

BP OIL -- TOLEDO REFINERY

Document Type: Practice	Refinery Wide	Procedure No.: SAF 117
Effective Date: August 30, 2013	Industrial Hygiene Hazard Assessments: Qualitative and Quantitative Methods	Rev. No.: 1
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Purpose	This procedure provides instructions for conducting Industrial Hygiene Hazard Assessments (IHHAs) including both qualitative and quantitative, instructions for updating and maintaining the Health Risk Register, and information on the TBU sampling plan.
Scope	<p>This procedure is applicable to all TBU employees in operations and activities where worker exposure to chemical, physical, and biological hazards at levels of occupational significance exists. It applies to operations covered under both OSHA general industry operations (29 CFR 1910, <i>Occupational Safety and Health Standards</i>) and OSHA construction activities (29 CFR 1926, <i>Safety and Health Regulations for construction</i>).</p> <p>In certain cases, specific OSHA standards contain requirements for qualitative and quantitative exposure assessment and/or hazard analysis.</p> <p>This procedure provides information to enhance the identification of work place hazards by:</p> <ol style="list-style-type: none"> 1. Addressing facility/project operations and activities; and 2. Establishing exposure levels and controls for operations and activities; and 3. Provide an overview of facility/project IH hazards.
Health and Special Hazards	This procedure provides instructions to improve the anticipation, recognition, evaluation, and control of hazards to health arising in the work environment at the TBU.
Safety and Special PPE	Quantitative and qualitative evaluations are to be done with the appropriate PPE.

<p>Reference Documents</p>	<p>SAF 023 Using Direct Reading Gas Testing Equipment SAF 026 Personal Protective Equipment Policy SAF 031 Sing In Sign Out Procedure SAF 032 Confined Space Entry SAF 058 BP-Husky Accident/Incident Investigation Guidelines SAF 081 Hearing Protection SAF 087 Hydrogen Sulfide SAF 090 Heat Stress Management Guidelines SAF 107 Written Hazard Communication Program SAF 108 Written Lead Management Program SAF 109 Respiratory Protection Program SAF 110 Refractory Ceramic Fiber Operations and Management Program PSM 003 Process Hazard Analysis HSE 004 Assessment and Audits Procedure MAINT-E-050 Asbestos O&M Program GDP 3.1-0001 Risk Framework GRP 3.4-0004 Managing Industrial Hygiene</p>
<p>Special Materials and Equipment</p>	<p>Sample pump, primary standard pump calibrator, sample media, noise dosimeter, noise dosimeter calibrator, sound level meter, sound level meter calibrator, velometer, WBGT</p>
<p>Quality</p>	<p>Criteria in established sampling methods must be followed to ensure sample quality is at acceptable levels. Special attention to storage and shipping requirements must be made. Internal Audits will be performed on the Health Risk Register, Annual Routine IH Sampling Plan, Laboratory Results, Worker Notification Letters, and Essential/CTM Tasking every three years.</p>
<p>Environmental</p>	<p>N/A</p>

<p>Overview</p>	<p>This procedure outlines Toledo Business Unit's (TBU) policy for performing assessments to determine:</p> <ul style="list-style-type: none"> ▪ The degree to which a person may be exposed to a chemical, physical, biological or ergonomic health hazard at his/her job, and ▪ The health risk associated with that hazard. <p>This procedure will help systematically evaluate, and where possible, quantify the exposures that present the greatest risk to employees. This procedure will also help to ensure that the Health Risk Register (HRR) appropriately identifies health hazards at the refinery as well as the associated risk ranking.</p>
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<p>1.0 Definitions</p>	<p>1.1 Airborne contaminants - The gases, vapors, fumes, mists and dusts of those chemicals and chemical compounds listed in OSHA 1910 Subpart Z, which are generated during the handling and processing of materials in the work place. Refer to Appendix A for a list of regulated chemical and compounds found at TBU.</p> <p>1.2 Physical hazards - Noise, vibration, particulates, radiation, and extreme temperatures.</p> <p>1.3 Acute health effect - The immediate outcome of a single exposure-related incident.</p> <p>1.4 Chronic health effect - The future outcome of either a single exposure related incident or repeated exposure-related incidents.</p> <p>1.5 Ergonomics - The study of a person's interface and interaction with the tools and equipment in the work environment.</p> <p>1.6 Exposure Monitoring - The means of determining the concentration of an airborne chemical contaminant(s) or levels of physical hazards that may be present on the job. The concentration of airborne chemicals present within a person's breathing zone is quantified. A person's breathing zone is defined as the air space around his/her nose and mouth represented by a 12 inch cone extending from the nose during the time they are performing a job.</p> <p>1.7 Monitoring Equipment - The equipment used to perform air monitoring. Equipment may be real-time direct reading, (such as a photo ionization detector or sound level meter) which give instantaneous results or time-delayed, and chemical sensitive methods such as an organic vapor badge or pump and sampling medium, which must undergo further analysis at a laboratory.</p> <p>1.8 Monitoring Results - The concentrations of airborne contaminants measured through exposure monitoring. Monitoring results are stored in a data base administered by the</p>
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	<p>Industrial Hygienist and must be maintained for the working lifetime of an employee.</p> <p>1.9 Permissible Exposure Limit (PEL) - The maximum allowable concentration of an airborne contaminant to which a person may be exposed during each work shift for a working lifetime. Compliance with a PEL is determined through exposure monitoring.</p> <p>1.10 Short Term Exposure Limit (STEL) - The maximum allowable concentration of an airborne contaminant to which a person may be exposed for any 15-minute period within a work shift. Compliance with a STEL is determined through exposure monitoring.</p> <p>1.11 Threshold Limit Value (TLV) - Similar to a PEL, but issued by ACGIH, a non-regulated organization. PELs are used by the regulatory agencies, and are enforceable in citations. TLV is a “best practices” guideline established by experts in the occupational health field.</p> <p>1.12 Similar Exposure Group (SEG) - Group of workers having the same general exposure profile for the agent(s) being studied because of the similarity and frequency of the tasks they perform, the materials and processes with which they work, and the similarity of the way they perform the task.</p> <p>1.13 Notification - Notification of monitoring results in writing is required when a person wears a piece of monitoring equipment.</p>
<p>2.0 Roles and Responsibilities</p>	<p>2.1 Operations and Maintenance Personnel Shall:</p> <p>2.1.1 Wear monitoring equipment, as requested by the Industrial Hygienist, to quantify possible exposures that may occur under routine and non-routine operating conditions.</p> <p>2.1.2 Notify the Industrial Hygienist of non-routine jobs that involve handling of chemicals, particularly chemicals that are new to the work area, or that pose a possible exposure concern.</p> <p>2.1.3 Request an assessment for any job that causes a concern from the standpoint of exposure to an airborne contaminant, a physical exposure hazard or an ergonomic hazard.</p> <p>2.1.4 Participate in the Refinery Health Risk Register qualitative assessment and review. Assessments and reviews may include field walk downs.</p> <p>2.2 Industrial Hygienist Shall:</p> <p>2.2.1 Manage and administer the Exposure Assessment Program.</p> <p>2.2.2 Conduct exposure monitoring and identify jobs that may need to be managed with engineering controls, administrative control measures, and/or personal</p>

	<p>protective equipment (PPE).</p> <p>2.2.3 Notify employees who wear a monitoring device and those in a similar exposure group (SEG) of the monitoring results.</p> <p>2.2.4 Update affected programs to reflect changes if new chemicals or processes are introduced that may produce new hazards.</p> <p>2.2.5 Follow up on traction reports relating to personnel exposures to chemical, biological, and physical agents.</p> <p>2.2.6 Organize a team to perform a review of the Health Risk Registers every two years.</p> <p>2.2.7 Identify situations in which emergency updates should be conducted for the Health Risk Registers.</p> <p>2.2 Contract Personnel shall:</p> <p>2.2.1 Provide monitoring data as requested by the BP Industrial Hygienist.</p> <p>2.2.2 Wear monitoring equipment as requested by the BP Industrial Hygienist.</p> <p>2.3 Health Services shall:</p> <p>2.3.1 Notify the Industrial Hygienist of reported illnesses and exposures.</p> <p>2.3.2 Administer medical evaluations in cases where monitoring results have exceeded established occupational exposure limits, or where compliance programs require biological monitoring.</p> <p>2.4 Supervisory Personnel shall:</p> <p>2.4.1 Notify the Industrial Hygienist of jobs that involve potential for exposure to chemical, biological, or physical agents.</p> <p>2.4.2 Implement appropriate controls identified by the Health Risk Register and associated quantitative exposure assessment results.</p> <p>2.5 Human Resource Personnel shall:</p> <p>2.5.1 Participate in Health Risk Register annual qualitative assessment and review. Assessments and reviews may include field walk downs.</p> <p>2.5.2 Provide the Industrial Hygienist with employee information needed for appropriate communication of results.</p>
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	<p>2.6 Chemical Hygiene Officer</p> <p>2.6.1 Maintain the Chemical Hygiene Plan</p> <p>2.6.2 Participate in the Quality Lab Health Risk Register qualitative assessment and review. Assessments and reviews may include field walk downs.</p>
<p>3.0 Procedure</p>	<p>3.1 Exposure Assessment Overview:</p> <p>3.1.1 Exposure assessments are driven by either compliance with a health and safety standard or an employee request or concern.</p> <p>3.1.2 Exposure assessments involve determining the agent of concern, who the impacted personnel are, the method the agent may enter the body, the duration of exposure, and whether the job is routine or non-routine.</p> <p>3.1.3 Exposure assessments identify many hazards including but not limited to chemical, biological, and physical agents.</p> <p>3.1.4 If applicable, results of an exposure assessment will include recommended controls. Exposure assessments may be qualitative or quantitative.</p> <p>3.2 Exposure Assessment:</p> <p>3.2.1 Monitoring the air in a person’s breathing zone is the most effective method of assessing a person’s exposure. Air monitoring requires an individual to wear a monitoring device (i.e., organic vapor monitor or sampling pump with collection media) for a period of time determined by the sampling method being used.</p> <p>3.2.2 Air monitoring is necessary in instances where the exposure assessment is required to comply with a health and safety regulation. Air monitoring is performed to demonstrate compliance with an established occupational exposure limit such as OSHA’s Permissible Exposure Limit (PEL), Short-Term Exposure Limit (STEL) or both.</p> <p>3.2.3 The Industrial Hygienist will perform air monitoring using approved methods (i.e., OSHA, NIOSH, etc.) to ensure the TBU is in compliance, and that current work practices and controls are providing adequate protection for personnel working at the TBU.</p> <p>3.2.4 Work performed at the TBU is divided into routine and non-routine work tasks. Non-routine is defined by what happens infrequently whether the task is scheduled or not. A turnaround (TAR), for example is classified as a non-routine work activity.</p> <p>3.2.4.1 Routine monitoring is focused on individual operating units and maintenance shops. Routine</p>

	<p>monitoring addresses potential exposures to hydrocarbons (determined by operating area), noise, and other chemicals that may be specific to an operating area. Routine monitoring is conducted on a rotating schedule between Operations and Maintenance. Each department is monitored approximately every two to three years depending on previous monitoring results and applicable standards. Please refer to Appendix B Sampling Plan.</p> <p>3.2.4.2 Non-routine monitoring: The Industrial Hygienist will monitor exposures during all major turnarounds. Operations personnel are monitored during oil out phase. Maintenance personnel are monitored during activities such as breaking containment, welding, and refractory ceramic insulation.</p> <p>3.2.5 Personnel who wear monitoring equipment as part of the exposure assessment process will be provided written notification of the monitoring results.</p> <p>3.2.6 The Industrial Hygienist maintains records of all personal monitoring in a data base. Records are maintained for no less than 30 years.</p> <p>3.2.7 Personal noise exposure assessments for routine work shifts are conducted every two to three years for Operations and Maintenance personnel. Assessments are made with a noise dosimeter.</p> <p>3.2.8 Heat stress assessments will be made on a situational basis by the area Safety Advisor with a wet bulb globe thermometer (WBGT), when work is required to be performed in an area where temperatures are in excess of 100°F. Refer to SAF 090 for guidance on heat stress.</p> <p>3.2.9 The Industrial Hygienist can evaluate work place areas for potential ergonomic stressors. Additional areas of ergonomic hazards can be evaluated as well. This can include but is not limited to tool handling and use, lifting technique, and body positioning while performing work.</p> <p>3.3 Exposure Controls</p> <p>3.3.1 An exposure to an airborne contaminant or physical agent in excess of established occupational exposure limits must be controlled. There are three methods of control used to minimize exposure to a hazard. These controls are engineering, administrative, and personal protective equipment (PPE).</p> <p>3.3.2 Engineering controls are the preferred methods for limiting the potential for an exposure. Engineering controls physically reduce the possibility of exposure to hazards. Examples of engineering controls include closed loop sample systems; ventilation hoods; abrasive blasting booths; and insulation to reduce heat, vibration,</p>
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	<p>and noise.</p> <p>3.3.3 Administrative controls are used to control the amount of time that a person may be in an area where there is an airborne contaminant or physical exposure hazard. An example of use of administrative control can be found in our heat stress procedure SAF 090. In this procedure there are recommendations for work rest regimens during extreme temperatures.</p> <p>3.3.4 Personal protection equipment (PPE) is our last choice for controls. PPE is used to control exposures to hazards that cannot be controlled by engineering or administrative controls, or for work that is temporary in nature. Common PPE used at the TBU include hard hat, hearing protection, respiratory protection, and safety glasses with side shields. Refer to SAF 026 for minimum PPE requirements at the TBU.</p> <p>3.4 Refinery Health Risk Register</p> <p>3.4.1 The Health Risk Register for the TBU Refinery will serve as a systematic approach to ranking health hazards in the refinery. The assigned rankings will serve as a prioritization tool for health, safety, security, and environmental (HSSE) projects and initiatives.</p> <p>3.4.2 The Refinery Health Risk Register will be completed in two steps. Refer to Appendix C for instructions to maintain the Refinery Health Risk Register, and GDP 3.1-0001 Risk Framework.</p> <p>3.4.3 The Refinery Health Risk Register Review team must consist of the Industrial Hygienist, one Operations Representative, one Maintenance Representative, and one Human Resources Representative.</p> <p>3.4.4 Prior to the final update approval one Legal Representative and one Health Services Representative must review the document.</p> <p>3.4.5 The Refinery Health Risk Register must be reviewed by and updated every two years.</p> <p>3.5 Quality Lab Health Risk Register</p> <p>3.5.1 The Quality Lab Health Risk Register will consist of 3 documents. The Chemical Hygiene Plan maintained by the Quality Lab Chemical Hygiene Officer, the Quality Lab Health Risk Register maintained by the Industrial Hygienist, and the Refinery Health Risk Register maintained by the Industrial Hygienist. Refer to Appendix D for document specifications.</p> <p>3.5.2 The Quality Lab Health Risk Register review team must consist of the Industrial Hygienist and one Quality Lab</p>
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	<p>Representative.</p> <p>3.5.3 Prior to the final update approval one Legal Representative and one Health Services Representative must review the document.</p> <p>3.5.4 The Quality Lab Health Risk Register must be reviewed and updated every two years.</p>
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Revision history

The following information documents at least the last 3 changes to this document, with all the changes listed for the last 6 months.

Date	Revised By	Changes
06/07/12	Michael Chambers	Implementation of this document. No revision at this time. MOC# M20122897-001
8/26/13	Michael Chambers	Revised Sample Plan to remove Reformer 1, Reformer 2, and Hydrogen Operators. Added Reformer 3 Operator to sample plan. Adjusted Sample number from 4 to 2 samples, and adjusted some sample frequencies based on historical data and medical surveillance. MOC# M2013740-001

Appendix A

Airborne Hazards at TBU

Category	Example
Hydrocarbons (Vapors, Gases)	
	Benzene
	Toluene
	Xylene
	Hexane
	Total Hydrocarbons (i.e., components of gasoline)
	1,3 Butadiene
	PAH (polycyclic aromatic)
Sulfur Containing Gases	
	Hydrogen sulfide
	Sulfur dioxide
	Mercaptan
Insulation Materials	
	Asbestos
	Mineral fibers (e.g., refractory, fiberglass, mineral wool)
	Silica
Metals	
	Welding Fumes
	Hexavalent Chromium
	Copper
	Cadmium
	Lead
	Iron
	Zinc Oxide
Miscellaneous	
	Carbon monoxide
	Carbon dioxide
	DEA
	Sulfuric Acid
	Nuisance dust (coke dust, Cal-Sil insulation dust)
	Ammonia

Appendix B															
TBU Routine Sampling Plan															
Asset	Positions	BTX & TH	Noise	Respirable Dust	Hexavalent Chromium	Welding Fumes	Metals	Scan	H2S	SO2	Lead	CO	1,3-butadiene	PAHs	#Samples
South															
	DHT	3 Yrs	3 Yrs												2
	Mercox	3 Yrs	3 Yrs												2
	Sat Gas	3 Yrs	3 Yrs												2
	Crude 1	3 Yrs	3 Yrs											3 Yrs	2
	Vac 1/Naph Trtr	3 Yrs	3 Yrs											3 Yrs	2
	Boilers	3 Yrs	3 Yrs												2
	Foreman	3 Yrs	3 Yrs												2
	Asset Coordinator	3 Yrs	3 Yrs												2
	Area Authority	3 Yrs	3 Yrs												2
	Maintenance Supervisor	3 Yrs	3 Yrs												2
East															
	Reformer 3	1 Yrs	3 Yrs												2
	Iso North	3 Yrs	3 Yrs												2
	Iso South	3 Yrs	3 Yrs												2
	Ally 1	3 Yrs	3 Yrs										3 Yrs or A/N		2
	Ally 2	3 Yrs	3 Yrs										3 Yrs or A/N		2
	Ally 3	3 Yrs	3 Yrs										3 Yrs or A/N		2
	Foreman	3 Yrs	3 Yrs												2
	Asset Coordinator	3 Yrs	3 Yrs												2
	Area Authority	3 Yrs	3 Yrs												2
	Maintenance Supervisor	3 Yrs	3 Yrs												2
North															
	Crude Vac 2	3 Yrs	3 Yrs											3 Yrs	2
	FCC1	3 Yrs	3 Yrs												2
	FCC2	3 Yrs	3 Yrs												2
	Poly Plant	3 Yrs	3 Yrs												2
	Unsat Gas	3 Yrs	3 Yrs												2
	Foreman	3 Yrs	3 Yrs												2
	Asset Coordinator	3 Yrs	3 Yrs												2
	Area Authority	3 Yrs	3 Yrs												2
	Maintenance Supervisor	3 Yrs	3 Yrs												2
West															
	EPA 1	3 Yrs	3 Yrs						3 Yrs						2
	EPA 2	3 Yrs	3 Yrs						3 Yrs						2
	EPA 3	3 Yrs	3 Yrs						3 Yrs						2
	Coker 2	3 Yrs	3 Yrs	3 Yrs					3 Yrs					3 Yrs	2
	Coker 3	3 Yrs	3 Yrs	3 Yrs					3 Yrs					3 Yrs	2
	Coke Cutter	3 Yrs	3 Yrs	3 Yrs					3 Yrs					3 Yrs	2
	Coke Catcher	3 Yrs	3 Yrs	3 Yrs					3 Yrs					3 Yrs	2
	Foreman	3 Yrs	3 Yrs												2
	Asset Coordinator	3 Yrs	3 Yrs												2
	Area Authority	3 Yrs	3 Yrs												2
	Maintenance Supervisor	3 Yrs	3 Yrs												2
OM&S															
	WWTU	3 Yrs	3 Yrs												2
	Blender	3 Yrs	3 Yrs												2
	Sulfur Railcar Loader	3 Yrs	3 Yrs						3Yr	3Yr					2
	Truck 10	3 Yrs	3 Yrs												2
Maintenance Shops															
	Pipe Fitter	3 Yrs	3 Yrs		3 Yrs or A/N	3 Yrs or A/N	3 Yrs or A/N				3 Yrs or A/N				2
	Heavy Craft	1 Yrs	3 Yrs		3 Yrs or A/N	3 Yrs or A/N	3 Yrs or A/N				3 Yrs or A/N				2
	Machinist	3 Yrs	3 Yrs		3 Yrs or A/N	3 Yrs or A/N	3 Yrs or A/N				3 Yrs or A/N				2
	Transportation	3 Yrs	3 Yrs									3 Yrs or A/N			2
QC Lab															
	Engine Technician	3 Yrs	3 Yrs									3 Yrs or A/N			2
	QA Technician	3 Yrs	3 Yrs										3 Yrs		2

A/N: As Needed
 BTX & TH: Benzene, toluene, xylene, and total hydrocarbons (gasoline range)
 CO: Carbon monoxide
 PAHs: Polyaomatic hydrocarbons
 H2S: Hydrogen sulfide
 SO2: Sulfur dioxide

Appendix C

Refinery Health Risk Register Instructions

Step 1

- The Refinery Health Risk Register is divided into eight categories. Each category should be defined using the associated method for identifying. The categories should be addressed in the following order:
 - Description of Hazard
 - Engineering practice
 - Traction reports
 - Location of Hazard
 - Engineering practice
 - Associated Risk/Hazard
 - Material safety data sheet's (MSDSs)
 - Accepted medical practice
 - Legislation/Standards/Guidance
 - Occupational Safety and Health Administration (OSHA) final regulations
 - OSHA recommended technical practices
 - Third party agency recommendations (i.e., American Conference of Governmental Industrial Hygienists (ACGIH))
 - TBU Procedures
 - Safe work procedures
 - Operations procedures
 - Group recommended practices
 - Toledo specific reference documents (i.e., The Little Chemical Book)
 - Medical programs
 - Industrial Hygiene exposure monitoring results
 - BP guidance documents
 - Any other TBU specific program that is applicable to the defined hazard
 - Controls
 - Engineering controls
 - Administrative controls
 - Personal protective equipment (PPE)
 - Raw Risk Ranking
 - To establish the raw risk ranking the Review Team will take the hazard into consideration as if no controls are in place. GDP 3.1-0001 Risk Framework will be used. Refer to **GDP 3.1-0001 Risk Framework**.
 - Residual Risk Ranking
 - To establish the residual risk ranking the Review Team will take the hazard into consideration with controls in place. GDP 3.1-0001 Risk Framework will be used. Refer to **GDP 3.1-0001 Risk Framework**.

Step 2

- After all eight categories of the Refinery Health Risk Register have been completed the hazards should be ranked against each other.
 - Residual Risk Ranking
 The hazards should be listed by residual risk rating and assigned a ranking. "1" will be assigned to the hazards with the highest residual risk ranking.

Appendix D

Quality Lab Health Risk Register Document Information

Chemical Hygiene Plan

- Systematically names each chemical used in the laboratory.
- Systematically names the health effects associated with each chemical.
- Identifies the controls in place for each chemical.
- Provides the systematic approach for maintaining the controls including checklists and inspection protocols.
- Provides reference to other necessary documents, including laboratory methods.

Quality Lab Health Risk Register

- Systematically assigns a risk ranking to each category of risk based on the chemical hygiene plan, current policies and controls currently in place.
- Is the driving factor in prioritization of risks for initiatives of the HSSE department. Refer to **Appendix C** for instructions on updating the Health Risk Register.

Refinery Health Risk Register

- Includes the Quality Lab information for biological and psychosocial hazard categories.
- Should be used for instruction for updating Quality Lab Health Risk Register. Refer to **Appendix C**.