# Department of Defense Needs for Inhalation Toxicity Testing

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# Glossary

- AEGL – Acute Exposure Guideline Level
- BMDL – Benchmark Dose Limit
- CEL – Continuous Exposure Limit
- EEL – Emergency Exposure Limit
- IDLH – Immediately Dangerous to Life or Health
- LC50 – Median Lethal Concentration
- LCt50 – Median Lethal Concentration x time
- LOAEL – Lowest Observed Adverse Effect Level
- NOAEL – No Observed Adverse Effect Level
- OEL – Occupational Exposure Limit
- PPE – Personal Protective Equipment
- RfC – Reference Concentration

# Quick Overview of Needs in General

- Information Collected: large variety from LC50 to RfCs, occupational exposure levels, extrapolations to human exposures
- Assay Endpoints: acute through chronic reproductive/behavioral
- Chemical Classes: many, e.g. organophosphates, high-nitrogen compounds (pyrotechnics, explosives), fuels, propellants, fire-extinguishing agents, combustion products
- Exposure Types: gases, vapors, aerosols (e.g. droplets/mists, particulate/dust)
  - May be non-traditional scenarios, e.g. high altitude, high g-force, high pressure, recirculated environments, hypoxia, extreme temperature/humidity, mixtures
- Hazard Categories: low toxicity through/to highly toxic

# Inhalation Needs for the Army

- Duration: acute to chronic
- Assay Endpoints: acute lethality, local effects, air-blood barrier breach, systemic effects
- Information Needs: LC50, LCt50, IDLH, OELs, PPE determinations, probit slopes, toxic load exponent, extrapolated human estimates, BMDLs, LOAELs and NOAELs
- Chemical Classes: organophosphates, propellants, smokes/obscurants, fuels (solid), fire-extinguishing agents, combustion products, metabolic poisons
- Exposure types: gases, vapors, aerosols (e.g. droplets/mists, particulate/dust)
- Hazard categories of interest: non-toxic through highly toxic

# Inhalation Needs for the Air Force

- Duration: acute to chronic
  - Acute for AEGLS and for dose-determination of longer term studies
- Assay Endpoints: local effects (irritation, inflammation) and systemic inclusive of behavioral effects
- Information Needs: OEL, AEGL, PPE determinations
- Chemical Classes: fuels and propellants (liquid), engine oils, coolants, hydraulic fluids, heavy metals
- Exposure Types: gases, vapors, aerosols (e.g. droplets/mists, particulate/dust)
- Hazard Category of Interest: low toxicity through highly toxic

# Inhalation Needs for the Navy

- Duration: acute to chronic
- Assay Endpoints: local effects (irritation, inflammation) and systemic effects to include physiological, behavioral/cognitive and reproductive/ developmental effects
- Information Needs: OEL, AEGL, CEL, EEL, PPE determinations
- Chemical Classes: fuels and propellants, coolants, metals, solvents, combustion products, emissions
- Exposure Types: gases, vapors, aerosols (e.g. droplets/mists, particulate/dust)
- Hazard Category of Interest: no/low toxicity through highly toxic

# Commonalities Across the Services

- Duration requirements are for acute to chronic
- Assay Endpoints: local and systemic effects
  - Systemic can include reproductive/developmental, behavioral, physiological
- Information Needs: PPE determinations and occupational exposure limits, acute hazard determinations
- Chemical Classes: industrial chemicals, chemical agents, heavy metals, energetics, fuels
- Exposures: gases, vapors, aerosols (e.g. droplets/mists, particulate/dust)
- Hazard Categories: low toxicity to high toxicity
- Existing efforts for non-animal approaches include QSAR modeling, inhalation toxicokinetic models, and some in-vitro approaches (cell-based and tissue chip)

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# For Additional Information

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