

# Job Hazard Analysis

JHA Name: Autoclave - Pressure Vessels



Assessment Date: 03-25-14

Revision Date: 04-06-17

Building or Location: North Mankato & Faribault Campus

Department or Program: Biology

Description of Individual Tasks or Assignments:

Sterilization of equipment and decontamination of biohazard infectious materials through a process utilizing high pressures and temperatures (e.g., steam sterilization)

Tools, Equipment, or Machinery Used when Performing Task:

Autoclave (i.e., Pressure Vessels), Laboratory Glassware, Surgical Tools, Autoclave Tape, Autoclave Paper, Sterilization Pouches, and Steam Indicator Strips

Hazard Type(s) Associated with Task or Assignment:		Check for Exposure:	Specific Hazard Exposure:	Check if Exposure Recommends or Requires a Style of PPE?
1	<b>Impact</b> <u>Example:</u> Person(s) can strike an object, or be struck by a moving or flying/falling object (e.g., fragments, chips, particles, sand, dirt/debris).			
2	<b>Penetration or Cut</b> <u>Example:</u> Person(s) can strike an object, be struck by an object, or fall upon an object or tool that would cut or otherwise break the skin.	X	Potential exposure to exploding glass vessels that have become pressured during processing (e.g., injuries to unprotected skin)	X
3	<b>Crush or Pinch</b> <u>Example:</u> An object(s) or equipment/machine may crush or pinch a body or body part			
4	<b>Chemical or Harmful Dust</b> <u>Example:</u> Exposure to chemicals (i.e., hazardous substances and harmful physical agents), infectious agents from spills, splashing, physical contact, and/ or exposure to dusts, vapors, fumes, or gases that could cause illness, irritation, burns, asphyxiation, breathing/vision difficulty, sensitization, infection, or other toxic health effects (i.e., acute or chronic). Note: "May also have or create ignition potential."	X	Potential exposure for infection by the inadvertent release infectious micro-organisms to environment or persons within vicinity. Sudden changes in pressure (e.g., opening autoclave) may cause superheated liquids to violently change from a liquid to gas and boil over (e.g., illness & toxic atmosphere)	X
5	<b>Heat</b> <u>Example:</u> Exposure to radiant heat sources, sparks, and splashes or spills of hot material	X	Potential exposure to the rapid release of stored energy (e.g., heat & steam) resulting from autoclave failure (e.g. failure of doors/lids), or from opening the door while autoclave is under pressure and/or heated (e.g., scalding & burns to exposed skin). Potential exposure to hot contents being processed or from the operator accidentally touching the sides of the autoclaves	X
6	<b>Light (optical) Radiation</b> <u>Example:</u> Exposure to strong light sources, glare, or intense light exposure which is a byproduct or a process. Note: "This category may also include hazards presented from lack of light (e.g., working in dark spaces/areas)."			
7	<b>Electrical Contact</b> <u>Example:</u> Exposure, contact, or proximity to live or potentially live electrical objects.			
8	<b>Ergonomic/ Human Factors</b> <u>Example:</u> Working in cramped spaces, repetitive movements, awkward postures, vibration, heavy lifting, etc... Note: "This category may also include unique hazards presented from tasks that require demanding or challenging degrees of mental and/or physical effort to be exerted by an individual. See <i>Physical Effort Definition/Examples</i> category for further explanation of physical effort."	X	Potential exposure to repetitive movements, lifting light to moderately heavy loads, and bending/twisting (when moving lumber) (e.g., Muscular Skeletal Disorders)	X
9	<b>Environmental</b> <u>Example:</u> Exposure to noisy environments, hot or cold work environments, poor weather conditions, working at a height, and any other conditions in the workplace that could cause danger, discomfort, and/or negative health effects.			

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**Personal Protective Equipment Requirements:**

<b>Eyes &amp; Face:</b>	Safety Glasses with Side Shields or Goggles (Requirements depend on laboratory work performed and any specific laboratory requirements), OR Face-shield worn over Safety Glasses with Side Shields or Goggles (Requirements depend on laboratory work performed and any specific laboratory requirements)
<b>Head &amp; Ears:</b>	
<b>Whole Body:</b>	Lab Coat and Long Pants (Requirements depend on laboratory work performed and any specific laboratory requirements), AND/OR Chemical Apron (Requirements depend on laboratory work performed and any specific laboratory requirements)
<b>Feet:</b>	Closed-Toe Shoes (Required during all laboratory work)
<b>Hands:</b>	Chemical Gloves (Requirements depend on laboratory work performed and any specific laboratory requirements) "Specific glove type is dependent on laboratory work being performed and laboratory-specific requirements" Heat Resistant Gloves (Required during loading and unloading)
<b>Respiratory:</b>	
<b>Other:</b>	"Note: Personnel must change from loose clothing, tie back long hair, and take off jewelry that could become entangled, snagged, or otherwise interfere in laboratory experiments"

**Other Control Measures or Requirements (Engineering & Administrative Controls):**

**#4) Chemical or Harmful Dust Hazards:** Personnel should receive Chemical Hygiene training (e.g., regarding chemical & physical hazards). Personnel should receive Bloodborne Pathogens training (e.g., regarding biohazard materials). Personnel should be offered the HBV vaccination series. Decontamination is achieved through a combination of time, temperature and pressure; the specified temperature must be maintained for the appropriate time (if not maintained the items are not decontaminated). Do not overload autoclave, an overloaded autoclave obstructs steam flow. Avoid packing items tightly into the autoclave chamber as this may prevent efficient steam penetration and effective sterilization. Use metal secondary containers when autoclaving waste. Ensure the "necks" of bags of waste materials are opened wide enough to allow efficient steam penetration and prevent pressure build up inside the bag. Make "safe cycles" to decontaminate waste containing biological pathogens of genetically modified organisms. Each load of bio-hazardous waste is different; factors influencing selection of autoclave parameters include the types of materials, amount of liquid, and how densely the waste materials are packed. **#5) Heat:** Before opening the autoclave at the end of the cycle, make sure that the chamber pressure has returned to zero, and make sure that the chart recorder demonstrates a successful cycle. Upon opening of the autoclave be mindful of the possibility of escaping steam; avoid placing body parts in the steam escape path. Stand back when the door opens and allow time for steam to escape. Hot items removed from the autoclave should be placed in a suitable cooling-area. Condensation on the load may splash user and cause burns. **#8) Ergonomic Hazards:** Personnel should receive Ergonomics training (including warning signs and conditions of ergonomic/human factors hazards). When possible set up workstation or immediate job site to help minimize reaching, and/or sitting or working in awkward positions to prevent strains, soreness, and other discomfort. Loading and unloading of material into and out of the autoclave can result in awkward movements due to weight and placement of material and location of the material and autoclave - engage in safe lifting practices. **Miscellaneous Considerations:** Only authorized persons shall operate autoclaves. Verify that autoclave holds valid inspection sticker confirming biannual inspections. Only use distilled water in autoclaves. Inspect the autoclave door gasket before each use, and replace worn or damaged gaskets. When loading ensure the caps or lids of containers are tightened, but loose enough allowing gases to escape and prevent them from becoming pressurized when heated. Containers with liquids should not be overfilled to avoid "boiling over." Keep liquid volumes as small as possible as larger volumes take longer to heat up and cool down. Crank the door handle to ensure the door is appropriately sealed. Allow autoclave chamber to return to atmospheric pressure and reasonable temperature before opening the door. Use caution when opening autoclaves for the possibility of erupting containers. Interlocks and pressure release valves should not be overridden to reduce cycle times. Open top containers or beakers should have tinfoil placed over the top to close the container. Never autoclave radioactive material, material suspected of containing hazardous materials (e.g., solvents, corrosives), chemicals that can become unstable/volatile at elevated temperatures, or contaminated sharps. Dispose of any infectious waste appropriately. " Note: Specific information and requirements for handling, labeling, and disposing of waste materials will be discussed in the "South Central College Exposure Control Plan." Operators of tools, equipment, and machinery should read and follow all Manufactures' recommendations/ requirements (e.g., inspections, servicing/maintenance, safe usage, etc...). Any tools, equipment, or machinery found damaged, defective, or otherwise unsafe should immediately be removed from service and not used until repaired or replaced. Personnel should always consult their Supervisors on the selection and use of PPE for the tasks being performed.

**Physical Effort Definition/Examples**

**1.) Physical Mobility-** Movement from place to place on the job, considering distance and speed **2.) Physical Agility-** ability to maneuver body while in place or in static position **3.) Physical Strength (Light to Moderate)-** Ability to handle routine office materials and tools **4.) Physical Strength (Moderate to Heavy)-** Ability to handle 50lbs+ objects, considering frequency **5.) Dexterity-** skill and ability in using hands, fingers, and feet **6.) Physical Balance-** ability to maintain balance and physical control **7.) Coordination-** harmonious functioning of body parts (e.g., eye/hand, hand/foot, etc...) **8.) Endurance-** ability to sustain a prolonged stressful effort or activity with limited opportunity to rest

Note: "This JHA provides only the minimum PPE/safety requirements necessary to safely complete the task or assignment, and the JHA only covers the hazards or exposures that are most likely to be encountered. Nothing within this JHA bars or restricts personnel from requesting higher degrees of PPE or control to mitigate workplace hazards. In addition, South Central College personnel (e.g., employees and students) are required to complete any applicable safety or on-the-job trainings required prior to performing their positions or participating in their programs of study. Finally, South Central College personnel should consult their supervisors/instructors, the college's written safety programs/policies, and/or the Security & Safety Director whenever they have questions or concerns."

**Certification: This document certifies a hazard assessment was conducted meeting the provisions specified under 29 CFR 1910.132 (d) and South Central College's related safety programs and policies.**

Name: Al Kluever

Date: 04-06-17