



U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL



Chemical Fume Hood Testing Improvements Needed to Reduce Health and Safety Risk to EPA Employees

Report No. 13-P-0363

August 28, 2013



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Abbreviations

AI	As Installed
AU	As Used
EPA	U.S. Environmental Protection Agency
FAR	Federal Acquisition Regulation
fpm	feet per minute
NF	not functioning
OAM	Office of Acquisition Management
OIG	Office of Inspector General
RTP	Research Triangle Park
VAV	Variable Air Volume

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At a Glance

Why We Did This Review

In response to a hotline complaint, we conducted an audit of the U.S. Environmental Protection Agency's acquisition of chemical fume hood retrofitting and testing contracts. Laboratory fume hoods minimize chemical exposure to laboratory workers. The fume hoods are considered the primary means of protection from inhalation of hazardous vapors, mists and particulate matter. The objectives of our audit were to answer the following questions:

1. Is the EPA complying with applicable procurement regulations and guidance regarding its purchases of chemical fume hood retrofit kits and procurement of fume hood testing contracts?
2. Do the chemical fume hood retrofit kits in question meet applicable safety standards and codes?

This report addresses the following EPA Goals or Cross-Cutting Strategies:

- *Ensuring the Safety of Chemicals and Preventing Pollution.*
- *Strengthening EPA's workforce and capabilities.*

For further information, contact our Office of Congressional and Public Affairs at (202) 566-2391.

The full report is at:
www.epa.gov/oig/reports/2013/20130828-13-P-0363.pdf

Chemical Fume Hood Testing Improvements Needed to Reduce Health and Safety Risk to EPA Employees

What We Found

We found that the EPA complied with applicable regulations and guidance in procuring both the chemical fume hood retrofit kits and fume hood testing contracts. The EPA awarded both contracts using competition as opposed to using sole source procurement contracting methods. However, the same subcontractor, operating under the same prime contractor, is performing both the retrofitting of the chemical fume hoods and the annual testing of the hoods, which presents a potential conflict of interest. The agency already completed corrective action in response to our preliminary recommendation for this finding.

In addition, our technical expert's review of a sample of testing results for the chemical fume hoods raises numerous concerns with the way the testing was performed at the EPA's Research Triangle Park laboratories. The subcontractor rated the hoods as pass:

- When not all of the EPA requirements were met.
- When controllers or monitors were not functional.
- When the testing results did not include all required documentation.

The agency's 2009 testing protocol spells out the criteria for testing and evaluating the performance of fume hoods at the EPA's laboratories, and would also be applicable to fume hood retrofitting. The EPA relied on the prime contractor to ensure the subcontractor's fume hood testing met all requirements, and did not retest any of the hoods, without a user's specific report of a problem. As a result, the EPA has limited assurance as to the safety of the chemical fume hoods, and there is a risk to the health and safety of the laboratory workers.

Recommendations and Planned Agency Corrective Actions

We recommend that the director, National Exposure Research Laboratory, require the Research Triangle Park Safety, Health and Environmental Management Office to:

- Increase oversight and analysis of contractor testing results.
- Ensure that when a monitor is reported as not functioning or inaccurate it is timely repaired or replaced.
- Establish a practice of retesting a sample of the chemical fume hoods annually to verify the subcontractor's testing results.
- Work to revise and update the EPA's 2009 testing protocol criteria.

The agency agreed to take corrective action for all four recommendations, and provided expected completion dates. The agency's proposed corrective actions and planned completion dates meet the intent of the recommendations.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

August 28, 2013

MEMORANDUM

SUBJECT: Chemical Fume Hood Testing Improvements Needed
to Reduce Health and Safety Risk to EPA Employees
Report No. 13-P-0363

FROM: Arthur A. Elkins Jr.

A handwritten signature in black ink, appearing to read "Arthur A. Elkins Jr.", is written over the printed name.

TO: Dr. Jennifer Orme-Zavaleta, Director
National Exposure Research Laboratory
Office of Research and Development

This is our report on the subject review conducted by the Office of Inspector General of the U.S. Environmental Protection Agency. This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

In responding to the draft report, the agency provided a corrective action plan for addressing the recommendations with milestone dates. Therefore, a response to the final report is not required. The agency should track corrective actions not implemented in the Management Audit Tracking System. This report will be available at <http://www.epa.gov/oig>.

If you or your staff have any questions regarding this report, please contact Richard Eyermann, acting assistant inspector general for the Office of Audit, at (202) 566-0565 or eyermann.richard@epa.gov, or Janet Kasper, director, Contracts and Assistance Agreements Audits, at (312) 886-3059 or kasper.janet@epa.gov.

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Chapter 1

Introduction

Purpose

In response to a hotline complaint, we conducted a review of the U.S. Environmental Protection Agency's acquisition of two chemical fume hood retrofitting and testing contracts related to the EPA's Research Triangle Park laboratories. The objectives of our review were to answer the following questions:

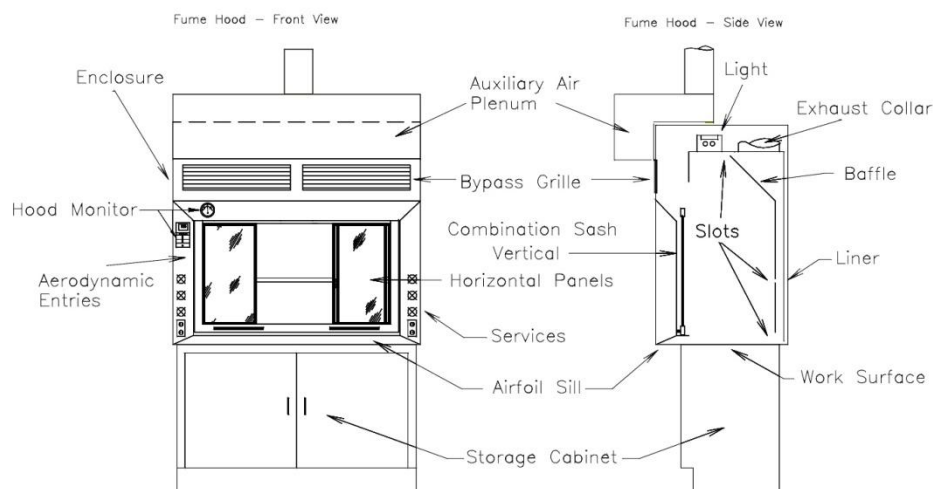
1. Is the EPA complying with applicable procurement regulations and guidance regarding its purchases of chemical fume hood retrofit kits and procurement of fume hood testing contracts?
2. Do the chemical fume hood retrofit kits in question meet applicable safety standards and codes?

Background

Laboratory Fume Hoods

Laboratory fume hoods minimize chemical exposure to laboratory workers. The fume hoods are considered the primary means of protection from inhalation of hazardous vapors, mists and particulate matter. Therefore, it is important that all potentially harmful chemical work be conducted inside a properly functioning fume hood. The EPA operates numerous laboratories across the nation and relies upon fume hoods to provide safe working conditions for laboratory workers.

Figure 1 is a diagram of a typical bench-top fume hood.



Source: EPA Performance Requirements for Laboratory Fume Hoods.

Hotline Complaint Allegations

In July 2012, the EPA Office of Inspector General received a hotline complaint regarding the EPA's procurement of chemical fume hood retrofit kits and related testing contracts. The complainant initially submitted the complaint in March 2012 to a U.S. senator. The complainant stated that the EPA has been awarding several hundred thousand dollars in no bid contracts to a contractor for chemical fume hood retrofit kits.

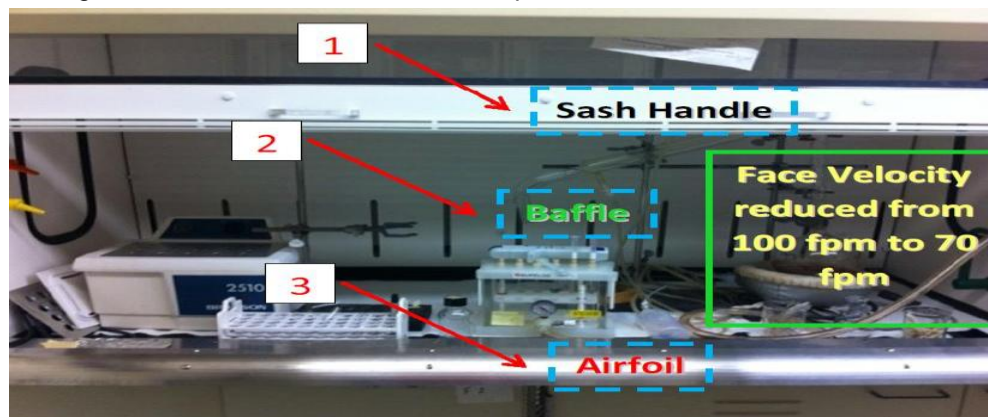
The complainant alleged:

- The EPA unfairly used the sole source procurement method for the chemical fume hood retrofit kits as well as the fume hood testing contracts.
- The EPA unfairly allowed the sole source vendor to self-validate its equipment, inconsistent with the EPA's previous positions requiring third-party independent testing for fume hood projects.
- The equipment does not meet applicable safety standards and codes.

Chemical Fume Hood Retrofit Project

The EPA contracted for the installation of chemical fume hood retrofit kits at its RTP facility. The Safety, Health and Environmental Management staff responsible for the RTP laboratories are located within the National Exposure Research Laboratory organization. The retrofit kits were designed to operate at a lower face velocity of 70 feet per minute, versus a conventional fume hood, which operates at 100 fpm. The reduced flow rate for the retrofitted fume hoods saves on heating and air conditioning costs because air in the laboratories is not recirculated. A pilot study estimated an annual energy savings of \$62,500 per year due to reduced flow of air in the fume hoods. The same contractor also subcontracts the required annual testing of the chemical fume hoods under a separate contract.

Figure 2 illustrates the installation of a fume hood retrofit kit (sash handle, baffle, airfoil) redesigned to achieve containment at a 30 percent reduction in airflow.



Source: EPA-RTP Fume Hood Retrofits – FAQs document.

While the chemical fume hood retrofit kits are primarily an energy saving measure, the hoods must operate properly at the lower flow rates to ensure the protection of laboratory workers from contaminants. As the face velocity drops, contaminants can leak back at a low concentration from the hood. Because the face velocity of a hood can decrease over time for different reasons, the Occupational Safety and Health Administration recommends that hoods be equipped with a flow monitor to ensure the hood is operating properly.

Scope and Methodology

We conducted this audit from October 2012 to June 2013 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We focused our review on two contracts where the contractor in question is performing as a subcontractor. One contract is for the EPA RTP chemical fume hood retrofit project (contract no. GS-23F-0225M; task order no. EP09H001115), while the other is for the routine annual fume hood certification testing of the RTP fume hoods (contract no. EP-D-09-081). We reviewed relevant contracting criteria from the Federal Acquisition Regulations to assess whether the EPA followed applicable regulations and procedures in procuring both contracts. We obtained an understanding of internal controls related to the fume hood testing by interviewing program staff and reviewing relevant agency guidance.

To answer objective 1, we interviewed the contracting officers for both contracts reviewed to gain an understanding of the rationale for the procurement method used. We also obtained and reviewed relevant contract file documentation.

To answer objective 2, we interviewed program staff knowledgeable about the fume hoods to obtain an understanding of the retrofit project, applicable safety standards and codes, internal controls related to the fume hood testing, and relevant agency guidance. We obtained and reviewed testing results performed on a random sample of 12 retrofitted fume hoods from three different RTP laboratory buildings. Specifically, for each of the 12 fume hoods in our sample, we obtained and reviewed both the testing results performed immediately after retrofit installation as well as the latest routine annual testing results. We also obtained assistance from an OIG chemist who holds a Ph.D. with technical expertise and experience working with chemical fume hoods in an EPA laboratory to fully evaluate those results. Specifically, the assistance entailed performing a technical analysis of the results to determine whether the tests were performed in accordance with applicable EPA standards, and whether the chemical fume hoods meet those standards based on the testing results. The technical expert reviewed

tests for a total of 76 fume hoods¹. The sample reviewed included and expanded upon our original sample of 12 fume hoods. The resulting technical report dated March 20, 2013, was provided to the agency for comment. This technical report is the basis for the finding in chapter 3.

¹ RTP has more than 500 laboratory modules spread across five laboratory buildings.

Chapter 2

Potential Conflict of Interest Identified

We found that the EPA complied with applicable regulations and guidance in procuring both the chemical fume hood retrofit kits and fume hood testing contracts. Specifically, the EPA awarded both contracts using competition, as opposed to using sole source procurement contracting methods. However, the same subcontractor, operating under the same prime contractor for two contracts, is performing both the retrofitting of the chemical fume hoods and the annual testing of the hoods, which presents a potential conflict of interest. FAR 9.5 states that contracting officers shall analyze acquisitions to identify and evaluate potential organizational conflicts of interest, and mitigate significant potential conflicts. The EPA did not consider that there might be a conflict of interest. As a result, there is a risk that the subcontractor could make the annual testing results look better by adjusting the results to show increased energy efficiency for the retrofitted hood in order to get more retrofitting work.

FAR Requires Mitigation of Significant Potential Conflicts

The testing contract includes conflict of interest clauses requiring the contractor to disclose to the EPA contracting officer any actual or potential conflicts of interest, and these requirements also flow down to any subcontracts. The contract also requires the contractor to provide annual certifications regarding conflict of interest. These contract clauses reference FAR 9.5. The contract for the retrofitting of the chemical fume hoods also includes conflict of interest clauses.

FAR 9.504 states that contracting officers shall analyze planned acquisitions in order to:

- (1) Identify and evaluate potential organizational conflicts of interest as early in the acquisition process as possible; and
- (2) Avoid, neutralize or mitigate significant potential conflicts before contract award.

FAR 9.505 states that each individual contracting situation should be examined on the basis of its particular facts and the nature of the proposed contract. The exercise of common sense, good judgment and sound discretion is required in both the decision on whether a significant potential conflict exists and, if it does, the development of an appropriate means for resolving it.

Potential Conflict of Interest Identified

The same subcontractor, operating under the same prime contractor for two contracts, is performing both the retrofitting of the chemical fume hoods and the

annual testing of the hoods, which presents a potential conflict of interest. A potential conflict of interest exists because the subcontractor who assembled and installed the retrofit kits was also conducting the annual testing.

The EPA has compensating controls in place but does not utilize all of them. For example, the agency's 2009 testing protocol criteria, *EPA Performance Requirements for Laboratory Fume Hoods*, states that the EPA reserves the right to double-check the testing of the hoods, but the EPA has chosen not to. Rather, if there is a problem with a fume hood, the EPA addresses it at that time with testing/troubleshooting. For the annual certifications, the on-site prime contractor reviews the subcontractor's work. One compensating control is that the fume hoods are all required to be equipped with monitors, sensors and alarms, which should alert laboratory personnel if there is a safety problem.

The EPA Did Not Identify the Potential Conflict

The contractor did not notify the EPA of the potential conflict of interest. In addition, the EPA's 2009 testing protocol criteria does not address whether the same contractor can perform the installation of the retrofit kits as well as the annual testing. EPA officials believed it was a good idea to have the contractor do the testing rather than the EPA, and did not consider that there might be a conflict of interest.

The potential conflict of interest creates a risk that the subcontractor could make the testing results look better in order to get more retrofitting work. For example, if testing results show increased energy efficiency for retrofitted hoods, the EPA would be more likely to increase the number of retrofits it requests the contractor to perform.

Recommendation and Corrective Action Taken

In a preliminary finding outline issued to the agency, we recommended that the assistant administrator for the Office of Administration and Resources Management, in accordance with FAR 9.5, require the EPA contracting officers for both the retrofitting of the chemical fume hoods and the routine annual testing of the hoods to analyze the situation to determine whether a significant conflict of interest exists, and if so, establish controls as necessary to mitigate the risk.

In its response to our finding outline, the agency analyzed the situation and stated that as the work being performed under each contract has no impact or affect on the other, and since contractor performance on each task is easily objectively confirmed and monitored by the EPA, the contractor saw no conflict of interest with these tasks, and the EPA concurs.

The agency's response also stated the following:

With regard to internal Office of Acquisition Management requirements management, while the primary intent of the Centers of Expertise Study is to identify both organizational and process improvements to increase procurement quality and efficiency, OAM anticipates another outcome of such improvements will be better alignment of these types of similar and related requirements among the EPA contracting offices. Accordingly, if requirements such as chemical fume hood retrofit and testing are better planned and coordinated, OAM will be better positioned and able to recognize and address such potential appearances of conflict of interest. As a result of implementing this new acquisition process, as well as the Balanced Scorecard self-assessment and peer review oversight programs, OAM believes the guidance and processes are in place to address and manage such situations in the future.

In response to our recommendation, the EPA analyzed the situation and determined a significant conflict of interest did not exist. In accordance with FAR 9.5, this determination involves contracting officer judgment. Therefore, the agency's action addressed the recommendation, and we consider the corrective action completed.

Chapter 3

Increased Oversight Needed to Ensure Chemical Fume Hood Safety

Our technical expert's review of a sample of chemical fume hood testing results raises numerous concerns with the way the testing was performed on the EPA RTP chemical fume hoods. For example, the subcontractor rated the hoods as pass when not all of the EPA requirements were met or when controllers or monitors were not functional. The testing results did not include all required documentation, and the EPA's testing protocol document did not include appropriate criteria for the fume hood retrofits. The agency's 2009 testing protocol spells out the criteria for testing and evaluating the performance of fume hoods at the EPA's laboratories, and would also be applicable to fume hood retrofitting. The EPA relied on the prime contractor to ensure the subcontractor's fume hood testing met all of the requirements, and did not retest any of the hoods without the prompting of a user's specific report of a problem. As a result, the EPA has limited assurance as to the safety of the chemical fume hoods, and there is a risk to the health and safety of the laboratory workers.

EPA Performance Requirements for Laboratory Fume Hoods

The agency's 2009 testing protocol criteria, *EPA Performance Requirements for Laboratory Fume Hoods*, spells out the criteria for testing and evaluating the performance of fume hoods at the EPA's laboratories. These requirements are also applicable to fume hood retrofitting. The EPA operates numerous laboratories across the nation and relies upon fume hoods to provide safe working conditions. In addition to As Manufactured Performance tests, this document includes criteria for the following types of tests:

- **As Installed tests**, which the fume hood manufacturer or a third-party, independent testing agency conducts immediately following installation and after the testing and balancing report has been reviewed by the EPA's Safety, Health and Environmental Management Division. These tests: (1) verify proper performance integration with mechanical heating, ventilating and air conditioning systems; and (2) establish a benchmark for the performance of the fume hood system. These AI tests also apply to the retrofitted fume hoods, and are performed immediately following the retrofitting.
- **As Used tests**, which EPA laboratory personnel or qualified contractors conduct annually to ensure long-term sustainable performance of the fume hood systems. These tests verify the continued long-term performance of the fume hood system.

The EPA's 2009 testing protocol includes multiple criteria for both the AI and AU tests, such as:

- Differential Pressure and Temperature Test.
- Cross-Draft Velocity Test.
- Face Velocity Test.
- Hood Monitor Test.
- Dynamic Variable Air Volume Response and Stability Test.
- Airflow Visualization (smoke) Test.
- Tracer Gas Containment with Manikin Test (not required for AU tests).
- Sash Movement Effect or VAV Tracer Gas Containment Test.

The document states that the results of each test shall be recorded on the EPA's performance test data sheets or equivalent. The EPA reserves the right to verify calibration of test equipment, photograph or videotape the tests, or take independent measurements before, during or after the routine tests.

See appendix A and B for diagrams illustrating the sequence of conducting the performance tests.

Technical Review Raises Fume Hood Testing Concerns

Our technical expert's review of a sample of chemical fume hood testing results raises numerous concerns with the way the testing was performed on the EPA RTP chemical fume hoods, which are outlined in the resulting technical report dated March 20, 2013. For example:

- The subcontractor rated the hoods as pass when not all of the EPA's requirements were met.
- The subcontractor rated the hoods as pass when controllers or monitors were not functional.
- The testing results did not include all required documentation.
- The EPA's testing protocol document did not include criteria for hoods operating at average face velocities of 70 fpm, which is the design face velocity for the retrofit kits.

Hoods Rated as Pass When Not All EPA Requirements Met

The contracts require the fume hoods to be certified in accordance with the *EPA Performance Requirements for Laboratory Fume Hoods* document, which lists several requirements. However, based on the technical review of a sample of testing results for both the AI testing of the retrofit kits and the AU annual testing, the subcontractor rated the hoods as pass when not all criteria or requirements from the EPA's 2009 testing protocol document were met.

Based on the retrofitted and annual hood test reports reviewed, the hoods failed some of the requirements the EPA has established in their testing procedures, such as lab differential partial pressures not met, cross-draft velocity not met, and face velocity not met. Overall, the technical expert’s review found one or more deviations for 71 out of 76 fume hoods tested. Therefore, about 93 percent of the fume hoods rated as pass did not meet all criteria or requirements from the EPA’s 2009 testing protocol document.

Hoods Rated as Pass When Controllers or Monitors Not Functional

Based on the technical review of a sample of testing results for both AI and AU tests, the subcontractor rated the hoods as pass when the VAV controllers or fume hood monitors were reported as not functioning. For example:

- All of the retrofitted chemical fume hoods did pass the tracer gas containment test, even though the subcontractor reported hood monitors and some VAV controllers as NF. The hood monitor is the primary feedback mechanism to the users regarding the safety of the hood. If the monitor is NF, this important control is useless.
- The EPA requires accurate hood flow monitors, but in the annual test reports, the subcontractor reported hood monitors as being unplugged, NF, or the flow rate on the monitor did not accurately measure the flow of air in the hood. After installation testing and acceptance, the hood flow monitor is the primary indicator to laboratory workers that the fume hood is working properly. In one example, the hood monitor read a flow of 102 fpm but the measured flow was only 35 fpm. Although the subcontractor correctly rated the hood as Fail in this case, this raises a concern about how long this hood monitor, with its inaccurate reading, was providing a false sense of security to the laboratory staff who may have needed to use this fume hood.

Overall, the technical expert’s review found one or more deviations for 44 out of 76 fume hoods tested. Therefore, about 58 percent of the fume hoods rated as pass had VAV controllers or fume hood monitors that were reported as NF.

Table 1 illustrates the deviations discussed above for hoods rated as pass when not all EPA requirements were met and when controllers or monitors were not functional.

Table 1: Deviations identified by technical review

Hoods passed when:	Number of fume hoods tested	Number of deviations	Deviation percentage
Not all requirements met	76	71	93
Controllers or monitors not functional	76	44	58

Source: Technical review of a sample of testing results.

Testing Results Missing Required Documentation

According to the technical analysis, the testing results did not include all documentation required by the EPA's 2009 testing protocol document. Based upon the documents provided for review, the tracer gas manikin tests were passed for the retrofitted fume hoods, but the subcontractor presented insufficient information to verify if the sash movement² effect test with tracer gas was acceptable. In addition, the EPA requires calibration information for all test equipment to be included with each testing report. However, calibration information could not be located in the reports for the following equipment:

- Micromanometer used to measure differential pressures.
- Smoke generator.
- Tracer gas sensor.
- Data logger/computer used to acquire flow measurements.

EPA's Testing Protocol Document Did Not Include Appropriate Criteria for Retrofits

The *EPA Performance Requirements for Laboratory Fume Hoods* document includes criteria for chemical fume hoods operating at an average face velocity of 100 fpm for typical chemical fume hoods, and 60 fpm for low-velocity chemical fume hoods. However, it does not include specific criteria for fume hoods or the retrofit kits operating at an average face velocity of 70 fpm, which is the design face velocity for the retrofit kits. The EPA testing protocol document should be updated with criteria for chemical fume hoods operating at an average face velocity of 70 fpm.

The Agency Does Not Independently Retest the Fume Hoods

The EPA relied on the prime contractor to ensure the subcontractor's fume hood testing met all requirements, and did not retest any of the hoods, without a user's specific report of a problem. Safety, Health and Environmental Management Division personnel also stated that the retrofits "got ahead of them" when trying to order appropriate hood monitors for the retrofits. Safety, Health and Environmental Management Division staff stated that all chemical fume hoods are required to be equipped with monitors, sensors and alarms, which would alert laboratory personnel if there is a safety problem. The agency relied on this compensating control to help ensure safety of the fume hoods.

² The sash movement effect test is conducted to determine the potential for escape from the hood following movement of the sash from closed to open.

The Agency Has Limited Assurance of Fume Hood Safety

The EPA has limited assurance as to the safety of the chemical fume hoods. Agency safety personnel are relying on the compensating control of the monitors alerting staff to problems, but we found this is not a reliable control because of the monitors being not functional or inaccurate. In addition, for one fume hood, a testing report stated that a hood monitor needed to be installed; however, a subsequent test report indicated the monitor still had not been installed 10 months later. Therefore, there is a risk to the health and safety of the laboratory workers.

In light of this risk, it would be a good internal control and business practice for the EPA to retest some of the hoods periodically, in order to protect the government's interests. Such retesting would verify the subcontractor's testing results to ensure the hoods meet all applicable standards, as allowed for by the EPA's testing protocol criteria.

Recommendations

We recommend that the director, National Exposure Research Laboratory, require the RTP Safety, Health and Environmental Management Office, to:

1. Increase oversight and analysis of contractor testing results to ensure that all the EPA's requirements are met when a hood is rated as pass, and that all the EPA's required documentation is included.
2. Take steps to ensure that when a monitor is reported as not functioning or inaccurate it is timely repaired or replaced as necessary.
3. Establish a practice of retesting a sample of the chemical fume hoods annually to verify the subcontractor's testing results.
4. Work with the Safety, Health and Environmental Management Division at headquarters to revise and update the EPA's 2009 testing protocol criteria, *EPA Performance Requirements for Laboratory Fume Hoods*, to add criteria for chemical fume hoods operating at an average face velocity of 70 fpm, which is the design face velocity for the retrofit kits.

Agency Response and OIG Evaluation

In response to recommendation 1, the agency stated it will ensure all health and safety requirements are met, and that the RTP Safety, Health and Environmental Management Office will continue to provide feedback to the facilities engineering, operations and maintenance staff when an EPA energy efficiency requirement or other requirements are not met. The RTP campus has multiple laboratories undergoing renovation to accommodate a move of personnel from the consolidation of another building expected to be vacated in April 2014. Any fume

hoods installed will be commissioned, with attention to complete documentation as the laboratory is inspected for occupancy and usage. All fiscal year 2013 data to date will be re-examined for completeness. The expected completion date to ensure complete documentation for fiscal year 2013 fume hood annual testing is August 30, 2013.

In response to recommendation 2, the agency stated that when a fume hood's face velocity monitor is reported as not functioning, as a temporary measure, a vaneometer will be issued to the laboratory occupants to visually verify adequate face velocity flow rates. At the RTP main campus, buildings A and B have had all the non-functioning monitors repaired or replaced. Non-functioning monitors in buildings D, E and the High Bay building are being prioritized based on laboratory utilization and future occupants. The expected completion date for replacement of any non-functioning monitors is September 30, 2013.

In response to recommendation 3, the agency proposed retesting one fume hood from each building within 30 days of delivery of passing fume hoods in a given building. If the random fume hood fails reinspection, two additional fume hoods from the building batch submitted as passed will be retested. The estimated completion date for retesting building by building random fume hoods is July 2014.

In response to recommendation 4, the agency stated that since revision to the EPA's testing protocols is the responsibility of the Safety, Health and Environmental Management Division at headquarters, which is in the Office of Administration and Resources Management, the agency suggested recommendation 4 be reassigned to the Director of the Safety, Health and Environmental Management Division.³ The consensus decision with the details on how to annually recertify fume hoods operating at 70 fpm for retrofitted fume hoods can reasonably be expected to be in place prior to the RTP campus annual fume hood recertification cycle which begins in fiscal year 2014. The estimated completion date for revising the testing protocols is October 31, 2013.

As a general narrative comment, the agency stated it disagrees with the assertion that the agency has "limited assurances of fume hood safety", as stated on page 12 of the draft audit report. The agency outlined various controls in place, and stated its back-up practices do not show exposure above action levels or health effects. Nevertheless, the agency recognized that the fume hoods are the primary engineering control used to minimize exposure and will receive improved oversight as outlined in the agency's responses to the recommendations.

The agency agreed to take corrective action in response to all four recommendations, and provided expected completion dates for all corrective

³ Since the Director, National Exposure Research Laboratory, agreed to work with the Office of Administration and Resources Management, Safety, Health and Environmental Management Division on this recommendation we did not change the action official. We did speak with staff that are revising the testing protocol criteria and they plan to incorporate the recommendation into the revision.

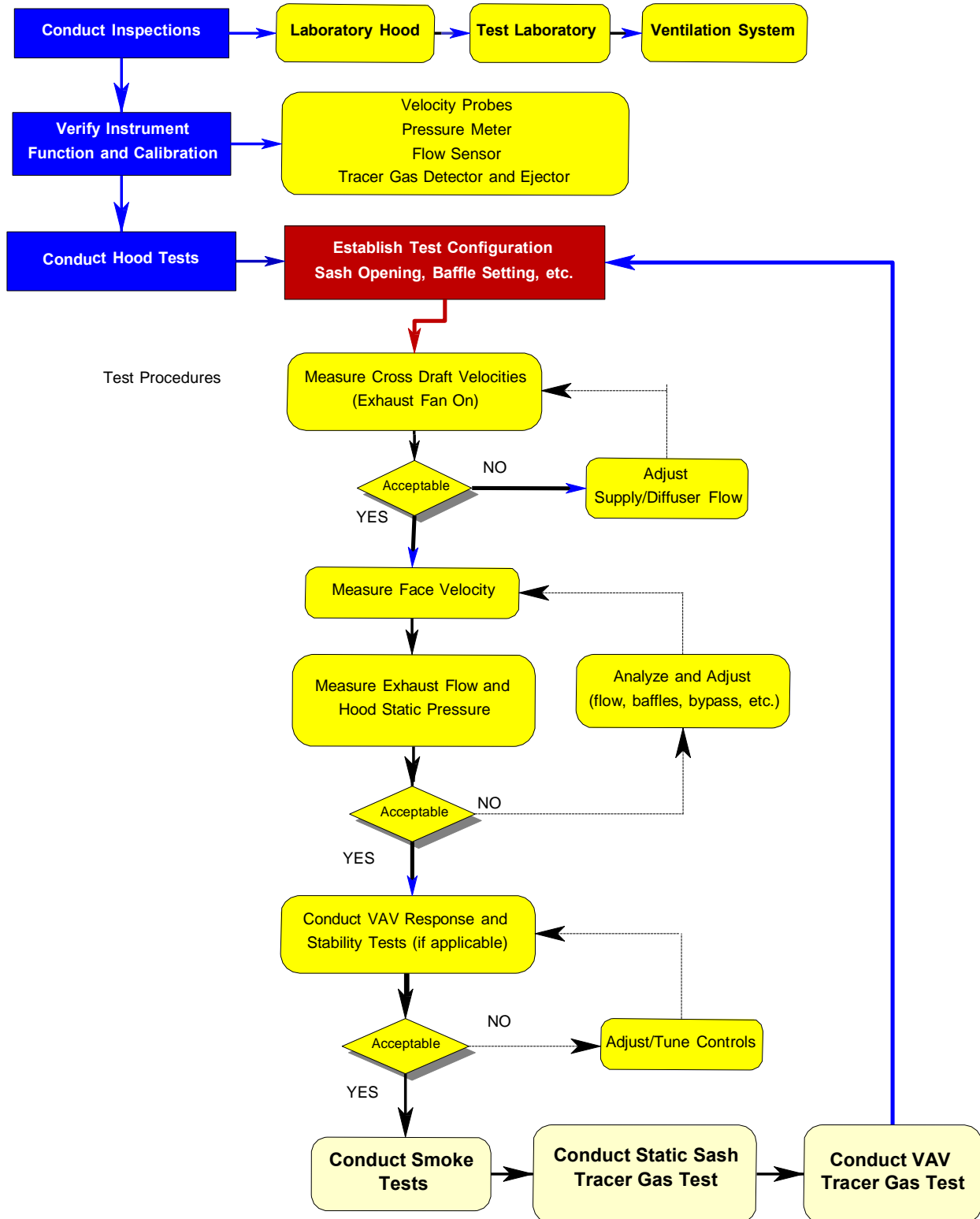
actions. The agency's proposed corrective actions and planned completion dates meet the intent of the recommendations. The complete agency response to the draft audit report is attached at appendix C.

Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in \$000s)	
Rec. No.	Page No.	Subject	Status ¹	Action Official	Planned Completion Date	Claimed Amount	Agreed-To Amount
1	12	Require the RTP Safety, Health and Environmental Management Office to increase oversight and analysis of contractor testing results to ensure that all the EPA's requirements are met when a hood is rated as pass, and that all the EPA's required documentation is included.	O	Director, National Exposure Research Laboratory	8/30/13		
2	12	Require the RTP Safety, Health and Environmental Management Office to take steps to ensure that when a monitor is reported as not functioning or inaccurate it is timely repaired or replaced as necessary.	O	Director, National Exposure Research Laboratory	9/30/13		
3	12	Require the RTP Safety, Health and Environmental Management Office to establish a practice of retesting a sample of the chemical fume hoods annually to verify the subcontractor's testing results.	O	Director, National Exposure Research Laboratory	7/31/14		
4	12	Require the RTP Safety, Health and Environmental Management Office to work with the Safety, Health and Environmental Management Division at headquarters to revise and update the EPA's 2009 testing protocol criteria, <i>EPA Performance Requirements for Laboratory Fume Hoods</i> , to add criteria for chemical fume hoods operating at an average face velocity of 70 fpm, which is the design face velocity for the retrofit kits.	O	Director, National Exposure Research Laboratory	10/31/13		

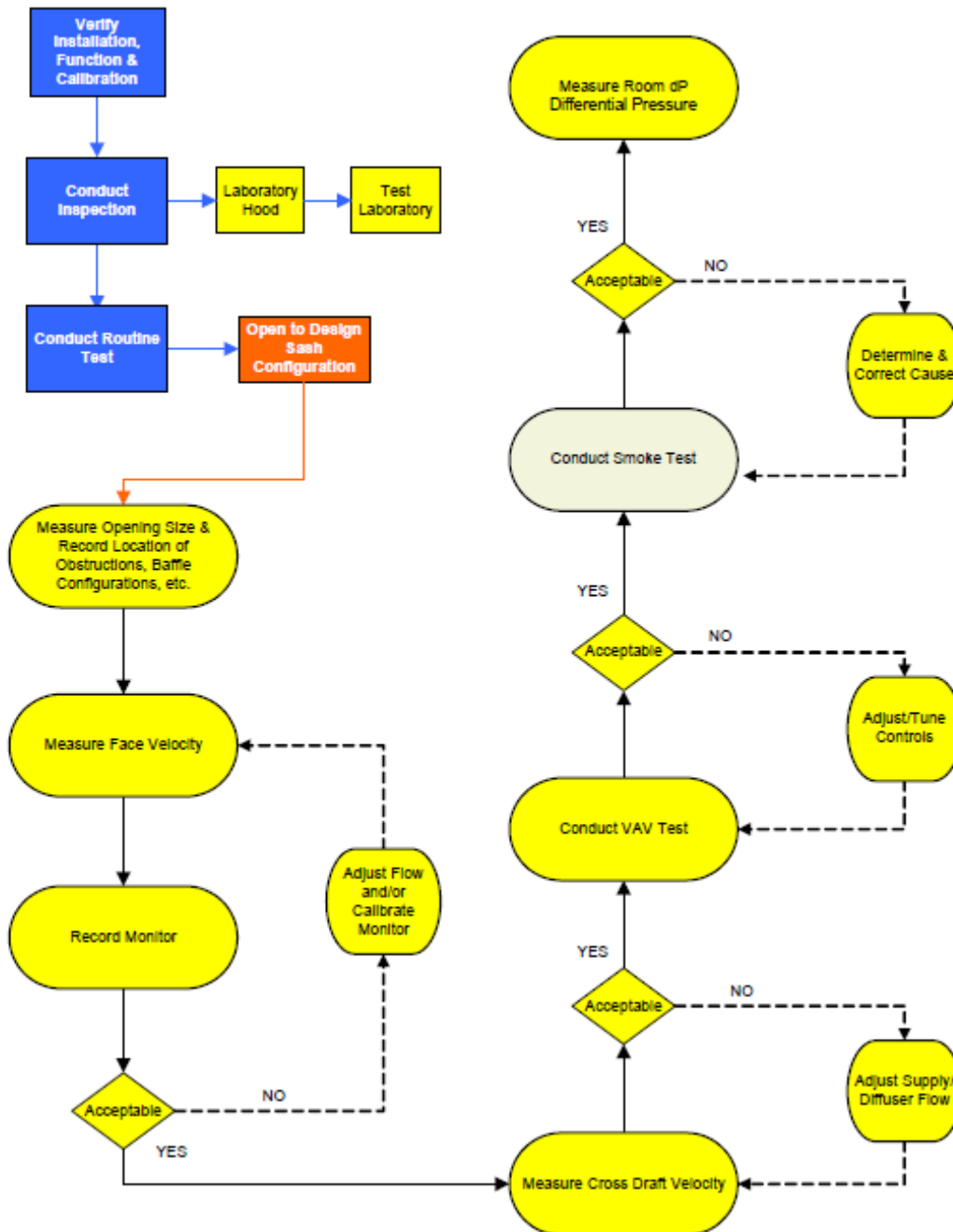
¹ O = recommendation is open with agreed-to corrective actions pending
 C = recommendation is closed with all agreed-to actions completed
 U = recommendation is unresolved with resolution efforts in progress

Sequence for Conducting AM and AI Performance Tests



Source: EPA Performance Requirements for Laboratory Fume Hoods.

Sequence for Conducting AU Performance Tests



Source: EPA Performance Requirements for Laboratory Fume Hoods.

Agency Response to Draft Report

July 25, 2013

MEMORANDUM

SUBJECT: Response to “The EPA Should Improve Chemical Fume Hood Testing Oversight to Reduce Health and Safety Risk” || OA-FY-13-0013 Dated June 25, 2013 (506 KB)

FROM: Jennifer Orme-Zavaleta, PhD
Director, National Exposure Research Laboratory
Mail Code D305-01

TO: Richard Eyermann
Acting Assistant Inspector General for Audit

Janet Kasper
OIG, Office of Audit
Director, Contracts and Assistance Agreement Audits

The purpose of this memorandum is to respond to the draft report transmitted in the e-mail sent by Janet Kasper on June 25, 2013 entitled: “The EPA Should Improve Chemical Fume Hood Testing Oversight to Reduce Health and Safety Risk.” This response is provided in accordance with EPA Manual 2750. Specific recommendations are individually addressed as enumerated in the report. No specific enumerated findings were found in the draft report, therefore, a general response to the draft report’s question about health and safety risk will be addressed in a narrative.

For reference, the four recommendations appearing on page 12 of the report are reiterated before each response.

Recommendation:

1. Increase oversight and analysis of contractor testing results to ensure that all the EPA’s requirements are met when a hood is rated as pass, and that all the EPA’s required documentation is included.

Response 1: The EPA-RTP SHEM office will ensure all legal Health and Safety requirements are met. The EPA-RTP SHEM office will continue to provide feedback to the facilities engineering, operations and maintenance staff when an EPA energy efficiency requirement or other requirements are not met. Some of EPA’s internal requirements, such as the operation of a variable air volume (VAV) box do not jeopardize safety and are only necessary to optimize energy conservation and efficiency. A VAV control box which is not functioning in the variable mode is essentially a constant air volume valve maintaining a set-point for exhaust. In order for

the fume hood to pass annual testing, a VAV box set to a constant flow would have to be set to the flow rate demanded by an “as used” chemical fume hood condition. Additionally, some fume hoods can fail EPA’s requirement tolerances for cross drafts but pass face velocity averages and demonstrate capture and containment when challenged with a smoke test as part of the annual recertification testing.

Please be advised the EPA-RTP campus has multiple laboratories undergoing renovation to accommodate a move of personnel from the consolidation of another building expected to be vacated in April 2014. Any fume hoods installed will be commissioned, with attention to complete documentation as the laboratory is inspected for occupancy and usage. All FY 2013 data to date will be re-examined for completeness. The main omission found previously was calibration data for the contractor’s instrumentation used to make measurements of the fume hoods. The contractor is required to provide instrument calibration data with each monthly or periodic report. They may have in some instances provided the instrument calibration data with a prior deliverable and failed to include it with subsequent submittals. Therefore, when a batch of fume hoods in a specific building location is completed as they are scheduled on a rolling basis to manage work flow, the instrument calibration documentation for the batch of fume hoods certified by the instruments for each building will be included with each batch of fume hoods tested. This will result in some duplication of documentation in the annual fume hood certification but allows each buildings report to stand alone as a complete documentation package.

Expected completion date to ensure complete documentation for FY2013 fume hood annual testing: August 30, 2013.

Recommendation:

2. Take steps to ensure that when a monitor is reported as not functioning or inaccurate it is timely repaired or replaced as necessary.

Response 2: When a fume hood’s face velocity monitor is reported as not functioning, as a temporary measure, a vaneometer will be issued to the laboratory occupants to visually verify adequate face velocity flow rates. EPA requirements are for a visual and audible alarm. No regulatory requirement exists for an audible alarm. Laboratory occupants are trained to report fume hood performance deficiencies or suspected malfunctions. Face velocity monitors are important and do serve as the primary indicator to laboratory workers that a chemical fume hood is working correctly. When face velocity monitors are not functioning and the fume hood is providing capture and containment, interim procedures allow researchers to use a portable vaneometer and/or have the EPA-RTP SHEM office perform “on demand” checks for any chemical fume hood prior to daily usage. Without these interim measures, research work would have to be suspended interrupting work when the fume hood is otherwise fully operational. At the EPA-RTP main campus, buildings A and B have had all the non functioning monitors repaired or replaced. Non functioning monitors in building D, E and the High Bay building are being prioritized based on laboratory utilization and future occupants. Please recall that multiple laboratories are under renovation in building D and E and therefore, not every fume hood is in an occupied laboratory during the renovation/construction phase.

Expected completion for replacement of any non functioning monitors: September 30, 2013.

Recommendation:

3. Establish a practice of retesting a sample of the chemical fume hoods annually to verify the subcontractor's testing results.

Response 3: Currently the EPA-RTP SHEM Office personnel routinely respond to chemical fume hood trouble calls or other deviations in ventilation controls to assess safe operations. A performance work statement and quality assurance monitoring requirement with penalty fees could establish acceptable sample sizes in future contracts.

A question exists as to how much retesting is required to demonstrate statistical significance?

The RTP-SHEM office proposes retesting one fume hood from each building within 30 days of delivery of 'passing' fume hoods in a given building. If the random fume hood fails re-inspection, two additional fume hoods from the building batch submitted as passed will be retested.

Expected Completion: As this will be a new practice, completion will occur with the next set of annual fume hood re-certifications beginning in FY 2014 where the current cycle completes all campus building fume hoods by the following June 2014.

Estimated Completion of re-testing building by building random fume hoods: July 2014.

Recommendation:

4. Work with the Safety, Health and Environmental Management Division at headquarters to revise and update the EPA's 2009 testing protocol criteria, *EPA Performance Requirements for Laboratory Fume Hoods*, to add criteria for chemical fume hoods operating at an average face velocity of 70 fpm, which is the design face velocity for the retrofit kits.

Response 4: The actual performance standard for retrofitted fume hoods applied at the EPA-RTP campus was the same as for any other fume hood, namely an onsite ASHRAE 110 test confirming containment performance of an average tracer gas concentration of less than or equal to 0.1 ppm. Before the retrofitted fume hoods were 'delivered' as operational the ASHRAE 110 test was performed on every retrofitted fume hood under the EPA RTP chemical fume hood retrofit project (contract no. GS-23F-0225M; task order no. EP09H001115.)

Revision to EPA's testing protocols for an average face velocity of 70 fpm is the responsibility of the Safety, Health and Environmental Management Division (SHEMD) at Headquarters which is in OARM/Office of Administration. Therefore, I suggest this fourth recommendation be re-assigned to the Director, Safety, Health and Environmental Division who is better positioned to address EPA's 2009 testing protocol criteria. As a combined EPA-OARM and EPA-ORD facility at the RTP North Carolina campus, the RTP SHEM office commits to work with SHEMD at Headquarters to provide review and comment for any updated testing protocols for retrofitted chemical fume hoods to explicitly state ASHRAE 110 testing for newly installed or retrofitted fume hoods. The RTP-SHEM office understands the SHEMD HQ is currently revising its 2009 testing protocols. Therefore the consensus decision with the details on how to

annually recertify fume hoods operating at 70 fpm for retrofitted fume hoods can reasonably be expected to be in place prior to the EPA-RTP campus annual fume hood recertification cycle which begins in FY 2014.

At the EPA-RTP campus, I disagree with the assertion the Agency has “limited assurances of fume hood safety” as stated on page 12 of the report. The facility has two full time Federal industrial hygienists who can perform on demand fume hood verification testing and additional chemical specific monitoring. The research staff community at the RTP campus is one of the most highly trained. Researchers are constantly evaluating environmental and health effects from various toxicants. This same research staff has a keen focus on their own individual work place exposure. The training delivered initially and on an annual basis to research staff communicates the correct usage of fume hoods and when to suspect a malfunction. The RTP’s campus Chemical Hygiene Plan further classifies laboratories according to the risk posed by the chemicals used in each laboratory setting and requires additional levels of personal protective equipment in addition to engineering controls in higher hazard level laboratories. Finally, personnel are enrolled in the occupational medical surveillance program to monitor their fitness for duty, potential exposures and health effects. All these back-up practices do not show exposure above action levels or health effects. Nevertheless, the fume hoods are the primary engineering control used to minimize exposure and will receive improved oversight as outlined in my responses.

Thank you for the opportunity to respond to the report.

Should you have any questions, please contact Jewel Morris, ORD’s designated Safety Health and Environmental Management Official at 919-541-2292; morris.jewel@epa.gov or Todd Baker, Acting Director ORD Safety, Health and Environmental Management at 919-541-4307; baker.todd@epa.gov.

Summary of Planned Actions

Rec. No.	Action	Planned Completion Date
1	Ensure complete documentation for FY2013 fume hood annual testing.	Aug. 30, 2013
2	Replacement of any non functioning monitors.	Sep. 30, 2013
3	Re-testing building by building random fume hoods. (As this will be a new practice, completion will occur with the next set of annual fume hood re-certifications beginning in FY 2014 where the current cycle completes all campus building fume hoods by the following June 2014.)	Jul. 31, 2014 (Begins FY 2014)
4	Review and comment for any updated testing protocols for retrofitted chemical fume hoods in coordination with SHEMD-HQ.	Oct. 31, 2013

CC: Jewel F. Morris
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