



UNITED STATES DEPARTMENT OF ENERGY  
**OFFICE OF RIVER PROTECTION**

# Improvements to the Occupational Health Program

Upgrades to Engineering Controls, Administrative Controls, Worker Training,  
Industrial Hygiene Procedures, Occupational Medicine Programs and Oversight  
*2009-Present*

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May 8, 2014



## Engineering Controls in Place at the Tank Farms

- Active ventilation, including portable exhausters and increased flow rates
- Stack extensions to displace emissions
- Sealing up emission sources, use of sleaving and glove bags
- Hard-piping CAM (continuous air monitor) cabinets or installing fans
- Radial filters with valves on risers
- Accessible cooling stations for personnel



## Administrative Controls, Including Training for Workers

- Vapor control and vapor reduction zones
- Voluntary respiratory protection encouraged, working to ease access
- Chemical Hazard Awareness Training - topics include:
  - Origin of tank farm waste characterization,
  - Health effects,
  - Odors,
  - Exercises and instrument demonstration
- Occupational and Environmental Health Overview, fiscal year (FY) 2014



# Training Tool: Tank Farm Chemical Vapor Odors

Chemical	Odor Threshold		Occupational Exposure Limit		Odor Description
Acetaldehyde	0.003	ppm	25	ppm	"Fruity odor"
<b>Ammonia</b>	<b>0.04</b>	ppm	<b>25</b>	ppm	<b>"pungent, sharp"</b>
Butanal	0.005	ppm	25	ppm	"body odor, sweaty socks, fishy, onions"
Ethyl Benzene	0.09	ppm	100	ppm	"spray paint"
n-Pentane	119	ppm	600	ppm	"gasoline"
<b>Toluene</b>	<b>0.16</b>	ppm	<b>20</b>	ppm	<b>"spray paint"</b>
Xylenes	0.008	ppm	100	ppm	"spray paint"
<b>Methylene Chloride</b>	<b>1.2</b>	ppm	<b>25</b>	ppm	<b>"paint stripper"</b>
Acetone	3.6	ppm	500	ppm	"nail polish remover"
2-Propanol	1	ppm	200	ppm	"rubbing alcohol"



## Programmatic Upgrades

- Acute, short-term sampling protocols, added chemicals
- New technology assessments
- Reporting, data sharing, industrial hygiene/occupational medicine interface
- Data and hazard analysis upgrades
- Chemical as low as reasonably achievable initiatives
- Heat stress initiatives

U.S. Department of Energy (DOE), Office of River Protection (ORP) incentivized Washington River Protection Solutions LLC to seek out innovative ideas for addressing acute odor and symptom concerns. ORP hired summer interns to support evaluations of new technologies in FY 2013 and FY 2014.



# Occupational Health Monitoring Involves “Defense in Depth”

