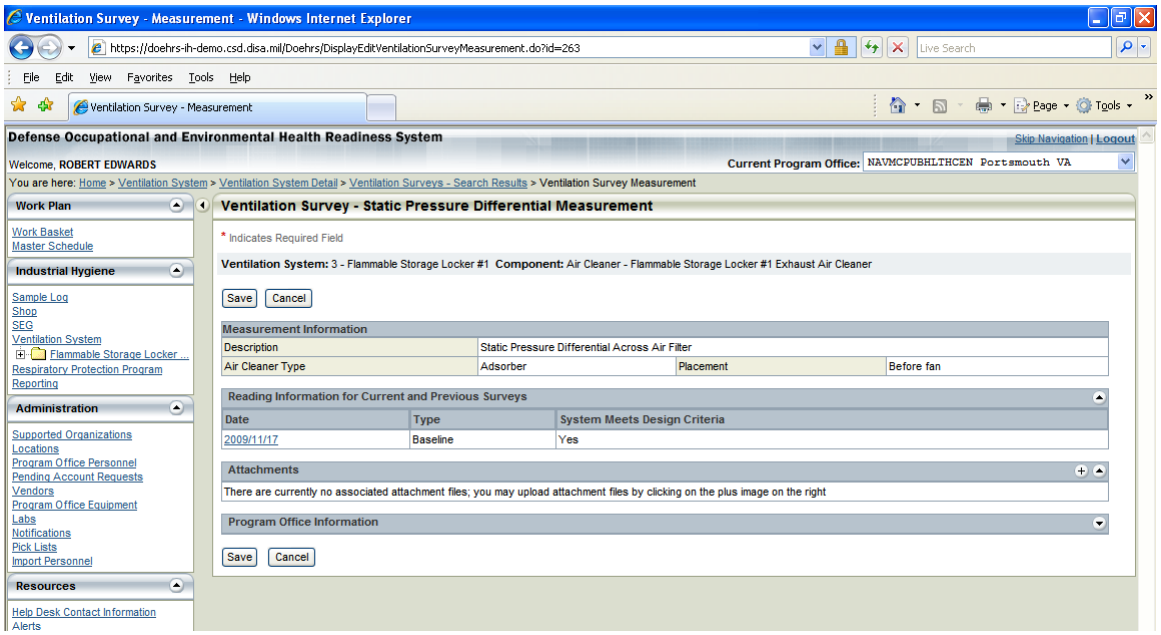

Figure 15-25. Ventilation Survey – Static Pressure Differential Measurement

VELOCITY TRAVERSE MEASUREMENTS*

Components that are designated as pitot and velocity traverse use the same form for documenting the survey. The example shows the survey for a stack component using the velocity traverse measurement type. The user will click the appropriate hyperlink to enter measurements on the survey form. Ensure the Program Office Equipment Information is also entered. (Figure 15-26)

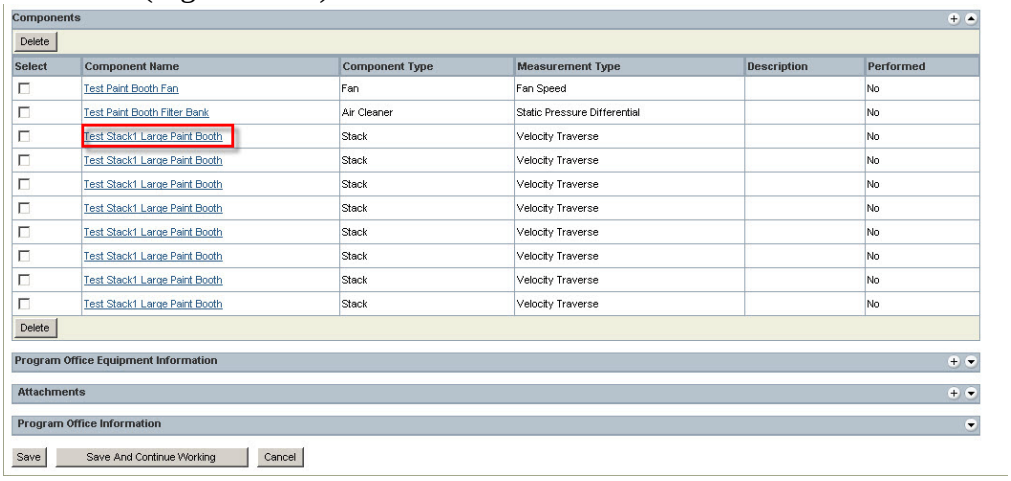

Figure 15-26. Components

* Note text in bold provided by Navy,

An example of the velocity traverses measurement entry data fields are displayed here. The user will click on the 'Date' hyperlink to complete the measurement information. The diagram loads automatically after the insertion points and depth have been entered. (Figure 15-27)

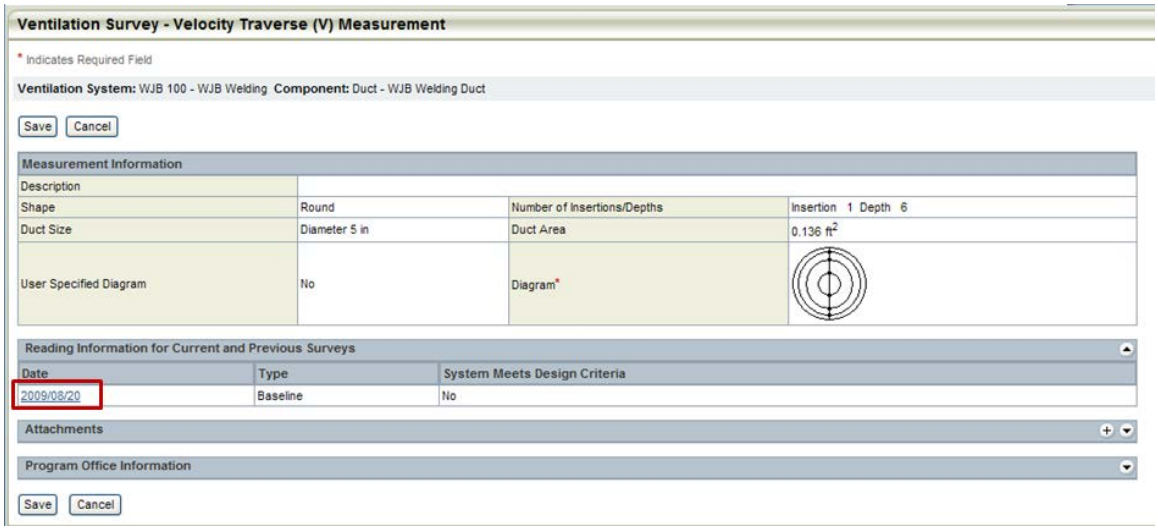

Figure 15-27. Ventilation Survey – Velocity Traverse (V) Measurement

Component data information is displayed to allow for the user to quickly determine which components have been measured and which still need to be evaluated. Clicking on the link for the component name will open the Ventilation Survey – Readings Information screen. (Figure 15-28)

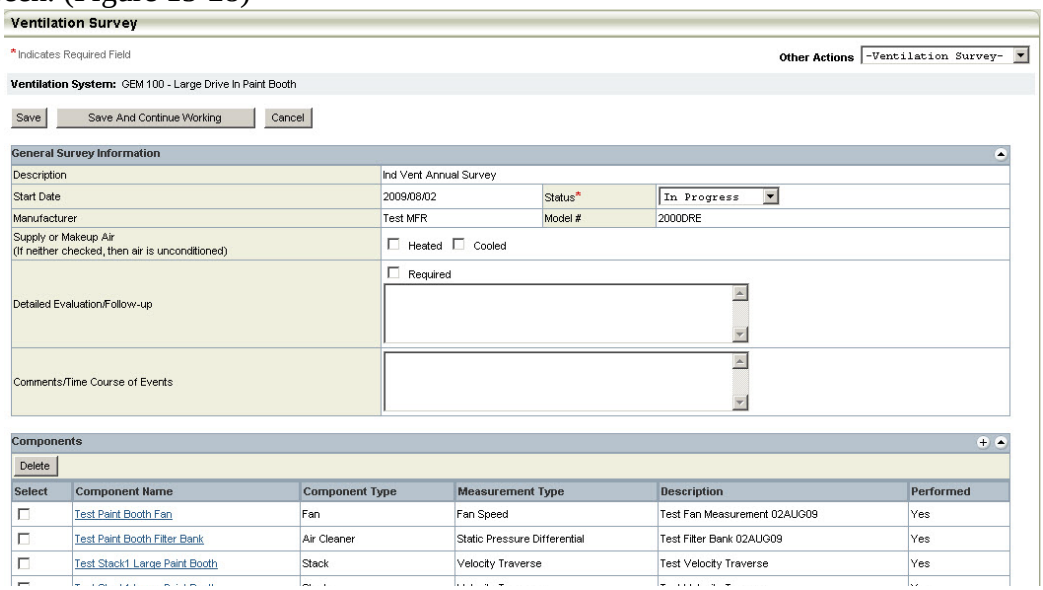

Figure 15-28. Ventilation Survey

The user will need to enter a Measurement Date and select the program office equipment used for the survey in the General Information tile. The user may expand the Design Criteria menu tile to view the specified minimum and maximum values. The user

may enter density factors (i.e. elevation, system static pressure, temperature, etc.) for the survey. **<u>Note the density factor defaults to '1,' which would be the factor that would normally be chosen in most cases.</u>**

Expand the Reading Information tile to enter the measurement location name and identify which measurement will be used for periodic check location. Note static pressure and centerline readings are not required to be entered if not conducted. In the insertion tile the user will enter the depth in inches, check which locations are used for periodic check locations and enter a velocity reading.

Expand the Measurement Information tile to calculate the survey readings. Click the calculator icons to calculate the Average Velocity and Volumetric Flow Rate. (Note, these values will calculate automatically. This is true for all calculated values.). The user may also enter the ACGIH reference.

Expand the Periodic Check Criteria Information tile to select the appropriate radio button to denote whether the system meets design criteria. (Figure 15-29) **A System Change Request has been submitted to define the Minimum and Maximum values. These values should be the Minimum and Maximum Acceptable values. The tile should read Minimum Acceptable and Maximum Acceptable.**

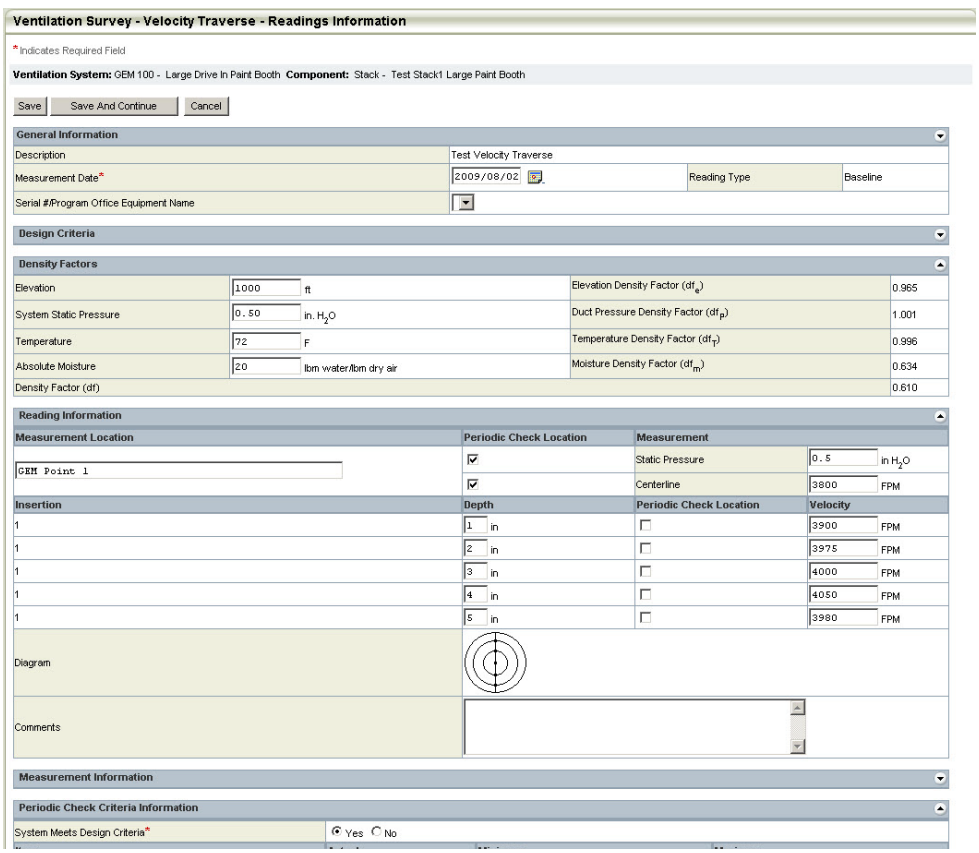

Figure 15-29. Ventilation Survey – Velocity Traverse – Readings Information

Saving the Readings Information screen will return the user to the Ventilation Survey – Measurement form for the selected component. The readings information just entered is accessible by clicking on the date link (Figure 15-30). The user can save the form at this

time and will be brought to the Ventilation Survey form where the next component can be selected to enter measurements for if needed.

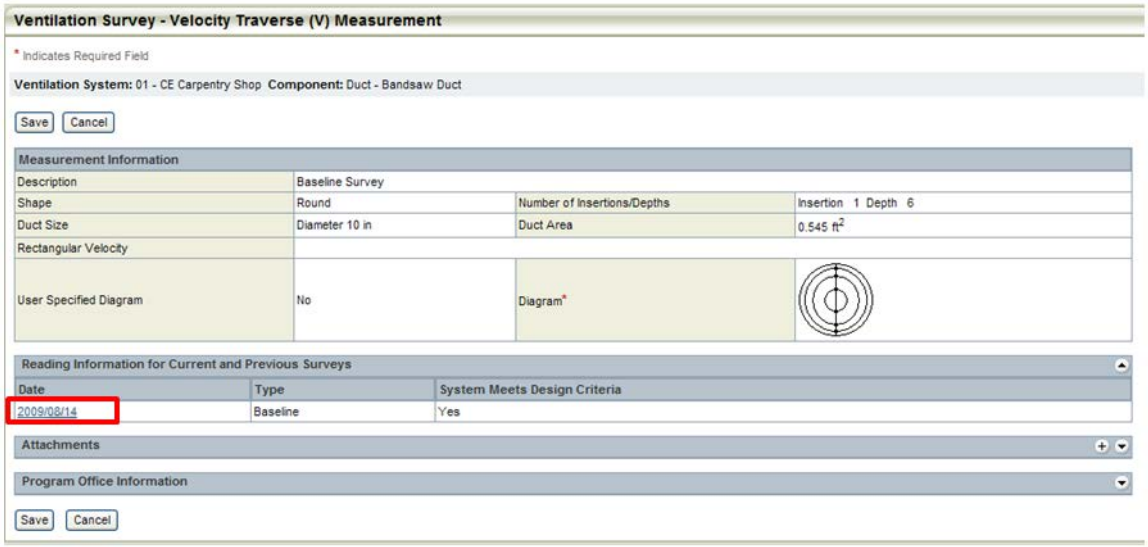

Figure 15-30. Ventilation Survey – Velocity Traverse (V) Measurement

PITOT TRAVERSE MEASURMENTS*

The example for pitot traverse measurements is an exhaust duct component. After searching for the appropriate Ventilation Survey the user will click the component name hyperlink to enter measurements on the survey form. Ensure the Program Office Equipment is also selected. (Figure 15-31)

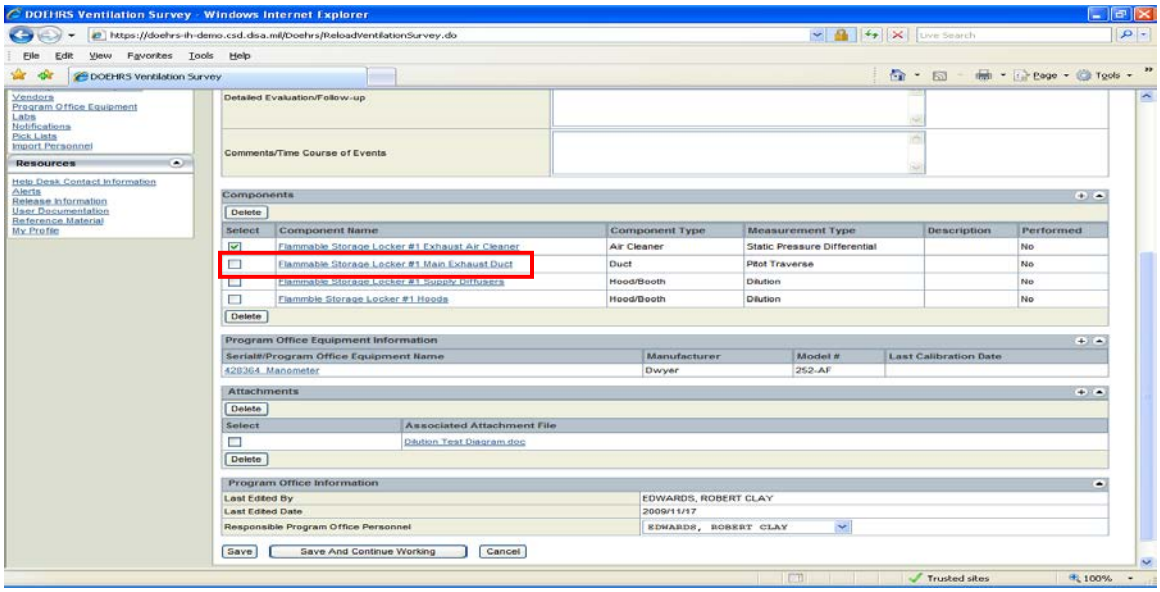

Figure 15-31. Ventilation Survey

* This section provided by Navy.

An example of the pitot traverses measurement entry data fields are displayed here. The user will click on the 'New' hyperlink to add additional measurement information. (Figure 15-32)

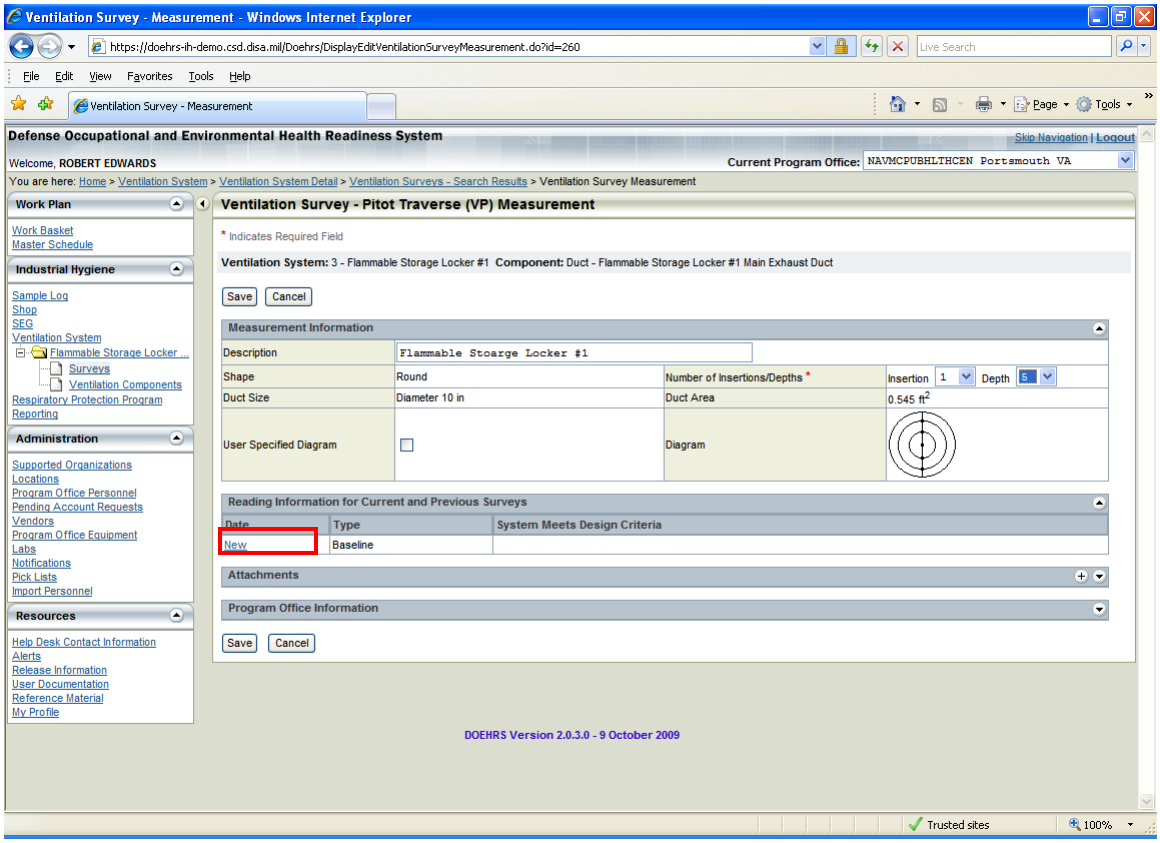

Figure 15-32. Ventilation Survey – Pitot Traverse (VP) Measurement

The user will need to enter a Measurement Date and select the program office equipment used for the survey in the General Information tile. The user may expand the Design Criteria menu tile to view the specified minimum and maximum values. The user may enter density factors (i.e. elevation, system static pressure, temperature, etc.) for the survey. **Note the density factor defaults to '1,' which would be the factor that would normally be chosen in most cases.**

Expand the Reading Information tile to enter the measurement location name and identify which measurement will be used for periodic check location. Note static pressure and centerline readings are not required to be entered if not conducted. In the insertion tile the user will enter the depth in inches, check which locations are used for periodic check locations and enter a velocity reading.

Expand the Measurement Information tile to calculate the survey readings. Click the calculator icons to calculate the Average Velocity and Volumetric Flow Rate. (Note, these values will calculate automatically. This is true for all calculated values.). The user may also enter the ACGIH reference.

Expand the Periodic Check Criteria Information tile to select the appropriate radio button to denote whether the system meets design criteria. The user can view the average velocity and volumetric flow rate at STP in the next tile. Minimum and maximum values may be

entered as well. (Figure 15-33) A System Change Request has been submitted to define the Minimum and Maximum values. These values should be the Minimum and Maximum Acceptable values. The tile should read Minimum Acceptable and Maximum Acceptable.

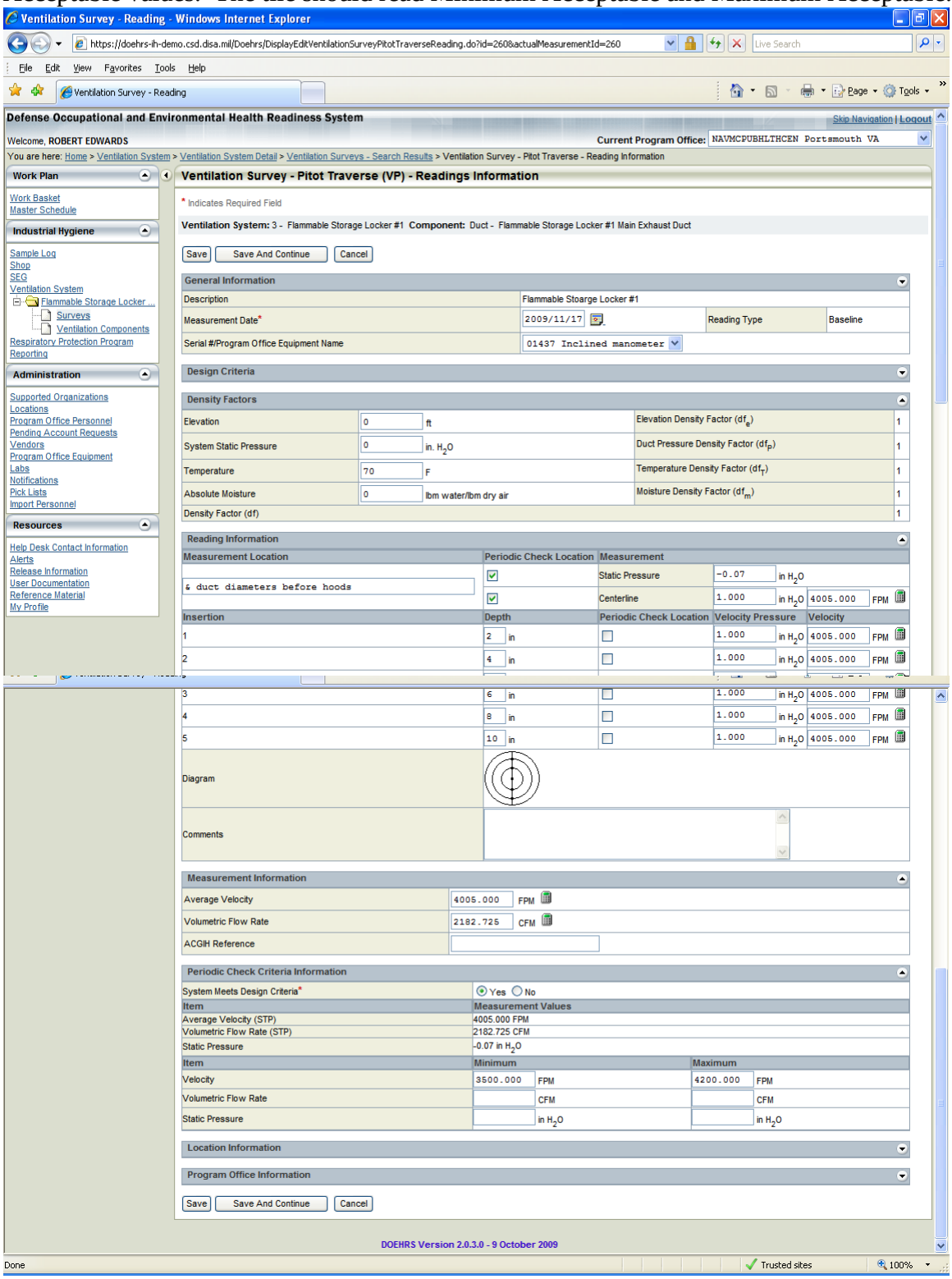

Figure 15-33. Ventilation Survey – Pitot Traverse (VP) Readings Information

Saving the Readings Information screen will return the user to the Ventilation Survey – Measurement form for the selected component. The readings information just entered is accessible by clicking on the date link (Figure 15-34). The user can save the form at this time and will be brought to the Ventilation Survey form where the next component can be selected to enter measurements for if needed.

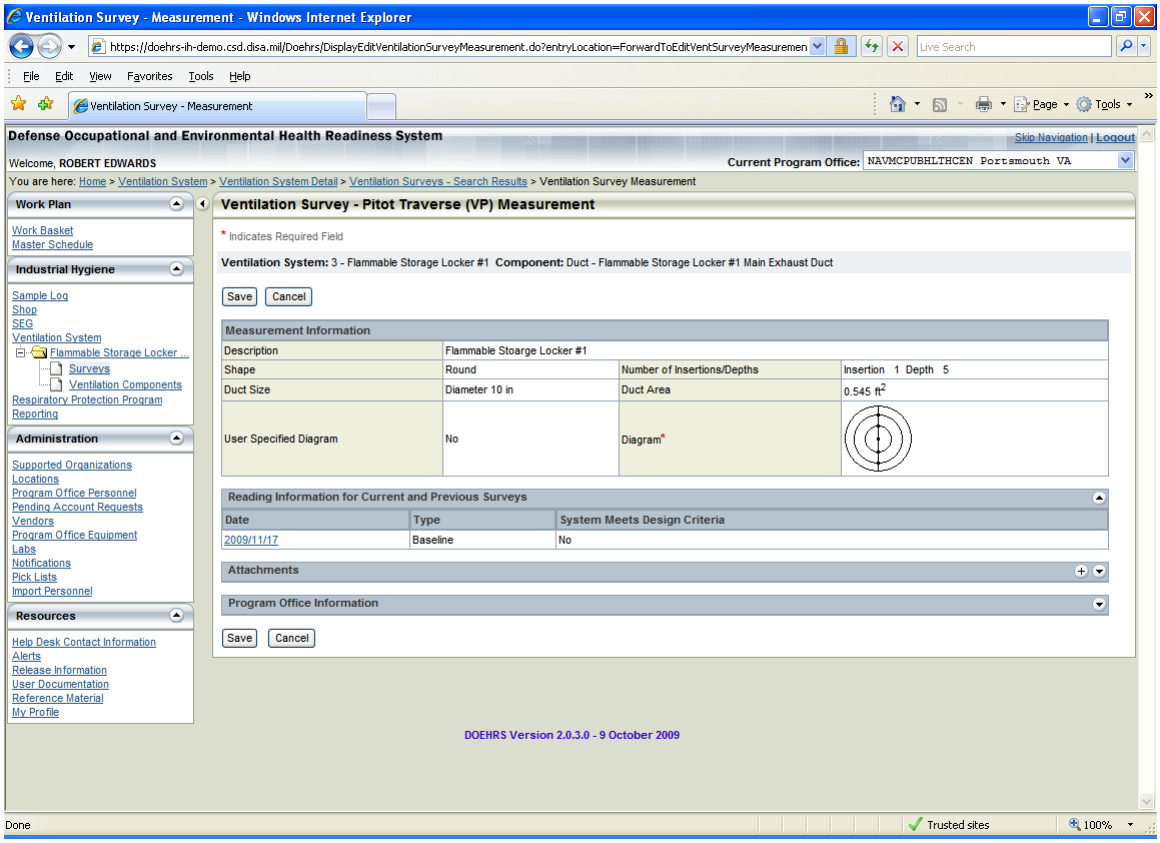

Figure 15-34. Ventilation Survey – Pitot Traverse (VP) Measurement

FACE/CAPTURE VELOCITY MEASUREMENTS*

The next type of ventilation measurements that can be entered are Face/Capture Velocity measurements. The example for Face/Capture Velocity measurements is a movable exhaust hood component used for welding operations. After searching for the appropriate Ventilation Survey the user will click the component name hyperlink to enter measurements on the survey form. Ensure the Program Office Equipment is also selected. An example of the Face/Capture velocity measurement entry data fields are displayed here. The user will enter a ventilation survey description under the Measurement Information tile. **Ensure the user selects whether to include Capture Velocity measurements.** Note the number of measurement points for Face and Capture Velocity must be selected by selecting the number of points on the X and Y axis under the Face and Capture Velocity Measurement Information tile. If personnel select User Specified Diagram the user will enter the Number of Face and Capture Velocity Measurement Points. The tile currently

* This section provided by Navy.

states: Number of Face (Capture) Velocity Measurement Locations. A System change request has been submitted to have the statement read: Number of Face (Capture) Velocity Measurement Points. Also the number of Static Pressure measurement locations must be selected under the Face Velocity Measurement Information tile. Even if you are not conducting static pressure measurements you have to select a number between 1 and 20. **<u>If you are not conducting static pressure measurements, select 1.</u>** A System change request has been submitted to be able to enter '0' for number of static pressure measurements. Under the Capture Velocity Measurement Information tile the user may enter the calculated capture distance for a particular velocity. The user will click on the 'New' hyperlink to add additional measurement information. (Figure 15-35)

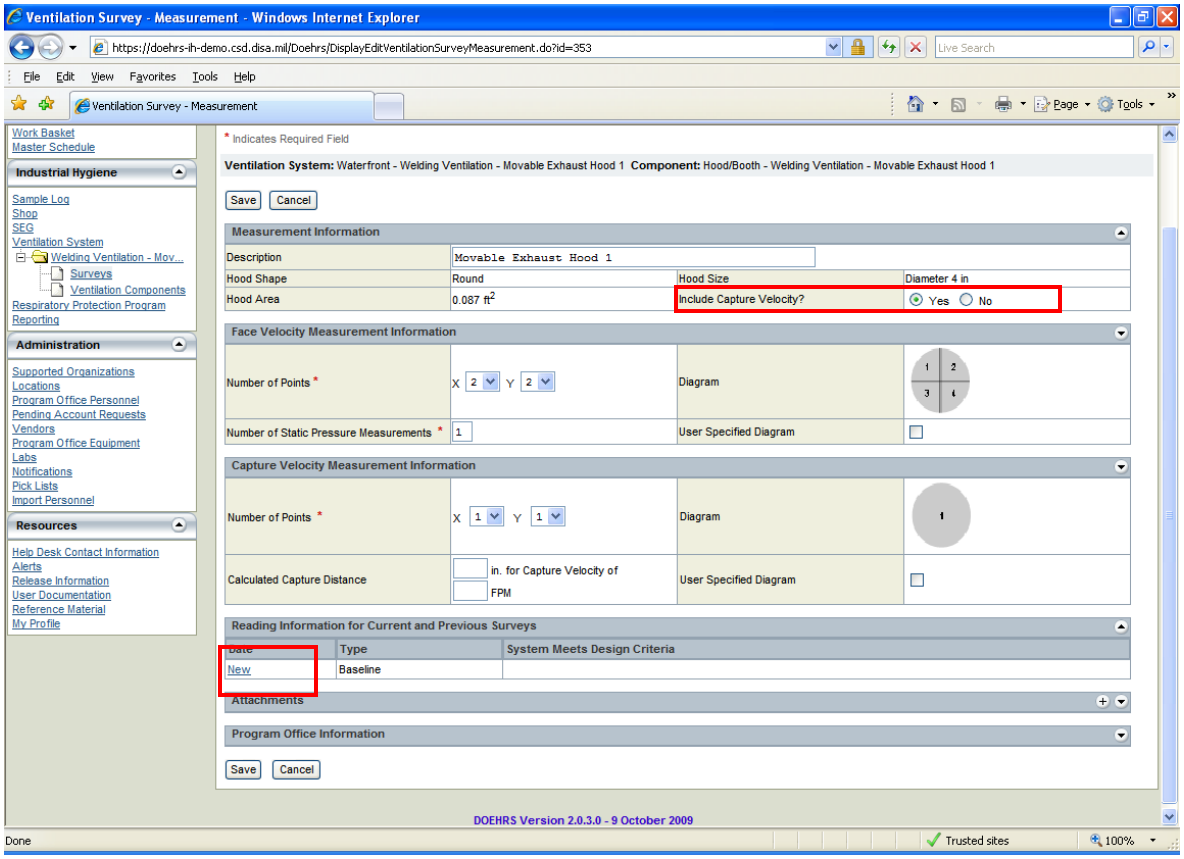

Figure 15-35. Ventilation Survey – Face/Capture Velocity Measurement

The user will need to enter a Measurement Date and select the program office equipment used for the survey in the General Information tile. The user may expand the Design Criteria menu tile to view the specified minimum and maximum values. The user may enter density factors (i.e. elevation, system static pressure, temperature, etc.) for the survey. **<u>Note the density factor defaults to '1,' which would be the factor that would normally be chosen in most cases.</u>**

Expand the Face Velocity Reading Information tile to enter the measurement location for the static pressure measurements if conducted and identify which measurement will be used for periodic check location. Enter the static pressure measurement. Note static

pressure readings are not required to be entered if not conducted. Enter velocity readings conducted.

Expand the Face Velocity Measurement Information tile to calculate the survey readings. Click the calculator icons to calculate the Average Velocity and Volumetric Flow Rate. The user may also enter the ACGIH reference.

Expand the Capture Velocity Reading Information tile and identify which measurements will be used for the periodic check location. Enter the distance from the hood where the measurements were taken. Enter the measured velocity.

Expand the Capture Velocity Measurement Information tile to calculate the survey readings. Click the calculator icon to calculate the average velocity. The user may also enter the ACGIH reference.

Expand the Periodic Check Criteria Information tile to select the appropriate radio button to denote whether the system meets design criteria. The user can view the average velocity and volumetric flow rate at STP in the next tile. Minimum and maximum values for face velocity and volumetric flow rate may also be entered. A System Change Request has been submitted to define the Minimum and Maximum values. These values should be the Minimum and Maximum Acceptable values. The tile should read Minimum Acceptable and Maximum Acceptable. Capture velocity values for minimum and maximum velocity measured, recommended and acceptable may also be entered. (Figure 15-36)

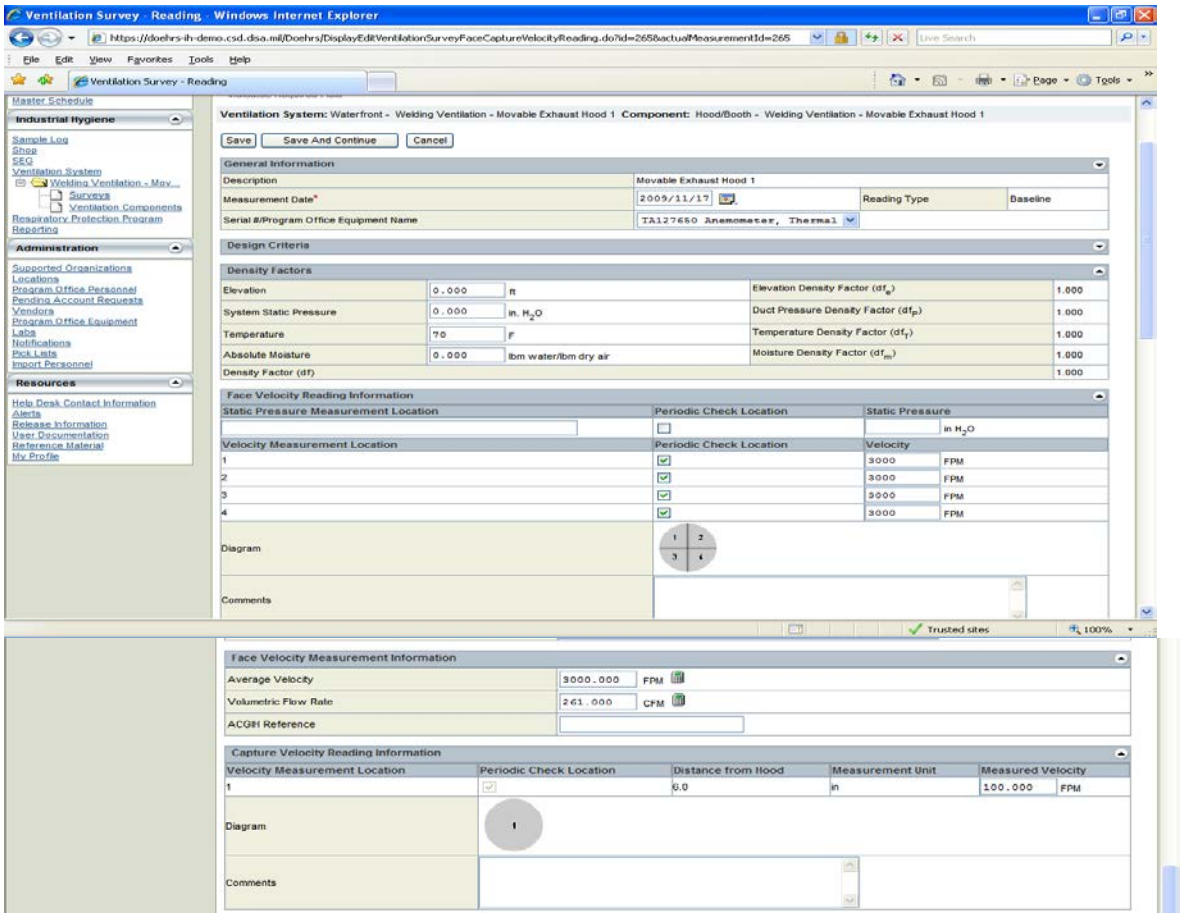

Figure 15-36. Ventilation Survey – Face/Capture Velocity – Readings Information (top of form)

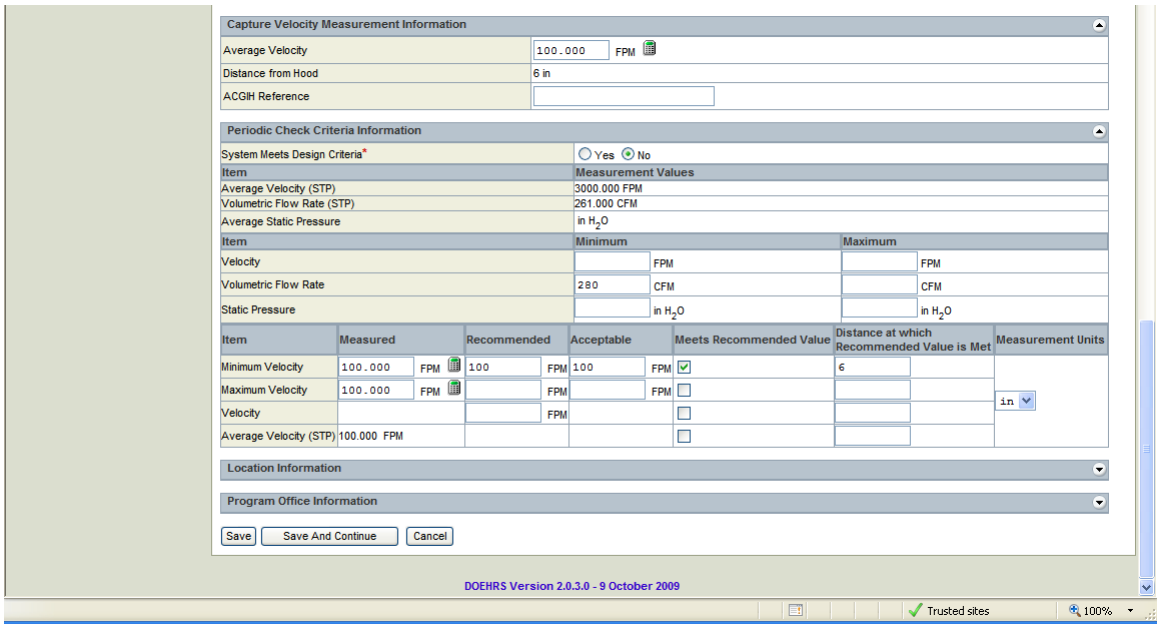

Figure 15-36. Ventilation Survey – Face/Capture Velocity – Readings Information (bottom of form)

Saving the Readings Information screen will return the user to the Ventilation Survey – Measurement form for the selected component. The readings information just entered is accessible by clicking on the date link (Figure 15-37). The user can save the form at this time and will be brought back to the Ventilation Survey form where the next component can be selected to enter measurements for if needed.

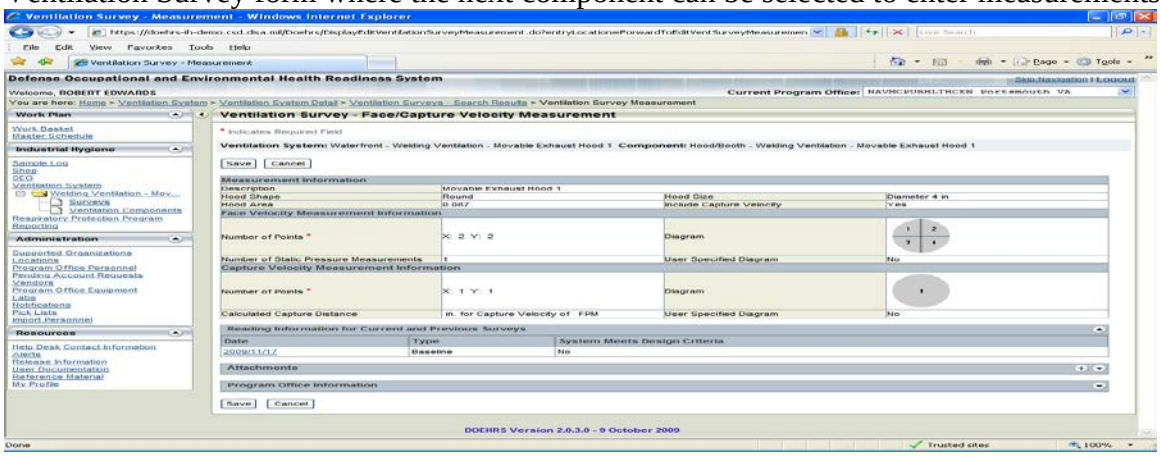

Figure 15-37. Ventilation Survey – Face/Capture Velocity Measurement

DILUTION MEASUREMENTS*

The last type of ventilation measurements that can be entered are Dilution measurements. The ventilation system example presented here for Dilution measurements is Flammable Storage Locker #1. Remember in DOEHRS the ventilation control is at the component level, which is usually a hood/booth when dealing with local exhaust ventilation. However, for Dilution (General) ventilation the control is at the system level because it may involve multiple components (hoods). In dilution measurements the user

* This section provided by Navy.

usually needs to determine the room air changes per hour. This is accomplished by summing the volumetric flow rate for each exhaust or supply component (hoods or ducts) and dividing this total volumetric flow rate by the room volume and multiplying by 60 to determine the exhaust air changes per hour and the supply air changes per hour. The Dilution calculations allows for multiple components (hoods or ducts) with different sizes (hood or duct areas) to be entered under the same dilution calculations in order to determine the air changes for a space. Therefore the component size entered under the Ventilation Component is not used to calculate the volumetric flow rate in the dilution calculations. There may be exhaust components and supply components and the user will need to determine the air changes per hour for exhaust and the air changes per hour for supply.

In order to accomplish this in DOEHRS the user will need to create two dilution surveys, one for exhaust and one for supply. For exhaust components suggest that the user name the component the same name as the ventilation system with the word exhaust hoods (ducts) behind the name. In this example the component is named Flammable Storage Locker #1 Exhaust Hoods. The user would enter the exhaust measurements for the exhaust components and check report exhaust. Again the user will name the supply component the ventilation system name with the word supply diffusers or registers (ducts) after it. In this example the component is named Flammable Storage Locker #1 Supply Diffusers. The user will need to do another (different) dilution measurement survey and enter the supply measurements and check report supply. For dilution measurements you are only able to measure one type of a component at a time. You are either measuring a hood or a duct. In most cases you would be measuring the hood for the dilution measurements. In the case where you measure the hood on one component and the duct on another (for example because you can not reach the hood face), you will just have to put it under one component in the component section and name it the system name with the word exhaust or supply after it and enter the dilution measurements on both components in the dilution measurements section as discussed above. After searching for the appropriate Ventilation Survey the user will click the component name hyperlink to enter measurements on the survey form. Ensure the Program Office Equipment is also selected. (Figure 15-38)

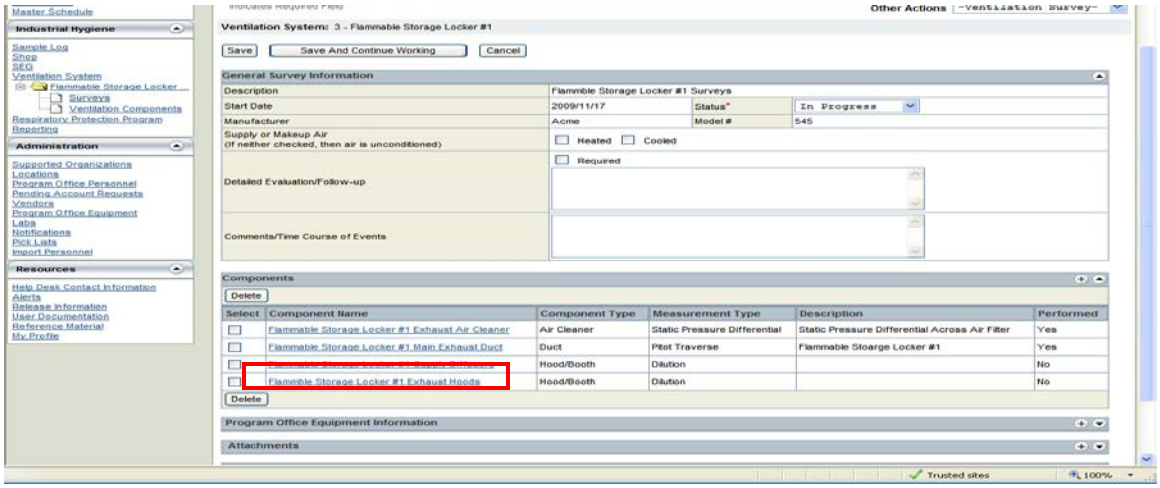

Figure 15-38. Ventilation Survey

An example of the dilution measurement entry data fields are displayed here. **Note a separate dilution survey will be conducted for the exhaust components and the supply components.** We will start with the exhaust components in this example. The user will enter a ventilation survey description under the Measurement Information tile. A diagram of the space may also be uploaded. The user will then enter the dimensions of the room (space) and then click the calculator icon to calculate the Room Volume. Note the Room Volume can be entered directly for irregular shaped rooms. The user will then click on the 'New' hyperlink to add additional measurement information. (Figure 15-39)

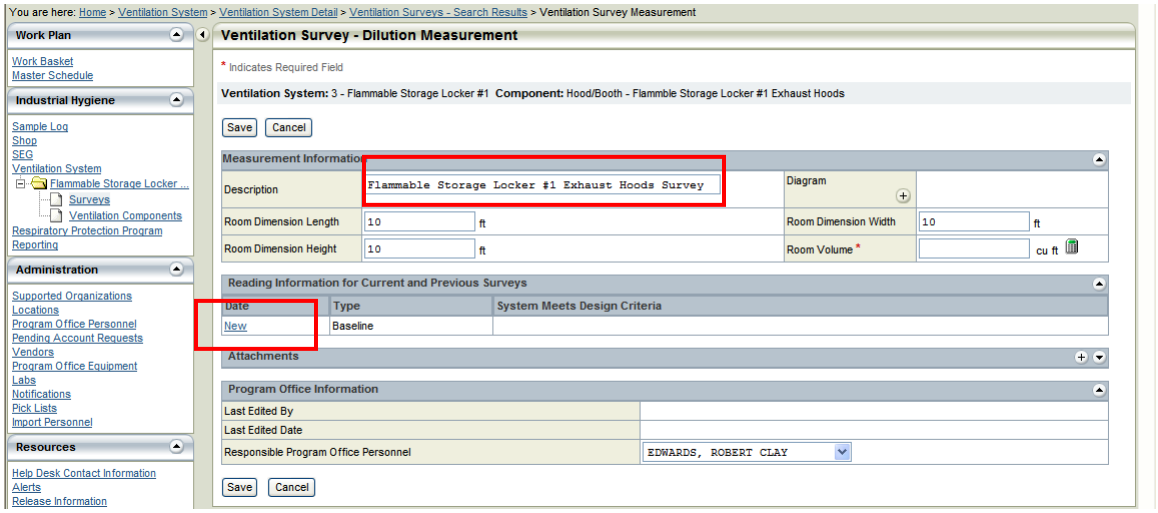

Figure 15-39. Ventilation Survey – Dilution Measurement

The user will need to enter a Measurement Date and select the program office equipment used for the survey in the General Information tile. Also select whether the equipment automatically corrects for temperature's effect on density. The user may expand the Design Criteria menu tile to view the specified minimum and maximum values. The user may enter density factors (i.e. elevation, system static pressure, temperature, etc.) for the survey. **Note the density factor defaults to '1,' which would be the factor that would normally be chosen in most cases.**

Expand the Reading Information tile to enter the location for the static pressure measurement and the static pressure reading if conducted. Select the appropriate radio button to specify whether the air changes per hour to report are Exhaust or Supply. In this example Exhaust is selected.

Expand the Exhaust Measurement Information tile and select the appropriate radio button whether the volumetric flow rate (Q) will be derived from the velocity measurements (Calculate Q) or whether the volumetric flow rate will be measured directly using a flow hood (Measure Q Directly). The system will not allow for a mixture of Calculate Q values or Measure Q Directly values. All measurements have to be one or the other. The user selects Calculate Q in this example and clicks on the '+' symbol to add components to be measured. (Figure 15-40)

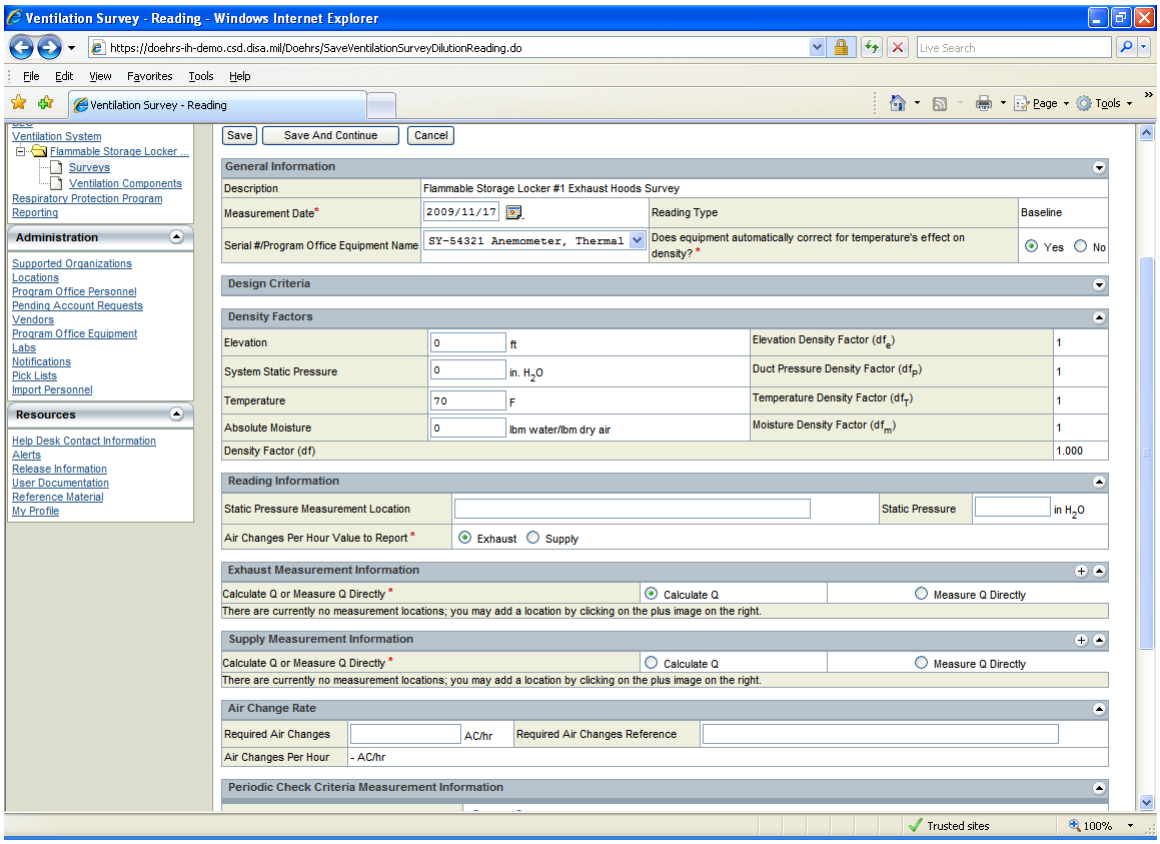

Figure 15-40. Ventilation Survey – Dilution Readings Information

After selecting the Calculate Q and clicking on the '+' symbol, the Enter Dilution Measurement Location Reading screen will appear. Under the Measurement Location Reading the user will enter the Location (component) name. In this example the user enters Hood 1. The user will then check the periodic check location. Under Calculate Q the user will select the Opening Type whether 'Round' or 'Square'. A System change request has been submitted to add 'Other' for the Opening Type so the Opening Area can be entered directly for irregular shaped openings. Also a request has been submitted to change 'Square' to 'Square or Rectangular'. Once the Opening Size has been entered the user clicks the calculator icon to calculate the Opening Area. Note the Opening Size is only in inches. A change request has been submitted to also be able to select feet. The user then enters the Velocity Reading of the Instrument. **Note only one velocity reading can be entered. The user should enter the average velocity reading.** A System change request has been submitted to allow for multiple velocity readings and then for these values to be averaged. Note because Measure Q Directly was not chosen the measurement area is shaded and can not be entered. (Figure 15-41)

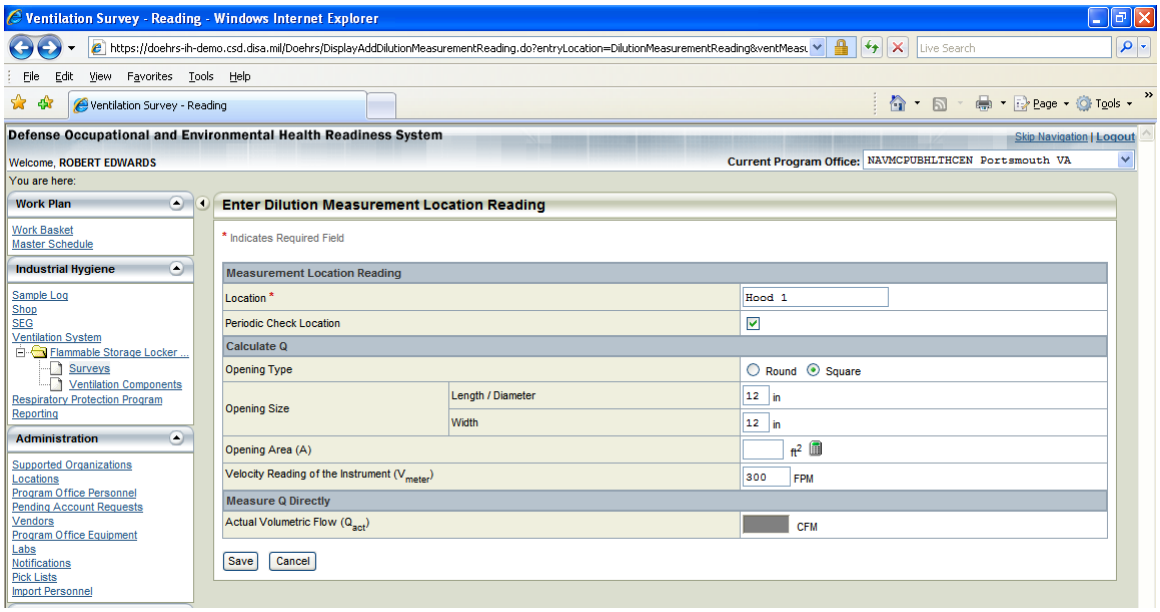

Figure 15-41. Enter Dilution Measurement Location Reading

After saving the user goes back to the Ventilation Survey - Dilution Readings Information screen and the values are displayed and the volumetric flow rate and air changes per hour are automatically calculated. The user then can add more components by clicking on the '+' symbol and following the steps described above. Once all of the components and measurements have been entered the user will be at the Ventilation Survey – Dilution Readings Information screen. (Figure 15-42) In this example three hoods were measured. The Total Q was calculated and the Air Changes per Hour were calculated. The Air Change Rate required and reference can be entered by expanding the Air Change Rate tile. Expand the Periodic Check Criteria Measurement Information tile to select the appropriate radio button to denote whether the system meets design criteria. Minimum and maximum values may also be entered. The appropriate radio button may be selected for the Room Pressure Relative to the Outside and the Pressure Differential may be entered.

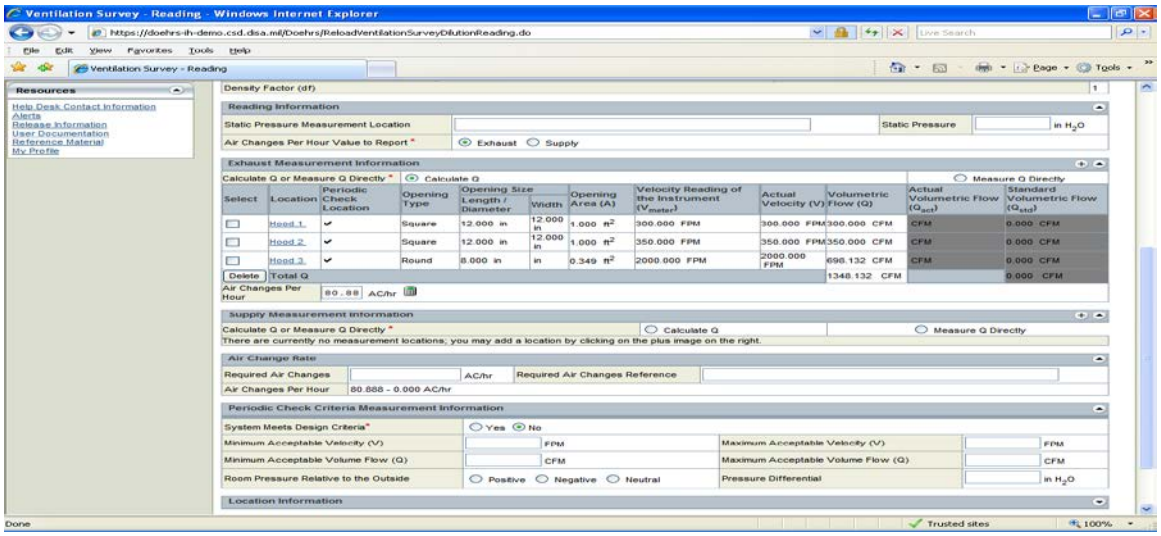

Figure 15-42. Ventilation Survey – Dilution Readings Information

Saving the Readings Information screen will return the user to the Ventilation Survey – Measurement form for the selected component. The readings information just entered is accessible by clicking on the date link (Figure 15-43).

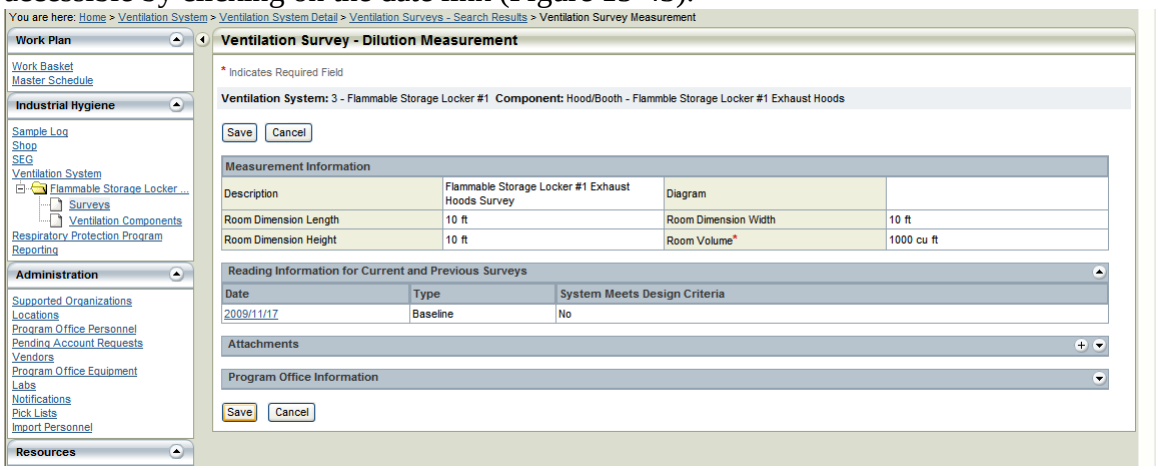

Figure 15-43. Ventilation Survey – Dilution Measurement

The user can save the form at this time and will be brought back to the Ventilation Survey form where the next component can be selected to enter measurements for if needed. (Figure 15-44) In this example the Flammable Storage Locker #1 Supply Diffusers still need to be measured. The user will click the component name hyperlink to enter measurements on the survey form. Ensure the Program Office Equipment is also selected. In this case the '+' symbol is clicked to add more equipment.

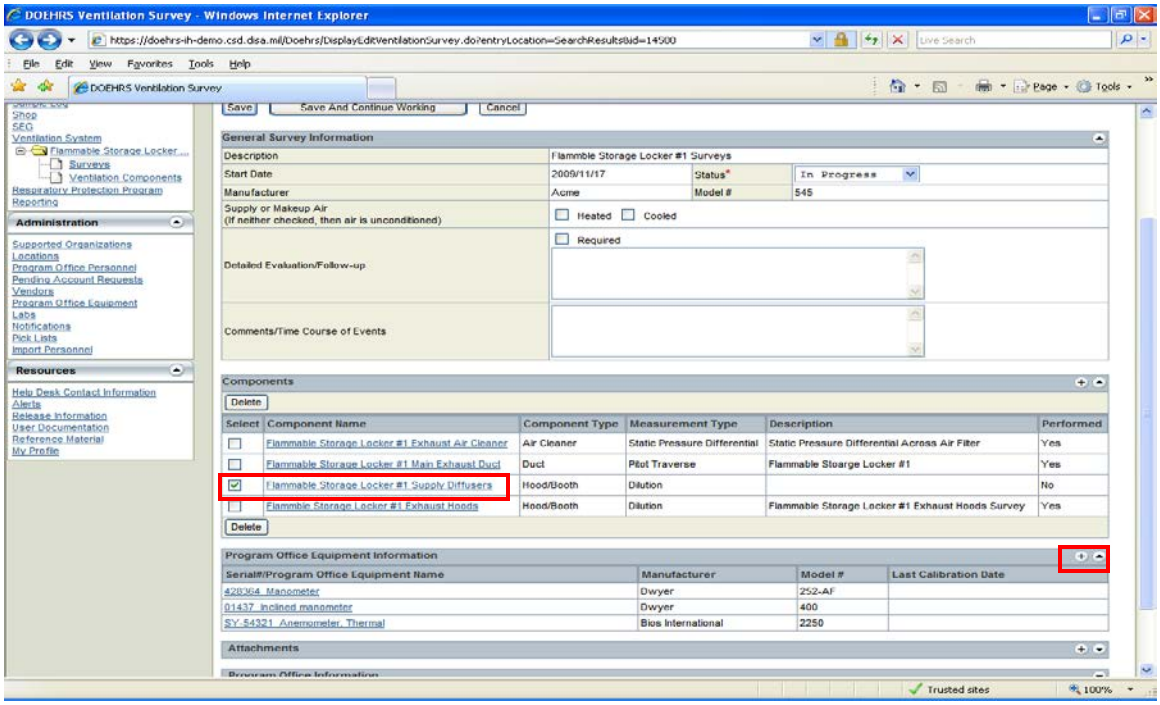

Figure 15-44. Ventilation Survey

In the example below a flow hood is selected to measure the volumetric flow rate directly (Measure Q Directly) for the supply diffusers. (Figure 15-45)

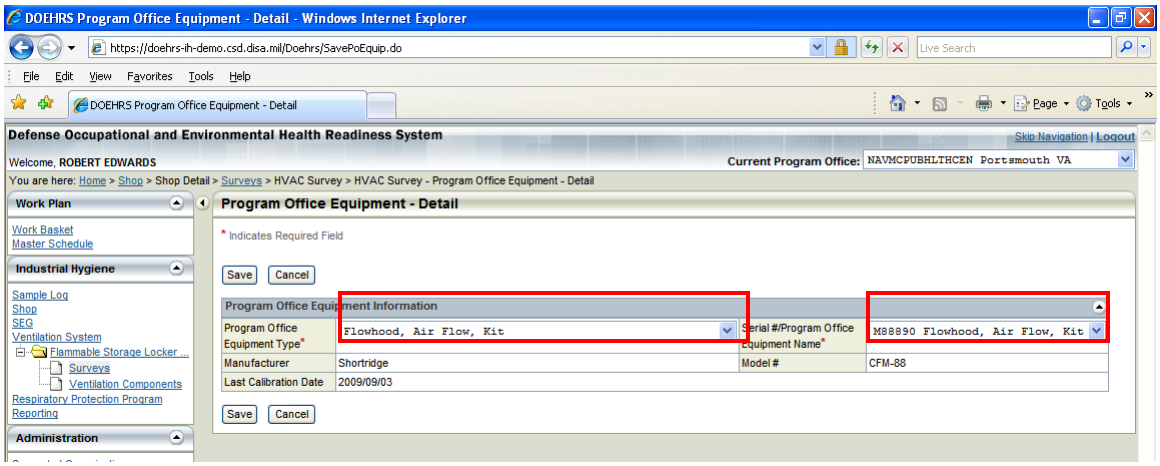

Figure 15-45. Program Office Equipment

After the user clicks the component name hyperlink the dilution measurement entry data fields are displayed. The user will enter a ventilation survey description under the Measurement Information tile. A diagram of the space may also be uploaded. The user will then enter the dimensions of the room (space) and then click the calculator icon to calculate the Room Volume. Note the Room Volume can be entered directly for irregular shaped rooms. The user will then click on the 'New' hyperlink to add additional measurement information. (Figure 15-46)

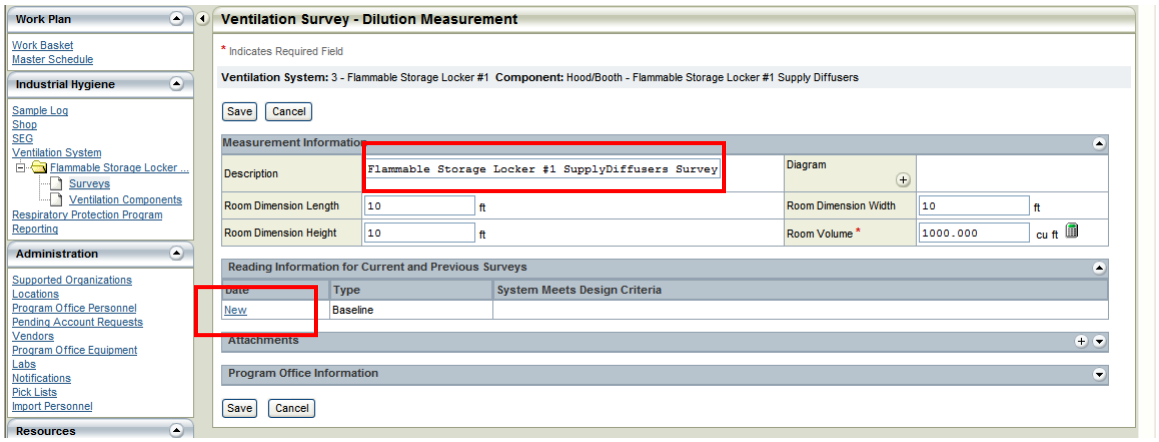

Figure 15-46. Ventilation Survey – Dilution Measurement

The user will need to enter a Measurement Date and select the program office equipment used for the survey in the General Information tile. Also select whether the equipment automatically corrects for temperature's effect on density. The user may expand the Design Criteria menu tile to view the specified minimum and maximum values. The user may enter density factors (i.e. elevation, system static pressure, temperature, etc.)

for the survey. **<u>Note the density factor defaults to '1,' which would be the factor that would normally be chosen in most cases.</u>**

Expand the Reading Information tile to enter the location for the static pressure measurement and the static pressure reading if conducted. Select the appropriate radio button to specify whether the air changes per hour to report are Exhaust or Supply. In this example Supply is selected.

Expand the Supply Measurement Information tile and select the appropriate radio button as to whether the volumetric flow rate (Q) will be derived from the velocity measurements (Calculate Q) or whether the volumetric flow rate will be measured directly using a flow hood (Measure Q Directly). The system will not allow for a mixture of Calculate Q values or Measure Q Directly values. All measurements have to be one or the other. The user selects Measure Q Directly in this example and clicks on the '+' symbol to add components to be measured. (Figure 15-47)

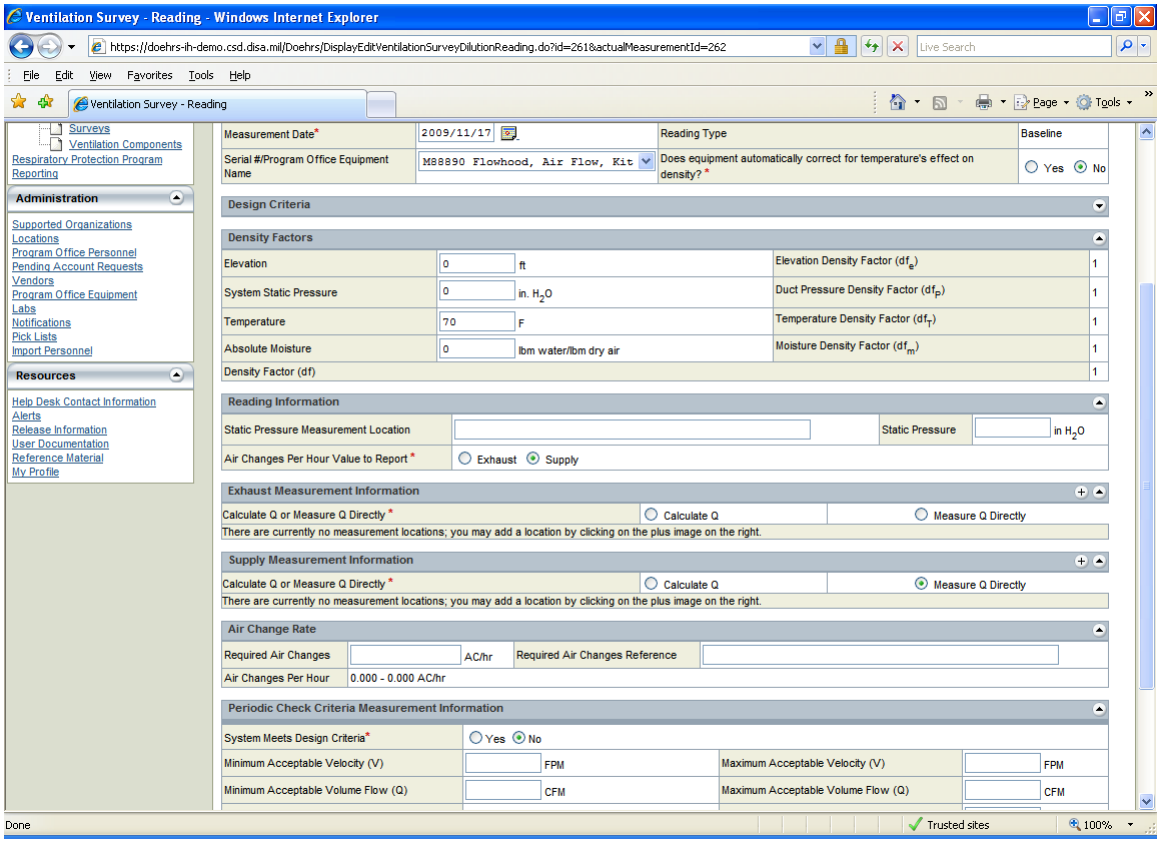

Figure 15-47. Ventilation Survey – Dilution Readings Information

After selecting the Measure Q Directly and clicking on the '+' symbol, the Enter Dilution Measurement Location Reading screen will appear. Under the Measurement Location Reading the user will enter the Location (component) name. In this example the user enters Diffuser 1. The user will then check the periodic check location. Under Measure Q Directly the user will enter the volumetric flow rate. Note because Calculate Q was not chosen the measurement area is shaded and can not be entered. (Figure 15-48)

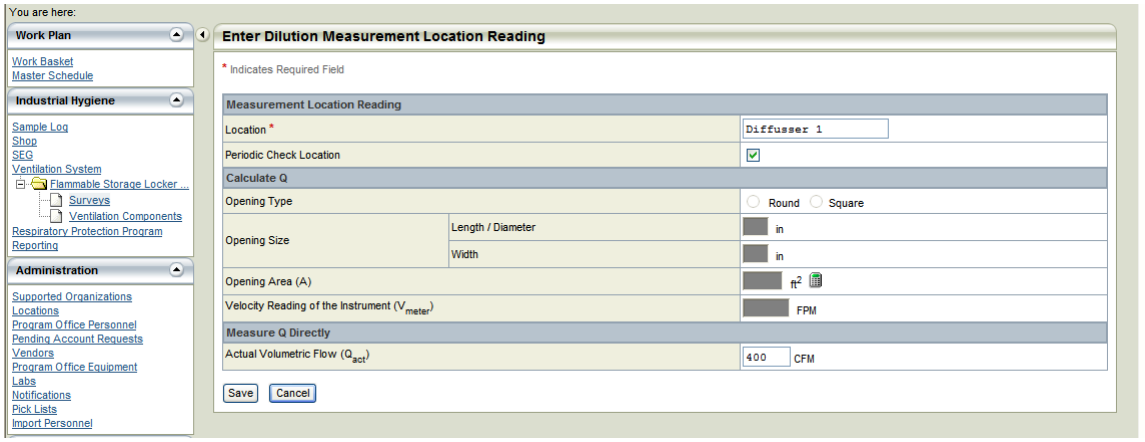

Figure 15-48. Enter Dilution Measurement Location Reading

After saving the user goes back to the Ventilation Survey - Dilution Readings Information screen and the values are displayed and the volumetric flow rate and air changes per hour are automatically calculated. The user then can add more components by clicking on the '+' symbol and following the steps described above. Once all of the components and measurements have been entered the user will be at the Ventilation Survey – Dilution Readings Information screen. (Figure 15-49) In this example three diffusers were measured. The Total Q was calculated and the Air Changes per Hour were calculated. The Air Change Rate required and reference can be entered by expanding the Air Change Rate tile. Expand the Periodic Check Criteria Measurement Information tile to select the appropriate radio button to denote whether the system meets design criteria. Minimum and maximum values may also be entered. The appropriate radio button may be selected for the Room Pressure Relative to the Outside and the Pressure Differential may be entered.

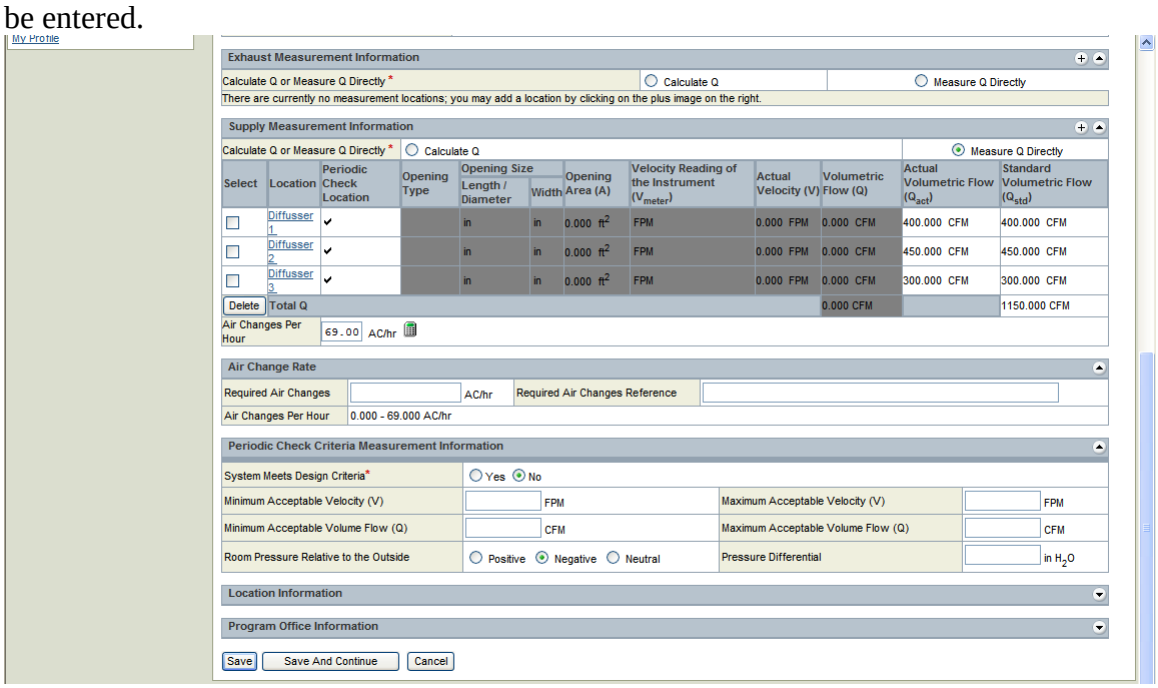

Figure 15-49. Ventilation Survey – Dilution Readings Information

Saving the Readings Information screen will return the user to the Ventilation Survey – Measurement form for the selected component. The readings information just entered is accessible by clicking on the date link (Figure 15-50).

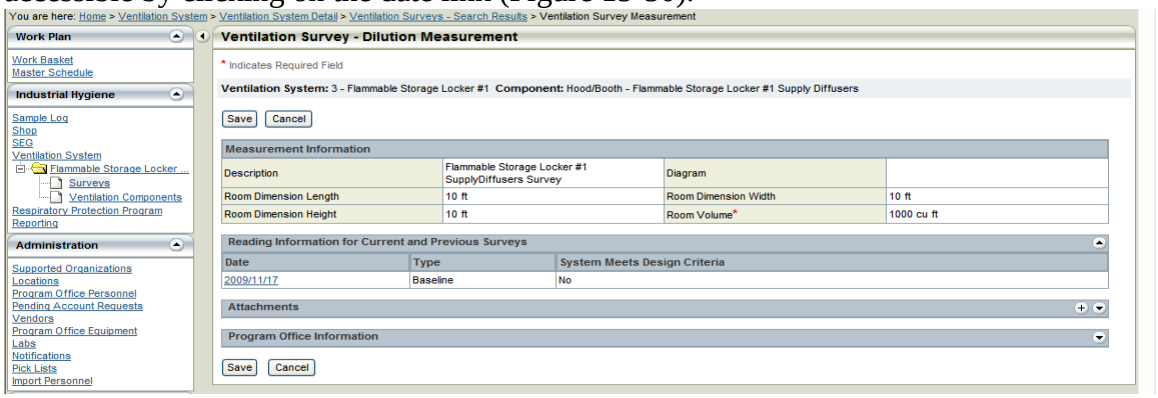

Figure 15-50. Ventilation Survey – Dilution Measurement

The user can save the form at this time and will be brought back to the Ventilation Survey form where the next component can be selected to enter measurements for if needed. Note in this example all of the components scheduled to be surveyed have been surveyed. (Figure 15-51)

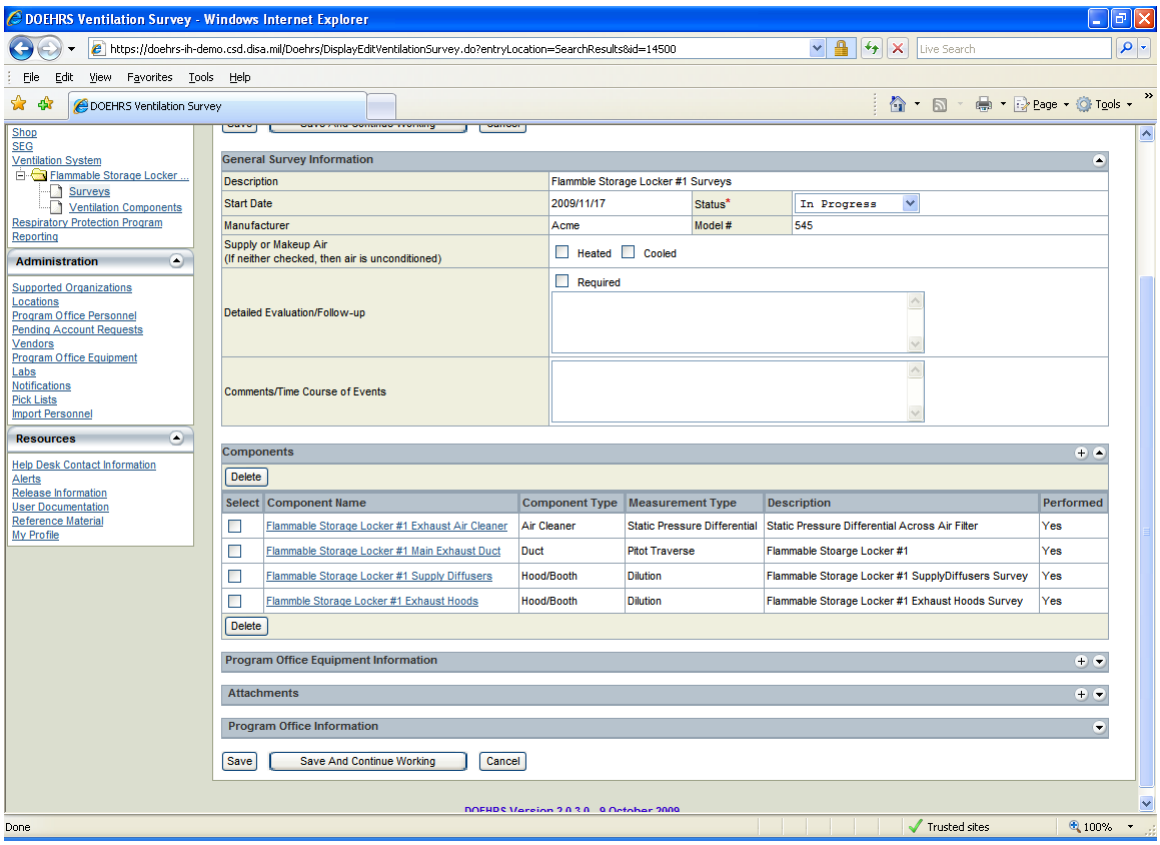

Figure 15-51. Ventilation Survey

QUALITY ASSURANCE*

After all component surveys have been entered. The user may change the Status to Ready for QA. (Figure 15-52) **Ensure appropriate personnel have been assigned the QA role (usually supervisors) under the Program Office Personnel Program Office Information tile Permission.**

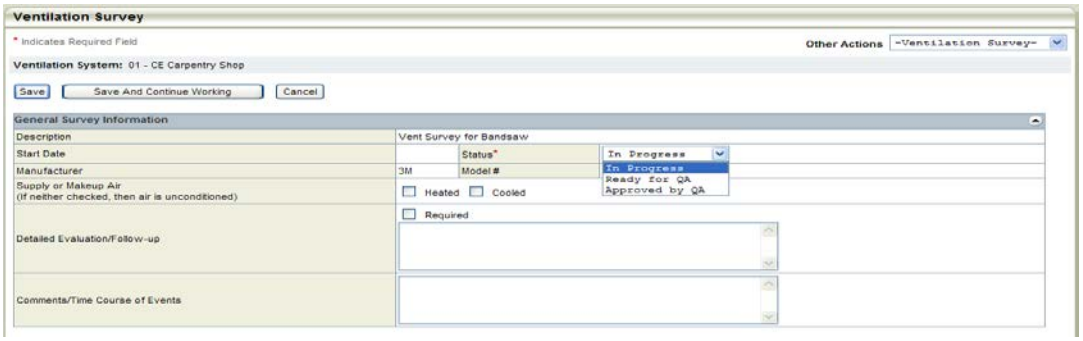

Figure 15-52. Ventilation Survey (General Survey Information)

The user may then select the survey and press the Ready for QA Review button. When the user saves a survey as Ready for QA Review, the survey becomes read only to an IH user without the QA role. **A System Change Request has been submitted to allow the user to select the QA person to review their survey. Suggest that after selecting 'Ready for QA', a drop down menu appears listing personnel within your program office who have been assigned the QA role. The user then selects the appropriate QA person and then the survey goes to the Work Basket for that QA person. Until there is a QA notification feature added in DOEHRS, the QA person must be notified outside of DOEHRS.** Also, if the survey is a periodic survey, the next periodic survey is scheduled at this time. (Figure 15-53) **The next periodic survey is based on the 'Close Date' of the baseline survey. A System Change Request has been submitted to schedule the next periodic survey based on the measurement date. Therefore, the next periodic survey will automatically adjust based on subsequent periodic survey measurement dates. Until the System Change Request is implemented, the periodic survey date will have to be changed based on the survey measurement date.**

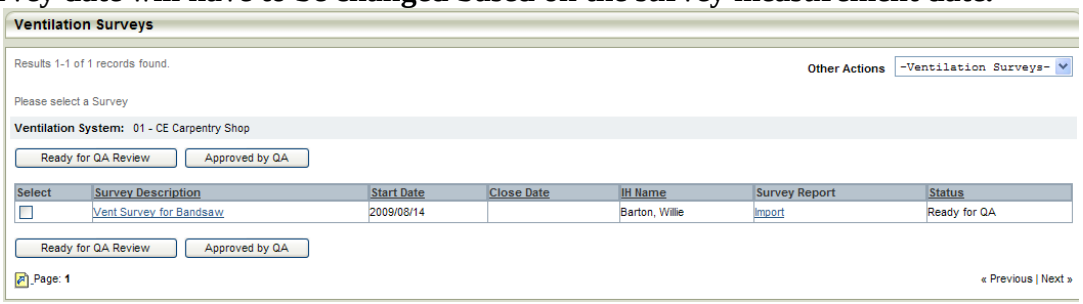

Figure 15-53. Ventilation Surveys (Ready for QA)

Once the QA has been accomplished the record can be marked as Approved by QA. When the QA user saves a survey with the Approved by QA status, the measurement

* Text in bold provided by Navy.

readings in the survey are made available in the Ventilation Survey Summary Report. (Figure 15-54)

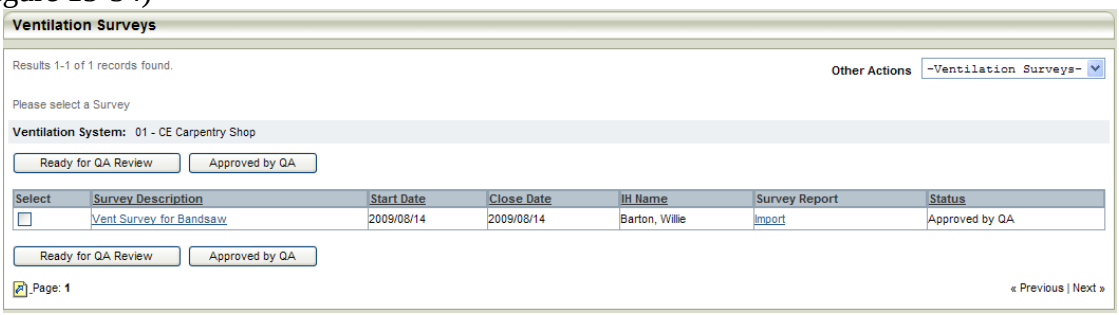

Figure 15-54. Ventilation Surveys (Approved by QA)

REPORTING (VENTILATION SUMMARY REPORT)

The user may create Ventilation Summary Reports. By clicking the "Reporting' hyperlink under the IH Menu Tile users gain access to the Create Ventilation Survey Summary Report hyperlink. (Figure 15-55)

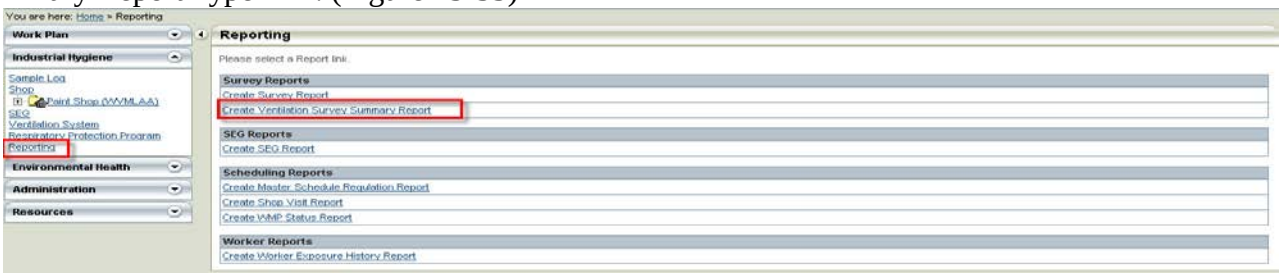

Figure 15-55. Reporting

Users will search for the ventilation system they desire a summary report for. (Figure 15-56)

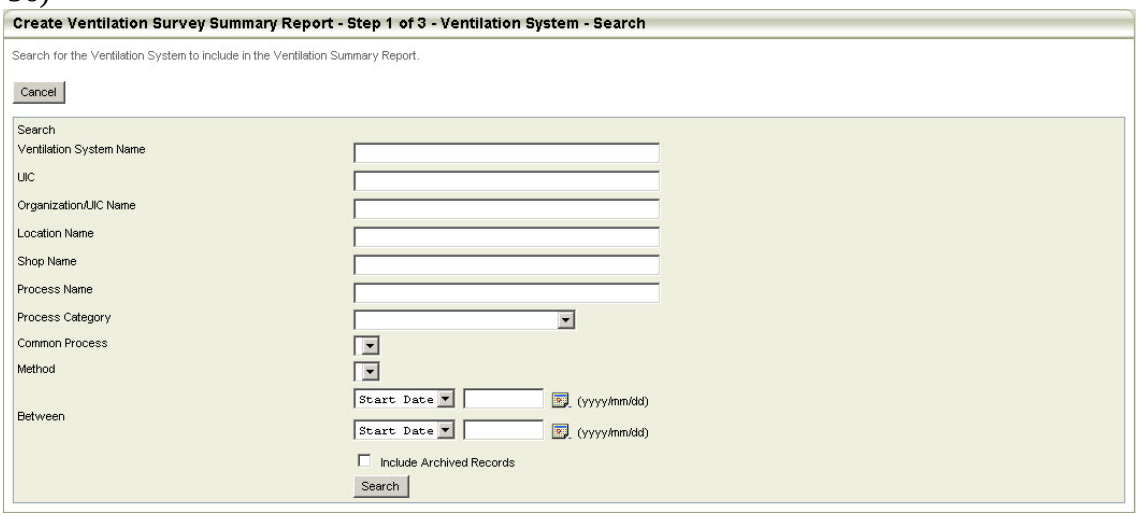

Figure 15-56. Create Ventilation Survey Summary Report – Step 1 of 3 – Ventilation System - Search

The user will select the ventilation system from the search results in step 2 and enter the survey date ranges in step 3. The generated report may then be exported as either an RTF or PDF file. (Figure 15-57)

Ventilation Survey - Summary Report

Ventilation System: GEM 100 - Large Drive In Paint Booth
Report Date Range: 2009/08/02-2009/08/02

Export As .rtf | Export As .pdf | Cancel

Exhaust Component	Survey Date	Survey Type	Duct Static Pressure (in H2O)	Duct Velocity	Duct Q	Hood Static Pressure(in H2O)	Hood Face Velocity (fpm)	Hood Q (cfm)	Hood Capture Velocity (fpm)	Speed (rpm)	SP Pressure Differential across filter(s) (in H2O)	Dilution Measurement	
												Air Changes Per Hour	Static Pressure (in H2O)
Stack - Test Stack1 Large Paint Booth													
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
	2009/08/02	Baseline	0.500										
Fan - Test Paint Booth Fan													
	2009/08/02	Baseline								7200			
Air Cleaner - Test Paint Booth Filter Bank													
	2009/08/02	Baseline									0.52		

Supply Component	Survey Date	Survey Type	Duct Static Pressure (in H2O)	Duct Velocity	Duct Q	Hood Static Pressure(in H2O)	Hood Face Velocity (fpm)	Hood Q (cfm)	Hood Capture Velocity (fpm)	Speed (rpm)	SP Pressure Differential across filter(s) (in H2O)	Dilution Measurement	
												Air Changes Per Hour	Static Pressure (in H2O)
No records found.													

Export As .rtf | Export As .pdf | Cancel

Figure 15-57. Ventilation Survey – Summary Report

REPORTING (VENTILATION SURVEY REPORT)*

To Generate a Report for a particular survey date the user will search for the ventilation system they desire a report for. (Figure 15-58)

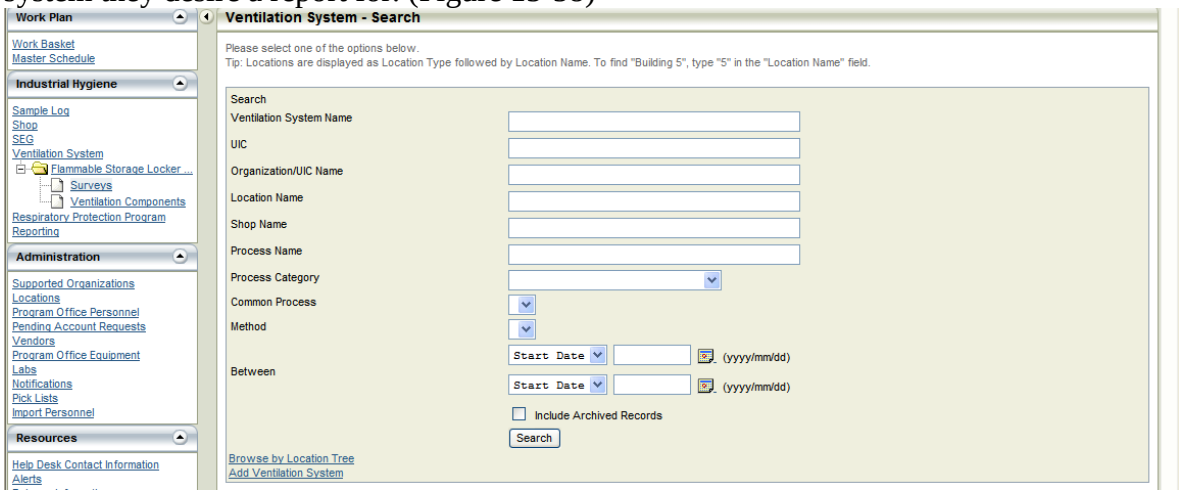

Figure 15-58. Ventilation System - Search

* This section provided by Navy.

The user will then select the ventilation system. (Figure 15-59)

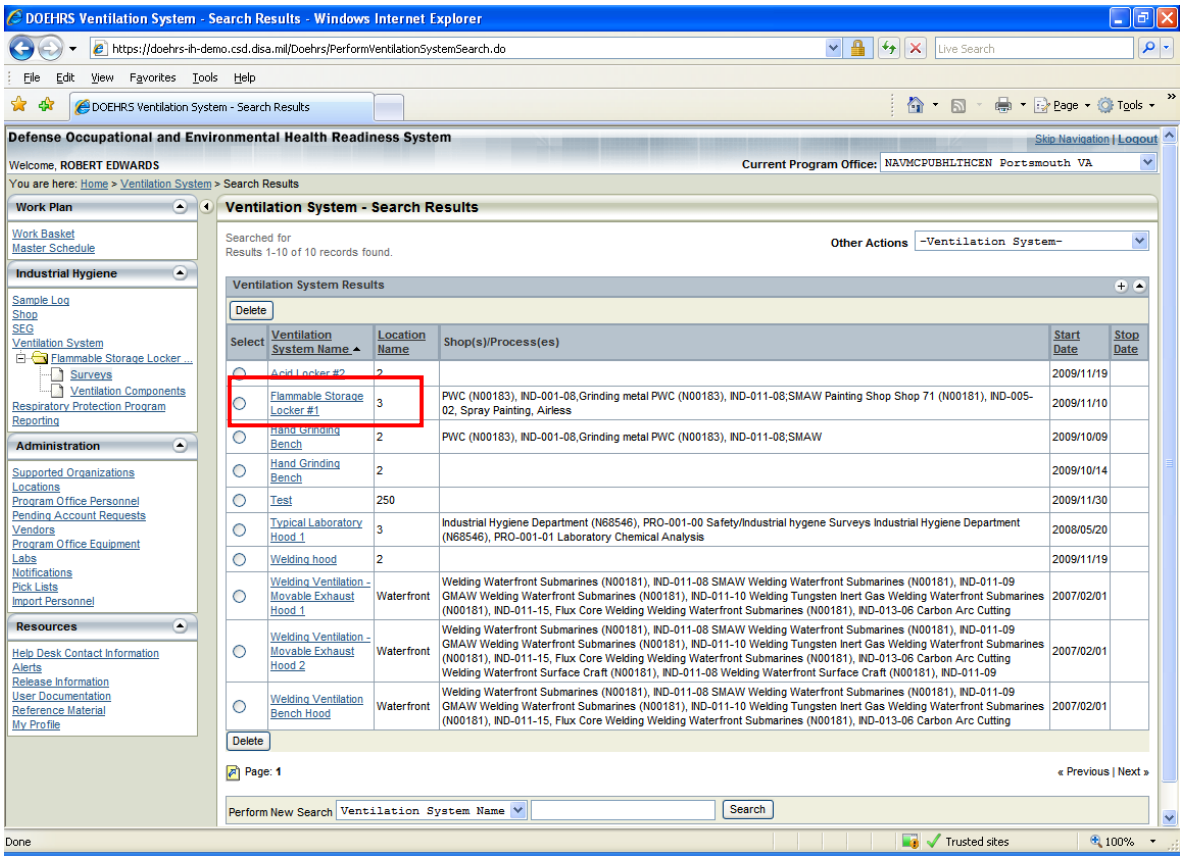

Figure 15-59. Ventilation System – Search Results

The user will then click on Surveys on the left navigation tree. (Figure 15-60)

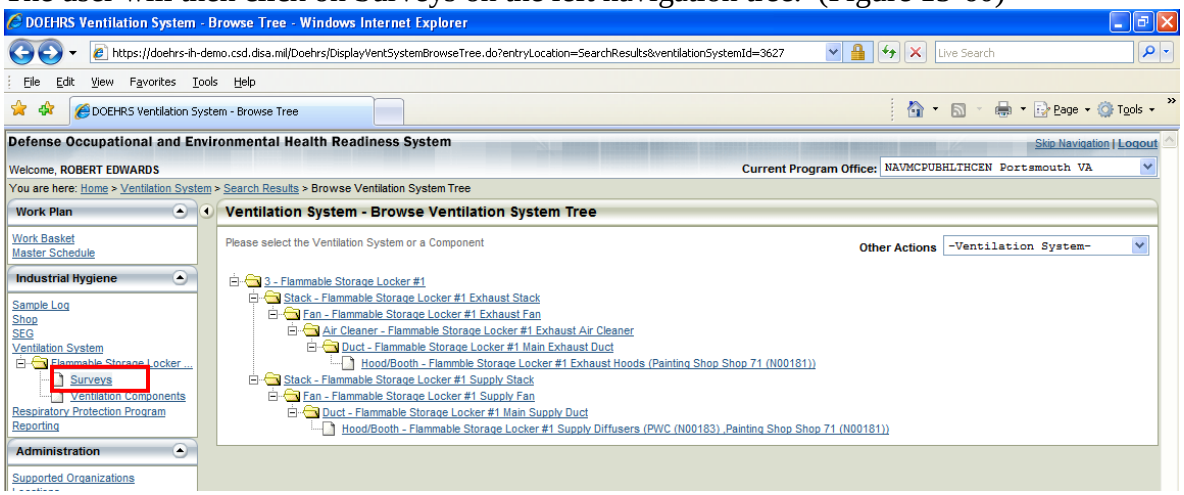

Figure 15-60. Ventilation System – Browse Ventilation System Tree

The user will then select the appropriate survey by the date they wish to generate a report for. (Figure 15-61)

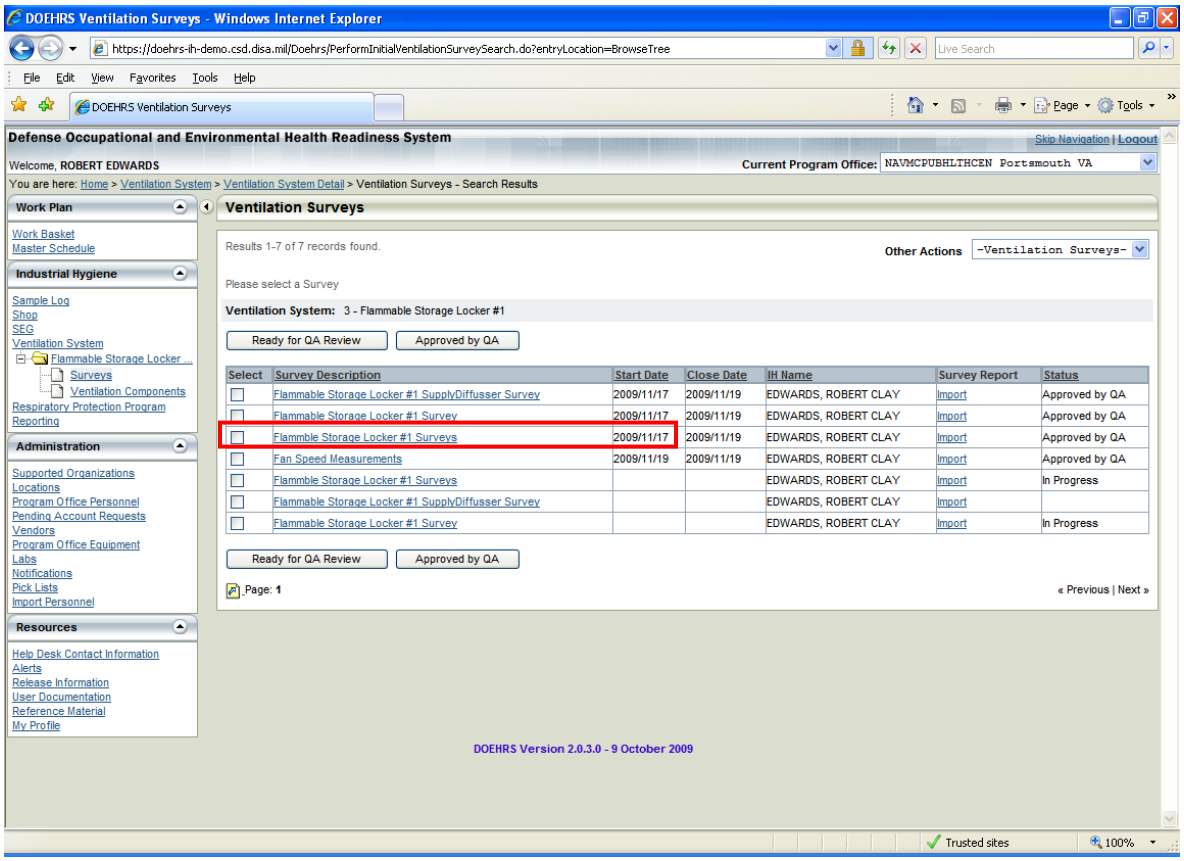

Figure 15-61. Ventilation Surveys

The ventilation survey is then displayed and the user will select Generate Report under Other Actions. (Figure 15-62)

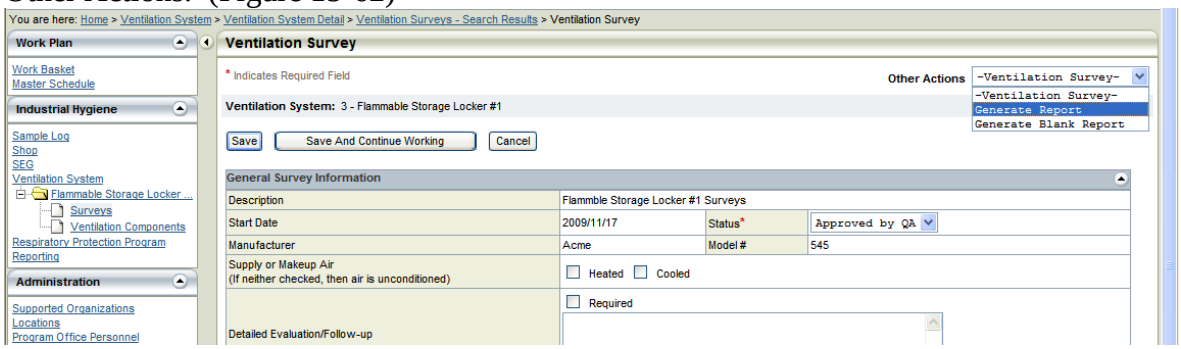

Figure 15-62. Ventilation Survey

The Ventilation Survey Report is displayed and can be exported as either an RTF or PDF file. (Figure 15-63)

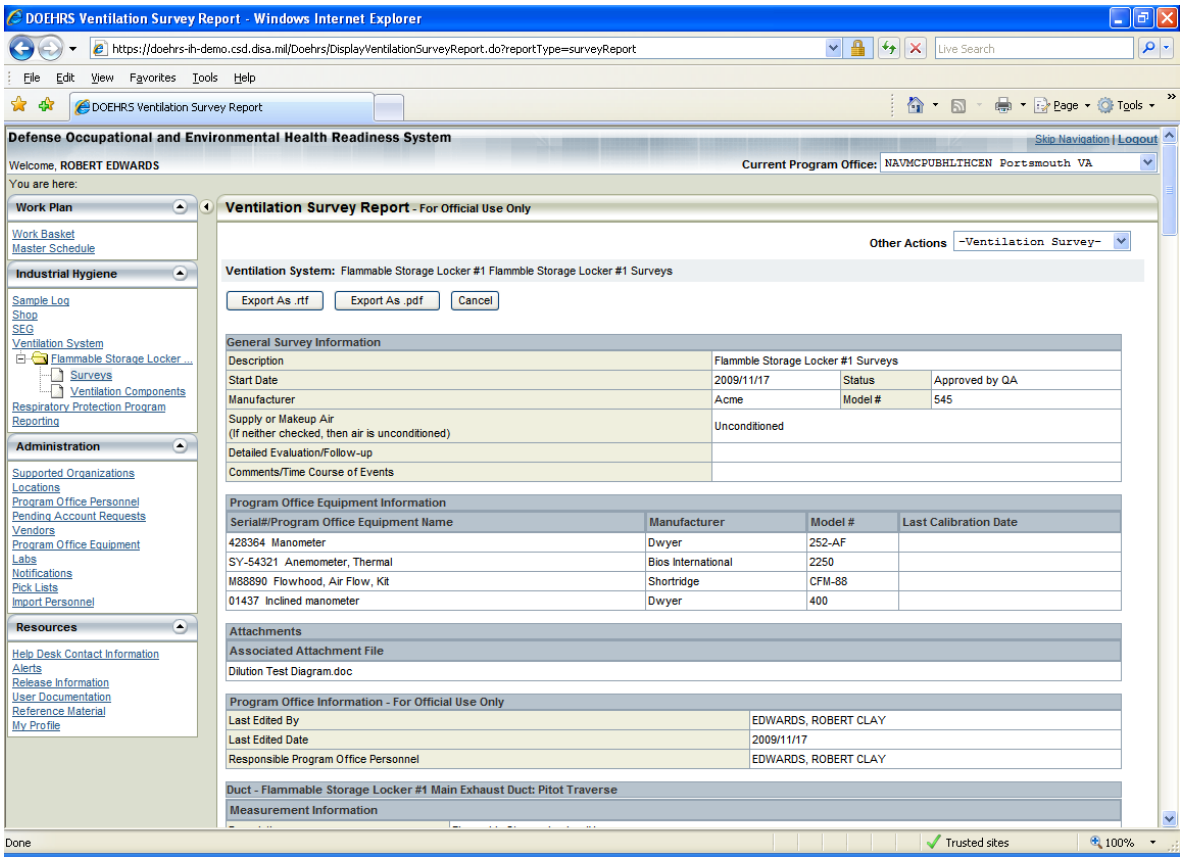

Figure 15-63 Ventilation Survey Report

REBASELINING A VENTILATION SYSTEM

DOEHRS provides the user with the ability to rebaseline a ventilation system. The basic concept is that if a ventilation system changes, then a new baseline survey must be conducted. There are situations where the physical ventilation system does not change, but the representation of the ventilation system within DOEHRS may change. For this reason, changing or adding a component in DOEHRS does not automatically rebaseline the ventilation system.

- When adding a component to a ventilation system, DOEHRS will determine if a survey has been conducted on the ventilation system. If a survey has been conducted, DOEHRS will ask the user if by adding the component is rebaselining the ventilation system necessary. If a survey has not been conducted on the ventilation system, DOEHRS will assume that the user is creating a new ventilation system.
- When editing a component to a ventilation system, such as stop dating the control for a process or adding a process to control, DOEHRS will execute the same logic for rebaselining as adding a ventilation system.
- DOEHRS provides the user a means to add a component to an existing survey without rebaselining the ventilation system. The user has the opportunity to record baseline measurements for the newly added component without disturbing the existing cycle for periodic surveys.

- When a new baseline is created, DOEHRS will remove all unperformed periodic surveys from the Master Schedule for the ventilation system. No new periodic surveys will be performed until the user creates a new baseline survey.
- If a ventilation system has been rebaselined, only the latest baseline is presented when generating a Ventilation Survey Summary Report.

For the example below, provided by the Navy, previous ventilation survey measurements had been conducted on Flammable Storage Locker #1, however the supply fan was not measured at that time. Since that survey, measurements were conducted on the supply fan; however this component had not been added to DOEHRS. Therefore this component needs to be added into DOEHRS for this ventilation system. After searching for the ventilation system and selecting the system, the user selects Add Ventilation Component under the drop-down menu for 'Other Actions.' (Figure 15-64)

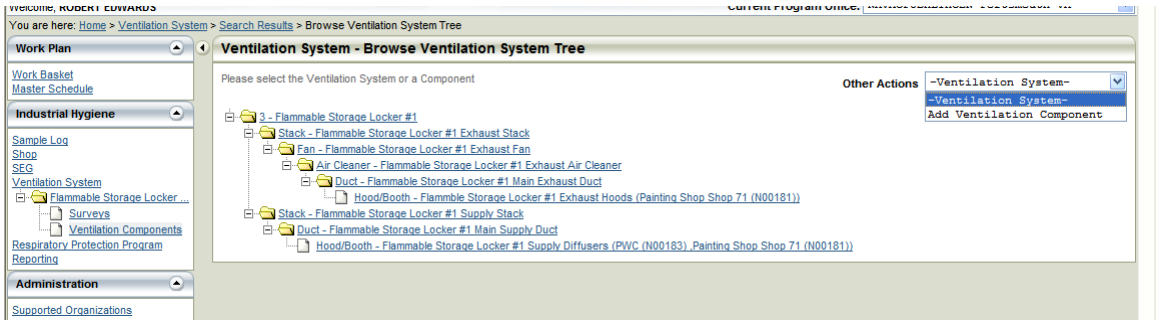

Figure 15-64. Ventilation System – Browse Ventilation System Tree

The user selects the component type and selects whether it is a control. (Figure 15-65)

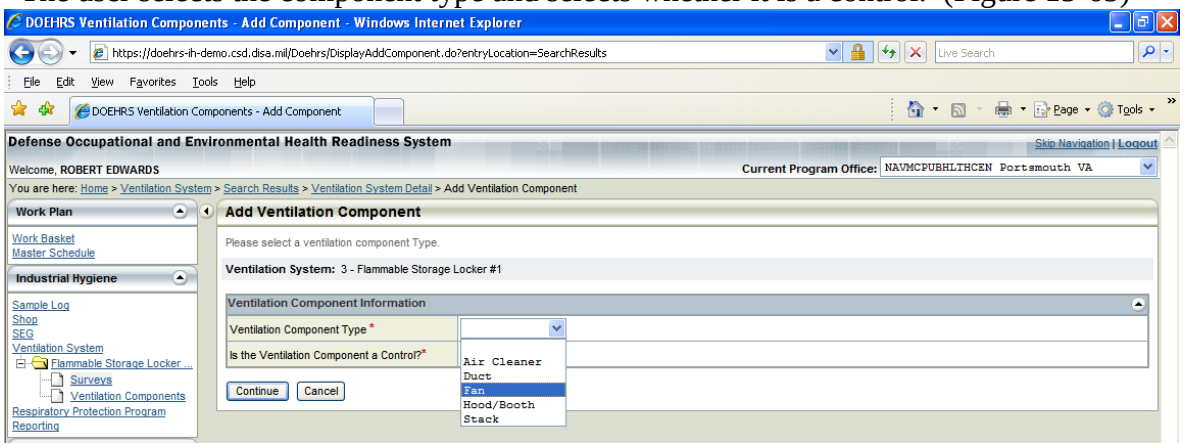

Figure 15-65. Add Ventilation Component

After filling in the required fields for the Ventilation Component – Fan – Detail and saving the information the user is prompted to 'Click OK to rebaseline all surveys associated with this ventilation system or click Cancel'. In this case the user would click Cancel which means the system will not be rebaselined. (Figure 15-66)

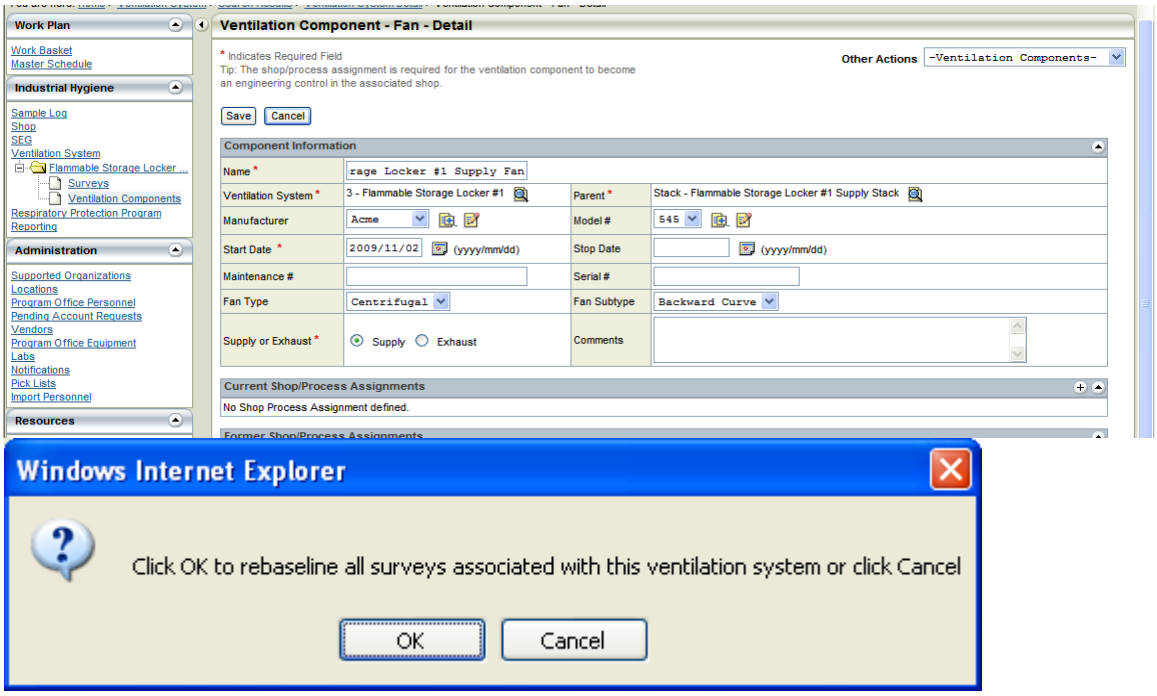

Figure 15-66. Prompt Whether to Rebaseline Ventilation System