

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

### Introduction:

The purpose of a monitoring program is to establish consistent sampling, analytical, and evaluation procedures to ensure quality assessment of real or potential health risks resulting from exposure to physical, chemical, and biological agents. Industrial hygiene monitoring is conducted to accurately assess worker exposures and to provide recommendations for their reduction or elimination.

The workplace monitoring program must follow all elements of KUC Health & Safety Standard 10.9, written to include all elements of the Rio Tinto Element 13 Measuring and Monitoring. The following elements are covered in the program:

- Exposure Identification
- Data Collection
- Non-Routine and Out of Scope Sampling
- Recordkeeping
- Data Evaluation
- Reporting
- Quality Control
- Instrumentation
- Contractors
- Training

### I. EXPOSURE IDENTIFICATION

1. All potential sources of exposure should initially be identified through the process of risk assessment. The risk assessment process should include a formal review of existing data and controls where available.
2. The workforce must be divided into appropriate Similar Exposure Groups (SEG's). All Kennecott Utah Copper Employees and Category 1 Contractors must be included within an appropriate SEG.
3. Residual risk identified through the KUC qualitative risk assessment process and/or statistically valid exposure data must be used as the basis for inclusion or exclusion of individual roles within SEG's.
4. SEG's must be reviewed for their relevancy at a minimum of every 2 years or where a change in process, task or controls may create additional exposures.

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

### II. DATA COLLECTION

- The following table is recommended to ensure data is captured with appropriate confidence:

Size of SEG (N)	Recommended # of Samples (n)
≤8	N-1
9	8
10	9
11-12	10
13-14	11
15-17	12
18-20	13
21-24	14
25-29	15
30-37	16
38-49	17
≥50	18

- Scheduling of sampling must be conducted in a manner to minimize bias to the extent possible. Trained Health & Safety Personnel should randomly choose the week, day and shift to sample in order to minimize bias (e.g. effects of summer/winter conditions). Additionally, the person(s) to be sampled should also be chosen at random through an active and updated employee roster. Prior notification should be given only to the appropriate Supervisor.
- Sampling conducted for the purposes of long-term exposure assessment must be based on routine operation under normal conditions (i.e. normal production with all applicable equipment in operation)

### III. NON-ROUTINE & OUT OF SCOPE SAMPLING

- Static (fixed) monitoring and/or biological monitoring will not be used in lieu of personal monitoring. From time to time it may be necessary to conduct area monitoring to assess the effectiveness of a control. This type of monitoring is considered special case and should only be accomplished for purposes of addressing the problem at hand. Special requests for monitoring should be handled through the appropriate

Page 2 of 8	<b>Plant:</b> All
PRINTED COPIES ARE UNCONTROLLED	

KUC00011.00

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

Management channels (i.e. JSHC, HSE Suggestion System, or Supervisor's & Superintendent request etc.) Area monitoring may or may not involve random sampling techniques and statistical analysis of data.

#### IV. RECORDKEEPING

- All Industrial Hygiene related records identified in KUC Health & Safety Standard 13.6 must be maintained. The following table lists retention periods for Industrial Hygiene related records:

Record Type	Retention Period
Occupational Illness cases	30 years
Register of Site Occupational Health & Hygiene Audits	10 years
Register of Regulatory and Consultant Occupational Hygiene Survey Reports	20 years
Industrial Hygiene Field Survey Cards	30 years
Summary Reports of Workplace Monitoring Data	30 years
Instrument Calibration Certificates and Quality Control Documentation	3 years
Training Records for Site Professional Employees	5 years or period of employment (whichever is longer)

#### V. DATA EVALUATION

- Site Occupational Exposure Limits as identified in KUC Health & Safety Standard 10.7 will be used to evaluate performance. Adjustments to the Occupational Exposure Limits (OEL's) are made in accordance to extended work shift. Adjustments for working shifts that extend beyond 12-hours require specialist consideration. In cases where a KUCC OEL or an OSHA/MSHA PEL is not available, refer to ACGIH TLV's or NIOSH REL's.
- At a minimum, the arithmetic mean and the 95% UCL must be used to evaluate potential overexposures for an SEG. Exposure results in excess of the Action Limit (usually half of the OEL) will require

Page 3 of 8	<b>Plant:</b> All
PRINTED COPIES ARE UNCONTROLLED	

KUC00011.00

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

consideration as to providing Medical Surveillance for individuals within that SEG. This should only be accomplished after consultation with the KUC Medical Advisor.

3. On an annual basis, data should be plotted or grouped statistically in order to evaluate any potential outliers. Each outlier should be investigated to determine relevance with regard to reporting and risk assessment.

### VI. REPORTING

1. All unexpected OEL exceedences must be reported within 24-hours upon receipt and confirmation of results. This initial notification can be accomplished via telephone or electronic mail to the appropriate Supervisor and Superintendent for the area or department where they occurred. Investigation should occur for every incident (i.e. overexposure) with maximum reasonable consequence.
2. All personal sampling results must be accompanied by a summary report within 7 days of receipt of results. The summary report must contain by employee, the measured (Time-Weighted) result vs. the appropriate OEL. Where necessary, the report should contain measures of central tendency and range (i.e. mean, maximum, standard deviation etc.) These reports are to be distributed to the appropriate area Supervisor and Superintendent. Carbon copies are to include the KUC Medical Advisor, Plant Manager and the Sr. Advisor Health & Safety. Health hazard control recommendations and previous actions taken must be included in the report. Additionally, it is recommended that all applicable notes that have been captured on the back of the Industrial Hygiene Field Survey card are included in the report. The appropriate area Supervisors are responsible for informing and reviewing results and recommendations with the affected employees in a timely manner. The plant Health & Safety or Industrial Hygiene Advisor must be available to discuss results with affected employees.
3. An Annual Summary of all Occupational Health & Industrial Hygiene related data must be provided to the KUC Senior Leadership Team. At a minimum, this summary should include the mean and the 95% UCL for each Similar Exposure Group. This report must not identify specific individuals and should be used as a basis to identify high risk exposure groups or areas of inadequate occupational health performance.

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

Information included in the Annual Summary should be considered when developing Health Improvement Action Plans.

### VII. QUALITY CONTROL

1. All KUCC Industrial Hygiene equipment must be calibrated in accordance with manufacturer's recommendations. Primary calibration standards will be used to determine all airflow requirements when using air sampling pumps. Secondary standards may be used only as "field checks." Primary flow calibrators (i.e. piston meters, spirometers) must be sent to the manufacturer for calibration at the manufacturer's recommended intervals. For direct reading instrumentation, a baseline (i.e. zero) must be established in a contaminant-free atmosphere and a manufacturer recommended span gas used to calibrate the instrument. All direct reading instruments must have a valid certificate of calibration located on the instrument. Where accurate air sample volumes are necessary to provide accurate calculations of contaminant concentrations, the following calibration guidelines should be used:

% Error	Guideline
<5%	Average Pre & Post values
5% - 10%	Use lower flow rate
>10%	Void sample

Note: When sampling RSiO<sub>2</sub> consider voiding sample at > 5%

2. Pre & post calibration (for instrumentation requiring accurate air volumes) must be included on the Industrial Hygiene Field Sampling Survey card. Health & Safety or Industrial Hygiene Advisors responsible for sampling will keep field sampling survey cards in a file on-site for a period of one (1) year at which time they will be transferred to the IH master files located at the Kennecott Environmental Laboratory to remain on file for the period required in Recordkeeping section of this document. Certificates of calibration for all other portable Industrial Hygiene instrumentation will be kept on file at the plant by the appropriate Health & Safety or Industrial Hygiene Advisor.
3. The KUC Environmental Laboratory is accredited by the American Industrial Hygiene Association (AIHA). Where possible, all Industrial

Page 5 of 8	<b>Plant:</b> All
PRINTED COPIES ARE UNCONTROLLED	

KUC00011.00

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

Hygiene related samples should go to the KUC Environmental Laboratory for analysis. Where analysis by the KUC Environmental Laboratory is not possible, samples must be sent to an AIHA accredited laboratory for analysis. Certificates of Analysis for outside analytical services must provide proof of current accreditation.

4. Field sample blanks must be provided for each set of samples submitted to the Kennecott Environmental Laboratory for quality control purposes. In addition to the blanks, spiked samples should be submitted periodically. Blank and spike samples can assist in determining potential analytical errors. Any significant discrepancies associated with field blank and/or spiked samples should be reported to the QA/QC Manager of the KUC Environmental Laboratory. In this case, consideration should be given to re-sample.
5. All Industrial Hygiene sampling data must be submitted with an Analytical Request Sheet and Sample Chain of Custody form. The IH sampler should retain the carbon copy (i.e. pink copy) for his/her records.
6. All Industrial Hygiene sampling should be conducted in accordance with the approved NIOSH/OSHA method.
7. A documented numbering system for all Industrial Hygiene samples must be maintained. The numbering system will include specific plant denotation with a sequential number generated by Medgate. The sequential number will ensure that sample numbers are not duplicated.

### VIII. INSTRUMENTATION

1. Where risk assessment has identified gas levels sufficient to cause health effects in less than one shift, continuous or "fixed station" monitoring is required. Each operating plant is responsible for ensuring that "fixed station," monitoring equipment are properly maintained in good working order and that each are identified on a routine calibration schedule in accordance with manufacturer's recommendations. Calibration records must be kept on file in the responsible department for a retention period as identified in the Recordkeeping section of this document. A list of "fixed station" monitoring equipment is maintained in each operating facilities Emergency Response Plan.

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

2. It's important that all KUC Industrial Hygiene instrumentation remain in good operating condition. An assessment of all instrumentation should be made at a minimum of every 3 years to determine overall condition and appropriateness. This assessment should include capabilities for conducting any special air samples (eg. Tank entry, incident investigations or emergency type samples).
3. Emergency Response personnel are responsible for all aspects of monitoring equipment contained in emergency vehicles or trailers. Training in the proper use of this equipment is the responsibility of appropriately trained Health & Safety personnel. It is recommended that all Health & Safety personnel conduct routine audits of ERT sampling instrumentation to ensure that it is in good operating condition and appropriately calibrated.

**Note:** Requirements for Environmental monitoring equipment (i.e. PM 10, stack monitoring equipment etc.) is not included as part of this monitoring program and are under direct responsibility of KUC Environmental personnel.

### IX. CONTRACTORS

1. Contractors may be required to conduct workplace monitoring depending upon the nature of the hazards involved. It is KUC's expectation that all contractors comply with KUC Health & Safety Standards and subsequently are responsible for conducting their own workplace monitoring. Additionally, contractors must comply with all elements of the Kennecott Utah Copper Contractor Management System. A risk assessment should be conducted prior to development of the Safety Health & Environmental Analysis (S.H.E.A.). The risk assessment in conjunction with the S.H.E.A. will determine the need for workplace monitoring. In the event that workplace monitoring is deemed necessary, the contractor must provide evidence of an appropriate workplace monitoring program as part of the Safety, Health & Environmental Action plan (S.H.E.A.P.) The KUC Contract Manager should involve the appropriate Plant Health & Safety or Industrial Hygiene Advisor where implementation of a monitoring program is necessary. The plant Health & Safety or Industrial Hygiene Advisor must ensure that individuals who conduct workplace monitoring for contractors have been adequately trained and that all analytical services are conducted by an AIHA accredited laboratory. Monitoring results absent of personal & medical information must be provided to KUC by the contractor in a timely manner.

Page 7 of 8	<b>Plant:</b> All
PRINTED COPIES ARE UNCONTROLLED	

KUC00011.00

# SAFETY AND HEALTH INDUSTRIAL HYGIENE

## Workplace Monitoring Program

<b>Effective Date:</b> 08/07/14	<b>Standard:</b> 10.9	<b>Document Number:</b> KUSHIH00007	<b>Rev:</b> 01
---------------------------------	-----------------------	-------------------------------------	----------------

2. In certain circumstances, workplace monitoring for contractors may be conducted by KUC. Prior to conducting any workplace monitoring for contractors, it is recommended that the KUC legal department be consulted.

### X. TRAINING

1. Under no circumstances should individuals conduct workplace monitoring without appropriate training unless under direct supervision of a KUC Health & Safety or Industrial Hygiene Advisor. At a minimum, appropriate training will consist of basic principles in recognition, evaluation and control of workplace health hazards. In addition, specific (i.e. "hands-on") training in the operation of sampling instrumentation to include the limitations of such should be documented.
2. The evaluation of data obtained through workplace monitoring is the sole responsibility of a trained Industrial Hygienist.

### REVISION HISTORY:

MOC#	Description of Change	Prepared By	Date
25994	Creation of document.	Kelli Hamilton	4/23/14