

STANDARD OPERATING PROCEDURE

FOR AUTOCLAVE OPERATION

Plant Ag SOP #	2002-1
Revision date:	26 Aug 2002
Reviewed by Env Health & Safety:	15 Aug 2002

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I. ASSOCIATED RISKS

Autoclaves are sterilizers using high pressure steam. Autoclaves operate at high temperatures and pressures and as a consequence pose a serious risk to operator safety.

Specific risks include:

- Heat burns – from hot materials and autoclave chamber walls and door
- Steam burns – from residual steam issuing from autoclave and materials on completion of cycle
- Hot fluid scalds – from boiling liquids and spillage in autoclave

II. RISK MANAGEMENT

- 2.1 Autoclaves to be regularly inspected and certified, and an inspection, service and repair record maintained as per University Safety Policy 851.07.09
- 2.2 An authorised training session must be successfully completed prior to use of autoclaves.
- 2.3 Procedure and instruction documentation must be followed.
- 2.3 Personal protective clothing and equipment must be worn when loading and unloading the autoclave to protect against scalds and burns:
  - Heat-insulating gloves that provide complete coverage of hands and forearms.
  - Face shield that provides complete coverage of the face and neck.
  - Splash apron that provides complete coverage of the chest and legs.
  - Closed-toed footwear.

III. OPERATOR INSTRUCTIONS

3.1 Training

- Training sessions on the safe operating procedures of autoclaves will be authorized by the Chair, Department of Plant Agriculture, or his/her designate. Training must cover proper packaging, loading, labelling, and operation procedures.
- All operators must have successfully completed an authorised training session on the safe operating procedures of autoclaves. This requirement applies to both new and experienced personnel.
- Records of the authorized users shall be maintained by the Chair, Department of Plant Agriculture, or his/her designate.

3.2 Material Preparation

- Ensure that the material is autoclavable – Oils, waxes, some plastics, flammable materials, radioactive materials, and samples containing solvents or substances that may emit toxic fumes should not be autoclaved.
- Glassware should be inspected for cracks prior to autoclaving.
- Package material suitably:
  - T Exposed, dry materials should be wrapped or bagged in steam-penetrable paper or loosely covered with aluminium foil. Wrapping too tightly will impede steam penetration, decreasing efficiency of the process.
  - T All containers should be covered by a loosened lid or steam-penetrable bung to ensure sterility.
  - T Containers of liquid should be a maximum of 2/3rds filled, with lids loosened.
  - T Glassware should be heat-resistant borosilicate.
  - T Plastics should be heat-resistant eg: polycarbonate (PC), PTFE ("Teflon") and most

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polypropylene (PP) items.

T Sharps must be in a designated University 'Sharps' container.

T Items or baskets should be tagged with autoclave tape to verify sterilisation.

- Loosen all lids to prevent pressure buildup.
- Bottles with liquids must be a maximum of two-thirds full, lids loosened.
- Place items in containers to secure and contain spills:
  - T Items should be placed in a stainless steel container for their stability and ease of handling.
  - T Place containers of liquid, bags of agar plates, or other materials that may boil over or leak, into a secondary pan in the autoclave. The pan must be large enough to contain a total spill of the contents.
- Biohazard materials must be labelled as such and secured in containment vessels or autoclavable bags and processed as soon as possible according to requirements for the handling of infectious or biohazard materials.

### 3.3 Loading Autoclave

- Wear heat-insulating gloves, splash apron, face shield, and closed toed shoes.
- Place material in autoclave.
- Do not overload; leave sufficient room for steam circulation.
- Close door firmly or until lock light operates (when fitted)

### 3.4 Operating Autoclave

- Choose appropriate cycle (fluid or dry)
- Set appropriate time(s), and temperature for the cycle
- Before commencing a fluid cycle, ensure the chamber pressure is '0'
- Press cycle on button to initiate cycle
- When cycle is complete, an audible signal will sound usually in conjunction with a light or message indicating that the cycle is complete.

### 3.5 Unloading Autoclave

- Wear heat-insulating gloves, splash apron, face shield, and closed toed shoes.
- Ensure that the pressure of the chamber is '0' before opening the door.
- Wearing gloves, and standing back from the door as a precaution, carefully crack door open no more than 1 inch (2.5 cm) to release residual steam and allow pressure within liquids and containers to normalize. After initial puff of steam has dissipated, open door fully.
- Allow sterilised material to stand for 3-4 minutes. This will allow steam to clear and trapped air to escape from hot liquids, reducing operator risk.
- Do not agitate containers of super-heated liquids or remove caps before unloading.
- After removal from the autoclave, place hot items in an area which clearly indicates the items are 'hot' until the items cool to room temperature.
- Close the autoclave door.

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### 3.6 Autoclave Log

- Entries must be placed in the log books each time the autoclaves are used. These records are used for maintenance/service schedules and reporting of incidents, accidents and/or faults
- Entries should include
  - operator name and supervisor
  - date / time / run type / run duration
  - problems encountered

### 3.7 Maintenance and repair

- No person shall operate an autoclave unless it has been inspected by a qualified inspector and a certificate of inspection has been issued as per University Safety Policy 851.07.09
- Users are not to attempt to make repairs (see item 4.1). Autoclaves shall be maintained and repaired by qualified persons as per University Safety Policy 851.07.09.

### 3.8 Sterility assurance

- Quality control programs for sterility assurance for each autoclave shall be implemented by the workplace supervisor as per University Safety Policy 851.07.09.

## IV. CONTINGENCY PLAN

### 4.1 Equipment malfunction

- If the autoclave does not operate exactly as expected, do not attempt to fix the problem. A notice is to be placed on the autoclave indicating that it is not to be used until the problem is diagnosed and corrected.
- Record the problem in the autoclave log book. Contact the laboratory manager (Chris Grainger, Ext 2509) to report the problem.
- Repair to the autoclave shall be performed by qualified persons. The University's Physical Resources shall be consulted about the repair of autoclaves. Any alteration or repair to the unit will require inspection for insurance and safety purposes; consult Environmental Health and Safety for advice.

### 4.2 Accident response

- All incidents are to be reported to proper personnel as per University Safety Policy 851.04.02
- If a burn is received, immediately proceed to the nearest emergency/shower station. See Occupational Health Nurse or, if necessary, seek medical assistance by dialling Ext 2000. Stay on the line until the dispatcher has confirmed your location and the nature of the accident.
- Place a notice on the autoclave indicating that it is not to be used until the cause of the incident is determined, procedures enacted to prevent future incidents, and the autoclave is deemed safe for operation.

### 4.3 Spill clean-up

- No operation of the autoclave is allowed until the spill is cleaned up. Contact the operator to notify them that a spill has occurred.

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- The operator is responsible for clean up of spills. Contain the spilled material using materials to absorb or contain the spill. Wait until the autoclave and materials have cooled to room temperature. Review the MSDS sheets to determine the protective equipment, spill cleanup, and disposal protocols that are necessary. Clean the equipment and work area in order to collect and remove all spilled materials. Dispose of the waste following the protocol appropriate for the material. If materials have been intermingled, follow the cleanup and disposal protocol for the most hazardous component of the mixture.
  - Cracked glassware must be disposed of properly.
  - Record the spill and cleanup procedure in the autoclave log book.