

Unattended Experiments Equipment Fact Sheet

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FACT SHEET #15

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REVISION: FOURTH

NORTHEASTERN UNIVERSITY PROCEDURE FOR RUNNING UNATTENDED

EQUIPMENT AND EXPERIMENTS

BACKGROUND. Equipment and experiments that run unattended during the day and overnight have the potential of causing significant problems and harm to University personnel, facilities, and equipment. Although we discourage this practice as much as possible, particularly when hazardous substances are involved, we do recognize there is a need to run these experiments at certain times. The following procedures should be used as guidance when carrying out such experiments.

HAZARD ANALYSIS. Anyone considering running an experiment unattended should consider the possible hazards that could occur as a result of failures, malfunctions, operational methods, environments encountered, maintenance error and operator error. These hazards can be identified by looking at the system as a whole and identifying which failure(s) could occur. Some examples include:

- a.) **WATER** - If water was suddenly interrupted or a hose pulled out or burst, would the system overheat, flood the laboratory, or cause some other problem?
- b.) **SIGNAGE** - If appropriate signage was not used, could someone mistake the containers or turn a switch that was intended to remain open/closed?
- c.) **POWER INTERRUPTION** - If power was suddenly interrupted would the system or safety features for the system also be shut down?

FAIL-SAFE DESIGN. Experiments must be designed so that they are "fail-safe", which means that they will prevent one malfunction from propagating other failures. Fail-safe designs ensure that a failure will leave the experiment unaffected or will convert it to a state in which no injury or damage will occur. An example of this is if water is used for certain experiments, then they can be designed with a water flow monitor and solenoid valve, which will turn off the water flow in the event of a broken hose or fitting.

REDUNDANCY. Another safety design consideration is redundancy, wherein events or devices are placed parallel so the failure of one will not jeopardize the operation and create a hazard condition. An example of redundancy in use could be when a laboratory freezer is connected to a power circuit and an emergency generator. Either power source will be able to run the freezer. Another common example of redundancy is used by the airline industry, where jet engines are supplied by two or more fuel sources, any one of which is capable of providing an adequate flow of fuel to the engine.

HAZARDOUS EXPERIMENTS. Experiments running unattended or overnight involving a water supply, chemical, energy source, or other hazard will be required to have hazard analysis done and fail-safe design and/or redundancy incorporated into them.

If you have any questions or would like assistance with conducting a hazard analysis to identify fail-safe design and redundancy for your experiments, please contact the office of Environmental Health and Safety at x2769