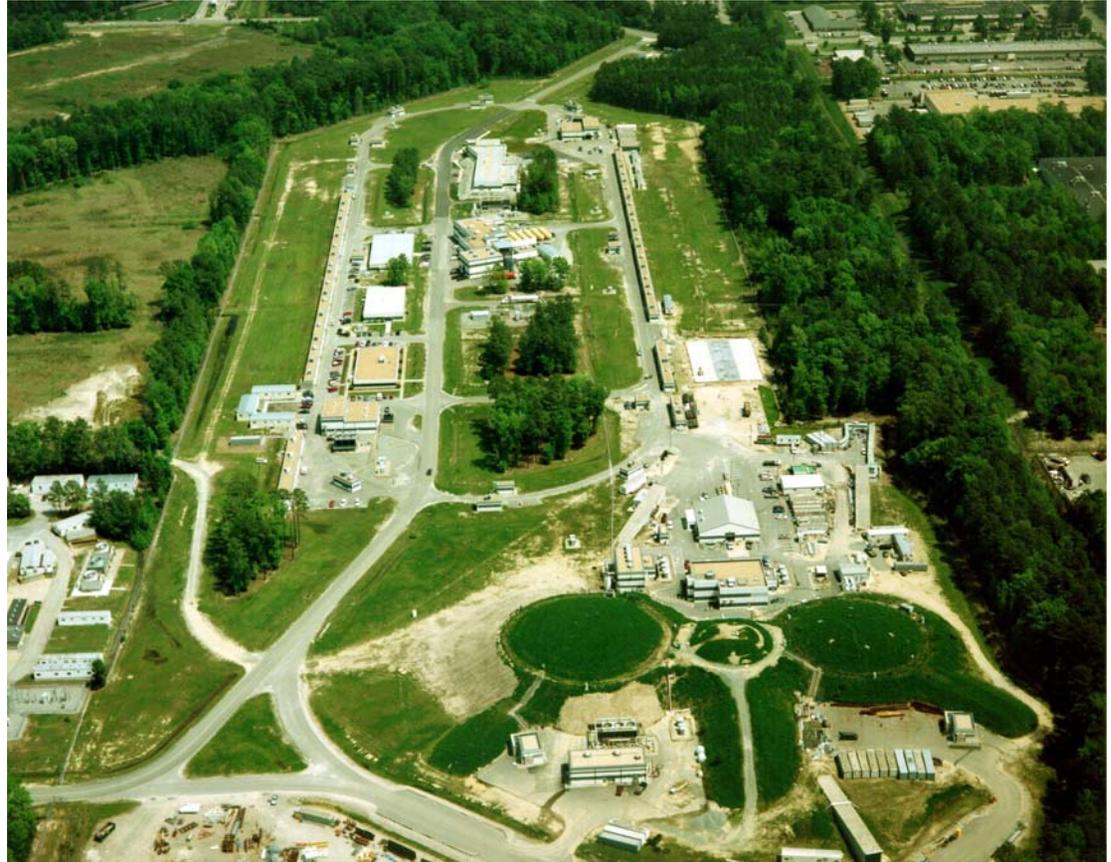


Classification

Jefferson Lab is designated as a “**Low-Hazard, Non-Nuclear, Accelerator Facility**” by the Department of Energy.

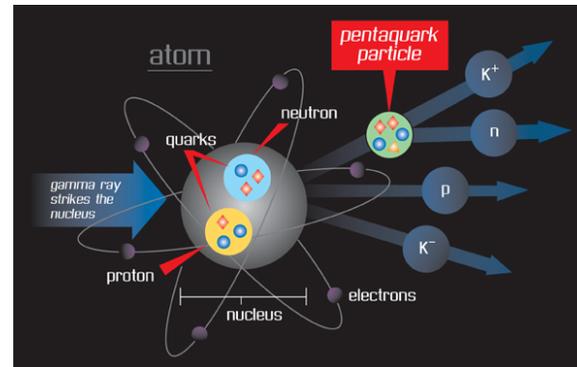
The JLab campus has hazards similar to those associated with general industrial facilities.



Non-Nuclear

“A facility is categorized as ‘non-nuclear’ if the amount of radioactive material potentially releasable from a facility is less than the reportable quantity value listed in Appendix B to Table 302.4 of 40 CFR 302 [Radionuclides] and the amount of potentially releasable hazardous material exceeds the reportable quantity values listed in Table 302.4 to 40 CFR 302 [Hazardous Substances]”

i.e. the facility does not generate reportable quantities of radioactive material but may have reportable quantities of other hazardous substances as defined by the EPA.



The very purpose of the CEBAF accelerator is to produce exotic combinations of ionizing matter and energy, i.e. radiation, under very controlled conditions. As soon as the beam is OFF, the radiation goes away.



HAZARD CATEGORIZATION

“Non-nuclear facilities will be categorized as high, moderate, or low hazards based on the following:

High

- hazards with a potential for onsite and offsite impacts to large numbers of persons or for major impacts to the environment;

Moderate

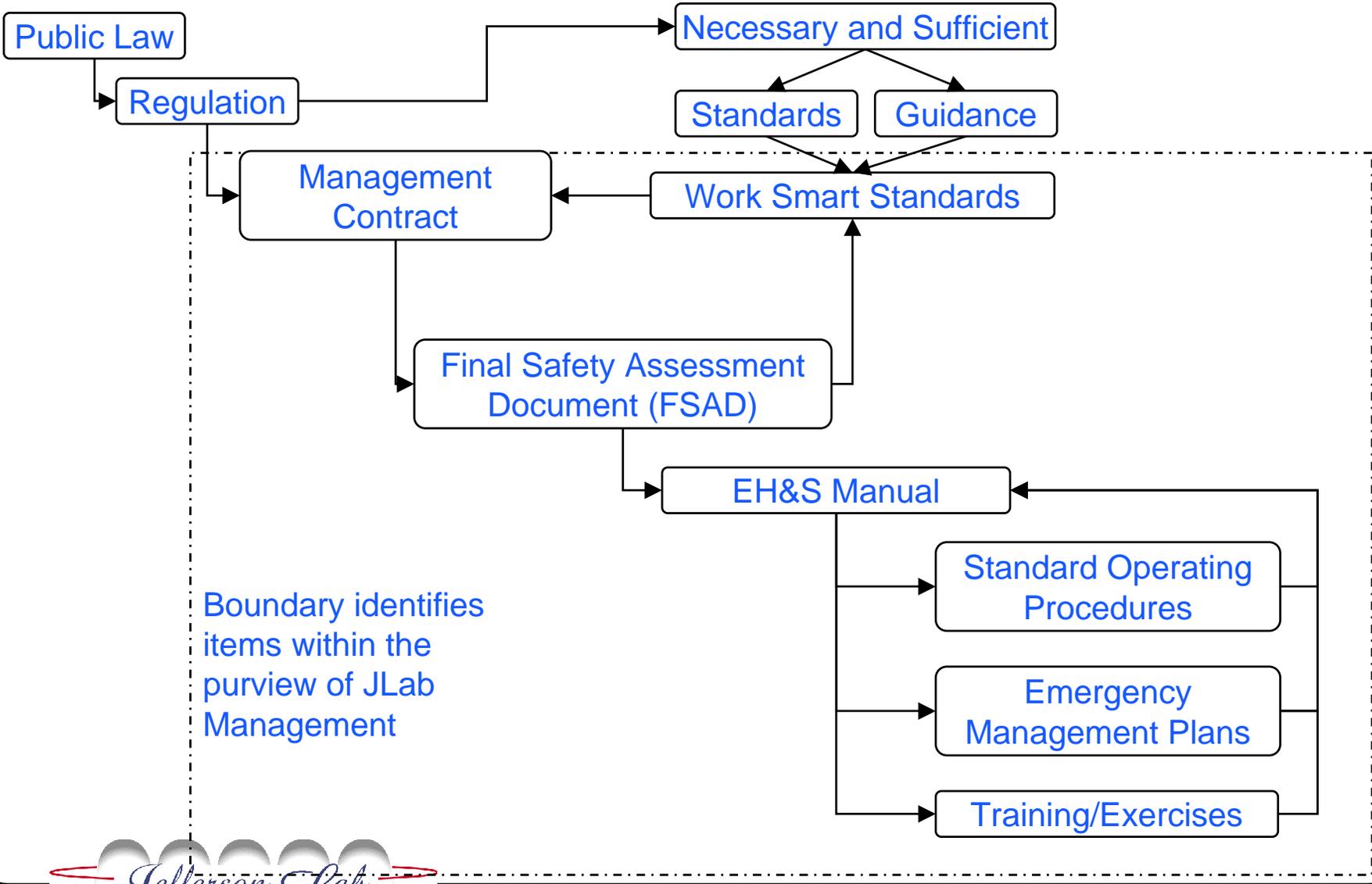
- hazards which present considerable potential onsite impacts to people or the environment, but at most only minor offsite impacts, and;

Low

- hazards which present minor onsite and negligible offsite impacts to people and the environment.”



Hazards Assessment and Documentation



Boundary identifies items within the purview of JLab Management



Hazard Identification



- Hazards are identified and addressed as part of the
 - JLab Hazards Analysis Document
 - Final Safety Assessment Document
 - EH&S Manual Chapter 2410-T1, *JLab Hazards Issue List*
 - EH&S Manual 6000 Series Chapters



Safety Assessment Risk Matrix

High (serious impact on or off site. Major environmental impact.)				
Medium (moderate impact on site and/or minor impact off site. Minor impact on the environment)				
Low (minor impact on site with no impact off site. Minor impact to environment)				
Extremely low (little, if any, injury; insignificant damage to environment)				
Severity	10 ⁴ to 10 ⁶ years	10 ² to 10 ⁴ years	10 to 100 years	< 10 years
Likelihood	Extremely Low	Low	Moderate	High



Jefferson Lab Hazard Types

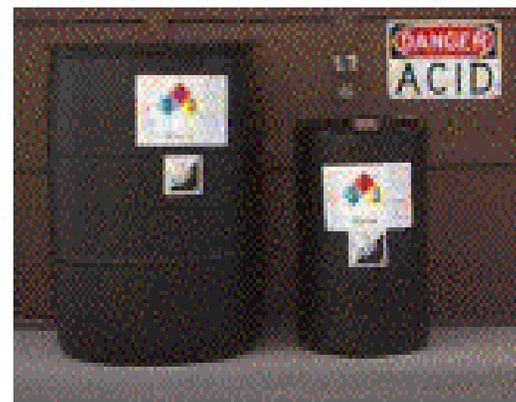
Major Hazards

- Chemical
- Cryogenics
- Electrical
- Fire
- Human
- Industrial
- Ionizing Radiation
- Non Ionizing Radiation
- Weather



Jefferson Lab Hazards – Chemical

- JLab is a small quantity generator
 - Many different chemicals in small quantities limited to individual buildings
 - Two primary types
 - Solvents (isopropanol & acetone)
 - Buffered Chemical Polish (BCP)
Mixture of HF, H₃PO₄, HNO₃
 - Bringing on line electro-polish cabinet
Mixture of HF, H₂SO₄

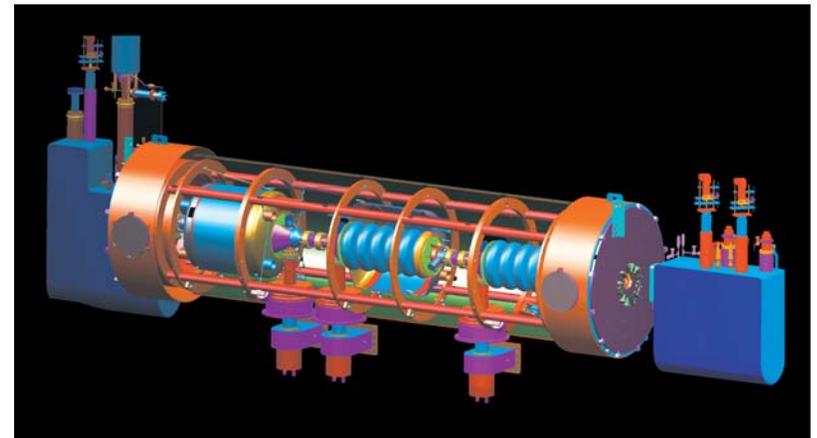


Chemical Storage



Jefferson Lab Hazards – Cryogenics

- Cold burns and freezing
- Oxygen Deficiency
- Explosion – pressure
 - Vacuum vessel components (relief valves, pressure plates)



SNS Cryomodule



Jefferson Lab Hazards – Electrical

- Standard industrial DC and 60 cycle AC power
 - AC Power
 - Two master substations delivering power to site
 - Accelerator: 40 MVA of 60 Hz, 3-phase power
 - Test Lab: 12.5 MVA of 60 Hz, 3-phase power
 - Master substations feed various 12KV unit substations
 - Unit substation output of either 4160V or 480V



40MVA Substation



Jefferson Lab Hazards – Electrical

- DC Power
 - Most JLab accelerator equipment and controls use DC power
 - Box supplies used to power magnets: 800V, 300A to 65V, 645A
 - High Power Amplifiers (HPA): 11KV, 10A
 - Cathode Power Supply converts AC to DC power and feeds DC power to HPA



East Arc Electromagnets



Jefferson Lab Hazards – Fire

- Electrical fires
- Chemical fires
 - Solvents
 - Flammable gases
- Industrial fires
 - Cutting, welding, brazing

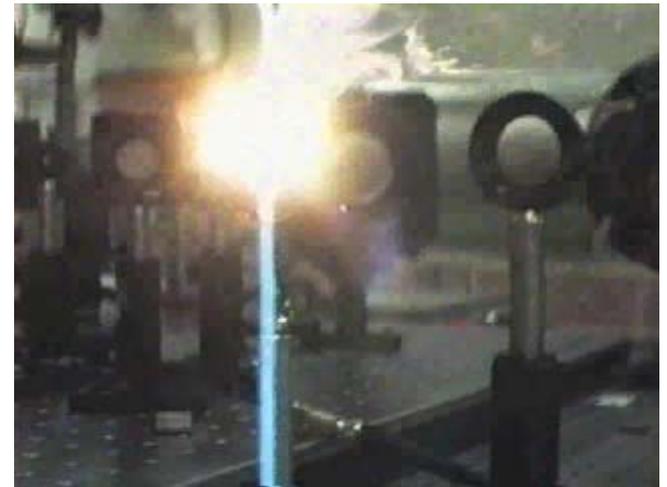


TRANSFORMER FIRE On July 6, 2002
Labadie, Missouri Power Plant.



Jefferson Lab Hazards – Fire (cont)

- People-related fires
 - Smoking
 - Housekeeping
- Beam-related
 - Electron beam burn through
 - Laser beam burn through



FEL at 100 Watts

Note: the visible beam is actually from harmonics of the invisible infrared beam.



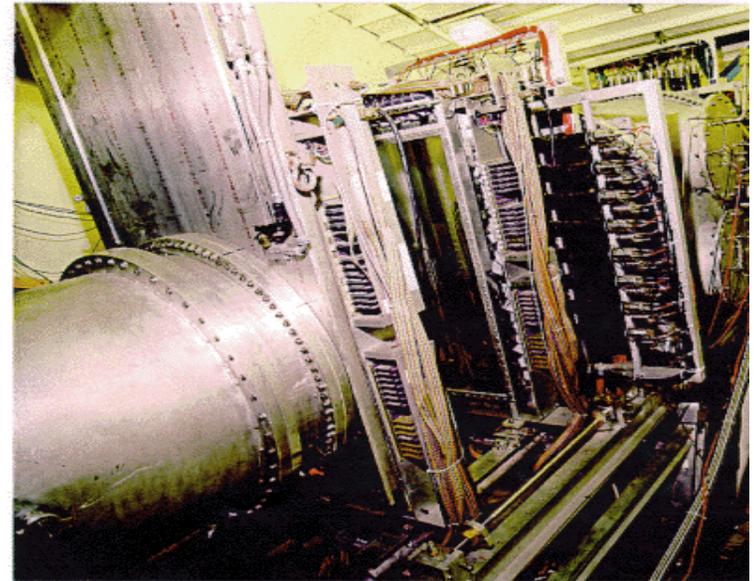
Jefferson Lab Hazards – Human

- Civil disturbances
- External threats
 - Bomb threat
 - Department of Homeland Security Advisory
 - Security Challenges
- Workplace violence



Jefferson Lab Hazards – Industrial

- Confined Space
- Explosion/Implosion
- Falls
- Material Handling
- Vehicle Accidents



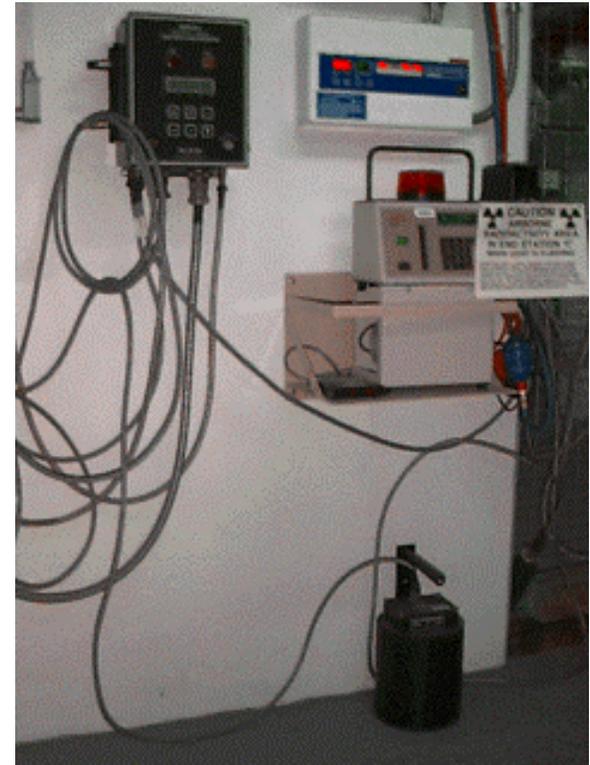
HMS Detector Assembly

The large cylinder on the left is under vacuum, isolated from atmospheric pressure by a thin mylar sheet.



Jefferson Lab Hazards – Ionizing Radiation

- Direct (prompt) radiation
- Radioactive gases
- Groundwater activity
- Surface discharge

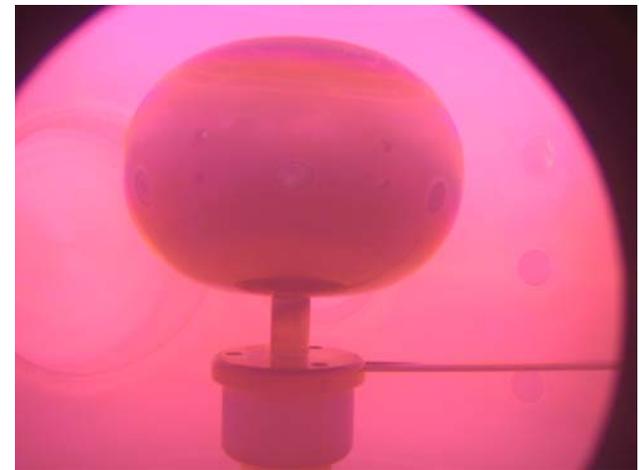


Airborne and area radiation monitors



Jefferson Lab Hazards – Non Ionizing Radiation

- Lasers
 - Class 4 > 0.5W (FEL > 10kW)
 - Class 3b 0.005-0.5W
- Magnetic Fields
- Radio Frequency
 - RF Amplifiers 1W to 1MW
 - Ultraviolet FEL Harmonics

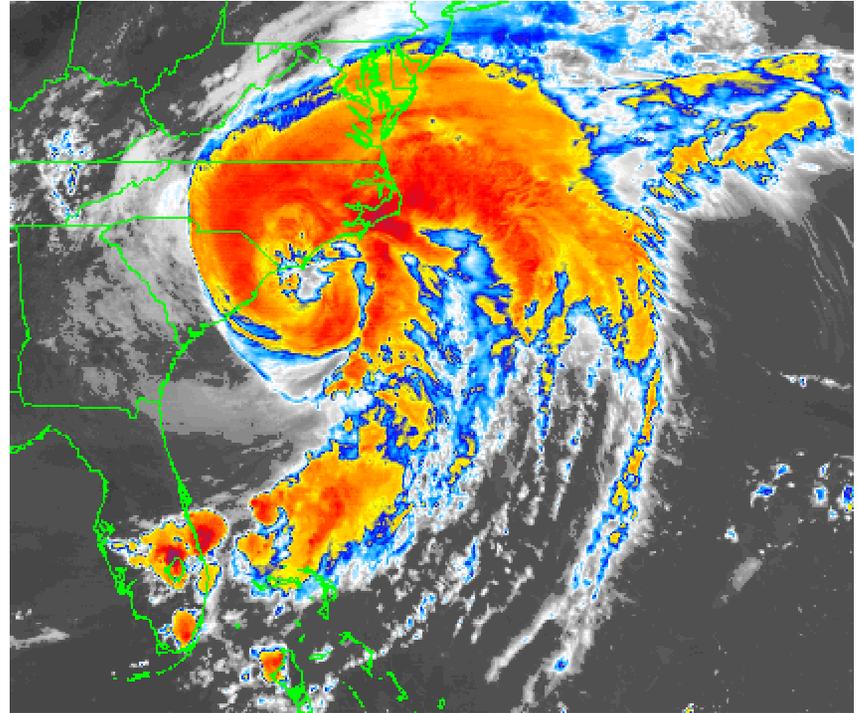


FEL source RF plasma processing



Jefferson Lab Hazards – Weather

- Heat
- Hurricanes
- Thunderstorms
- Tornadoes
- Winter storms
- Ice
- Nor'easters



Hurricane Floyd



Jefferson Lab Hazards – Summary

HAZARD	LOCAL (Confined to immediate area)	ON-SITE (Confined to DOE/SURA Property)	OFF-SITE
Chemical	Moderate	Low	Low
Cryogenics	Moderate	Low	Low
Electrical	Moderate	Low	Low
Ionizing Radiation	Moderate	Low	Low
Weather	Moderate	Low	Low

Low = negligible risk to individuals or environment

Moderate = significant risk to few individuals or environment



Jefferson Lab Hazards - Summary

- On June 2, 1993, Jefferson Lab was designated a “Low-Hazard, Non-Nuclear, Accelerator Facility” by the Department of Energy. This remains true 10 years later.
- Low Hazard Class means that hazards have potential for no more than minor on-site and negligible off-site impacts to people or the environment.

