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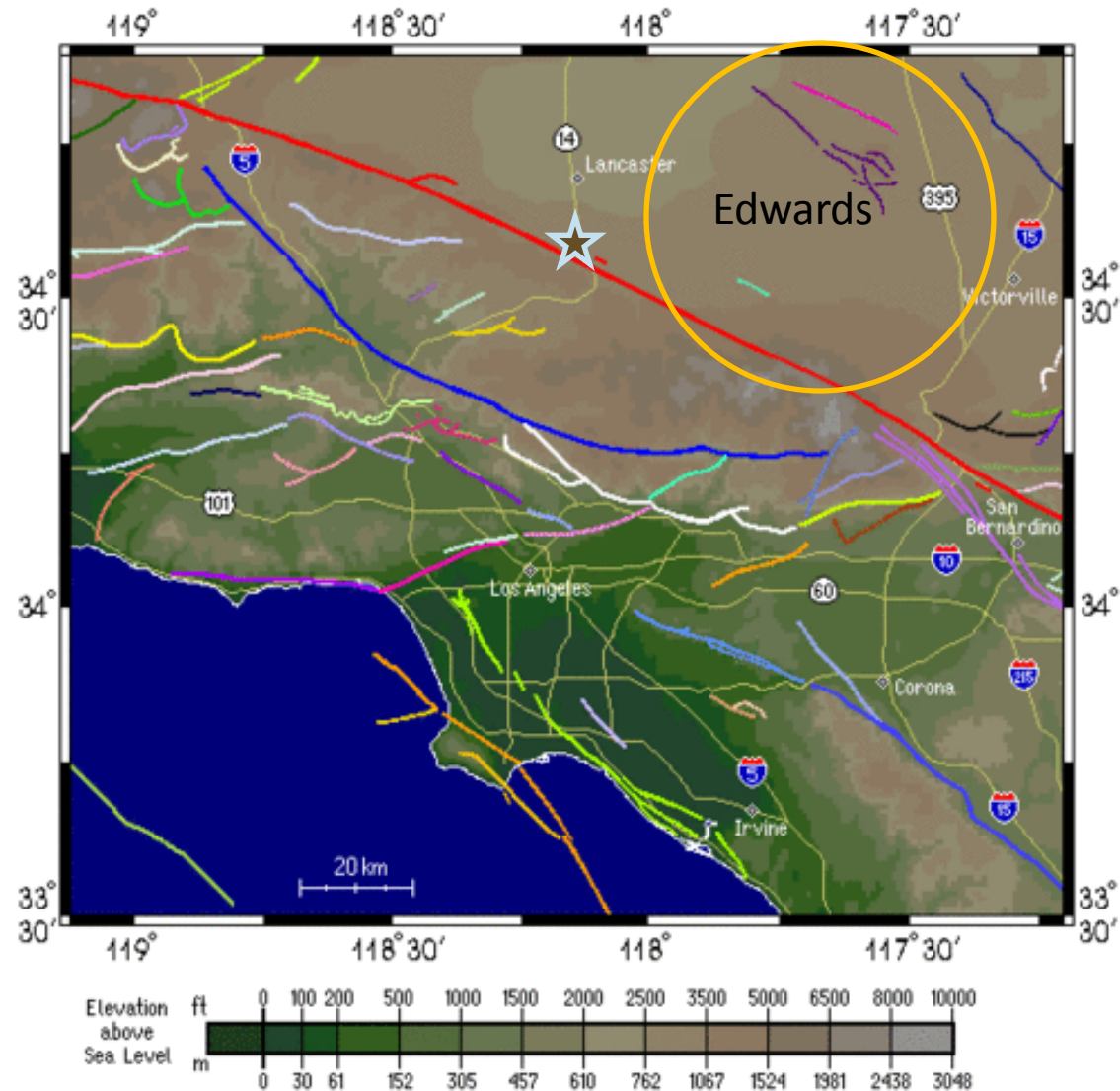
An Air Force Research Laboratory Approach To ESOH Risk Management



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Greetings from the Mojave desert



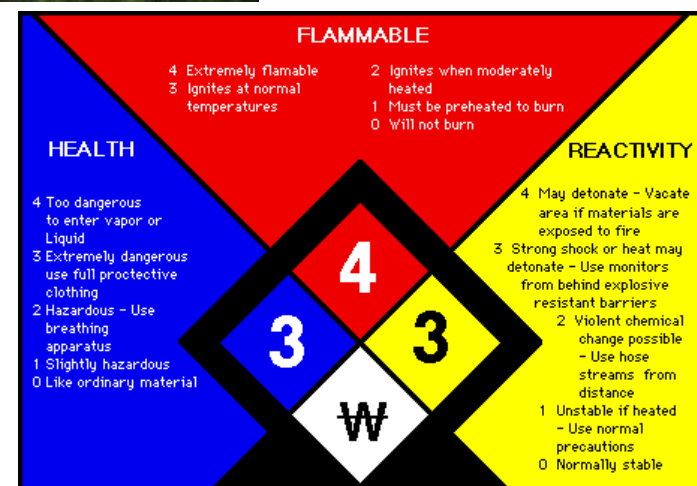


Where living can be hazardous





But today, lets talk about Chemical Hazards





Chemical safety in academia

Texas Tech Accident

GOVERNMENT & POLICY

Home » February 1, 2010 Issue » Government & Policy » School Labs Go Under Microscope

FEBRUARY 1, 2010 | VOLUME 88, NUMBER 5 | PP. 25 - 26

School Labs Go Under Microscope

Laboratory accidents in academia to be investigated by chemical safety board

Jeff Johnson



Texas Tech U

ICEBERG TIP A CSB accident investigation at the Texas Tech chemistry building could lead to a national examination of school lab safety.

One student, Preston Brown, 29, was seriously injured in the Jan. 7 accident and remains in critical condition, according to Eric Finley, a spokesperson with University Medical Center in Lubbock. Brown is being treated in the hospital's burn center, where he has been since the accident. Initially, press accounts said two students were injured; however, university officials say only one was hurt.

Brown received severe burns and lacerations to his face and hands when a mixture of nickel hydrazine perchlorate exploded during the afternoon accident in Texas Tech's chemistry building, according to a police report. University officials told CSB the accident involved the detonation of a high-energy metal compound. Texas Tech, the board reported, has an agreement with Northeastern University in Boston to study high-energy materials for the **Department of Homeland Security**.



UCLA Accident



Home » Latest News » Negligence Caused UCLA Death

LATEST NEWS

MAY 11, 2009 | VOLUME 87, NUMBER 19 | P. 7 | FIRST APPEARED ONLINE MAY 5, 2009
SAFETY

Negligence Caused UCLA Death

State safety and health agency faults university for training lapses, unsafe practices

Jillian H. Kemsley

Negligence of lab safety by the **department of chemistry and biochemistry** at the **University of California, Los Angeles**, led to the Dec. 29, 2008, accident and subsequent death of researcher Sheharbano (Sheri) Sangji, says the state agency charged with investigating the incident.

In particular, the **California Division of Occupational Safety & Health (Cal/OSHA)** cited the department in a report released on May 4 for lacking both safety training and training documentation; failing to ensure employees wore appropriate personal protective equipment (PPE), such as lab coats; and failing to correct unsafe conditions and work practices identified in an Oct. 30, 2008, laboratory safety inspection.

Among the findings of the October lab inspection was that PPE was not fully used in the lab in which the 23-year-old Sangji worked. She was not wearing a lab coat in December when pyrophoric material she was handling splashed and ignited her clothing.



Sangji
Courtesy of Naveen Sangi



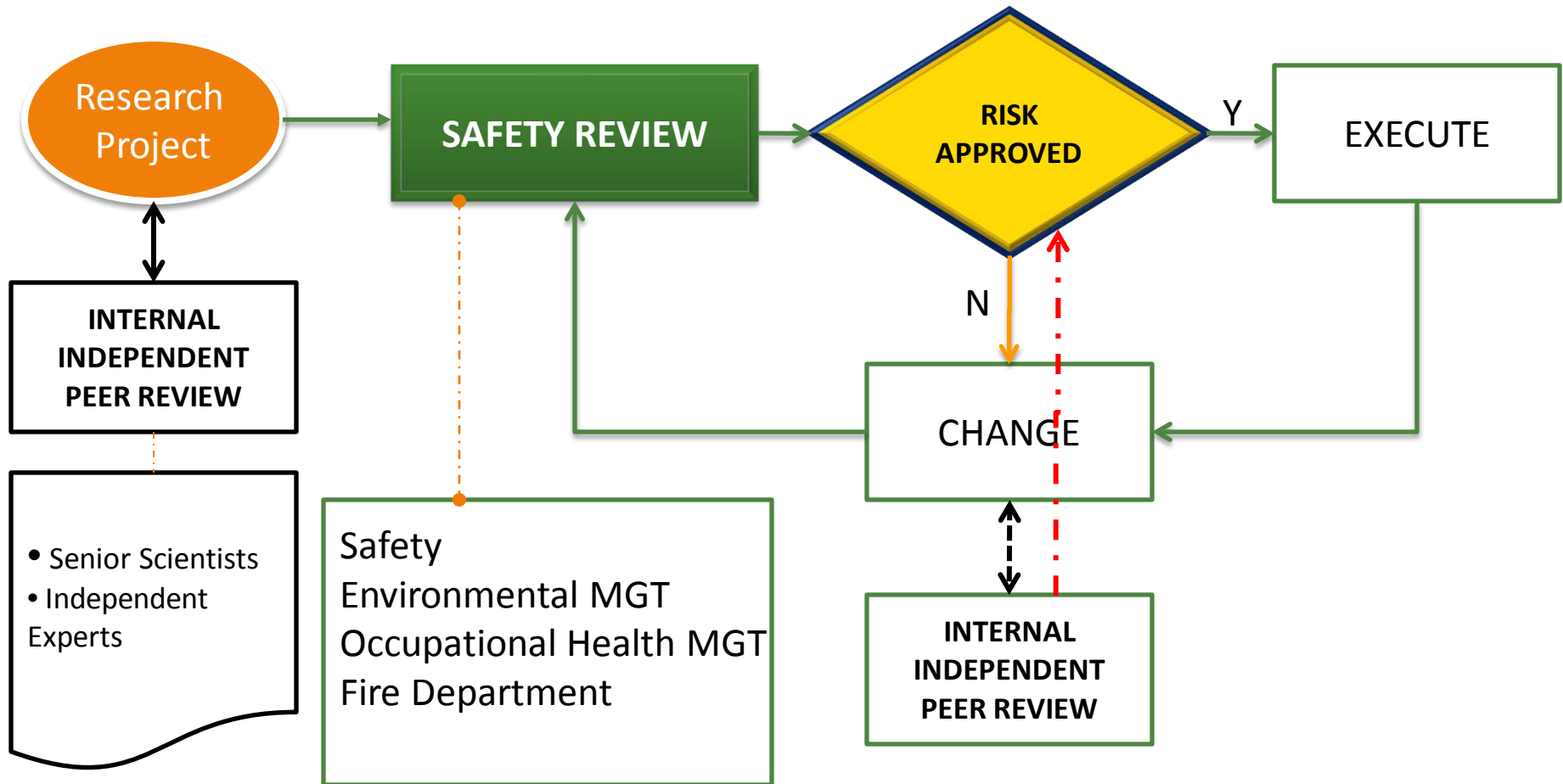
UCLA Accident Consequences

- **Charges first of its kind in US**
 - Potential 4.5 years in prison
 - Potential \$4.5 million fine to institution
- **Reference:**
 - Antelope Valley Press, Thursday, December 29, 2011

Potential Liability



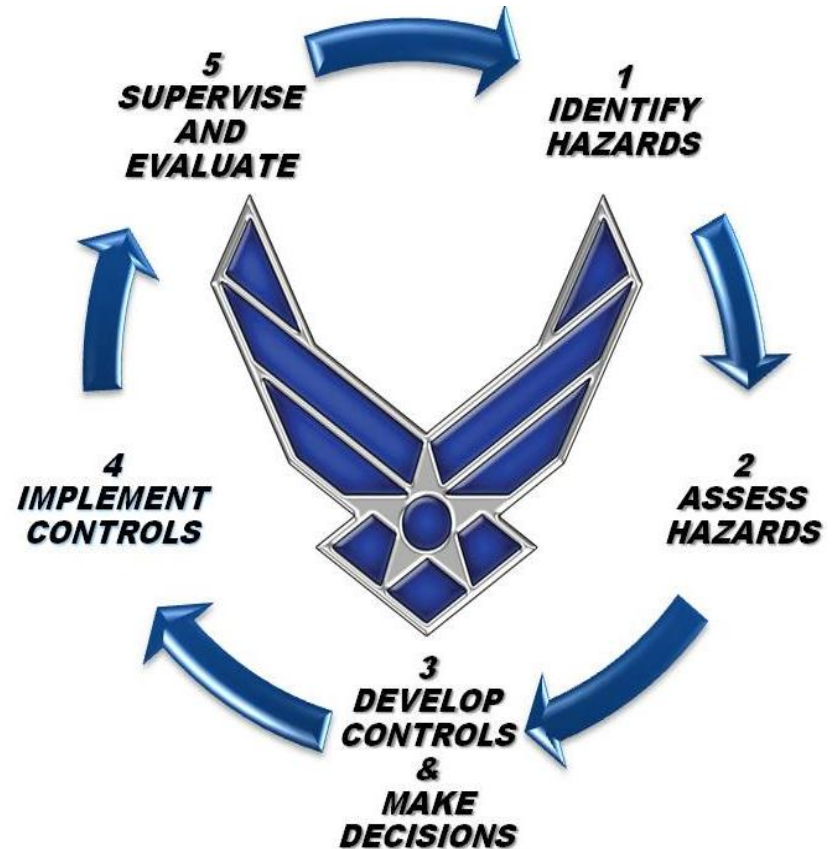
Research approval process





Risk Management

- Identify hazards
- Assess risk
- Develop & make control decision
- Implement risk controls
- Accept risk by appropriate authority
- Supervise and manage the change

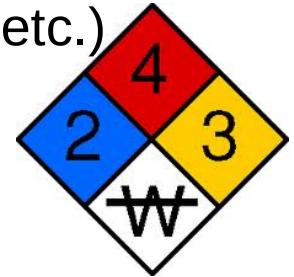




Hazard Assessment

- **Hazard Assessment – a deeper insight into dangers**

- Health (Carcinogens, mutagens, teratogens, irritants etc.)
- Flammability
- Reactivity (explosives, peroxide formers, etc.)
- Special Properties (corrosives, pyrophoric, water-reactive etc.)
- Cryogenics (cold burns etc.)
- Rupture (Over pressure, glass vs. metal reactors etc.)



HEALTH	☐
FLAMMABILITY	☐
REACTIVITY	☐
PERSONAL PROTECTION	

- **Have you considered any hazards not listed above?**

- Unintentional oversight, complacency, overconfidence in subject

Consider Hazard consequences, your control measures and residual risk – Low/Med/High



Facility Evaluation

- **Evaluate Facility for:**

- Electrical safety
- Fire safety
- Chemical safety
- Hazardous Waste
- Lab structure



- **Do you have *effective* Engineering Controls?**

- Fume/bio hoods
- Eye wash/showers
- Fire extinguishers/suppression devices
- Warning lights/signs
- Emergency signs



IN CASE OF
EMERGENCY
DIAL 9
THEN 911

A	Common Combustibles	Wood, paper, cloth etc.
B	Flammable liquids and gases	Gasoline, propane and solvents
C	Live electrical equipment	Computers, fax machines (see note)
D	Combustible metals	Magnesium, lithium, titanium
K	Cooking media	Cooking oils and fats





PPE Evaluation

- **Personal Protective Equipment (PPE) and Clothing**

- Face/Eyes (safety glasses, goggles, shields)
- Body protection (shield, apron, fire retardant coverall/labcoat)
- Respiratory system protection
- Feet protection (absolutely NO sandals and flip flops, hard-toe if needed)
- Hand protection (type of gloves – know the limitation of glove materials)
- Hearing protection (ear plugs, mugs, etc.)



Resources: MSDS, NFPA, OSHA, ERG, Experts



Procedures & Training

- **Procedures**
 - Lab Manual
 - Standard
 - Operating Instruction
 - Chemical Hygiene Plan (CHP)
 - Emergency and protocols
- **Class room training and CBTs**
 - CPR/AED/First aid
 - Fire extinguisher
 - LOTO
 - Confined Space
 - Safe handling of chemicals
 - Emergency evacuation/disaster management



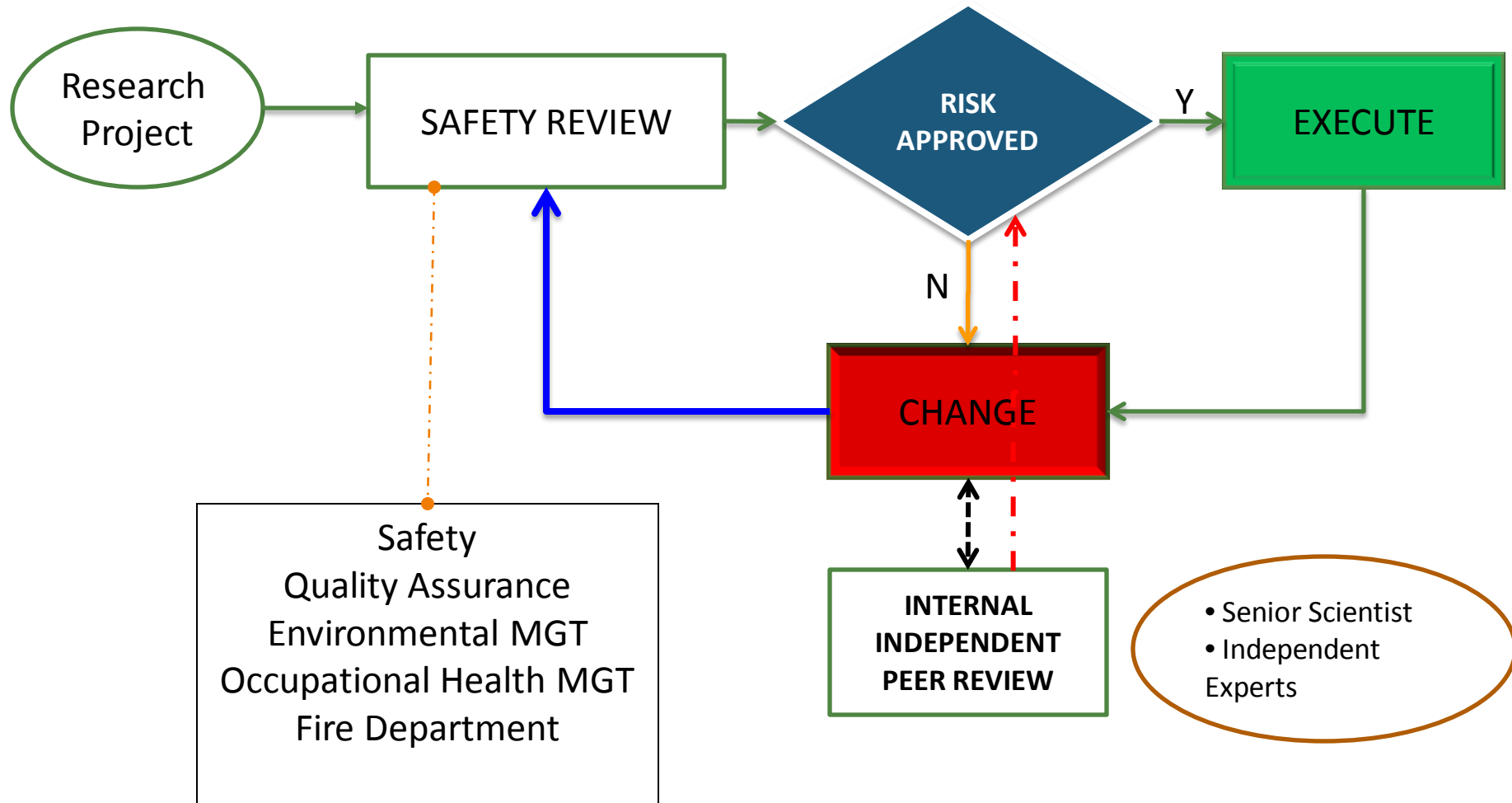


Risk Assessment Matrix

HAZARD SEVERITY				
HAZARD PROBABILITY	Catastrophic-I	Critical-II	Marginal-III	Negligible-IV
Frequent-A	1	3	7	13
Probable-B	2	5	9	16
Occasional-C	4	6	11	18
Remote-D	8	10	14	19
Improbable-E	12	15	17	20
HIGH RISK (RHI 1-4)		Requires HQ AFRL/CC Commander's approval (Institution Owner)		
MEDIUM RISK (RHI 5-9)		Requires no lower than Division Chief's approval (Institution Manager)		
LOW RISK (RHI 10-20)		Requires no lower than Branch Chief's approval (Department Head)		



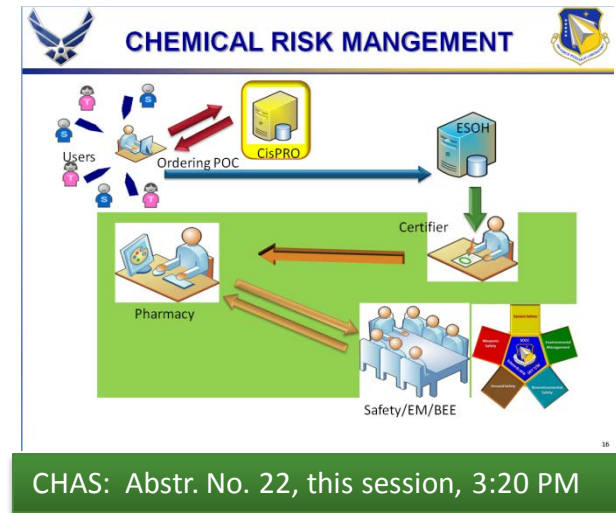
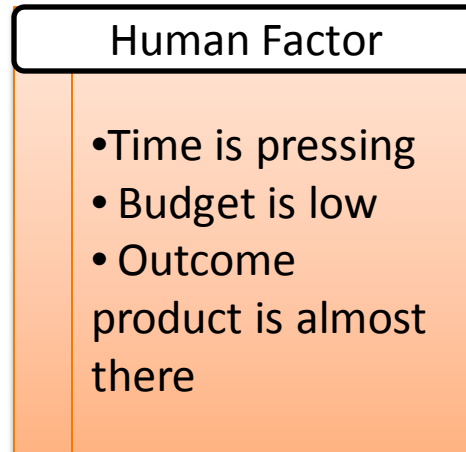
Research approval process





Managing Change

- Track hazards and validate risk
- Changes
 - Process
 - Equipment
 - Location
 - Personnel
 - Chemical
- Manage Change is a process
 - Important and Challenging
 - Oversight/Supervision
 - Establish Internal Protocols
- Annual review and safety permit expires



CHEMICAL MANAGEMENT PROCESS



Lesson Learned

- **Potential liability to individual and institution**
- **Establish safety practices and processes**
 - Evaluation of PPE
 - Training
 - Procedures/Manuals
 - Management Oversight/Supervision
- **ESOH is an Institution/Management's Program**
- **Risk management is part of the research culture.**



Acknowledgments



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- ❖ Reggie Ching, Senior Systems Safety Engineer

QUESTIONS?

243rd ACS National Meeting, San Diego, California, March 27, 2012

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BACKUP





CHEMICAL RISK MANGEMENT

