

# *Applying Environmental & Occupational Hazard, Exposure, and Risk Management Processes*

2015 CIHC Conference San Francisco, CA  
Evaluating Worker Exposures – The Future is Here  
Wednesday, December 9, 2015

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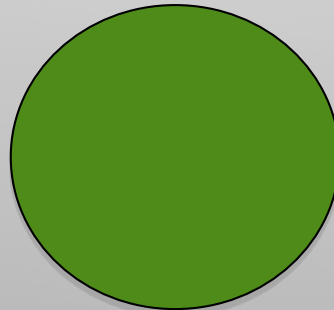
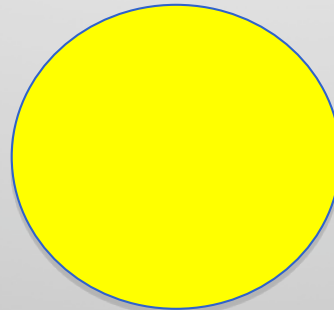
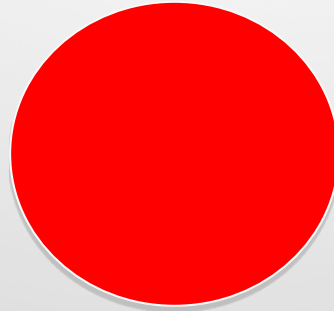
# E&ORM – The Banding of EHS

- Risk Communication through Risk Assessment
- Risk Level Based Management System (RLBMS)
- Developing and Applying RLBMS
- Risk Assessment & Control Database
- Banding Environment, Health, and Safety (EHS)
- Banding Environmental & Occupational Risk Management (E&ORM)
- Lessons Learned
- Future Vision



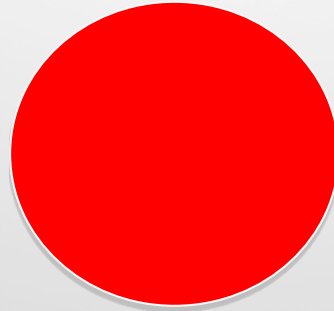
# Risk Communication

The Stoplight Effect – What do *you* do at a red?

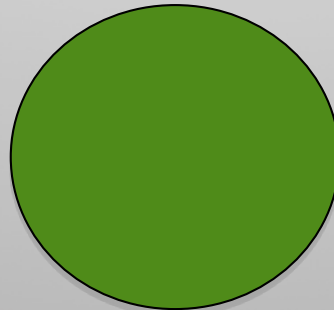
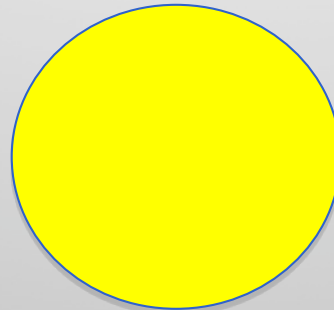


# Risk Communication

The Stoplight Effect – What do *you* do at a green?



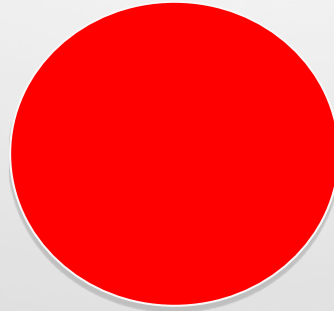
**STOP!**



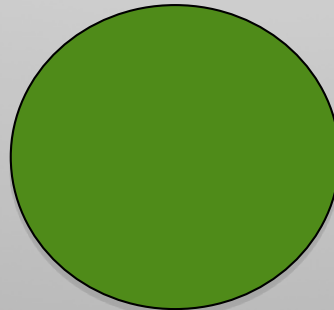


# Risk Communication

Easy worker system is green & red – is it practical?



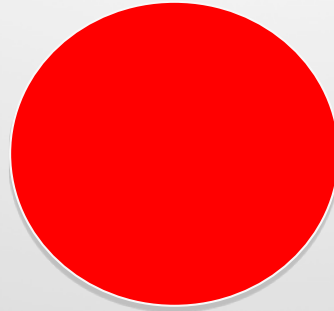
STOP!



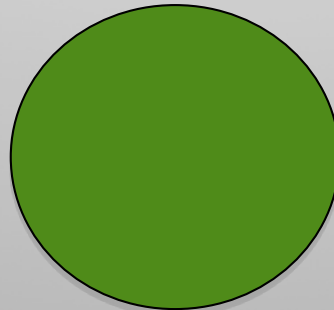
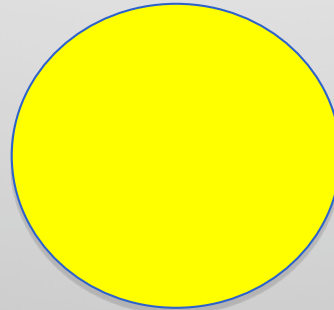
GO!

# Risk Communication

The Stoplight Effect – What do *you* do at a yellow?



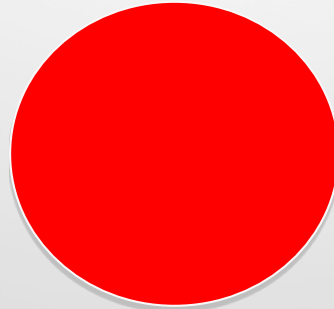
STOP!



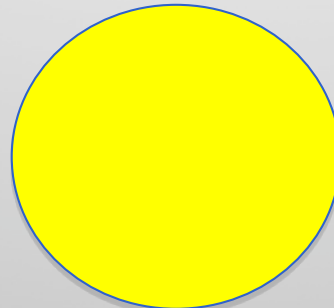
GO!

# Risk Communication

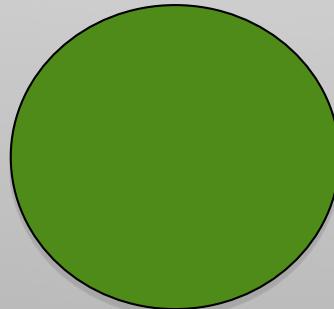
The Stoplight Effect – What do *you* do at a yellow?



**STOP!**



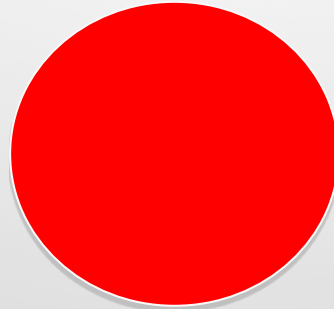
- Stop every time?
- Go every time?
- Assess traffic, then decide?
- Speed limit vs. your speed?



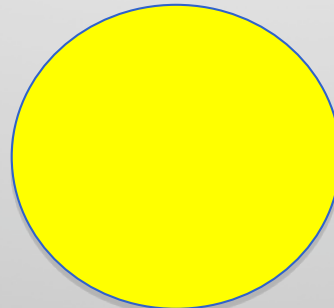
**GO!**

# Risk Communication

The Stoplight Effect – What do *you* do at a yellow?

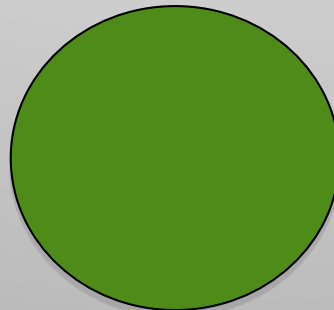


STOP!



- Stop every time?
- Go every time?
- Assess traffic, then decide?
- Speed limit vs. your speed?

... or **CHECK FOR  
POLICE?**



GO!

# Risk Communication

“Banding” splits ‘yellow’ into two risk levels (RLs)

<b>S E V E R I T Y</b>	Very High (serious injury)	RL 3	RL 3	RL 4	RL 4
	High (lost work time)	RL 2	RL 2	RL 3	RL 4
	Medium (first aid)	RL 1	RL 1	RL 2	RL 3
	Low (first aid)	RL 1	RL 1	RL 1	RL 2
		Extremely Unlikely	Less Likely	Likely	Probable
		<b>PROBABILITY</b>			



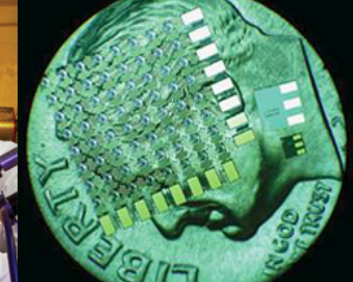
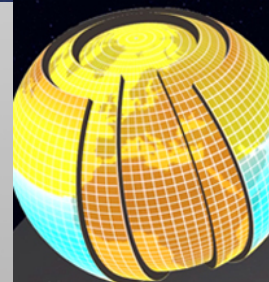
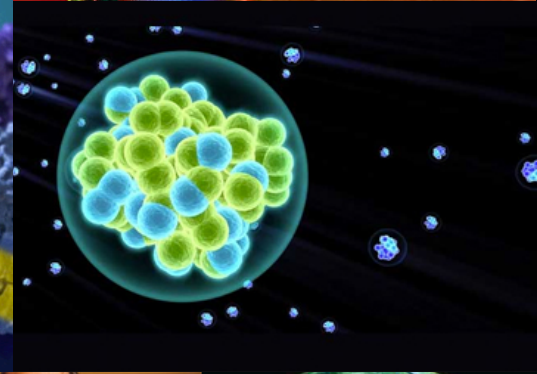
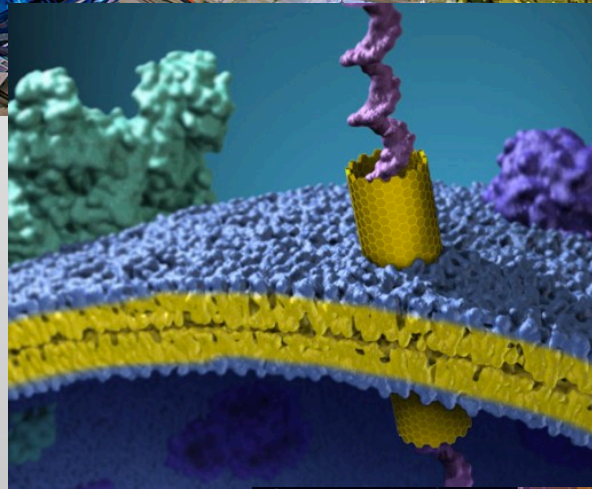
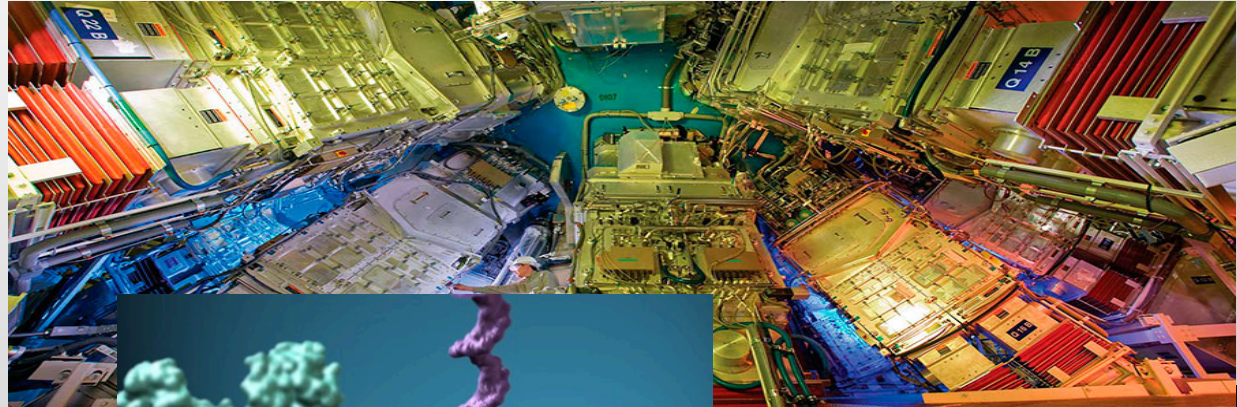
# Daily Life at a National Research Laboratory

## ■ Mission

- Basic Science
- Biosecurity
- Counterterrorism
- Defense
- Energy

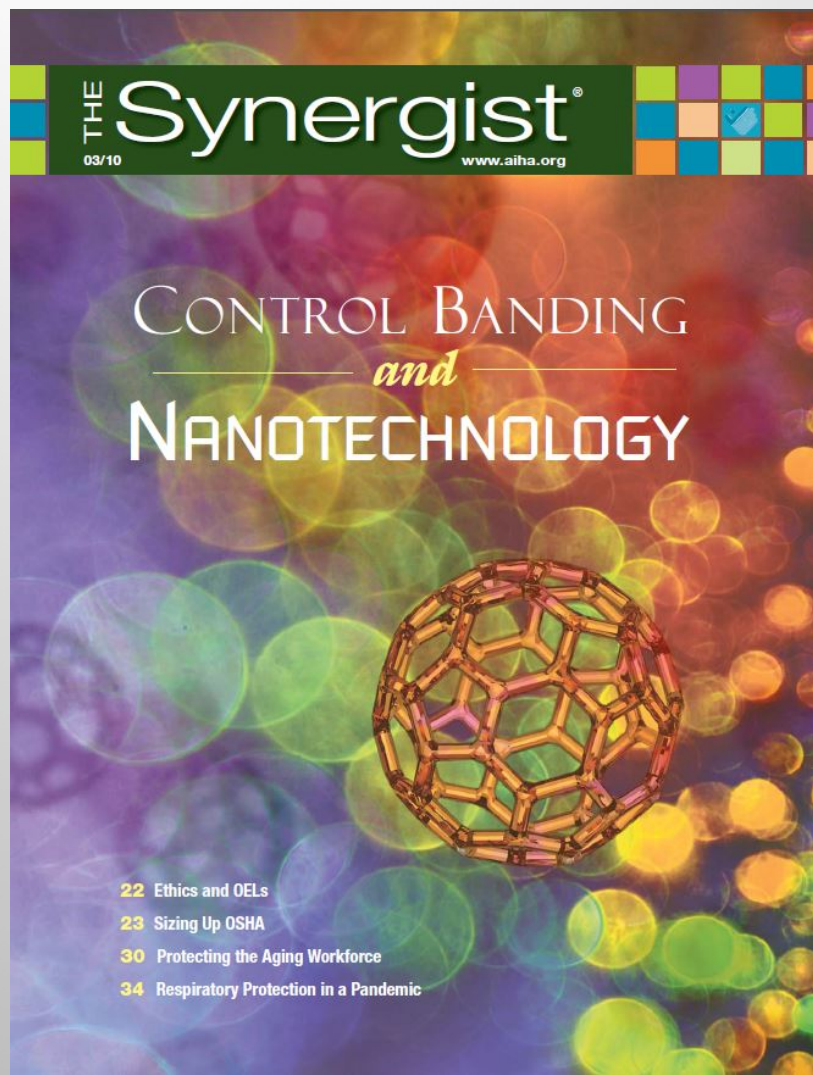
## ■ Research

- Computation
- Engineering
- Physical and Life Sciences
- Global Security
- Lasers





# Can Control Banding Work at a National Lab?



# Logic Behind Risk Level Based Management System (RLBMS)

**S  
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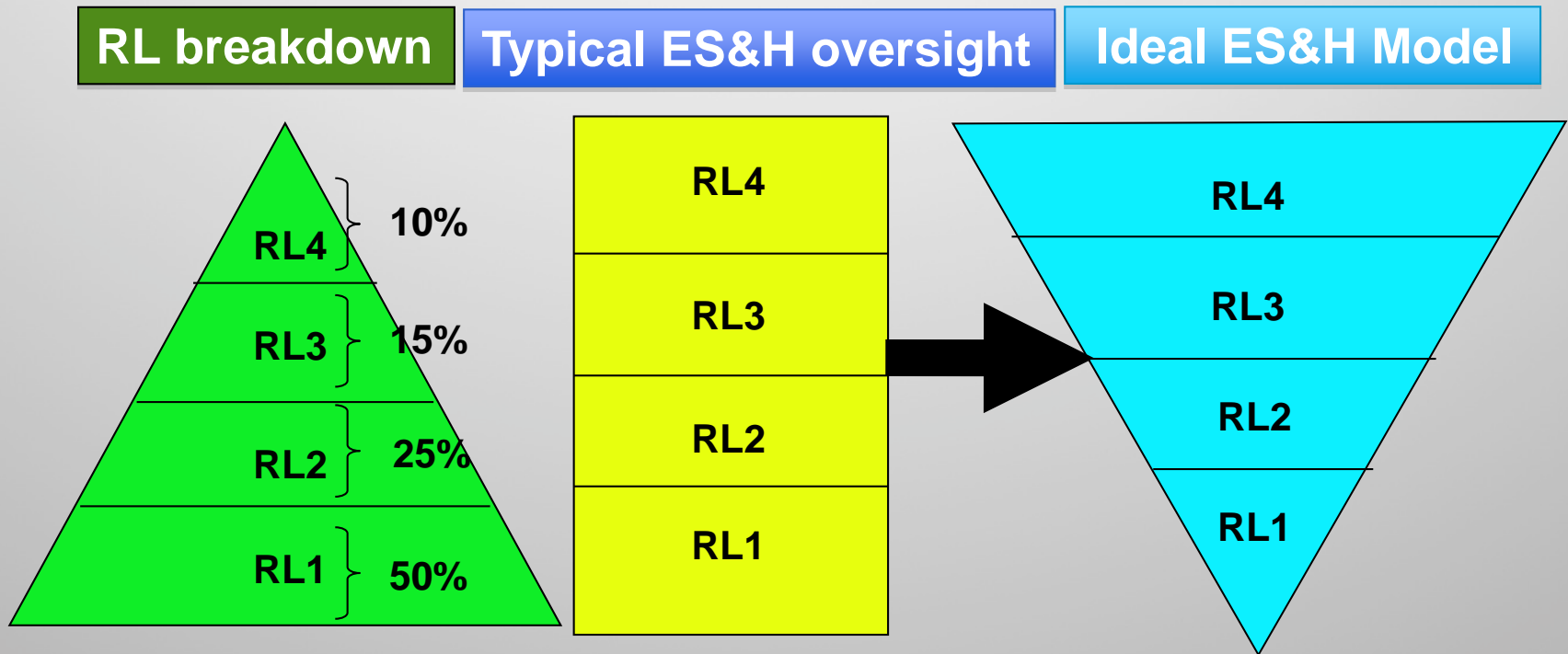
Very High (serious injury or illness)	RL 3	RL 3	RL 4	RL 4
High (lost work time)	RL 2	RL 2	RL 3	RL 4
Medium (recordable)	RL 1	RL 1	RL 2	RL 3
Low (up to first aid)	RL 1	RL 1	RL 1	RL 2
	Extremely Unlikely	Less Likely	Likely	Probable

**PROBABILITY**

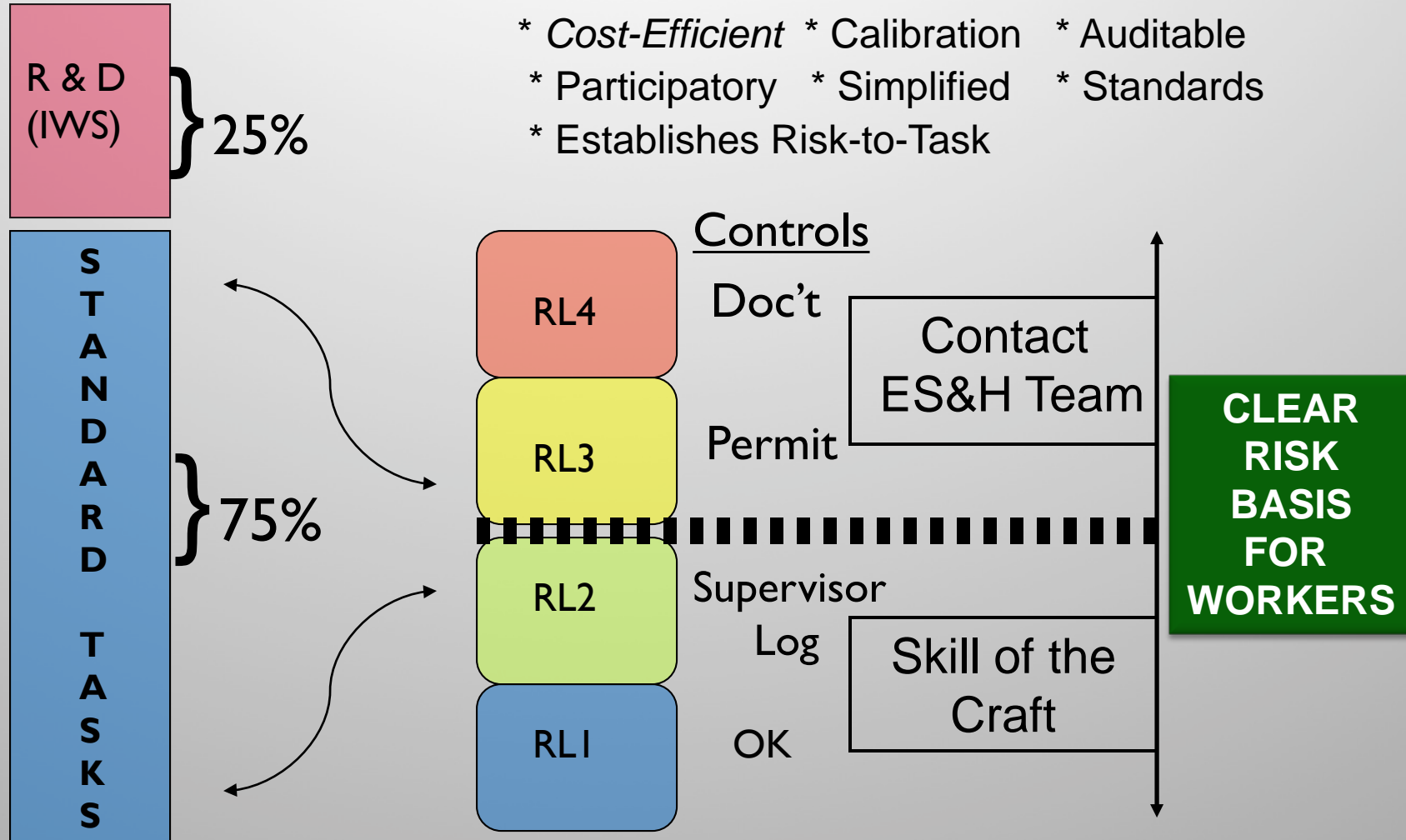


- RL1: OK.** Employees perform work under bi-annual application or approval. No oversight by Occupational Health & Safety (H&S) disciplines necessary.
- RL2: Log.** Established tasks with approved controls, recorded by supervisor. Periodic review of tasks, procedures, and controls by H&S disciplines.
- RL3: Permit.** H&S Team/supervisor review of hazard & controls (1 page). Supervisor and cognizant H&S disciplines need to formally concur.
- RL4: Controlling Document.** A thorough review of hazards & controls with the H&S Team, workers, and supervisors is performed and documented.

# Logic Behind RLBMS



# Risk Level Based Management System as Risk Communication



- Benefits to RLBMS
  - \* *Cost-Efficient*
  - \* *Calibration*
  - \* *Auditable*
  - \* *Participatory*
  - \* *Simplified*
  - \* *Standards*
  - \* *Establishes Risk-to-Task*

# Risk Level Based Management System as Risk Communication

Once the RL is known...  
... Risk Communication flows



- What level of hazards are present
- What controls are required
- What PPE is necessary
- What level of 'sign-off' is expected
- What documentation is necessary
- What level of training is required
- Whether medical surveillance is necessary
- What level of assistance is necessary
- Do I need advice from an expert
- **SHOULD I PICK UP A PHONE AND ASK**



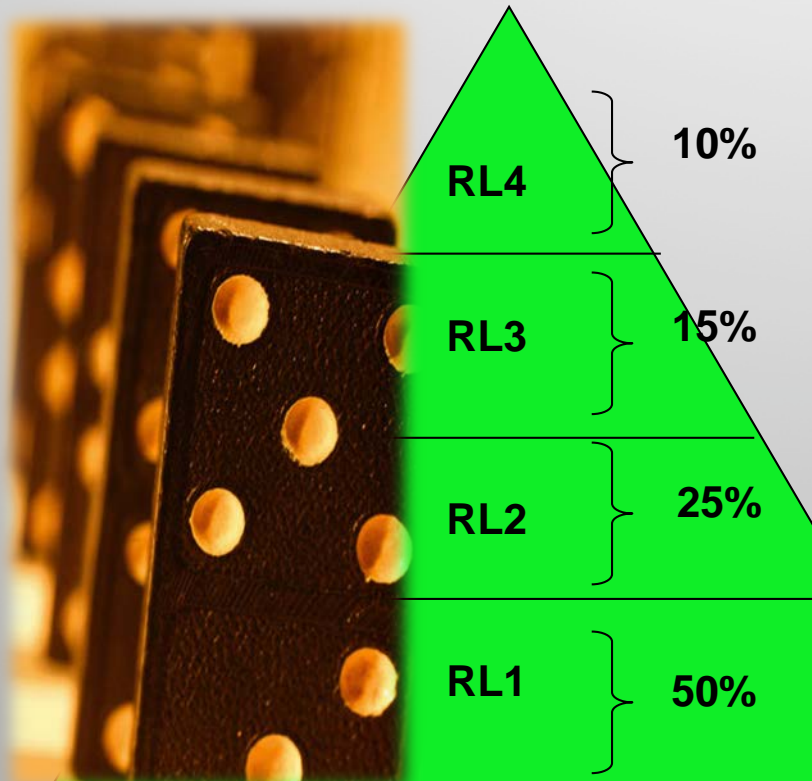
# How to Solve Hazard Assessment Inconsistency Issues?

## RLBMS and Control Banding Strategies

Once the RL is known...  
... Risk Communication flows

Batching tasks by similar  
exposures / controls

Example for Beryllium



Hazard	Example Tasks	Controls
Reasonable likelihood of airborne	CFF Chamber Entry; Large-scale D&D	RBWA; Tyveks; Respirator; Be Workers;
Dermal, possibility of limited airborne	Mechanical testing; Sputtering; Large assemblies	BWA: Respirator; Be Workers
Dermal exposure only	Handling small parts (targets); Work with foils	Local posting / labeling; Gloves; Be Awareness
No exposure potential	Instrument with embedded Be window	Do not access components.



# RLBMS Outcomes: Safety Checklist

NO	N/A	Items Assessed	YES	NO	N/A	Items Assessed
		<b>Fall Prevention and Protection</b>				<b>Excavation and Trenching</b>
		Employees are utilizing 100% fall protection at/above 6 feet (2 m).	22			Before digging, "utility locates" have been performed
		100% tie-off maintained at/above 6 feet (2 m) or when exposed to a fall hazard.	23			Occupied excavations are adequately protected against cave-in
		Fall protection in use is in satisfactory condition	24			"Competent Person" daily inspections are completed prior to excavation entry
		Employees will not contact a lower level obstruction during an arrest	25			Adjacent equipment (stationary/mobile) is controlled to prevent imminent danger to occupants
		Floor/Wall openings are covered, protected and labeled (i.e., load rating)	26			Employees are hand digging with non-conductive tools while locating underground utilities
		<b>Electrical Safety and Lockout/Tagout (LOTO)</b>				<b>Scaffolds</b>
		A GFCI/CB/Assured Grounding/Earthing program is being used where required	27			Scaffolds are installed, maintained and inspected per requirements and possess scaffold tag
		All exposed conductors are covered by closed electrical enclosures	28			Modification, erection and dismantling are performed only by competent scaffold erectors
		Temporary wiring terminations are protected both dielectrically and mechanically	29			Scaffolds are grounded where exposed to induction/electrical conductors
		Ground prongs are present on extension cords and power tools as required				<b>Ladders</b>
		Proper PPE is being used when working on energized circuits	30			Metal ladders and multi purpose ladders are not being used
		All applicable hazardous energies are isolated with an attached LOTO device and tag and all residual/stored energy relieved	31			Straight/Extension ladders are secured against displacement
		Zero energy checks are being performed with a volt ohm meter	32			Ladder positioning is adequate to perform work safely (proper ladder angle)
		Each exposed individual has control over the lockout device	33			Ladder is suitable for the task (e.g., extension vs. A-frame)
		LOTO device emergency/absent removal protocols are being followed	34			Employees are not standing on the top two rungs of ladders
		Proper insulated tools are being used for electrical work	35			Employees are maintaining 3-point contact while climbing ladders
		Is the proper signage in place				<b>Lifting/Rigging Operations</b>
		<b>Confined Space</b>	36			Only qualified operators are operating hoists (stationary and mobile)
		A full time attendant is present during confined space entry	37			Rigging operations are performed only by qualified riggers
		Confined space is being monitored for potential chemical and atmospheric hazards	38			In-service rigging equipment is in satisfactory condition (load limit tags, inspected, defect free, hoists)
		Adequate rescue equipment is readily available	39			All load hooks are equipped with safety latches
		The entry permit addresses all imminent dangers for permit required confined spaces	40			Swing radius has been identified/barricaded with danger tape or barricaded if needed
		Is the proper signage in place	41			High voltage lines are shielded when hoisting and rigging operations are within 10 feet

**ALL ITEMS**

Potential RL3  
 • RL2 if:  
 + In Place  
 + Identified  
 + Assessed

# Expert-Based Calibration is Essential

What makes an  
Negative  
Exposure  
Assessment?

- **Quantitative Validation!**
- How many samples?
- How often do we re-sample?
- How broad is the task scope?
- How narrow is the task scope?
- How detailed are the captured parameters?
- Other considerations?

**KEY COMPONENT  
FOR RL3 → RL2**



# Does Control Banding Fit with Regulations?

## Contract Management (External) – Selected from 1262 entries

10 CFR 835

BMBL

10 CFR 850

BAAQMD

10 CFR 851

CA Health & Safety

29 CFR 1910

CA Labor Code

29 CFR 1926

CA Water Code

ACGIH Ventilation Manual

DOE Orders

ACGIH TLVs 2005

DOE Guidelines

ACGIH TLVs & BEIs 2008

Executive Orders

ANSI

IEEE

ASME

ISO 14001:2004

BS OHSAS 18001:2007

ISO 9001:2008

## Contractor Assurance (Internal) – Adds Policies & Processes



# DOE-Related Regulations

- DOE-STD-6005-2001
  - Section 5.1 “...Baselines must be updated periodically with the frequency of updates being determined by **risk** and **variability** of operations...”
  - Section 5.3 “...The frequency that evaluations are updated should be proportional to the risk presented by the **hazard(s)**, the **variability** of the operation, the operation **frequency**, and the type and dependability of the **controls** limiting exposures...”
- 10 CFR 851
  - Sub-Section 851.24 (6)(a) Industrial Hygiene: {Contractors must implement...} **Initial or baseline surveys** and periodic resurveys and/or exposure monitoring as appropriate of **all work areas or operations** to identify and evaluate potential worker health risks;



# Risk Assessment & Control (RAC) Database (Main Menu)

## FIRST Step is to Develop a Procedure:

1. Hazard ID
2. Hazard Assessment
3. Risk Assessment
4. Control Application

## SECOND Step is to Develop Tool/Database:

1. Outline database processes to match procedure

**NOT the other way around!**

The screenshot shows the main menu of the Worker Safety & Health Functional Area IH Risk Assessment & Control Database. The header includes the Lawrence Livermore National Laboratory logo and the text "Worker Safety & Health Functional Area" and "IH Risk Assessment & Control Database". Below the header is a row of historical figures. The main menu consists of three sections: 1. Risk Assessment: A large blue button labeled "Risk Assessment". To its right are four colored buttons: "Asbestos AWP Work Permit" (purple), "Lead LWP Work Permit" (green), "Respiratory HAC Protection" (yellow), and "Filtering RIP Facepieces" (orange). Below these buttons is a form with fields for "WCD #:" and "Task:", a "Type:" dropdown, and a "Clear Criteria" button. 2. Facility Survey: A large red button labeled "Facility Survey". To its right is a form with a "Facility #:" field, a "Perform Search" button, and a "Clear Criteria" button. 3. Hazard Source Documents: A large grey button labeled "Hazard Source Documents Risk Levels". To its right is a form with fields for "Hazard Title:" and "IH SME Name:", and "Perform Search" and "Clear Criteria" buttons.



# Accessing and Using the RAC Database

The screenshot displays the 'Worker Safety & Health Functional Area' website for Lawrence Livermore National Laboratory. The page is titled 'IH Risk Assessment & Control Database' and features a header with historical figures. Below the header, there are navigation links: 'Peroxidizable Chemicals', 'Beryllium Inventory & Characterization Summaries', 'Reports', and 'Exit Database'. The main content area is divided into three sections: 'Risk Assessment', 'Facility Survey', and 'Hazard Source Documents'. Each section contains a large button and a search form with 'Perform Search' and 'Clear Criteria' buttons.

**Worker Safety & Health Functional Area** Lawrence Livermore National Laboratory

**IH Risk Assessment & Control Database**

Peroxidizable Chemicals Beryllium Inventory & Characterization Summaries Reports Exit Database

**Risk Assessment**

Asbestos **AWP** Work Permit

Lead **LWP** Work Permit

Respiratory **HAC** Protection

Filtering **RIP** Facepieces

**ALAB** Rush Form

To create a new permit, first perform a risk assessment. To view or extend existing permits or HAC, enter WCD#, Type & Task, then click on AWP, LWP or HAC button. Leave fields blank to find all.

WCD #:  Type:  Clear Criteria

Task:

**Facility Survey**

Select a specific facility from the list and then click the Perform Search button. Leave the field blank to find all.

Facility #:

Perform Search

Clear Criteria

**Hazard Source Documents** Risk Levels

Hazard Title:

IH SME Name:

Perform Search

Clear Criteria



# Hazard Source Documents

## The “Source” of Truth

## Development

- Define Risk Levels
- Include example tasks
- Define controls per RL
- Define follow up requirements

### Key Points:

- Assessment & control language written for the worker
- Field ESH personnel concurrence on content

Hazard Risk Level Determination Document		Arsenic	
New Summary		Archive Summary	
Update Summary		Undo Typing	
		Main Menu	
<b>Note from SME:</b> Use this RL Source Document for work operations where the exposure to inorganic arsenic may occur (e.g., copper acetoarsenite, arsenic and all inorganic compounds containing arsenic except arsine). DO NOT use this RL Source Document for arsine gas. Use the Gas RL Source document for arsine gas. Use the Metal Fume RL Source Document for welding metals alloyed with arsenic or coated with arsenic containing paint. Use the NOL – Liquid/Mist/Vapor or NOL – Solid/Dust/Fiber RL Source Document when organic		<b>Hazard</b> (see end for full description) Any activity that involves the potential for inhalation or ingestion or skin or eye contact with inorganic arsenic containing dusts, fumes, aerosols, liquids or vapors. Current uses of inorganic arsenic include: as a wood preservative (e.g.	
<b>Risk Level 1:</b> Typically the level at which there is no dermal, inhalation or body part exposure to the hazard (i.e., enclosed system, etc.). $<1 \mu\text{g}/\text{m}^3$ as 8-hour TWA		<b>Risk Level 2:</b> Typically dermal or body part exposure but confident that inhalation exposure will not exceed 50% of the ACGIH TLV and OSHA PEL or 100% of the OSHA AL. Between $1 \mu\text{g}/\text{m}^3$ , but $<5 \mu\text{g}/\text{m}^3$ as 8-hour TWA	
<b>Risk Level 3:</b> Typically dermal or body part exposure but confident that inhalation exposure will not exceed the OSHA PEL. No confidence that inhalation exposure is less than 50% of the ACGIH TLV or 100% of the OSHA AL. Between $5 \mu\text{g}/\text{m}^3$ , but $<10 \mu\text{g}/\text{m}^3$ as 8-hour TWA		<b>Risk Level 4:</b> Typically dermal or body part exposure and no confidence that inhalation exposure will be below the ACGIH TLV or OSHA PEL. $\geq 10 \mu\text{g}/\text{m}^3$ as 8-hour TWA	
<b>Hazard in WCD?</b> Yes; WAL B; Carcinogens, mutagens, reproductive hazards		<b>Hazard in WCD?</b> Yes; WAL B; Carcinogens, mutagens, reproductive hazards	
<b>Hazard Assessment Language:</b> [NAME OF SPECIFIC INORGANIC ARSENIC COMPOUND / TRADENAME WHICH HAS XX% INORGANIC ARSENIC, ETC.] is a [CHEMICAL FORM] and is [DESCRIBE TASK]. This is done approximately [FREQUENCY] for about [DURATION]. No more than [QUANTITY] is handled. Routes of		<b>Hazard Assessment Language:</b> [NAME OF SPECIFIC INORGANIC ARSENIC COMPOUND / TRADENAME WHICH HAS XX% INORGANIC ARSENIC, ETC.] is a [CHEMICAL FORM] and is [DESCRIBE TASK]. This is done approximately [FREQUENCY] for about [DURATION]. No more than [QUANTITY] is handled. Routes of	
<b>Example Tasks:</b> <b>HAZARD COMMUNICATION:</b> Storage and handling of intact and closed containers of arsenic (i.e., organization of materials; performing chemical inventories; facility inspections; transporting completely sealed materials/samples, etc.).		<b>Example Tasks:</b> <b>HAZARD COMMUNICATION:</b> None yet identified <b>CHEMICAL HYGIENE:</b> 1. Performing closed system operations. Charging closed systems is considered RL3 or RL4 depending upon chemical form.	
<b>Controls:</b> <b>ADMINISTRATIVE:</b> 1. Visually inspect containers prior to handling. If evidence of leaks are present, do not handle material and contact chemical owner and/or H&S Technician. 2. If container breaks or spills, prevent others from entering area; evacuate area and call the H&S Technician and Facility Manager.		<b>Controls:</b> <b>NOTE:</b> No HAZCOM tasks have been identified for RL2. Contact SME if you believe a HAZCOM task should be included in RL2. The below controls will need to be modified for HAZCOM tasks. <b>SUBSTITUTION:</b> IH to discuss with customer to consider alternatives to arsenic	
<b>Respirator Req:</b> None		<b>Respirator Req:</b> None	
<b>Required Follow-up:</b> None		<b>Required Follow-up:</b> 1. [HAZCOM] initial monitoring to determine TWA is required for each shift for each job classification in each work area. Create a sampling plan using 142655 or the sampling	
		<b>HAZARD COMMUNICATION:</b> Minimum APR HF APP10 or APR FF	
		<b>HAZARD COMMUNICATION:</b> Minimum APR FF APP50 for	

# Hazard Source Documents

List developed by identifying OSHA regulated materials and LLNL specific policy. NOL-Liquid/Mist/Vapor & NOL-Solid/Dust/Fiber hazards are a catch-all for chemicals “Not Otherwise Listed” below.

## > 36 Hazard Source Documents for IH

1,3-Butadiene	Biological (BSL)	Hydrofluoric Acid	NOL-Liquid/Mist/Vapor
1-DB-3-CP	Bloodborne Pathogens	Lead	NOL-Solid/Dust/Fiber
13 Carcinogens	Cadmium	Magnetic Fields	Peroxidizables
Acrylonitrile	Chromium +6	Mercury	Refrigerants
Arsenic	Cryogen	Metal Fume	RF/Microwave
Asbestos	Ethylene Oxide	Methylene Chloride	Rodent Droppings
Benzene	Formaldehyde	Methylenedianiline	Silica
Beryllium	Gas	Nanomaterials	Valley Fever
Biological (ABSL)	Heat Stress (x2)	Noise	Vinyl Chloride



# Perform a Risk Assessment

Everything starts with the risk assessment:

1. Start with scope of work
2. Identify tasks
3. Identify hazards

**FUNDAMENTAL IH!**

The screenshot shows the 'Worker Safety & Health Functional Area' website for Lawrence Livermore National Laboratory. The page features a header with the title and a navigation bar with links for 'Peroxidizable Chemicals', 'Beryllium Inventory & Characterization Summaries', 'Reports', and 'Exit Database'. Below the header is a row of historical figures. The main content area includes a large blue 'Risk Assessment' button, four colored buttons for 'Asbestos AWP Work Permit' (purple), 'Lead LWP Work Permit' (green), 'Respiratory HAC Protection' (yellow), and 'Filtering RIP Facepieces' (orange), and a dark blue 'ALAB Rush Form' button. A text block explains the process: 'To create a new permit, first perform a risk assessment. To view or extend existing permits or HAC, enter WCD#, Type & Task, then click on AWP, LWP or HAC button. Leave fields blank to find all.' Below this is a form with fields for 'WCD #:', 'Type:', and 'Task:', and a 'Clear Criteria' button.



# Perform a Risk Assessment

## The IH Control Panel:

1. ID Location
2. ID Task (define them!)
3. ID Hazard
4. ID Risk Level via example tasks or built-in algorithms

What appears is the standard hazard assessment language, minimum controls and required follow up actions (surveillance requirements)

**Risk Assessment and Control** FOM 1-07 Thursday, June 27, 2013

Location: S200 WCD #: 13103 WCD Type: IWS  
 Task: Chemistry  
 Hazard: Chemical Use (Hazard Communication) Risk Level: 1  
 Specific Agent(s): toxic, corrosive, flammable chemicals  
 Assessment: Lab packing of chemicals for offsite disposal. Usually chemicals will remain in sealed, original manufacturers containers, work is performed on a ventilated table. Occasionally chemicals will be opened in a laboratory fume hood for tests, such as pH, freeze point and

**Task Specific Requirements for Risk Level: Expanded View**

**INSTRUCTIONS:** Modify text in the "Hazard Assessment Language" and the "Minimum Level of Control" fields to match the specific task you are assessing. Click the button above the field to copy the text. Paste the text into your WCD. Use the follow up tools to immediately close out any required followup actions. Change the Follow-Up status field to "Complete" when finished.

Task	Hazard	Specific Agent(s)	RL	Assessor Name	WCD Type	WCD #	Location	Follow-Up Complete
Chemistry	Chemical Use (Hazard Communication)	toxic, corrosive, flammable chemicals	1		IWS	13103	S200	6/27/13
Developing Instrumentation	Oxygen Deficiency		0		IWS	17762	S200	
Testing, Non-Destructive	Heat Stress (Normal Work Clothing)		2		IWS	777	S200, S300,	
Testing, Non-Destructive	Noise		2		IWS	777	S200, S300,	6/27/13
Abating	Asbestos		4		IWS	11111	1111	
Abating	Lead		4		IWS	00000	000	
Collecting Samples (ESH)	Beryllium		3		IWS	15316	S200, S300	
Collecting Samples (ESH)	Beryllium		3		IWS	15317	S200, S300	

# Perform a Risk Assessment

Risk Levels for Particular Hazards Determined by:

1. The definition of the hazard's risk levels
2. Example tasks by risk level
3. Built-in algorithms:
  - CB NanoTool
  - Chemical Use Tool
  - Oxygen Deficiency Tool
  - Toxic Gas Tool
  - Welding Tool

# Risk Assessment Algorithms – CB NanoTool

## The CB NanoTool:

- Developed with Sam Paik
- Used world-wide

Select items from dropdown lists in yellow highlighted fields to determine probability and severity.

Click the Assign Risk Level button to automatically generate the RL along with minimum hazard assessment language, controls and follow up actions.

Task Specific Requirements for Risk Level		Risk Level Selection Tools		Risk Level Selection Guide	
CB NanoTool	Chemical Tool	Oxygen Deficiency Tool	Toxic, Corrosive or Reactive Gas Tool		
<b>INSTRUCTIONS:</b> Select a variable from the yellow highlighted fields to obtain your risk level. Click the "Assign Risk Level" button when all yellow highlighted fields have been completed.					
<b>Activity Classification:</b> <input type="text"/>	<b>Parent Material:</b> Lowest OEL: <input type="text"/> Carcinogen?: <input type="text"/> Reproductive Hazard?: <input type="text"/> Mutagen?: <input type="text"/> Dermal Hazard?: <input type="text"/> Asthmagen?: <input type="text"/>	<b>Nanoscale Material:</b> Surface Reactivity: <input type="text"/> Particle Shape: <input type="text"/> Particle Diameter: <input type="text"/> Solubility: <input type="text"/> Carcinogen?: <input type="text"/> Reproductive Hazard?: <input type="text"/> Mutagen?: <input type="text"/> Dermal Hazard?: <input type="text"/> Asthmagen?: <input type="text"/>	<b>Operational Factors:</b> Maximum Amount of Chemical Used in One Day: <input type="text"/> Dustiness / Mistiness: <input type="text"/> # of Employees with Similar Exposure: <input type="text"/> Frequency of Operation (Annual Basis): <input type="text"/> Operation Duration (per Shift): <input type="text"/>		
Visit the following to help you determine if the material is an asthmagen: <a href="#">O'heal (Asthmagens)</a> <a href="#">Public Library of Materials (Asthmagens)</a> <a href="#">Industries &amp; Asthmagens</a> <a href="#">Occupational Asthmagens (NY DOH)</a>					
			<b>Probability:</b>	<b>Severity:</b>	<b>Risk Level:</b>
			<input type="text"/>	<input type="text"/>	<input type="text"/>
			<input type="text"/>	<input type="text"/>	<input type="text"/>
			<b>Assign Risk Level</b> (click if satisfied with displayed risk level)		



# Risk Assessment: Tools

## ChemTool

- Based on EMKG Risk Assessment Tool, Federal Institute for Occupational Safety & Health, Germany (BAuA)
- For NOL – Solid/Dust/Fiber or NOL – Liquid/Mist/Vapor
  - Define Hazard Group, Dispersion Potential and Quantity to obtain RL

### Risk Assessment and Control

FOM1-07 Saturday, May 10, 2014

[New](#) [Duplicate](#) [Archive](#) [Save](#) [Email Assessment](#) [Main Menu](#)

Location:  WCD #:  WCD Type:

Task:  [Task List](#)

Hazard:  Risk Level:

Specific Agent(s):  [ChemTool](#)

Task Definition:

**INSTRUCTIONS:** Specify the chemical hazard first (i.e., ethanol, IPA, acetone, metalworking fluids, etc.). You can also specify classes of chemicals (i.e., acids, bases, carcinogens, etc.). Then make your chemical state selection. Fill in the remaining yellow highlighted fields based on the definitions provided. Click the "Assign Risk Level" button when complete.

Specific Agent(s):  Peroxidizables?  Yes  No [\(see list\)](#) [NIOSH Pocket Guide](#) [Guidance for Handling Powders with Unknown Toxicity](#)  
[OSHA Chemical Database](#)

Chemical State:

Hazard Group:

Dispersion Potential:

Quantity:

1 Dermal and respiratory irritant. May cause lung damage. Vapors may cause drowsiness or dizziness.	OR	<input type="text" value="OEL ≥ 50 ppm"/>	<b>Low:</b> BP > 150 C (> 302 F); VP < 0.5 kPa (< 4 Torr or mmHg)	<b>Low:</b> milliliters (ml)	
2 Harmful by inhalation and ingestion. Risk of irreversible effects.	OR	<input type="text" value="5 ≤ OEL &lt; 50 ppm"/>			<b>Moderate:</b> liters (L)
3 Acutely toxic. Causes burns. Suspect carcinogen. May cause sensitization upon inhalation. Possible risk of impaired fertility, mutagen or teratogen.	OR	<input type="text" value="0.5 ≤ OEL &lt; 5 ppm"/>			<b>High:</b> cubic meter (m3)
4 Very toxic by inhalation and ingestion. Contact with acids liberates very toxic gas. Carcinogen, mutagen, and/or teratogen. Danger of very serious irreversible effects.	OR	<input type="text" value="OEL &lt; 0.5 ppm"/>			<b>Assign Risk Level</b> (click after entering values for each yellow highlighted field)

**Moderate:** BP between 50 - 150 C (122 - 302 F); VP between 0.5 - 25 kPa (4 - 188 Torr or mmHg)

**High:** BP < 50 C (< 122 F); VP > 25 kPa (> 188 Torr or mmHg)

# Risk Assessment: Tools

## Peroxide Formers

- LLNL Institutional guidance for peroxide forming chemicals

Peroxidizable Chemicals

**Peroxidizable Chemical List**

Tables from ESH Manual Document 14.1, Section 3.7.3, Revision 10

Hazard and control language below are **IN ADDITION** to those for the NOL - Liquid/Mist Vapor or NOL - Solid/Dust/Fiber hazards. Many common industrial chemicals contain peroxidizable solvents (e.g. tetrahydrofuran in PVC cement and 2-butanol in solder flux). The non-volatile compounds in these mixtures prevent the concentration of explosive peroxides. Such mixtures are exempt from labeling, testing, and storage limits.

Table 2: Autopolymerizable Chemicals	Table 3: Peroxidizables Capable of Violent Reaction without Concentration	Table 4: Peroxidizables Requiring Concentration (Storage Hazard)
butadiene chloroprene chlorotrifluoroethylene methyl methacrylate styrene tetrafluoroethylene vinyl acetate vinyl acetylene vinyl chloride vinylidene chloride vinyl pyridine	isopropyl ether diethyl ether (uninhibited) dioxanes (uninhibited) tetrahydrofuran (uninhibited)	acetal allyl ether cyclohexene diethyl ether (inhibited) dioxanes (inhibited) ethylene glycol dimethyl ether (glyme) diethylene glycol dimethyl ether (diglyme) 1,2-dimethoxymethane (methylal) furan 2-methoxyethanol 2-methyltetrahydrofuran tetrahydrofuran (inhibited) vinyl ethers
<b>Hazard</b> <span>Copy</span> [Chemical Name(s)] is/are an organic [liquid] [gas] that forms peroxides when exposed to air. This chemical autopolymerizes which means the peroxides formed are capable of initiating violent polymerization reactions.	<b>Hazard</b> <span>Copy</span> [Chemical Name(s)] is/are an organic [liquid] [gas] that forms peroxides which are capable of violent reactions without concentration.	<b>Hazard</b> <span>Copy</span> [Chemical Name(s)] is/are an organic [liquid] [gas] that forms peroxides upon concentration and is a storage hazard.
<b>Controls:</b> <span>Copy</span> 1. Visually inspect the container for crystal growth, layering of liquids and discoloration before handling the container. DO NOT handle the container if any of these or other signs of dangerous peroxide levels are present. Call the ESH Team or Fire Department. 2. (Liquid or gaseous monomers exceeding 10 grams) Label container with Figure 1 in ESH Manual 14.1. Write on the label the date received and disposal date which is one year from the receipt date [H CAN MODIFY DISPOSAL DATE IF MSDS INDICATES THAT IT IS STABLE UPON STORAGE].	<b>Controls:</b> <span>Copy</span> 1. Visually inspect the container for crystal growth, layering of liquids and discoloration before handling the container. DO NOT handle the container if any of these or other signs of dangerous peroxide levels are present. Call the ESH Team or Fire Department. 2. Label container with Figure 1 in ESH Manual 14.1. Write on the label the date received and disposal date which is one year from the receipt date [three years for sure-seal or inert gas storage]. 3. Opened Container: Update the label with the opened date and the six month peroxide testing frequency [12-months for sure-seal or inert gas storage]. 4. Dispose of chemical when peroxide results exceed 100 ppm. [DE-PEROXIDING ON A CASE-BY-CASE BASIS IS ALLOWED IF NEEDED. CONTACT THE SME FOR CONTROLS].	<b>Controls:</b> <span>Copy</span> 1. Visually inspect the container for crystal growth, layering of liquids and discoloration before handling the container. DO NOT handle the container if any of these or other signs of dangerous peroxide levels are present. Call the ESH Team or Fire Department. 2. Label container with Figure 1 in ESH Manual 14.1. Write on the label the date received and disposal date which is three years from the receipt date [six years for sure-seal or inert gas storage]. 3. Opened Container: Update the label with the opened date and the 12-month peroxide testing frequency [24-months for sure-seal or inert gas storage]. 4. Dispose of chemical when peroxide results exceed 100 ppm. [DE-PEROXIDING ON A CASE-BY-CASE BASIS IS ALLOWED IF NEEDED. CONTACT THE SME FOR CONTROLS].

# Risk Assessment: Tools

## Eye & Face Protection

- ANSI Z87.1-2010 compliant
- Considerations for what type of eye/face protection to prescribe based on splash potential
- Includes requirements for when respirators are worn too

**Eye & Face Protection for Chemical Operations**

PPE alone should not be relied upon as the sole means of protection against eye and face hazards, but should be used in conjunction with engineering controls and sound safety practices.

NOTES:

- Working with volumes of  $\leq 100$  mL of chemicals is generally not considered to be an eye/face splash hazard unless energy is applied or created.
- Goggles can be substituted for safety glasses w/ side shields, but not vice versa.
- Enclosed systems must be fully enclosed to act as a barrier to prevent splash or dermal contact. If the enclosure is breached to interact with materials, the enclosure cannot be treated as an engineering barrier at that time.
- The risk levels below are to be used in conjunction with the specific hazard (i.e., Chemical Use, etc.) in RAC which are based on airborne exposure levels. If respiratory protection is prescribed for any of the Risk Levels using the specific hazards in RAC, the respirator configurations described in the below Risk Level 4 must be used regardless of the Risk Level determined by the specific hazard in RAC if a splash hazard also exists. For example, if your Chemical Use hazard in RAC tells you it is Risk Level 2 or 3 and you prescribe a respirator and the task has the potential for splash, you must prescribe one of the respirator configurations listed in Risk Level 4 of the table below.

	Risk Level 1	Risk Level 2	Risk Level 3	Risk Level 4
<b>Definition</b>	No credible splash hazard exists and there is no potential for mist, vapor or gas creation.	Minor splash hazard exists and there may be potential for mist, vapor or gas creation.	Splash hazard exists and/or there may be potential for mist, vapor or gas creation.	Major splash hazard exists and/or there is a potential for mist, vapor or gas creation.
<b>Bounding Conditions</b>	Chemical or reaction by-products do not create a mist, vapor or gas exposure hazard that is also an eye or dermal hazard.	Chemical or reaction by-products without a Skin Designation that may create a mist, vapor or gas exposure hazard without regard for engineered controls and is/are also an eye or dermal hazard.	Chemical or reaction by-products including those with a Skin Designation that may create a mist, vapor or gas exposure hazard without regard for engineered controls and is/are also an eye or dermal hazard.	Chemical or reaction by-products including those with a Skin Designation that create a mist, vapor or gas exposure hazard without regard for engineered controls and is/are also an eye or dermal hazard.
<b>Minimum Protection</b>	Safety glasses w/ side shields	1. Safety glasses w/ side shields and face shield; or 2. Goggles	Goggles and face shield	1. FF APR; or 2. FF PAPR; or 3. FF airline; or 4. FF SCBA; or 5. Hood/helmet PAPR w/ goggles
<b>Ability to Downgrade</b>	No	Yes: If an engineering barrier is in place that provides the same level of protection as a face shield then the minimum protection requirements for RL1 can be used (i.e., blast shield, safety shield/splash guard, fume hood sash, fully-enclosed reaction vessel, etc. that does not permit the contents to vent to an area where employees are present). State how the engineering control is to be used in the WCD.	Yes: If an engineering barrier is in place that provides the same level of protection as a face shield then the minimum protection requirements for RL2 can be used (i.e., blast shield, safety/splash guard, fume hood sash, fully-enclosed reaction vessel, etc. that does not permit the contents to vent to an area where employees are present). State how the engineering control is to be used in the WCD.	Yes: If an engineering control is in place that reduces airborne exposure to below the AL or OEL then the minimum protection requirements for RL3 can be used (i.e., LEV). State how the engineering control is to be used in the WCD.

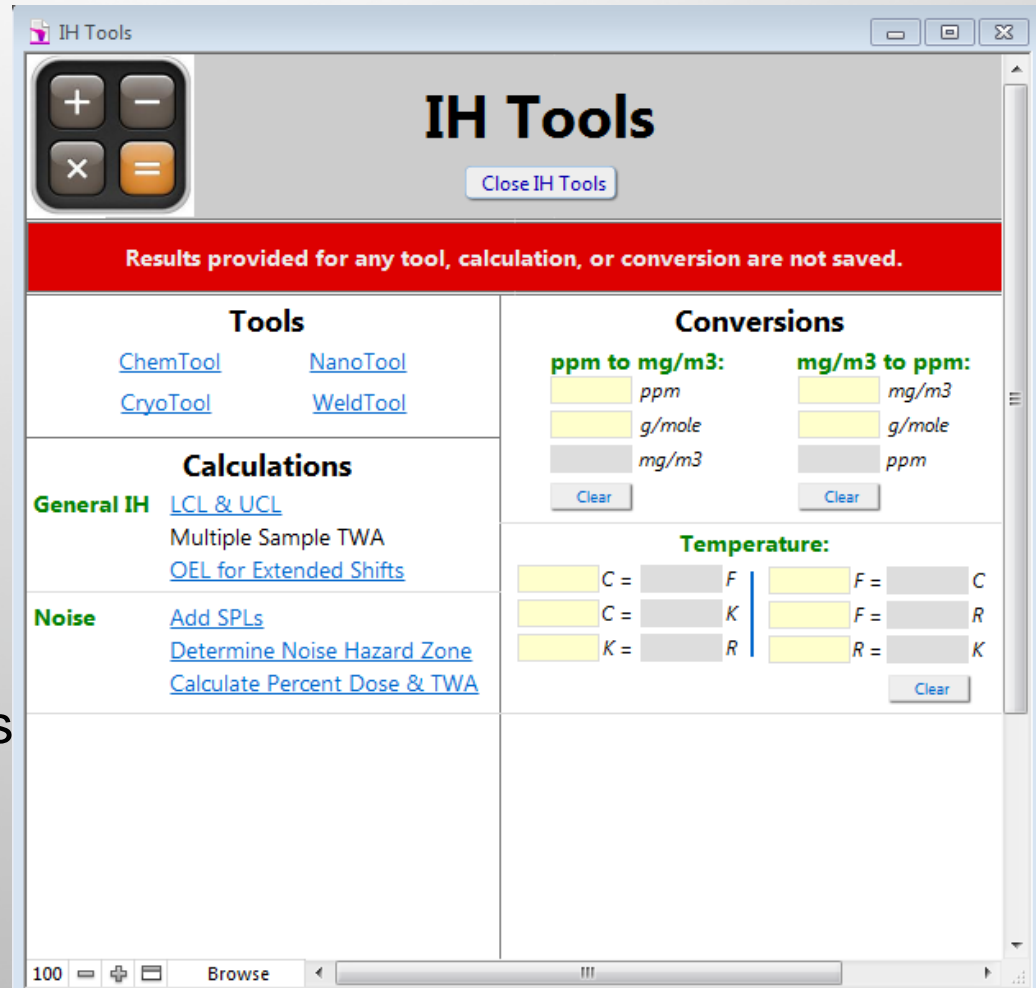
100 | Browse

ist/Vapor    reactivities    2    Janeen Robertson    IWS    11851    132N    5/9/2014

# Risk Assessment: Tools

## IH Tools

- Quick method to calculate rationale for selection of risk levels
- Conversions
- Calculations
  - LCL & UCL
  - OELs for Extended Shifts
  - Add SPLs
  - Noise Hazard Zones
  - Percent Dose



# Risk Assessment: Tools

## Statistics

- Calculate LCL and UCL for single data points using Sampling & Analytical Errors (SAE)

The screenshot shows a software window titled "IH Tools" with a subtitle "Upper & Lower Confidence Limits for a Data Point". A red status bar at the top right indicates "Results are NOT saved". The interface includes a "Main Menu" and "Close Window" button. A text block explains the calculation of confidence limits, followed by the formula: 
$$LCL \text{ or } UCL = \frac{\text{Measured Exposure}}{OEL} \pm SAE$$
 Definitions for LCL, UCL, SAE, OEL, and Measured Exposure are provided. The form is divided into two sections: "Personal Air Sampling" and "Personal Noise Dosimetry". The "Personal Air Sampling" section includes input fields for Agent, SAE, Measured Exposure, and OEL, along with a "Clear Data" button and a table for LCL and UCL results. The "Personal Noise Dosimetry" section includes an input field for Measured Exposure (in dBA TWA) and a "Clear Data" button, with a corresponding table for LCL and UCL results.

**Upper & Lower Confidence Limits for a Data Point** Results are NOT saved

IH Tools Main Menu Close Window

The calculation of a confidence limit or interval is a statement of probability. In application, this equation is used to calculate the one-sided upper OR lower confidence limit. The upper confidence limit (UCL) is calculated to determine the exposure reporting route for the exposure result(s) you collected. OSHA will not issue a citation unless the exposure sampling results obtained by their industrial hygienist exceeds the 95% UCL for that method and PEL. What they are saying is that they are relatively confident that the result they obtained did not occur by chance.

$$LCL \text{ or } UCL = \frac{\text{Measured Exposure}}{OEL} \pm SAE$$

LCL = 95% Lower Confidence Limit  
UCL = 95% Upper Confidence Limit  
SAE = Sum of the sampling and analytical error expressed as a fraction  
OEL = Occupational Exposure Limit  
Measured Exposure = 8-hour TWA, STEL, Ceiling, etc. without regard for PPE protection factors

**Personal Air Sampling:**

For reporting route determination, the Action Level or 50% of the OEL, in absence of an Action Level, must be inputted into the OEL field.

Agent =  Clear Data

SAE =

Measured Exposure =  (without units)

OEL =  (without units)

LCL	UCL
<input type="text"/>	<input type="text"/>

**Personal Noise Dosimetry:**

Enter the time weighted average result into the field to the right.

Measured Exposure =  dBA TWA Clear Data

LCL	UCL
<input type="text"/>	<input type="text"/>

100 Browse



# Risk Assessment: Reports

## Individual RA Report

- Generates PDF with standard naming convention
- Works with email software to automatically attach to outgoing message

Risk Assessment	
Asbestos Hazard during Abating at Facility #TEST (JWS #TEST)	
<b>Similar Exposure Group (SEG)</b>	
Abating - Asbestos - Risk Level 4	
<b>Assessment Details</b>	
Performed by Ryan Kamerzell on 5/10/2014 (Rev. #2)	
<b>Task Description</b>	
The following is the standard definition for the Abating: Remove a hazardous material. Most often associated with asbestos and lead.	
<b>Asbestos Hazard</b>	
Respiratory exposure to airborne asbestos fibers.	
<b>Asbestos Risk Level 4 Description</b>	
Class 1	
Deliberate asbestos removal tasks include abatement of those materials listed in RL2 as well as other TSI and surfacing material that is removed for other purposes than what is required for maintenance activities.	
The risk of inhalation exposure to airborne asbestos fibers above the OEL, without regard for controls, is due to the relative ease of asbestos fiber release from TSI and surfacing material. It is also due to the potential poor physical condition of TSI or surfacing material that must be abated.	
NEAs are, and will not be, created for Class I activities.	
<b>Hazard Assessment</b>	
Inhalation of airborne asbestos fibers can lead to lung cancer or mesothelioma. Deliberately removing [AMOUNT OF MATERIAL] [MATERIAL TO BE REMOVED] will release asbestos fibers into the air. The potential for the [MATERIAL TO BE REMOVED] to become friable and available for inhalation is enhanced due to the brittle nature and air pockets within the material. The material that will be removed contains approximately [%] [TYPE OF ASBESTOS] asbestos. Removal of this material will be performed approximately [FREQUENCY] and will usually last no more than [DURATION]. Exposure to asbestos fibers is expected to exceed the occupational exposure limit if the listed controls are not implemented.	
<b>Controls</b>	
Engineering:	
1. Set up glove bags around the abatement area or establish work area containment with a minimum 6 mil. polypropylene plastic and Negative Air (HEPA) Filtration Machines (NAMs, aka Hogs) that have a volumetric flow rate ranging between ~ 800 and ~1800 cubic feet per minute (CFM). The NAMs must be configured within the abatement work control area to effectively create a negative differential pressure of 0.02 inches water gauge. The NAM(s) must be tested by IHIL prior to work.	
2. Apply a light mist of amended water directly to the area being physically disturbed and the adjacent areas to mitigate dispersal of particulate/dust released from dry surfaces.	
3. Use a HEPA filtered vacuum that was tested by IHIL within the last year to vacuum up debris.	
4. Lightly spray the controlled work area with amended water upon completion of each task and wet wipe.	
5. Use a wet disposable rag to collect debris and/or water	
6. Dispose of collected material as hazardous waste in a leak-tight container labeled with the DANGER sign	
Printed on: 5/10/2014 at 10:59:59 PM	

Preview Risk Assessment

Use the arrow buttons at the top-left of the screen to view each page of the risk assessment. If satisfied, click the 'Continue' button at the top-right of the screen. You will have the option to abort after clicking the 'Continue' button.

OK

# Risk Assessment Determination – Example Tasks

Task Specific Requirements for Risk Level		Risk Level Selection Tools		Risk Level Selection Guide		
<b>Asbestos</b>		<b>Note from SME:</b>				
Respiratory exposure to airborne asbestos fibers.		Any qualified LLNL IH can review and approve an AWP if the proposed work scope is small and does not exceed any of the following three conditions:				
Risk Level Descriptions	Example Tasks	Hazard Language	Controls	Follow-Up	References	Hazard Description
<b>Risk Level 1:</b>	<b>Risk Level 2:</b>	<b>Risk Level 3:</b>	<b>Risk Level 4:</b>			
These activities include the handling of ACM that is substantially intact and not likely to become friable (i.e. subject to dispersal of airborne fibers).	<p>Include, but are not limited to, the following:</p> <ol style="list-style-type: none"> <li>1. Wall Penetrations;</li> <li>2. Floor Penetrations;</li> <li>3. ACM Gasket/Seal removal and replacement.</li> </ol> <p>Contact the Asbestos SME for guidance as to whether other tasks fit into this Risk Level.</p> <p>Tasks 1 &amp; 2, above are currently</p>		<p>Tasks include but are not limited to:</p> <ol style="list-style-type: none"> <li>1. Wallboard removal or demolition;</li> <li>2. Transite removal;</li> <li>3. Linoleum removal (with paper backing)</li> <li>4. Cleanup of friable ACM</li> <li>5. Vinyl Asbestos Tile (VAT) removal; and</li> <li>6. Asbestos Containing Roofing Material (ACRM) removal.</li> </ol> <p>Contact the Asbestos SME for guidance</p>			Abatement



# Risk Assessment Determination – Hazard Language

Task Specific Requirements for Risk Level

Risk Level Selection Tools

Risk Level Selection Guide

## Asbestos


### Note from SME:

Respiratory exposure to airborne asbestos fibers.

Any qualified LLNL IH can review and approve an AWP if the proposed work scope is small and does not exceed any of the following three conditions:

Risk Level Descriptions	Example Tasks	Hazard Language	Controls	Follow-Up	References	Hazard Description
	<b>Risk Level 1:</b>	<b>Risk Level 2:</b>	<b>Risk Level 3:</b>	<b>Risk Level 4:</b>		
Hazard in WCD?	Materials of special concern (e.g., alkali metals, fluorine, asbestos).	Materials of special concern (e.g., alkali metals, fluorine, asbestos).	Materials of special concern (e.g., alkali metals, fluorine, asbestos).	Materials of special concern (e.g., alkali metals, fluorine, asbestos).	Materials of special concern (e.g., alkali metals, fluorine, asbestos).	Materials of special concern (e.g., alkali metals, fluorine, asbestos).
Hazard Assessment Language:	Inhalation of airborne asbestos fibers can lead to lung cancer or mesothelioma. Cleaning up small amounts of non-friable asbestos containing material (ACM) from surfaces with a HEPA vacuum and wet wiping will not generate airborne asbestos fibers regardless of task frequency and duration. Exposure to asbestos fibers is	Inhalation of airborne asbestos fibers can lead to lung cancer or mesothelioma. Operations and Maintenance (O&M) tasks including [TASKS] will disturb asbestos containing material causing it to become airborne and available for inhalation. The material that will be disturbed contains approximately [%] [TYPE OF ASBESTOS] asbestos.	Inhalation of airborne asbestos fibers can lead to lung cancer or mesothelioma. Deliberately removing [AMOUNT OF MATERIAL] [MATERIAL TO BE REMOVED] will release asbestos fibers into the air. The material that will be removed contains approximately [%] [TYPE OF ASBESTOS] asbestos. Removal of this material will be performed	Inhalation of airborne asbestos fibers can lead to lung cancer or mesothelioma. Deliberately removing [AMOUNT OF MATERIAL] [MATERIAL TO BE REMOVED] will release asbestos fibers into the air. The potential for the [MATERIAL TO BE REMOVED] to become friable and available for inhalation is enhanced due to the brittle nature		

# Risk Assessment Determination – References

Task Specific Requirements for Risk Level		Risk Level Selection Tools			Risk Level Selection Guide	
<b>Asbestos</b>		<b>Note from SME:</b>				
Respiratory exposure to airborne asbestos fibers.		Any qualified LLNL IH can review and approve an AWP if the proposed work scope is small and does not exceed any of the following three conditions:				
Risk Level Descriptions	Example Tasks	Hazard Language	Controls	Follow-Up	References	Hazard Description
<b>Policy:</b>						
<b>References:</b>	<ol style="list-style-type: none"> <li>1. ESH Manual Document 14.9 (New Revision Title): Asbestos Abatement and Operations and Maintenance (O&amp;M) Safety Program</li> <li>2. Asbestos Program website</li> </ol>					
<b>Risk Level Determination Document:</b>	 Asbestos - RL Determination - R7 - 05-15-13 pab.pdf		<div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;">           Save a Copy to Your Computer         </div>			



# Risk Assessment Determination – Hazard Description

Task Specific Requirements for Risk Level	Risk Level Selection Tools		Risk Level Selection Guide			
<p><b>Asbestos</b></p> <p>Respiratory exposure to airborne asbestos fibers.</p>	<p><b>Note from SME:</b></p> <p>Any qualified LLNL IH can review and approve an AWP if the proposed work scope is small and does not exceed any of the following three conditions:</p>					
Risk Level Descriptions	Example Tasks	Hazard Language	Controls	Follow-Up	References	Hazard Description
<p>Respiratory exposure to airborne asbestos fibers. Intact Asbestos Containing Material (ACM) is not hazardous unless the material is disturbed or deteriorates, causing loose fibers to become airborne and respirable. Inhalation of asbestos fibers may increase the risk of developing lung cancer or mesothelioma, a cancer of the lining of the lungs and abdominal area. Inhalation of airborne asbestos fibers may also cause asbestosis, a scarring of the lungs. Concurrent exposure to asbestos and cigarette smoke may greatly increase the risk of lung cancer because the two substances act synergistically.</p>						



# Perform a Risk Assessment

## Quality and Consistency Check with the Assessment Viewer:

- Sort according to user defined variables (e.g., task, hazard, RL, IH, location, etc.)
- Allows an IH to view similar risk assessments made by other IHs for the same task and hazard

**VERY POWERFUL!**

**Risk Assessment and Control** FOM1-07 Thursday, June 27, 2013

Location: S200, S300, Offsite WCD #: 777 WCD Type: IWS  
 Task: Testing, Non-Destructive  
 Hazard: Heat Stress (Normal Work Clothing) Risk Level: 2  
 Assessor: [Name] Date: 6/27/2013 Status: In Progress

**Task Specific Requirements for Risk Level**

**Hazard Assessment Language**  
 Hazard in WCD? Yes  
 Work may be performed outdoors on rooftops. The frequency is 3 times per month for a duration of 3.5 hours.  
 Employees are at an increased risk of developing a heat related illness when temperatures are between 88 and 96 degrees F with about 50% humidity (Livermore average).  
 If controls are not implemented to stop the progression of heat symptoms, the severity of the outcome can progress to death.

**Minimum Level of Control**  
 Respirator prescribed for this hazard's risk level: None  
 Do not perform this activity outdoors during times of rain, high temperature, or high wind.  
 1. Conduct a pre-job briefing with employees to:  
 a. Alert them of heat conditions anticipated for the day  
 2. Drink at least 8 ounces of water every 20 minutes. Provide cool water in convenient locations close to the work area.  
 3. Take frequent rest breaks in cool areas. Set up temporary shade when working in open fields or areas without easy access to shade or air conditioning.  
 4. Wear sunscreen. Limit exposure to direct sunlight. Wear hats and work in shaded areas where possible.  
 5. Gradually increase the workload or allow more frequent breaks to help new and

**Assessment Viewer**

Task	Hazard	Specific Agent(s)	RL	Assessor Name	WCD Type	WCD	Location	Follow-Up Complete
Chemistry	Chemical Use (Hazard)	toxic, corrosive, flammable chemicals	1		IWS	13103	\$200	6/27/13
Developing Instrumentation	Oxygen Deficiency		0		IWS	17762	\$200	
Testing, Non-Destructive	Heat Stress (Normal Work Clothing)		2		IWS	777	\$200, \$300,	
Testing, Non-Destructive	Noise		2		IWS	777	\$200, \$300,	6/27/13
Abating	Asbestos		4		IWS	11111	1111	
Abating	Lead		4		IWS	00000	000	
Collecting Samples (ESH)	Beryllium		3		IWS	15316	\$200, \$300	
Collecting Samples (ESH)	Beryllium		3		IWS	15317	\$200, \$300	

# Perform a Risk Assessment

Quantitative Follow up Actions as a Result of the Risk Assessment (Typically Begins at RL3):

Could include any one or a combination of the following:

1. Respirator Permit (HAC)
2. Voluntary Use of Filtering Facepieces
3. Asbestos Work Permit
4. Lead Work Permit
5. Sampling Plan for Air (personal or area)
6. Sampling Plan for Surface (swipe, wipe, bulk)
7. Inclusion of a particular periodic surveillance requirement (IH DAP)
8. Analytical Lab RUSH Analysis Form



# Follow Up Requirements – Respirator Permit

## Hazard Assessment & Control (HAC) Form:

- Lists all applicable hazards associated with the TASK along with their minimum respirator requirements.
- IH selects the required type and configuration based on all the hazards involved in the task.

*DRAFT - Complete and Finalize*      Industrial Hygiene Section Respiratory Protection Program      *DRAFT - Complete and Finalize*  
**HAZARD ASSESSMENT & CONTROL (HAC)**

**INSTRUCTIONS**  
This Hazard Assessment & Control (HAC) form is used by an Industrial Hygienist (IH) or Health Physicist (HP) to select respiratory protection. The audience for the HAC is Respirator Services, not the employee. The completed HAC must be maintained with the work control document (WCD) that authorizes the activity. Respiratory protection will not be issued by Respirator Services without a completely filled in HAC. This HAC is a certification of hazard assessment when issued in conjunction with the documented hazard assessment in the authorizing WCD. Be sure to remind your customers to clean their equipment to remove any visible dust & dispose of filters and/or swipe/survey their equipment, if applicable, according to the WCD requirements prior to return or exchange. Contact Respirator Services at 2-7910 for assistance.

**WORK CONTROL DOCUMENT, TASK NAME & TASK DESCRIPTION**

Type	Number	Standard Task from Risk Assessment
IWS	15316	Collecting Samples (ESH)

**Additional Task Description**  
Applicable to all tasks under Industrial Safety Related Activities.

**CERTIFICATION OF EVALUATION**

Completed by	Title	Certification Date	Certification Period
		6/27/2013	From [ ] 1 year maximum
Completed by (additional)	Title (additional)		To [ ]
N/A	N/A		

**RESPIRATOR ISSUE POINT LOCATION(S)**  
Respirator Services (B255/R129)

**RESPIRATOR SELECTION**

Use Requirement	Type / Config. / APF	Filter	Change Schedule

Optional Type/Config: APR FF APF50

Selection Comments:

Yes  No    IH release required. Swipe sample respirators for beryllium prior to return or exchange  
 Yes  No    HP release required. Survey respirators for radiological contamination prior to return or exchange

**Risk Assessment Requirements Summary - from the risk assessments for this Work Control Document & Task**

Agent	Location	RL	Minimum Respiratory Protection Requirement
Beryllium	S200, S300	3	APR HF APF10 P100

IHS401 (01/01/2012)      HAC Revision: 2    08/27/13 08:50 AM



# Follow Up Requirements – Asbestos Work Permit

## Asbestos Work Permit (AWP)

- LLNL policy for asbestos-related tasks that are not covered by a Negative Exposure Assessment (NEA)

**DRAFT - Complete and Finalize**      **ASBESTOS WORK PERMIT**      **DRAFT - Complete and Finalize**

Supervisor's Name: \_\_\_\_\_ WCD #: 11111      WCD Type: IWS

Affected Building: 1111      Room / Area: \_\_\_\_\_

Is area Occupied?:  Yes  No      Will work area be posted before start?:  Yes  No

Brief Job Description: \_\_\_\_\_

Planned Work Dates from: \_\_\_\_\_ to \_\_\_\_\_      Hours: from \_\_\_\_\_ to \_\_\_\_\_

Activity to be performed: **Complete at least one of the below:**      Measured Quantity:      LF      SF      CF

Thermal System Insulation (TSI) removal:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thermal System Insulation (TSI) encapsulation:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transite panel or pipe removal:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vinyl asbestos tile (VAT) / mastic removal:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Linoleum removal:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acoustic or fireproofing removal:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cleaning or decontamination of surfaces:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sawing, drilling, scoring, or breaking of asbestos:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (describe project on second page of this permit):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Type of Asbestos (chrysotile, amosite, crocidolite): \_\_\_\_\_      Concentration: \_\_\_\_\_      File #: \_\_\_\_\_

Individuals involved in activity: **Complete at least one of the below:**

NAME:	EMP. #:	TRAINING:	NAME:	EMP. #:	TRAINING:

**ASBESTOS CONTROL EQUIPMENT:**

HEPA Vacuums:  Yes  No      Amended water:  Yes  No

Encapsulant:  Yes  No      name: \_\_\_\_\_      Glove bags:  Yes  No

Mastic remover:  Yes  No      name: \_\_\_\_\_      Bridging:  Yes  No      name: \_\_\_\_\_

Decon chamber:  Yes  No      Decon type?: \_\_\_\_\_      Shower:  Yes  No

HEPA filtered negative air:  Yes  No      Estimated negative air CFM?: \_\_\_\_\_      Qty.: \_\_\_\_\_

**Waste Disposal Arrangements:**

1. Is this a demolition?:  Yes  No

2. Are the material conditions friable or likely to become friable?:  Yes  No

3. If response #2 is "Yes", are regulated quantities of friable asbestos greater than 100 LF, 100SF, or 35 CF?:  Yes  No  N/A

**To be completed by EPD/PRAG Group:**

1. If response to 1, 2, & 3 is "No", then the notification is processed through the industrial hygienist.

2. If "Yes" to 1 or 3 above, then EPD must file notification more than 10 days prior to start of job.

EPD/PRAG Name (if required): \_\_\_\_\_

**To be completed by the industrial hygienist:**

**Personal Protective Equipment:**

Coveralls: \_\_\_\_\_      Other (Specify): \_\_\_\_\_

Eye protection: \_\_\_\_\_      Shoe covers: \_\_\_\_\_

Hearing protection: \_\_\_\_\_      Hard hats: \_\_\_\_\_

Gloves: \_\_\_\_\_      Comments: \_\_\_\_\_

**Respirator Protection Requirements:**

Respirator Issue Point (if other than Supervisor): \_\_\_\_\_

Type: \_\_\_\_\_      Configuration: \_\_\_\_\_      Filter/Cartridge: \_\_\_\_\_      Change Schedule: \_\_\_\_\_

Comments: \_\_\_\_\_

Air Monitoring?: \_\_\_\_\_

Additional Controls &/or Procedures: \_\_\_\_\_

**Scope of Work / Work Plan:**

1. Will the work scope be limited to a single room?  Yes  No

2. Will the work scope involve less effort than about two employees for a full work shift?  Yes  No

3. Will any part of the work scope be performed in a location that is in need of an OSHA defined alternate design?  Yes  No





# Follow Up Requirements – Sampling Plan for Surface (Swipe, Wipe, Bulk)

Assessment Viewer	HACs, RIPs, Asbestos & Lead Work Permits	DAPs & Sampling Plans	Previous Revision Requirements (History)
Update DAP Inventory List		Sampling Plan (Personal or Area)	Sampling Plan (Swipe, Wipe or Bulk)

**INSTRUCTIONS:** Complete to request swipe, wipe or bulk samples be collected by an H&S Tech. Click the "Preview & Email" button to email this form to the H&S Tech. & the Tech. Supervisor.

Preparation Date / Rev #:	Sample Type:	Sampling Procedure:	Specify NIOSH, OSHA, ASTM, PIM, FOM, etc. method.
Dates Sampling Must be Performed:	Sample Media:	Special Sampling Instructions:	
Requesting IH:	Results Decision Criteria:	Specify the decision criteria you will use to evaluate the sampling results. This is based on your sampling objective including, but not limited to, known limits.	
Technician Supervisor:	<b>Judgmental Samples</b>		<b>Random Samples</b>
H&S Technician:	Specify Item(s) / Area(s) & # of Samples:		Specify in the format: "Item/Area = #Swipes"
Building(s):	# Field Blanks:		# Media Blanks:
Room or Location:	Total # Samples:		
Hazard / Agent:	ALAB Analysis:		Turnaround Time:
Sampling Purpose:			<b>Preview &amp; Email</b>

# Follow Up Requirements – IH Discipline Action Plan (DAP)

Assessment Viewer

HACs, RIPs, Asbestos & Lead Work Permits

DAPs & Sampling Plans

Previous Revision Requirements (History)

Update DAP Inventory List

Sampling Plan (Personal or Area)

Sampling Plan (Swipe, Wipe or Bulk)

**INSTRUCTIONS:** Select which DAP the new inventory item belongs or which DAP needs to be updated. An email will be generated with all of the applicable fields that are needed for the particular inventory list. Address each item in the email and address the email to the person who is responsible for updating the DAP. Push Send Email and consider this follow-up requirement COMPLETE!

## Evaluation of Hazards

Chemical Exposure Assessment  
(IH DAP 2)

Physical Agent Exposure Assessment  
(IH DAP 3)

## Control of Hazards

Biohazards & Biological Toxins  
(IH DAP 8)

Non-ionizing Radiation  
(IH DAP 9)

Surface Contamination Assessment  
(IH DAP 21)

Beryllium  
(IH DAP 22)

Lead  
(IH DAP 24)

Noise  
(IH DAP 40)

Local Exhaust Ventilation  
(IH DAP 45)

Biosafety Cabinets  
(IH DAP 48)

Safety Eyewashes & Showers  
(IH DAP 55)

Respiratory Protection  
(IH DAP 65)

Breathing Air Quality Testing  
(IH DAP 68)

# Follow Up Requirements – Analytical Laboratory Rush Request Form

## Analytical Laboratory Sample RUSH Request Form:

- Used for our on-site IH Analytical Lab
- IH completes and submits form to lab if a RUSH analysis is needed

Industrial Hygiene Section  
**ALAB "RUSH" SAMPLE ANALYSIS REQUEST FORM**

Batch #:	20153016	Type of Samples:	Swipes
Date Submitted:	5/16/2013	# of Samples:	13
Responsible IH:		Sample Analysis:	Beryllium

Describe Special Circumstances: DAP routine showed detectable beryllium. This is to ascertain if this is a larger issue.

Check One:

**EMERGENCY** Personal exposure or spill occurred (NOT potential)  
Date of Occurrence: \_\_\_\_\_  
Time of Occurrence: \_\_\_\_\_  
*Analysis will be done ASAP*

**URGENT** Personal monitoring samples where potential exposure is greater than Action level (w/o respect to respiratory protection)  
*Analysis will be done in two (2) business days*

**WORK AUTHORIZATION SAMPLES**  
(Programmatic Requests)

≤ ten (10) samples (Approval by ALAB supervisor)  
Approved by: \_\_\_\_\_ Date: \_\_\_\_\_

> ten (10) samples for Beryllium (Approval by Be SME)  
Approved by: \_\_\_\_\_ Date: \_\_\_\_\_

> ten (10) samples (other than Be) (Approval by IHS Leader)  
Approved by: 5/13/2013 Date: \_\_\_\_\_

**AGREED UPON TURNAROUND TIME:**  
**5/13/2013**



# Facility Survey Through the RAC Database

**Worker Safety & Health Functional Area** Lawrence Livermore National Laboratory

**IH Risk Assessment & Control Database**

Peroxidizable Chemicals Beryllium Inventory & Characterization Summaries Reports Exit Database

**Risk Assessment**

Asbestos **AWP** Work Permit

Lead **LWP** Work Permit

Respiratory **HAC** Protection

Filtering **RIP** Facepieces

ALAB Rush Form

To create a new permit, first perform a risk assessment. To view or extend existing permits or HAC, enter WCD#, Type & Task, then click on AWP, LWP or HAC button. Leave fields blank to find all.

WCD #:  Type:  Clear Criteria

Task:

**Facility Survey**

Select a specific facility from the list and then click the Perform Search button. Leave the field blank to find all.

Facility #:

Perform Search Clear Criteria

**Hazard Source Documents** Risk Levels

Hazard Title:

IH SME Name:

Perform Search Clear Criteria

# Facility Information

## Facility Overview

- Condition
- Operational Status
- Security Level
- Hazard Classification
- Predominant Use
- Age
- Resident population
- Historical Summary

Facility Overview

Facility #

Facility Type: PERMANENT BUILDING

Summary Condition: FAIR [Construction Details](#)

Operational Status: OPERATING

Excess?: N

Security Level: **BLOCKED**

Hazard Classification: **BLOCKED**

Predominant Use: **BLOCKED**

Historical Use: **BLOCKED**

Facility Age (years): 59 Occupied: 1/1/1954

Resident Population: 76 Responsible IH: **BLOCKED**

Directorate: **BLOCKED**

Occupant Organization: **BLOCKED**


Facility Manager: [Email](#)

AD Facility Manager: [Email](#)

Fac. Assurance Manager: [Email](#)

ITS Response Owner: [Email](#)

Example Facility.bmp



Drag a Picture Here

Drag a Picture Here

Drag a Picture Here

Overview of facility and its history. Narrative describes uses, major programs, actual and potential legacy issues, etc.



# Facility Information

## Facility Overview

- Construction Type & # of units
- Square footage distribution

The screenshot displays a web interface for facility information. The main panel shows the following details:

- Facility #**: [Empty field]
- Facility Type**: PERMANENT BUILDING
- Summary Condition**: FAIR (with a **Construction Details** button)
- Operational Status**: OPERATING
- Excess?**: N
- Security Level**: BLOCKED
- Hazard Classification**: [Empty field]
- Predominant Use**: [Empty field]
- Historical Use**: [Empty field]
- Facility Age (years)**: 59
- Occupied**: 1/1/1954
- Resident Population**: 76
- Responsible IH**: BLOCKED
- IWS List for Facility**: 10867, 10971, 11180

A **Construction Details** popup is open, showing:

- Construction Type**: STEEL FRAMED
- Completion Date**: 1/1/1954
- # of Facility Units**: 1
- # of Floors**: 2
- # of Floors Below Grade**: 0

Below the popup is a **Square Footage Distribution** table:

Category	Value
Gross	BLOCKED
Net	BLOCKED
Computer	
Industrial Shop	
Service Shop	
Storage	
Lab	
Office	

The background of the interface shows a photograph of a paved road and a building.

# Facility Information

## Hazards by Room

- Aids in identifying location specific controls for RA
  - Room
  - Hazards
  - Description

Room	Hazards	Description
Facility Wide	Asbestos, Confined Spaces, Lead, Mercury, Other	ASBESTOS: ACM consists of TSI, flooring, mastics, drywall skim coat, roofing tars and paints, and fire doors. Others may be present. BERYLLIUM: Bridge crane collector shoes (2% Be-Cu). CONFINED SPACES: See CSIS (link provided above).
1000	Noise, Other	OTHER: Quench furnace (NW corner) and large press (NE/center). Noise: High noise area in Hi Bay
1001	None specified	BERYLLIUM: No details provided there are no beryllium hazards in 1001. This is a janitors closet.
1128	Toxic, Corrosive, Reactive Gases	Methylene chloride.
1140	Noise	Noise: Caution High Noise Area due to standard machine tools.
1152	Noise	Noise: Caution High Noise Area - Standard Machine Tool Operations
1200	Beryllium, Lead	BERYLLIUM: 2% Be-Cu fingerstock on screen room door jambs. Lead: Soldering in South Room, Box Area
1201	Noise	Noise: Caution High Noise Area - at Entrance to Area

# Facility Information

## Similar Exposure Groups

- Lists SEGs in facility
  - Task +
  - Hazard +
  - Risk Level
- Lists Activity Title for each SEG

Facility #		Similar Exposure Group (SEG) List			
Task	Hazard	Risk Level	Location(s)	IWS #	IWS Activity Title
Soldering	Lead	2	BLOCKED		eneral electronic maintenance, fabrication and stallation and repair.
Soldering	Lead	2			BLOCKED Project Work Spaces : Work Activities.
Testing, Destructive	Beryllium	3			echanical Testing of Hazardous Materials
Testing, Destructive	Chemical Use Metal Fume	1			user heating of mechanical test samples
Testing, Destructive	Chemical Use Hexavalent Chromium	2			user heating of mechanical test samples
Testing, Destructive	Cryogen Not Specified	1			user heating of mechanical test samples
Testing, Destructive	Lead	2			echanical Testing of Hazardous Materials
Testing, Destructive	Nanomaterials	2			echanical Testing of Hazardous Materials
Welding (GTAW / TIG / Heli-Arc)	Metal Fume	4			BLOCKED or Decommissioning intaminated
Welding (Resistance)	Chemical Use Welding Fumes	1			echanical Testing
Welding (Resistance)	Metal Fume	3			BLOCKED

# RAC Database Reports – Main Menu



Main Menu

## Reports

6/27/2013 at 5:37:33 PM

### Task

+

### Hazard

+

### Risk Level

=

### Similar Exposure Group

#### Task Distribution (overall)

Lists the number of risk assessments performed by task. This report provides an important metric for understanding the distribution of tasks across the laboratory.

#### Task Distribution (by IH)

Lists the tasks in which individual IHs have performed a risk assessment. It also lists the number of risk assessments performed per task per IH. This provides an important metric to understand if IHs are too focused on certain tasks.

#### Task Distribution (by Hazard)

Lists tasks and their corresponding IH hazards. It also lists the number of risk assessments performed per IH hazard by task. This provides an understanding of what are our most common hazards are per task.

#### Hazard Distribution (overall)

Lists the number of risk assessments performed by IH hazard. This report provides an important metric for knowing what the most common IH hazards are across the laboratory.

#### Hazard Distribution (by IH)

Lists the IH hazards in which individual IHs have performed a risk assessment. It also lists the number of risk assessments performed per IH hazard. This provides an important metric to understand if IHs are too focused on a single hazard.

#### Hazard Distribution (by Risk Level)

Lists the IH hazards according to risk level. It also lists the number of risk assessments performed per IH hazard by risk level. This provides an important metric to understand what are our highest risk hazards.

#### Risk Level Distribution (overall)

Lists the number of risk assessments performed by risk level. This report provides an important metric for understanding the distribution of risk across the laboratory.

#### Risk Level Distribution (by IH)

Lists the risk levels in which individual IHs have performed a risk assessment. It also lists the number of risk assessments performed per risk level per IH. This provides an important metric to understand an IHs workload.

#### Risk Level Distribution (by Hazard)

Lists the IH hazards and their corresponding risk level. It also lists the number of risk assessments performed per IH hazard by risk level. This provides an important metric to understand what are our highest risk hazards.

#### Similar Exposure Groups (SEG)

Lists the similar exposure groups at the laboratory.

#### Similar Exposure Group (by IH)

Lists IHs and each SEG in which they have made an assessment. It also lists the number of assessments that each IH has performed on a given SEG.

#### Comprehensive

List of the most common fields for risk assessments. You can browse all records, sort or find what you want. No summaries or calculations provided.

#### "In Progress" Follow Up Actions

Lists risk assessments with "In Progress" follow up actions by IH.

#### RAs & WCDs: The Numbers

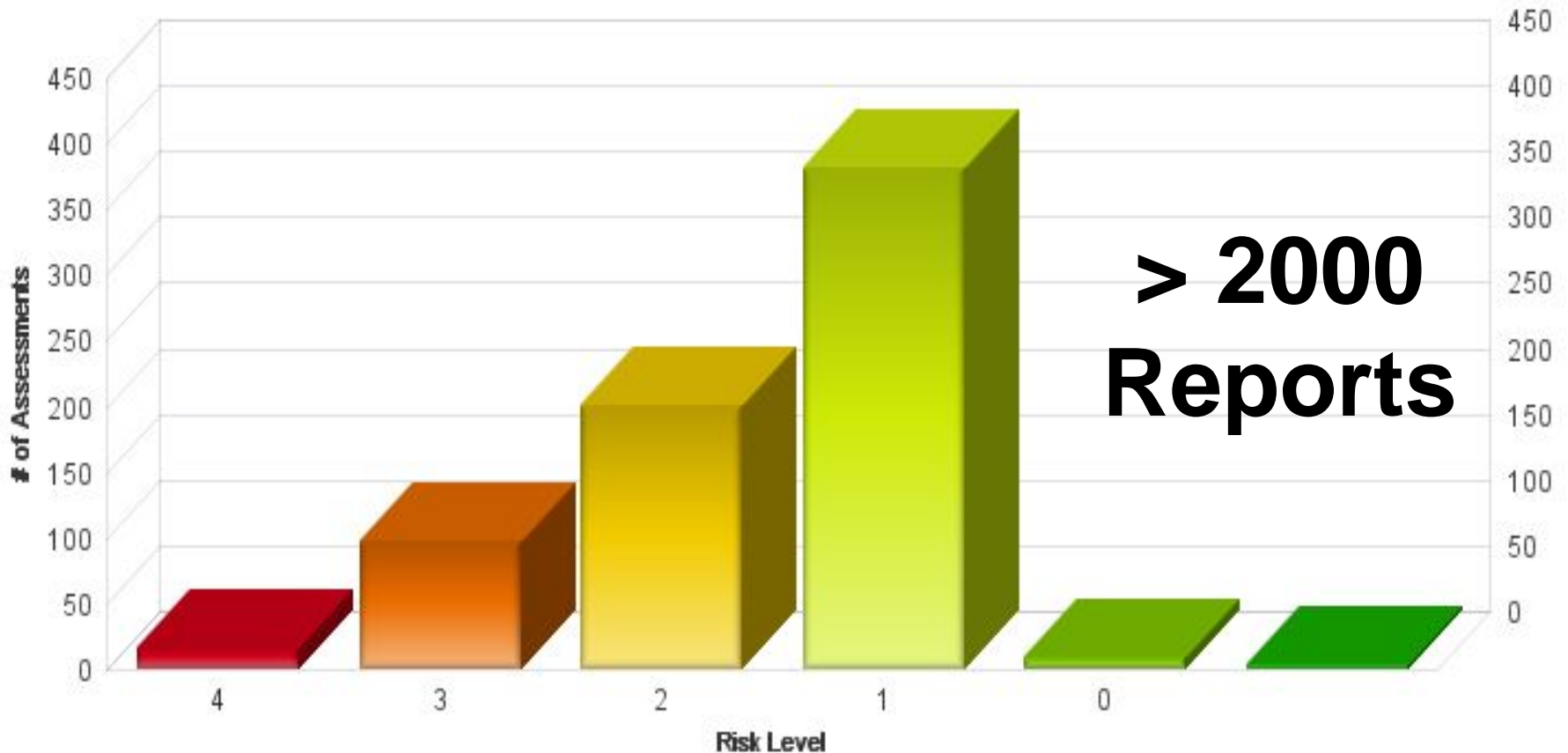
Provides a summary of the total number of WCDs in RAC, the average number of risk assessments per WCD. Provides this information overall as well as by IH. **ADD: % of IWSs in RAC.**

# RAC Database Reports – RL Distribution

Main Menu | Reports Menu

## Risk Level Distribution

6/27/2013 at 5:39:2



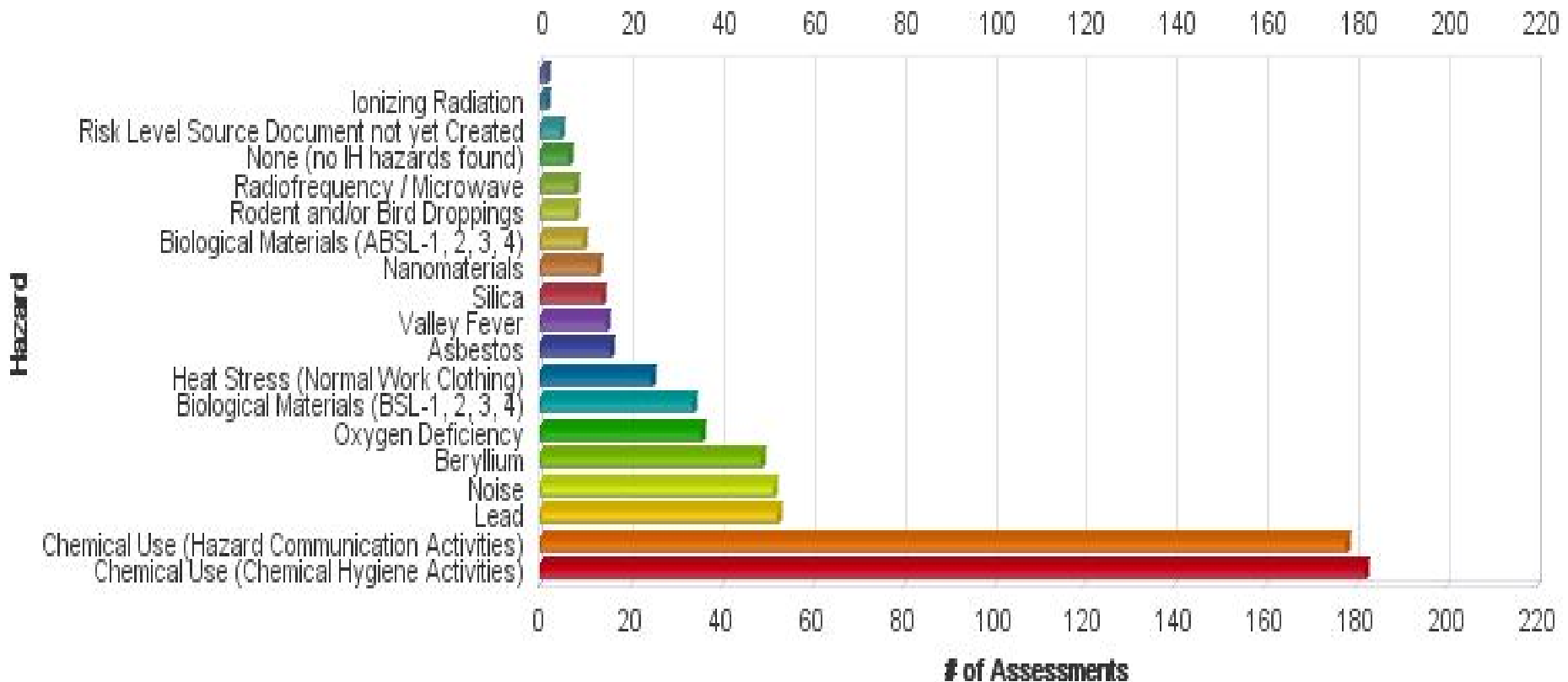


# RAC Database Reports – Hazard Distribution

[Main Menu](#) | [Reports Menu](#)

6/27/2013 at 5:40:54 PM

## Hazard Distribution

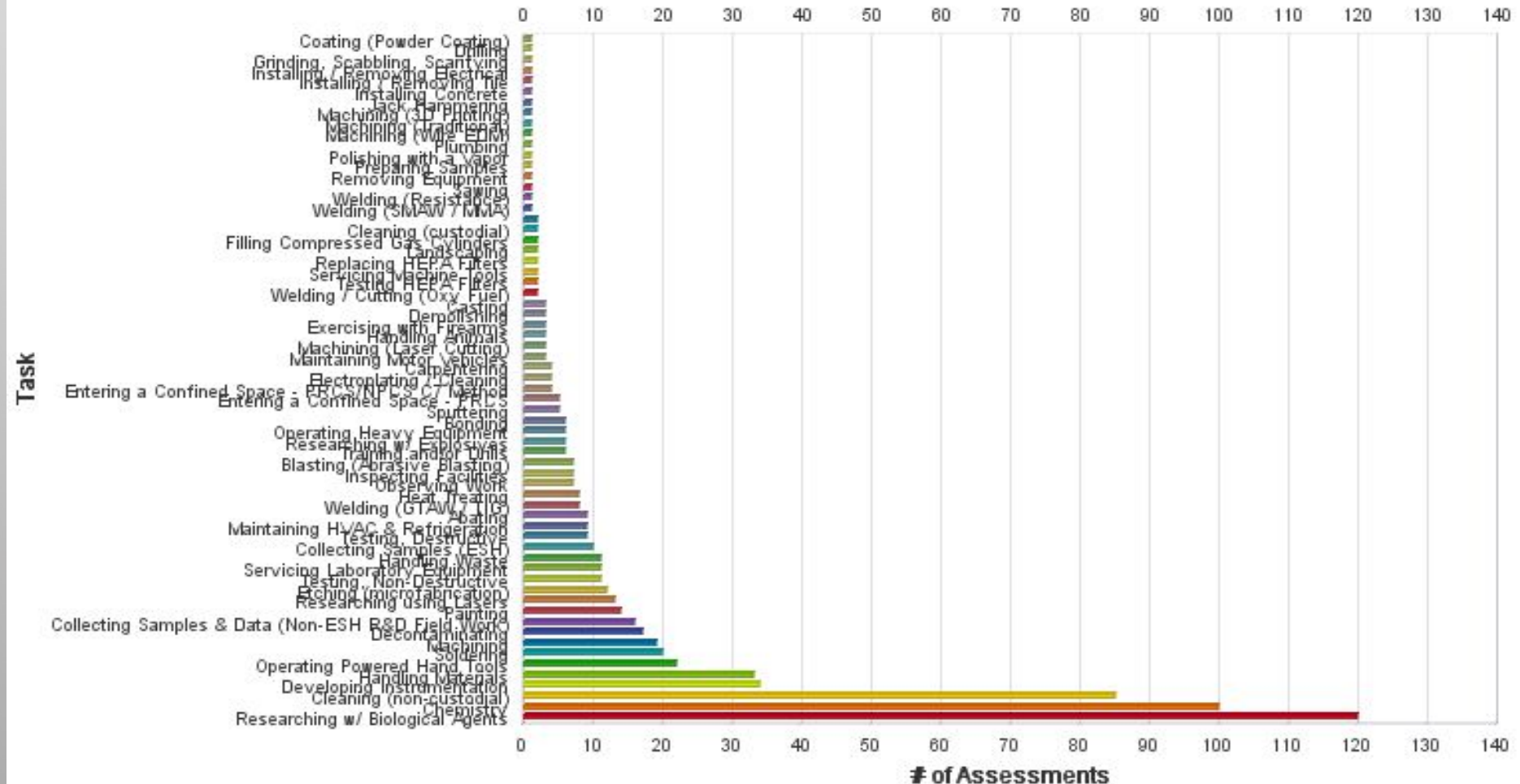


# RAC Database Reports – Task Distribution

Main Menu | Reports Menu

## Task Distribution (overall)

6/27/2013 at 5:42:04 PM



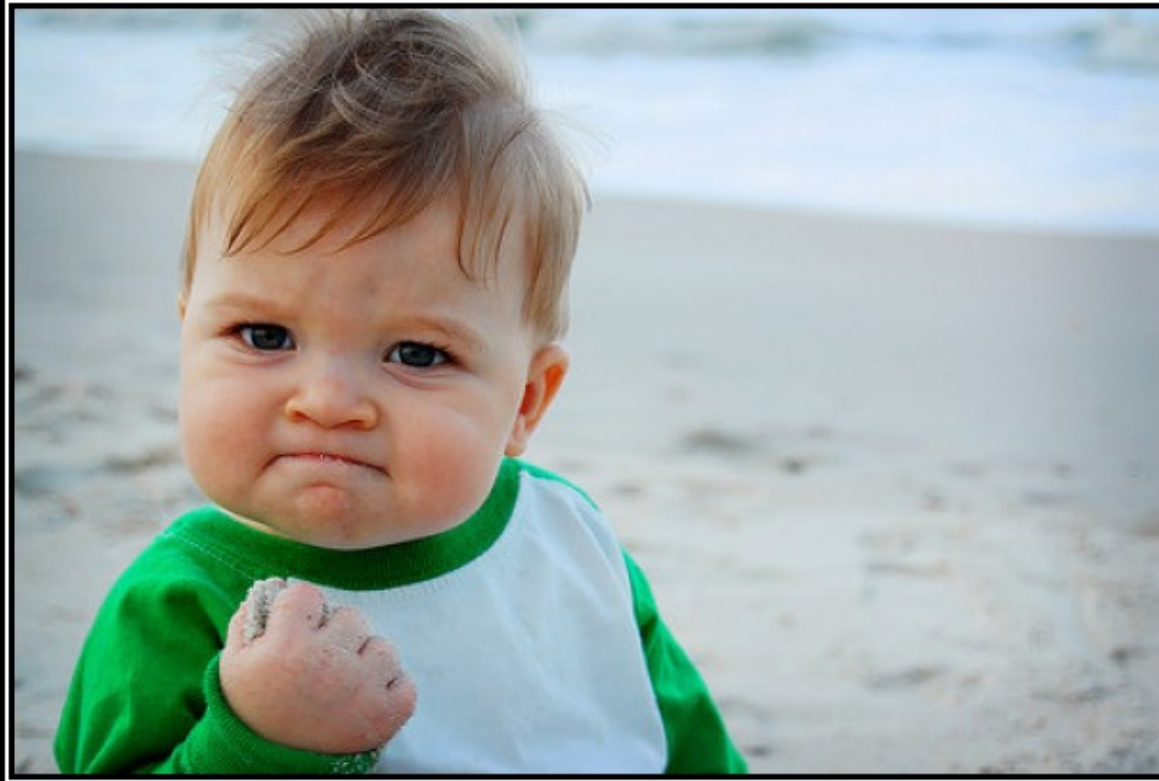
# RAC Database Reports – Similar Exposure Group (SEG) Summary

## SEGs:

- Defined by TASK – HAZARD – RISK LEVEL

Inspecting Facilities	Risk Level	# at Risk Level
Chemical Use (Hazard Communication Activities)	1	4
Heat Stress (Normal Work Clothing)	2	1
Rodent and/or Bird Droppings	1	1
Valley Fever	1	1
Installing / Removing Electrical	Risk Level	# at Risk Level
Risk Level Source Document not yet Created	2	1
Installing / Removing Tile	Risk Level	# at Risk Level
Asbestos	2	1
Installing Concrete	Risk Level	# at Risk Level
Silica	1	1
Jack Hammering	Risk Level	# at Risk Level
Silica	3	1
Landscaping	Risk Level	# at Risk Level
Heat Stress (Normal Work Clothing)	3	1
Noise	3	1
Machining	Risk Level	# at Risk Level
Beryllium	3	1
Chemical Use (Chemical Hygiene Activities)	1	3
Chemical Use (Hazard Communication Activities)	1	5
Lead	3	1
Noise	2	8
Silica	2	1
Machining (3D Printing)	Risk Level	# at Risk Level
Chemical Use (Hazard Communication Activities)	1	1
Machining (Laser Cutting)	Risk Level	# at Risk Level
Chemical Use (Hazard Communication Activities)	1	1
Nanomaterials	2	1
Noise	3	1
Machining (Traditional)	Risk Level	# at Risk Level
Noise	2	1

# Lessons Learned – Time to Expand RLBMS



S U C C E S S

Because you too can own this face of pure accomplishment

DIY.DESPAIR.COM



# Combining Facility Baselines and RLBMS

## A Basis For E&ORM Expansion

- Facility Baselines  
Effort *Alone*
- Reduced work by ~  
2 re-surveys per IH  
per year.
- Saves ~ \$250K
- Benefits clients
- Benefits us

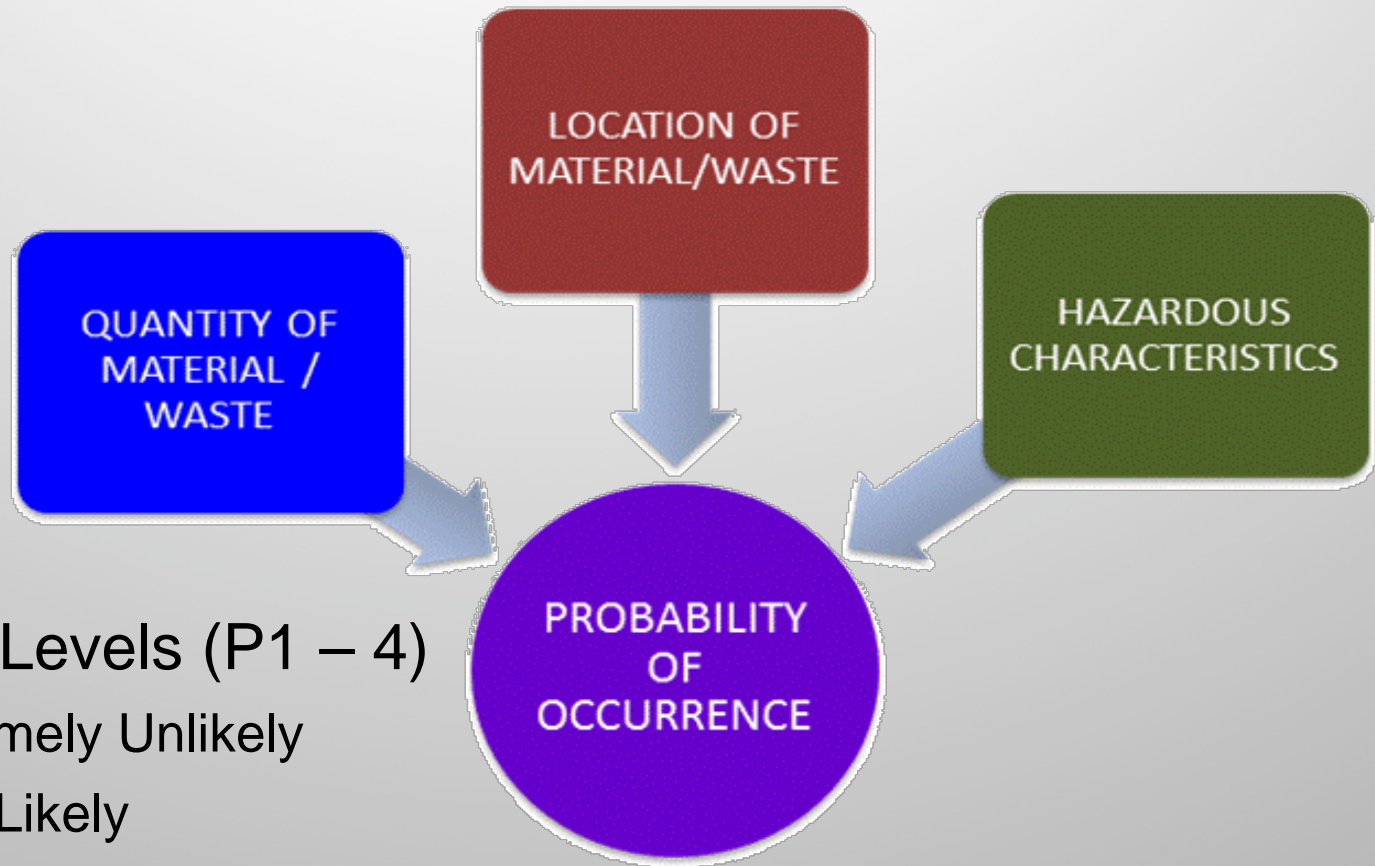


# Future Of E&ORM Is Almost Here

- EHS Ready – Approved for OHSAS 18001, ISO 14001 & ISO 9001
- RL Approach in Industrial Safety – 12 Source documents in RAC
  - Electrical Safety
  - Laser Safety
  - Liquid Nitrogen
  - Barriers
  - Fall Protection
  - Ladders
  - Fall Protection
  - Ergonomics
  - Cranes & Rigging
  - Cryogenics
  - Pressure Safety
  - Industrial Trucks
- Expanding the RL Approach into Health Physics
  - Regulations in RL Format and to be Finalized in 3 Source Documents
- Expanding the RL Approach into Explosives Safety
  - Fits Well into RL Format and Avoids Classic RL4 Default Approach
- Expanding the RL Approach for Environmental Analysts
  - Culture Shift, but RL Process Already in Development



# RLBMS – Environmental Approach



- Probability Levels (P1 – 4)
  - P1 – Extremely Unlikely
  - P2 – Less Likely
  - P3 – Likely
  - P4 – Probable

# RLBMS – Environmental Approach

Probability Component of Environmental Contamination; 3 Factors

Probability Level	Quantity		Location		Hazardous Characteristics		
	<RQ	≥RQ	Controlled	Inadequate & Uncontrolled	Regulated Material/ Waste	Environ. Permit	EMP Goal
P1	✓		✓				✓
P1	✓			✓			✓
P2	✓		✓		✓		
P2	✓		✓			✓	
P2		✓	✓				✓
P2		✓		✓			✓
P3		✓	✓		✓		
P3	✓			✓	✓		
P3		✓	✓			✓	
P3	✓			✓		✓	
P4		✓		✓	✓		
P4		✓		✓		✓	

## Severity Component

### Long-Term Effect

-Reportable

### Short-Term Effect

-Reportable

### Short-Term Effect

-Non-reportable

### Minimal Effect



# RLBMS – Environmental Risk Matrix

		PROBABILITY			
		Extremely Unlikely (P1)	Less Likely (P2)	Likely (P3)	Extremely Likely (P4)
SEVERITY (CONSEQUENCE TO THE ENVIRONMENT)	Long-term damage (reportable)	RL3	RL3	RL4	RL4
	Short-term damage (reportable)	RL2	RL2	RL3	RL4
	Short-term damage (non-reportable)	RL1	RL1	RL2	RL3
	Minimal damage / Nuisance/ Not immediately reportable event	RL1	RL1	RL1	RL2

## Control Outcomes:

**RL1;** Administrative controls only.

**RL2;** Basic Engineering and Administrative controls.

**RL3;** Requires EA involvement for a documented review and signature with controls specified.

**RL4;** Complex work for EA evaluation, often requiring other ES&H disciplines.

# Integrating RLBMS with LLNL Work Control

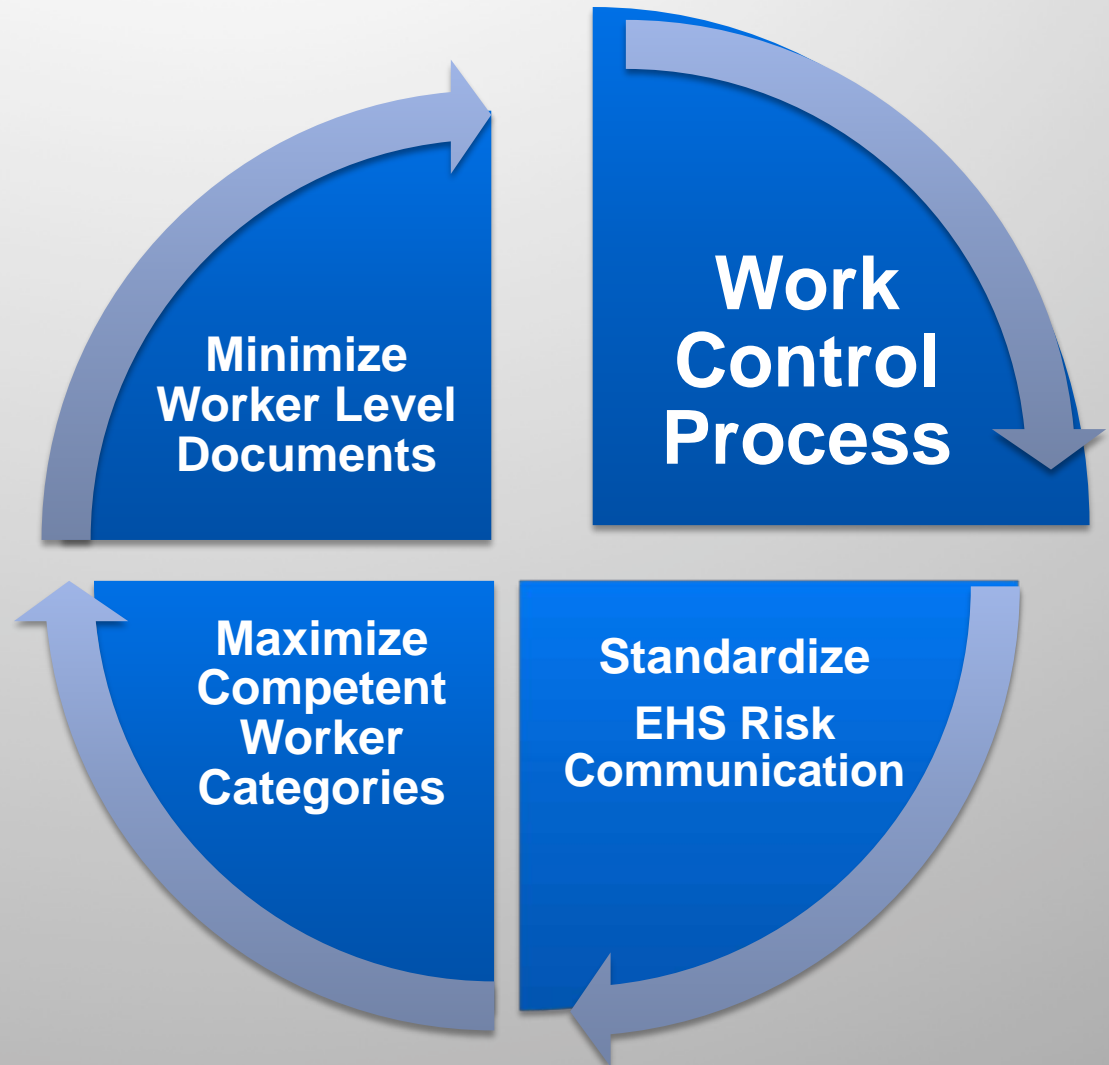
## RLBMS into E&ORM

Once EHS Risk Levels are known the worker knows:

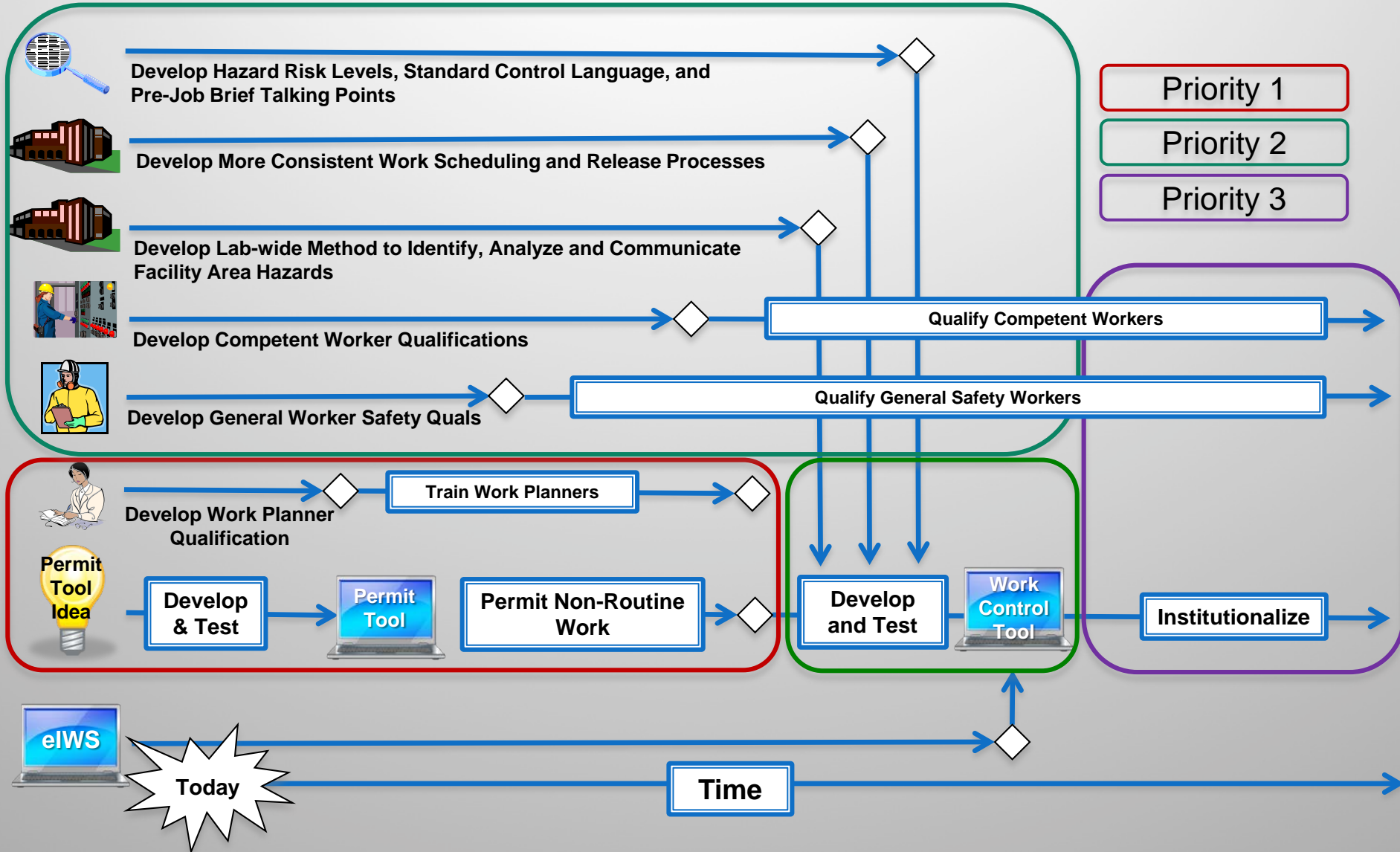
- Hazards Present
- Controls Needed
- PPE Necessary
- Sign-Off Expectations
- Documentation Required
- Level of Training Needed
- Medical Surveillance
- Assistance Needed
- Expertise Required
- ES&HHS Team Assistance

### Current Process Status

- RLs by Discipline
- Update EHS Manual
- Update EHS Training



# Implementation Priority and Timeline



# Future Vision for RLBMS & E&ORM

Q: Why do you spend your free time on this?



# Future Vision for RLBMS & E&ORM

Q: Why do you spend your free time on this?

A: 2.3 million work-related deaths annually



# Future Vision for RLBMS & E&ORM

Q: Why do you spend your free time on this?

A: 2.3 million work-related deaths annually.



**IOHA 2016-20 Strategy Document; Fulfill IOHA's Mission**

# What's in my Toolbox Today?



**What hazards do you see?**

**Is it risky?**

**How would you communicate hazards & risk?**



# Future Vision for RLBMS & E&ORM



**Safety** RL3

**Industrial Hygiene** RL3

**Ergonomics** RL4

**Environment** RL2

**Fire Protection** RL1

**Project** RL3

# Future Vision for RLBMS & E&ORM



**Safety**                      **RL3**

**Industrial  
Hygiene**                      **RL2**

**Ergonomics**                      **RL3**

**Environment**                      **RL2**

**Fire  
Protection**                      **RL1**

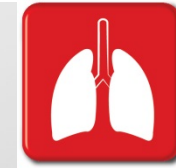
**Project**                      **RL3**



# Future Vision for RLBMS & E&ORM



RL3



RL2



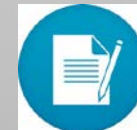
RL3



RL2







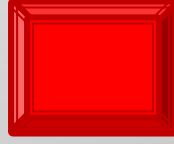

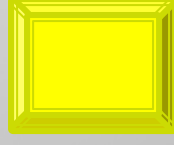



RL1



RL3

# What's in my toolbox today?





# What's in my toolbox today?



A vertical column of icons representing various safety hazards: a yellow hard hat, lungs, a person slipping, a green leaf, flames, and a document with a pencil. To the right of these icons are seven colored squares (yellow, red, green, orange) with a 3D effect. A large red arrow points from the bottom right towards the icons.



HEARING PROTECTION  
MUST BE WORN  
IN THIS AREA



SAFETY HELMET  
MUST BE WORN  
IN THIS AREA



EYE PROTECTION  
MUST BE WORN  
IN THIS AREA



SAFETY VESTS  
MUST BE WORN



SAFETY FOOTWEAR  
MUST BE WORN  
IN THIS AREA



RESPIRATOR  
MUST BE WORN  
IN THIS AREA



HAIR PROTECTION  
MUST BE WORN  
IN THIS AREA



GLOVES  
MUST BE WORN  
IN THIS AREA



PROTECTIVE  
CLOTHING  
MUST BE WORN



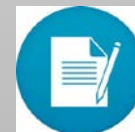
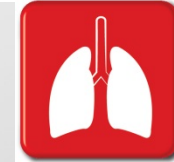
HEARING AND EYE  
PROTECTION  
MUST BE WORN  
IN THIS AREA

THIS PROTECTIVE EQUIPMENT  
MUST BE WORN  
ON THIS SITE





# Future Vision for RLBMS & E&ORM









# E&ORM – The Banding of EHS



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# E&ORM – The Banding of EHS

## Questions?

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