

<b>BROOKHAVEN NATIONAL LABORATORY</b> Safety & Health Services Division	NUMBER <b>IH60100</b>
	REVISION <b>Final Rev0</b>
<b>INDUSTRIAL HYGIENE GROUP</b> Standard Operating Procedure	DATE <b>02/01/06</b>
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SUBJECT: <b>Site Level IH Exposure Monitoring Plan &amp; Sampling Strategy</b>	

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Exposure Ranking Category		
Exposure Level	Frequency of Monitoring	
A	Worker exposure exceeds OEL on the Task	All workers in SEU during each pass until PPE requirements characterized, then all workers quarterly
B	Area exposure near exceeds OEL, but worker exposure is <math>\pm</math> TWA6 based on data above in SEU	20% of workers in SEU, Quarterly
C	Area/worker exposure is <math>\pm</math> 10% of OEL to OEL level	10% of workers once per year
D	Area/worker exposure is non-detected to <math>\pm</math> 10% of OEL	1 representative sample per year for 3 years, then one sample per 3 year cycle
U	Unknown area/personal exposure	Sample on next operation(s) until characterized as A-D

### 1.0 Purpose & Scope

This document describes the SHSD Industrial Hygiene Group (IHG) site level exposure monitoring plan and risk ranking strategy. It provides a uniform mechanism for:

- Listing hazardous operations that need exposure monitoring,
- Ranking the hazards so that the highest risks are addressed first,
- Establishing a schedule of when monitoring will occur with the available personnel resources, and
- Converting estimated risk for un-measured operations into the proper periodic monitoring schedule once data is obtained on an operation.

The goal of the procedure is to provide a mechanism for targeting high risk operations and tasks and allocating the available IH expertise resources to conduct personnel exposure monitoring.

### 2.0 Responsibilities

- 2.1 **Program Administration:** This procedure is administered through the SHSD Industrial Hygiene Group.

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2.2 Members of the SHSD Industrial Hygiene Group and other BNL organizations that provide field monitoring services are required to follow this procedure.

### **3.0 Definitions**

**“IH Monitoring Scheduler” database:** A single, unified *Microsoft Access*® database that:

- compiles all industrial hygiene hazard inventories,
- ranks the risk of operations or risk to worker exposure groups, and
- establishes the “who and when” of sampling.

This database is modified once a previously un-measured operation is monitored to appropriately change the risk rating (if necessary), establish the monitoring frequency, and set the schedule for monitoring.

**Similar Exposure Group (SEG):** A group of individuals with a pattern of exposure that is nearly identical. These workers perform the same tasks in relationship to the inclusion in the SEG. These workers are grouped together for the purpose of inclusion in an exposure control program. Monitoring on one individual within an SEG is representative of the exposure expected for any member of the group.

**4.0 Prerequisites** None. See qualification in Section 7.

### **5.0 Precautions**

**Personal Protective Equipment:** The use of personal protective equipment to protect personnel when preparing exposure assessment reports is not typically required. This SOP involves computer data entry only which should be done at appropriately designed workstations.

### **6.0 Procedure**

**Equipment:** Typical file supplies (including: computers and electronic media).

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### **Exposure Assessment Sampling Strategy:**

- 6.1 Compile a list of hazards in each organization that need exposure monitoring. The list includes
- a.) hazardous areas (such as areas with noise suspected to be above 85dBA),
  - b.) hazardous operations (such as handling chemicals without engineering controls), or
  - c.) grouping of tasks (such as asbestos abatement work).
- 6.2 Enter the information on hazards for an organization into the SHSD *IH Monitoring Scheduler* database. The primary IH hazards covered in this database are: Asbestos, Beryllium Biohazards, Chemicals, Lead, Noise, Non-ionizing radiation, and Static Magnetic Fields, and Welding.
- Some IH hazards that are more reactionary than proactively conducted, especially Indoor Air Quality investigations and confined space pre-entry testing, are not scheduled using this procedure.
  - Some IH hazards, especially Ergonomic evaluations, are initiated by reactive or proactive mechanisms and may be included optionally in the IH Scheduler Database to account for IH Expertise sampling time, but the IH Scheduler is not the primary tool for these hazards.
  - Some field measuring work, especially exhaust ventilation testing, is done based on requests from line organizations that is dependent on operations and are not scheduled via this procedure.
  - Other time spent by SHSD Field Deployed Personnel, such as Hazard Recognition during Tier 1 Inspections, other consulting, and program management is not tracked in the IH Monitoring Scheduler database.
- 6.3 **Estimate Personnel Exposure for entry into the *IH Monitoring Scheduler* database:**
- If data exists from previous monitoring of the operator or a very similar operation, that data is to be used as the basis for the risk ranking and entered in to the database.
  - For operations not previously monitored- estimate the potential personnel exposure breathing zone (or whole body exposure for noise and NIR).
  - Once an operation has been monitored, that data is to be used as the basis for the risk ranking and entered in to the database to replace an estimate.

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6.4 Rank the risk of the operation from A to D or U using the following ranking system:  
**Table 6.3**

Rank	Estimated or Known Exposure (without regards to PPE used)	Frequency of Monitoring
<b>A</b>	Worker exposure exceeds OEL on 8hr TWA	All workers in Similar Exposure Group (SEG) during each job until PPE requirements characterized, then all workers quarterly
<b>B</b>	Area exposure level exceeds OEL, but worker exposure is < TWA-8 based on duration in area	25% of workers in SEG, Quarterly
<b>C</b>	Area/worker exposure is >10% of OEL to OEL level	10% of workers once per year
<b>D</b>	Area/worker exposure is Non-detected to <10% of OEL	1 representative sample per year for 3 years, then one sample per 3 year cycle
<b>U</b>	Unknown: Too little is known of the operation to estimate potential exposure	Sample on next operation(s) until characterized as A-D

- 6.5 Enter the date when sampling is planned, the person (or organization) who will do the monitoring, and the anticipated hours to complete monitoring and reporting.
- 6.6 Whenever feasible, address monitoring of the highest risk operations first (i.e. ranking of A and U).
- 6.7 Incorporate any special emphasis on particular IH hazards identified in the BNL Annual *BNL Industrial Hygiene Exposure Monitoring Plan*. See Attachment 9.1 for an example of the monitoring plan. Consult the SHSD SOP web page for the current official copy of the Monitoring Plan. This Plan lists hazards, worker groups, or other categories that are targeted for special emphasis in the current year.
- 6.8 Once an operation or group of workers has been monitored, using the new sampling data, enter the revised risk ranking (if necessary) and set the next sampling date based on the frequency set in the Table 6.3. Revise the entries for who will do the monitoring, and the anticipated hours to complete monitoring and reporting.
- 6.9 If a process or operation is changed in a manner that alters potential employee exposure, modify the risk ranking based on the new set of conditions.

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## **7.0 Implementation and Training**

**Qualification Criteria:** Only individuals who have knowledge of this procedure and extensive experience in IH hazard assessments or certification in industrial hygiene will be qualified to plan the assessments described in this procedure. Qualification criteria for any organization using this SOP:

- 7.1 All work under this SOP shall be performed by persons who have demonstrated the competence as evidenced by experience and training to meet the qualification criteria set in IH50300 *BNL IH Program and IH Group Training & Qualification Matrix*. The qualification of personnel is to be by a method approved by the SHSD IH Program Manager.
- 7.2 ***BNL Training & Qualification Program on the Site Level Monitoring Plan and Strategy:*** Personnel are to meet the performance measures set forth in ***Attachment 9.2 JPM Qualification***. This qualification is to be completed on a three year cycle.

## **8.0 References**

- 8.1 AIHA Strategy for Occupational Exposure Assessment

## **9.0 Attachments**

- 9.1 Sample of the *BNL Site Level Exposure Monitoring Plan & Monitoring Strategy*
- 9.2 Sample of the Data Entry Form of the ***BNL IH Monitoring Scheduler***
- 9.3 *Job Performance Measure- HP-IHP-60100: BNL IH Exposure Monitoring Plan and Monitoring Strategy* form

## **10.0 Documentation**

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Document Development and Revision Control Tracking		
PREPARED BY: <i>(signature and date on file)</i> R. Selvey Date: 01/31/06	REVIEWED BY: <i>(signature and date on file)</i> J. W. Peters Date: 02/01/06	APPROVED BY: <i>(signature and date on file)</i> R. Selvey; IH Group Leader Date: 02/01/06
ESH Coordinator/ Date:  <i>none</i>	Work Coordinator/ Date:  <i>none</i>	SHSD Manager / Date  <i>none</i>
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ISM Review - Hazard Categorization <input type="checkbox"/> High <input type="checkbox"/> Moderate <input checked="" type="checkbox"/> Low/Skill of the craft	Validation: <input type="checkbox"/> Formal Walkthrough <input type="checkbox"/> Desk Top Review <input type="checkbox"/> SME Review Name / Date:	IMPLEMENTATION: Training Completed: tracked in BTMS Procedure posted on Web: 02/01/06 Hard Copy files updated: 02/01/06

Revision Log		
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls		
Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input type="checkbox"/> none of the above		
Section/page and Description of change:		
SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:

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## Attachment 9.1

# Sample of the Annual BNL Site Level Exposure Monitoring Plan and Monitoring Strategy

Worker Safety and Health  
Annual Industrial Hygiene Monitoring Plan  
FY 2006

## 1. Purpose

The purpose of the annual industrial hygiene monitoring plan is to establish priorities for industrial hygiene monitoring during the year. The plan is developed based on regulatory compliance, a need for risk of hazards.

The IH Group at BNL has been identified, through discussions with Safety and Health, during FY2006.

BNL is implementing the plan and monitor worker exposures. The scheme includes four parts: this Plan, the Compliance Suite exposure monitoring database, the IH Calculator and the IH Scheduler.

**Sample**  
See the SHSD SOP Web Page  
for the current copy of this  
document

## 2. IH Monitoring Goal Setting

To establish goals, the following criteria are used:

- Compliance with regulatory (OSHA/DOE) standards/guidance
- Relative risk to worker and assignment of Similar Exposure Groups
- Needs of the Department/Directorate
- Special Emphasis programs identified by the IH Group

Goals for the FY2006 plan were determined using the following inputs: IH and ESH coordinator staff discussions; a review of chemical inventories; a review of worker concerns; anticipated and known

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worker exposures. Additional information was gathered through reviews of: recent accidents/injuries; recent OSHA/DOE inspection findings; lessons learned; and assessment of need by departments.

### **3. Prioritization of Monitoring Strategies for Specific Stressors**

IH stressors at BNL include: asbestos, beryllium, cadmium, carcinogens, chemicals, heat/cold stress, lead, noise, non-ionizing radiation, reproductive hazards, silica, and welding. Additional stressors might include areas such as ergonomics. However, these areas are not part of a monitoring strategy.

Priority stressors have been established and will be the focus of IH monitoring throughout FY2006. The top three priorities for BNL lab-wide this year are:

1. Noise
2. Cutting, Welding, Brazing
3. Chemicals
  - o carcinogens
  - o other
  - o chem

The priority stressors for each department has a different department that does not Safety and Health Representative scheme as described below

**Sample**  
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document

s Calculator. Each product. For any listed above, the a hazard ranking

### **4. Exposure Characterization, Hazard Ranking and Sampling Frequency**

The IH Calculator was developed to assess the effort required for regulatory compliance. Its purpose was to identify the resource needs necessary to provide an effective baseline monitoring program. Using the number of monitoring events and average estimates of time for each event, the resource need is generated for each department.

The Compliance Suite IH module is currently the single electronic source for IH monitoring data. All IH monitoring samples are documented in the database with specific information pertaining to the samples.

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The IH Scheduler is an activity scheduler, which identifies the areas of concern for IH monitoring during the coming year. It is currently being populated with the proposed baseline monitoring as identified in the IH Calculator. This tool will be used to rank the monitoring events and establish the frequency for future sampling events based on the rank profile.

**Exposure Assessments (EA)**

This monitoring plan uses the following EA strategy:

Qualitative Exposure Assessment	Hazard Characterization	Need determined primarily through Work Planning; review of existing data; area monitoring (ex. Noise); and ESH coordinator input
	Scope/Screen for exposure potential	
	Analyze and Interpret Results	
	Prevention and Controls	
Quantitative Exposure Assessment	Develop quantitative Monitoring Plan	Annual IH Monitoring Plan based on review of analytical data and interpretive reports.
	Conduct Exposure Monitoring	
	Determine need for and periodicity of re-evaluations	
Medical Monitoring	Review with OMC exposure and medical data as required:	Data is input to Compliance Suite for OMC review and

**Sample**  
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In some instances, BNL will provide... assessment would include: exposure monitoring and analysis such as biological assessments based on a quantitative analysis of the exposure potential.

An example of a theoretical hazard assessment based on exposure potential might include the use of extremely small quantities. For instance, an S&H representative may determine through calculations that if all of the material were instantaneously aerosolized the airborne level would be below 10% of the OEL and ventilation would lessen exposures further. In this instance, there is essentially no risk of overexposure.

**Ranking Exposure Monitoring Data**

The IH Scheduler is used to rank monitoring data, assess the need for additional monitoring and schedule future monitoring. The following criteria are used by the Safety and Health Representative to establish the IH monitoring schedule:

Risk Category	Exposure Level	Relative Risk	Frequency of Monitoring
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The only official copy is on-line at the SHSD IH Group website.  
 Before using a printed copy, verify that it is current by checking the document issue date on the website.

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A	Worker exposure exceeds OEL on TWA <sub>8</sub>	Significant risk	All workers in SEG during each job until PPE requirements characterized, then all workers quarterly
B	Area exposure level exceeds OEL but worker exposure is <TWA <sub>8</sub> based on duration in area	May be at significant risk. Needs further evaluation: compliance with OEL uncertain	25% of workers in SEG, quarterly
C	Area/worker exposure is >10% of OEL to OEL level	Moderate risk	10% of workers once per year
D	Area/worker exposure <10% of OEL.	Low risk	1 representative sample per year for three years, then one sample per 3 year cycle
U	Unknown area/personal exposure	Risk assigned on best available guidance	Sample on next operation(s) until characterized as A-D

BNL will use 10-25% of the OEL as the Administrative Control Limit (ACL). This will be confirmed or changed as needed by continual review of monitoring data and hazard analyses as they become available. The ACL is not to be viewed as a modified OEL but rather as a level for decision making with respect to regulatory compliance and for determining the need for additional monitoring.

The IH monitoring data will be used in exposure assessments (EAs) for all operations. The IH Monitoring manager.

**Sample**  
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## Attachment 9.2

### Sample of the Data Entry form of the *BNL IH Monitoring Scheduler*

BNL Industrial Hygiene Monitoring Schedule

<b>Organization</b> Life Sciences Directorate- BO, MO	<b>Date Last Sampled</b> None
<b>Org code</b> BO, MO	<b>Next Sample Date</b> 2006:
<b>Building</b>	<b>Sampler</b>
<b>Location</b> Placeholder for actual location descripti	<b>Time (hrs)</b> 8
<b>Source Title</b> Placeholder for actual source descripti	<b>Comment:</b>
<b>Hazard</b> Noise	
<b>Sample Type:</b> Area Survey Event	<input type="button" value="Add Blank Record"/>
<b>Exposure Ranking</b>	<input type="button" value="Duplicate This Record"/> <input type="button" value="Delete This Record"/>
<b>IH Prject Number:</b>	

**Exposure Ranking Category.** Known or anticipated levels are:

	Exposure Level	Frequency of Monitoring
<b>A</b>	Worker exposure exceeds OEL on 8hr TWA	All workers in SEG during each job until PPE requirements characterized, then all workers quarterly
<b>B</b>	Area exposure level exceeds OEL, but worker exposure is < TWA-8 based on duration in area	25% of workers in SEG, Quarterly
<b>C</b>	Area/worker exposure is >10% of OEL to OEL level	10% of workers once per year
<b>D</b>	Area/worker exposure is Non-detected to <10% of OEL	1 representative sample per year for 3 years, then one sample per 3 year cycle
<b>U</b>	Unknown area/ personal exposure	Sample on next operation(s) until characterized as A-D

Field Name	Data Type	
Organization	Text	Full Name of Organization
Org code	Text	
Building	Text	
Location	Text	Room or Area Description
Source Title	Text	Equipment generating the hazard
Hazard	Text	
Sample Type	Text	Area or Personnel
Exposure Ranking	Text	Rating A, B, C, D, or U
Last Sample date	Text	
Next Sample Date	Text	
Sampler	Text	Who will/did the sampling
Time (hrs)	Number	Hours to complete sampling, data entry & reporting
IH Project Number	Number	SHSD
Comment	Text	Comment for clairifation of any field

**IH Site Level Exposure Monitoring Plan and Sampling Strategy  
Job Performance Measure (JPM) Completion Certificate**

Candidate's Name	Life Number:
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**SHSD Procedure Knowledge**

**Practical Skill Evaluation: Demonstration of Evaluation Methodology**

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
<b>1. Hazard Identification</b>	Has the appropriate knowledge of the full scope of Industrial Hygiene to identify IH hazards for entry into the <i>IH Monitoring Scheduler</i> .			
<b>2. Hazard Analysis</b>	Demonstrates knowledge of the various conditions that impact exposure and possesses the essential skills for performing a meaningful hazard analysis of the work operation and area.			
<b>3. Exposure Standards</b>	Demonstrates knowledge of each applicable occupational exposure limit, action level, TLV, PEL, STEL, etc. needed as part of the risk ranking			
<b>4. Exposure Assessment Strategy</b>	Demonstrates sufficient knowledge of the principles to accurately estimate worker exposure and assign the correct risk ranking in the <i>IH Monitoring Scheduler</i> ..			
<b>5. Estimating Resource</b>	Demonstrates experience in conducting exposure assessment so that accurate estimates of time resources are entered in to the <i>IH Monitoring Scheduler</i> ..			
<b>6. Completing &amp; Maintaining Data</b>	Shows where the database necessary for planning assessment is located and how to correctly and completely fill the data entry form or table. Demonstrates knowledge of how to enter data into the BNL <i>IH Monitoring Scheduler</i> database.			
<b>7. Revising data</b>	Demonstrates the knowledge of the correct method to update the database when exposure monitoring data is analyzed and its impact on the next monitoring date. Understands the necessity to maintain the database in an "evergreen" manner.			
<b>8. Special Emphasis</b>	Demonstrates knowledge of the <i>Site Level Exposure monitoring Plan</i> and the need to target hazards that BNL has highlighted and the need to incorporate them into the temporal schedule so that they are addressed during the year of emphasis.			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

Candidate Signature:	Date:
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I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

Evaluator Signature:	Date:
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