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Class II A2 and Class II B2 Bio-Safety Cabinet Air Sampling Study

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Prepared for:

Washington State Department of Labor & Industries Safety and Health Investment Programs (SHIP)

In Partnership with:

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The authors also wish to thank the following partner healthcare facilities for volunteering access to their facilities for this study. Without their cooperation, this study would not have been possible.

- CHI Franciscan Health - Highline Cancer Center Pharmacy
- CHI Franciscan Health - St. Joseph Medical Center
- Group Health - Bellevue Medical Center (now known as Kaiser Permanente)
- Group Health - Capitol Hill Campus (now known as Kaiser Permanente)
- MultiCare Health System - Tacoma General Hospital

Executive Summary

The objective of this cohort study was to obtain representative air sampling data to evaluate the relative effectiveness of Class II A2 Biosafety Cabinets (BSC) as compared with Class II B2 BSC at controlling workplace airborne exposures to select chemotherapy agents and/or a suitable surrogate compound. The purpose of this study was to assist the Washington State Department of Labor & Industries with determining whether the use of Class II A2 BSC together with administrative controls used by many healthcare facilities in Washington State for compounding tasks are effective at controlling worker exposures or require change/modification.

This study involved performing airborne sampling over two separate phases to compare the ventilation effectiveness of representative Class II A2 BSC with Class II B2 BSC. The study phases were as follows:

- **Phase 1:** Assess the airborne concentrations of two chemotherapy drugs (particulate and aerosol fractions) in the breathing zones of personnel and the ambient air in rooms and/or areas of compounding during typical compounding activities and during a simulated worst-case spill condition in Class II A2 BSC for the purpose of comparing the results of similar air sampling performed in Class II B2 BSC
- **Phase 2:** Assess the airborne concentrations of a suitable surrogate chemical compound (vapor fraction) to evaluate potential, simulated incidental and worst-case spill conditions involving chemotherapy drugs in Class II A2 BSC for the purpose of comparing the results of similar air sampling performed in Class II B2 BSC

To accomplish this, the study design focused on collecting airborne samples in the breathing zones of personnel and/or ambient air in rooms and/or areas of compounding during typical compounding activities or during simulated spill conditions in each BSC.

The Phase 1 air sampling results assessing the particulate and aerosol fractions of airborne Cyclophosphamide and 5-Fluorouracil during representative compounding activities and simulated spill events in Class II A2 BSC vs. Class II B2 BSC across all study sites were below the respective occupational exposure limits which suggests that current exposure control methods appear to be similarly effective during compounding work activities.

The Phase 2 air sampling data suggest that there is no notable difference in effectiveness of control of volatile fractions of propylene glycol outside of Class II A2 BSC as compared to Class II B2 BSC. This is relevant to healthcare workers such as compounding technicians who work in the compounding rooms.

However, the air sampling data also suggest that during minor and/or large spills, there is a potential for airborne exposure risk to volatile fractions of chemotherapy drugs inside the ventilated cabinets for both Class II A2 BSC and Class II B2 BSC. In order for this exposure risk to be realized, the compounding technicians would need to lift the ventilated cabinet sash and insert their face/breathing zone into the cabinet. This scenario could occur if a spill requires extensive cleaning of the interior surfaces of the cabinet without proper respiratory protection.

Recommendations for further study are provided by the author.

Introduction

Many healthcare facilities, large and small, urban and rural, throughout the state of Washington use biological safety cabinets (BSC) for compounding of chemotherapy (antineoplastic) drugs. Class II BSC are more commonly used as they are designed to provide personnel, environmental, and product protection. Class II, Type B2 BSC are designed to provide a higher level of worker protection than the other Class II BSC because they exhaust 100% of the inflow air, thus they are ideal for compounding due to the toxic and sometimes semi-volatile nature of chemotherapy drugs. However, many healthcare facilities are also utilizing recirculating Class II A2 BSC for their operations including compounding for their energy conservation and cost saving benefits. Class II BSC generally operate in one of following distinct modes:

1. Recirculating Class II, Type A1 ventilated cabinets have a minimum inflow face velocity of at least 75 fpm; 70% of inflow air is recirculated to the cabinet work area through an integrated high efficiency particulate arrest (HEPA) filter; 30% of air can be exhausted through the HEPA filter back into the room or to building exterior
2. Recirculating Class II, Type A2 ventilated cabinets (formerly referred to as A/B3 cabinets) have a minimum inflow face velocity of at least 100 fpm; 70% of inflow air is recirculated to the cabinet work area through an integrated HEPA filter; 30% of air is exhausted to the building exterior through a HEPA filter, reference Figure 1.
3. Class II, Type B1 ventilated cabinets have a minimum inflow face velocity of at least 75 fpm; 30% of inflow air is recirculated to the cabinet work area through an integrated HEPA filter; 70% of air is exhausted through a HEPA filter to the building exterior
4. Class II, Type B2 ventilated cabinets have a minimum inflow face velocity of at least 100 fpm, and exhaust 100% of all air to the exterior of the building (reference Figure 2)

Figure 1. The tabletop model of a Class II, Type A2 BSC: (A) front opening; (B) sash; (C) exhaust HEPA filter; (D) supply HEPA filter; (E) positive pressure common plenum; (F) negative pressure plenum.

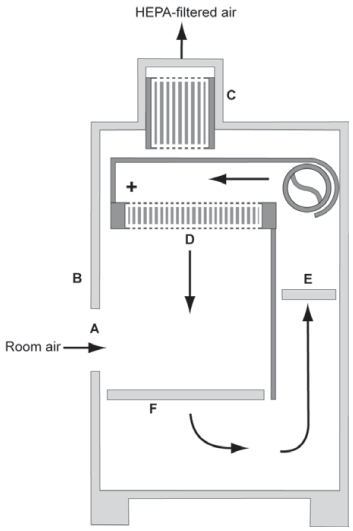

Diagram Credit: CDC/NIH publication Biosafety in Microbiology and Biomedical Laboratories (BMBL) Appendix A

Figure 2. *The tabletop model of a Class II, Type B2 BSC:* A) front opening; (B) sash; (C) exhaust HEPA filter; (D) supply HEPA filter; (E) negative pressure exhaust plenum. *Note:* The carbon filter in the exhaust system is not shown. The cabinet is hard connected to the building exhaust system.

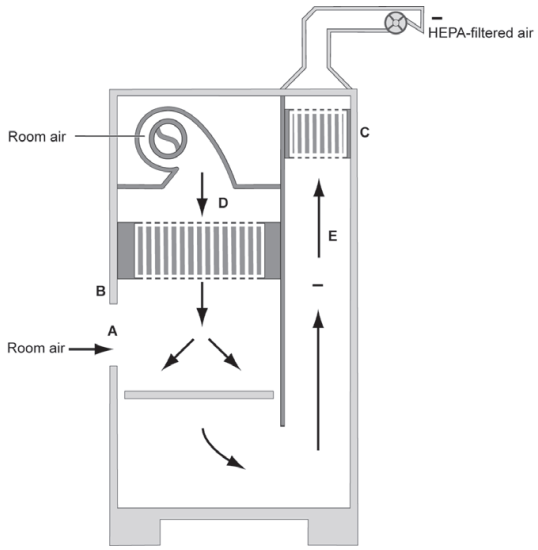

Diagram Credit: CDC/NIH publication Biosafety in Microbiology and Biomedical Laboratories (BMBL) Appendix A

The Washington Administrative Code (WAC) 296-62-50025 has various requirements for compounding cabinets including the following:

> *(2) Ventilated Cabinets*
>
> *(a)(ii) Chemotherapy drugs must be prepared in an appropriate ventilated cabinet*
>
> *(b) Hazardous drugs that volatilize must be handled only in a ventilated cabinet that captures the volatilized material to prevent employee exposure, or in a ventilated cabinet that does not recirculate air inside the cabinet or exhausts air back into the room environment*

According to one of the healthcare facilities participating in the study, the cost to replace a recirculating cabinet can reportedly exceed $200,000 due to capital equipment costs, energy costs, and structural modifications. This cost could be prohibitive for many small and rural healthcare facilities.

There have been few studies demonstrating whether recirculating Class II, Type A2 ventilated cabinets (Class II, A2 BSC) are similarly effective as Class II, Type B2 ventilated cabinets (Class II, B2 BSC) in protecting employees during volatile chemotherapy drug compounding activities. A literature review performed by BSI did not identify any validated air-sampling test protocols or comprehensive data to evaluate the effectiveness of Recirculating Class II A2 cabinets during compounding activities. Therefore, with collaboration from the Washington State Pharmacy Association (WSPA) and funding through the Washington State Department of Labor & Industries Safety and Health Investment Programs (SHIP) grant, BSI EHS Services and Solutions (BSI) performed an air sampling study to compare the ventilation effectiveness of representative Class II A2 Biosafety Cabinets (BSC) with Class II B2 BSC.

Study Purpose and Objective

The objective of this cohort study was to obtain representative air sampling data to evaluate the relative effectiveness of Class II A2 BSC as compared with Class II B2 BSC at controlling workplace exposures to select chemotherapy agents and/or a suitable surrogate compound. The purpose of this study was to with determine whether the use of Class II A2 BSC together with administrative controls used by many healthcare facilities in Washington State for compounding tasks are effective at controlling workplace exposures or require change or modification.

This study involved performing airborne sampling over two separate phases to compare the ventilation effectiveness of representative Class II A2 Biosafety Cabinets (BSC) with Class II B2 BSC. The study phases were as follows:

- Phase 1: Assess the airborne concentrations of two chemotherapy drugs (particulate and aerosol fractions) in the breathing zones of personnel and the ambient air in rooms and/or areas of compounding during typical compounding activities and during a simulated spill condition in Class II A2 BSC for the purpose of comparing the results of similar air sampling performed in Class II B2 BSC

- Phase 2: Assess the airborne concentrations of a suitable surrogate chemical compound (vapor fraction) to evaluate potential, simulated incidental and worst-case spill conditions involving chemotherapy drugs in Class II A2 BSC for the purpose of comparing the results of similar air sampling performed in Class II B2 BSC

To accomplish this, the study design focused on collecting airborne samples in the breathing zones of personnel and/or the ambient air in rooms and/or areas of compounding during typical compounding activities or during simulated spill conditions in each BSC.

The results and conclusions of this study are intended to provide the Washington State Department of Labor & Industries with preliminary baseline data for review for future decision-making regarding compliance with applicable sections of WAC 296-62-50025. Furthermore, healthcare management of facilities that are affected by this regulation may wish to review the study conditions and results in this report and compare them to their own facilities and operations to determine their applicability and aid them in future decision-making on use/effectiveness of Class II A2 BSC vs. Class II B2 BSC.

Project Team and Responsibilities

The onsite sampling and assessments were performed by BSI Senior Consultant Mike Peterson, CIH, CSP with Project Management by BSI Principal Consultant Russell Snyders, PE. Study design and review/evaluation of the data was provided by Principal Investigator, Xavier Alcaraz, CIH, CSP. Technical oversight and quality review of this report was provided by Nick Filipp, PhD, CIH.

Alex Truchot, Sr. Health, Safety, Environment Manager with Kaiser Permanente served as a study advocate and liaison between BSI, Washington State Department of Labor & Industries, study partner facilities and key stake holders.

Table 1 provides a list of key project personnel and their primary study responsibilities.

Table 1: Key Study Personnel and Primary Responsibilities

Responsible Persons	Activities
Washington State Department of Labor & Industries: SHIP - Safety and Health Investment Projects	• Review and approval of study design (by subject matter expert) • Funding for study • Review, comment, and approval of final report (by subject matter expert)
Alex Truchot (Kaiser Permanente), Russell Snyders (BSI) and Jeff Rochon (Washington State Pharmacy Association)	• Project initiation meetings with study team – Kaiser Permanente, WSPA, Partner Facilities, and BSI • Determination of chemotherapy drugs to be considered and selected for testing – WSPA, Kaiser Permanente, Partner Facilities, and BSI • Provide pre-task planning with the Partner Facilities and BSI
Alex Truchot and Xavier Alcaraz (BSI) and Michael Peterson(BSI)	• Evaluate alternative surrogate chemicals to simulate chemo compounding and spill conditions – WSPA, Partner Facilities, and BSI (if applicable) • Sampling plan development – BSI • Preliminary sampling plan approval – WSPA, Kaiser Permanente, Partner Facilities

Responsible Persons	Activities
	• Procurement of subcontractors, labs and other vendors – WSPA, Kaiser Permanente, Partner Facilities, and BSI
Alex Truchot Russell Snyders Xavier Alcaraz, Michael Peterson	• Study planning and preparation • Confirm approach and determine sampling event schedule – WSPA, Partner Facilities, and BSI • Provide pre-task orientation site visits to individual facilities – Partner Facilities and BSI
Michael Peterson, Xavier Alcaraz	• Conduct air sampling – BSI and Partner Facilities • Air sampling oversight - BSI
Xavier Alcaraz, Michael Peterson, Russell Snyders, Nick Filipp (BSI), Contract Analytical laboratories	• Laboratory analytical testing – BSI's contract analytical laboratories • Initial data review and draft report preparation – BSI • Quality review of draft report - BSI
Jeff Rochon, Alex Truchot, Xavier Alcaraz, Michael Peterson Nick Filipp, Russell Snyders	• Distribute draft report to L&I and study partners for review and comment – WSPA, Alex Truchot, and BSI • Revisions to report – BSI • Submit final report to NIOSH for review and comment – L&I • Final revisions to report – BSI • Distribute final report to L&I and study partners – WSPA, Alex Truchot, and BSI • Schedule presentation to Labor & Industries – WSPA
Jeff Rochon, Alex Truchot, Xavier Alcaraz, Russell Snyders	• Deliver presentation to Labor & Industries – BSI • Author manuscript and submit for publication in a peer-reviewed journal - BSI

Facility Information

The Washington State Pharmacy Association identified five medical centers to serve as partners/participants in the study. These facilities have Class II A2 Biosafety Cabinets (BSC) and/or Class II B2 BSC. Participation from five separate facilities in the study served to provide a broader industry comparison rather than limiting sampling to just one facility. The participating facilities were generally located within the greater Seattle-Tacoma metropolitan area and are generally considered larger healthcare facilities. Smaller or rural facilities were not selected for the study. The partner facilities identified for this study with location/site contact information were as follows:

- CHI Franciscan Health
  Highline Cancer Center Pharmacy
  16233 Sylvester Road SW
  Burien, WA 98166:
  Site Contact: Thuy Vo

- CHI Franciscan Health
  St. Joseph Medical Center
  1717 South J Street
  Tacoma, WA 98405:
  Site Access: Michael Li

- Group Health (now known as Kaiser Permanente)
  Bellevue Medical Center
  11511 NE 10th St.
  Bellevue, WA 98004
  Site Access: Valerie Nakagaki

- Group Health (now known as Kaiser Permanente Washington)
  Capitol Hill Campus
  201 16th Ave. E.
  Seattle, WA 98112.
  Site Access: Jennifer Wesselius

- MultiCare Health System
  Tacoma General Hospital
  315 MLK Jr. Way
  Tacoma, WA 98405
  Site Access: Annie Lambert

Exposure Limits

Airborne Occupational Exposure Limits

The Federal Occupational Safety and Health Administration (OSHA) has established Permissible Exposure Limits (PELs) for airborne contaminants in Title 29, Subpart Z, Standard Number 1910.1000, which specify average airborne contaminant levels that nearly all workers may be exposed to for 8 hours per day (40 hours per week) without adverse health effects. The Washington Division of Occupational Safety and Health (DOSH) as part of the Washington State Department of Labor & Industries has similarly established state-specific PELs as expressed in the Washington Administrative Code (WAC 296-841-20025).

To date, there are very few pharmaceutical compounds with established Permissible Exposure Limits (PEL). Fluorouracil and Cyclophosphamide do not have established Federal OSHA or Washington DOSH PELs. Thus, in some cases, manufacturers of pharmaceutical agents have established their own recommended occupational exposure limits (OEL). Based on a limited review of publicly available material safety data sheets and publicly available literature, Table 2 lists occupational exposure limits identified for select antineoplastic agents considered for this study including 5-Fluorouracil and Cyclophosphamide.

Although there few established exposure limits for pharmaceutical compounds, the National Institute for Occupational Safety and Health (NIOSH) published an alert “Preventing Occupational Exposures to Antineoplastic Drugs and Other Hazardous Drugs in Health Care Settings” in 2004 that provided guidance for exposure controls through use of engineering controls (e.g., ventilated cabinets), use of proper procedures, and use of personal protective equipment. In 2016, NIOSH prepared “NIOSH List of Antineoplastic and Other Hazardous Drugs in Health Care Settings” that established criteria for defining hazardous drugs using several toxicological end-points and included a comprehensive list of hazardous drugs by group using the established NIOSH criteria.

Table 2: Summary of Recommended Occupational Exposure Limits for Study Compounds

Compound Name	Recommended Occupational Exposure Limit 8-hour TWA	Source
5-Fluorouracil	Occupational Exposure Band 5 = <1 µg/m^3	Pfizer Safety Data Sheet: Fluorouracil Injection Revision date: 19-Jul-2012 http://www.pfizer.com/files/products/material_safety_data/FLUOROURACIL%20INJECTION.pdf
Cyclophosphamide	0.1 µg/m^3	Edward V. Sargent, et. al. (2002): The Importance of Human Data in the Establishment of Occupational Exposure Limits, Human and Ecological Risk Assessment: An International Journal, 8:4, 805-822
Ifosfamide*	None identified	Thermo Fisher Scientific Safety Data Sheet, Revision Date: 26-May-2017

Compound Name	Recommended Occupational Exposure Limit 8-hour TWA	Source
Methotrexate*	2 µg/m^3	Pfizer Safety Data Sheet: Methotrexate Injection Revision date: 29-March-2012 http://www.pfizer.com/files/products/material_safety_data/PZ00137.pdf

µg/m^3 = micrograms per cubic meter

TWA = Time Weighted Average

*Considered for use, but not used in study

Phase 1 Methods

For Phase 1, integrated air sampling (personal and area) was performed to assess airborne concentrations (particulate and aerosol) of the selected chemotherapy drugs used during compounding and simulated spill conditions in Class II A2 BSC and Class II B2 BSC. All sampling events for this study were performed at Group Health, MultiCare, and CHI Franciscan facilities as listed in the Facility Information section of this report. BSI developed a sampling strategy/protocol detailing the purpose, scope and methods to be used to perform the air sampling. The sampling strategy/protocol (*15-1594 WSPA SHIP Grant Class II A2 BioSafety Hood Sampling 101816* dated October 18, 2016) was reviewed and approved by study partners prior to proceeding with the sampling.

Chemotherapy Drugs

Several common chemotherapy drugs were considered for incorporation into the study including the following:

- 5-Fluorouracil
- Cyclophosphamide
- Ifosfamide
- Methotrexate

Cyclophosphamide and 5-Fluorouracil were the two compounds selected by Group Health, MultiCare and CHI Franciscan for inclusion in the study. Although Cyclophosphamide and 5-Fluorouracil are both typically prepared using a closed system transfer device (CSTD), they were selected for the study because of their common use and/or similar relative volatility (vapor pressure) as compared to the other agents.

Sampling Conditions

A total of six BSC ventilated cabinets were identified for inclusion in this study. Three cabinets were Class II A2 BSC and three cabinets were Class II B2 BSC. Both Class II A2 BSC and Class II B2 BSC cabinets were tested at MultiCare Health System - Tacoma General Hospital. Whereas, only one type of cabinet was tested at the other facilities. For Phase 1, BSI performed air sampling under the following two unique sampling conditions to evaluate the effectiveness of each type of BSC:

- **Compounding:** Cyclophosphamide and 5-Fluorouracil chemotherapy solutions were individually prepared in each cabinet. The solutions were prepared in series. The duration of compounding tasks for each agent ranged from approximately 75 - 92 minutes including preparation and clean-up time. Air sampling was conducted during the entire duration of compounding and continued at least 30 minutes after the completion of compounding. Discarded personal protective equipment (PPE) and compounding task-related materials

(consumables) were left inside the cabinet during the sampling event to assess the cabinet's ventilation effectiveness and not variations in PPE or waste materials handling techniques. To assess potential variability, BSI planned to repeat air sampling events for one Class II A2 BSC and one Class II B2 BSC (time and resources permitting). However, this was not accomplished due to facility access limitations.

- **Simulated Spill Condition:** Cyclophosphamide and 5-Fluorouracil were used to simulate a worst-case spill condition in each BSC. The maximum volume used for compounding (approximately 250 ml) for each compound were both poured into a single containment tray (18" Wx18" Lx 4"H) inside of the cabinet with the sash position maintained at working height (Photo 1 for reference – Attachment 12). Air sampling for both compounds was conducted simultaneously for at least 30 minutes under this condition. Discarded PPE and other consumables were left inside the cabinet during the test. The spilled materials were then cleaned using DSS ChemoSorb pads, and all material was deposited in chemical waste bags and disposed of according to local, state and federal regulations. Air sampling continued for an additional 30 minutes following spill clean-up activities.

There was a minimum of 30 minutes between sampling of the compounding activities and the spill scenario sampling events to allow for multiple air changes in the compounding room and to flush any potential residual airborne contaminant in the room to allow return to background levels. The BSCs were allowed to run during this period to facilitate room air changes.

Spill clean-up was performed by the BSI representative using clean-up materials provided by the partner facilities. All waste materials were handled in accordance with local, state, and federal requirements following each facility's waste disposal protocols.

Photo documentation of compounding room conditions and compounding activities was collected at each site.

Integrated Air Sampling

All air sampling was performed by Michael Peterson, CIH, CSP with BSI. BSI collected a combination of personal and area air samples of Cyclophosphamide and 5-Fluorouracil for each sampling event. Personal sample assemblies were attached to the compounding technician/employee's breathing zone (lapel) during sampling. Area samples were placed on tri-pods in representative locations within the room at approximate breathing zone level (4 feet high from floor). Due to the relative small size of compounding rooms, the area samples were generally placed on opposite sides of the BSC. Source samples were placed inside the BSC adjacent to the compounding materials/activities. A baseline area sample (outside of the BSC) was collected for a minimum of 30 minutes prior to the chemotherapy testing to determine background levels in the compounding room.

Each sample was collected by passing a known quantity of air through a 25mm, 1-micron Teflon filter with support pad in 3 piece cassettes applicable for the selected test agents. BSI used laboratory-supplied sampling media. Airflow through the sampling devices was provided by portable Sensidyne GilAir-5 battery-powered industrial hygiene air sampling pumps which were calibrated to between 2.4 – 2.7 liters of air per minute (lpm), before and after the sampling event with a BIOS Dry-Cal DC Lite Primary Flow Meter or similar.

Two field blank samples for each sampling event were collected for quality control/assurance purposes by handling the sampling cassettes in the same manner as the actual air samples, but without passing air through them. In addition, two laboratory blanks were submitted per each sample lot. The laboratory blank samples were not manipulated prior to lab submittal.

At the completion of the sampling period, the sampling media were labeled, sealed, and submitted for analysis with a standard 7-day turnaround-time to Bureau Veritas of Lake Zurich, Illinois, which is an independent, AIHA-accredited laboratory for pharmaceutical compounds. At the laboratory, the samples were analyzed in accordance with a Bureau Veritas internally-developed and validated sampling method using Liquid Chromatography/Mass Spectroscopy (LC/MS) for Cyclophosphamide and 5-Fluorouracil. A summary of the sampling and analytical methods including sampling media used, detection limits, and the methods for analysis for Cyclophosphamide and 5-Fluorouracil are summarized in Table 3 and included in Attachments 1 and 2, respectively.

Table 3: Summary of Methods for Sampling and Laboratory Analyses for Cyclophosphamide and 5-Fluorouracil

Compound Name	Sampling Media Code	Sampling Rate (LPM)	Limit of Quantitation (ng/sample)	BV Internal Lab Method #	Laboratory Analysis
5-Fluorouracil	TFE3A	2 - 3	1	BV-2016-29599	Liquid Chromatography/ Mass Spectroscopy (LC/MS)
Cyclophosphamide	TFE3A	2 - 3	1	BV-2016-29599	LC/MS

ng/sample = nanogram per sample

TFE3A = 1 micron Polytetrafluoroethylene (PTFE) filter in a 3-piece polypropylene cassette

Note: Bureau Veritas' internally-developed and validated sampling method was developed for the collection of the agents in powder form. The method would also be expected to collect aerosols of the agents in solution; however, the sampling medium (Teflon filter) would not be expected to collect the agents in the vapor phase. Bureau Veritas' data generated during the validation of the method for cyclophosphamide indicated that analyte spiked onto the sampling medium was quantitatively recovered under study sampling conditions. Therefore, analyte loss would not be expected due to the volatilization or decomposition of collected material during sampling.

The number of samples and the sample locations collected for each sampling event/location are summarized in Table 4, as follows:

Table 4: Summary of Sample Number and Locations for Each Sampling Event

Sample Type	Outside BSC Sample(s)	Inside BSC Sample(s)
Baseline (prior to compounding) - area sample	1	0
During Compounding – area sample	2	1
During Compounding – personal sample	1	Not Applicable
During Spill Condition – area sample	2	1
Field Blanks (per site, per event)	2	Not Applicable
Laboratory Blank (per sample lot)	2	Not Applicable

Approximately 10 samples (including field blanks) were collected for each of the six BSC cabinets included in the study. A total of 48 air samples and 14 field/laboratory quality control blanks were collected for the study. All sample media used were from the same lot; therefore, only two laboratory blanks were submitted for analysis. The airborne limit of detection for the chemotherapy agents ranged from 0.0137 µg/m^3 to 0.00319 µg/m^3 based on the air sample duration, air sample volume, and the analytical laboratory's limit of quantitation.

Figure 3 depicts a typical compounding room and the personal and air sample locations (red) during compounding. Photo 2 depicts a typical air sampling set-up during compounding.

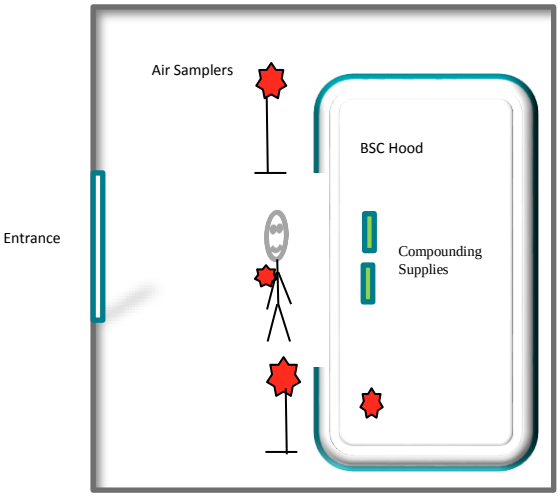

Figure 3: Typical Compounding Room with Sample Locations during Compounding

Figure 4 depicts a typical compounding room and the area air sample locations (red) during a simulated spill scenario. Photos 3 and 4 depict a typical air sampling set-up during a spill condition.

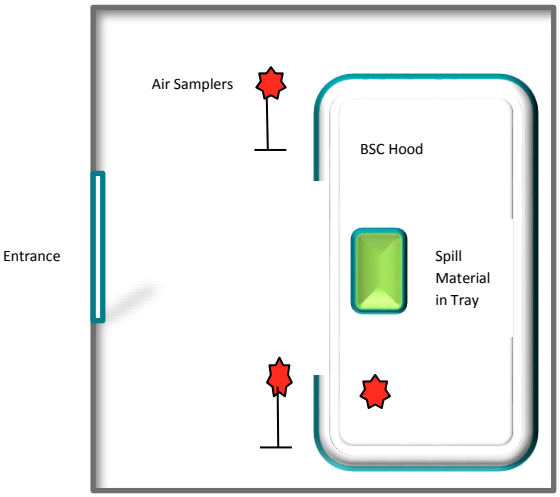

Figure 4: Typical Compounding Room with Sample Locations during Spill Event

The facility's engineering, administrative, and personal protective equipment controls for compounding activities were observed and noted for each site. In addition, photo documentation was collected during air sampling.

Ventilation Assessments

Partner facilities provided documentation of ventilation performance testing/certification of their Class II A2 BSC and Class II B2 BSC that were selected for the study. BSI requested that the certification was current within 6-months of the scheduled air sampling events.

On the date of the sampling events, BSI performed verification ventilation assessments on each of the Class II A2 BSC and Class II B2 BSC selected for the study. Prior to testing for chemotherapy drugs, the cabinets were smoke tested to verify that there was no particle leakage from the ventilation system. A calibrated TSI P-Trak Ultrafine Particle Counter Model 8525 (condensation particle counter), capable of measuring particles between a diameter range of 20 nm to 1,000 nm was used for this assessment. The resolution of this instrument is 10 particles per cubic centimeter (p/cc). The TSI P-Trak monitor is equipped with a telescoping probe which was placed in the areas of potential particle release (e.g., at the HEPA supply inside the Class II A2 BSC). For a properly operating BSC, there should be minimal or no measured particle release from smoke tube generation when air is recirculated through the HEPA-filtered air supply.

In addition, the cabinets were tested for performance with a calibrated velometer to ensure they met the manufacturer's face velocity requirements (typically 100 fpm) with the cabinet sashes adjusted to their proper working positions. If the cabinets did not conform to manufacturer's specifications for proper ventilation performance, BSI requested that the cabinet system be adjusted and re-tested. Video documentation was performed during smoke tube testing.

The facility heating, ventilation, and air conditioning (HVAC) in each compounding room was allowed to operate according to each facility's standard operating mode. BSI requested information on HVAC performance for each compounding room such as locations of air supplies and returns, make-up air sources, air airflow volumes, air changes per hour, and relative pressure differentials to adjacent rooms. The facilities provided their compounding rooms' ventilation data in air changes per hour. However, availability of Facilities representatives from participating sites was limited; thus, access to additional information was not obtained.

Phase 2 Methods

Phase 1 air sampling and laboratory analytical methods were effective for capture of powder, particulate and aerosol forms of 5-Fluorouracil and Cyclophosphamide; however, they were not effective and/or have not been validated for the capture of volatile fractions of 5-Fluorouracil and Cyclophosphamide. There are currently no known validated methods for the capture of volatile fractions of 5-Fluorouracil and Cyclophosphamide. Therefore, BSI performed additional sampling (Phase 2) to supplement Phase 1 sampling data to better meet the study objectives.

Since there are no known validated methods for the capture of volatile fractions of 5-Fluorouracil and Cyclophosphamide, BSI proposed the use of a surrogate compound with semi-volatile properties for air sampling under realistic and worst-case simulated spill conditions within representative Class II A2 BSC as compared with Class II B2 BSC. This surrogate compound air sampling was performed to supplement the existing sampling data for powder, particulate and aerosol forms of 5-Fluorouracil and Cyclophosphamide. All sampling events for Phase 2 were similarly performed at the same medical centers, in the same rooms, and for the same BSC selected for Phase 1 of the study.

Surrogate Sampling Chemical

BSI proposed the use of propylene glycol (CAS #57-55-6) as the surrogate chemical for sampling for Phase 2. Propylene glycol was selected for several reasons including the following:

- Low vapor pressure
- Miscible in water
- Low toxicity
- Validated air sampling method for the volatile fraction
- Readily available

The National Institute for Occupational Safety and Health (NIOSH) recently identified propylene glycol as one of several potential surrogate compounds for evaluating the effectiveness of CSTD (*A Performance Test Protocol for Closed System Transfer Devices Used During Pharmacy Compounding and Administration of Hazardous Drugs, NIOSH draft document available for public review*).

The vapor pressure of propylene glycol at room temperature is several orders of magnitude higher (approximately 1,000x) than that of Cyclophosphamide, 5-Fluorouracil, and several other antineoplastic agents (reference Table 5). This provides a greater safety factor for use of propylene glycol as a surrogate chemical for sampling.

Table 5: Comparison of Vapor Pressure Values for Chemotherapy Agents and Proposed Surrogate Sampling Chemical

Chemical	Vapor Pressure (Pa) @ 20°C	Molecular Weight (g/moll)	Source
5-Fluorouracil	0.0014	130	Kiffmeyer et. al. Vapor Pressures, Evaporation Behavior and Airborne Concentrations of Hazardous Drugs. The Pharmaceutical Journal 2002; 268: 331-7
Cyclophosphamide	0.0033	261	
Carmustine	0.019	214	
Cisplatin	0.0018	300	
Etoposide	0.0026	588	
Propylene Glycol	9.0	76	NIOSH. Sampling and Analytical Method 5523 for Glycols. Issue 1, May 1996

Sampling Conditions

The six BSC cabinets tested for Phase 1 sampling were also tested for Phase 2 sampling. Three cabinets were Class II A2 BSC and three cabinets were Class II B2 BSC. BSI performed air sampling under the following two unique sampling conditions to evaluate the effectiveness of each type of BSC:

- **Simulated Minor Spillage:** Propylene glycol was used to simulate minor (incidental) spillage or leakage of a chemotherapy agent in solution that could occur during compounding in a BSC using a closed system transfer device (CSTD). A small quantity of propylene glycol (5 ml) was dispensed onto an absorbent wipe (DSS ChemoSorb pad) using a 5 – 10 ml syringe and placed inside a single containment tray (18”Wx18”Lx4”H) inside of the cabinet with the cabinet sash position maintained at working height (Photo 5 – Attachment 12). Air sampling was conducted for at least 30 minutes under this condition.
- **Simulated Large Spill Condition:** Propylene glycol was used to simulate a worst-case spill condition in each BSC. The maximum volume used for compounding (approximately 250 ml) was poured into a single containment tray (18”Wx18”Lx4”H) inside of the cabinet with the cabinet sash position maintained at working height. Air sampling was conducted for at least 30 minutes under this condition (Photo 6 – Attachment 12). The spilled materials were cleaned using DSS ChemoSorb pads, and all material was deposited in sealed waste bags (Photo 7 – Attachment 12). Air sampling continued for an additional 30 minutes following spill clean-up activities.

There was approximately 10 minutes between sampling of the two spill conditions to allow for multiple air changes in the compounding room to flush potential residual airborne contaminant in the room and allow return to background levels. The BSCs were allowed to run during this period to facilitate room air changes.

Spill clean-up was performed by the BSI representative. All waste materials were handled in accordance with local, state, and federal requirements.

Integrated Air Sampling

All air sampling was performed by Michael Peterson, CIH, CSP with BSI. BSI collected area air samples for propylene glycol for each sampling event. Area samples were placed on tri-pods in representative locations within the room at approximate breathing zone level (4 feet high from floor). Source samples were placed inside the BSC adjacent to the spill materials. A baseline sample was collected in the room for a minimum of 30 minutes prior to the surrogate compound testing to determine potential background levels in the compounding area.

Each sample was collected by passing a known quantity of air through a XAD-7 OVS tube (13mm glass fiber filter and 200 mg/100 mg XAD-7 sorbent). Airflow through the sampling devices was provided by Sensidyne GilAir-5 portable battery-powered industrial hygiene air sampling pumps and calibrated to approximately 2 liters of air per minute (lpm), before and after the sampling event with a BIOS Dry-Cal DC Lite Primary Flow Meter or similar. Two field blank samples for each sampling event were collected for quality assurance purposes by handling the sampling media in the same manner as the actual air samples, but without passing air through them. In addition, two laboratory blanks were submitted per sample lot.

At the completion of the sampling period, the sampling media were labeled, sealed, and submitted for analysis with a 7-day turnaround-time to ALS Environmental (Cincinnati, OH) an independent, AIHA-accredited laboratory. At the laboratory, the samples were analyzed in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 5523 for glycols as summarized in Table 6 and provided in Attachment 3. BSI used laboratory-supplied sampling media.

Table 6: Summary of Propylene Glycol Sampling and Analytical Method

Sampling Media Code	Sampling Rate (LPM)	Limit of Quantitation (µg/sample)	Sampling Method #	Laboratory Analysis
XAD-7 OVS Tube (glass fiber filter, 13mm, XAD-7 200mg/100mg)	1 - 2	1	NIOSH 5523	Gas Chromatography/ Flame Ionization Detection (GC/FID)

µg/sample = microgram per sample

The approximate number of samples and the sample locations for each sampling event are summarized in Table 7.

Table 7: Summary of Sample Number and Locations for Each Sampling Event

Sample Type	Outside BSC Sample(s)	Inside BSC Sample(s)
Baseline (prior to compounding) - area sample	1	0
Minor Spillage condition – area sample	2	1
Large Spill condition – area sample	2	1
Field Blanks (per site, per event)	2	Not Applicable
Laboratory Blank (per sample lot)	2	Not Applicable

For each of the six BSC cabinets included in the study, approximately 9 samples (including field blanks) were collected. A total of 48 air samples and 12 field/laboratory quality control blanks were collected for the study. Six of the samples were replicate samples. BSI performed replicate air sampling under the large spill condition at the Class II A2 BSC at Group Health - Belleview. All sample media used were from the same lot; therefore, only two laboratory (lot) blanks were submitted for analysis. The airborne limit of detection for propylene glycol ranged from 0.0026 mg/m^3 to 0.0056 mg/m^3 based on the air sample duration, air sample volume, and the analytical laboratory's limit of quantitation.

Photo documentation was collected during air sampling. Figure 5 depicts a typical compounding room and the area air sample locations (red) during each simulated spill condition. Photos 3 and 4 depict a typical air sampling set-up during a spill condition.

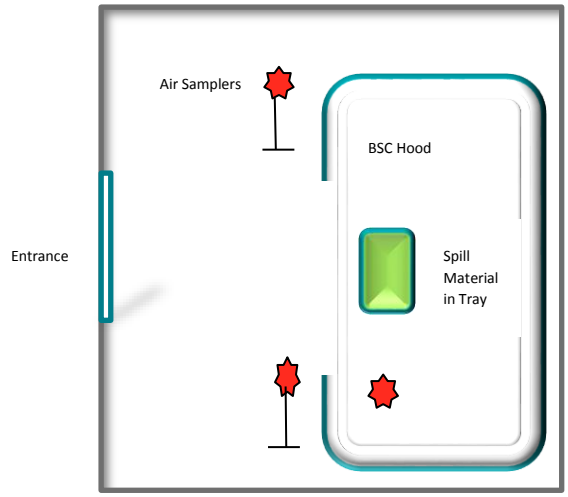

Figure 5: Typical Compounding Room with Sample Locations during Minor and Large Spill Event

Direct-Read Air Sampling

Photo-ionization detectors (PIDs) are broad-band sensors that respond to a large variety of organic and some inorganic compounds. The general class of compounds suitable for detection with PIDs is volatile organic compounds (VOCs).

In addition to the integrated air sampling, direct-read air sampling for propylene glycol as total volatile organic compounds (TVOC) was performed using a calibrated ppbRae3000 (RAE Systems) photo-ionization detector (PID) equipped with a 10.6eV lamp configuration. The ppbRae3000 has an instrument resolution of 1 ppb (±2.5%), measurement range up to 9999 ppb and 3 second response time (Honeywell, Rae Systems PID Handbook, 3rd Edition, 2013). An equipment spec sheet for the ppbRae3000 and calibration record is provided in Attachment 11.

Spot measurements were collected in the locations noted in Figure 5 at 5 minute intervals throughout the simulated spill sampling periods for each spill condition and recorded on field data sheets. A baseline (background) TVOC measurement was collected prior to initiating each spill event, in between spill events, and following completion of the final spill event.

An additional measurement was collected at less than 1 inch from the spill to verify operation of the direct-read air monitor.

The final direct-read sampling data was converted using the manufacturer's-provided correction factor for propylene glycol (5.5 for ppbRae3000 with 10.6eV lamp). Since the PID is capable of measuring a large variety of VOCs, baseline direct-read PID measurement values were assumed to be background VOC levels not associated with propylene glycol used for the simulated spill conditions. However, no baseline direct-read air sampling values were measured above the direct-read monitor's lower level of detection (instrument's resolution).

Ventilation Assessments

During Phase 1, partner facilities provided documentation of ventilation performance testing/certification of their Class II A2 BSC and a Class II B2 BSC to verify that they were current within 6-months of the scheduled air sampling events. For Phase 2, each BSC was re-tested for performance with a calibrated TSI VelociCalc meter 9555 to ensure they continued to meet the manufacturer's face velocity requirements (typically 100 fpm) with the cabinet sashes adjusted to their proper working positions.

The facility HVAC system in each compounding room was allowed to operate according to each facility's standard operating mode.

Phase 1 Results

The results from the Phase 1 personal and area air sampling performed during representative compounding activities and simulated worst-case spill conditions involving Cyclophosphamide and 5-Fluorouracil in Class II A2 BSC and Class II B2 BSC are summarized by facility in Tables 8 through 16 (Attachment 4). The analytical laboratory reports and chain of custody forms are provided in Attachment 6. Summaries of the method validation documentation for both Cyclophosphamide and 5-Fluorouracil are also provided in Attachment 1 and 2, respectively. BSI air sampling data sheets are provided in Attachment 7. Calibration records for select equipment utilized are included in Attachment 8.

Air Sampling

All air sampling results for Cyclophosphamide and 5-Fluorouracil during representative compounding activities in both Class II A2 BSC and Class II B2 BSC were lower than the analytical laboratory's limit of quantitation (1 ng/sample). The resulting non-detect exposure values ranged from <0.00319 µg/m^3 to <0.00549 µg/m^3. The variation in detection level was due to differences in sampling times (i.e., volumes of air collected) for the samples. A comparison of air sampling results for Cyclophosphamide and 5-Fluorouracil during representative compounding activities in Class II A2 BSC vs. Class II B2 BSC across all study sites is provided in Table 14. All non-detect exposure values were lower than the occupational exposure limits for Cyclophosphamide and 5-Fluorouracil listed in Table 2.

All air sampling results for Cyclophosphamide and 5-Fluorouracil during simulated worst-case spill conditions in both Class II A2 BSC and Class II B2 BSC were also lower than the analytical laboratory's limit of quantitation (1 ng/sample). The resulting non-detect exposure values ranged from <0.00629 µg/m^3 to <0.00712 µg/m^3. A comparison of air sampling results for Cyclophosphamide and 5-Fluorouracil during simulated spill conditions in Class II A2 BSC vs. Class II B2 BSC across all study sites is provided in Table 15. All non-detect exposure values were lower than the occupational exposure limits for Cyclophosphamide and 5-Fluorouracil listed in Table 2.

Ventilation Assessments

The results from the ventilation assessments of BSC performed prior to air sampling events are summarized in Table 16. BSI ventilation testing data sheets are provided in Attachment 7. Calibration records for the equipment utilized (TSI VelociCalc meter and TSI P-Trak) are included in Attachment 8.

All BSC cabinets evaluated in the study were of stainless steel construction with an adjustable sash. The BSC cabinets were equipped with integrated airflow monitoring devices that alarm when they fall below a minimum performance level (Photos 8 and 9 – Attachment 12). The compounding rooms were designed to maintain a negative air pressure in relation to the adjacent rooms. Room

ventilation for each compounding room ranged from 36 air changes per hour – 73 air changes per hour.

All BSC had average face velocity measurements above 100 fpm (with no value single measurement value below 75 fpm) when the sash was at working height (i.e., at indicator arrows). Particle testing data indicate that the Class II A2 supply HEPA filters which recirculate air back into the BSC were operating effectively on the dates of our sampling events (Table 16). All BSC cabinets were performance-tested and certified by an independent ventilation test contractor within 6 months prior to our sampling event(s).

Phase 2 Results

The results from the Phase 2 air sampling performed during simulated incidental (minor) and worst-case spill conditions using propylene glycol as a surrogate semi-volatile compound for chemotherapy agents in Class II A2 BSC and Class II B2 BSC are summarized by facility in Tables 17 through 24 (Attachment 5). The analytical laboratory reports and chain of custody forms are provided in Attachment 9. BSI air sampling data sheets are provided in Attachment 10. Calibration records for select equipment utilized are included in Attachment 11.

Integrated Air Sampling

The majority of the integrated air sampling results for propylene glycol during simulated incidental (minor) and worst-case spill conditions outside of both Class II A2 BSC and Class II B2 BSC did not exceed the analytical laboratory's limit of quantitation (1 µg/sample). The resulting non-detect exposure values ranged from <0.0026 ppm to <0.0056 ppm. The variation in detection level was due to differences in sampling times (i.e., volumes of air collected) for the samples. However, one of the integrated air samples collected outside of a Class II A2 BSC at Group Health Belleview Medical Center during the simulated incidental (minor) spill condition resulted in a detection of propylene glycol at 0.10 ppm.

One of the two field blanks collected at Group Health Capitol Hill contained a detectable level of propylene glycol (18 µg). All other field blanks and lot blanks were below the analytical laboratory's limit of quantitation (1 µg/sample).

Two integrated air samples collected inside of two separate Class II A2 BSC during the simulated incidental (minor) spill condition resulted in detections of propylene glycol ranging from 0.014 ppm to 0.017 ppm. Similarly, one integrated air sample collected inside of a Class II B2 BSC during the incidental (minor) spill condition resulted in detection of propylene glycol at 0.051 ppm. A comparison of air sampling results for propylene glycol during the simulated incidental (minor) spill condition in Class II A2 BSC vs. Class II B2 BSC across all study sites is provided in Table 23.

Two integrated air samples collected inside of two separate Class II A2 BSC during the simulated large spill condition resulted in detections of propylene glycol ranging from 0.040 ppm to 0.044 ppm. One integrated air sample collected inside of a Class II B2 BSC during the large spill condition resulted in detection of propylene glycol at 0.0070 ppm. A comparison of air sampling results for propylene glycol during simulated large spill conditions in Class II A2 BSC vs. Class II B2 BSC across all study sites is provided in Table 24.

Direct-Read Air Sampling

All baseline (background) TVOC measurement collected using the direct-read PID air sampling monitor prior to initiating each spill event, in between spill events, and following completion of the final spill event were below the instrument's lower level of detection (instrument's resolution) of 1 ppb.

Following set-up of spill materials, propylene glycol measurements were collected by placing the direct-read monitor's probe at less than 1 inch from both minor and major spill materials at all sites to verify a response from the instrument. An immediate response was detected for all spill events (as expected) and measured values were observed to return to background when the direct-read monitor probe was retracted to greater than 1 inch from the spill materials.

Direct-read PID air sampling measurements collected for propylene glycol during simulated worst-case spill conditions outside of a Class II B2 BSC at Multi-Care Health – Tacoma General detected values from non-detect to 700 ppb (calculated to be 3,850 ppb with the 5.5x instrument correction factor). It was observed that cleaning activities were being performed in an adjacent room concurrently with our air sampling. Because the compounding room is under negative pressure, the cleaning solvent used in the adjacent room may have contributed or been the sole source of the direct-read PID measurements. All other direct-read PID air sampling results for propylene glycol during simulated incidental (minor) and worst-case spill conditions inside and outside of both Class II A2 BSC and Class II B2 BSC did not exceed the instrument's lower level of detection (instrument resolution) of 1 ppb.

Ventilation Assessments

The quantitative ventilation survey was repeated for each BSC prior to air sampling events and results are summarized together with Phase 1 results in Table 16. BSI ventilation testing data sheets are provided in Attachment 10. Calibration record for the equipment utilized (TSI VelociCalc meter) is included in Attachment 11.

All BSC had average face velocity measurements above 100 fpm (with no single measurement value below 75 fpm) when the sash was at working height (i.e., at indicator arrows). The BSC at all sites appeared to be well-maintained and storage of items that could impede the ventilation-performance of the cabinets was observed to be minimal.

Discussion

General Observations

The facilities evaluated were located at larger hospitals or medical centers in the greater Seattle-Tacoma area. The compounding areas were generally small rooms (<100 square feet) to medium sized rooms (100 square feet – 500 square feet). The compounding rooms generally had one or two BSC within the room. However, one site (St. Joseph Medical Center) had three BSC in the room. Compounding technicians follow strict methods for preparation of chemotherapy solutions which were very similar across all sites. All facilities used CSTD for compounding during our sampling events which minimizes the risk of spillage and release of chemotherapy compounds (Photos 10, 11, 12 – Attachment 12). Compounding activities were performed by one individual, which is typical, and the duration of compounding activities ranged from 20 minutes to 30 minutes for each of the two solutions. Following the completion of compounding for each solution, the technicians bagged and sealed all waste (Photo 12 – Attachment 12) and placed it inside dedicated hazardous waste containers inside the room. This was followed by a cursory wipedown of the horizontal surfaces inside the BSC using isopropanol-moistened disposable towels. For this study, total task time including preparation, compounding, and clean-up ranged from 75 minutes to 92 minutes per compounding event. According to the compounding technicians, frequency and duration of compounding at each facility varies daily ranging from less than one hour per day to greater than 8 hours per day.

Compounding technicians generally wore disposable coveralls or lab coat, sterile nitrile gloves, hairnet, and patient mask (Photos 2, 11 – Attachment 12).

Cyclophosphamide was observed to be in dry-powder form prior to compounding, whereas 5-Fluorouracil is in a liquid solution. 50ml of sodium chloride solution is added to 1 gram of dry form of Cyclophosphamide and then mixed by hand. An aliquot of the solution is extracted and mixed into 250ml saline solution (intravenous bag). The process was similarly repeated, but using 5 grams of 5-Fluorouracil pre-prepared in solution. No spillage or release was observed during compounding activities at any of the sites.

Additional site-specific observations are provided as follows:

Group Health, Bellevue Medical Center - Class II A2 BSC

The compounding room at Group Health - Bellevue Medical Center consists of an approximate 11 foot x 9 foot negative pressure room containing one BSC along the east wall. The face of the BSC is approximately 70 inches wide with sash height indicating arrows at approximately 9.5 inches. The entrance to the room is on the west wall and a pass-through window on the south wall. The area adjacent to the room contains the sterile supplies and gowning area.

Group Health, Capitol Hill - Class II B2 BSC

The compounding room at Group Health - Capitol Hill Center consists of an approximate 12 foot x 8-foot negative pressure room containing two BSCs along the south wall. The face of the BSC is approximately 70 inches wide with sash height indicating arrows at approximately 8 inches. The entrance to the room is on the west wall and a pass-through window on the west wall. The area adjacent to the room contains the sterile supplies and gowning area (Photo 3 – Attachment 12).

CHI Franciscan Health, Highline Cancer Center - Class II A2 BSC

The compounding room at CHI Franciscan Health - Highline Cancer Center consists of an approximate 18 foot x 10 foot negative pressure room containing one BSC along the west wall. The face of the BSC is approximately 70 inches wide with sash height indicating arrows at approximately 8 inches (Photo 13 – Attachment 12). The entrance to the room is on the east wall and does not have a pass-through window. The area adjacent to the room contains the sterile supplies and gowning area.

CHI Franciscan Health, Saint Joseph Medical Center - Class II B2 BSC

The compounding room at CHI Franciscan Health - St. Joseph Medical Center consists of an approximate 28 foot x 9 foot negative pressure room containing two BSC along the south wall and one on the north wall. The face of the BSC is approximately 70 inches wide with sash height indicating arrows at approximately 8 inches. The entrance to the room is on the north wall and does not have pass-through window (Photo 14 – Attachment 12). The area adjacent to the room contains the sterile supplies and gowning area.

MultiCare Health System, Tacoma General Hospital - Class II B2 BSC

The Class II B2 BSC compounding room at MultiCare Health System - Tacoma General Hospital consists of an approximate 8 foot x 8 foot negative pressure room containing one BSC along the south wall. The face of the BSC is approximately 46 inches wide with sash height indicating arrows at approximately 7 inches. The entrance to the room is on the east wall and does not have pass-through window. The area adjacent to the room contains a positive pressure pharmacy compounding area between the gowning and sterile supplies area to the north.

MultiCare Health System, Tacoma General Hospital - Class II A2 BSC

The Class II A2 BSC compounding room at MultiCare Health System - Tacoma General Hospital consists of an approximate 20 foot x 10 foot negative pressure room containing two BSC along the east wall (Photo 15 – Attachment 12). The face of the BSC is approximately 70 inches wide with sash height indicating arrows at approximately 9 inches.

The entrance to the room is on the west wall and does not have pass-through window. The area adjacent to the room contains the sterile supplies and gowning area.

Phase 1 Discussion

A comparison of air sampling results for Cyclophosphamide and 5-Fluorouracil during representative compounding activities in Class II A2 BSC vs. Class II B2 BSC across all study sites showed non-detect exposure values that were lower than the occupational exposure limits for Cyclophosphamide and 5-Fluorouracil. Common exposure control methods across all sites such as the use of established compounding protocols and use of Class A2 or B2 BSC ventilated cabinets appear to be notable contributing factors to minimizing release of, and/or exposure to, the particulate fraction of chemotherapy agents. Strict compounding protocols established at each facility using CSTD for both the liquid form of 5-Fluorouracil and the powder form of Cyclophosphamide also serve to minimize exposure to particulate fractions of the chemotherapy agents during compounding. Duration of compounding activities from start to completion of clean-up was generally similar across all sites ranging from approximately 75 minutes to 92 minutes. Air sampling continued for at least 30 minutes following completion of compounding activities which resulted in a sampling duration of 105 minutes to 120 minutes.

Although our sampling methods for Cyclophosphamide and 5-Fluorouracil were capable of measurement of aerosol forms of the compounds, our observations of compounding activities did not identify conditions where notable aerosols would be generated.

Air sampling results for Cyclophosphamide and 5-Fluorouracil during simulated worst-case spill conditions in both Class II A2 BSC and Class II B2 BSC also did not identify any measurable airborne exposures for either Class II A2 BSC vs. Class II B2 BSC across all study sites. Furthermore, all non-detect exposure values for air samples collected during simulated worst-case spill conditions were lower than the occupational exposure limits for Cyclophosphamide and 5-Fluorouracil (referenced in Table 2). All simulated spill events were performed with chemotherapy agents in solution and dispensed onto spill pads within a secondary containment within the confines of the ventilated cabinet. It is reasonable to conclude that risk of exposure to particulate fractions would be higher if powders were incidentally released as a spill or if the spill extended beyond the confines of the ventilated cabinet. However, these spill conditions were reported by the participating healthcare facilities to have a low probability of occurring and were not assessed as part of study scope.

Due to facility access restrictions and resource limitations at the partner facilities during Phase 1, BSI was unable to perform repeat sampling events to assess the potential variability of air sampling exposure data.

Phase 2 Discussion

The integrated air sampling results for propylene glycol during the simulated incidental (minor) spill condition in Class II A2 BSC vs. Class II B2 BSC were generally similar across all study sites. Two of the three air samples (#0215-4, #0220-14) collected inside Class II A2 BSC had detectable values as compared to one of the three air samples (#0227-4) collected inside Class II B2 BSC.

However, the detectable value measured in the Class II B2 BSC (0.051 ppm) was somewhat higher than the detectable values measured in the Class II A2 BSC (0.014 ppm to 0.017 ppm). Review of the direct-read air monitoring data did not reveal any propylene glycol detections inside any of the Class II A2 BSC or Class II B2 BSC across all study sites.

Review of the ventilated cabinet face-velocity test data did not reveal any obvious or notable influence from air flow on propylene glycol concentration for air samples inside the cabinets with detectable values in Class II A2 BSC vs. Class II B2 BSC, and/or those cabinets with non-detect values under simulated incidental (minor) spill conditions. All ventilation face velocities were above 100 fpm (range = 115 fpm – 152 fpm).

A comparison of air sampling results during the simulated large spill conditions identified propylene glycol concentrations ranging from 0.040 ppm (#0215-7) to 0.044 ppm (#0220-17) inside the Class II A2 BSC which were somewhat higher than the propylene glycol concentration of 0.0070 ppm (#0220-7) detected inside of the Class II B2 BSC. Other than the cabinet type, there were no clearly observed factors that could account for the variation of propylene glycol concentrations for air samples inside the cabinets with detectable values in Class II A2 BSC vs. Class II B2 BSC, and/or those cabinets with non-detect values under the same simulated large spill conditions. The air sampling performed in the Class II A2 BSC at CHI-Highline resulted in two detections of propylene glycol. No other site had more than one integrated airborne propylene glycol detection. Interestingly, CHI-Highline was the only site that had a high ambient dust particle count outside of the cabinet (2,370 pt/cc - 2,800 pt/cc) as compared to the other sites (range = 0 pt/cc - 34 pt/cc). It is unclear if this condition could have had an influence on the propylene glycol airborne sampling results.

The majority of the integrated air sampling results were non-detect for propylene glycol during simulated incidental (minor) and worst-case spill conditions outside of both the Class II A2 BSC and Class II B2 BSC across all sites. However, one of the integrated air samples collected outside of the Class II A2 BSC (sample #0226-3 on the right side of the ventilated cabinet) at the Group Health Belleview Medical Center during the simulated incidental (minor) spill condition resulted in a detection of propylene glycol at 0.10 ppm. This was the highest air concentration of propylene glycol measured for an integrated air sample in the study. The integrated air sample collected on the left side of the same ventilated cabinet was non-detect and the direct-read air sample results on both the left and right sides of the same ventilated cabinet were non-detect. The integrated air samples and field blanks collected inside the same cabinet for both spills were also non-detect. At BSI's request, the analytical laboratory performed an internal quality control review including repeat analysis of the sample in question. The laboratory's analytical result of repeat analysis for this sample was very similar. There were no known reports of propylene glycol contamination on the sampling media and it is unlikely that cross-contamination occurred during field sampling; however, these possibilities cannot be ruled-out.

For Phase 2, BSI performed repeat sampling at the Group Health - Bellevue Medical Center to assess the potential variability of air sampling exposure data for the large spill condition. All repeat air sampling data were non-detect and no variability in propylene glycol concentrations was observed for the repeat samples collected.

One of the two field blanks (#0227-9) collected at Group Health Capitol Hill contained a detectable level (18 µg) of propylene glycol. Interestingly, the mass of propylene glycol for this field blank was similar to that found on sample #0226-3 noted above (19 µg). However, the air samples were collected on different days. At BSI's request, the analytical laboratory performed an internal quality control review including repeat analysis of this sample. The laboratory's analytical result of repeat analysis for this sample was very similar. There were no known reports of propylene glycol contamination on the sampling media and it is unlikely that cross-contamination occurred during field sampling; however, these possibilities cannot be ruled-out.

Compounding activities were not performed for the Phase 2 air sampling because the partner healthcare facilities were not prepared to use a surrogate chemical, such as propylene glycol, for compounding in this manner. Furthermore, exposure risk from particulate or volatile fractions of chemotherapy agents during compounding is reduced by use of CSTD methods. Instead, the Phase 2 sampling focused only on characterizing potential volatile fractions from higher exposure risk conditions, namely simulated minor (incidental) spills and simulated large (worst-case) spill events.

The number of integrated air samples collected for each unique spill condition was small (generally limited to 3 for each location), and the number of study sites was limited (three Class II A2 BSC and three Class II B2 BSC). As such, the study sample set did not allow for robust statistical analysis of the data. Furthermore, many of the air sample results were non-detect, which also limited the comparative analysis across BSC types.

Conclusions

Phase 1

The Phase 1 air sampling results assessing the particulate and aerosol fractions of Cyclophosphamide and 5-Fluorouracil during representative compounding activities and simulated worst-case spill events in Class II A2 BSC vs. Class II B2 BSC across all study sites were below the occupational exposure limits for Cyclophosphamide and 5-Fluorouracil. Based on the air sampling data, current exposure control methods across all sites such as the use of established compounding protocols and use of performance-verified Class A2 or B2 BSC ventilated cabinets appear to be similarly effective at minimizing release of, and/or exposure to, the particulate fraction of chemotherapy agents. Strict compounding protocols established at each facility using CSTD for both the liquid form of 5-Fluorouracil and the powder form of Cyclophosphamide also serve to minimize exposure to airborne particulate fractions of the chemotherapy agents during compounding.

For this study, the simulated spill events were performed with chemotherapy agents in solution and dispensed onto spill pads within a secondary containment within the confines of the ventilated cabinet. It is reasonable to conclude that risk of exposure to particulate fractions of chemotherapy agents would be higher if powders were incidentally released as a spill or if the spill extended beyond the confines of the ventilated cabinet. However, these spill conditions reportedly have a low probability and, thus were not assessed as part of study scope.

Phase 2

The Phase 2 air sampling data and results for the vapor fractions of the selected surrogate compound (propylene glycol) were not as conclusive as those of Phase 1.

Air sampling results for propylene glycol during the simulated incidental (minor) spill condition in Class II A2 BSC vs. Class II B2 BSC were somewhat similar across all study sites, but not without variations in number of detections and concentration. However, other than cabinet type, there were no clear factors that could account for the variations of propylene glycol concentrations detected inside the cabinets of Class II A2 BSC vs. Class II B2 BSC.

The majority of the integrated air sampling results for propylene glycol during simulated incidental (minor) and worst-case spill conditions outside of both the Class II A2 BSC and Class II B2 BSC across all sites were non-detect. The Phase 2 air sampling data suggest that there is no notable difference in effectiveness of control of volatile fractions of propylene glycol outside of Class II A2 BSC as compared to Class II B2 BSC. This is relevant to healthcare workers such as compounding technicians who work in the compounding rooms.

The air sampling data also suggest that during minor and/or large spills, there is a potential for airborne exposure risk to volatile fractions of chemotherapy drugs inside the ventilated cabinets for both Class II A2 BSC and Class II B2 BSC. In order for this exposure risk to be realized, the compounding technicians would need to lift the ventilated cabinet sash and insert their face/breathing zone into the cabinet. This scenario could occur if a spill requires extensive cleaning of the interior surfaces of the cabinet without proper respiratory protection.

It should be noted that the small study data set did not allow for robust statistical analysis of the results. Furthermore, many of the air sample results were non-detect, which also limited the comparative analysis across BSC types.

Recommendations for Further Study

Based on the results of this study, further assessment is warranted to validate the conclusions of this study and/or provide additional insight. Recommendations for further study to evaluate the relative effectiveness of Class II A2 BSC as compared with Class II B2 BSC at controlling workplace exposures to select chemotherapy agents and/or a suitable surrogate are as follows:

- Perform additional sampling events to increase the data set so that robust statistical and comparative analysis of the results can be made. This should include additional sampling events at new sites and repeat sampling events at the same sites.
- Perform sampling events at small metropolitan facilities and small rural facilities to document potential variations in procedures, equipment, and/or facilities.
- Consider developing a sampling strategy to involve the use of a semi-volatile surrogate chemical during typical chemotherapy compounding activities to evaluate the effectiveness of exposure control during use of CSTD.
- If the practice of not using a CSTD for chemotherapy compounding exists, consider developing a sampling strategy to assess this condition.
- Incorporate a qualitative ventilation assessment to evaluate capture efficiency and/or potential air turbulence conditions at the face of each cabinet. Excess air turbulence and poor capture efficiency at the face of the cabinet can affect exposure potential even when cabinets meet minimum face-velocity performance requirements.
- Further evaluate the relative volatile chemical properties of antineoplastic agents and how they are handled in Class II A2 BSC to screen their potential exposure risk.
- Develop a sampling and analytical method to simultaneously monitor the volatile and non-volatile fractions of antineoplastic agents in workplace air.

Limitations

This study was performed by the referenced BSI personnel who have extensive industrial hygiene experience and are well-versed in exposure assessment. The sampling strategy was prepared based on information and input provided by WSPA and its partner facilities as noted in this document. The study included both airborne particulate and/or aerosol fractions of the agents used during compounding, and a surrogate volatile compound to address the potential vapor phase components that could be present. However, the risk or degree of potential vapor generation of specific chemotherapy agents during compounding or during the spill scenarios was not expressly evaluated.

Worker exposure to chemotherapy drugs may occur through inhalation, skin contact, skin absorption, ingestion, and/or injection. This study was not designed to evaluate specific work practices or chemical exposures to employees performing compounding by any or all of the exposure routes noted. As a best management industrial hygiene practice, exposure through all routes should be kept as low as reasonably achievable. As such, selection of effective engineering, administrative, and personal protective equipment controls should always be made based on site-specific operations, chemical use, and conditions by experienced environmental, health and safety professionals with input from employees and their managers.

Attachment 1: Bureau Veritas Internally-Validated Laboratory Analytical Method Summary for Cyclophosphamide

Bureau Veritas Air Sampling and Analytical Method Summary Sheet

Cyclophosphamide Monohydrate: BV-2011-22369

Chemical Formula: $C_7H_{15}Cl_2N_2O_2P \cdot H_2O$ MW: 279.1 CAS: 6055-19-2

OEL: *redacted*
Properties: White Crystalline Powder
Supplier: Sigma
Lot Numbers: 079K1569
Standard Storage: 2-8°C

Sampling	Measurement
Sampling Media: Omega 25 mm PTFE filter, in a three-piece polypropylene cassette (BV Code TFE3a)	Technique: LC/MS/MS
Supplier: SKC	LC System: Agilent 1200 Series, binary pump, and high performance auto-sampler
Catalog Number: 225-2257	Extraction: 2 mL Extraction Solution, Sonicate 10 minutes Extraction Solution: 10 ng/mL Cyclophosphamide-D4 (IS) diluted in 60% Water / 40% Acetonitrile
Pore Size: 1.0 µm	Injection Volume: 5 µL + 14 second flushport rinse
Flow Rate: 2.0 L/min	Mobile Phase: [60% Water / 40% Acetonitrile], 0.1% (v/v) Formic Acid
Vol. –Min: 30-L will result in 0.033 µg/m^3 at the LOQ –Max: 960-L will result in 0.0010 µg/m^3 at the LOQ	Flow: 1200 µL/min
Shipment: Return samples immediately after sampling.	Column: Waters Sunfire C18, 4.6 x 75 mm, 2.5 µm particle size Column Temperature: 40°C
Stability: At least 7 days at room temperature; at least 21 days refrigerated.	Detector: API 4000 QTRAP Triple Quadrupole Mass Spectrometer Ionization Source: Turbo V Source w/ Turbo IonSpray® Probe
Field Blanks: Include at least one blank filter with every set of samples	MS/MS transitions: 261.0/106.0 (Quant.); 261.0/140.0 (Qual.); 265.0/235.0 (IS)
	Calibration: Stocks and spiking standards in Extraction Solution
	Validated Analytical Range: 0.5 ng/mL to 200 ng/mL
	LOQ: 1.0 ng/filter

Accuracy

Range Studied:

1ng (LOQ): DE and CE
4.8ng – 960ng: DE*, CE*, Storage*

*Dilution employed above calibration range

Validation (Pooled Results)

Conditions	%Recovery	%RSD
Day of DE (n=20)	102.7	5.04
CE/air sampled (n=8)	106.5	9.61
7 Storage, Day 7 RT (n=8)	97.5	12.1
Storage, Day 21 Refrigerated (n=8)	117.3	3.64

Interference

Interferences are expected to be minimal for LC/MS/MS. Conditions may be modified to resolve interfering peaks from the sample matrix if an interference is identified. Please note any other active ingredients that may be present in the sampling area.

Tables from analytical method validation

Sensitivity

Table 6. Replicate Injections of a Cyclophosphamide Monohydrate LOQ Standard (0.5 ng/mL)					
Inj. #	**S/N**	**Area**	**Mean**	**% RSD**	**%Difference from Mean**
1	43.9	782	748	4.39	4.59
2	44.7	749			0.178
3	40.4	761			1.78
4	28.4	775			3.66
5	44.1	696			-6.91
6	26.0	723			-3.30

Standard Stability

Bureau Veritas determined that the working standards prepared in Extraction Solution will be stable for at least 28 days when stored tightly sealed in glass flasks, protected from light. This was determined by injecting a standard at Time 0 (T_0), Day 14 (T_{14}), and at Day 28 (T_{28}) after it was prepared and comparing its calculated concentration to a freshly prepared calibration curve. The results are presented in Table 7. Solution stability criterion is no more than 10% deviation from the T_0 value. Figure 1 represents a chromatogram of a 50 ng/mL standard.

Table 7: Standard Solution Stability		
Solution Storage (Days)	**Calculated Concentration (ng/mL)**	**% Deviation from T_0**
T_0	51.2	--
T_{14}	52.1	1.76%
T_{28}	55.2	7.81%

Tables from air sampling validation report

Table 5. % Recovery for 0.5 %, 5 %, 25 %, 100 %, and 200 % OEL In-Cassette Cyclophosphamide Media Spikes After 0.5 Hours Shaking by Platform

Cassette #	0.5 % OEL 4.8 ng	5 % OEL 48 ng	25 % OEL 240 ng	100 % OEL 960 ng	200 % OEL 1,920 ng
1	96.7	113.3	107.5	114.4	108.3
2	100.8	112.9	104.2	106.5	105.2
3	105.0	104.6	109.2	111.5	111.5
4	111.3	114.2	110.8	108.3	109.4
Average	103.5	111.3	107.9	110.2	108.6
SD	0.06235	0.04467	0.02825	0.03494	0.02627
% RSD	6.02	4.02	2.62	3.17	2.42

Table 7. Stability of Samples: Long Term Recoveries (%) for 5 % OEL and 100 % OEL Spiked Media In-Cassette

Level	Condition	Day 0	Day 7	Day 21	Day 35
Average Recovery	Ambient	110.7	107.0	81.8	74.0
% RSD		3.39	4.82	27.69	47.16
Average Recovery	Refrigerated	-	116.8	121.5	130.7
% RSD		-	3.65	8.83	8.82

n=8 for Day 0, n=4 for Day 7, Day 21 and Day 35

Table 8. Collection Effect of Cyclophosphamide for 0.5 % and 100 % OEL Spiked 25 mm PTFE filters In-Cassette, 2.0 L/min for 8 Hours

Level (%OEL)	% Recovery (DE from Table 5)	Collection Effect % Average Recovery (%RSD)
0.5 %	103.5	103.6 (14.02)
100 %	110.2	109.4 (3.01)

n=4 for both levels

Attachment 2: Bureau Veritas Internally-Validated Laboratory Analytical Method Summary for 5-Fluorouracil

Bureau Veritas North America, Inc.

5-Fluorouracil

Empirical Formula: $C_4H_3FN_2O_2$
Molecular Weight: 130.08
CAS Number: 51-21-8

Bureau Veritas Work Order No.: [redacted]
Draft Report Date: March 31, 2008

OSHA: None
NIOSH: None
ACGIH: None
Maximum Allowable Carryover (MAC) Limit Range: 19 - 139 µg/m³

Synonyms: 5-Fluoro-2,4(1*H*,3*H*)-pyrimidinedione; 2,4-dioxo-5-fluoropyrimidine; 5-FU; Ro-2-9757; NSC-19893; Adrucil; Arumel; Efudex; Efudix; Fluril; Fluracil; Fluoroplex; Fluroblastin; Fluro Uracil; Timazin.

Sampling and Storage

Sampler:	25-mm polypropylene 2-piece cassette with a PTFE filter (1 µm pore size)
Sampling:	2.0 L/min for up to 8 hours
Storage:	Refrigerated or ambient temperatures
Shipping:	Samples can be shipped at ambient temperature
Sample Stability:	14 days at refrigerated or ambient temperatures

Method Performance

Range Studied:	0.19 to 278 µg/m³ for a 240 L sample
Extraction Efficiency/Accuracy:	99.5% (0.70% Pooled RSD) 45.4 to 66,600 ng/sample
Sampling Stability:	99.5% (1.2% Pooled RSD) 45.4 to 66,600 ng/sample
Limit of Quantitation:	20 ng/sample
Analytical Precision:	1.2% Pooled RSD

Attachment 3: NIOSH 5523 Analytical Method for Glycols

FORMULA: Table 1 MW: Table 1 CAS: Table 1 RTECS: Table 1

METHOD: 5523, Issue 1 **EVALUATION: PARTIAL** **Issue 1: 15 May 1996**

OSHA : No PEL
NIOSH: No REL
ACGIH: C 50 ppm (ethylene glycol)
(1 ppm = 2.54 mg/m^3 @ NTP)

PROPERTIES: See Table 1

NAMES & SYNONYMS: (1) ethylene glycol: 1,2-ethanediol; (2) propylene glycol: 1,2-propanediol
(3) 1,3-butylene glycol: 1,3-butanediol (4) diethylene glycol: 2-hydroxyethyl ether, 2,2'-oxydiethanol

SAMPLING

SAMPLER: XAD-7 OVS tube (glass fiber filter, 13-mm; XAD-7, 200mg/100mg)

FLOW RATE: 0.5 to 2 L/min

VOL-MIN: 5 L
-MAX: 60 L

SHIPMENT: pack cold for shipment

SAMPLE STABILITY: 28 days @ 5 °C [1]
ethylene glycol 14 days @ 5 °C [1]

BLANKS: 2 to 10 field blanks per set

ACCURACY

RANGE STUDIED: see EVALUATION OF METHOD

BIAS: see EVALUATION OF METHOD

OVERALL PRECISION ($\hat{S}_{rT}$): not determined

ACCURACY: not determined

MEASUREMENT

TECHNIQUE: GAS CHROMATOGRAPHY, FID

ANALYTES: compounds above

DESORPTION: 2 mL methanol; ultrasonicate 30 min

INJECTION VOLUME: 1 µL

TEMPERATURE-INJECTION: 250 °C
-DETECTOR: 300 °C
-COLUMN: 40 °C, 8 °C/min to 230 °C

CARRIER GAS: He_2 @ 2.4 to 2.6 mL/min

COLUMN: Rtx-35 fused silica capillary, 30 m, 0.53-mm ID, 3-µm film

CALIBRATION: solutions of glycols in methanol

RANGE: 15 to 800 µg/sample

ESTIMATED LOD: see Table 2

PRECISION ($\bar{S}_r$): 0.04 to 0.09 [1]

APPLICABILITY: Under the GC parameters given in the method, the glycols listed above are baseline separated and can be identified based on retention time and quantified. Hexylene glycol can be determined by this method; however, no sampling or analytical evaluation has been conducted.

INTERFERENCES: No specific interferences were identified. The method yields baseline separation for all analytes.

OTHER METHODS: This method replaces NMAM 5500 [2], which was found deficient in the collection of ethylene glycol in aerosol form. Also ethylene glycol was not separated from propylene glycol by the chromatography.

REAGENTS:

1. Ethylene glycol, reagent grade.*
2. Propylene glycol, reagent grade.*
3. 1,3-Butylene glycol, reagent grade.*
4. Diethylene glycol, reagent grade.*
5. Triethylene glycol, reagent grade.*
6. Tetraethylene glycol, reagent grade.*
7. Methanol, chromatographic grade.*
8. Calibration stock solution, 10 mg/mL: Weigh aliquots of each glycol and dissolve in methanol.
9. Helium, purified.
10. Hydrogen, prepurified.
11. Air, filtered.

* See SPECIAL PRECAUTIONS

EQUIPMENT:

1. Sampler: XAD-7 OVS tube, 13-mm OD, containing two sections of XAD-7 (200 mg front/100 mg back section) separated by polyurethane foam plug. A glass fiber filter plug precedes the front section and a polyurethane foam plug follows the back section. Tubes are commercially available (SKC, Inc., #226-57).
2. Personal sampling pump, 0.5 to 2 mL/min, with flexible connecting tubing.
3. Gas chromatograph, flame ionization detector, integrator, and column (page 5523-1).
4. Ultrasonic bath.
5. Vials, autosampler, with PTFE-lined caps.
6. Vials, 4 mL, with screw caps.
7. Syringes, 10-µL and other sizes as needed, readable to 0.1 µL.
8. Flasks, volumetric, various sizes.
9. Pipets, various sizes.

SPECIAL PRECAUTIONS: Inhalation of glycol mists causes respiratory irritation, shortness of breath, and coughing. Methanol is flammable and a dangerous fire risk. Work with these compounds in a well-ventilated hood.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.
2. Remove front and rear caps from the tube immediately before sampling. Attach sampler to personal sampling pump with flexible tubing.
3. Sample at an accurately known flow rate between 0.5 and 2 L/min for a total sample size of 5 to 60 L.
4. Cap the samplers and pack securely in dry ice for shipment.

SAMPLE PREPARATION:

5. Place front sorbent section and glass fiber filter in a 4-mL screw cap vial. Place backup sorbent section in a separate vial. Discard foam plugs.
6. Add 2 mL of methanol to each vial and cap.
7. Place vials in an ultrasonic bath for 30 min to aid desorption.

CALIBRATION AND QUALITY CONTROL:

8. Calibrate daily with at least six working standards over the range of interest. Three standards (in duplicate) should cover the range from LOD to LOQ.
   a. Add known amounts of calibration stock solution to methanol in 10-mL volumetric flasks and dilute to the mark.
   b. Analyze together with samples and blanks (steps 11 and 12).
   c. Prepare calibration graph (peak area or height vs. µg glycol).
9. Determine desorption efficiency (DE) at least once for each lot of OVS tubes used for sampling in the calibration range (step 8).
   a. Prepare three samplers at each of six levels plus three media blanks.
   b. Inject a known amount of calibration stock solution directly onto the filter of OVS tubes. Draw air

through the sampler at 1 L/min for 60 min.

c. Cap the ends of the tubes and allow to stand overnight.
d. Desorb (steps 5 through 7) and analyze together with standards and blanks (steps 11 and 12).
e. Prepare a graph of DE vs. µg analyte recovered.

10. Analyze three quality control blind spikes and three analyst spikes to ensure that the calibration graph and DE graphs are in control.

MEASUREMENT:

11. Set gas chromatograph according to manufacturer's recommendations and to conditions given on page 5523-1. Inject 1-µL sample aliquot manually using solvent flush technique or with autosampler.
    NOTE: If peak area is above the linear range of the working standards, dilute with methanol, reanalyze and apply the appropriate dilution factor in the calculations.
12. Measure peak areas.

CALCULATIONS:

13. Determine the mass, µg (corrected for DE), of each glycol found in the sample front (W_f) and back (W_b) sorbent sections, and in the average media blank front (B_f) and back (B_b) sorbent sections.
    NOTE: If $W_b > W_f/10$, report breakthrough and possible sample loss.
14. Calculate concentration, C, of each analyte in the air volume sampled, V (L):

$$C = \frac{(W_f + W_b - B_f - B_b)}{V}, mg/m^3$$

EVALUATION OF METHOD:

The method was evaluated for six glycols (ethylene, propylene, 1,3-butylene, diethylene, triethylene, and tetraethylene). Desorption efficiency (DE) was determined by spiking known amounts of each glycol in methanol solution onto the glass fiber filter plug of the XAD-7 OVS tubes, drawing air through the spiked tubes at 1 L/min for 60 min, and analyzing. Recovery data along with LODs and LOQs for each analyte are listed in Table 2. When stored at 5°C, ethylene glycol samples on XAD-7 OVS tubes were stable for 14 days, and the other glycols were stable up to 28 days. Glycol aerosols were generated at three concentration levels (6 samples per concentration) from a ROSCO™ Model 1500 Fog Machine. Precision [as calculated from the pooled relative standard deviation ($\bar{S}_r$)] and mean bias for the glycols are as follows:

Analyte	Range Studied (µg/sample)	Precision ($\bar{S}_r$)	Bias
Ethylene glycol	33 to 218	0.043	-15%
Propylene glycol	26 to 187	0.062	-3.2%
1,3-butylene glycol	34 to 178	0.054	-0.5%
Diethylene glycol	68 to 219	0.047	-0.2%
Triethylene glycol	33 to 201	0.075	-4.0%
Tetraethylene glycol (2 levels)	32 to 197	0.035	+20%

The low recovery for ethylene glycol possibly may be attributed to increased volitility when sampled at 1 L/min [1]. Although hexylene glycol is separated by the chromatographic conditions given in the method, no evaluation of sampling or analytical parameters was done for this compound.

REFERENCES:

[1] Pendergrass, S.M. [1994]. Development of a sampling and analytical methodology for the

determination of glycols in air: Application to theatrical smokes. Unpublished paper presented at Pittsburgh Conference, Chicago, IL, March 1994.

[2] NIOSH [1984]. Ethylene glycol: Method 5500. In: Eller PM, Ed. NIOSH manual of analytical methods, 3rd ed. Cincinnati, OH: U.S. Department of Health and Human Services, HHS (NIOSH) Publication No. 84-100.

METHOD WRITTEN BY:

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TABLE 1. GLYCOLS GENERAL INFORMATION

Analyte	Formula	MW	CAS #	RTECS #	Properties
Ethylene glycol	$C_2H_6O_2$	62.07	107-21-1	KW2975000	liquid; BP 197.2 °C; FP -13 °C; d 1.113 g/mL @ 20 °C; n_D 1.4310; vp 0.007 kPa (0.05 mm Hg) @ 20°C; explosive limits 3.2 to 15.3% v/v in air
Propylene glycol	$C_3H_8O_2$	76.10	57-55-6	TY2000000	liquid; BP 188 °C; FP -60 °C ; d 1.038 g/mL @ 20 °C; n_D 1.4320; vp 0.009 kPa (0.07 mm Hg) @ 20°C; explosive limits 2.6 to 12.5% v/v in air
1,3-Butylene glycol	$C_4H_{10}O_2$	90.12	107-88-0	EK0440000	liquid; BP 207.5 °C; d 1.0059 g/mL @ 20 °C; n_D 1.4400; vp 0.06 mm Hg @ 20 °C
Diethylene glycol	$C_4H_{10}O_3$	106.12	111-46-6	ID5950000	liquid; BP 245 °C; FP -6.5 °C; d 1.118 g/mL @ 20 °C; n_D 1.4460 @ 25 °C; vp <0.01 mm Hg @ 20°C; explosive limits 3 to 7% v/v in air
Triethylene glycol	$C_6H_{14}O_4$	150.17	112-27-6	YE4550000	liquid; BP 285 °C; FP -5 °C; d 1.125 g/mL @ 20 °C; n_D 1.4550; vp <0.001 mm Hg @ 20 °C; explosive limits 0.9 to 9.2% v/v in air
Tetraethylene glycol	$C_8H_{18}O_5$	194.23	112-60-7	XC2100000	liquid; BP 327.3 °C; FP -4 °C; d 1.125 g/mL @ 20 °C; n_D 1.4577; vp >0.001 mm Hg @ 20 °C

TABLE 2. GLYCOL RECOVERY DATA

Analyte	LOD (µg/sample)	LOQ (µg/sample)	Desorption Efficiency Spikes[a]		$\bar{S}_r$[b]
			100 µg (% Recovery)	200 µg (% Recovery)	
Ethylene glycol	7	22	93.4	101	0.059
Propylene glycol	6	13	83.4	92.5	0.064
1,3-Butylene glycol	6	12	98.8	102	0.072
Diethylene glycol	16	48	94.6	114	0.041
Triethylene glycol	14	42	85.3	98.7	0.043
Tetraethylene glycol	14	42	111	141	0.092

[a] n = 6 for each spiking level
[b] Pooled Relative Standard Deviation

Attachment 4: Phase 1 Data Tables 8-16

Table 8: Summary of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities and Simulated Spill Conditions in Class II A2 BSC at Group Health Bellevue Medical Center – October 24, 2016

Facility	Date	Cabinet Type	Sample Type: Task, Location	Sampling Duration (minutes)	Sample ID	Chemotherapy Agent	Results (µg/m³)
Group Health – Bellevue	10/24/16	Class II A2	Area: Baseline	30	1024-2379	Cyclophosphamide	ND, <0.0137
						5-Fluorouracil	ND, <0.0137
Group Health – Bellevue	10/24/16	Class II A2	Area: Compounding, inside cabinet (right)	120	1024-2373	Cyclophosphamide	ND, <0.00333
						5-Fluorouracil	ND, <0.00333
Group Health – Bellevue	10/24/16	Class II A2	Area: Compounding, outside cabinet (left)	120	1024-2344	Cyclophosphamide	ND, <0.00336
						5-Fluorouracil	ND, <0.00336
Group Health – Bellevue	10/24/16	Class II A2	Area: Compounding, outside cabinet (right)	120	1024-2356	Cyclophosphamide	ND, <0.0035
						5-Fluorouracil	ND, <0.0035
Group Health – Bellevue	10/24/16	Class II A2	Personal: Compounding	85	1024-2313	Cyclophosphamide	ND, <0.00469
						5-Fluorouracil	ND, <0.00469
Group Health – Bellevue	10/24/16	Class II A2	Field Blank 1	NA	1024-2326	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
Group Health – Bellevue	10/24/16	Class II A2	Field Blank 2	NA	1024-2374	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
Group Health – Bellevue	10/24/16	Class II A2	Area: Spill, outside cabinet (right)	60	1024-2364	Cyclophosphamide	ND, <0.00669
						5-Fluorouracil	ND, <0.00669
Group Health – Bellevue	10/24/16	Class II A2	Area: Spill, outside cabinet (left)	60	1024-2367	Cyclophosphamide	ND, <0.00659
						5-Fluorouracil	ND, <0.00659
Group Health – Bellevue	10/24/16	Class II A2	Area: Spill, inside cabinet (right)	60	1024-2370	Cyclophosphamide	ND, <0.00675
						5-Fluorouracil	ND, <0.00675

NA = Applicable

ND = Non-Detect

µg/m³ = micrograms per cubic meter

Table 9: Summary of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities and Simulated Spill Conditions in Class II B2 BSC at Group Health Capitol Hill – October 27, 2016

Facility	Date	Cabinet Type	Sample Type: Task, Location	Sampling Duration (minutes)	Sample ID	Chemotherapy Agent	Results (µg/m^3)
Group Health – Capitol Hill	10/27/16	Class II B2	Area: Baseline	30	1027-2348	Cyclophosphamide	ND, <0.0132
						5-Fluorouracil	ND, <0.0132
Group Health – Capital Hill	10/27/16	Class II B2	Area: Compounding, inside cabinet (left)	120	1027-2365	Cyclophosphamide	ND, <0.00327
						5-Fluorouracil	ND, <0.00327
Group Health – Capitol Hill	10/27/16	Class II B2	Area: Compounding, outside cabinet (left)	120	1027-2378	Cyclophosphamide	ND, <0.00324
						5-Fluorouracil	ND, <0.00324
Group Health – Capitol Hill	10/27/16	Class II B2	Area: Compounding, outside cabinet (right)	120	1027-2355	Cyclophosphamide	ND, <0.00319
						5-Fluorouracil	ND, <0.00319
Group Health – Capitol Hill	10/27/16	Class II B2	Personal: Compounding	85	1027-2351	Cyclophosphamide	ND, <0.00467
						5-Fluorouracil	ND, <0.00467
Group Health – Capitol Hill	10/27/16	Class II B2	Field Blank 1	NA	1027-2353	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
Group Health – Capitol Hill	10/27/16	Class II B2	Field Blank 2	NA	1027-2381	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
Group Health – Capitol Hill	10/27/16	Class II B2	Area: Spill, outside cabinet (right)	60	1027-2369	Cyclophosphamide	ND, <0.00654
						5-Fluorouracil	ND, <0.00654
Group Health – Capitol Hill	10/27/16	Class II B2	Area: Spill, outside cabinet (left)	60	1027-2322	Cyclophosphamide	ND, <0.00629
						5-Fluorouracil	ND, <0.00629
Group Health – Capitol Hill	10/27/16	Class II B2	Area: Spill, inside cabinet (left)	60	1027-2370	Cyclophosphamide	ND, <0.00631
						5-Fluorouracil	ND, <0.00631

NA = Applicable
ND = Non-Detect
µg/m3 = micrograms per cubic meter

Table 10: Summary of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities and Simulated Spill Conditions in Class II A2 BSC at CHI Franciscan Health, Highline Cancer Center – November 2, 2016

Facility	Date	Cabinet Type	Sample Type: Task, Location	Sampling Duration (minutes)	Sample ID	Chemotherapy Agent	Results (µg/m^3)
CHI - Highline	11/2/16	Class II A2	Area: Baseline	30	1102-2298	Cyclophosphamide	ND, <0.0135
						5-Fluorouracil	ND, <0.0135
CHI - Highline	11/2/16	Class II A2	Area: Compounding, inside cabinet (left)	115	1102-2290	Cyclophosphamide	ND, <0.00353
						5-Fluorouracil	ND, <0.00353
CHI - Highline	11/2/16	Class II A2	Area: Compounding, outside cabinet (left)	115	1102-2276	Cyclophosphamide	ND, <0.00352
						5-Fluorouracil	ND, <0.00352
CHI - Highline	11/2/16	Class II A2	Area: Compounding, outside cabinet (right)	115	1102-2271	Cyclophosphamide	ND, <0.00358
						5-Fluorouracil	ND, <0.00358
CHI - Highline	11/2/16	Class II A2	Personal: Compounding	85	1102-2375	Cyclophosphamide	ND, <0.0048
						5-Fluorouracil	ND, <0.0048
CHI - Highline	11/2/16	Class II A2	Field Blank 1	NA	1102-2269	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
CHI - Highline	11/2/16	Class II A2	Field Blank 2	NA	1102-2321	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
NA	11/1/16	NA	Laboratory Blank 1	NA	1101-2308	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
NA	11/1/16	NA	Laboratory Blank 2	NA	1102-2327	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
CHI - Highline	11/2/16	Class II A2	Area: Spill, outside cabinet (right)	60	1102-2303	Cyclophosphamide	ND, <0.00689
						5-Fluorouracil	ND, <0.00689
CHI - Highline	11/2/16	Class II A2	Area: Spill, outside cabinet (left)	60	1102-2302	Cyclophosphamide	ND, <0.00686
						5-Fluorouracil	ND, <0.00686
CHI - Highline	11/2/16	Class II A2	Area: Spill, inside cabinet (left)	60	1102-2305	Cyclophosphamide	ND, <0.00707
						5-Fluorouracil	ND, <0.00707

NA = Applicable

ND = Non-Detect

µg/m^3 = micrograms per cubic meter

Table 11: Summary of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities and Simulated Spill Conditions in Class II B2 BSC at Saint Joseph Medical Center – November 3, 2016

Facility	Date	Cabinet Type	Sample Type: Task, Location	Sampling Duration (minutes)	Sample ID	Chemotherapy Agent	Results (µg/m³)
St. Joseph Medical Center	11/3/16	Class II B2	Area: Baseline	30	1103-2350	Cyclophosphamide 5-Fluorouracil	ND, <0.0137 ND, <0.0137
St. Joseph Medical Center	11/3/16	Class II B2	Area: Compounding, inside cabinet (left)	105	1103-2284	Cyclophosphamide 5-Fluorouracil	ND, <0.00387 ND, <0.00387
St. Joseph Medical Center	11/3/16	Class II B2	Area: Compounding, outside cabinet (left)	105	1103-2306	Cyclophosphamide 5-Fluorouracil	ND, <0.00387 ND, <0.00387
St. Joseph Medical Center	11/3/16	Class II B2	Area: Compounding, outside cabinet (right)	105	1103-2342	Cyclophosphamide 5-Fluorouracil	ND, <0.00394 ND, <0.00394
St. Joseph Medical Center	11/3/16	Class II B2	Personal: Compounding	75	1103-2376	Cyclophosphamide 5-Fluorouracil	ND, <0.00549 ND, <0.00549
St. Joseph Medical Center	11/3/16	Class II B2	Field Blank 1	NA	1103-2281	Cyclophosphamide 5-Fluorouracil	ND, <1ng ND, <1ng
St. Joseph Medical Center	11/3/16	Class II B2	Field Blank 2	NA	1103-2350	Cyclophosphamide 5-Fluorouracil	ND, <1ng ND, <1ng
St. Joseph Medical Center	11/3/16	Class II B2	Area: Spill, outside cabinet (right)	58	1103-2268	Cyclophosphamide 5-Fluorouracil	ND, <0.00712 ND, <0.00712
St. Joseph Medical Center	11/3/16	Class II B2	Area: Spill, outside cabinet (left)	58	1103-2283	Cyclophosphamide 5-Fluorouracil	ND, <0.00712 ND, <0.00712
St. Joseph Medical Center	11/3/16	Class II B2	Area: Spill, inside cabinet (left)	58	1103-2324	Cyclophosphamide 5-Fluorouracil	ND, <0.00707 ND, <0.00707

NA = Applicable
ND = Non-Detect
µg/m3 = micrograms per cubic meter

Table 12: Summary of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities and Simulated Spill Conditions in Class II B2 BSC at MultiCare Health System, Tacoma General Hospital - November 7, 2016

Facility	Date	Cabinet Type	Sample Type: Task, Location	Sampling Duration (minutes)	Sample ID	Chemotherapy Agent	Results (µg/m^3)
MultiCare Health	11/7/16	Class II B2	Area: Baseline	30	1107-2315	Cyclophosphamide	ND, <0.0134
						5-Fluorouracil	ND, <0.0134
MultiCare Health	11/7/16	Class II B2	Area: Compounding, inside cabinet (left)	120	1107-2339	Cyclophosphamide	ND, <0.00339
						5-Fluorouracil	ND, <0.00339
MultiCare Health	11/7/16	Class II B2	Area: Compounding, outside cabinet (left)	120	1107-2371	Cyclophosphamide	ND, <0.00336
						5-Fluorouracil	ND, <0.00336
MultiCare Health	11/7/16	Class II B2	Area: Compounding, outside cabinet (right)	120	1107-2272	Cyclophosphamide	ND, <0.00333
						5-Fluorouracil	ND, <0.00333
MultiCare Health	11/7/16	Class II B2	Personal: Compounding	86	1107-2380	Cyclophosphamide	ND, <0.00471
						5-Fluorouracil	ND, <0.00471
MultiCare Health	11/7/16	Class II B2	Field Blank 1	NA	1107-2291	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
MultiCare Health	11/7/16	Class II B2	Field Blank 2	NA	1107-2273	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
MultiCare Health	11/7/16	Class II B2	Area: Spill, outside cabinet (right)	60	1107-2311	Cyclophosphamide	ND, <0.00675
						5-Fluorouracil	ND, <0.00675
MultiCare Health	11/7/16	Class II B2	Area: Spill, outside cabinet (left)	60	1107-2295	Cyclophosphamide	ND, <0.0068
						5-Fluorouracil	ND, <0.0068
MultiCare Health	11/7/16	Class II B2	Area: Spill, inside cabinet (left)	60	1107-2312	Cyclophosphamide	ND, <0.00694
						5-Fluorouracil	ND, <0.00694

NA = Applicable

ND = Non-Detect

µg/m3 = micrograms per cubic meter

Table 13: Summary of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities and Simulated Spill Conditions in Class II A2 BSC at MultiCare Health System, Tacoma General Hospital – November 8, 2016

Facility	Date	Cabinet Type	Sample Type: Task, Location	Sampling Duration (minutes)	Sample ID	Chemotherapy Agent	Results (µg/m^3)
MultiCare Health	11/8/16	Class II A2	Area: Baseline	30	1108-2304	Cyclophosphamide	ND, <0.0133
						5-Fluorouracil	ND, <0.0133
MultiCare Health	11/8/16	Class II A2	Area: Compounding, inside cabinet (left)	112	1108-2366	Cyclophosphamide	ND, <0.00359
						5-Fluorouracil	ND, <0.00359
MultiCare Health	11/8/16	Class II A2	Area: Compounding, outside cabinet (left)	112	1108-2377	Cyclophosphamide	ND, <0.00357
						5-Fluorouracil	ND, <0.00357
MultiCare Health	11/8/16	Class II A2	Area: Compounding, outside cabinet (right)	112	1108-2293	Cyclophosphamide	ND, <0.00356
						5-Fluorouracil	ND, <0.00356
MultiCare Health	11/8/16	Class II A2	Personal: Compounding	92	1108-2352	Cyclophosphamide	ND, <0.00428
						5-Fluorouracil	ND, <0.00428
MultiCare Health	11/8/16	Class II A2	Field Blank 1	NA	1108-2296	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
MultiCare Health	11/8/16	Class II A2	Field Blank 2	NA	1108-2349	Cyclophosphamide	ND, <1ng
						5-Fluorouracil	ND, <1ng
MultiCare Health	11/8/16	Class II A2	Area: Spill, outside cabinet (right)	60	1108-2289	Cyclophosphamide	ND, <0.00667
						5-Fluorouracil	ND, <0.00667
MultiCare Health	11/8/16	Class II A2	Area: Spill, outside cabinet (left)	60	1108-2286	Cyclophosphamide	ND, <0.00669
						5-Fluorouracil	ND, <0.00669
MultiCare Health	11/8/16	Class II A2	Area: Spill, inside cabinet (left)	60	1108-2297	Cyclophosphamide	ND, <0.00675
						5-Fluorouracil	ND, <0.00675

NA = Applicable

ND = Non-Detect

µg/m3 = micrograms per cubic meter

Table 14: Comparison of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Representative Compounding Activities in Class II A2 BSC vs. Class II B2 BSC Across All Study Sites

Cabinet Type	Sample Type: Task, Location	Sampling Duration Range (min)	Chemotherapy Agent	Range (µg/m³)
Class II A2	Area: Compounding, inside cabinet	112 - 120	Cyclophosphamide	ND, <0.00333 - ND, <0.00359
			5-Fluorouracil	ND, <0.00333 - ND, <0.00359
Class II A2	Area: Compounding, outside cabinet	112 - 120	Cyclophosphamide	ND, <0.00336 - ND, <0.00358
			5-Fluorouracil	ND, <0.00336 - ND, <0.00358
Class II A2	Personal: Compounding	85 - 92	Cyclophosphamide	ND, <0.00428 - ND, <0.0048
			5-Fluorouracil	ND, <0.00428 - ND, <0.0048
Class II B2	Area: Compounding, inside cabinet	105 - 120	Cyclophosphamide	ND, <0.00327 - ND, <0.00387
			5-Fluorouracil	ND, <0.00327 - ND, <0.00387
Class II B2	Area: Compounding, outside cabinet	105 – 120	Cyclophosphamide	ND, <0.00319 - ND, <0.00394
			5-Fluorouracil	ND, <0.00319 - ND, <0.00394
Class II B2	Personal: Compounding	75 - 86	Cyclophosphamide	ND, <0.00467 - ND, <0.00549
			5-Fluorouracil	ND, <0.00467 - ND, <0.00549

NA = Applicable
ND = Non-Detect
µg/m³ = micrograms per cubic meter

Table 15: Comparison of Air Sampling Results for Cyclophosphamide and 5-Fluorouracil During Simulated Spill Conditions in Class II A2 BSC vs. Class II B2 BSC Across All Study Sites

Cabinet Type	Sample Type: Task, Location	Sampling Duration Range (min)	Chemotherapy Agent	Range (µg/m³)
Class II A2	Area: Spill, outside cabinet	60	Cyclophosphamide	ND, <0.00659 - ND, <0.00689
			5-Fluorouracil	ND, <0.00659 - ND, <0.00689
Class II A2	Area: Spill, inside cabinet	60	Cyclophosphamide	ND, <0.00675 - ND, <0.00707
			5-Fluorouracil	ND, <0.00675 - ND, <0.00707
Class II B2	Area: Spill, outside cabinet	58 - 60	Cyclophosphamide	ND, <0.00629 - ND, <0.00712
			5-Fluorouracil	ND, <0.00629 - ND, <0.00712
Class II B2	Area: Spill, inside cabinet	58 – 60	Cyclophosphamide	ND, <0.00631 - ND, <0.00707
			5-Fluorouracil	ND, <0.00631 - ND, <0.00707

NA = Applicable
ND = Non-Detect
µg/m³ = micrograms per cubic meter

Table 16: Comparison of Ventilation Assessment Results of Class II A2 BSC and Class II B2 BSC Across All Study Sites (Phase 1 and Phase 2 results included where noted)

Facility	Date	Cabinet Type	Phase 1 Face Velocity* (fpm)	Phase 2 Face Velocity* (fpm)	Phase 1 Flow Rate (cfm)	Phase 1 Particle Count - Outside Cabinet/Inside Cabinet (particles/cc)	Facility Reported Room ACH	Certified in Last 6 months?
Group Health – Bellevue	10/24/16	Class II A2	141.4	139	653.0	10 - 18 0 - 1	40	Yes
CHI - Highline	11/2/16	Class II A2	145.0	150	704.8	2,370 – 2,800 0	36	Yes
MultiCare Health	11/8/16	Class II A2	114.3	118.5	499.7	0 - 2 0	38	Yes
Group Health – Capitol Hill	10/27/16	Class II B2	135.4	152	526.6	7 – 18 0	55	Yes
St. Joseph Medical Center	11/3/16	Class II B2	154.1	115	599.5	12 – 34 0	69	Yes
MultiCare Health	11/7/16	Class II B2	130.2	138	291.6	15 – 23 0	73	Yes

*At working sash height/arrow

ACH = Air Changes per Hour

Attachment 5: Phase 2 Data Tables 17-24

Table 17: Summary of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage and Large Spill Conditions in Class II A2 BSC at Group Health Bellevue Medical Center – February 26, 2017

Facility	Date	Cabinet Type	Sample Type, Location	Sampling Duration (minutes)	Sample ID	Integrated Air Sampling Results (ppm)	Direct-Read Sampling Results (ppm)
Group Health – Bellevue	02/26/17	Class II A2	Baseline outside cabinet (left)	30	0226-1	ND, <0.0052	ND
Group Health – Bellevue	02/26/17	Class II A2	Small Spill, outside cabinet (left)	30	0226-2	ND, <0.0052	ND
Group Health – Bellevue	02/26/17	Class II A2	Small Spill, outside cabinet (right)	30	0226-3	0.10	ND
Group Health – Bellevue	02/26/17	Class II A2	Small Spill, inside cabinet (right)	30	0226-4	ND, <0.0052	ND 2.45 / 13.48* (<1" from spill)
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, outside cabinet (left)	60	0226-5A	ND, <0.0026	ND
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, outside cabinet (right)	60	0226-6A	ND, <0.0027	ND
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, inside cabinet (right)	60	0226-7A	ND, <0.0027	ND 3.50 / 19.25* (<1" from source)
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, outside cabinet (left)	60	0226-5B Replicate	ND, <0.0026	ND
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, outside cabinet (right)	60	0226-6B Replicate	ND, <0.0027	ND
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, inside cabinet (right)	60	0226-7B Replicate	ND, <0.0026	ND 3.50 / 19.25* (<1" from source)
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, outside cabinet (left)	60	0226-5C Replicate	ND, <0.0026	ND
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, outside cabinet (right)	60	0226-6C Replicate	ND, <0.0027	ND
Group Health – Bellevue	02/26/17	Class II A2	Large Spill, inside cabinet (right)	60	0226-7C Replicate	ND, <0.0026	ND 3.50 / 19.25* (<1" from source)
Group Health – Bellevue	02/26/17	NA	Field Blank 1	NA	0226-8	ND, <1.0µg	NA
Group Health – Bellevue	02/26/17	NA	Field Blank 2	NA	0226-9	ND, <1.0µg	NA

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Table 18: Summary of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage and Large Spill Conditions in Class II B2 BSC at Group Health Capitol Hill – February 27, 2017

Facility	Date	Cabinet Type	Sample Type, Location	Sampling Duration (minutes)	Sample ID	Integrated Air Sampling Results (ppm)	Direct-Read Sampling Results (ppm)
General Health: Capitol Hill	02/27/17	Class II B2	Baseline outside cabinet (left)	30	0227-1	ND, <0.0051	ND
General Health: Capitol Hill	02/27/17	Class II B2	Small Spill, outside cabinet (left)	30	0227-2	ND, <0.0051	ND
General Health: Capitol Hill	02/27/17	Class II B2	Small Spill, outside cabinet (right)	30	0227-3	ND, <0.0052	ND
General Health: Capitol Hill	02/27/17	Class II B2	Small Spill, inside cabinet (right)	30	0227-4	0.051	ND 3.30 / 18.15* (<1" from source)
General Health: Capitol Hill	02/27/17	Class II B2	Large Spill, outside cabinet (left)	60	0227-5	ND, <0.0026	ND
General Health: Capitol Hill	02/27/17	Class II B2	Large Spill, outside cabinet (right)	60	0227-6	ND, <0.0026	ND
General Health: Capitol Hill	02/27/17	Class II B2	Large Spill, inside cabinet (right)	60	0227-7	ND, <0.0026	ND 5.80 / 31.90* (<1" from source)
General Health: Capitol Hill	02/27/17	NA	Field Blank 1	NA	0227-8	ND, <1.0µg	NA
General Health: Capitol Hill	02/27/17	NA	Field Blank 2	NA	0227-9	18µg	NA

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Table 19: Summary of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage and Large Spill Conditions in Class II A2 BSC at CHI Franciscan Health, Highline Cancer Center – February 15, 2017

Facility	Date	Cabinet Type	Sample Type, Location	Sampling Duration (minutes)	Sample ID	Integrated Air Sampling Results (ppm)	Direct-Read Sampling Results (ppm)
CHI - Highline	02/15/17	Class II A2	Baseline outside cabinet (left)	30	0215-1	ND, <0.0054	ND
CHI - Highline	02/15/17	Class II A2	Small Spill, outside cabinet (left)	30	0215-2	ND, <0.0053	ND
CHI - Highline	02/15/17	Class II A2	Small Spill, outside cabinet (right)	30	0215-3	ND, <0.0054	ND
CHI - Highline	02/15/17	Class II A2	Small Spill, inside cabinet (right)	30	0215-4	0.014	ND 1.45 / 7.98* (<1" from source)
CHI - Highline	02/15/17	Class II A2	Large Spill, outside cabinet (left)	60	0215-5	ND, <0.0027	ND
CHI - Highline	02/15/17	Class II A2	Large Spill, outside cabinet (right)	60	0215-6	ND, <0.0027	ND
CHI - Highline	02/15/17	Class II A2	Large Spill, inside cabinet (right)	60	0215-7	0.040	ND 5.00 / 27.50* (<1" from source)
CHI - Highline	02/15/17	NA	Field Blank 1	NA	0215-8	ND, <1.0µg	NA
CHI - Highline	02/15/17	NA	Field Blank 2	NA	0215-9	ND, <1.0µg	NA
CHI - Highline	02/15/17	NA	QC Lot Blank	NA	LOT 1	ND, <1.0µg	NA
CHI - Highline	02/15/17	NA	QC Lot Blank	NA	LOT 2	ND, <1.0µg	NA

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Table 20: Summary of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage and Large Spill Conditions in Class II B2 BSC at Saint Joseph Medical Center – February 16, 2017

Facility	Date	Cabinet Type	Sample Type, Location	Sampling Duration (minutes)	Sample ID	Integrated Air Sampling Results (ppm)	Direct-Read Sampling Results (ppm)
St. Joseph Medical Center	02/16/17	Class II B2	Baseline outside cabinet (left)	29	0216-01	ND, <0.0056	ND
St. Joseph Medical Center	02/16/17	Class II B2	Small Spill, outside cabinet (left)	29	0216-02	ND, <0.0056	ND
St. Joseph Medical Center	02/16/17	Class II B2	Small Spill, outside cabinet (right)	29	0216-03	ND, <0.0055	ND
St. Joseph Medical Center	02/16/17	Class II B2	Small Spill, inside cabinet (right)	29	0216-04	ND, <0.0056	ND 0.51 / 2.79* (<1" from source)
St. Joseph Medical Center	02/16/17	Class II B2	Large Spill, outside cabinet (left)	59	0216-05	ND, <0.0028	ND
St. Joseph Medical Center	02/16/17	Class II B2	Large Spill, outside cabinet (right)	59	0216-06	ND, <0.0027	ND
St. Joseph Medical Center	02/16/17	Class II B2	Large Spill, inside cabinet (right)	59	0216-07	ND, <0.0028	ND 2.45 / 13.48* (<1" from source)
St. Joseph Medical Center	02/16/17	NA	Field Blank 1	NA	0216-08	ND, <1.0µg	NA
St. Joseph Medical Center	02/16/17	NA	Field Blank 2	NA	0216-09	ND, <1.0µg	NA

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Table 21: Summary of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage and Large Spill Conditions in Class II A2 BSC at MultiCare Health System, Tacoma General Hospital – February 20, 2017

Facility	Date	Cabinet Type	Sample Type, Location	Sampling Duration (minutes)	Sample ID	Integrated Air Sampling Results (ppm)	Direct-Read Sampling Results (ppm)
MultiCare Health: Tacoma General	02/20/17	Class II A2	Baseline outside cabinet (left)	30	0220-11	ND, <0.0053	ND
MultiCare Health: Tacoma General	02/20/17	Class II A2	Small Spill, outside cabinet (left)	30	0220-12	ND, <0.0052	ND
MultiCare Health: Tacoma General	02/20/17	Class II A2	Small Spill, outside cabinet (right)	30	0220-13	ND, <0.0053	ND
MultiCare Health: Tacoma General	02/20/17	Class II A2	Small Spill, inside cabinet (right)	30	0220-14	0.017	ND 0.10 / 0.55* (<1" from source)
MultiCare Health: Tacoma General	02/20/17	Class II A2	Large Spill, outside cabinet (left)	60	0220-15	ND, <0.0026	ND
MultiCare Health: Tacoma General	02/20/17	Class II A2	Large Spill, outside cabinet (right)	60	0220-16	ND, <0.0027	ND
MultiCare Health: Tacoma General	02/20/17	Class II A2	Large Spill, inside cabinet (right)	60	0220-17	0.044	ND 0.40 / 2.20* (<1" from source)
MultiCare Health: Tacoma General	02/20/17	NA	Field Blank 1	NA	0220-18	ND, <1.0µg	NA
MultiCare Health: Tacoma General	02/20/17	NA	Field Blank 2	NA	0220-19	ND, <1.0µg	NA

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Table 22: Summary of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage and Large Spill Conditions in Class II B2 BSC at MultiCare Health System, Tacoma General Hospital – February 20, 2017

Facility	Date	Cabinet Type	Sample Type, Location	Sampling Duration (minutes)	Sample ID	Integrated Air Sampling Results (ppm)	Direct-Read Sampling Results (ppm)
MultiCare Health: Tacoma General	02/20/17	Class II B2	Baseline outside cabinet (left)	30	0220-1	ND, <0.0054	ND
MultiCare Health: Tacoma General	02/20/17	Class II B2	Small Spill, outside cabinet (left)	30	0220-2	ND, <0.0054	ND
MultiCare Health: Tacoma General	02/20/17	Class II B2	Small Spill, outside cabinet (right)	30	0220-3	ND, <0.0054	ND
MultiCare Health: Tacoma General	02/20/17	Class II B2	Small Spill, inside cabinet (right)	30	0220-4	ND, <0.0054	ND 0.50 / 2.75* (<1" from source)
MultiCare Health: Tacoma General	02/20/17	Class II B2	Large Spill, outside cabinet (left)	60	0220-5	ND, <0.0027	ND
MultiCare Health: Tacoma General	02/20/17	Class II B2	Large Spill, outside cabinet (right)	60	0220-6	ND, <0.0027	ND – 0.70 /3.85*
MultiCare Health: Tacoma General	02/20/17	Class II B2	Large Spill, inside cabinet (right)	60	0220-7	0.0070	ND 2.45 / 13.48* (<1" from source)
MultiCare Health: Tacoma General	02/20/17	NA	Field Blank 1	NA	0220-8	ND, <1.0µg	NA
MultiCare Health: Tacoma General	02/20/17	NA	Field Blank 2	NA	0220-9	ND, <1.0µg	NA

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Table 23: Comparison of Air Sampling Results for Propylene Glycol During Simulated Incidental Spillage in Class II A2 BSC vs. Class II B2 BSC Across All Study Sites

Cabinet Type	Sample Type: Task, Location	Sampling Duration (min)	Integrated Air Sampling Results - Range (ppm)	Direct-Read Sampling Results - Range (ppm)
Class II A2	Inside cabinet (right)	30	ND, <0.0052 0.014 0.017	ND
Class II A2	Outside cabinet (left)	30	ND, <0.0052 ND, <0.0052 ND, <0.0053	ND
Class II A2	Outside cabinet (right)	30	ND, <0.0053 ND, <0.0054 0.10	ND
Class II B2	Inside cabinet (right)	30	ND, <0.0054 ND, <0.0056 0.051	ND
Class II B2	Outside cabinet (left)	30	ND, <0.0051 ND, <0.0054 ND, <0.0056	ND
Class II B2	Outside cabinet (right)	30	ND, <0.0052 ND, <0.0054 ND, <0.0055	ND

NA = Applicable ND = Non-Detect ppm= parts per million

Table 24: Comparison of Air Sampling Results for Propylene Glycol During Simulated Large Spill Conditions in Class II A2 BSC vs. Class II B2 BSC Across All Study Sites

Cabinet Type	Sample Type: Task, Location	Sampling Duration (min)	Integrated Air Sampling Results - Range (ppm)	Direct-Read Sampling Results - Range (ppm)
Class II A2	Inside cabinet (right)	30	ND, <0.0026 x3 (repeat sampling) 0.04 0.044	ND
Class II A2	Outside cabinet (left)	60	ND, <0.0026 x3 (repeat sampling) ND, <0.0026 ND, <0.0027	ND
Class II A2	Outside cabinet (right)	60	ND, <0.0026 x3 (repeat sampling) ND, <0.0027 ND, <0.0027	ND
Class II B2	Inside cabinet (right)	60	ND, <0.0026 ND, <0.0028 0.0070	ND
Class II B2	Outside cabinet (left)	60	ND, <0.0026 ND, <0.0027 ND, <0.0027	ND
Class II B2	Outside cabinet (right)	60	ND, <0.0026 ND, <0.0027 ND, <0.0028	ND – 0.70 /3.85*

NA= Applicable; ND= Non-Detect ppm= parts per million; *Result adjusted with instrument correction factor of 5.5

Attachment 6: Phase 1 - Analytical Lab Results and Chain of Custody

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

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USA

REPORT DATE NOV 07, 2016
SAMPLES REC'D OCT 31, 2016
REQUEST NUMBER 608955
PAGE NUMBER 1 OF 5

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1024-2379	**73.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0137
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0137
1024-2326		**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1024-2313	**213.35 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00469
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00469

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

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USA

REPORT DATE NOV 07, 2016
SAMPLES REC'D OCT 31, 2016
REQUEST NUMBER 608955

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS		ANALYZED DATE
1024-2374		**25mm 1 micron Teflon Filter**		**NOV 04, 2016**
		Nanograms		
	5-FLUOROURACIL (BLANK)	< 1.0		
		NONE DETECTED		
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0		
		NONE DETECTED		
1024-2373	**300 Liters**	**25mm 1 micron Teflon Filter**		**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter	
	5-FLUOROURACIL	< 1.0	< 0.00333	
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00333	
1024-2370	**148.2 Liters**	**25mm 1 micron Teflon Filter**		**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter	
	5-FLUOROURACIL	< 1.0	< 0.00675	
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00675	

COMMENTS:

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Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

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Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
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Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 07, 2016
SAMPLES REC'D OCT 31, 2016
REQUEST NUMBER 608955

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1024-2364	**149.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00669
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00669
1024-2344	**297.6 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00336
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00336
1024-2367	**151.8 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00659
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00659
1024-2356	**285.6 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0035
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0035

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Division Manager, Laboratory Services

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REPORT DATE NOV 07, 2016
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REQUEST NUMBER 608955

REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
1 Nanograms	5-FLUOROURACIL TFE3A	NAT-2009-20269 LC/MS	51-21-8
1 Nanograms	CYCLOPHOSPHAMIDE MONOHYDRATE TFE3A	BV-2011-22369 LC/MS	6055-19-2

COMMENTS:

* CONCENTRATION CALCULATED USING AIR VOLUMES SUPPLIED BY CLIENT
* UNLESS OTHERWISE NOTED, SAMPLES RECEIVED IN GOOD CONDITION
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	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: JOB #15-1594. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1027-2348	**75.9 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0132
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0132
1027-2365	**306 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00327
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00327
1027-2378	**308.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00324
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00324
1027-2355	**313.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00319
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00319

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1027-2369	**153 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00654
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00654
1027-2322	**159 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00629
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00629
1027-2270	**158.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00631
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00631
1027-2351	**214.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 04, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00467
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00467

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Division Manager, Laboratory Services

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1027-2353		**25mm 1 micron Teflon Filter** Nanograms	**NOV 04, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1027-2381		**25mm 1 micron Teflon Filter** Nanograms	**NOV 04, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	

COMMENTS:

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Division Manager, Laboratory Services

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USA

REPORT DATE NOV 07, 2016
SAMPLES REC'D OCT 31, 2016
REQUEST NUMBER 608956

REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
1 Nanograms	5-FLUOROURACIL TFE3A	NAT-2009-20269 LC/MS	51-21-8
1 Nanograms	CYCLOPHOSPHAMIDE MONOHYDRATE TFE3A	BV-2011-22369 LC/MS	6055-19-2

COMMENTS:

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	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: JOB #15-1594. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

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Division Manager, Laboratory Services

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REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 07, 2016
REQUEST NUMBER 608961

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1101-2308		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1101-2327		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	

COMMENTS:

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Respectfully submitted,

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Division Manager, Laboratory Services

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USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 07, 2016
REQUEST NUMBER 608958

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1103-2350	**73.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0137
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0137
1103-2284	**258.3 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00387
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00387
1103-2306	**258.3 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00387
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00387
1103-2342	**254.1 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00394
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00394

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Division Manager, Laboratory Services

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USA

REPORT DATE NOV 15, 2016
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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1103-2268	**140.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00712
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00712
1103-2283	**140.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00712
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00712
1103-2324	**141.5 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00707
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00707
1103-2376	**182.3 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00549
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00549

COMMENTS:

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Division Manager, Laboratory Services

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1103-2281		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1103-2310		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1102-2298	**74.1 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0135
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0135
1102-2290	**282.9 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00353
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00353
1102-2276	**284.1 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00352
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00352
1102-2271	**279.5 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00358
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00358

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1102-2303	**145.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00689
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00689
1102-2302	**145.8 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00686
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00686
1102-2305	**145.8 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00686
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00686
1102-2375	**208.3 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0048
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0048

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SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1102-2269		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1102-2321		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	

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REQUEST NUMBER 608961

REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
1 Nanograms	5-FLUOROURACIL TFE3A	NAT-2009-20269 LC/MS	51-21-8
1 Nanograms	CYCLOPHOSPHAMIDE MONOHYDRATE TFE3A	BV-2011-22369 LC/MS	6055-19-2

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* UNLESS OTHERWISE NOTED, SAMPLES RECEIVED IN GOOD CONDITION
* MODIFICATIONS MAY BE MADE TO ABOVE METHODS TO OPTIMIZE RESULTS (AVAILABLE UPON REQUEST)
* RESULTS ARE STRICTLY LIMITED TO SAMPLES ANALYZED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 07, 2016
REQUEST NUMBER 608961

	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: JOB #15-1594. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608960

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1107-2315	**74.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0134
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0134
1107-2339	**295.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00339
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00339
1107-2371	**297.6 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00336
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00336
1107-2272	**300 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00333
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00333

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608960

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1107-2311	**148.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00675
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00675
1107-2295	**147 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0068
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0068
1107-2312	**144 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00694
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00694
1107-2380	**212.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00471
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00471

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608960

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1107-2291		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1107-2273		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608960

REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
1 Nanograms	5-FLUOROURACIL TFE3A	NAT-2009-20269 LC/MS	51-21-8
1 Nanograms	CYCLOPHOSPHAMIDE MONOHYDRATE TFE3A	BV-2011-22369 LC/MS	6055-19-2

COMMENTS:

* CONCENTRATION CALCULATED USING AIR VOLUMES SUPPLIED BY CLIENT
* UNLESS OTHERWISE NOTED, SAMPLES RECEIVED IN GOOD CONDITION
* MODIFICATIONS MAY BE MADE TO ABOVE METHODS TO OPTIMIZE RESULTS (AVAILABLE UPON REQUEST)
* RESULTS ARE STRICTLY LIMITED TO SAMPLES ANALYZED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

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Bureau Veritas
Health, Safety & Environmental Services

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608960

	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: JOB #15-1594. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608959

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1108-2304	**75.3 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.0133
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.0133
1108-2366	**278.9 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00359
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00359
1108-2377	**280 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00357
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00357
1108-2293	**281.1 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00356
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00356

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

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Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608959

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1108-2289	**150 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00667
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00667
1108-2286	**149.4 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00669
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00669
1108-2297	**148.2 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00675
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00675
1108-2352	**233.7 Liters**	**25mm 1 micron Teflon Filter**	**NOV 15, 2016**
		Nanograms	Micrograms/Cubic Meter
	5-FLUOROURACIL	< 1.0	< 0.00428
	CYCLOPHOSPHAMIDE MONOHYDRATE	< 1.0	< 0.00428

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
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Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608959

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
1108-2296		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	
1108-2349		**25mm 1 micron Teflon Filter** Nanograms	**NOV 15, 2016**
	5-FLUOROURACIL (BLANK)	< 1.0	
		NONE DETECTED	
	CYCLOPHOSPHAMIDE MONOHYDRATE (BLANK)	< 1.0	
		NONE DETECTED	

COMMENTS:

.UNLESS SPECIFICALLY NOTED IN ANALYTE RESULTS REPORTED ABOVE, BLANK CORRECTION HAS NOT BEEN PERFORMED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608959

REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
1 Nanograms	5-FLUOROURACIL TFE3A	NAT-2009-20269 LC/MS	51-21-8
1 Nanograms	CYCLOPHOSPHAMIDE MONOHYDRATE TFE3A	BV-2011-22369 LC/MS	6055-19-2

COMMENTS:

* CONCENTRATION CALCULATED USING AIR VOLUMES SUPPLIED BY CLIENT
* UNLESS OTHERWISE NOTED, SAMPLES RECEIVED IN GOOD CONDITION
* MODIFICATIONS MAY BE MADE TO ABOVE METHODS TO OPTIMIZE RESULTS (AVAILABLE UPON REQUEST)
* RESULTS ARE STRICTLY LIMITED TO SAMPLES ANALYZED

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

Bureau Veritas
Health, Safety & Environmental Services

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO: MICHAEL PETERSON
BSI SERVICES AND SOLUTIONS
1400 NW COMPTON DR. 203
BEAVERTON, OR 97006
USA

REPORT DATE NOV 15, 2016
SAMPLES REC'D NOV 10, 2016
REQUEST NUMBER 608959

	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: JOB #15-1594. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

Jason Forbes
Division Manager, Laboratory Services

*** * * ELECTRONIC COPY * * ***

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608955

608955

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) _____
☐ Email Results ☐ Fax

REPORT RESULTS TO
Name: Michael Peterson
Company: BSI
Mailing Address:
City, State, Zip:
Telephone No.: 831-233-2119
Email: Michael.Peterson@BSIGROUP.COM
Client Job. No.: 15-1594
Dept.:

BILLING/INVOICE INFORMATION
☐ PO # _____ ☐ Call for Credit Card Information ☐ Direct Bill
Name: Accounts Payable
Company: BSI
Address: 4 N. 2nd St. #270
City, State, Zip: San Jose CA 95113

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust)	Cyclopentanone	5-Fluorouracil	FOR LAB USE ONLY
1024-2379	10/24/16		TFES4	73.2 L		✓	✓		
-2326				0 L		✓	✓		
-2313				213.35 L		✓	✓		
-2374				0 L		✓	✓		
-2373				300.0 L		✓	✓		
-2370				148.2 L		✓	✓		
-2364				149.4 L		✓	✓		
-2344				297.6 L		✓	✓		
-2367				151.8 L		✓	✓		
-2356	↓		↓	285.6 L		✓	✓		

CHAIN OF CUSTODY

Collected by: Mike Peterson (print) — Collector's Signature:
Relinquished by: — Date/Time 10/28/16 — Received by: — Date/Time
Relinquished by: — Date/Time — Received by: — Date/Time
Method of Shipment: — Received at Lab by: — Date/Time
Authorized by: — Date 10/28/16 — Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)

(Client Signature **MUST** Accompany Request)

B# _____ F# _____ Page ____ of ____

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608956

608956

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) _____
☐ Email Results ☐ Fax

REPORT RESULTS TO

Name: Michael Peterson
Company: BSI
Mailing Address:
City, State, Zip:
Telephone No: 831-233-2119
Email: Michael.Peterson@BSIGroup.com
Client Job. No.: 15-1594
Dept.:

BILLING/INVOICE INFORMATION

☐ PO # _____ ☐ Call for Credit Card Information ☐ Direct Bill
Name: Accounts Payable
Company: BSI
Address: 4N. 2nd ST., #270
City, State, Zip: San Jose CA 95113

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust)	Cyclophosphamide	5-Fluorouracil	FOR LAB USE ONLY
1027-2348	10/27/16		TFSA	75.9 L					
-2365				306.0 L					
-2378				308.4 L					
-2355				313.2 L					
-2369				153.0 L					
-2322				159.0 L					
-2270				153.4 L					
-2351				214.2 L					
-2353				0 L					
-2381				0 L					

CHAIN OF CUSTODY

Collected by: Mike Peterson (print) — Collector's Signature:
Relinquished by: — Date/Time 10/27/16 — Received by: — Date/Time
Relinquished by: — Date/Time — Received by: — Date/Time
Method of Shipment: — Received at Lab by: — Date/Time
Authorized by: — Date 10/28/16 — Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)

(Client Signature **MUST** Accompany Request)

B# _____ F# _____ Page ____ of ____

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608961

608961

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) ________
☐ Email Results ☐ Fax

REPORT RESULTS TO
Name: Michael Peterson | Client Job. No.: 15-1594
Company: BSI | Dept.:
Mailing Address:
City, State, Zip:
Telephone No.: 831 233 2119 | Email: Michael.Peterson@BSIGROUP.COM

BILLING/INVOICE INFORMATION
☐ PO # ________ ☐ Call for Credit Card Information ☐ Direct Bill
Name: AP
Company: BSI
Address:
City, State, Zip: San José CA 95115

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust) Cyclophosphamide	5-Fluorouracil							FOR LAB USE ONLY
1101-2308	11/1/16		TFESA	0 L		/	/							
1101-2327	↓		↓	0 L		/	/							

CHAIN OF CUSTODY
Collected by: Mike Peterson **(print)** | Collector's Signature: [signature]
Relinquished by: [signature] | Date/Time 11/01/16 | Received by: | Date/Time
Relinquished by: | Date/Time | Received by: | Date/Time
Method of Shipment: | Received at Lab by: | Date/Time
Authorized by: [signature] Date 11/01/16 | Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)
(Client Signature **MUST** Accompany Request)

B# ____ F# ____ Page ____ of ____

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608957

608957

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) _____
☐ Email Results ☐ Fax

REPORT RESULTS TO

Name Michael Peterson	Client Job. No. 15-1594
Company BSI	Dept.
Mailing Address	
City, State, Zip	
Telephone No. 831-235-2119	Email: MichaelP@BSIGROUP.COM

BILLING/INVOICE INFORMATION

☐ PO # _____ ☐ Call for Credit Card Information ☐ Direct Bill

Name	Accounts Payable
Company	BSI
Address	4N. 2nd St. #270
City, State, Zip	San Jose, CA 95113

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust)	Cyclophosphamide	5-Fluorouracil	FOR LAB USE ONLY
102-2298	11/2	T1	PBA	74.1	2				
2290				282.9					
2276				284.1					
2271				279.5					
2303				145.2					
2302				145.8					
2305				145.8					
2378				258.3					
2269				0					
2321				0					

CHAIN OF CUSTODY

Collected by: Mike Peterson (print)		Collector's Signature:	
Relinquished by:	Date/Time 11-2-16	Received by:	Date/Time
Relinquished by:	Date/Time	Received by:	Date/Time
Method of Shipment:		Received at Lab by:	Date/Time
Authorized by:	Date 11-2-16	Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)	

(Client Signature **MUST** Accompany Request)

B# _____ F# _____ Page ____ of ____

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608958

608958

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) _____
☐ Email Results ☐ Fax

REPORT RESULTS TO

Name: Michael Peterson | Client Job. No.: 154594
Company: BSI | Dept.:
Mailing Address:
City, State, Zip:
Telephone No.: 831-233-2119 | Email: Michael.Peterson@BSIGroup.com

BILLING/INVOICE INFORMATION

☐ PO # _____ ☐ Call for Credit Card Information ☐ Direct Bill
Name: Accounts Payable
Company: BSI
Address: 4 N 2nd St. #450
City, State, Zip: San Jose CA 95113

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust)	Cyclophosphamide	5-Fluorouracil	FOR LAB USE ONLY
1103-2350	11/03		TPE3A	73.2	2				
2284				258.3					
2306				258.3					
2342				254.1					
2268				140.4					
2285				140.4					
2324				141.5					
2376				182.3					
2281	↓		↓	0					
2310				0					

CHAIN OF CUSTODY

Collected by: Mike Peterson (print) | Collector's Signature:
Relinquished by: _____ | Date/Time 11/3/16 | Received by: _____ | Date/Time
Relinquished by: _____ | Date/Time | Received by: _____ | Date/Time
Method of Shipment: | Received at Lab by: | Date/Time

Authorized by: _____ Date 11/3/16 | Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)

(Client Signature **MUST** Accompany Request)

B# ____ F# ____ Page ____ of ____

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608960

608960

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) ____
☐ Email Results ☐ Fax

REPORT RESULTS TO

Name: Michael Peterson
Company: BSI
Client Job. No.: 15-1594
Dept.:
Mailing Address:
City, State, Zip:
Telephone No.: 831-233-2119
Email: Michael.Peterson@BSIGroup.com

BILLING/INVOICE INFORMATION

☐ PO # ____ ☐ Call for Credit Card Information ☐ Direct Bill
Name: AP
Company: BSI
Address: 4 N. 2nd St. # 1270
City, State, Zip: San Jose CA 95113

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust)	Cyclohexylamine	5-Fluorouracil	FOR LAB USE ONLY
1107-2315	11/7/16		TFSA	74.4					
2339				295.2					
2371				297.6					
2212				300.0					
2311				148.2					
2295				147.0					
2312				144.0					
2380				212.4					
2291				0					
2273				0					

CHAIN OF CUSTODY

Collected by: Mike Peterson (print) — Collector's Signature:
Relinquished by: — Date/Time 11/7/16 — Received by: — Date/Time
Relinquished by: — Date/Time — Received by: — Date/Time
Method of Shipment: — Received at Lab by: — Date/Time

Authorized by: — Date 11/7/16
(Client Signature MUST Accompany Request)

Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)

B# ____ F# ____ Page ____ of ____

REQUEST FOR LABORATORY ANALYTICAL SERVICES

Request No. 608959

608959

Bureau Veritas North America, Inc.

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(800) 806-5887
(847) 726-3320
Fax (847) 726-3323

Detroit Lab
22345 Roethel Drive
Novi, MI 48375
(800) 806-5887
(248) 344-1770
Fax (248) 344-2655

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
(800) 806-5887
(770) 499-7500
Fax (770) 499-7511

RUSH ANALYSIS
CONTACT LAB IN ADVANCE
Need Results by: ____/____/____
Charges Authorized? ☐ Yes ☐ No
(if yes, initial here) ____
☐ Email Results ☐ Fax

REPORT RESULTS TO

Name	Mike Peterson
Company	BSI
Mailing Address	
City, State, Zip	
Telephone No.	831-233-2119
Client Job. No.	151594
Dept.	
Email:	Michael.Peterson@BSIGROUP.COM

BILLING/INVOICE INFORMATION

☐ PO # ____ ☐ Call for Credit Card Information ☐ Direct Bill

Name	AP
Company	BSI
Address	4N. 2nd ST. #270
City, State, Zip	San Jose CA 95113

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

ANALYSIS REQUESTED
(Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.*)

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX/ MEDIA	AIR VOLUME (specify units)	Number of Containers	(i.e. Total Dust)	Cyclophosphamide	5-fluorouracil	FOR LAB USE ONLY
1103-2304	11/9/11		TPBA	75.3					
2366				278.9					
2377				2800					
2293				281.1					
2289				150.0					
2286				149.4					
2297				148.2					
2352				23.7					
2296				0					
2349				0					

CHAIN OF CUSTODY

Collected by:	Mike Peterson (print)	Collector's Signature:	
Relinquished by:	Date/Time	Received by:	Date/Time
Relinquished by:	Date/Time	Received by:	Date/Time
Method of Shipment:		Received at Lab by:	Date/Time
Authorized by:	Date	Sample Condition Upon Receipt: ☐ Acceptable ☐ Other (explain)	

(Client Signature **MUST** Accompany Request)

B# ____ F# ____ Page ____ of ____

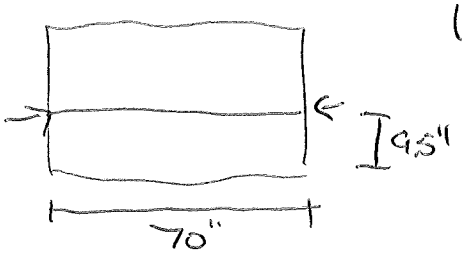
Attachment 7: Phase 1 - BSI Field Data Sheets

page 1 of 1

BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):



Project Name/Description: WSPA SHEP GRANT		Job Number: 15-1594
Survey Location: GroupHealth Bellevue		Fume Hood Number:
Instrument Type and Manufacturer: TSI 8386 VelocicalPlus		Date/Time: 10/24/16
Instrument Model: 8386	Date Last Calibrated: 6-7-16	Serial Number: 6032065

Type of Ventilation System (indicate orientation of hood face/slots):

Down Draft Faces Back

FACE VELOCITY TEST DATA (ft/min):

1A	103	2A	110	3A	95	4A	110	5A		6A	
1B	174	2B	180	3B	175	4B	184	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM	Ave. FPM x Area = Total CFM
9.5 x 70 = 665	1131 / 8 = 141.4	141.4 x 4.618 = 652.99

Type of Service (circle one): Air Gases Vacuum ~~Water~~		Chemical Fume Hood? (circle one): (Yes) No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes (No)
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): (Yes) No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes (No)
		Responsible Supervisor: Extension:

Conclusion and notes:

7100

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Mike Peterson			10-24-16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-24-16
Survey Location: GM Bellevue	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PTrak 80612 SN # 8525-12080020	Zero Cal Date/Time: 10/24/16-14:45	Cal. 2-24-16

Sampling Data

Location Description	-smoketest @face	- smoketest - Horizon	All sampling complete - throughout Room	→ inside Hood	
Reading	15-28	12-35	225	0-1	

Industrial Hygienist/IH Tech

Print Name	Signature	Date
Mike Peterson	[signature]	10-24-16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-24-16
Survey Location: GH Bellevue	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PTRAK 8016 SN# 8525-D0S0020	Zero Cal Date/Time: 10/24/16 – 14:45	Calibrated 2-24-16

Sampling Data

Location Description	- Baseline - Near entry Door	- Baseline - Middle of Room	- Baseline - @ face	- Baseline - inside Hood	- Smoke test - Varying Distance Around Room
Reading	9-15	10-16	12-18	0-1	12-36

Industrial Hygienist/IH Tech

Print Name	Signature	Date
Mike Peterson		10-24-16

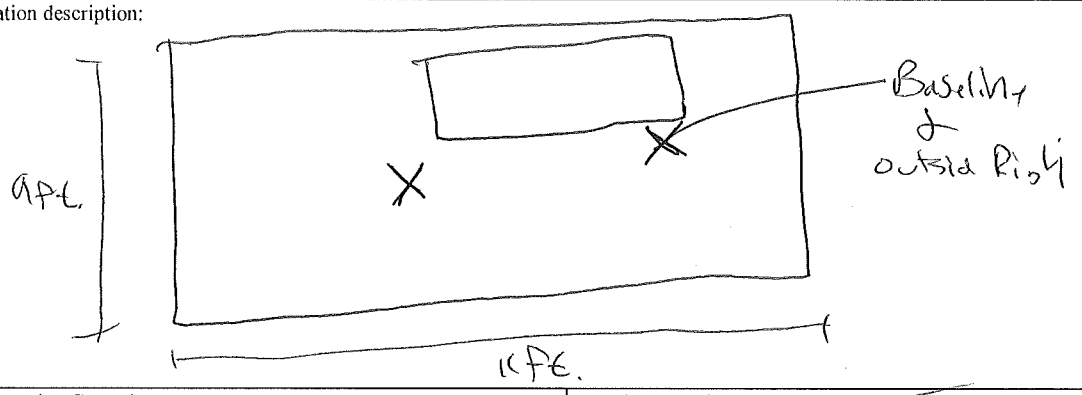
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-24-16
Survey Location: GH Bellevue	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	Baseline	Inside	outside/Left Behind	outside/Right Behind
PUMP ID:	2379	2373	2344	2356
Sample ID:	1024-2379	1024-2373	1024-2344	1024-2356
Collection Media:	TPE34	→	→	→
Size and Lot Number:	25MM 9/17	→	→	→
Flow Rate (L/min):	2.44	2.50	2.48	2.38
Sampling Time (min):	30	120	120	120
Sampled Volume (L):	73.2	300.0	297.6	285.6
Analyte 1	Cydo	→	→	→
Analyte 2	SFU	→	→	→
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

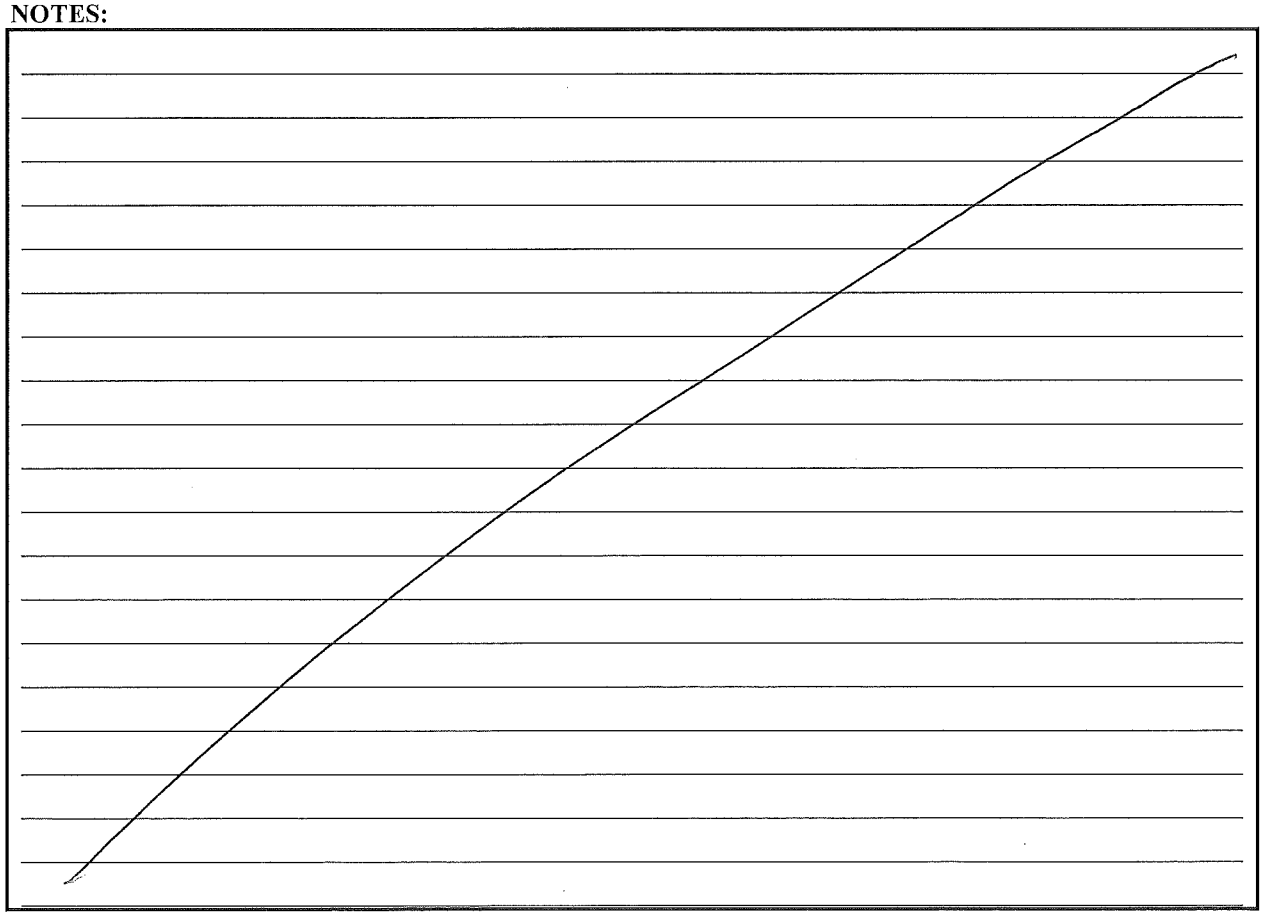
Stop Time:	16:33	16:35	16:35	16:35
Start Time:	16:05	14:35	14:35	14:35
Elapsed Time:	30	120	120	120

Industrial Hygienist/~~IH~~ Tech (Print & Signature):	Date/Time:
Mike Peterson	10-24-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard:		Pump Condition:	
GilAir 5 —		(Y) N		Good	
Pre-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
10-24-16	MP				
PUMP ID:	2379	2373	2344	2356	
Trial 1: (L/min)	2.58	2.50	2.50	2.55	
Trial 2: (L/min)	2.56	2.50	2.50	2.55	
Trial 3: (L/min)	2.57	2.50	2.52	2.55	
Flow Rate Avg (L/min):	2.57	2.50	2.51	2.55	
Post-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
10-24-16	MP				
PUMP ID:	2379	2373	2344	2356	
Trial 1: (L/min)	2.29	2.49	2.43	2.29	
Trial 2: (L/min)	2.29	2.50	2.49	2.10	
Trial 3: (L/min)	2.31	2.50	2.44	2.23	
Flow Rate Avg (L/min):	2.30	2.50	2.45	2.21	
Pre- and post-cal avg. flow rate (L/min)	2.44	2.50	2.48	2.38	

NOTES:



BSI AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-24-16
Survey Location: UW Bellvue	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:	Employee Name:	Employee Number:
Neg. Pressure A2 Room Hood	Collette Le	
	Job Title/Duties: Compounding	Phone Number:
	Work Duration & Frequency: 8-40	Number of Employees performing similar duties: 1@ a time
	Personal Protective Equipment Used: Gloves, Apron	
Engineering Controls: Hood	Ambient Weather Conditions:	

SAMPLING DATA:

Pump ID: 2313

Manifold:	A / Filter	B	C	D
			BLANK 1	BLANK 2
Sample ID:	1024-2313		1024-2326	1024-2374
Collection Media:	TPE3A			
Size and Lot Number:	25MM 9/17			
Flow Rate (L/min):	2.51		0	0
Sampling Time (min):	85		0	0
Sampled Volume (L):	213.35		0	0
Analyte 1	Cyclo		Cyclo	Cyclo
Analyte 2	5FU		5FU	5FU
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

Stop Time:	16:00					**Total Time:** 85
Start Time:	16:35					
Elapsed Time:	85					
Industrial Hygienist/IH Tech (Print & Signature): Mike Roberson					Employee #:	Date: 10-24-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5 —		Primary Standard: (Y) N	Pump Condition: Good	
Pre-Survey Date/Time: 10-24-16 1300	Technician: MP	Temperature: —	Barometric Pressure: —	Relative Humidity: —
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.55			
Trial 2: (L/min)	2.53			
Trial 3: (L/min)	2.51			
Flow Rate Avg (L/min):	2.53			
Post-Survey Date/Time: 10-24-16	Technician: MP	Temperature: 63°	Barometric Pressure: —	Relative Humidity: 22%
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.49			
Trial 2: (L/min)	2.48			
Trial 3: (L/min)	2.47			
Flow Rate Avg (L/min):	2.48			
Pre- and post-cal avg. flow rate (L/min)	2.51			

NOTES:

Cyclo:
- collects Ados 50 ml NS into 1.0 gram glass vial of cyclo
- shakes until in solution
- then pull out of vial & inject into 250 ml Bag
- Bags waste & places below into waste containers
- finally cleans hood w/ IPA

SFU:
- removes 50 ml of .9% NaCl injection USP then 40 ml/hr & injects each time into empty Bag - 93 ml total
  - removes air bubbles
- connects tubing to Bag
- Pulls 50 ml of SFU & injects into NaCl Bag - then 40 ml ap
  - removes air Bubbles
- finally cleans w/ IPA

BSI AREA AIR SAMPLING DATA RECORD

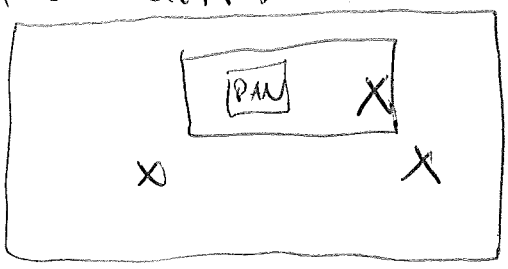
PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-24-16
Survey Location: GM Bellevue	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:

Spill condition



Engineering Controls:	Ambient Weather Conditions:
A2 Hood + Dilution Ventilation	

SAMPLING DATA: outside Right outside left inside

PUMP ID:	2364	2367	2370		
Sample ID:	1024-2364	1024-2367	1024-2370		
Collection Media:	TPE3A	TPE3A	TPE3A		
Size and Lot Number:	25MM 9/17	25MM 9/17	25MM 9/17		
Flow Rate (L/min):	2.49	2.53	2.47		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	149.4	151.8	148.2		
Analyte 1	Cydo	cydo	cydo		
Analyte 2	5FU	5FU	5FU		
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	19:41	19:41	19:41		
Start Time:	18:41	18:41	18:41		
Elapsed Time:	60	60	60		
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson				Date/Time: 10-24-16	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAIR 5 —		Primary Standard: (Y)/N	Pump Condition: GOOD	
Pre-Survey Date/Time: 10/24/16-1300	Technician: MP	Temperature: —	Barometric Pressure: —	Relative Humidity: —

PUMP ID:	2364	2367	2370	/	/
Trial 1: (L/min)	2.48	2.53	2.43	/	/
Trial 2: (L/min)	2.47	2.55	2.49	/	/
Trial 3: (L/min)	2.48	2.55	2.44	/	/
Flow Rate Avg (L/min):	2.48	2.54	2.45	/	/

Post-Survey Date/Time: 10/24/16	Technician: MP	Temperature: —	Barometric Pressure: —	Relative Humidity: —

PUMP ID:	2364	2367	2370	/	/
Trial 1: (L/min)	2.49	2.51	2.48	/	/
Trial 2: (L/min)	2.49	2.51	2.49	/	/
Trial 3: (L/min)	2.50	2.51	2.50	/	/
Flow Rate Avg (L/min):	2.49	2.51	2.49	/	/
Pre- and post-cal avg. flow rate (L/min)	2.49	2.53	2.49	/	/

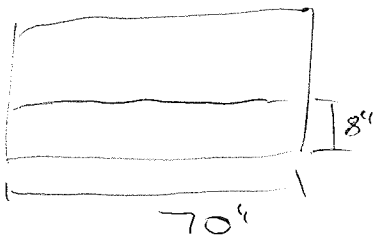
NOTES:

- opened tubing on Both Bags & Drained into 1 12" x 12" PVC spill container
  - ~ 99% of Bags emptied
  - took ~ 7 minutes
- @ 30 minutes Soaked up spill w/ ChemSorb towels (3)
  - took ~ 2 minutes to soak

page 1 of 1

BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant	15-1594
	Survey Location: GH Capitol Hill	Fume Hood Number:
	Instrument Type and Manufacturer: TSI 8386 Velocicalc Plus	Date/Time: 10-27-16
	Instrument Model: 8386 / Date Last Calibrated: 6-7-16 / Serial Number: 0030065	
Type of Ventilation System (indicate orientation of hood face/slots):		

FACE VELOCITY TEST DATA (ft/min):

1A	130	2A	105	3A	113	4A	104	5A		6A	
1B	205	2B	120	3B	165	4B	141	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM	Ave. FPM x Area = Total CFM
70 x 8 = 560	1083 / 9 = 135.4	135.4 x 3.89 = 526.6

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Mike Retusu			2-27-16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 10-27-16
Survey Location: GH Capitol Hill	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: P-Trak 8525 SN 8525-12090020	Zero Cal Date/Time: 10-27-16- 14:30	Cal -2-24-16

Sampling Data

Location Description	-Baseline → -Near entry Door	-Middle of Room	-@ face	-Inside Hood	-Smoke testing -throughout Room
Reading	10-16	9-18	7-16	0	7-16

Industrial Hygienist/IH Tech

Print Name Mike Peterson	Signature [signature]	Date 10-27-16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 10-27-16
Survey Location: GH Capitol Hill	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PMK 801612 S/N # 8525-0080020	Zero Cal Date/Time: 10/27/16 - 14:30	Cal - 2-24-16

Sampling Data

Location Description	Smoke testing → - @ face	→ - Above Hood	- All sampling completed - Throughout Room	- Inside Hood	
Reading PT/CC	7-19	10-17	8-15	0	

Industrial Hygienist/IH Tech

Print Name Mike Peterson	Signature	Date 10-27-16

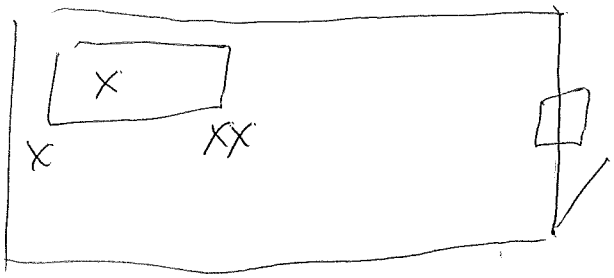
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 10.27-16
Survey Location: GH Capital Hill	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Sketch



Engineering Controls: Hood + Dilution	Ambient Weather Conditions:

SAMPLING DATA:

	Baseline	Inside	outside/left Behind	outside/Right Behind	
PUMP ID:	2348	2365	2378	2355	
Sample ID:	10~~27~~-2348	10~~27~~-2365	10~~27~~-2378	10~~27~~-2355	
Collection Media:	~~IPBSA~~	→	→	→	
Size and Lot Number:	25mm 9117	→	→		
Flow Rate (L/min):	2.53	2.55	2.57	2.66	
Sampling Time (min):	30	120	120	120	
Sampled Volume (L):	75.9	306.0	308.4	315.2	
Analyte 1	Cyclo	→	→	→	
Analyte 2	5FU	→	→	→	
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	16:17	18:34	18:34	18:34	
Start Time:	15:47	16:34	16:34	16:34	
Elapsed Time:	30	120	120	120	
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson				Date/Time: 10.27-16	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard:		Pump Condition:	
GilAir 5 —		(Y) N		Good (All)	
Pre-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
10-28-16: 1400	MP				
PUMP ID:	2348	2365	2378	2355	
Trial 1: (L/min)	2.51	2.53	2.51	2.58	
Trial 2: (L/min)	2.53	2.53	2.50	2.58	
Trial 3: (L/min)	2.52	2.59	2.51	2.58	
Flow Rate Avg (L/min):	2.52	2.55	2.51	2.58	
Post-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
10-28-16	MP				
PUMP ID:	2348	2365	2378	2355	
Trial 1: (L/min)	2.54	2.54	2378	2.71	
Trial 2: (L/min)	2.54	2.54	2.66	2.75	
Trial 3: (L/min)	2.54	2.54	2.67	2.73	
Flow Rate Avg (L/min):	2.54	2.54	2.65	2.73	
Pre- and post-cal avg. flow rate (L/min)	2.53	2.55	2.57	2.66	

NOTES:

BSI AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-28-16
Survey Location: GH Capitol Hill	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:	Employee Name:	Employee Number:
Neg. Pressure B2 Room	Vlan Phan	
	Job Title/Duties: Compounding	Phone Number:
	Work Duration & Frequency: 40hr/week	Number of Employees performing similar duties: 10 +/-
	Personal Protective Equipment Used: Nitrile gloves - Apron	
Engineering Controls: Hood + Dilution	Ambient Weather Conditions:	

SAMPLING DATA:

Pump ID:			Blank1	Blank2
Manifold:	**A / Filter**	**B**	**C**	**D**
Sample ID:	1028-2351		1028-2353	1028-2381
Collection Media:	TPSA			
Size and Lot Number:	25MM 9117			
Flow Rate (L/min):	2.52		0	0
Sampling Time (min):	85		0	0
Sampled Volume (L):	214.2		0	0
Analyte 1	Cyclo			
Analyte 2	5FU			
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

Stop Time:	17:59					**Total Time:** 85
Start Time:	16:34					
Elapsed Time:	85					
Industrial Hygienist/IH Tech (Print & Signature): Mike Ruben					Employee #:	Date: 10-28-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard:	Pump Condition:	
GilAir5 —		~~Y~~ N	Good	
Pre-Survey Date/Time: 10-27-16 1430	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.63			
Trial 2: (L/min)	2.63			
Trial 3: (L/min)	2.63			
Flow Rate Avg (L/min):	2.63			
Post-Survey Date/Time: 10-28-16	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.40			
Trial 2: (L/min)	2.40			
Trial 3: (L/min)	2.42			
Flow Rate Avg (L/min):	2.41			
Pre- and post-cal avg. flow rate (L/min)	2.52			

NOTES:

- no variation in during sampling

BSI AREA AIR SAMPLING DATA RECORD

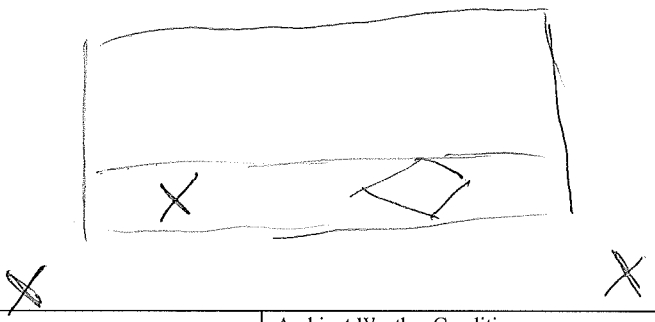
PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	10-27-16
Survey Location: CH Capitol Hill	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:

- Spill condition
- sketch



Engineering Controls:	Ambient Weather Conditions:
Hood	

SAMPLING DATA: outside Right outside/Left Behind Inside

PUMP ID:	2369	2322	2270		
Sample ID:	1027-2369	1027-2322	1027-2270		
Collection Media:	TPBA →	→	→		
Size and Lot Number:	25mm a/17 →	→	→		
Flow Rate (L/min):	2.55	2.65	2.64		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	153.0	159.0	158.4		
Analyte 1	Cyclo →	→	→		
Analyte 2	SFU →	→	→		
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	14:34	14:34	14:34		
Start Time:	14:34	14:34	14:34		
Elapsed Time:	60	60	60		
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson				Date/Time:	10-27-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard: (Y) N		Pump Condition:		
GilAir 5				Good		
Pre-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:		Relative Humidity:
10-27-16; 1430	MP					
PUMP ID:	2369	2322	2270			
Trial 1: (L/min)	2.54	2.66	2.71			
Trial 2: (L/min)	2.54	2.67	2.75			
Trial 3: (L/min)	2.54	2.65	2.73			
Flow Rate Avg (L/min):	2.54	2.66	2.73			
Post-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:		Relative Humidity:
10-27-16	MP					
PUMP ID:	2369	2322	2270			
Trial 1: (L/min)	2.55	2.64	2.54			
Trial 2: (L/min)	2.56	2.63	2.53			
Trial 3: (L/min)	2.57	2.63	2.54			
Flow Rate Avg (L/min):	2.56	2.63	2.54			
Pre- and post-cal avg. flow rate (L/min)	2.55	2.65	2.63			

NOTES:

-SAME conditions as previous location

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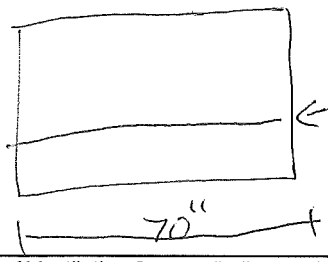
BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant	15-1594
	Survey Location: Highline	Fume Hood Number:
	Instrument Type and Manufacturer: TSI 8386 Velocicalc Plus	Date/Time: 11/2/16
	Instrument Model: 8386 / Date Last Calibrated: 6-7-16 / Serial Number: 058065	
Type of Ventilation System (indicate orientation of hood face/slots):		

FACE VELOCITY TEST DATA (ft/min):

1A	111	2A	103	3A	99	4A	88	5A		6A	
1B	223	2B	154	3B	177	4B	205	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM; Ave. FPM x Area = Total CFM	
____ x ____ = ____	____ / ____ = ____ ____ x ____ = ____	
Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Mike Peterson			11/2/16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 11/2/16
Survey Location: Highline	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PTRAK 8a612 SN # 8525-12080020	Zero Cal Date/Time: 11/2/16 - 10:00	Cal-2-29-16

Sampling Data

Location Description	Smoke testing → - @ Face	- Above Hood	All Sampling complete - throughout Room	- Inside Hood	
Reading	2200-2400	2800-3040	800-900	~~0~~	

Industrial Hygienist/IH Tech

Print Name Mike Peterson	Signature [signature]	Date 11/2/16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	Client: Washington State Pharmacy Association	Date/Time:
Survey Location: Highline	Job Number: 15-1594	Project Manager: Russ S.
Instrument ID: PTRAK 8062 SN# 8525-12080022	Zero Cal Date/Time: 11/2/16 :10:00	Cal - 2-24-16

Sampling Data

Location Description	Baseline → -Near entry Door	-middle of Room	- @face	-Inside Hood	-smoke testing -throughout Room
Reading	1960-2420	2370-2500	2360-2800	0	2520-2780

Industrial Hygienist/IH Tech

Print Name: Mike Peterson	Signature: [signature]	Date: 11/2/16

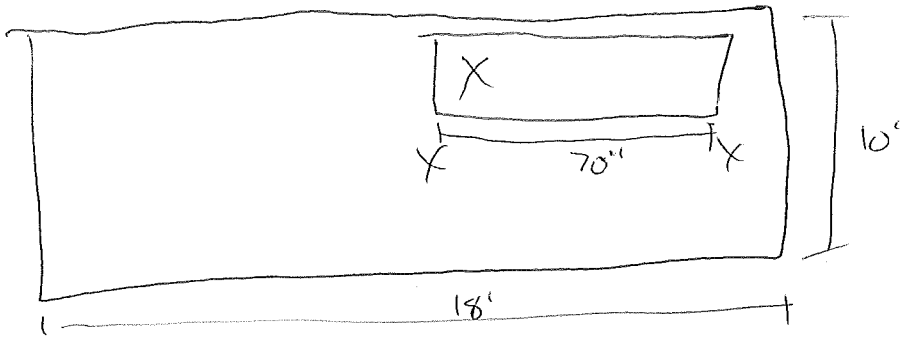
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-2-16
Survey Location: Highline	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Sketch



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	Baseline	Inside	outside/left Bldg	Outside/Right Bldg	
PUMP ID:	2298	2290	2276	2271	
Sample ID:	1102-2298	1102-2290	1102-2276	1102-2271	
Collection Media:	TFE3A	→	→	→	
Size and Lot Number:	25MM GLF	→	→	→	
Flow Rate (L/min):	2.47	2.46	2.47	2.43	
Sampling Time (min):	30	115	115	115	
Sampled Volume (L):	74.1	282.9	284.1	279.5	
Analyte 1	Cyclo	→	→	→	
Analyte 2	5FU	→	→	→	
Analyte 3					
Analyte 4					
Analyte 5					

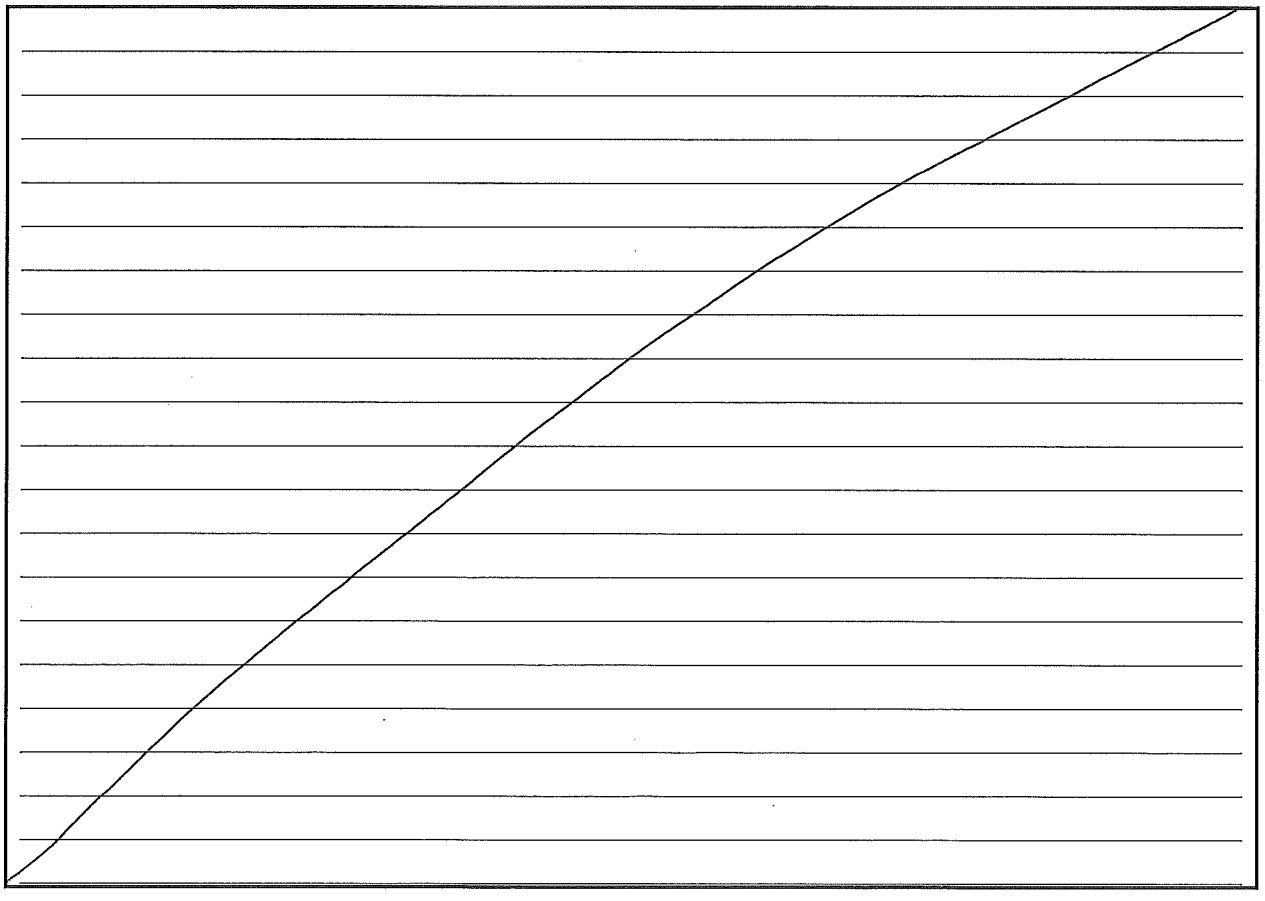
SAMPLING TIME:

Stop Time:	13:02	15:05	15:05	15:05	
Start Time:	12:32	13:10	13:10	13:10	
Elapsed Time:	30	115	115	115	
Industrial Hygienist/IH Tech (Print & Signature): Nila Peterson				Date/Time: 11-2-16	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard:		Pump Condition:		
Gilair5 —		(Y)/N		Good		
Pre-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:		Relative Humidity:
11-1-17 16:00	MP	—		—		—
PUMP ID:	2298	2290		2276	2271	
Trial 1: (L/min)	2.50	2.51		2.50	2.44	
Trial 2: (L/min)	2.50	2.50		2.50	2.44	
Trial 3: (L/min)	2.50	2.49		2.50	2.44	
Flow Rate Avg (L/min):	2.50	2.50		2.50	2.44	
Post-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:		Relative Humidity:
11-2-17	MP	—		—		—
PUMP ID:	2298	2290		2276	2271	
Trial 1: (L/min)	2.44	2.41		2.44	2.41	
Trial 2: (L/min)	2.44	2.41		2.44	2.41	
Trial 3: (L/min)	2.44	2.45		2.44	2.41	
Flow Rate Avg (L/min):	2.44	2.42		2.44	2.41	
Pre- and post-cal avg. flow rate (L/min)	2.47	2.46		2.47	2.43	

NOTES:



BSI AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-2-16
Survey Location: Highline	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:	Employee Name:	Employee Number:
Neg Pressure 2 Room	Anthony Lindsay	
	Job Title/Duties: Compounding	Phone Number:
	Work Duration & Frequency: 4 hr/wk	Number of Employees performing similar duties: 1 @ time
	Personal Protective Equipment Used: Nitrile gloves - Apron	
Engineering Controls: Hood + Dilution	Ambient Weather Conditions:	

SAMPLING DATA:

Pump ID:			BLANK	BLANK
Manifold:	**A / Filter**	**B**	**C**	**D**
Sample ID:	1102-235		1102-2269	1102-2301
Collection Media:	TPE3A			→
Size and Lot Number:	25MM a/17			→
Flow Rate (L/min):	2.45		0	0
Sampling Time (min):	85		0	0
Sampled Volume (L):	208.3		0	0
Analyte 1	Cyclo			→
Analyte 2	5FU			→
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

Stop Time:	14:35					**Total Time:** 85
Start Time:	13:10					
Elapsed Time:	85					
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson					Employee #:	Date: 11-2-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: Gil Air 5		Primary Standard: (TSN)	Pump Condition: Good	
Pre-Survey Date/Time: 11/1/16 1600	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.50			
Trial 2: (L/min)	2.50			
Trial 3: (L/min)	2.50			
Flow Rate Avg (L/min):	2.50			
Post-Survey Date/Time: 11/2/16	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.34			
Trial 2: (L/min)	2.34			
Trial 3: (L/min)	2.42			
Flow Rate Avg (L/min):	2.40			
Pre- and post-cal avg. flow rate (L/min)	2.45			

NOTES:

- cyclo- same practice as GH

- 5FU - SAME w/ exception → pulled from 5 1.0g 5FU vials & injected into standard Bug - NO pump BMS

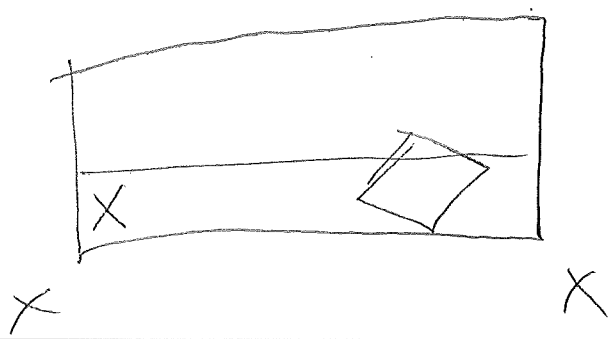
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-2-17
Survey Location: Highline	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Spill Condition



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA: outside Right B | outside LB | inside

PUMP ID:	2303	2302	2305		
Sample ID:	1102-2303	1102-2302	1102-2305		
Collection Media:	TPE3A	→	→		
Size and Lot Number:	25mm a117	→	→		
Flow Rate (L/min):	2.42	2.43	2.43		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	145.2	145.8	145.8		
Analyte 1	Aydo	→	→		
Analyte 2	5FU	→	→		
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	16:07	16:07	16:07		
Start Time:	15:07	15:07	15:07		
Elapsed Time:	60	60	60		

Industrial Hygienist/IH Tech (Print & Signature):	Date/Time:
Mike Peterson	11-2-16

CALIBRATION RECORD:

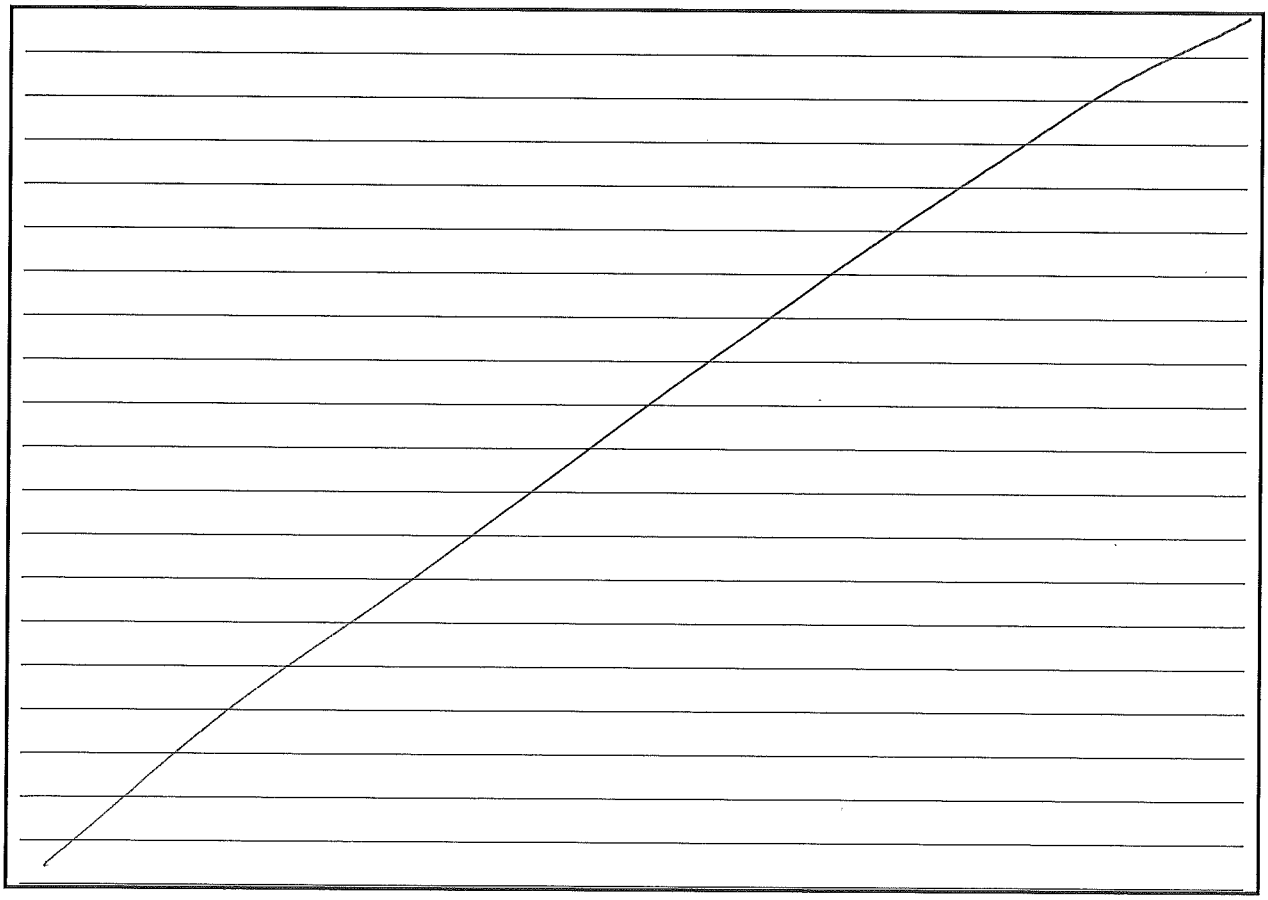
Pump Manufacturer and Serial Number:		Primary Standard: Y / N		Pump Condition:
GilAir5		(Y)		Good
Pre-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
10-31-16	MP			

PUMP ID:	2303	2302	2305		
Trial 1: (L/min)	2.41	2.44	2.41		
Trial 2: (L/min)	2.41	2.44	2.41		
Trial 3: (L/min)	2.41	2.44	2.43		
Flow Rate Avg (L/min):	2.41	2.44	2.42		

Post-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-2-16	MP			

PUMP ID:	2302	2302	2305		
Trial 1: (L/min)	2.43	2.41	2.43		
Trial 2: (L/min)	2.42	2.42	2.43		
Trial 3: (L/min)	2.43	2.42	2.43		
Flow Rate Avg (L/min):	2.42	2.41	2.43		
Pre- and post-cal avg. flow rate (L/min)	2.42	2.43	2.43		

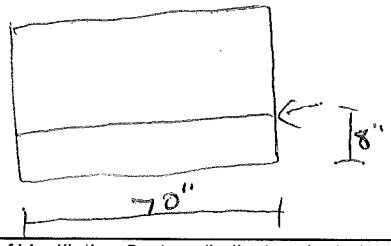
NOTES:



page 1 of 1

BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP GRANT	15-1594
	Survey Location: St. Joseph	Fume Hood Number:
	Instrument Type and Manufacturer: TSI 8386 Velocicalc plus	Date/Time: 11/3/16
	Instrument Model: 8386 / Date Last Calibrated: 6-7-16 / Serial Number: 0030065	
Type of Ventilation System (indicate orientation of hood face/slots):		

FACE VELOCITY TEST DATA (ft/min):

1A	100	2A	98	3A	105	4A	101	5A		6A	
1B	200	2B	176	3B	165	4B	290	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM; Ave. FPM x Area = Total CFM	
_____ x _____ = _____	_____ / _____ = _____ ; _____ x _____ = _____	
Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Mike Peterson			11/3/16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 11/3/16
Survey Location: St. Joseph	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: Pyrak 8112 SN 8525-12080020	Zero Cal Date/Time: 11/3/16 : 03:30	Cal. 2-24-16

Sampling Data

Location Description	Baseline →			→	-Smoke testing
	-Near entry Door	-middle of Room	-@ face	-Inside hood	-throughout Room
Reading	8-37	1-28	12-34	0	8-38

Industrial Hygienist/IH Tech

Print Name Mike Ruttan	Signature	Date 11/3/16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 11/3/16
Survey Location: St. Joseph	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PTrak 8062 SN 8525-120080020	Zero Cal Date/Time: 11/3/16: 08:30	Cal - 2-24-16

Sampling Data

Location Description	Smoke testing → -@face	-Above Hood	- All sampling -throughout Room	complete -Inside Hood	
Reading	23-35	22-36	19-40	0	

Industrial Hygienist/IH Tech

Print Name: Mike Paterson	Signature: [signature]	Date: 11/3/16

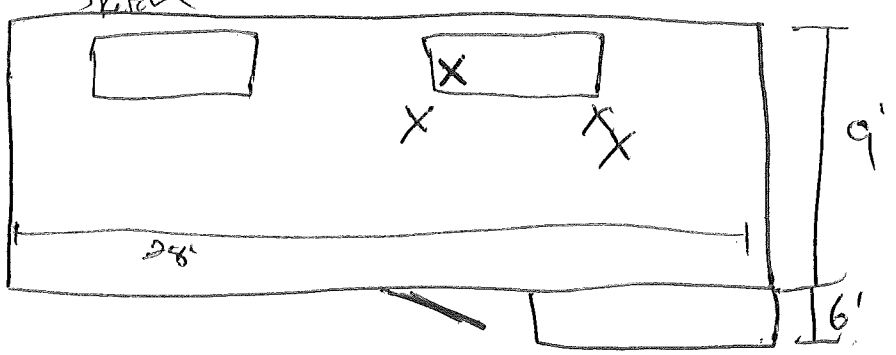
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-3-16
Survey Location: Spokane	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Sketch



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	Baseline	Inside	outside LB	Outside RB	
PUMP ID:	2350	2284	2306	2342	
Sample ID:	1103-2350	1103-2284	1103-2306	1103-2342	
Collection Media:	TPESA 25mm 9/17	→	→	→	
Size and Lot Number:	→	→	→	→	
Flow Rate (L/min):	2.44	2.46	2.46	2.42	
Sampling Time (min):	30	105	105	105	
Sampled Volume (L):	73.2	258.3	258.3	254.1	
Analyte 1	Cyclo	→	→	→	
Analyte 2	5FU	→	→	→	
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	03:32	05:25	05:25	05:25	
Start Time:	03:02	03:40	03:40	03:40	
Elapsed Time:	30	105	105	105	
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson				Date/Time: 11-3-16	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard: (Y) N		Pump Condition:	
Gil Air 5				Good	
Pre-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:		Relative Humidity:
11-2-17	MP				
PUMP ID:	2350	2284	2306	2342	
Trial 1: (L/min)	2.47	2.47	2.48	2.42	
Trial 2: (L/min)	2.43	2.50	2.49	2.44	
Trial 3: (L/min)	2.45	2.47	2.46	2.44	
Flow Rate Avg (L/min):	2.45	2.48	2.48	2.43	
Post-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:		Relative Humidity:
11-3-17	MP				
PUMP ID:	2350	2284	2306	2342	
Trial 1: (L/min)	2.42	2.44	2.43	2.41	
Trial 2: (L/min)	2.44	2.44	2.43	2.41	
Trial 3: (L/min)	2.44	2.44	2.44	2.41	
Flow Rate Avg (L/min):	2.43	2.44	2.43	2.41	
Pre- and post-cal avg. flow rate (L/min)	2.44	2.46	2.46	2.42	

NOTES:

BSI AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-3-16
Survey Location: St. Joseph	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:	Employee Name:	Employee Number:
NES Pharm B2 Room	Jessica Roberts	✓
	Job Title/Duties: Compounding	Phone Number: ✓
	Work Duration & Frequency: 40h/week	Number of Employees performing similar duties: 1 @ times
	Personal Protective Equipment Used: Nitrile gloves - Apron	
Engineering Controls: Hood + Dilution	Ambient Weather Conditions: ✓	

SAMPLING DATA:

Pump ID:			BLANK	BLANK
Manifold:	**A / Filter**	**B**	**C**	**D**
Sample ID:	1103-2376		1103-2281	1103-2350
Collection Media:	TPE3A			
Size and Lot Number:	25MM 9417			
Flow Rate (L/min):	2.43			
Sampling Time (min):	75			
Sampled Volume (L):	182.3			
Analyte 1	Cyclo			
Analyte 2	5-FU			
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

Stop Time:	04:55					**Total Time:**
Start Time:	03:40					75
Elapsed Time:	75					
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson					Employee #:	Date: 11-3-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard:	Pump Condition:	
GilAir5		(Y) N	Good	
Pre-Survey Date/Time: 11/2/16 - 1800	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.46			
Trial 2: (L/min)	2.44			
Trial 3: (L/min)	2.46			
Flow Rate Avg (L/min):	2.45			
Post-Survey Date/Time: 11-3-16	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.40			
Trial 2: (L/min)	2.39			
Trial 3: (L/min)	2.40			
Flow Rate Avg (L/min):	2.40			
Pre- and post-cal avg. flow rate (L/min)	2.43			

NOTES:

Same as highline

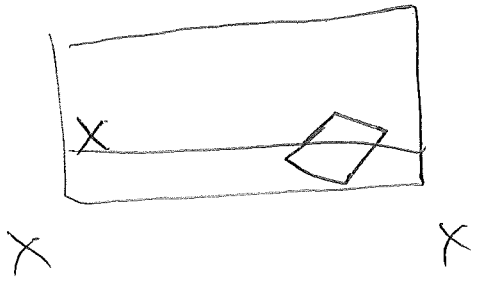
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-3-16
Survey Location: St. Joseph	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: - Spill condition



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	OR B	OLB	inside		
PUMP ID:	2268	2283	2324		
Sample ID:	1103-2268	1103-2283	1103-2324		
Collection Media:	TPE3 A →	→	→		
Size and Lot Number:	25mm 9/17 →	→	→		
Flow Rate (L/min):	2.42	2.42	2.44		
Sampling Time (min):	58	58	58		
Sampled Volume (L):	140.4	140.4	141.5		
Analyte 1	Cyclo →	→	→		
Analyte 2	5FU →	→	→		
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

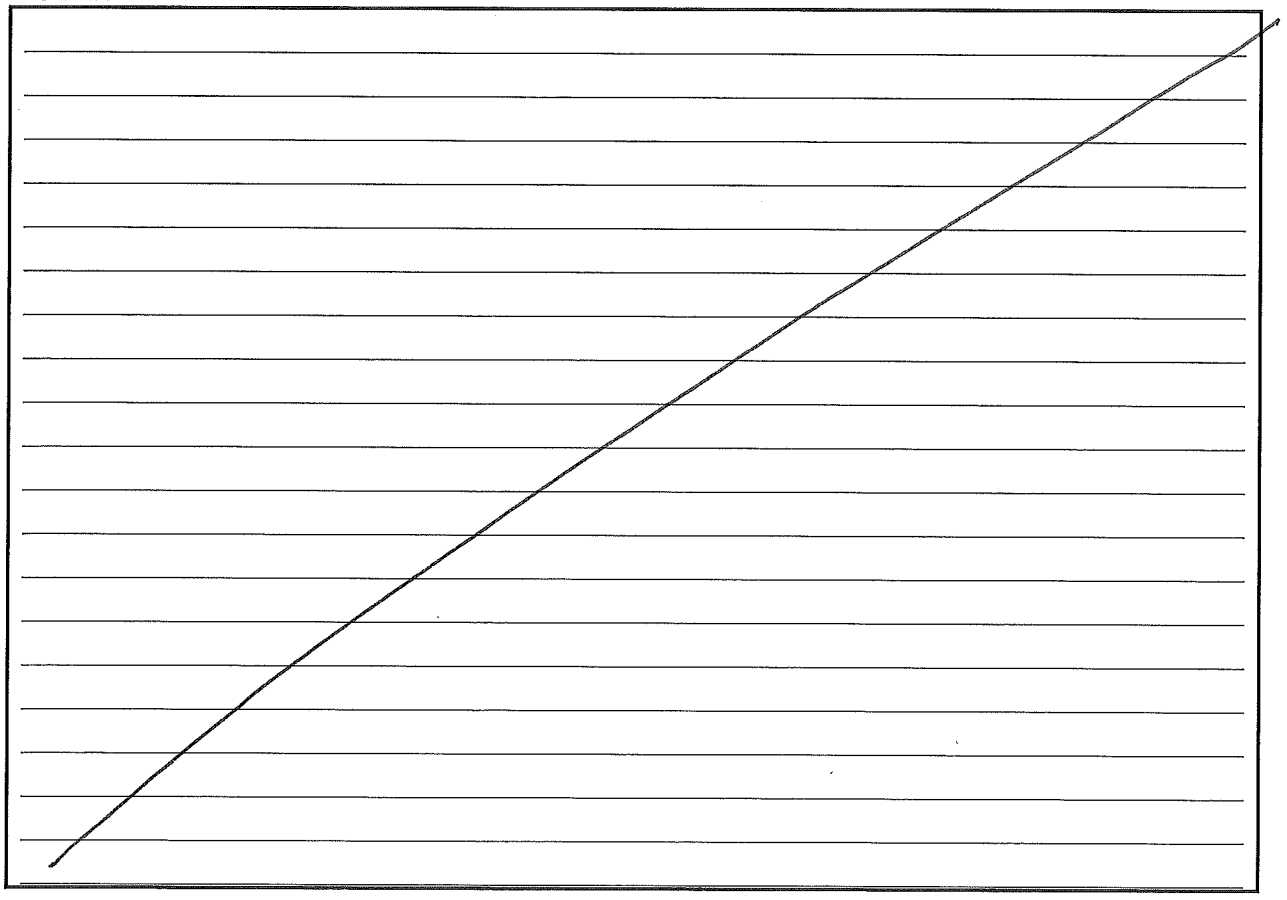
Stop Time:	06:25	06:25	06:25		
Start Time:	05:27	05:27	05:27		
Elapsed Time:	58	58	58		

Industrial Hygienist/IH Tech (Print & Signature):	Date/Time:
Mike Ruhan	11-3-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard:	Pump Condition:	
GilAir 5		(Y)N	Good	
Pre-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-2-16	MP	~	~	~
PUMP ID:	2268	2283	2324	
Trial 1: (L/min)	2.41	2.43	2.44	
Trial 2: (L/min)	2.41	2.43	2.44	
Trial 3: (L/min)	2.41	2.44	2.44	
Flow Rate Avg (L/min):	2.41	2.43	2.44	
Post-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-3-16	MP	~	~	~
PUMP ID:	2268	2283	2324	
Trial 1: (L/min)	2.42	2.41	2.44	
Trial 2: (L/min)	2.41	2.42	2.44	
Trial 3: (L/min)	2.42	2.41	2.44	
Flow Rate Avg (L/min):	2.42	2.41	2.44	
Pre- and post-cal avg. flow rate (L/min)	2.42	2.42	2.44	

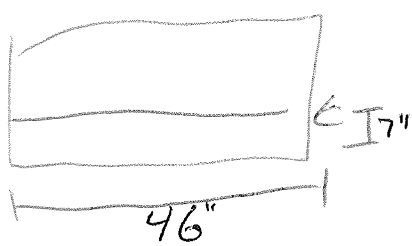
NOTES:



BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):



Field	Entry
Project Name/Description:	WSPA SHIPWRANT
Job Number:	15-1599
Survey Location:	Multicare 2
Fume Hood Number:	
Instrument Type and Manufacturer:	TSI 9388 Velocicalc
Date/Time:	11/7/16
Instrument Model:	6386
Date Last Calibrated:	6-7-16
Serial Number:	0030065
Type of Ventilation System (indicate orientation of hood face/slots):	

FACE VELOCITY TEST DATA (ft/min):

	1	2	3	4	5	6
A	116	111	101			
B	163	146	144			
C						
D						

FUME HOOD DATA AND NOTES:

Dimensions:

Length x Width = Area

____ x ____ = ____

Calculation:

Total FPM / No. Readings = Ave. FPM   Ave. FPM x Area = Total CFM

____ / ____ = ____   ____ x ____ = ____

Type of Service (circle one): Air Gases Vacuum Water

Chemical Fume Hood? (circle one): Yes No

Manometer Used? (circle one): Yes No

Manometer Reading (inches of water):

Radioisotope Hood? (circle one): Yes No

Thermometer Used? (circle one): Yes No

Thermometer Reading (fahrenheit):

Carcinogen Hood? (circle one): Yes No

Wet Production Chemistry:

Gas Cabinet? (circle one): Yes No

Responsible Supervisor:

Extension:

Conclusion and notes:

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Mike Peterson		[signature]	11/7/16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	Client: Washington State Pharmacy Association	Date/Time: 11/7/16
Survey Location: Multicare B2	Job Number: 15-1594	Project Manager: Russ S.
Instrument ID: P-Trak 8016 SN 8525-1208020	Zero Cal Date/Time: 11/7/16 15:00	Cal 2-24-16

Sampling Data

Location Description	Smoke testing → -@ face	-Above hood	All sampling completed -throughout Room	-inside hood	
Reading	0-10	4-24	4-28	0	

Industrial Hygienist/IH Tech

Print Name Mike Paterson	Signature	Date 11/7/16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 11/7/16
Survey Location: Multicare B2	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PINK 8018 SN 8525-12058	Zero Cal Date/Time: 11-7-16- 15:00	Cal-2-24-16

Sampling Data

Location Description	Baseline -near entry door	-middle of floor	-@ face	-inside Hood	smoke testing -thru, thru
Reading	15-28	15-23	3-6	0	8-22

Industrial Hygienist/IH Tech

Print Name Mike Peterson	Signature	Date 11-7-16

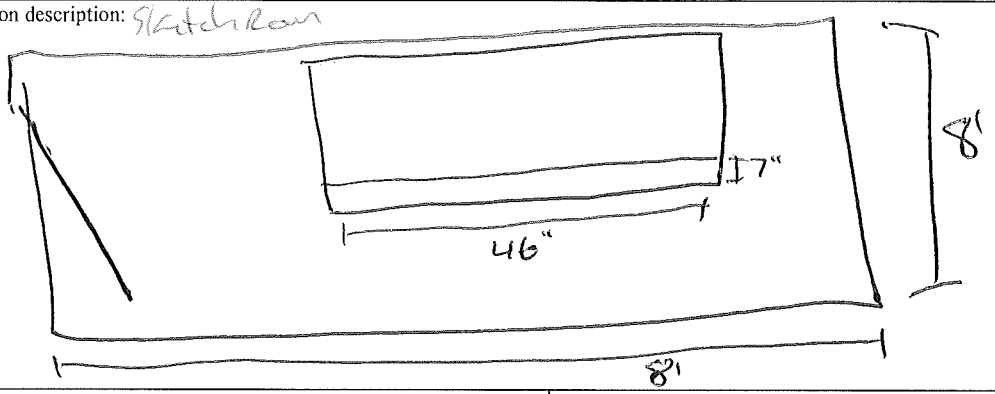
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-7-16
Survey Location: Multicare B2	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Sketch Room



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	Baseline	Inside	OLB	OLB	
PUMP ID:	2315	2339	2371	2272	
Sample ID:	1107-2315	1107-2339	1107-2371	107-2272	
Collection Media:	1PE3A	→	→	→	
Size and Lot Number:	25mm 9/17	→	→	→	
Flow Rate (L/min):	2.48	2.46	2.48	2.50	
Sampling Time (min):	30	120	120	120	
Sampled Volume (L):	74.4	295.2	297.6	300.0	
Analyte 1	Cyclo	→	→	→	
Analyte 2	SPU	→	→	→	
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	16:27	18:38	18:38	18:38	
Start Time:	15:57	16:38	16:38	16:38	
Elapsed Time:	30	120	120	120	
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson				Date/Time: 11-7-16	

CALIBRATION RECORD: Bare I OC OR

Pump Manufacturer and Serial Number:		Primary Standard: Y / N		Pump Condition:
GilAir5		(Y)		Good
Pre-Survey Date/Time: 11-7-16	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:

PUMP ID:	2315	2339	2371	2272	
Trial 1: (L/min)	2.50	2.50	2.50	2.50	
Trial 2: (L/min)	2.50	2.50	2.50	2.50	
Trial 3: (L/min)	2.50	2.50	2.50	2.50	
Flow Rate Avg (L/min):	2.50	2.50	2.50	2.50	

Post-Survey Date/Time: 11-7-16	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:

PUMP ID:	2315	2339	2371	2272	
Trial 1: (L/min)	2.46	2.41	2.45	2.49	
Trial 2: (L/min)	2.46	2.41	2.46	2.49	
Trial 3: (L/min)	2.45	2.41	2.47	2.49	
Flow Rate Avg (L/min):	2.46	2.41	2.46	2.49	
Pre- and post-cal avg. flow rate (L/min)	2.48	2.46	2.48	2.50	

NOTES:

BSI AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11/7/16
Survey Location: Multicare B2	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:	Employee Name:	Employee Number:
Neg. Pressure B2 Room	Tina Krogh	
	Job Title/Duties: Compounding	Phone Number:
	Work Duration & Frequency: 40hr/wk	Number of Employees performing similar duties: 1 of 1 imp
	Personal Protective Equipment Used: N, Wiglasher - Apron	
Engineering Controls: Hood + Dilution	Ambient Weather Conditions:	

SAMPLING DATA:

Pump ID:			Blank1	Blank2
Manifold:	**A / Filter**	**B**	**C**	**D**
Sample ID:	1107-2380		1107-	1107-
Collection Media:	TPSA			
Size and Lot Number:	25mm 9117			
Flow Rate (L/min):	2.47		0	0
Sampling Time (min):	86		0	0
Sampled Volume (L):	212.4		0	0
Analyte 1	Cyclo			
Analyte 2	5-FU			
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

Stop Time:	18:04					**Total Time:**
Start Time:	16:38					86
Elapsed Time:	86					
Industrial Hygienist/HI Tech (Print & Signature): M. Kelson					Employee #:	Date: 11-7-16

CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard: Y / N	Pump Condition:	
Gilian 5		(Y)	Good	
Pre-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-7-16-10am	MP			
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.50			
Trial 2: (L/min)	2.50			
Trial 3: (L/min)	2.50			
Flow Rate Avg (L/min):	2.50			
Post-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-7-16	MP			
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.44			
Trial 2: (L/min)	2.44			
Trial 3: (L/min)	2.43			
Flow Rate Avg (L/min):	2.44			
Pre- and post-cal avg. flow rate (L/min)	2.47			

NOTES:

- cydu - SAME @ BOTH

- STU - SAME as GTH

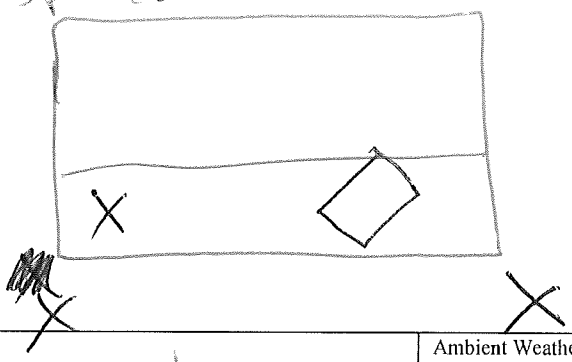
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 11-7-16
Survey Location: Multicare	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Spill Condition



Engineering Controls: Hood + Dilution	Ambient Weather Conditions:

SAMPLING DATA: OLB OLB Inside

PUMP ID:	2311	2295	2312		
Sample ID:	1107-2311	1107-2295	1107-2312		
Collection Media:	TPE3A	→	→		
Size and Lot Number:	25mm a17	→	→		
Flow Rate (L/min):	2.47	2.45	2.40		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	148.2	147.0	144.0		
Analyte 1	Cyclo	→	→		
Analyte 2	5FU	→	→		
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	19:40	19:40	19:40		
Start Time:	18:40	18:40	18:40		
Elapsed Time:	60	60	60		

Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson	Date/Time: 11-7-16

CALIBRATION RECORD: ORB 025 1545

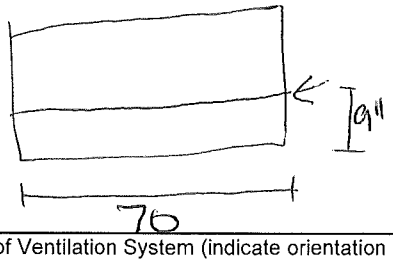
Pump Manufacturer and Serial Number:		Primary Standard: Y / N		Pump Condition:	
Gilair5		Y		Good	
Pre-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
11-7-16	MP				
PUMP ID:	2311	2295	2312		
Trial 1: (L/min)	2.49	2.45	2.41		
Trial 2: (L/min)	2.49	2.46	2.41		
Trial 3: (L/min)	2.49	2.47	2.41		
Flow Rate Avg (L/min):	2.49	2.46	2.41		
Post-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
11-7-16	MP				
PUMP ID:	2311	2295	2312		
Trial 1: (L/min)	2.44	2.44	2.39		
Trial 2: (L/min)	2.44	2.45	2.38		
Trial 3: (L/min)	2.44	2.43	2.39		
Flow Rate Avg (L/min):	2.44	2.44	2.39		
Pre- and post-cal avg. flow rate (L/min)	2.47	2.45	2.40		

NOTES:

page 1 of 1

BSI Ventilation System Survey

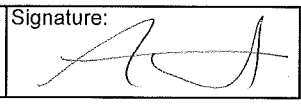
PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHARPSMART	15-1594
	Survey Location: Multi-care A2	Fume Hood Number:
	Instrument Type and Manufacturer: TSI 8388 Velocicalc plus	Date/Time: 11-8-16
	Instrument Model: 8386 / Date Last Calibrated: 6-7-16 / Serial Number: 0030065	
Type of Ventilation System (indicate orientation of hood face/slots):		

FACE VELOCITY TEST DATA (ft/min):

1A	100	2A	101	3A	100	4A	99	5A		6A	
1B	150	2B	120	3B	116	4B	128	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM; Ave. FPM x Area = Total CFM	
____ x ____ = ____	____ / ____ = ____ ____ x ____ = ____	
Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		
Industrial Hygienist/IH Technician (print): Mike Peterson	Employee Number:	Signature:  Date: 11-8-16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-8-16
Survey Location: Multicare A2	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PTrak 8d62 SN 8525-12008	Zero Cal Date/Time: 11-8-16 15:00	Cal- 2-24-16

Sampling Data

Location Description	Baseline → -Near entry Door	- middle of Room	- @ face	- inside Hood	smoke testing - throughout Room
Reading	0-2	0-2	0-2	~~0~~	0-2

Industrial Hygienist/IH Tech

Print Name	Signature	Date
Mika Peterson		11-8-16

BSI Ultrafine Particle Count Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 11-8-16
Survey Location: MultiCare A2	Job Number: **15-1594**	Project Manager: **Russ S.**
Instrument ID: PTRAK 8525 SN 8525-12080020	Zero Cal Date/Time: 11-8-16 15:00	Cal - 2-24-16

Sampling Data

Location Description	Smoke Testing → @ face	- Above Hood	ALL Sampling complete - throughout room	- Inside Hood	
Reading	0-1	0-2	0-1	0	

Industrial Hygienist/IH Tech

Print Name Mike Peterson	Signature [signature]	Date 11-8-16

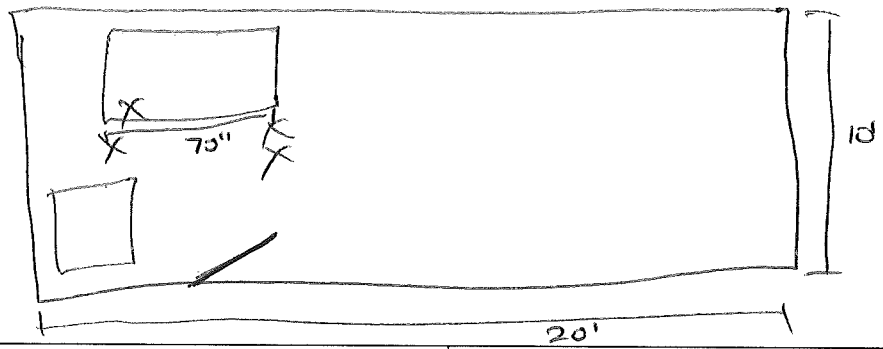
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-8-16
Survey Location: MultiCare A2	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: Sterile Room



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	Baseline	I	OL	OR	
PUMP ID:	2304	2366	2377	2293	
Sample ID:	1108-2304	1108-2366	1108-2377	1108-2293	
Collection Media:	TPE3A	→	→	→	
Size and Lot Number:	25mm 9117	→	→	→	
Flow Rate (L/min):	2.51	2.49	2.50	2.51	
Sampling Time (min):	30	112	112	112	
Sampled Volume (L):	75.3	278.9	280.0	281.1	
Analyte 1	Cyclo	→	→	→	
Analyte 2	5FU	→	→	→	
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	16:25	16:28	16:28	16:28	
Start Time:	1555	14:20	14:20	14:20	
Elapsed Time:	30	112	112	112	
Industrial Hygienist/IH Tech (Print & Signature): Mike Peterson				Date/Time: 11-8-16	

CALIBRATION RECORD: B I OL OR

Pump Manufacturer and Serial Number:	Primary Standard:	Pump Condition:
GilAir5	(Y)/N	Good

Pre-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-8-16	MP			

PUMP ID:	2304	2366	2377	2295	
Trial 1: (L/min)	2.50	2.50	2.50	2.50	
Trial 2: (L/min)	2.50	2.50	2.50	2.51	
Trial 3: (L/min)	2.50	2.50	2.50	2.52	
Flow Rate Avg (L/min):	2.50	2.50	2.50	2.51	

Post-Survey Date/Time:	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:
11-8-16	MP			

PUMP ID:	2304	2366	2377	2295	
Trial 1: (L/min)	2.50	2.48	2.49	2.49	
Trial 2: (L/min)	2.51	2.47	2.49	2.50	
Trial 3: (L/min)	2.52	2.47	2.49	2.51	
Flow Rate Avg (L/min):	2.51	2.47	2.49	2.50	
Pre- and post-cal avg. flow rate (L/min)	2.51	2.49	2.50	2.51	

NOTES:

BSI AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-8-16
Survey Location: Multicare A2	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:	Employee Name:	Employee Number:
Neg. Pressure A2 Room	Tina Krogh	
	Job Title/Duties: Compounding	Phone Number:
	Work Duration & Frequency: 40hrs/week	Number of Employees performing similar duties: 1@ Time
	Personal Protective Equipment Used: Nitrile gloves - Apron	
Engineering Controls: Hood + Dilution	Ambient Weather Conditions:	

SAMPLING DATA:

Pump ID:	2352		BLANK 1	BLANK 2
Manifold:	**A / Filter**	**B**	**C**	**D**
Sample ID:	1108-2352		1108-2296	1108-2349
Collection Media:	TPESA			
Size and Lot Number:	25MM 9/17			
Flow Rate (L/min):	2.54		0	0
Sampling Time (min):	92		0	0
Sampled Volume (L):	233.7		0	0
Analyte 1	Cyclo			
Analyte 2	5-FU			
Analyte 3				
Analyte 4				
Analyte 5				

SAMPLING TIME:

Stop Time:	18:00					**Total Time:**
Start Time:	16:28					
Elapsed Time:	92					
Industrial Hygienist/IH Tech (Print & Signature): Mia Peterson					Employee #:	Date: 11-8-16

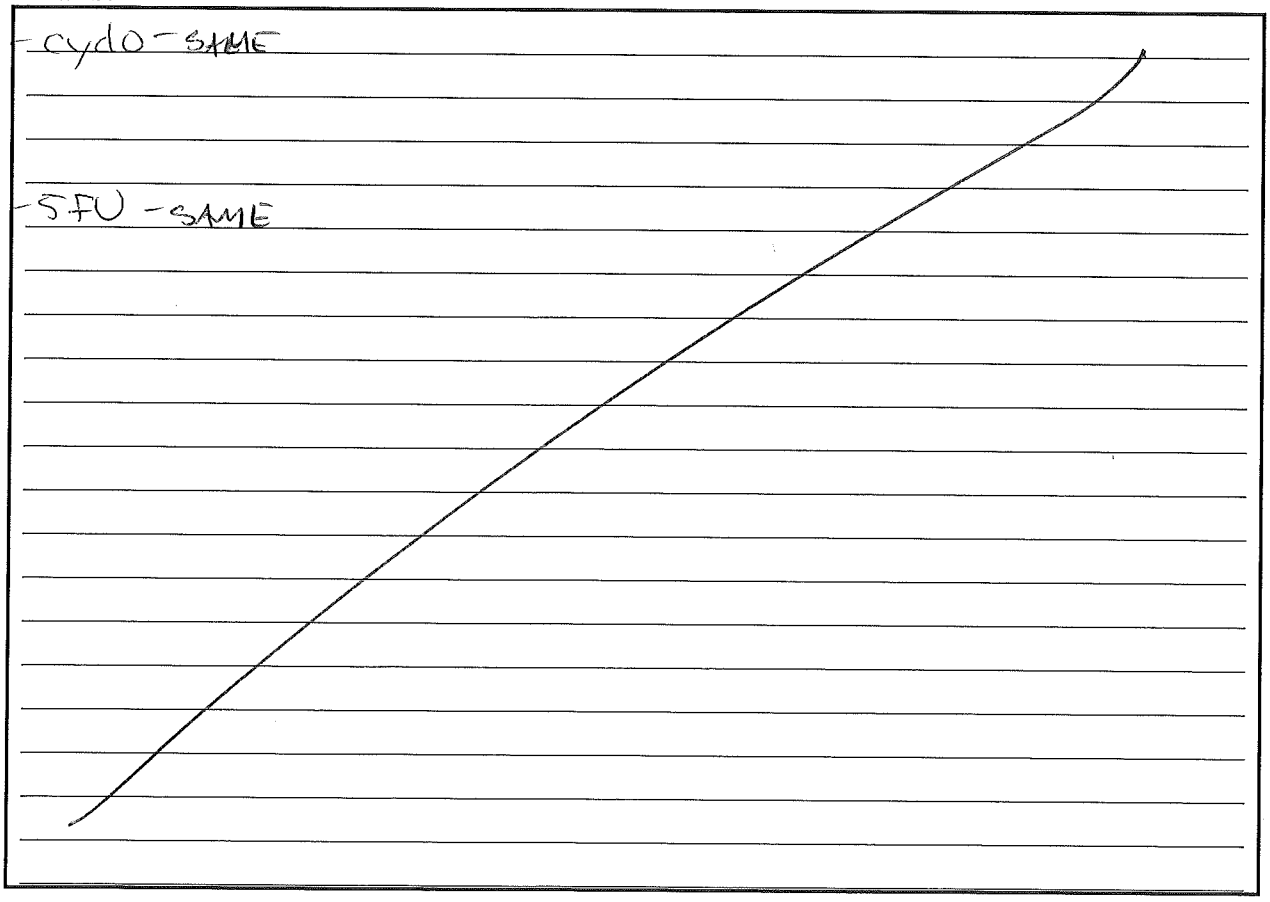
CALIBRATION RECORD:

Pump Manufacturer and Serial Number:		Primary Standard: Y / N	Pump Condition:	
GilAir 5 —		Y	GOOD	
Pre-Survey Date/Time: 11-8-16	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.50			
Trial 2: (L/min)	2.50			
Trial 3: (L/min)	2.50			
Flow Rate Avg (L/min):	2.50			
Post-Survey Date/Time: 11816	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:
Manifold:	**A**	**B**	**C**	**D**
Trial 1: (L/min)	2.56			
Trial 2: (L/min)	2.58			
Trial 3: (L/min)	2.57			
Flow Rate Avg (L/min):	2.57			
Pre- and post-cal avg. flow rate (L/min)	2.54			

NOTES:

-cyclo - SAME

-5FU - SAME



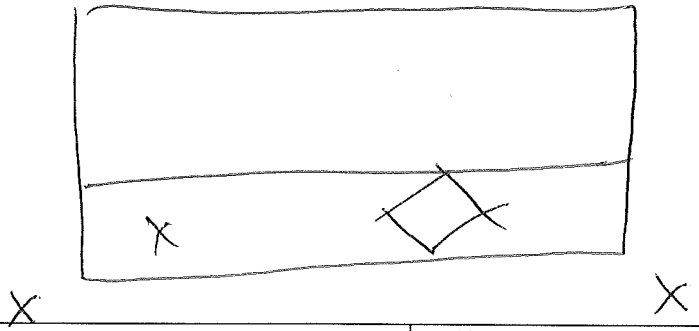
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	11-8-16
Survey Location: Multicare A2	Job Number: **15-1594**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description: -Spill condition



Engineering Controls:	Ambient Weather Conditions:
Hood + Dilution	

SAMPLING DATA:

	OR	OL	I
PUMP ID:	2289	2286	2297
Sample ID:	1108-2289	1108-2286	1108-2297
Collection Media:	TPSA	→	→
Size and Lot Number:	25MM 9117	→	→
Flow Rate (L/min):	2.50	2.49	2.47
Sampling Time (min):	60	60	60
Sampled Volume (L):	150.0	149.4	148.2
Analyte 1	Cyclo	→	→
Analyte 2	5FU	→	→
Analyte 3			
Analyte 4			
Analyte 5			

SAMPLING TIME:

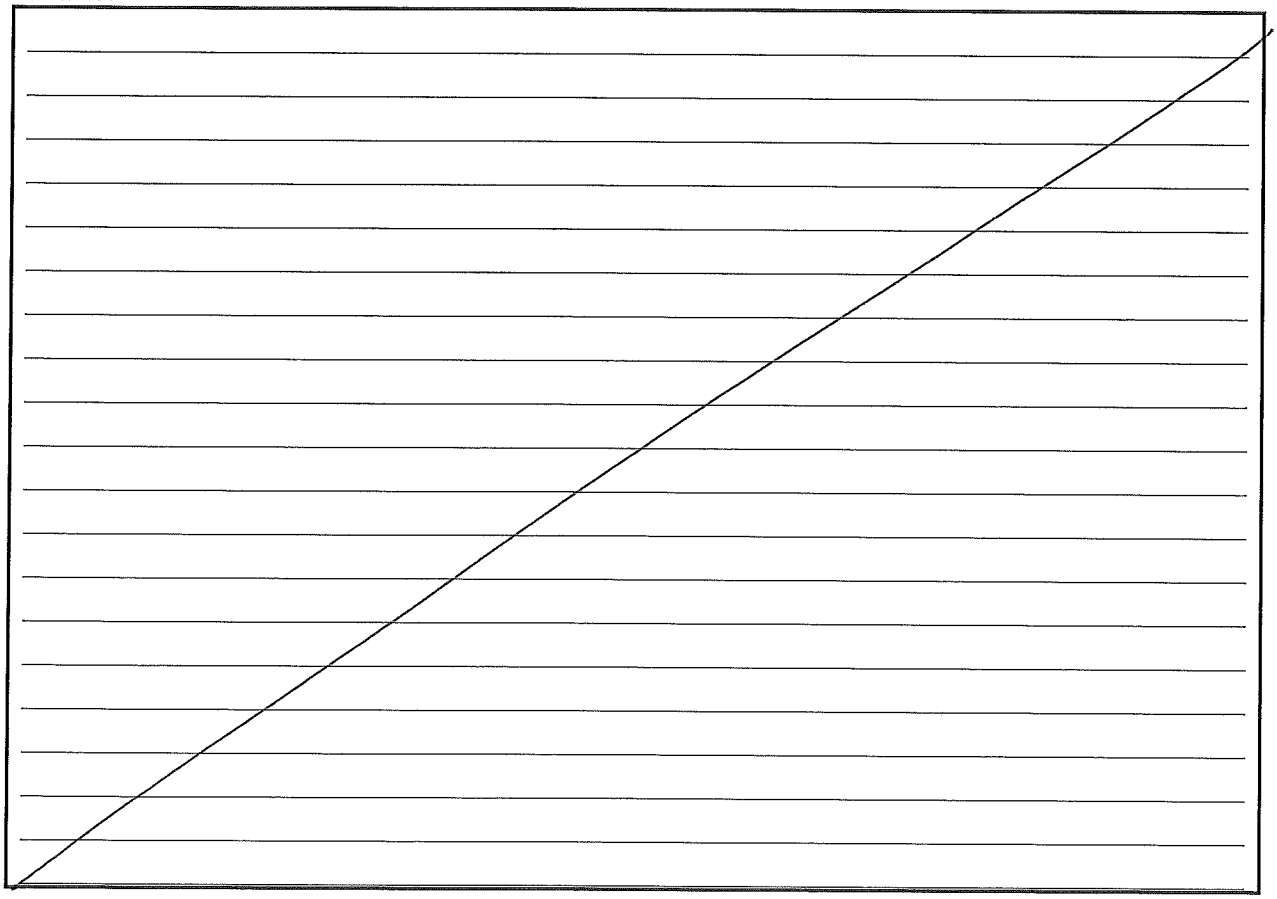
Stop Time:	19:21	19:21	19:21
Start Time:	18:21	18:21	18:21
Elapsed Time:	60	60	60

Industrial Hygienist/IH Tech (Print & Signature):	Date/Time:
M. Kitterson	11-8-16

CALIBRATION RECORD: OR OL I

Pump Manufacturer and Serial Number:		Primary Standard:		Pump Condition:	
Gilair5 —		(Y) / N		Good	
Pre-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
11-8-16	MP				
PUMP ID:	2289	2286	2297		
Trial 1: (L/min)	2.49	2.49	2.49		
Trial 2: (L/min)	2.50	2.49	2.47		
Trial 3: (L/min)	2.51	2.49	2.47		
Flow Rate Avg (L/min):	2.50	2.49	2.47		
Post-Survey Date/Time:	Technician:	Temperature:		Barometric Pressure:	Relative Humidity:
11-8-16	MP				
PUMP ID:	2289	2286	2297		
Trial 1: (L/min)	2.49	2.48	2.41		
Trial 2: (L/min)	2.49	2.49	2.46		
Trial 3: (L/min)	2.48	2.49	2.45		
Flow Rate Avg (L/min):	2.49	2.49	2.46		
Pre- and post-cal avg. flow rate (L/min)	2.50	2.49	2.47		

NOTES:



Attachment 8: Phase 1 - Equipment Calibration Records

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 8468
Description Bios DC-Lite M
Calibrated 10/4/2016

Manufacturer Bios
Model Number DCL-M
Serial Number 107972
Location New Jersey
Temp 74

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 30

Calibration Specifications

Group # 1
Group Name Calibration
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 1.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.03	ccm	100.03	ccm	100.30	100.30	0.27%	Pass
2000.00 / 2000.90	ccm	2000.90	ccm	2,004.00	2,004.00	0.15%	Pass
10000.00 / 10006.00	ccm	10006.00	ccm	10,010.00	10,010.00	0.04%	Pass

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
FLUKE 114	Fluke 114 NIST Traceable Multimeter	Fluke	15310288	5/6/2016	5/6/2017
ML-500-10	Met Lab ML-500-10	Bios International	119826	1/25/2016	1/25/2017
ML-500-24	Met Lab ML-500-24	Bios International	116617	1/25/2016	1/25/2017
ML-500-44	Met Lab ML-500-44	Bios International	120274	1/25/2016	1/25/2017
ML-500-B	Met Lab ML-500-B	Bios International	120696	1/25/2016	1/25/2017

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

TSI P/N 2300157

CERTIFICATE OF TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
TEL:1-800-874-2811 1-651-490-2811 FAX: 1-651-490-3824 www.tsi.com

CALIBRATION STANDARDS USED
PortaCount Bench 2

MODEL	P-TRAK® Ultrafine Particle Counter 8525
SERIAL NO.	8525-12080020

VERIFICATION DATA (PARTICLE CONCENTRATION)

TESTING NUMBER	MEASURED CONCENTRATION IN *Particles/cm³* *Tolerance: 95% to 105% of standard*		
	TESTING STANDARD	INSTRUMENT OUTPUT	PERCENT OF STANDARD
1	154.4	151.3	98.0
2	412.1	403.0	97.8
3	924.6	903.6	97.7
4	2839.5	2781.4	98.0
5	8097.5	8011.2	98.9

* *Indicates out of tolerance condition*

TSI Incorporated does hereby certify that the above described instrument conforms to the original manufacturer's specifications (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limitations of NIST's calibration services or have been derived from accepted values of natural physical constants or have been derived by the ratio type of self calibration techniques. TSI is registered to ISO-9001:2008, Quality Assurance Requirements. This report may not be reproduced, except in full, unless permission for the publication of an approved abstract is obtained in writing from the calibration organization issuing this report.

Measurement Variable	System ID Number	Date Last Calibrated	Calibration Due Date
DC Voltage	E002456	06-18-15	12-18-16
DC Voltage	E002794	06-18-15	12-18-16
Particle Concentration	E002795	04-14-15	04-14-16
Particle Concentration	E001955	04-15-15	04-15-16
Particle Diameter	E005270	11-04-15	11-04-16

Calibration procedure used: 10000013472

Overall Rating: PASS

Calibrated By

Feb. 23, 2016
Calibration Date

500 Cardigan Road
Shoreview, MN 55126-3996
USA
EIN 41-0843524

Service Report
For RMA 800407704

Date Received: 17 Feb 2016

Date Completed: 24 Feb 2016

Customer: 26354

Pine Environmental Services LLC
PO Box 943
Hightstown NJ 08520-0943
USA

Shipping Address: 21352

Pine Environmental Services Inc
Windsor Industrial Park
92 N Main St Bldg 20
Windsor NJ 08561
USA

Customer PO: ALJ-174
Model Number: 801612 P-TRAK Ultrafine Particle Counter
Serial Number: 8525-12080020

Customer Return Reason:
CALIBRATE

Findings:
Unit sent in for clean and calibration. The unit passed as found. The nozzle is plugged with contaminant.

Actions:
Replaced the filter, tubing and nozzle. Reset the flow. Cleaned and realigned the optics. The unit was cleaned calibrated, and a complete operational checkout was performed.

Thank you for the opportunity to service your instrument.

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID R3633
Description TSI 8386 VelociCalc Plus
Calibrated 6/7/2016

Test Instruments Used During the Calibration

				(As Of Cal Entry Date)	
Test Instrument ID	**Description**	**Manufacturer**	**Serial Number**	**Last Cal Date**	**Next Cal Date**
DWYER 477A-1 NY0213061	Dwyer 477A-1 Digital Manometer	Dwyer	NY0213061	6/12/2015	6/12/2016
FLUKE 114	Fluke 114 NIST Traceable Multimeter	Fluke	15310288	5/6/2016	5/6/2017
MICHELL DM-509-TX-01	Relative Humidity Meter	Michell	273296	6/25/2015	6/25/2016
OMEGA HX93AC/DP25-E	Omega HX93AC/DP25-E	Omega Engineering	1010368 035025 035026	8/25/2015	8/25/2016
OMEGA PX02K1-16A5T /DP25-E-A	Omega PX02K1-16A5T/DP25-E-A	Omega Engineering	168377/8375030	8/25/2015	8/25/2016
OMEGA WT4401-D	Omega WT4401-D	Omega Engineering	101105	8/25/2015	8/25/2016

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Kevin Cole

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID R3633
Description TSI 8386 VelociCalc Plus
Calibrated 6/7/2016

Manufacturer TSI
Model Number 8386
Serial Number 0030065
Location New Jersey
Temp 76

Classification
Status fail
Frequency Yearly EOM
Department
Humidity 33

Calibration Specifications

Group # 1
Group Name Velocity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
0.00 / 0.00	ft/min	0.00	ft/min	0.00	0.00	0.00%	Pass
40.00 / 40.00	ft/min	40.00	ft/min	40.00	40.00	0.00%	Pass
70.00 / 70.00	ft/min	70.00	ft/min	71.00	71.00	1.43%	Pass
100.00 / 100.00	ft/min	100.00	ft/min	101.00	101.00	1.00%	Pass
150.00 / 150.00	ft/min	150.00	ft/min	154.00	154.00	2.67%	Pass
325.00 / 325.00	ft/min	325.00	ft/min	321.00	321.00	-1.23%	Pass
700.00 / 700.00	ft/min	700.00	ft/min	705.00	702.00	0.29%	Pass
1000.00 / 1000.00	ft/min	1000.00	ft/min	990.00	990.00	-1.00%	Pass
1500.00 / 1500.00	ft/min	1500.00	ft/min	1,510.00	1,510.00	0.67%	Pass
2000.00 / 2000.00	ft/min	2000.00	ft/min	2,020.00	2,020.00	1.00%	Pass
5000.00 / 5000.00	ft/min	5000.00	ft/min	4,870.00	4,870.00	-2.60%	Pass
8000.00 / 8000.00	ft/min	8000.00	ft/min	7,980.00	7,980.00	-0.25%	Pass

Group # 2
Group Name Temperature
Stated Accy Plus / Minus
Range Acc % 0.0000
Reading Acc % 0.0000
Plus/Minus 0.50

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
70.00 / 70.00	°F	70.00	°F	69.40	70.00	0.00%	Pass

Group # 3
Group Name Humidity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
30.00 / 30.10	%	30.10	%	31.00	30.10	0.00%	Pass

Group # 4
Group Name Pressure
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 1.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
-4.00 / -4.11	inH2O	-4.11	inH2O	-4.14	-4.14	0.73%	Pass
4.00 / 4.10	inH2O	4.10	inH2O	4.14	4.14	0.98%	Pass
8.00 / 8.10	inH2O	8.10	inH2O	8.16	8.16	0.74%	Pass
12.00 / 12.02	inH2O	12.02	inH2O	12.08	12.08	0.50%	Pass

MesaLabs

NVLAP®

NVLAP Lab Code 200661-0

Calibration Certificate

CertificateNo. 125337

Product DCL-ML DryCal DC-Lite Medium Low

Serial No. 3925

Cal. Date 21-Oct-2016

Sold To: Environmental & Occupational Risk Management (EORM)
4 North 2nd Street, Suite 1270
San Jose, CA 95113
US

All calibrations are performed at Mesa Laboratories, Inc., 10 Park Place, Butler, NJ, 07405, an ISO 17025:2005 accredited laboratory through NVLAP of NIST. This report shall not be reproduced except in full without the written approval of the laboratory. Results only relate to the items calibrated. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

As Received Calibration Data

Technician Lilianna Malinowska

Lab. Pressure 755 mmHg
Lab. Temperature 22.9 °C

Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation	As Received
51.3 ccm	50.85 ccm	0.88%	1.00%	In Tolerance
502.2 ccm	500.25 ccm	0.39%	1.00%	In Tolerance
2004 ccm	2001.5 ccm	0.12%	1.00%	In Tolerance

Mesa Laboratories Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML_500_10	113778	30-Jan-2016	29-Jan-2017
ML_500_24	113774	29-Apr-2016	29-Apr-2017

Attachment 9: Phase 2 - Analytical Lab Results and Chain of Custody

20679

ALS Environmental
4388 Glendale Milford Rd.
Cincinnati, Ohio 45242
Phone: (800)-458-1493 or
(513) 733-5336
Fax: (513) 733-5347

ANALYTICAL REQUEST FORM

Page: 1 of 1

☒ **REGULAR** Status 1702600

☐ **RUSH** Status Required - ADDITIONAL CHARGE

RESULTS REQUIRED BY _____ DATE

CONTACT ALS LABORATORY GROUP PRIOR TO SENDING SAMPLES

Date 2-16-17 Purchase Order No. 15-1594-T3

Company Name BSI

Address 1400 NW Compton Dr.

City Hillsboro State OR Zip 97006

Send Report To Mike Peterson

Email Address Michael.Peterson@BSIGroup.com

Telephone (831-233-2119

Alt. Contact Name _____

Alt. Contact Info _____

Quote No. STELLA

Sampling Site LOT BLANK

Date/Time of Collection 2-15-17

Project No. 15-1594 T3

Billing Address (if different) AP

Lab Use Only	Client Sample Number	Media Type	Sample Volume (L)/ Sample Time (min.)	ANALYSIS REQUESTED - Use Method Number if Known
01	LOT 1	XAD7	0	Propylene Glycol
02	LOT 2	XAD7	0	

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

CHAIN OF CUSTODY

Relinquished by: (Signature)	Date / Time 2-16-17	Received by: (Signature)	Date / Time 2/17/17 10:27
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time

ALS LAB USE ONLY

COOLER TEMP: 4.3 °C pH ADJUSTMENTS:

COOLING METHOD: NONE (COOLER) WET ICE DRY ICE (ICE PACK)

DELIVERY METHOD: CLIENT DROP BOX FEDEX (UPS) STD MAIL PRTY MAIL ALS COURIER OTHER: _____

CUSTODY SEALS: (NONE) COOLER PACKAGE SAMPLES

EQUIP. RETURNED:

24-Feb-2017

Mike Peterson
BSI Services and Solutions (West) Inc.
1600 NW Compton Drive,
Suite 202
Hillsboro, OR 97006

Tel: (408) 440-6533
Fax: (503) 726-0227

Re: Lot Blank; 15-1594T3 Work Order: **1702600**

Dear Mike,

ALS Environmental received 2 samples on 17-Feb-2017 10:27 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 7.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Rob Nieman

Electronically approved by: Rob Nieman

Rob Nieman
Project Manager

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: Lot Blank; 15-1594T3
Work Order: **1702600**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1702600-01	LOT1	Air		2/15/2017	2/17/2017 10:27	☐
1702600-02	LOT2	Air		2/15/2017	2/17/2017 10:27	☐

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: Lot Blank; 15-1594T3
Work Order: 1702600

Case Narrative

The sample condition upon receipt was acceptable except where noted.

Results relate only to the items tested and are not blank corrected unless indicated.

Compound identification is based upon retention time matching only. Any compound with a similar retention time will interfere.

Samples were prepared and analyzed by the analytical method and the laboratory's applicable standard operating procedure listed below:
- IH-001- "Determination of Analytes Using NIOSH and OSHA Methods Using Gas Chromatography."
- IH-002- "Determination of Suspended Particulates in the Atmosphere Using Various Media"
- IH-003- "Determination of Suspended Particulates Not Otherwise Regulated (Total and Respirable)."
- IH-004- "Determination of Analytes by NIOSH and OSHA Methods Using Liquid Chromatography."
- IH-005- "Benzene-Soluble Fraction and Total Particulate (Asphalt Fume)."
- IH-006- "Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates."
- IH-196- "Carbon Black by OSHA 196."
- IH-6009- "Determination of Mercury in Industrial Hygiene Samples by Manual Cold Vapor Atomic Absorption Spectroscopy."
- ENV-6010B- "Determination of Trace Metals in Solution by Inductively Coupled Plasma-Atomic Emission Spectroscopy by EPA Method 6010B Non-VAP."
- IH-7300 modified- "Elements by ICP."

ALS Environmental

Date: *24-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: Lot Blank; 15-1594T3

Work Order: 1702600

Analytical Results

Lab ID: 1702600-01A
Client Sample ID: LOT1

Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Lab ID: 1702600-02A
Client Sample ID: LOT2

Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.

Work Order: 1702600

Project: Lot Blank; 15-1594T3

QC BATCH REPORT

Batch ID: **41514** Instrument ID: **GC1** Method: **N5523**

MBLK Sample ID: **MBLK-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453122** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	ND	1.0								

LCS Sample ID: **LCS-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453123** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	18.7	1.0	20.72	0	90.3	70-130	0			

LCSD Sample ID: **LCSD-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453145** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.38	1.0	20.72	0	83.9	70-130	18.7	7.32	20	

The following samples were analyzed in this batch: 1702600-01A 1702600-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: Lot Blank; 15-1594T3
WorkOrder: **1702600**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
µg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: **EORM-HILLSBORO** Date/Time Received: **17-Feb-17 10:27**

Work Order: **1702600** Received by: **SNH**

Checklist completed by: Jan Wilcox (eSignature) 20-Feb-17 (Date) Reviewed by: Rob Nieman (eSignature) 20-Feb-17 (Date)

Matrices:

Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.3		
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

20680

ALS Environmental
4388 Glendale Milford Rd.
Cincinnati, Ohio 45242
Phone: (800)-458-1493 or
(513) 733-5336
Fax: (513) 733-5347

ANALYTICAL REQUEST FORM

1702lod

☒ REGULAR Status

☐ RUSH Status Required - ADDITIONAL CHARGE

RESULTS REQUIRED BY _____ DATE

CONTACT ALS LABORATORY GROUP PRIOR TO SENDING SAMPLES

Page: 1 of 1

Date 2-16-17 Purchase Order No. 15-1594 T3 Quote No. STELLA

Company Name BSI Sampling Site Highline - Burien

Address 1400 NW Compton Dr #203 Date/Time of Collection 2-15-17 - PM

Hillsboro (City) OR (State) 97006 (Zip) Project No. 15-1594 - T3

Send Report To M. K. Peterson Billing Address (if different) AP

Email Address Michael.Peterson@BSIGroup.com

Telephone (503) 233-2149

Alt. Contact Name _____

Alt. Contact Info _____

Lab Use Only	Client Sample Number	Media Type	Sample Volume (L) / Sample Time (min.)	ANALYSIS REQUESTED - Use Method Number if Known
01	0215-1	AIR	59.7	Propylene Glycol
02	-2		60.6	
03	-3		60.0	
04	-4		59.4	
05	-5		117.6	
06	-6		120.0	
07	-7		115.8	
08	-8		⊘	
09	-9		⊘	

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

CHAIN OF CUSTODY

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
	2-16-17		2/17/17 10:27
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time

ALS LAB USE ONLY

COOLER TEMP: 4.3 °C pH ADJUSTMENTS:

COOLING METHOD: NONE (COOLER) WET ICE DRY ICE (ICE PACK)

DELIVERY METHOD: STD MAIL PRTY MAIL CLIENT ALS DROP BOX COURIER FEDEX UPS OTHER _____

CUSTODY SEALS: (NONE) COOLER PACKAGE SAMPLES

EQUIP. RETURNED:

24-Feb-2017

Mike Peterson
BSI Services and Solutions (West) Inc.
1600 NW Compton Drive,
Suite 202
Hillsboro, OR 97006

Tel: (408) 440-6533
Fax: (503) 726-0227

Re: Highline- Burien; Project No.: 15-1594-T3 Work Order: **1702601**

Dear Mike,

ALS Environmental received 9 samples on 17-Feb-2017 10:27 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 9.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Rob Nieman

Electronically approved by: Rob Nieman

Rob Nieman
Project Manager

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: Highline- Burien; Project No.: 15-1594-T3
Work Order: **1702601**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1702601-01	0215-1	Air		2/15/2017	2/20/2017	☐
1702601-02	0215-2	Air		2/15/2017	2/20/2017	☐
1702601-03	0215-3	Air		2/15/2017	2/20/2017	☐
1702601-04	0215-4	Air		2/15/2017	2/20/2017	☐
1702601-05	0215-5	Air		2/15/2017	2/20/2017	☐
1702601-06	0215-6	Air		2/15/2017	2/20/2017	☐
1702601-07	0215-7	Air		2/15/2017	2/20/2017	☐
1702601-08	0215-8	Air		2/15/2017	2/20/2017	☐
1702601-09	0215-9	Air		2/15/2017	2/20/2017	☐

Client:	BSI Services and Solutions (West) Inc.
Project:	Highline- Burien; Project No.: 15-1594-T3
Work Order:	1702601

Case Narrative

The sample condition upon receipt was acceptable except where noted.

Results relate only to the items tested and are not blank corrected unless indicated.

Compound identification is based upon retention time matching only. Any compound with a similar retention time will interfere.

Samples were prepared and analyzed by the analytical method and the laboratory's applicable standard operating procedure listed below:
- IH-001- "Determination of Analytes Using NIOSH and OSHA Methods Using Gas Chromatography."
- IH-002- "Determination of Suspended Particulates in the Atmosphere Using Various Media"
- IH-003- "Determination of Suspended Particulates Not Otherwise Regulated (Total and Respirable)."
- IH-004- "Determination of Analytes by NIOSH and OSHA Methods Using Liquid Chromatography."
- IH-005- "Benzene-Soluble Fraction and Total Particulate (Asphalt Fume)."
- IH-006- "Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates."
- IH-196- "Carbon Black by OSHA 196."
- IH-6009- "Determination of Mercury in Industrial Hygiene Samples by Manual Cold Vapor Atomic Absorption Spectroscopy."
- ENV-6010B- "Determination of Trace Metals in Solution by Inductively Coupled Plasma-Atomic Emission Spectroscopy by EPA Method 6010B Non-VAP."
- IH-7300 modified- "Elements by ICP."

ALS Environmental

Date: *24-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: Highline- Burien; Project No.: 15-1594-T3

Work Order: 1702601

Analytical Results

Lab ID: 1702601-01A
Client Sample ID: 0215-1
Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **59.7**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0054	

Lab ID: 1702601-02A
Client Sample ID: 0215-2
Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **60.6**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0053	

Lab ID: 1702601-03A
Client Sample ID: 0215-3
Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **60**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0054	

Lab ID: 1702601-04A
Client Sample ID: 0215-4
Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **59.4**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	**ppm**	
Propylene glycol	**2.6**	**1.0**	**0.014**	

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1702601
Project: Highline- Burien; Project No.: 15-1594-T3

Analytical Results

Lab ID: 1702601-05A **Collection Date:** 2/15/2017
Client Sample ID: 0215-5 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **117.6**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0027	

Lab ID: 1702601-06A **Collection Date:** 2/15/2017
Client Sample ID: 0215-6 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **120**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0027	

Lab ID: 1702601-07A **Collection Date:** 2/15/2017
Client Sample ID: 0215-7 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **115.8**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	**ppm**	
Propylene glycol	**14**	**1.0**	**0.040**	

Lab ID: 1702601-08A **Collection Date:** 2/15/2017
Client Sample ID: 0215-8 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: *24-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: Highline- Burien; Project No.: 15-1594-T3

Work Order: 1702601

Analytical Results

Lab ID: 1702601-09A
Client Sample ID: 0215-9

Collection Date: 2/15/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/23/2017	µg/sample	Reporting Limit µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.

Work Order: 1702601

Project: Highline- Burien; Project No.: 15-1594-T3

QC BATCH REPORT

Batch ID: **41514** Instrument ID: **GC1** Method: **N5523**

MBLK Sample ID: **MBLK-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453122** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	ND	1.0								

LCS Sample ID: **LCS-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453123** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	18.7	1.0	20.72	0	90.3	70-130	0			

LCSD Sample ID: **LCSD-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453145** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.38	1.0	20.72	0	83.9	70-130	18.7	7.32	20	

The following samples were analyzed in this batch:

1702601-01A	1702601-02A	1702601-03A
1702601-04A	1702601-05A	1702601-06A
1702601-07A	1702601-08A	1702601-09A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: BSI Services and Solutions (West) Inc.
Project: Highline- Burien; Project No.: 15-1594-T3
WorkOrder: **1702601**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
µg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: **EORM-HILLSBORO** Date/Time Received: **17-Feb-17 10:27**

Work Order: **1702601** Received by: **SNH**

Checklist completed by: Jan Wilcox 20-Feb-17 Reviewed by: Rob Nieman 20-Feb-17

eSignature | Date | eSignature | Date

Matrices:

Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.3		
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

22800

ALS Environmental
4388 Glendale Milford Rd.
Cincinnati, Ohio 45242
Phone: (800)-458-1493 or
(513) 733-5336
Fax: (513) 733-5347

ANALYTICAL REQUEST FORM

☒ REGULAR Status 1702102

☐ RUSH Status Required - ADDITIONAL CHARGE

RESULTS REQUIRED BY _____ DATE

CONTACT ALS LABORATORY GROUP PRIOR TO SENDING SAMPLES

Page: 1 of 1

Date 2-16-17 Purchase Order No. 15-1594T3

Company Name BSI

Address 1400 NW Compton Dr. #203

Hillsboro OR 97006
City State Zip

Send Report To Mike Peterson

Email Address Michael.Peterson@BSIGroup.com

Telephone (951) 233-2119

Alt. Contact Name _____

Alt. Contact Info _____

Quote No. STELLA

Sampling Site CHI-TACOMA-51,SOE

Date/Time of Collection 2-16-17 -AM

Project No. 15-1594-T3

Billing Address (if different) AP

Lab Use Only	Client Sample Number	Media Type	Sample Volume (L) / Sample Time (min)	ANALYSIS REQUESTED - Use Method Number if Known
01	0216-1	KAD7	57.1	Propylene Glycol
02	-2		57.7	
03	-3		58.0	
04	-4		57.1	
05	-5		115.6	
06	-6		117.4	
07	-7		116.8	
08	-8		⊖	
09	-9		⊖	

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

CHAIN OF CUSTODY

Relinquished by: (Signature)	Date / Time 2-16-17	Received by: (Signature)	Date / Time 2/17/17 10:27
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time

ALS LAB USE ONLY

COOLER TEMP: 4.3 °C | pH ADJUSTMENTS:

COOLING METHOD: NONE (COOLER) WET ICE DRY ICE ICE PACK

DELIVERY METHOD: CLIENT DROP BOX FEDEX (UPS) STD MAIL PRTY MAIL ALS COURIER OTHER _____

CUSTODY SEALS: (NONE) COOLER PACKAGE SAMPLES

EQUIP. RETURNED:

24-Feb-2017

Mike Peterson
BSI Services and Solutions (West) Inc.
1600 NW Compton Drive,
Suite 202
Hillsboro, OR 97006

Tel: (408) 440-6533
Fax: (503) 726-0227

Re: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3 Work Order: **1702602**

Dear Mike,

ALS Environmental received 9 samples on 17-Feb-2017 10:27 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 9.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Rob Nieman

Electronically approved by: Rob Nieman

Rob Nieman
Project Manager

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3
Work Order: **1702602**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1702602-01	0216-1	Air		2/16/2017	2/20/2017	☐
1702602-02	0216-2	Air		2/16/2017	2/20/2017	☐
1702602-03	0216-3	Air		2/16/2017	2/20/2017	☐
1702602-04	0216-4	Air		2/16/2017	2/20/2017	☐
1702602-05	0216-5	Air		2/16/2017	2/20/2017	☐
1702602-06	0216-6	Air		2/16/2017	2/20/2017	☐
1702602-07	0216-7	Air		2/16/2017	2/20/2017	☐
1702602-08	0216-8	Air		2/16/2017	2/20/2017	☐
1702602-09	0216-9	Air		2/16/2017	2/20/2017	☐

Client:	BSI Services and Solutions (West) Inc.
Project:	CHI-TACOMA-St.Joe; Project No.: 15-1594-T3
Work Order:	1702602

Case Narrative

The sample condition upon receipt was acceptable except where noted.

Results relate only to the items tested and are not blank corrected unless indicated.

Compound identification is based upon retention time matching only. Any compound with a similar retention time will interfere.

Samples were prepared and analyzed by the analytical method and the laboratory's applicable standard operating procedure listed below:
- IH-001- "Determination of Analytes Using NIOSH and OSHA Methods Using Gas Chromatography."
- IH-002- "Determination of Suspended Particulates in the Atmosphere Using Various Media"
- IH-003- "Determination of Suspended Particulates Not Otherwise Regulated (Total and Respirable)."
- IH-004- "Determination of Analytes by NIOSH and OSHA Methods Using Liquid Chromatography."
- IH-005- "Benzene-Soluble Fraction and Total Particulate (Asphalt Fume)."
- IH-006- "Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates."
- IH-196- "Carbon Black by OSHA 196."
- IH-6009- "Determination of Mercury in Industrial Hygiene Samples by Manual Cold Vapor Atomic Absorption Spectroscopy."
- ENV-6010B- "Determination of Trace Metals in Solution by Inductively Coupled Plasma-Atomic Emission Spectroscopy by EPA Method 6010B Non-VAP."
- IH-7300 modified- "Elements by ICP."

ALS Environmental

Date: *24-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3

Work Order: 1702602

Analytical Results

Lab ID: 1702602-01A
Client Sample ID: 0216-1
Collection Date: 2/16/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **57.1**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0056

Lab ID: 1702602-02A
Client Sample ID: 0216-2
Collection Date: 2/16/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **57.7**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0056

Lab ID: 1702602-03A
Client Sample ID: 0216-3
Collection Date: 2/16/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **58**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0055

Lab ID: 1702602-04A
Client Sample ID: 0216-4
Collection Date: 2/16/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **57.1**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0056

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1702602
Project: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3

Analytical Results

Lab ID: 1702602-05A **Collection Date:** 2/16/2017
Client Sample ID: 0216-5 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **115.6**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0028

Lab ID: 1702602-06A **Collection Date:** 2/16/2017
Client Sample ID: 0216-6 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **117.4**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0027

Lab ID: 1702602-07A **Collection Date:** 2/16/2017
Client Sample ID: 0216-7 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **116.8**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0028

Lab ID: 1702602-08A **Collection Date:** 2/16/2017
Client Sample ID: 0216-8 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	NA

Note:

ALS Environmental

Date: *24-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3

Work Order: 1702602

Analytical Results

Lab ID: 1702602-09A
Client Sample ID: 0216-9

Collection Date: 2/16/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/23/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: 24-Feb-17

Client: BSI Services and Solutions (West) Inc.

Work Order: 1702602

Project: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3

QC BATCH REPORT

Batch ID: **41514** Instrument ID: **GC1** Method: **N5523**

MBLK Sample ID: **MBLK-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453122** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	ND	1.0								

LCS Sample ID: **LCS-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453123** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	18.7	1.0	20.72	0	90.3	70-130	0			

LCSD Sample ID: **LCSD-41514-41514** Units: **µg/sample** Analysis Date: **2/23/2017**

Client ID: Run ID: **GC1_170223A** SeqNo: **1453145** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.38	1.0	20.72	0	83.9	70-130	18.7	7.32	20	

The following samples were analyzed in this batch:

1702602-01A	1702602-02A	1702602-03A
1702602-04A	1702602-05A	1702602-06A
1702602-07A	1702602-08A	1702602-09A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: BSI Services and Solutions (West) Inc.
Project: CHI-TACOMA-St.Joe; Project No.: 15-1594-T3
WorkOrder: **1702602**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
µg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: **EORM-HILLSBORO** Date/Time Received: **17-Feb-17 10:27**

Work Order: **1702602** Received by: **SNH**

Checklist completed by: Jan Wilcox 20-Feb-17 Reviewed by: Rob Nieman 20-Feb-17

eSignature | Date | eSignature | Date

Matrices:

Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):			
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

22801

ALS Environmental
4388 Glendale Milford Rd.
Cincinnati, Ohio 45242
Phone: (800)-458-1493 or
(513) 733-5336
Fax: (513) 733-5347

ANALYTICAL REQUEST FORM

☐ REGULAR Status

☐ RUSH Status Required - ADDITIONAL CHARGE

RESULTS REQUIRED BY _____ DATE

CONTACT ALS LABORATORY GROUP PRIOR TO SENDING SAMPLES

Page: 1 of 1

Date 2/20/17 Purchase Order No. 15-1594T3

Company Name BSI

Address _____

City Millsboro State OR Zip _____

Send Report To Mike Peterson

Email Address Michael.Peterson@BSIGroup.com

Telephone (831 2332119

Alt. Contact Name _____

Alt. Contact Info _____

Quote No. STELLA

Sampling Site TACOMA General A2

Date/Time of Collection PM

Project No. 15-1594T3

Billing Address (if different) AP

1702768

Lab Use Only	Client Sample Number	Media Type	Sample Volume (L) / Sample Time (min.)	ANALYSIS REQUESTED - Use Method Number if Known
01	0220-11	XAD7	60.6	Propylene Glycol
02	-12		61.5	
03	-13		60.6	
04	-14		60.3	
05	-15		124.2	
06	-16		121.2	
07	-17		120.0	
08	-18		0	
09	-19		0	

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

CHAIN OF CUSTODY

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
[signature]	2017	[signature]	2/22/17 11:45
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time

ALS LAB USE ONLY						DELIVERY METHOD:	CLIENT	DROP BOX	FEDEX	UPS
COOLER TEMP:	°C	pH ADJUSTMENTS:				STD MAIL	PRTY MAIL	ALS	COURIER	OTHER
COOLING METHOD:	NONE	COOLER	WET ICE	DRY ICE	ICE PACK	CUSTODY SEALS:	NONE	COOLER	PACKAGE	SAMPLES
						EQUIP. RETURNED:				

27-Feb-2017

Mike Peterson
BSI Services and Solutions (West) Inc.
1600 NW Compton Drive,
Suite 202
Hillsboro, OR 97006

Tel: (408) 440-6533
Fax: (503) 726-0227

Re: TACOMA General A2; Project No.: 15-1594T3 Work Order: **1702768**

Dear Mike,

ALS Environmental received 9 samples on 22-Feb-2017 11:05 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 9.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Rob Nieman

Electronically approved by: Rob Nieman

Rob Nieman
Project Manager

ALS Environmental

Date: 27-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General A2; Project No.: 15-1594T3
Work Order: **1702768**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1702768-01	0220-11	Air		2/20/2017	2/22/2017 11:05	☐
1702768-02	0220-12	Air		2/20/2017	2/22/2017 11:05	☐
1702768-03	0220-13	Air		2/20/2017	2/22/2017 11:05	☐
1702768-04	0220-14	Air		2/20/2017	2/22/2017 11:05	☐
1702768-05	0220-15	Air		2/20/2017	2/22/2017 11:05	☐
1702768-06	0220-16	Air		2/20/2017	2/22/2017 11:05	☐
1702768-07	0220-17	Air		2/20/2017	2/22/2017 11:05	☐
1702768-08	0220-18	Air		2/20/2017	2/22/2017 11:05	☐
1702768-09	0220-19	Air		2/20/2017	2/22/2017 11:05	☐

ALS Environmental

Date: 27-Feb-17

Client:	BSI Services and Solutions (West) Inc.
Project:	TACOMA General A2; Project No.: 15-1594T3
Work Order:	1702768

Case Narrative

The sample condition upon receipt was acceptable except where noted.

Results relate only to the items tested and are not blank corrected unless indicated.

Compound identification is based upon retention time matching only. Any compound with a similar retention time will interfere.

Samples were prepared and analyzed by the analytical method and the laboratory's applicable standard operating procedure listed below:
- IH-001- "Determination of Analytes Using NIOSH and OSHA Methods Using Gas Chromatography."
- IH-002- "Determination of Suspended Particulates in the Atmosphere Using Various Media"
- IH-003- "Determination of Suspended Particulates Not Otherwise Regulated (Total and Respirable)."
- IH-004- "Determination of Analytes by NIOSH and OSHA Methods Using Liquid Chromatography."
- IH-005- "Benzene-Soluble Fraction and Total Particulate (Asphalt Fume)."
- IH-006- "Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates."
- IH-196- "Carbon Black by OSHA 196."
- IH-6009- "Determination of Mercury in Industrial Hygiene Samples by Manual Cold Vapor Atomic Absorption Spectroscopy."
- ENV-6010B- "Determination of Trace Metals in Solution by Inductively Coupled Plasma-Atomic Emission Spectroscopy by EPA Method 6010B Non-VAP."
- IH-7300 modified- "Elements by ICP."

ALS Environmental

Date: *27-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General A2; Project No.: 15-1594T3

Work Order: 1702768

Analytical Results

Lab ID: 1702768-01A
Client Sample ID: 0220-11
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **60.6**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0053	

Lab ID: 1702768-02A
Client Sample ID: 0220-12
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **61.5**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0052	

Lab ID: 1702768-03A
Client Sample ID: 0220-13
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **60.6**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0053	

Lab ID: 1702768-04A
Client Sample ID: 0220-14
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **60.3**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	**ppm**	
Propylene glycol	**3.2**	**1.0**	**0.017**	

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1702768
Project: TACOMA General A2; Project No.: 15-1594T3

Analytical Results

Lab ID: 1702768-05A **Collection Date:** 2/20/2017
Client Sample ID: 0220-15 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **124.2**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0026	

Lab ID: 1702768-06A **Collection Date:** 2/20/2017
Client Sample ID: 0220-16 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **121.2**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0027	

Lab ID: 1702768-07A **Collection Date:** 2/20/2017
Client Sample ID: 0220-17 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **120**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	**ppm**	
Propylene glycol	**16**	**1.0**	**0.044**	

Lab ID: 1702768-08A **Collection Date:** 2/20/2017
Client Sample ID: 0220-18 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: *27-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General A2; Project No.: 15-1594T3

Work Order: 1702768

Analytical Results

Lab ID: 1702768-09A
Client Sample ID: 0220-19

Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/24/2017	µg/sample	Reporting Limit µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: 27-Feb-17

Client: BSI Services and Solutions (West) Inc.

Work Order: 1702768

Project: TACOMA General A2; Project No.: 15-1594T3

QC BATCH REPORT

Batch ID: **41516** Instrument ID: **GC1** Method: **N5523**

MBLK Sample ID: **MBLK-41516-41516** Units: **µg/sample** Analysis Date: **2/24/2017**

Client ID: Run ID: **GC1_170224A** SeqNo: **1453328** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	ND	1.0								

LCS Sample ID: **LCS-41516-41516** Units: **µg/sample** Analysis Date: **2/24/2017**

Client ID: Run ID: **GC1_170224A** SeqNo: **1453329** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.48	1.0	20.72	0	84.4	70-130	0			

LCSD Sample ID: **LCSD-41516-41516** Units: **µg/sample** Analysis Date: **2/24/2017**

Client ID: Run ID: **GC1_170224A** SeqNo: **1453348** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.93	1.0	20.72	0	86.5	70-130	17.48	2.54	20	

The following samples were analyzed in this batch:

1702768-01A	1702768-02A	1702768-03A
1702768-04A	1702768-05A	1702768-06A
1702768-07A	1702768-08A	1702768-09A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Environmental

Date: 27-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General A2; Project No.: 15-1594T3
WorkOrder: **1702768**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
µg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: **EORM-HILLSBORO** Date/Time Received: **22-Feb-17 11:05**

Work Order: **1702768** Received by: **RDN**

Checklist completed by: Jan Wilcox 23-Feb-17 Reviewed by: Rob Nieman 24-Feb-17

eSignature | Date | eSignature | Date

Matrices:

Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):			
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

22802

ALS Environmental
4388 Glendale Milford Rd.
Cincinnati, Ohio 45242
Phone: (800)-458-1493 or (513) 733-5336
Fax: (513) 733-5347

ANALYTICAL REQUEST FORM

☐ **REGULAR Status**

☐ **RUSH Status Required - ADDITIONAL CHARGE**
RESULTS REQUIRED BY _____ DATE
CONTACT ALS LABORATORY GROUP PRIOR TO SENDING SAMPLES

Page: 1 of 1

Date 2/20/17 Purchase Order No. 15-1594 T5
Company Name BSI
Address _____
City Hillsboro State OR Zip _____
Send Report To Mike Peterson
Email Address Michael.Peterson@BSIGroup.com
Telephone (503)233-2119
Alt. Contact Name _____
Alt. Contact Info _____

Quote No. STELLA
Sampling Site TACOMA Terminal - B2
Date/Time of Collection AM
Project No. 15-1594 T3
Billing Address (if different) AP

1702769

Lab Use Only	Client Sample Number	Media Type	Sample Volume / Sample Time (min.)	ANALYSIS REQUESTED - Use Method Number if Known
01	0220-1	XAD7	60.0	Propylene Glycol
02	-2		60.0	
03	-3		59.7	
04	-4		60.0	
05	-5		118.8	
06	-6		117.0	
07	-7		117.6	
08	-8		0	
09	-9		0	

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

CHAIN OF CUSTODY

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
[signature]	2/20/17	[signature]	2/22/17 11:25
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time

ALS LAB USE ONLY

COOLER TEMP: °C | pH ADJUSTMENTS:

COOLING METHOD: NONE (COOLER) WET ICE DRY ICE (ICE PACK)

DELIVERY METHOD: CLIENT DROP BOX FEDEX (UPS) STD MAIL PRTY MAIL ALS COURIER OTHER _____

CUSTODY SEALS: (NONE) COOLER PACKAGE SAMPLES

EQUIP. RETURNED

27-Feb-2017

Mike Peterson
BSI Services and Solutions (West) Inc.
1600 NW Compton Drive,
Suite 202
Hillsboro, OR 97006

Tel: (408) 440-6533
Fax: (503) 726-0227

Re: TACOMA General B2; Project No.: 15-1594T3 Work Order: **1702769**

Dear Mike,

ALS Environmental received 9 samples on 22-Feb-2017 11:05 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 9.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Rob Nieman

Electronically approved by: Rob Nieman

Rob Nieman
Project Manager

ALS Environmental

Date: 27-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General B2; Project No.: 15-1594T3
Work Order: **1702769**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1702769-01	0220-1	Air		2/20/2017	2/23/2017	☐
1702769-02	0220-2	Air		2/20/2017	2/23/2017	☐
1702769-03	0220-3	Air		2/20/2017	2/23/2017	☐
1702769-04	0220-4	Air		2/20/2017	2/23/2017	☐
1702769-05	0220-5	Air		2/20/2017	2/23/2017	☐
1702769-06	0220-6	Air		2/20/2017	2/23/2017	☐
1702769-07	0220-7	Air		2/20/2017	2/23/2017	☐
1702769-08	0220-8	Air		2/20/2017	2/23/2017	☐
1702769-09	0220-9	Air		2/20/2017	2/23/2017	☐

ALS Environmental

Date: 27-Feb-17

Client:	BSI Services and Solutions (West) Inc.
Project:	TACOMA General B2; Project No.: 15-1594T3
Work Order:	1702769

Case Narrative

The sample condition upon receipt was acceptable except where noted.

Results relate only to the items tested and are not blank corrected unless indicated.

Compound identification is based upon retention time matching only. Any compound with a similar retention time will interfere.

Samples were prepared and analyzed by the analytical method and the laboratory's applicable standard operating procedure listed below:
- IH-001- "Determination of Analytes Using NIOSH and OSHA Methods Using Gas Chromatography."
- IH-002- "Determination of Suspended Particulates in the Atmosphere Using Various Media"
- IH-003- "Determination of Suspended Particulates Not Otherwise Regulated (Total and Respirable)."
- IH-004- "Determination of Analytes by NIOSH and OSHA Methods Using Liquid Chromatography."
- IH-005- "Benzene-Soluble Fraction and Total Particulate (Asphalt Fume)."
- IH-006- "Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates."
- IH-196- "Carbon Black by OSHA 196."
- IH-6009- "Determination of Mercury in Industrial Hygiene Samples by Manual Cold Vapor Atomic Absorption Spectroscopy."
- ENV-6010B- "Determination of Trace Metals in Solution by Inductively Coupled Plasma-Atomic Emission Spectroscopy by EPA Method 6010B Non-VAP."
- IH-7300 modified- "Elements by ICP."

ALS Environmental

Date: *27-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General B2; Project No.: 15-1594T3

Work Order: 1702769

Analytical Results

Lab ID: 1702769-01A
Client Sample ID: 0220-1
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **60**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0054

Lab ID: 1702769-02A
Client Sample ID: 0220-2
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **60**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0054

Lab ID: 1702769-03A
Client Sample ID: 0220-3
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **59.7**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0054

Lab ID: 1702769-04A
Client Sample ID: 0220-4
Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **60**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit	
	µg/sample	µg/sample	ppm
Propylene glycol	ND	1.0	<0.0054

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1702769
Project: TACOMA General B2; Project No.: 15-1594T3

Analytical Results

Lab ID: 1702769-05A **Collection Date:** 2/20/2017
Client Sample ID: 0220-5 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **118.8**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0027	

Lab ID: 1702769-06A **Collection Date:** 2/20/2017
Client Sample ID: 0220-6 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **117**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0027	

Lab ID: 1702769-07A **Collection Date:** 2/20/2017
Client Sample ID: 0220-7 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **117.6**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	**ppm**	
Propylene glycol	**2.6**	**1.0**	**0.0070**	

Lab ID: 1702769-08A **Collection Date:** 2/20/2017
Client Sample ID: 0220-8 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/24/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: *27-Feb-17*

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General B2; Project No.: 15-1594T3

Work Order: 1702769

Analytical Results

Lab ID: 1702769-09A
Client Sample ID: 0220-9

Collection Date: 2/20/2017
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **0**	Analyst: **MHW**
Date Analyzed: 2/24/2017	µg/sample	Reporting Limit µg/sample	ppm	
Propylene glycol	ND	1.0	NA	

Note:

ALS Environmental

Date: 27-Feb-17

Client: BSI Services and Solutions (West) Inc.

Work Order: 1702769

Project: TACOMA General B2; Project No.: 15-1594T3

QC BATCH REPORT

Batch ID: **41516** Instrument ID: **GC1** Method: **N5523**

MBLK Sample ID: **MBLK-41516-41516** Units: **µg/sample** Analysis Date: **2/24/2017**

Client ID: Run ID: **GC1_170224A** SeqNo: **1453328** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	ND	1.0								

LCS Sample ID: **LCS-41516-41516** Units: **µg/sample** Analysis Date: **2/24/2017**

Client ID: Run ID: **GC1_170224A** SeqNo: **1453329** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.48	1.0	20.72	0	84.4	70-130	0			

LCSD Sample ID: **LCSD-41516-41516** Units: **µg/sample** Analysis Date: **2/24/2017**

Client ID: Run ID: **GC1_170224A** SeqNo: **1453348** Prep Date: **2/23/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.93	1.0	20.72	0	86.5	70-130	17.48	2.54	20	

The following samples were analyzed in this batch:

1702769-01A	1702769-02A	1702769-03A
1702769-04A	1702769-05A	1702769-06A
1702769-07A	1702769-08A	1702769-09A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Environmental

Date: 27-Feb-17

Client: BSI Services and Solutions (West) Inc.
Project: TACOMA General B2; Project No.: 15-1594T3
WorkOrder: **1702769**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
µg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: **EORM-HILLSBORO** Date/Time Received: **22-Feb-17 11:05**

Work Order: **1702769** Received by: **RDN**

Checklist completed by: Rob Nieman 24-Feb-17 Reviewed by: Rob Nieman 24-Feb-17

eSignature | Date | eSignature | Date

Matrices:

Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):			
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

22804

ALS Environmental
4388 Glendale Milford Rd.
Cincinnati, Ohio 45242
Phone: (800)-458-1493 or
(513) 733-5336
Fax: (513) 733-5347

ANALYTICAL REQUEST FORM

☐ REGULAR Status

☐ RUSH Status Required - ADDITIONAL CHARGE

RESULTS REQUIRED BY _____ DATE

CONTACT ALS LABORATORY GROUP PRIOR TO SENDING SAMPLES

Page: 1 of 1

Date 2-26-17 Purchase Order No. 15-1594T3

Company Name BSI

Address _____

Hillsboro OR
City State Zip

Send Report To Mike Peterson

Email Address Michael.Peterson@BSIGroup.com

Telephone (503) 233 2119

Alt. Contact Name _____

Alt. Contact Info _____

Quote No. STELLA

Sampling Site GH Bellview-A2

Date/Time of Collection 2-26-17

Project No. 15-1594T3

Billing Address (if different) AP

1703012

Lab Use Only	Client Sample Number	Media Type	Sample Volume (L) / Sample Time (min.)	ANALYSIS REQUESTED - Use Method Number if Known
01	0226-1	XAD7	61.5	propylene glycol
02	2		62.1	
03	3		60.6	
04	4		61.5	
05	5A		123.0	
06	6A		117.6	
07	7A		120.0	
08	8		Ø	
09	9		Ø	
10	5B		124.8	
11	6B		120.6	
12	7B		123.0	
13	5C		126.0	
14	6C		120.6	
15	7C		123.0	

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

CHAIN OF CUSTODY

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
	2-28-17	ALS	3/1/17 1052
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time

ALS LAB USE ONLY		DELIVERY METHOD: CLIENT DROP BOX FEDEX UPS STD MAIL PRTY MAIL ALS COURIER OTHER _____
COOLER TEMP: °C	pH ADJUSTMENTS:	CUSTODY SEALS: NONE COOLER PACKAGE SAMPLES
COOLING METHOD: NONE COOLER WET ICE DRY ICE ICE PACK		EQUIP. RETURNED:

08-Mar-2017

Mike Peterson
BSI Services and Solutions (West) Inc.
1600 NW Compton Drive,
Suite 202
Hillsboro, OR 97006

Tel: (408) 440-6533
Fax: (503) 726-0227

Re: GH Bellview- A2 Work Order: **1703012**

Dear Mike,

ALS Environmental received 15 samples on 01-Mar-2017 10:52 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 10.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Rob Nieman

Electronically approved by: Rob Nieman

Rob Nieman
Project Manager

ALS Environmental

Date: 08-Mar-17

Client: BSI Services and Solutions (West) Inc.
Project: GH Bellview- A2
Work Order: **1703012**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1703012-01	0226-1	Air		2/26/2017	3/1/2017 10:52	☐
1703012-02	0226-2	Air		2/26/2017	3/1/2017 10:52	☐
1703012-03	0226-3	Air		2/26/2017	3/1/2017 10:52	☐
1703012-04	0226-4	Air		2/26/2017	3/1/2017 10:52	☐
1703012-05	0226-5A	Air		2/26/2017	3/1/2017 10:52	☐
1703012-06	0226-6A	Air		2/26/2017	3/1/2017 10:52	☐
1703012-07	0226-7A	Air		2/26/2017	3/1/2017 10:52	☐
1703012-08	0226-8	Air		2/26/2017	3/1/2017 10:52	☐
1703012-09	0226-9	Air		2/26/2017	3/1/2017 10:52	☐
1703012-10	0226-5B	Air		2/26/2017	3/1/2017 10:52	☐
1703012-11	0226-6B	Air		2/26/2017	3/1/2017 10:52	☐
1703012-12	0226-7B	Air		2/26/2017	3/1/2017 10:52	☐
1703012-13	0226-5C	Air		2/26/2017	3/1/2017 10:52	☐
1703012-14	0226-6C	Air		2/26/2017	3/1/2017 10:52	☐
1703012-15	0226-7C	Air		2/26/2017	3/1/2017 10:52	☐

ALS Environmental

Date: 08-Mar-17

Client:	BSI Services and Solutions (West) Inc.
Project:	GH Bellview- A2
Work Order:	1703012

Case Narrative

The sample condition upon receipt was acceptable except where noted.

Results relate only to the items tested and are not blank corrected unless indicated.

Compound identification is based upon retention time matching only. Any compound with a similar retention time will interfere.

Samples were prepared and analyzed by the analytical method and the laboratory's applicable standard operating procedure listed below:
- IH-001- "Determination of Analytes Using NIOSH and OSHA Methods Using Gas Chromatography."
- IH-002- "Determination of Suspended Particulates in the Atmosphere Using Various Media"
- IH-003- "Determination of Suspended Particulates Not Otherwise Regulated (Total and Respirable)."
- IH-004- "Determination of Analytes by NIOSH and OSHA Methods Using Liquid Chromatography."
- IH-005- "Benzene-Soluble Fraction and Total Particulate (Asphalt Fume)."
- IH-006- "Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates."
- IH-196- "Carbon Black by OSHA 196."
- IH-6009- "Determination of Mercury in Industrial Hygiene Samples by Manual Cold Vapor Atomic Absorption Spectroscopy."
- ENV-6010B- "Determination of Trace Metals in Solution by Inductively Coupled Plasma-Atomic Emission Spectroscopy by EPA Method 6010B Non-VAP."
- IH-7300 modified- "Elements by ICP."

ALS Environmental

Date: *08-Mar-17*

Client: BSI Services and Solutions (West) Inc.
Project: GH Bellview- A2

Work Order: 1703012

Analytical Results

Lab ID: 1703012-01A
Collection Date: 2/26/2017
Client Sample ID: 0226-1
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **61.5**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0052	

Lab ID: 1703012-02A
Collection Date: 2/26/2017
Client Sample ID: 0226-2
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **62.1**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0052	

Lab ID: 1703012-03A
Collection Date: 2/26/2017
Client Sample ID: 0226-3
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **60.6**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	**ppm**	
Propylene glycol	**19**	**1.0**	**0.10**	

Lab ID: 1703012-04A
Collection Date: 2/26/2017
Client Sample ID: 0226-4
Matrix: AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **61.5**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0052	

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1703012
Project: GH Bellview- A2

Analytical Results

Lab ID: 1703012-05A **Collection Date:** 2/26/2017
Client Sample ID: 0226-5A **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **123**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	<0.0026

Lab ID: 1703012-06A **Collection Date:** 2/26/2017
Client Sample ID: 0226-6A **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **117.6**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	<0.0027

Lab ID: 1703012-07A **Collection Date:** 2/26/2017
Client Sample ID: 0226-7A **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **120**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	<0.0027

Lab ID: 1703012-08A **Collection Date:** 2/26/2017
Client Sample ID: 0226-8 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **0**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	NA

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1703012
Project: GH Bellview- A2

Analytical Results

Lab ID: 1703012-09A **Collection Date:** 2/26/2017
Client Sample ID: 0226-9 **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **0**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	NA

Lab ID: 1703012-10A **Collection Date:** 2/26/2017
Client Sample ID: 0226-5B **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **124.8**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	<0.0026

Lab ID: 1703012-11A **Collection Date:** 2/26/2017
Client Sample ID: 0226-6B **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **120.6**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	<0.0027

Lab ID: 1703012-12A **Collection Date:** 2/26/2017
Client Sample ID: 0226-7B **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.	Method: **N5523**	Air Volume (L): **123**	Analyst: **TSA**
Date Analyzed: 3/6/2017			
	µg/sample	Reporting Limit µg/sample	ppm
Propylene glycol	ND	1.0	<0.0026

Note:

Client: BSI Services and Solutions (West) Inc. **Work Order:** 1703012
Project: GH Bellview- A2

Analytical Results

Lab ID: 1703012-13A **Collection Date:** 2/26/2017
Client Sample ID: 0226-5C **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **126**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0026	

Lab ID: 1703012-14A **Collection Date:** 2/26/2017
Client Sample ID: 0226-6C **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **120.6**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0027	

Lab ID: 1703012-15A **Collection Date:** 2/26/2017
Client Sample ID: 0226-7C **Matrix:** AIR

Analyses

GLYCOLS BY NIOSH 5523 MOD.		Method: **N5523**	Air Volume (L): **123**	Analyst: **TSA**
Date Analyzed: 3/6/2017		Reporting Limit		
	µg/sample	µg/sample	ppm	
Propylene glycol	ND	1.0	<0.0026	

Note:

Client: BSI Services and Solutions (West) Inc.

Work Order: 1703012

Project: GH Bellview- A2

QC BATCH REPORT

Batch ID: **41735** Instrument ID: **GC5** Method: **N5523**

MBLK Sample ID: **MBLK-41735-41735** Units: **µg/sample** Analysis Date: **3/6/2017**

Client ID: Run ID: **GC5_170306A** SeqNo: **1458168** Prep Date: **3/6/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	ND	1.0								

LCS Sample ID: **LCS-41735-41735** Units: **µg/sample** Analysis Date: **3/6/2017**

Client ID: Run ID: **GC5_170306A** SeqNo: **1458169** Prep Date: **3/6/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	17.7	1.0	20.72	0	85.4	70-130	0			

LCSD Sample ID: **LCSD-41735-41735** Units: **µg/sample** Analysis Date: **3/6/2017**

Client ID: Run ID: **GC5_170306A** SeqNo: **1458185** Prep Date: **3/6/2017** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Propylene glycol	18.79	1.0	20.72	0	90.7	70-130	17.7	5.97	20	

The following samples were analyzed in this batch:

1703012-01A	1703012-02A	1703012-03A
1703012-04A	1703012-05A	1703012-06A
1703012-07A	1703012-08A	1703012-09A
1703012-10A	1703012-11A	1703012-12A
1703012-13A	1703012-14A	1703012-15A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Environmental

Date: 08-Mar-17

Client: BSI Services and Solutions (West) Inc.
Project: GH Bellview- A2
WorkOrder: **1703012**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
µg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: **EORM-HILLSBORO** Date/Time Received: **01-Mar-17 10:52**

Work Order: **1703012** Received by: **JNW**

Checklist completed by: Rob Nieman 02-Mar-17 Reviewed by: Rob Nieman 02-Mar-17

eSignature | Date | eSignature | Date

Matrices:

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):			
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Attachment 10: Phase 2 - BSI Field Data Sheets

BSI VOC Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-27-17
Survey Location: GH Capitol Hill	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**
Instrument ID: ppbRAE 3000	Zero Cal Date/Time: 2-27-17	

Sampling Data

Location Description	Baseline 16:15-16:45 throughout & inside	small 16:45-17:15 throughout + inside 7"	small 16:45-17:15 <1"	large 17:25-18:25 7"	large 17:25-18:25 <1"
Reading	0	0	3300	0	5800

Between

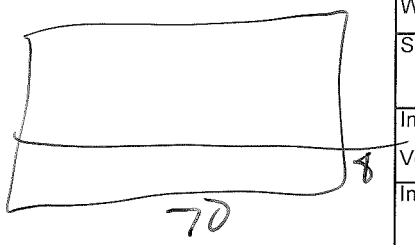
Industrial Hygienist/IH Tech

Print Name	Signature	Date
Michael Peterson		2-27-17

page 1 of 1

BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant Class II A2 BioSafety Hoo	15-1594
	Survey Location: G+H Capitol Mill	Fume Hood Number:
	Instrument Type and Manufacturer: VelociCalc	Date/Time: 2-27-17
	Instrument Model: Velocicalc 9555P	Date Last Calibrated: Serial Number:
Type of Ventilation System (indicate orientation of hood face/slots): B2		

FACE VELOCITY TEST DATA (ft/min):

1A	110	2A	152	3A	128	4A	131	5A		6A	
1B	204	2B	168	3B	165	4B	161	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM	Ave. FPM x Area = Total CFM
5.833 x .667 = 3.89	1217 / 8 = 152.13	x 3.89 = 591.8

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Michael Peterson			2-27-17

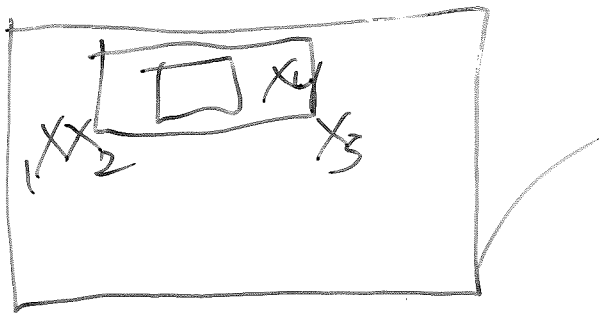
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-27-17
Survey Location: GH - Capitol Hill	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
B2	

SAMPLING DATA:

PUMP ID:	1	2	3	4	
Sample ID:	0227-1	0227-2	0227-3	0227-4	
Collection Media:	XAD7	→	→	→	
Size and Lot Number:	10928	→	→	→	
Flow Rate (L/min):	2.09	2.10	2.07	2.08	
Sampling Time (min):	30	30	30	30	
Sampled Volume (L):	62.7	63.0	62.1	62.4	
Analyte 1	prop. Glycol	→	→	→	
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	16:45	17:15	17:15	17:15	
Start Time:	16:15	16:45	16:45	16:45	
Elapsed Time:	30	30	30	30	

Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson	Date/Time: 2-27-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2.27.17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.09	2.10	2.08	2.10	
Trial 2: (L/min)	2.10	2.11	2.08	2.09	
Trial 3: (L/min)	2.09	2.09	2.09	2.09	
Flow Rate Avg (L/min):	2.09	2.11	2.08	2.09	
Post-Survey Date/Time: 2.27.17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.09	2.09	2.06	2.08	
Trial 2: (L/min)	2.09	2.08	2.05	2.07	
Trial 3: (L/min)	2.09	2.09	2.06	2.07	
Flow Rate Avg (L/min):	2.09	2.09	2.06	2.07	
Pre- and post-cal avg. flow rate (L/min)	2.09	2.10	2.07	2.08	

NOTES:

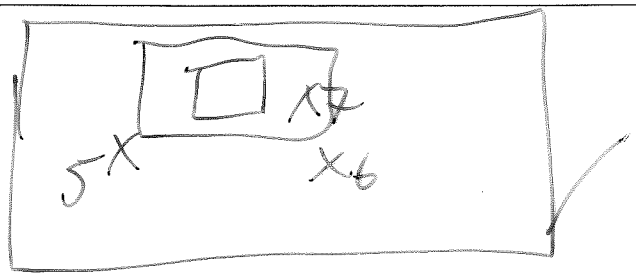
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-27-17
Survey Location: GH - Capitol Hill	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
B2	

SAMPLING DATA:

PUMP ID:	2	3	4		
Sample ID:	0227-5	0227-6	0227-7		
Collection Media:	XAD-7	→	→		
Size and Lot Number:	10928	→	→		
Flow Rate (L/min):	2.09	2.06	2.06		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	125.4	123.6	123.6		
Analyte 1	Cmp.Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	18:25	18:25	18:25		
Start Time:	17:25	17:25	17:25		
Elapsed Time:	60	60	60		

Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson	Date/Time: 2-27-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-27-17	Technician: MP	Temperature: ~	Barometric Pressure: ~		Relative Humidity: ~
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.09	2.06	2.04		
Trial 2: (L/min)	2.08	2.05	2.07		
Trial 3: (L/min)	2.09	2.06	2.07		
Flow Rate Avg (L/min):	2.09	2.06	2.07	/	/
Post-Survey Date/Time: 2-27-17	Technician: MP	Temperature: ~	Barometric Pressure: ~		Relative Humidity: ~
PUMP ID:					
Trial 1: (L/min)	2.09	2.05	2.04		
Trial 2: (L/min)	2.08	2.05	2.05		
Trial 3: (L/min)	2.08	2.06	2.04		
Flow Rate Avg (L/min):	2.08	2.05	2.04		
Pre- and post-cal avg. flow rate (L/min)	2.09	2.06	2.06	/	/

NOTES:

BSI VOC Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-16-17
Survey Location: St. Soseph B2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**
Instrument ID: ppbRAE	Zero Cal Date/Time: 2-16-17	

Sampling Data

Location Description	Baseline 04:10 - 04:40 Walk throughout Room & inside Hood	Small spill 04:40 - 05:10 throughout Room & inside Hood >1" from spill	Small spill 04:40 - 05:10 <1" from spill Between @ 05:10	large spill 05:15 - 06:15 throughout Room & inside Hood @ >1" from spill	large spill 05:15 - 06:15 ~~throughout~~ <1" from spill
Reading	0.0	0	505	0	2450

Industrial Hygienist/IH Tech

Print Name	Signature	Date
Michael Peterson		2-16-17

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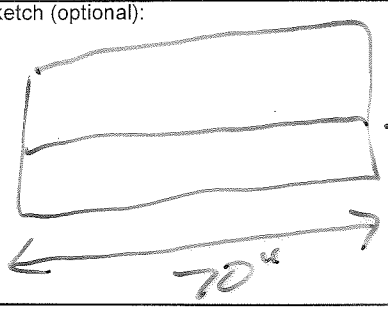
BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant Class II A2 BioSafety Hoo	15-1594
	Survey Location: St. Joseph	Fume Hood Number: B2
	Instrument Type and Manufacturer: VelociCalc	Date/Time:
	Instrument Model: VelociCalc 9555P	Date Last Calibrated: / Serial Number:
Type of Ventilation System (indicate orientation of hood face/slots):		

FACE VELOCITY TEST DATA (ft/min):

1A	81	2A	77	3A	84	4A	101	5A		6A	
1B	135	2B	120	3B	135	4B	158	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM	Ave. FPM x Area = Total CFM
5.833 x .625 = 3.646	921 / 8 = 115.13	____ x 3.646 = 419.7

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Michael Peterson			2-16-17

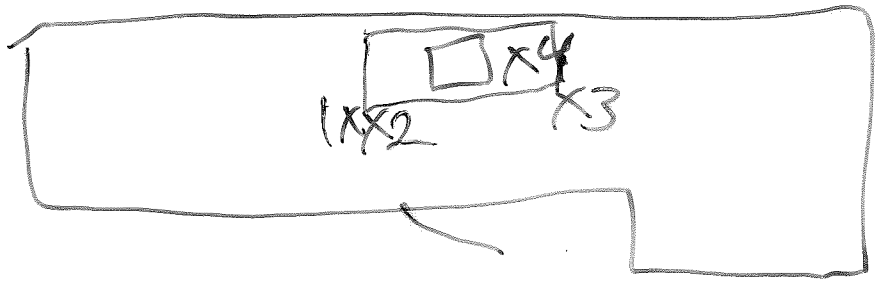
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 2-16-17
Survey Location: St. Joseph	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: B2	Ambient Weather Conditions:

SAMPLING DATA: Baseline Small L Small R Small T

PUMP ID:	1	2	3	4	
Sample ID:	0216-1	0216-2	0216-3	0216-4	
Collection Media:	XAD7	→	→	→	
Size and Lot Number:	10928	→	→	→	
Flow Rate (L/min):	1.97	1.99	2.00	1.97	
Sampling Time (min):	29	29	29	29	
Sampled Volume (L):	57.1	57.7	58.0	57.1	
Analyte 1	Propylene Glycol	→	→	→	
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	04:37	04:37	04:37	04:37	
Start Time:	04:08	05:06	05:06	05:06	
Elapsed Time:	29	29	29	29	
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson M. Peterson				Date/Time: 2-16-17	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-16-17	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	1.98	1.99	2.01	1.97	
Trial 2: (L/min)	1.98	1.98	2.02	1.97	
Trial 3: (L/min)	1.98	2.00	2.01	1.98	
Flow Rate Avg (L/min):	1.98	1.99	2.01	1.97	
Post-Survey Date/Time: 2-16-17	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:					
Trial 1: (L/min)	1.96	1.99	2.00	1.97	
Trial 2: (L/min)	1.96	1.99	1.99	1.98	
Trial 3: (L/min)	1.96	1.99	1.99	1.97	
Flow Rate Avg (L/min):	1.96	1.99	1.99	1.97	
Pre- and post-cal avg. flow rate (L/min)	1.97	1.99	2.00	1.97	

NOTES:

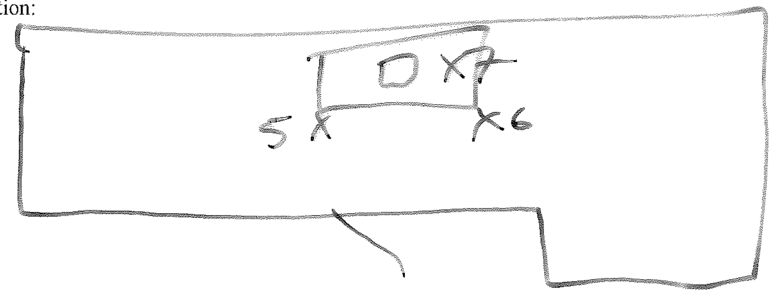
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 2-16-17
Survey Location: St. Joseph	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: B2	Ambient Weather Conditions:

SAMPLING DATA:

PUMP ID:	1	5	4		
Sample ID:	0216-5	0216-6	0216-7		
Collection Media:	XAD7	→	→		
Size and Lot Number:	10928	→	→		
Flow Rate (L/min):	1.96	1.99	1.98		
Sampling Time (min):	59	59	59		
Sampled Volume (L):	115.6	117.4	116.8		
Analyte 1	Prop. Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	06:15	06:15	06:15		
Start Time:	05:16	05:16	05:16		
Elapsed Time:	59	59	59		
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson — Michael Peterson [signature]				Date/Time: 2-16-17	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-16-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	1	5	4		
Trial 1: (L/min)	1.98	1.98	1.97		
Trial 2: (L/min)	1.98	1.98	1.97		
Trial 3: (L/min)	1.96	1.98	1.97		
Flow Rate Avg (L/min):	1.96	1.98	1.97		
Post-Survey Date/Time: 2-16-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	1	5	4		
Trial 1: (L/min)	1.96	1.99	1.96		
Trial 2: (L/min)	1.96	2.00	1.98		
Trial 3: (L/min)	1.96	1.99	1.99		
Flow Rate Avg (L/min):	1.96	1.99	1.98		
Pre- and post-cal avg. flow rate (L/min)	1.96	1.99	1.98		

NOTES:

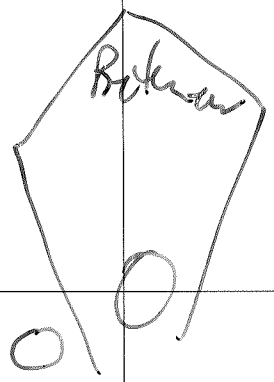
BSI VOC Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-26-17
Survey Location: GH Bellevue	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**
Instrument ID: MiniRAE 3000	Zero Cal Date/Time: 2-26-17	

Sampling Data

Location Description	Baseline 11:13 - 11:43 throughout & inside	Small 11:43 - 12:13 Throughout & inside @ 7"	Small 11:43 - 12:13 Inside @ <1"	Large 12:23 - 13:23 1325 - 1425 1426 - 1526 throughout & inside @ 7"	Large 12:23 - 13:23 1325 - 1425 1426 - 1526 <1"
Reading	0	0	2450	0	3500



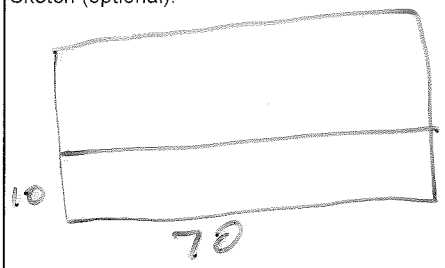
Industrial Hygienist/IH Tech

Print Name	Signature	Date
Michael Peterson		2-26-17

page _____ of _____

BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant Class II A2 BioSafety Hoo	15-1594
	Survey Location: GH - Bellows	Fume Hood Number: A2
	Instrument Type and Manufacturer: VelociCalc	Date/Time:
	Instrument Model:	Date Last Calibrated: / Serial Number:
Type of Ventilation System (indicate orientation of hood face/slots): A2		

FACE VELOCITY TEST DATA (ft/min):

1A	118	2A	102	3A	91	4A	114	5A		6A	
1B	204	2B	142	3B	171	4B	170	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM	Ave. FPM x Area = Total CFM
5.833 x .933 = 4.86	1112 / 8 = 139	____ x 4.86 = 675.5

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:

Conclusion and notes:

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Michael Peterson			2-26-17

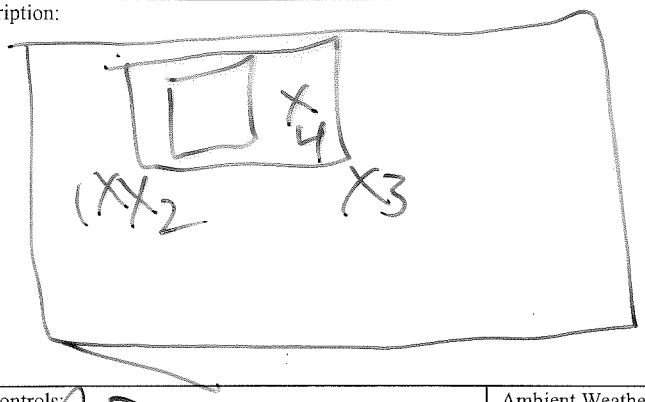
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 2-26-17
Survey Location: GH-Bellevue	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: A2	Ambient Weather Conditions:

SAMPLING DATA: Baseline Small OL Small OR Small I.

PUMP ID:	1	2	3	4	
Sample ID:	0226-1	0226-2	0226-3	0226-4	
Collection Media:	XAD7	→	→	→	
Size and Lot Number:	10928	→	→	→	
Flow Rate (L/min):	2.05	2.07	2.02	2.05	
Sampling Time (min):	30	30	30	30	
Sampled Volume (L):	61.5	62.1	60.6	61.5	
Analyte 1	Prop. Glycol	→	→	→	
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	11:43	12:13	12:13	12:13	
Start Time:	11:13	11:43	11:43	11:43	
Elapsed Time:	30	30	30	30	

Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson	Date/Time: 2-26-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y	Pump Condition: Good	
Pre-Survey Date/Time: 02.26.17	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:

PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.03	2.08	2.03	2.06	
Trial 2: (L/min)	2.04	2.07	2.04	2.07	
Trial 3: (L/min)	2.03	2.09	2.04	2.09	
Flow Rate Avg (L/min):	2.03	2.08	2.04	2.07	

Post-Survey Date/Time: 2.26.17	Technician:	Temperature:	Barometric Pressure:	Relative Humidity:

PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.07	2.05	1.99	2.03	
Trial 2: (L/min)	2.07	2.05	1.99	2.03	
Trial 3: (L/min)	2.07	2.05	1.99	2.03	
Flow Rate Avg (L/min):	2.07	2.05	1.99	2.03	
Pre- and post-cal avg. flow rate (L/min)	2.05	2.07	2.02	2.05	

NOTES:

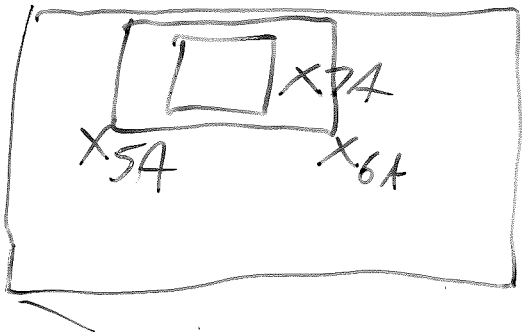
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-26-17
Survey Location: **4H-Bellevue**	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
A2	

SAMPLING DATA:

PUMP ID:	2	3	4		
Sample ID:	0226-5A	0226-6A	0226-7A		
Collection Media:	XAD-7	→	→		
Size and Lot Number:	10928	→	→		
Flow Rate (L/min):	2.05	1.96	2.00		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	123	117.6	120.0		
Analyte 1	Prop. Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

A

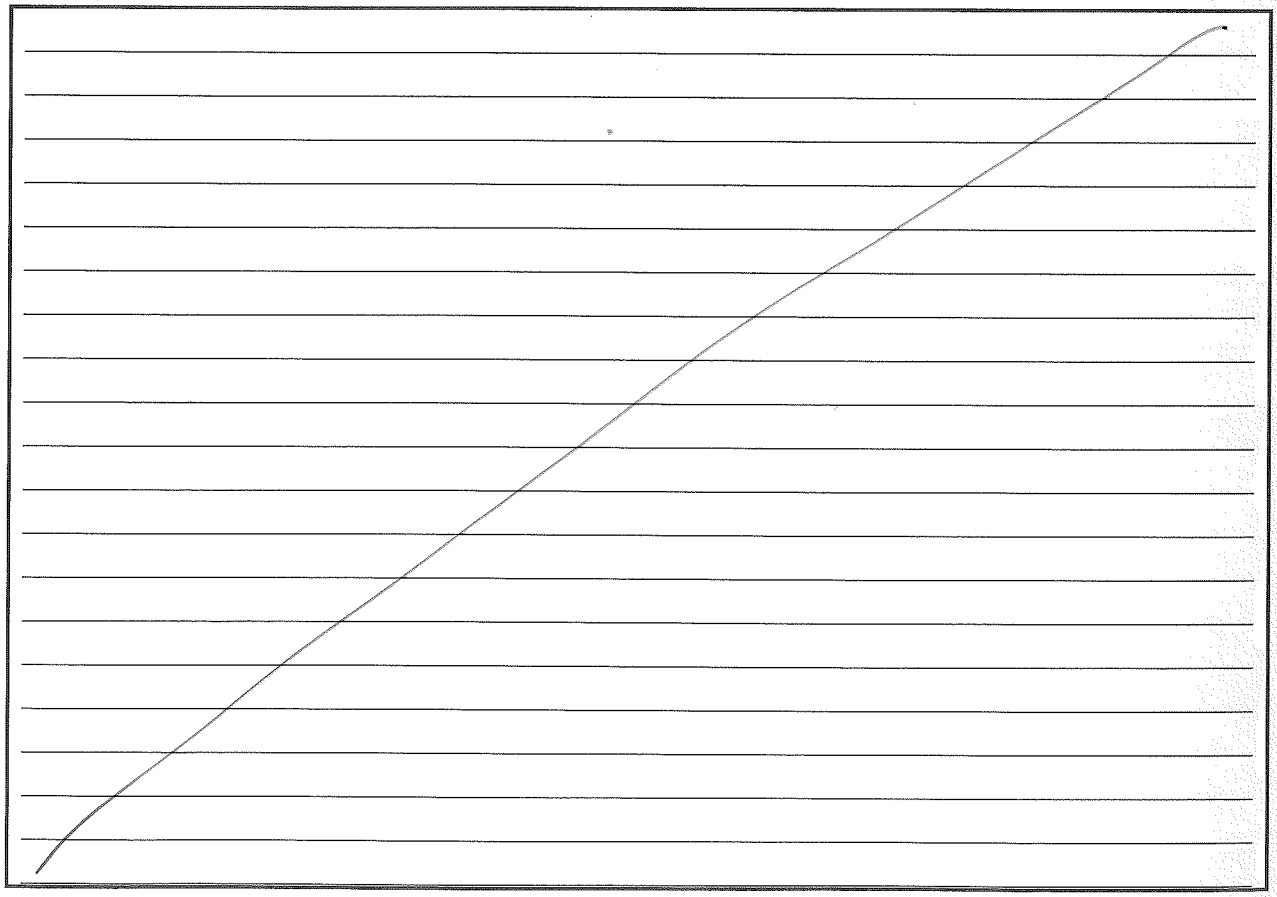
SAMPLING TIME:

Stop Time:	13:23	13:23	13:23		
Start Time:	12:23	12:23	12:23		
Elapsed Time:	60	60	60		
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson				Date/Time: 2-26-17	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-26-17	Technician: [illegible]	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.05	1.99	2.03		
Trial 2: (L/min)	2.05	1.99	2.03		
Trial 3: (L/min)	2.05	1.99	2.03		
Flow Rate Avg (L/min):	2.05	1.99	2.03		
Post-Survey Date/Time: 2-26-17	Technician: [illegible]	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.04	1.93	1.97		
Trial 2: (L/min)	2.04	1.93	1.97		
Trial 3: (L/min)	2.04	1.93	1.97		
Flow Rate Avg (L/min):	2.04	1.92	1.97		
Pre- and post-cal avg. flow rate (L/min)	2.05	1.96	2.00		

NOTES:



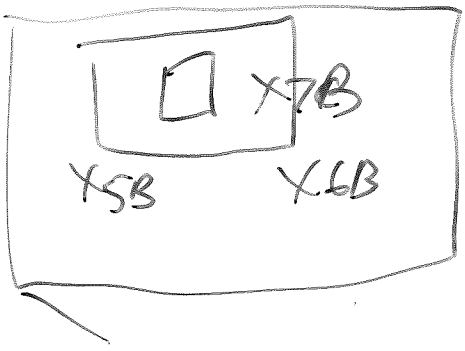
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 2-26-17
Survey Location: GH Bellevue	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: A2	Ambient Weather Conditions:

SAMPLING DATA:

PUMP ID:	2	3	4		
Sample ID:	0226-5B	0226-6B	0226-7B		
Collection Media:	XAD-7	→	→		
Size and Lot Number:	10928	→	→		
Flow Rate (L/min):	2.08	2.01	2.05		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	124.8	120.6	123.0		
Analyte 1	Propylene Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	14:25	14:25	14:25		
Start Time:	13:25	13:25	13:25		
Elapsed Time:	60	60	60		
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson				Date/Time: 2-26-17	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-26-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.07	2.01	2.05		
Trial 2: (L/min)	2.07	2.01	2.06		
Trial 3: (L/min)	2.07	2.00	2.01		
Flow Rate Avg (L/min):	2.07	2.01	2.06		
Post-Survey Date/Time: 2-26-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.09	2.01	2.04		
Trial 2: (L/min)	2.09	2.01	2.04		
Trial 3: (L/min)	2.10	2.01	2.05		
Flow Rate Avg (L/min):	2.09	2.01	2.04		
Pre- and post-cal avg. flow rate (L/min)	2.08	2.01	2.05		

NOTES:

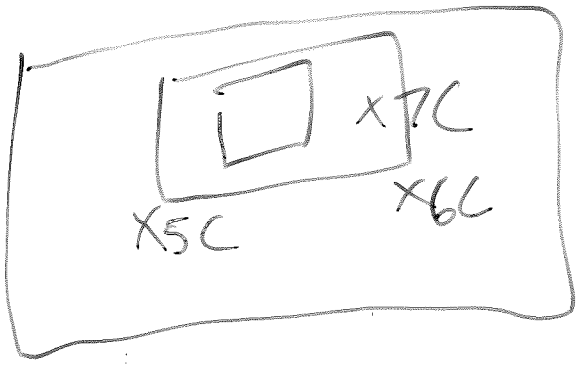
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-26-17
Survey Location: GH Bellevue	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
A2	

SAMPLING DATA:

PUMP ID:	2	3	4		
Sample ID:	0226-5C	0226-6C	0226-7C		
Collection Media:	XAD-7	→	→		
Size and Lot Number:	0028	→	→		
Flow Rate (L/min):	2.10	2.01	2.05		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	126.0	120.6	123.0		
Analyte 1	Propylene Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	1526	1526	1526		
Start Time:	1426	1426	1426		
Elapsed Time:	60	60	60		
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson				Date/Time: 2-26-17	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-26-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.09	2.01	2.04		
Trial 2: (L/min)	2.09	2.02	2.04		
Trial 3: (L/min)	2.10	2.01	2.05		
Flow Rate Avg (L/min):	2.09	2.01	2.04		
Post-Survey Date/Time: 2-26-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.11	2.01	2.04		
Trial 2: (L/min)	2.12	2.01	2.06		
Trial 3: (L/min)	2.10	2.01	2.05		
Flow Rate Avg (L/min):	2.11	2.01	2.05		
Pre- and post-cal avg. flow rate (L/min)	2.10	2.01	2.05		

NOTES:

BSI VOC Data Record

Project Data

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 2-2017
Survey Location: TACOMA Tacoma - A2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**
Instrument ID: PPB RAE 3000	Zero Cal Date/Time:	

Sampling Data

Location Description	Baseline 12:30-1300 throughout Room & inside hood	small spill 13:00-13:30 >1"	small spill 13:00-13:30 <1"	large spill 13:40-14:40 >1" Return	large spill 13:40-1440 <1"
Reading	0	0	~100	0	400

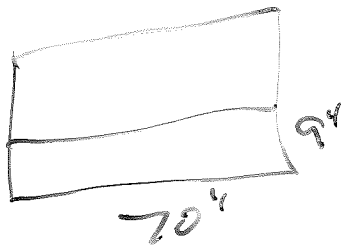
Industrial Hygienist/IH Tech

Print Name Michael Peterson	Signature	Date 2-2017

page _____ of _____

BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:		Job Number:
	WSPA SHIP Grant Class II A2 BioSafety Hoo		15-1594
	Survey Location:		Fume Hood Number:
	Instrument Type and Manufacturer: VelociCalc		Date/Time:
	Instrument Model:	Date Last Calibrated:	Serial Number:
Type of Ventilation System (indicate orientation of hood face/slots):			

FACE VELOCITY TEST DATA (ft/min):

1A	98	2A	94	3A	88	4A	100	5A		6A	
1B	107	2B	120	3B	113	4B	141	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM	Ave. FPM x Area = Total CFM
5.833 x .75 = 4.375	948 / 8 = 118.5	_____ x _____ = 518.44

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Michael Peterson			2-10-17

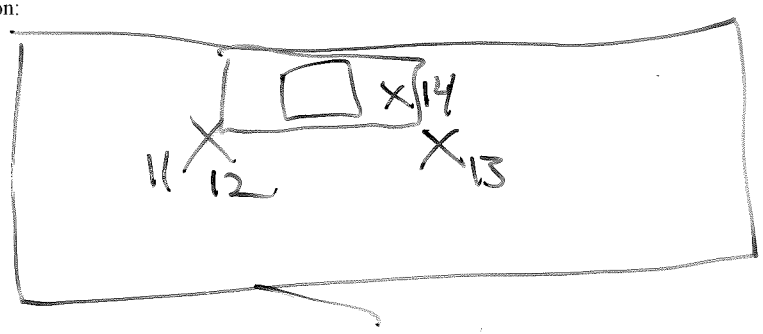
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-20-17
Survey Location: TACOMA (Additional A2)	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:

SAMPLING DATA:

	Boeing	small G	Small R	Small I	
PUMP ID:	1	2	3	4	
Sample ID:	0220-11	0220-12	0220-13	0220-14	
Collection Media:	XAD7	→	→	→	
Size and Lot Number:	10928	→	→	→	
Flow Rate (L/min):	2.02	2.05	2.02	2.01	
Sampling Time (min):	30	30	30	30	
Sampled Volume (L):	60.6	61.5	60.6	60.3	
Analyte 1	Prop. Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

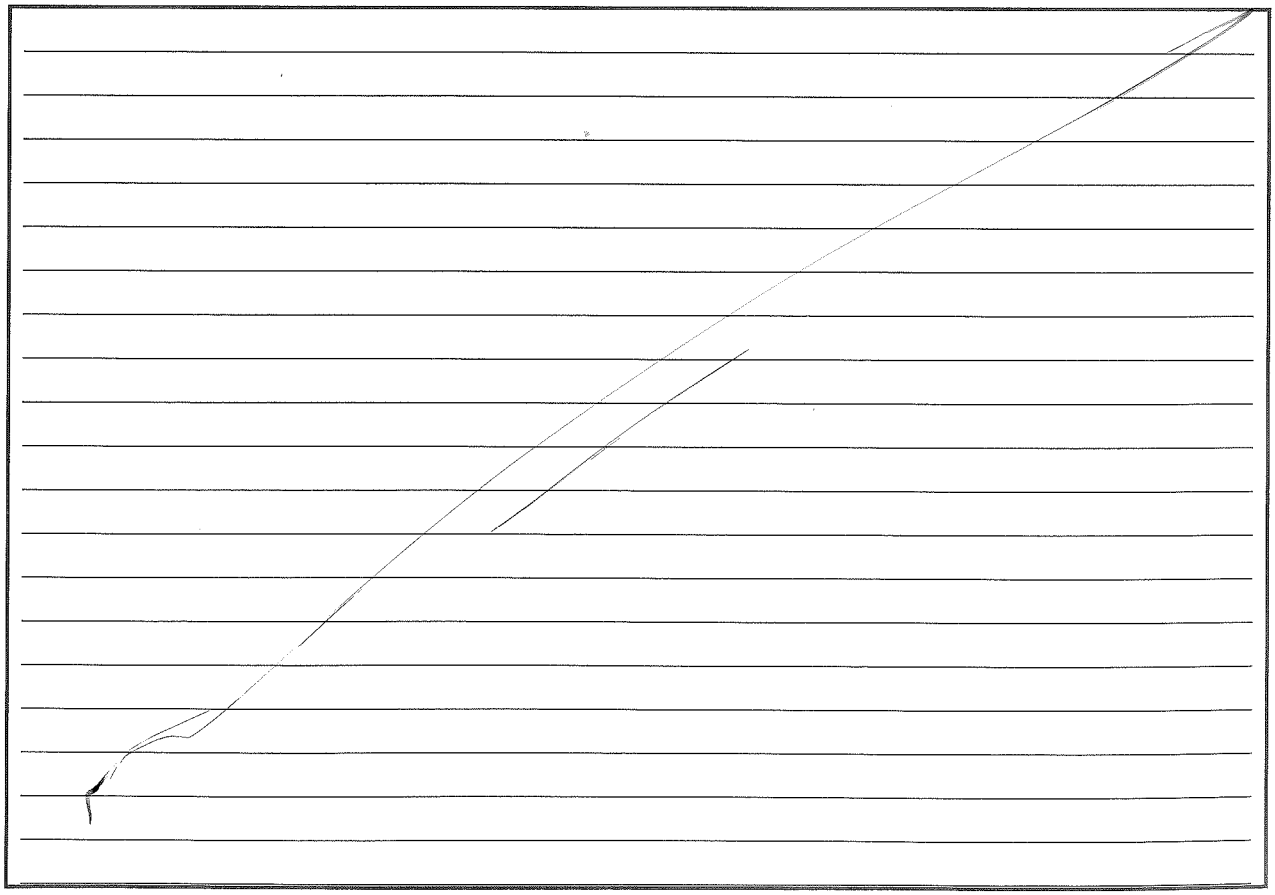
Stop Time:	13:00	13:30	13:30	13:30	
Start Time:	12:30	13:00	13:00	13:00	
Elapsed Time:	30	30	30	30	

Industrial Hygienist/IH Tech (Print & Signature):	Date/Time:
Michael Peterson	2-20-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-20-17	Technician: MP	Temperature: —	Barometric Pressure: —		Relative Humidity: —
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.02	2.02	2.02	2.02	
Trial 2: (L/min)	2.02	2.02	2.02	2.02	
Trial 3: (L/min)	2.02	2.02	2.02	2.02	
Flow Rate Avg (L/min):	2.02	2.02	2.02	2.02	
Post-Survey Date/Time: 2-20-17	Technician: MP	Temperature: —	Barometric Pressure: —		Relative Humidity:
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.02	2.07	2.02	2.06	
Trial 2: (L/min)	2.02	2.07	2.02	2.06	
Trial 3: (L/min)	2.02	2.07	2.02	2.06	
Flow Rate Avg (L/min):	2.02	2.07	2.02	2.00	
Pre- and post-cal avg. flow rate (L/min)	2.02	2.05	2.02	2.01	

NOTES:



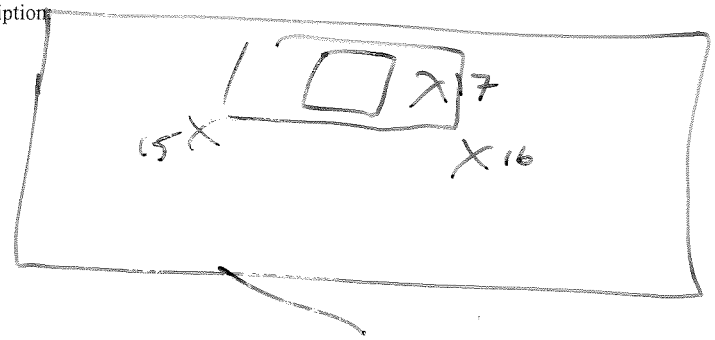
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-[illegible]-17
Survey Location: Access Hygiene A2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
A2	

SAMPLING DATA:

PUMP ID:	2	3	4		
Sample ID:	0220-15	0220-16	0220-17		
Collection Media:	XAD7	→	→		
Size and Lot Number:	10928	→	→		
Flow Rate (L/min):	2.07	2.02	2.00		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	124.2	121.2	120.0		
Analyte 1	Asp. Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	14:40	14:40	14:40		
Start Time:	13:40	13:40	13:40		
Elapsed Time:	60	60	60		

Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson	Date/Time: 2-2017

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-2017	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	2.07	2.02	2.00		
Trial 2: (L/min)	2.07	2.02	2.00		
Trial 3: (L/min)	2.07	2.02	2.00		
Flow Rate Avg (L/min):	2.07	2.02	2.00		
Post-Survey Date/Time: 2-2017	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:					
Trial 1: (L/min)	2.05	2.01	1.99		
Trial 2: (L/min)	2.05	2.02	2.00		
Trial 3: (L/min)	2.05	2.01	2.06		
Flow Rate Avg (L/min):	2.06	2.01	2.00		
Pre- and post-cal avg. flow rate (L/min)	2.07	2.02	2.00		

NOTES:

BSI VOC Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-20-17
Survey Location: Tacoma Guard - B2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**
Instrument ID: PID/FID	Zero Cal Date/Time:	

Sampling Data

Location Description	Baseline 9:36 - 10:06 throughout room in Hood	Small spill 10:07 - 10:37 7 1" from spill	Small spill 10:07 - 10:37 <1" from spill	Large spill 10:47 - 11:47 7 1" Between	Large spill 10:47 - 11:47 <1"
Reading	0	0	500	0-700 no pattern	2450

Industrial Hygienist/IH Tech

Print Name	Signature	Date
Michael Peterson		2-20-17

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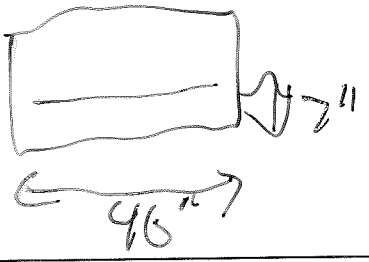
BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant Class II A2 BioSafety Hoo	15-1594
	Survey Location: Teaching General	Fume Hood Number:
	Instrument Type and Manufacturer: VelociCalc	Date/Time:
	Instrument Model:	Date Last Calibrated: / Serial Number:
Type of Ventilation System (indicate orientation of hood face/slots): B2		

FACE VELOCITY TEST DATA (ft/min):

1A	110	2A	108	3A	94	4A		5A		6A	
1B	176	2B	177	3B	164	4B		5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM; Ave. FPM x Area = Total CFM
3.833 x .583 = 2.236	829 / 6 = 138.17 x 2.236 = 308.9

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Michael Peterson			2-2017

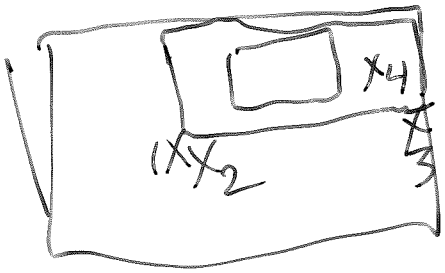
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-20-17
Survey Location: TACOMA General - B2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls:	Ambient Weather Conditions:
B2	—

SAMPLING DATA:

	Baseline	Small L	Small R	Small I	
PUMP ID:	1	2	3	4	
Sample ID:	0220-1	0220-2	0220-3	0220-4	
Collection Media:	XAD7	→	→	→	
Size and Lot Number:	10924	→	→	→	
Flow Rate (L/min):	2.00	2.00	1.99	2.00	
Sampling Time (min):	30	30	30	30	
Sampled Volume (L):					
Analyte 1	Prop. Glycol	→	→	→	
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	10:06	10:37	10:37	10:37	
Start Time:	09:36	10:07	10:07	10:07	
Elapsed Time:	30	30	30	30	
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson				Date/Time:	2-20-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-19-17	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	2.02	2.02	2.02	2.02	
Trial 2: (L/min)	2.02	2.02	2.02	2.02	
Trial 3: (L/min)	2.02	2.02	2.02	2.02	
Flow Rate Avg (L/min):	2.02	2.02	2.02	2.02	
Post-Survey Date/Time: 2-20-17	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	1	2	3	4	
Trial 1: (L/min)	1.98	1.98	1.96	1.97	
Trial 2: (L/min)	1.98	1.98	1.96	1.97	
Trial 3: (L/min)	1.98	1.98	1.96	1.97	
Flow Rate Avg (L/min):	1.98	1.98	1.96	1.97	
Pre- and post-cal avg. flow rate (L/min)	2.00	2.00	1.99	2.00	

NOTES:

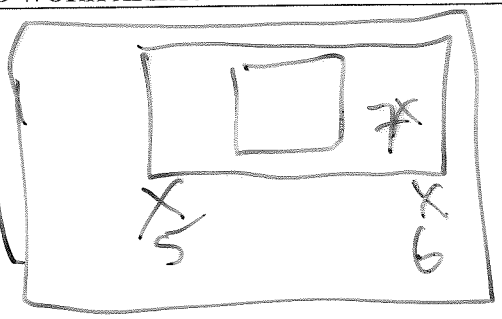
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-20-17
Survey Location: TACOMA General - B2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: B2	Ambient Weather Conditions:

SAMPLING DATA:

	L	R	I		
PUMP ID:	2	3	4		
Sample ID:	0220-5	0220-6	0220-7		
Collection Media:	XAD7	→	→		
Size and Lot Number:	10024	→	→		
Flow Rate (L/min):	1.98	1.95	1.96		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	118.8	117.0	117.6		
Analyte 1	Prop. Glycol	→	→		
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	11:47	11:47	11:47		
Start Time:	10:47	10:47	10:47		
Elapsed Time:	60	60	60		

Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson	Date/Time: 2-20-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-20-17	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	1.98	1.96	1.97		
Trial 2: (L/min)	1.98	1.96	1.97		
Trial 3: (L/min)	1.98	1.96	1.97		
Flow Rate Avg (L/min):	1.98	1.96	1.97		
Post-Survey Date/Time: 2-20-17	Technician: MP	Temperature:		Barometric Pressure:	Relative Humidity:
PUMP ID:	2	3	4		
Trial 1: (L/min)	1.97	1.93	1.94		
Trial 2: (L/min)	1.97	1.93	1.94		
Trial 3: (L/min)	1.97	1.93	1.94		
Flow Rate Avg (L/min):	1.97	1.93	1.94		
Pre- and post-cal avg. flow rate (L/min)	1.98	1.95	1.96		

NOTES:

BSI VOC Data Record

Project Data

Project Name/Description:	Client:	Date/Time:
WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	**Washington State Pharmacy Association**	2-15-17
Survey Location: Highline	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**
Instrument ID: ppb RAE 3000	Zero Cal Date/Time: 2-15-17	

Sampling Data

Location Description	Baseline 14:20 - 14:50 walk throughout Room & inside Hood	Small spill 14:50 - 15:20 throughout Room (including upto 1" from spill)	Small spill 14:50 - 15:20 <1" from spill	Large spill 15:30 - 16:30 throughout Room & inside Hood (>1" from spill)	Large spill 15:30 - 16:30 <1" from spill
Reading FPB	0	0	1450	0	5,000

Between @ 15:30

Industrial Hygienist/IH Tech

Print Name	Signature	Date
Michael Peterson		2-15-17

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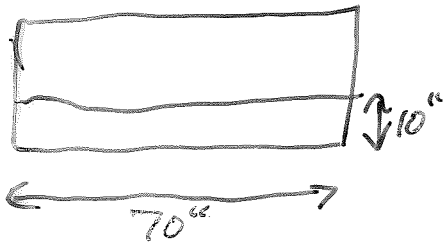
BSI Ventilation System Survey

PROJECT AND INSTRUMENT DATA:

Sketch (optional):	Project Name/Description:	Job Number:
	WSPA SHIP Grant Class II A2 BioSafety Hoo	15-1594
	Survey Location: Highline	Fume Hood Number: A2
	Instrument Type and Manufacturer: VelociCalc	Date/Time: 2-15-17
	Instrument Model: Velocical 9535-P	Date Last Calibrated: / Serial Number:
Type of Ventilation System (indicate orientation of hood face/slots): A2		

FACE VELOCITY TEST DATA (ft/min):

1A	101	2A	97	3A	97	4A	89	5A		6A	
1B	250	2B	205	3B	175	4B	188	5B		6B	
1C		2C		3C		4C		5C		6C	
1D		2D		3D		4D		5D		6D	

FUME HOOD DATA AND NOTES:

Dimensions: Length x Width = Area	Calculation: Total FPM / No. Readings = Ave. FPM; Ave. FPM x Area = Total CFM
70 x 10 = 700	1202 / 8 = 150.25 x 4.86 = 730.2

Type of Service (circle one): Air Gases Vacuum Water		Chemical Fume Hood? (circle one): Yes No
Manometer Used? (circle one): Yes No	Manometer Reading (inches of water):	Radioisotope Hood? (circle one): Yes No
Thermometer Used? (circle one): Yes No	Thermometer Reading (fahrenheit):	Carcinogen Hood? (circle one): Yes No
Wet Production Chemistry:		Gas Cabinet? (circle one): Yes No
		Responsible Supervisor: Extension:
Conclusion and notes:		

Industrial Hygienist/IH Technician (print):	Employee Number:	Signature:	Date:
Michael Peterson			2-15-17

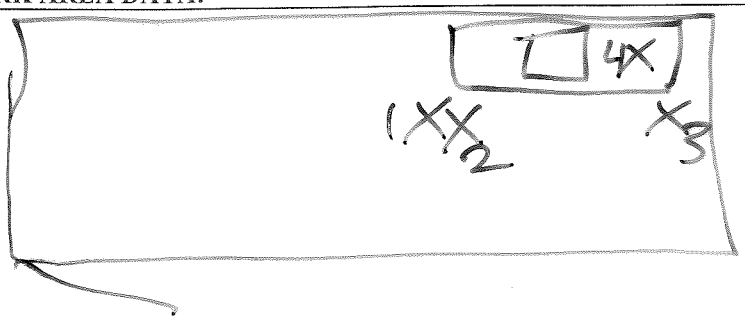
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: **WSPA SHIP Grant Class II A2 BioSafety Hood Sampling**	Client: **Washington State Pharmacy Association**	Date/Time: 2-15-17
Survey Location: Highline A2	Job Number: **15-1594 Task 3**	Project Manager: **Russ S.**

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: A2	Ambient Weather Conditions:

SAMPLING DATA:

BASELINE SMALL L SMALL R SMALL I

PUMP ID:	1	2	3	4	5
Sample ID:	0215-1	0215-2	0215-3	0215-4	
Collection Media:	XAD7				
Size and Lot Number:	10928				
Flow Rate (L/min):	1.99	2.02	2.00	1.98	
Sampling Time (min):	30	30	30	30	
Sampled Volume (L):	59.7	60.6	60.0	59.4	
Analyte 1	Prop. Glyc.				
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	14:51	14:51	14:51	14:51	
Start Time:	14:21	15:21	15:21	15:21	
Elapsed Time:	30	30	30	30	
Industrial Hygienist/IH Tech (Print & Signature) Michael Peterson M. Peterson				Date/Time:	2-15-17

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 02/13/17	Technician: BE	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	1	2	3	4	5
Trial 1: (L/min)	2.003	2.010	2.004	2.010	2.016
Trial 2: (L/min)	2.001	2.016	1.994	2.006	2.010
Trial 3: (L/min)	2.004	2.016	2.004	2.001	2.016
Flow Rate Avg (L/min):	2.003	2.014	2.003	2.006	2.014
~~Post-Survey~~ Date/Time: 2-15-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:
PUMP ID:	1				
Trial 1: (L/min)	1.98	2.03	1.99	1.95	
Trial 2: (L/min)	1.98	2.02	1.99	1.95	
Trial 3: (L/min)	1.98	2.02	1.99	1.95	
Flow Rate Avg (L/min):	1.98	2.02	1.99	1.95	
Pre- and post-cal avg. flow rate (L/min)	1.99	2.02	2.00	1.98	

NOTES:

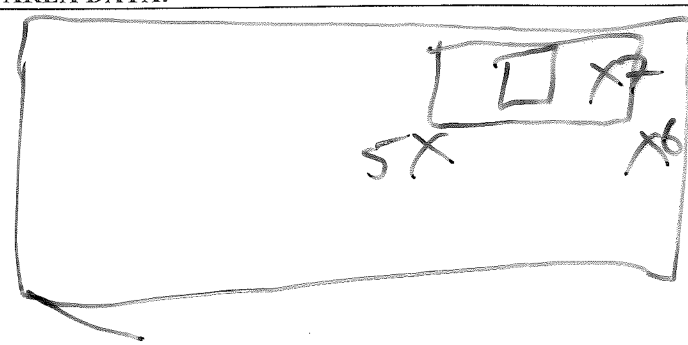
BSI AREA AIR SAMPLING DATA RECORD

PROJECT DATA:

Project Name/Description: WSPA SHIP Grant Class II A2 BioSafety Hood Sampling	Client: Washington State Pharmacy Association	Date/Time: 2-15-17
Survey Location: Highline A2	Job Number: 15-1594 Task 3	Project Manager: Russ S.

EMPLOYEE AND WORK AREA DATA:

Location description:



Engineering Controls: A2	Ambient Weather Conditions:

SAMPLING DATA:

	Large L	Large R	Large I		
PUMP ID:	1	5	4		
Sample ID:	0215-5	0215-6	0215-7		
Collection Media:	XAD 7	→	→		
Size and Lot Number:	18928	→	→		
Flow Rate (L/min):	1.96	2.00	1.93		
Sampling Time (min):	60	60	60		
Sampled Volume (L):	117.6	120.0	115.8		
Analyte 1					
Analyte 2					
Analyte 3					
Analyte 4					
Analyte 5					

SAMPLING TIME:

Stop Time:	14:31	14:31	14:31		
Start Time:	15:31	15:31	1531		
Elapsed Time:	60	60	60		
Industrial Hygienist/IH Tech (Print & Signature): Michael Peterson — Mike Peterson [signature]				Date/Time: 21517	

CALIBRATION RECORD:

Pump Manufacturer and Serial Number: GilAir 5		Primary Standard: Y		Pump Condition: Good	
Pre-Survey Date/Time: 2-15-17	Technician: MP	Temperature:	Barometric Pressure:		Relative Humidity:

PUMP ID:	1	5	4		
Trial 1: (L/min)	1.98	2.02	1.95		
Trial 2: (L/min)	1.98	2.02	1.95		
Trial 3: (L/min)	1.98	2.02	1.95		
Flow Rate Avg (L/min):	1.98	2.02	1.95		

Post-Survey Date/Time: 2-15-17	Technician: MP	Temperature:	Barometric Pressure:	Relative Humidity:

PUMP ID:	1	5	4		
Trial 1: (L/min)	1.94	1.98	1.91		
Trial 2: (L/min)	1.94	1.98	1.91		
Trial 3: (L/min)	1.94	1.98	1.91		
Flow Rate Avg (L/min):	1.94	1.98	1.91		

Pre- and post-cal avg. flow rate (L/min)	1.96	2.00	1.93		

NOTES:

Attachment 11: Phase 2 - Equipment Specifications Sheets and Calibration Records

RAE SYSTEMS by Honeywell

ppbRAE 3000

Portable Handheld VOC Monitor

The compact ppbRAE 3000 is a comprehensive VOC gas monitor and datalogger for hazardous environments. The ppbRAE 3000 is the most advanced handheld VOC monitor available for parts-per-billion detection. This third-generation patented PID device monitors VOCs using a photoionization detector with a 9.8 eV, 10.6 eV UV-discharge lamp.

The built-in wireless modem allows real-time data connectivity with the ProRAE Guardian command center located up to two miles/3 km away (with optional RAELink3 portable modem) from the ppbRAE 3000 detector.

- **Accurate VOC measurement in all operating conditions**
- **Easy access to lamp and sensor in seconds without tools**
- **Patented sensor and lamp auto-cleaning reduces maintenance**
- **Monitors real-time readings and location of people**
- **Low Cost of Ownership: 3-year 10.6 eV lamp Warranty**

KEY FEATURES

Proven PID Technology

- 3-second response time
- Extended range from 1 ppb to 10,000 ppm with best in class linearity
- Humidity compensation with integral humidity and temperature sensors

Integrated

- Real-time wireless data transmission through built-in Bluetooth & RAElink3 link
- Integrated Correction Factors list of 220 compounds—more than any other PID
- Includes flashlight for dark conditions
- Large graphic display presents gas type, Correction Factor and concentration

Durable

- Easy access to battery, lamp and sensor in seconds without tools
- Rugged housing withstands use in harsh environments
- IP-67 waterproof design for easy cleaning and decontamination

APPLICATIONS

- Oil & Gas
- HazMat
- Industrial Safety
- Civil Defense
- Environmental & Indoor Air Quality

Workers can easily measure VOCs and wirelessly transmit readings up to two miles/3 km away.

Wireless | AutoRAE Compatible | ISO 9001 CERTIFIED | ATEX | CSA US | IECEx

ppbRAE 3000

Portable Handheld VOC Monitor

Specifications

Detector Specifications

Size	10" L x 3.0" W x 2.5" H (25.5 cm x 7.6 cm x 6.4 cm)
Weight	26 oz (738 g)
Sensors	Photoionization sensor with standard 10.6 eV or optional 9.8 eV lamp
Battery	• Rechargeable, external field-replaceable Lithium-Ion battery pack • Alkaline battery adapter
Operating Hours	16 hours of operation (12 hours with alkaline battery)
Display Graphic	4 lines, 28 x 43 mm, with LED backlight for enhanced display readability
Keypad	1 operation and 2 programming keys, 1 flashlight on/off
Direct Readout	Instantaneous reading • VOCs as ppm by volume or mg/m^3 (3 in upper case for cubic) • STEL, TWA and PEAK • Battery and shutdown voltage • Date, time, temperature
Alarms	95 dB (at 12"/30 cm) buzzer and flashing red LED to indicate exceeded preset limits • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms latching with manual override or automatic reset • Additional alarm for low battery and pump stall
EMI/RFI	Highly resistant to EMI/RFI Compliant with EMC Directive 89/336/EEC
IP Rating	• IP-67 unit off and without flexible probe • IP-65 unit running
Datalogging	Standard 6 months at one-minute intervals
Calibration	Two-point or three-point calibration for zero and span Calibration memory for 8 calibration gases
Sampling Pump	• Internal, integrated flow rate at 500 cc/mn • Sample from 100' (30m) horizontally and vertically
Low Flow Alarm	• Auto pump shutoff at low-flow condition
Communication	• Download data and upload instrument set-up from PC through charging cradle or optional Bluetooth™ • Wireless data transmission through built-in RF modem
Wireless Network	ProRAE Guardian Real-Time Wireless Safety System
Wireless Frequency	ISM license-free bands
Wireless Range (Typical)	ppbRAE 3000 to RAELink3 or RAELink3 Z1 modems ~ 33 feet (10 meters)
Hazard Area Approval	• US and Canada: UL, cUL, Classified as Intrinsically Safe for use in Class I, Division 1 Groups A, B, C, D • Europe: ATEX Ex II 2GEx ia IIC/IIB T4 • IECEx: Ex ia IIC/IIB T4
Temperature	-4° to 113° F (-20° to 50° C)
Humidity	0% to 95% relative humidity (non-condensing)
Attachments	Durable black rubber boot with straps
Warranty	3-year warranty for 10.6 eV lamp, 1 year for pump, battery, and instrument

Specifications are subject to change

Sensor Specifications

Gas Monitor	Range	Resolution	Response Time T90
VOCs	0 to 9999 ppb	1 ppb	< 3 s
	10 to 99 ppm	0.01 ppm	< 3 s
	100 to 99 ppm	0.1 ppm	< 3 s
	1000 to 9999 ppm	1 ppm	< 3 s

Monitor only includes:

- ppbRAE 3000 Monitor, with RAE Systems UV lamp, as specified
- Datalogging with ProRAE Studio II
- Charging/download adapter
- VOC Zeroing Tubes (1 box)
- Tube adapter
- Tedlar® bag for calibration
- Flex-I-Probe™
- External filter
- Rubber boot with straps
- Alkaline battery adapter
- Lamp-cleaning and tool kit
- Operation CDROM
- Operation & Maintenance manual
- Soft leather case

Monitor with accessories kit adds:

- Hard transport case with pre-cut foam padding
- Charging/download cradle
- 5 Porous metal filters and O-rings
- Organic vapor zeroing kit
- Gas outlet port adapter and tubing

Optional calibration kit adds:

- 10 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance service

CORPORATE HEADQUARTERS

RAE Systems by Honeywell
3775 North First Street
San Jose, CA 95134 USA
raesales@raesystems.com

WORLDWIDE SALES OFFICES

USA/Canada 1.877.723.2878
Europe +45.86.52.51.55
Middle East +00971.4.440.5949
China +86.10.5885.8788-3000
Asia Pacific +852.2669.0828

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 14628
Description TSI 9555P VelociCalc
Calibrated 12/12/2016

Manufacturer TSI
Model Number 9555P
Serial Number 9555P0913013
Location New Jersey
Temp 68

Classification
Status pass
Frequency Yearly EOM
Department Lab
Humidity 25

Calibration Specifications

Group # 1
Group Name Barometric Pressure
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 2.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
30.00 / 29.74	inHg	29.74	inHg	29.70	29.74	0.00%	Pass

Group # 2
Group Name Differential Pressure
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 1.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
-4.00 / -4.00	inH2O	-4.00	inH2O	-4.03	-4.03	0.75%	Pass
4.00 / 4.00	inH2O	4.00	inH2O	4.03	4.03	0.75%	Pass
8.00 / 8.00	inH2O	8.00	inH2O	8.07	8.07	0.88%	Pass
12.00 / 12.00	inH2O	12.00	inH2O	12.08	12.08	0.67%	Pass

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
DWYER 477AV-1	Dwyer 477AV-1 Digital Manometer	Dwyer	005PM2	8/1/2016	8/1/2017
FLUKE 114	Fluke 114 NIST Traceable Multimeter	Fluke	15310288	5/6/2016	5/6/2017
OMEGA HX93AC/DP25-E	Omega HX93AC/DP25-E	Omega Engineering	1010368 035025 035026	9/15/2016	9/15/2018

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 27805
Description TSI 964 Probe
Calibrated 12/1/2016

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufactnrer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
FLUKE 114	Fluke 114 NIST Traceable Multimeter	Fluke	15310288	5/6/2016	5/6/2017
MICHELL DM-509-TX-01	Relative Humidity Meter	Michell	273296	8/22/2016	8/22/2017
OMEGA HX93AC/DP25-E	Omega HX93AC/DP25-E	Omega Engineering	1010368 035025 035026	9/15/2016	9/15/2018
OMEGA PX02K1-16A5T /DP25-E-A	Omega PX02K1-16A5T/DP25-E-A	Omega Engineering	168377/8375030	9/15/2016	9/15/2018
OMEGA WT4401-D	Omega WT4401-D	Omega Engineering	101105	9/15/2016	9/15/2018

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 27805
Description TSI 964 Probe
Calibrated 12/1/2016

Manufacturer TSI
Model Number 964
Serial Number P09200027
Location New Jersey
Temp 74

Classification
Status pass
Frequency Yearly EOM
Department Lab
Humidity 29

Calibration Specifications

Group # 1
Group Name Relative Humidity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
30.00 / 29.20	%	29.20	%	31.90	29.20	0.00%	Pass

Group # 2
Group Name Temperature
Stated Accy Plus / Minus
Range Acc % 0.0000
Reading Acc % 0.0000
Plus/Minus 0.50

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
70.00 / 74.30	°F	74.30	°F	74.00	74.30	0.00%	Pass

Group # 3
Group Name Velocity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
0.00 / 0.00	ft/min	0.00	ft/min	0.00	0.00	0.00%	Pass
40.00 / 40.00	ft/min	40.00	ft/min	40.00	40.00	0.00%	Pass
70.00 / 70.00	ft/min	70.00	ft/min	70.00	70.00	0.00%	Pass
100.00 / 100.00	ft/min	100.00	ft/min	101.00	101.00	1.00%	Pass
150.00 / 150.00	ft/min	150.00	ft/min	150.00	150.00	0.00%	Pass
325.00 / 325.00	ft/min	325.00	ft/min	320.00	320.00	-1.54%	Pass
700.00 / 700.00	ft/min	700.00	ft/min	680.00	680.00	-2.86%	Pass
1000.00 / 1000.00	ft/min	1000.00	ft/min	990.00	990.00	-1.00%	Pass
1500.00 / 1500.00	ft/min	1500.00	ft/min	1,460.00	1,460.00	-2.67%	Pass
2000.00 / 2000.00	ft/min	2000.00	ft/min	1,950.00	1,950.00	-2.50%	Pass
5000.00 / 5000.00	ft/min	5000.00	ft/min	4,850.00	4,850.00	-3.00%	Pass
8000.00 / 8000.00	ft/min	8000.00	ft/min	7,780.00	7,780.00	-2.75%	Pass

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.

92 North Main St, Building 20
Windsor, NJ 08561
Toll-free: (800) 301-9663

Pine Environmental Services, Inc.

Instrument ID 14628
Description Tsi 9555 VelociCalc
Calibrated 12/29/2016 10:48:35AM

Manufacturer Tsi
Model Number 9555-P
Serial Number/ Lot Number 9555P0913013
Location New Jersey
Department

State Certified
Status Pass
Temp °C 23.1
Humidity % 27

Calibration Specifications

Group # 1
Group Name Functional Test
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dave German

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services, LLC. of any defect within 24 hours of receipt of equipment
Please call 866-960-7463 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
12524 130th Lane NE Unit A 114
Kirkland WA 98034
Toll Free: 800-242-3910

Pine Environmental Services, Inc.

Instrument ID 22868
Description ppb Rae 3000

Manufacturer Rae Systems
Model Number PGM-7340
Serial Number/ Lot Number 594-90815
Location Seattle
Department

State Certified
Status Pass
Temp °C 21.39
Humidity % 27.96

Calibration Specifications

Group # 1
Group Name VOC
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.000 / 100.000	PPM	100.000	PPM	99.760	99.760	-0.24%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA 100PPM ISO	SEA ISOBUTYLENE 100PPM	Porta Gas	ISOBUTYLENE	CAQ-248-100-7		3/15/2020

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Andrew Bowers

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

Attachment 12: Photos

Photo 1: Simulated large spill condition during Phase 1

Photo 2: Typical air sampling set-up during compounding (Phase 1)

Photo 3: Typical air sampling set-up during a spill condition (Phase 1/Phase 2)

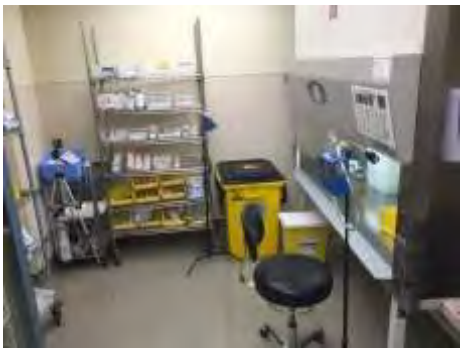


Photo 4: Typical air sampling set-up during a spill condition (Phase 1/Phase 2)

Photo 5: Simulated minor spill condition during Phase 2

Photo 6: Simulated large spill condition during Phase 2

Photo 7: Spill materials deposited in sealed waste bags during sampling event

Photo 8: Integrated airflow monitoring device on BSC cabinet

Photo 9: Integrated airflow monitoring device on BSC cabinet

Photo 10: Use of CSTD for compounding during Phase 1 sampling event (Group Health – Bellevue)

Photo 11: Use of CSTD for compounding during Phase 1 sampling event (CHI - Highline)

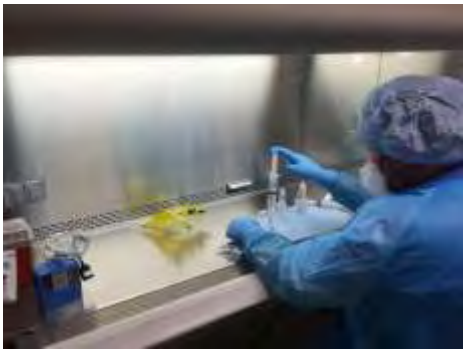


Photo 12: Use of CSTD during Phase 1 sampling event (MultiCare Health: Tacoma General). Waste bags in background.

Photo 13: Compounding room at CHI Franciscan Health - Highline Cancer Center

Photo 14: Entrance to compounding room at CHI Franciscan Health - St. Joseph Medical Center

Photo 15: Class II A2 BSC compounding room at MultiCare Health System - Tacoma General Hospital