**Examples of Hazard Controls**

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| **Engineering Controls (Eliminate)** | **Administrative Controls (Reduce)** |
| **Isolation*** Control rooms or restricted access areas
* Guarding (ex. machinery guards, fall protection/guardrail systems/parapet walls on roofs)
* Barriers/shielding (ex. welding shields, plastic for P-32 radiation sources)
* Locking out hazardous energy sources
 | **Housekeeping*** Regular cleaning of work area
* Dry, clean floors
* Proper storage of tools, materials, chemicals, radioactive substances
* Proper spill response
* Surplus old machinery/equipment
* Vacuum instead of sweeping
 |
| **Design*** Proper access (ex. stairways, ramps)
* Height (ex. hazard located above employee access, typically 8 feet)
* Impervious work surfaces
* Seamless flooring
* Safety interlocks on equipment
* Automatic shutoff
 | **Training*** Hazard recognition
* Hazard controls
* Safe work practices
* Safe operating procedures
* Emergency procedures
* Machinery and equipment
 |
| **Substitution*** Dipping/brushing instead of spraying
* Bolting together instead of welding
* Hacksaw use instead of grinding
* Wet processes instead of dry processes
* Using non-hazardous chemicals
* Using less hazardous radioactive substances (ex. P-33 instead of P-32)
* Soap and water instead of solvents
* Automation instead of manual eqpt.
 | **Reduction*** Perform hazardous tasks less frequently
* Rotate employees in hazardous areas (not permitted for respiratory hazards)
* Minimize on-hand stock of hazardous materials
* Minimize waste products by recycling or redistribution (donate chemicals to university surplus)
* Decrease time/increase distance (rad)
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| **Elimination*** On-demand supply instead of on-site storage
* Maintenance-free batteries
* Purchase premixed products
 | **Preventative Maintenance*** Regular inspections
* Regular service and maintenance
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| **Work Area Layout*** Separating non-compatible work tasks
* Routing high-traffic paths away from hazardous areas
* Minimize size of radioactive work areas
* Segregating radioactive work
 | **Exposure Monitoring*** Quarterly review of personal radiation doses
* Investigation at 10% and 25% of occupational exposure limits (radiation)
* Identify radiation contaminated areas
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| **Ventilation*** Increase air flow
* Use fume hoods for mixing
* Local exhaust ventilation
* Filtration (ex. HEPA-filtered Biosafety cabinets, charcoal filtering for radioactive substances such as I-125)
 | **Safe Work Practices and Procedures*** Identify and develop for hazardous processes
* Perform radiological hazard analysis
* Label equipment as radioactive
* Container labeling (chemical, radioactive, biohazardous)
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