



Policy: 01-03-00

General Campus Chemical Hygiene Plan

OFFICE OF RECORD: Business Office
ISSUED BY: Risk Management Committee
APPROVED BY: 01-03-00
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Policy

1. Introduction

Safety is the responsibility of everybody. This statement is the cornerstone of any successful safety plan, because it is only by working together and watching out for one another's safety that we can hope to achieve the goal of any good safety plan: zero injuries. The second most critical component of minimizing risk of injury is through the adoption of a safety plan of action, continually improved by peer review, so that we all know our responsibilities and actions to take to prevent accidental injury, and how to respond if it should occur despite our best efforts. We, the administration, faculty, and staff of Dakota State University (DSU), have adopted this plan in an effort to ensure uniform and appropriate behaviors and attitudes, specifically regarding chemical safety.

This Chemical Hygiene Plan (CHP) is founded upon several simple but fundamental principles:

1. That the safety of all administration, faculty, staff, and students of DSU is the priority taking precedence when necessary even over education;
2. That chemical safety begins with a well thought out plan (the CHP), which everybody involved in is not only aware of, but also follows and into which they all have input;
3. That said plan incorporates safety features of the physical campus and safety procedures for handling chemicals;
4. That said plan covers emergency procedures, and;

5. That said plan includes the manner in which all chemicals present are to be handled from the time of acquisition to the time of disposal (the "cradle to grave" concept).

This chemical hygiene plan has been adopted by Dakota State University in a good-faith effort to maintain acceptable standards of safety for the entire campus. This plan may only be superseded by an appropriate chemical hygiene plan for a particular building or college if the chemical hygiene plan of that building or college addresses specific problems unique to that building or college, and maintains a level of safety not less than that presented here. Examples of areas that should have a unique chemical hygiene plan include but are not limited to the College of Natural Sciences to address chemistry, biology and physics labs, the College of Liberal Arts to address special chemicals used in art classes, Health Services to address special storage and handling procedures for any equipment such as needles or drugs that may be kept on hand, and the Trojan Center to address the special problems of handling large quantities of waste food. It is up to those working in the individual buildings or colleges to ascertain whether this plan covers their particular situation, and develop and adopt a chemical hygiene plan unique to their situation if they feel it is warranted.

2. Key Safety Personnel

Although safety is indeed the responsibility of all involved, there are nonetheless a few key players with additional responsibility. Following is a list of these positions and their definitions. The list of individuals responsible for each of these given roles is presented in Appendix C of this document along with the means of contacting them.

Campus Safety Officer: (CSO) The person responsible for ensuring that the DSU CHP is carried out for the entire campus. Appoints/approves Building Safety Officers (BSO) and assumes the role of the BSO for those portions of the campus that do not have a BSO.

Building Safety Officers: (BSO) The person ultimately responsible for the safety of all persons in their college, including administration, faculty, staff, and visitors. Typically, this will be the college dean or department supervisor. Appoints the Building Chemical Hygiene Officer (BCHO), and is responsible to see to the development and faithful implementation of the CHP. Responsible for periodic inspection of their building to ensure all appropriate safety equipment is in good working condition.

Building Chemical Hygiene Officer: (BCHO) Reports to the BSO. Responsible for development, implementation, review and update of the CHP, and regular employee safety training. The BCHO must be qualified for this position through either training or experience in an appropriate setting.

Building Procurement Officer: (BPO) Responsible for maintaining a complete chemical inventory, updated no less than once annually, maintaining an appropriate collection of Material Safety Data Sheets (MSDS's) for the building, and ensuring that duplicate reagent purchases are avoided. Additionally, the BPO oversees the regular removal of waste chemicals to be done at least annually.

Chemistry Consultant: (CC) Responsible to answer questions regarding chemical safety and handling. On request, works in an advisory capacity with CSO, BSO's, BCHO's and BPO's. Typically the CC is the DSU chemistry faculty member.

3. Risk Minimization

Risk minimization involves special procedures designed to protect all members of the DSU community from the risks and hazards arising from mishandling of chemicals. Involved are general procedures for handling chemicals, safety equipment, and training of employees. Like anything else, these guidelines may only be superseded by guidelines that are more appropriate for specific situations that are handed down from an appropriate expert, provided the standards of these guidelines are not compromised. In most situations, however, these guidelines should be generally applicable to any setting.

It is the policy of DSU that all complaints involving chemical or physical hazards or injuries are immediately investigated and addressed. This includes but is not limited to complaints of ailment that may be related to chemicals, safety issues, spillages, and oversights in safety policy or equipment. A complete record of all such concerns and responses to these concerns is kept on file by the BSO.

3.1 Procedures Involving Specialized Chemicals

Almost all chemicals are hazardous to health, reactive, and in the wrong hands can cause serious damage to health or property either through accidental misuse or by design. For this reason, special precautions must be put into place to protect personnel from the hazardous effects of chemicals as well as to ensure that said chemicals do not fall into the wrong hands. The following guidelines are based on two basic assumptions: that all chemicals are to be treated as hazardous materials, and that minimization of chemicals leads to minimization of the hazards associated with these materials. The specialized chemicals, which this CHP refers to, include but are not limited to cleaning chemicals, chemicals used for repair and/or maintenance, and chemicals used for other specialized purposes.

3.1.1 Procurement

Accumulation of large quantities of any given chemical or a large number of unused chemicals for an extended period of time can lead to degradation products of these chemicals with unpredictable consequences. For this reason, the simple rule of thumb that "less is more" will be strictly adhered to, and all efforts will be made to prevent the accumulation of unused, duplicate, or unwanted reagents. The following guidelines should be followed at all times:

1. The BPO will maintain at all times a current chemical inventory, which is to include all chemicals in storage in all rooms within their assigned building, updated no less frequently than once a year. This inventory is to minimally include the chemical name, quantity, storage location(s), and unusual hazards (for example, shock sensitive explosives that any individual should be aware of even before having the opportunity to read the label).
2. The BPO will ensure that a complete collection of MSDS sheets is up to date with all chemicals in the inventory represented in the collection. This collection is to be kept in a location where all personnel who work in the BPO's assigned building can have access at all times.
3. Before any new chemicals are ordered, the BPO must be given the opportunity to see if the chemicals desired are present within the building already in appropriate amounts to cover the current needs. If so, no new reagents will be ordered.
4. If new chemicals must be purchased, the quantity of the chemical purchased will be only enough to cover the current needs. Ordering large quantities based on price minimization is strongly discouraged.
5. The BPO must be informed of the purchase. On receipt of the chemical, it is the responsibility of the BPO to make the appropriate entry in the chemical inventory and ensure that the MSDS has been procured and placed in the appropriate location.
6. It is the responsibility of the purchaser to ensure that the chemical and any excess remaining after its use is appropriately stored on receipt.

The importance of effective communication cannot be stressed enough in the minimization of chemical inventory. A single point of reference, specifically the BPO, is critical to the task, and special care must be taken by all personnel to go through this individual before putting forward any new purchase requests.

3.1.2 Chemical Storage

Three primary concerns must be addressed with chemical storage: appropriate separation of incompatible materials; protection of safety of DSU personnel; and preventing the chemicals from falling into the wrong hands. Toward these ends, the following guidelines will be used in the storage of reagents:

1. There will be one primary storage area for the entire university, which will contain all chemicals for long-term storage. This makes procedures such as inventory, procurement and security easier to handle. Any campus building may also have a chemical storage area, to be used for short-term chemical storage only.
2. All storage areas will have appropriate security such that they can be locked to prevent students or inappropriate persons from entering the chemical storage area. These areas are to be kept locked as a matter of routine except during times of heavy usage by appropriate personnel.
3. Ventilation of these storage areas will be appropriate for the task of the area. Accumulation of possibly toxic fumes can only be avoided by appropriate ventilation.
4. Chemicals will be appropriately segregated to keep incompatible materials from coming into contact with one another.
5. Chemical waste may not be stored for longer than one year.
6. Students will not be permitted into chemical storage areas.
7. Chemicals that have not been used recently or are not anticipated to be used in the near future will be disposed of either as chemical waste or through a chemical exchange program. Exceptions to this rule include chemicals that are used in small quantities but frequently or chemicals that are deemed both safe for extended storage and expensive to replace should the need for the chemical arise. Searches specifically for infrequently used chemicals are to be performed no less frequently than once every five years.

Additional guidelines for materials with specific hazards associated with them may have additional guidelines imposed.

3.1.3 Chemical Usage

Chemical usage refers to the handling of chemicals between the time that they are in storage and when they become classified as chemical waste. Typical usage includes the use of the chemical for which it was designed, or in preparation of a diluted solution or other material for use later, but may also include temporary storage in preparation for an upcoming procedure. The following guidelines are designed to protect personnel during such usage:

1. Appropriate attire will be donned whenever chemicals are in use, including special components to attire when appropriate (such as gloves, eye protection, or respiration equipment).
2. Dilutions are to be performed slowly, following the appropriate procedure, with careful attention paid to prevent excessive heat formation.
3. Excess chemicals in diluted form may be stored subject to the guidelines of chemical storage.
4. Chemicals may be stored outside of regular storage areas for up to 24 hours provided they are to be used during that time.
5. Chemical labels will under no circumstances be removed or defaced.

Other guidelines specific to the usage and reagents involved will also apply.

3.1.4 Chemical Waste

All chemical waste is to be considered hazardous and disposal will inevitably be expensive. To minimize the hazards and costs associated with chemical waste, special care must be taken to avoid the most common problem associated with chemical waste: lack of knowledge. It is all too common that wastes are generated haphazardly with little regard given to documentation of the exact components of the waste. The following guidelines are designed to avoid hazardous accumulation and lack of knowledge of chemical waste:

1. No waste is to be stored for more than one year, with the exception of partially filled waste containers with waste that is deemed safe for extended storage.
2. A waste management service will be contracted on an annual basis to remove all hazardous waste. This service may be contracted by individual building to handle specialized waste disposal, or by DSU as a general contract.
3. All waste containers are to be appropriately labeled with the date, the name of the individual responsible for managing the waste, a log entry number and the contents of the waste container with special care taken to denote any known heavy metal, flammable, organic, corrosive, explosive, health and/or other particular hazards associated with the waste.
4. All BCHO's will maintain a logbook of waste containers accumulated within their assigned areas. The log books are minimally to contain a log entry number for each waste container, the dates in which waste was added to the container, the name of the person(s) adding the waste, the contents of the waste and any known hazards.

5. Organic and/or water waste may have its volume reduced by evaporation if no heat is applied whatsoever during the process. All evaporation processes of chemical waste must be performed within a functioning fume hood.
6. The BPO is responsible for disposal of waste on an annual basis and hiring a company for its removal. This work may be delegated as necessary.

All chemical waste must be handled with extreme care and special attention must be paid to remain vigilant in its correct identification.

3.2 Minimum Building Requirements

Any area used for chemical storage has special risks associated with it. For this reason, special care must be made to ensure that appropriate equipment and design goes into these areas to ensure that these risks, while impossible to remove, are at the very least minimized. Such items include safety equipment, appropriate space, continual ventilation and security measures to prevent usage by non-approved individuals. The following guidelines must be met in these environments:

1. All storage areas will have at least one fire extinguisher located near the exit designed for use on all types of fires.
2. All storage areas will have at least one eye wash station located near the exit. Eye wash stations may be permanent or portable.
3. All storage areas will have at least one fire blanket located near the exit.
4. Rooms in which large quantities of corrosive chemicals are regularly used will have at least one emergency shower.
5. Storage areas that house chemicals with known fume hazards will be equipped with appropriate ventilation for the entire room.
6. All buildings will have at least one first aid kit, containing no less than bandages, antiseptic ointment, and an instant ice pack.
7. Areas with specific and unique hazards other than those typically associated with chemicals will be appropriately equipped to handle the hazards.
8. Pathways to safety equipment (fire extinguishers, eye wash stations, etc) must never be blocked by any object, even temporarily.
9. All safety equipment will be kept in good working condition.

These regulations are designed to prevent accidents, but accidents can always occur. Only by properly equipping an area for every possible contingency will anybody be able to truly claim that the hazards have been minimized.

3.3 Employee Training

Employee safety training consists of two parts--initial training and refresher training-- and is the responsibility of the BCHO. Initial training is typically assumed for those who enter a position with degrees that would have included such safety instruction. However, all other personnel must be given proper safety training before being allowed to handle or to be exposed to hazardous chemicals.

To avoid the hazards associated with forgetfulness of safety procedures due to lack of practice, all employees who may handle hazardous reagents must receive refresher training at least annually. Training of new employees can be included in this refresher training as their initial safety instruction if the level of training is appropriate. Such training must minimally include handling hazardous materials, procedures for purchasing and disposing of reagents, record keeping procedures, safety equipment and attire, and reading MSDS's and the information contained therein. A written record of the employees receiving such training and the date of the training is to be kept by the BCHO.

Employee training shall incorporate at least the following:

1. Information on the rights of personnel as delineated by the Occupational Safety and Health Administration (OSHA).
2. The contents of this or the appropriate specialized CHP.
3. The concept of permissible exposure limits (PEL) and OSHA regulations of such limits, including but not limited to definition, where to find PEL's, and signs and symptoms of overexposure to hazardous chemicals.
4. The location and availability of safety reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the building.
5. Methods and observations that may be used to detect the presence of hazardous chemicals.
6. The physical and health hazards associated with working with hazardous chemicals and means of protection from such hazards.
7. The right of all employees to seek medical attention free of charge should symptoms appear of toxic exposure or when exposed to chemicals above the PEL.

4. Emergency Procedures

The best plans of safety cannot prevent injury from occurring due to either accident or unforeseen circumstances. It is assumed that, should an injury occur, there would be an appropriate expert nearby or someone who can be quickly contacted who will know how to handle the incident immediately. We are more concerned here with follow-up procedures to ensure that the situation is not propagated.

4.1 Bodily Injury

There is, naturally, a distinct difference between minor and serious bodily injury. Injuries that are deemed minor can be handled immediately. Such injuries should be noted by the BSO, who can then make a judgment as to whether or not to report the injury to the health services (HS). The primary reason for reporting such incidences is to inform the HS that a given individual may develop symptoms because of the injury sustained. Any person developing symptoms which may be the result of exposure to chemicals or who are known to have been exposed to a chemical at concentrations above the permissible exposure limit (PEL) will be assumed to have received a bodily injury and as such will receive a free examination and treatment if necessary at the HS.

Handling of more severe accidents depends on the extent of the injury. Any of these injuries must be reported to HS. If the individual is well enough to walk on their own, then they can walk to the HS but only with the accompaniment of the BSO or an individual appointed by the BSO. Injured individuals are never to walk to the HS alone. If the individual cannot walk, then 911 is to be called and the HS is to be apprised of the situation.

All injuries resulting in the need for a physical examination and/or medical treatment must be reported to the BSO. The BSO will maintain a record of all persons injured in assigned area, including the nature of the injury, the chemical(s) involved in the incident if applicable, the date, and response to the injury including but not limited to medical procedures incurred.

Should any person need to be examined by a medical professional, the medical professional must be provided with the following information: the identity of the hazardous chemical(s) to which the person was exposed; a description of the conditions under which the exposure occurred including quantitative exposure data if available; and a description of the signs and symptoms of exposure that the person is experiencing, if any. In return, the physician is requested to offer the following: a written opinion based on the examination which includes any recommendations for medical follow-up; the results of the examination including any tests that were performed; any medical condition which may be revealed in the course of the examination which may place the person at increased risk as a result of exposure to hazardous chemicals; and a statement that the individual has been informed of the results. This written opinion is to be kept on file by the BSO.

4.2 Physical Damage

It is assumed here that the incident resulting in the damage--through fire, explosion or spillage--has been contained and eliminated. Should major physical damage occur to a portion of a building or equipment therein, the first priority would always be to treat anybody who has been injured. Assuming the injured have been attended to, the BSO is to make a decision as to whether or not the building or room is in suitable condition for use. If it is not, classes will be moved or cancelled and other functions that would have occurred in the area will be assigned to other areas until repairs can be made. If the incident occurred during a class, the class will be cancelled if the room is deemed unsafe because of the incident or if the students are deemed overly distressed to be able to continue by an appropriate individual of authority. Before the area can be used again, the damage must be repaired at least to a state where there is no physical danger in using the area and the appropriate safety standards are met.

4.3 Uncontrollable Situations

Here we assume that the incident that has occurred cannot be eliminated and is still occurring, such as fires or chemical spillage producing toxic fumes. In such a situation, both the area and the building is to be evacuated immediately and the correct emergency agency, fire department or HAZMAT team, is to be notified. Any injured people are to be carried to safety and treated immediately for their injuries. To avoid further injury to individuals, the person in charge who was present when the situation arose must remain available to explain the situation to the appropriate emergency response professionals.

5. Special Safety Procedures

Special safety procedures include the handling of radioactive or infectious materials. Currently, DSU does not work with or store such materials, so procedures for handling these types of material are not necessary now. Should we begin utilizing this type of material, appropriate modifications will be made to this CHP.

6. Conclusion

This document began with the statement that safety is the responsibility of everybody. Throughout the document, we have delineated the responsibilities of many people, and hopefully gave the impression that there is enough responsibility to share. Only through vigilant effort can we ensure that our campus is as safe as possible. We are all in this together; we all have to do our part to see that we stay well.

Appendix A: Types of Hazards and Hazardous Materials

Aerosol, Flammable: An aerosol that yields a flame protection exceeding 18 inches at full valve opening or a flashback at any degree of valve opening.

Carcinogen: Regulated by OSHA as a carcinogen, listed under the category "known to be carcinogens" in the Annual Report on Carcinogens by the National Toxicology Program (NTP), listed under Group 1 ("carcinogenic to humans") in the latest editions by the International Agency for Research on Cancer Monographs (IARC), or listed in either Group 2A or Group 2B by the IARC or under the category "reasonably anticipated to be carcinogens" by the NTP.

Combustible Liquid: Any liquid having a flashpoint at or above 100 oF (37.8 oC) but below 200 oF (93.3 oC).

Compressed Gas: A gas or mixture of gases having, in a container, pressure exceeding 40 psi at 70 oF (21.1oC) or exceeding 104 psi at 130 oF (54.4 oF).

Explosive: A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to a sudden shock, pressure or high temperature.

Gas, Flammable: a gas that forms a flammable mixture with air at a concentration of 13% by volume or less, or a gas that forms a range of flammable mixtures with air wider than 12% by volume.

Hazardous Chemical: A chemical for which there is statistically significant evidence based on at least one study in accordance with established scientific principles that acute or chronic health effects may occur in exposed persons. The term "health hazard" includes chemicals which are carcinogens, toxic, reproductive toxins, irritants, corrosives, sensitizers, hepatoxins, nephrotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

Liquid, Flammable: Any liquid having a flashpoint below 100 oF (37.8 oC).

Organic Peroxide: An organic compound that contains the bivalent -O-O- structure.

Oxidizer: A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Physical Hazard: A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Reproductive Toxins: Chemicals which affect the reproductive capabilities including chromosomal damage (mutagens) and effects on fetuses (teratogenesis).

Solid, Flammable: A solid other than a blasting agent or explosive that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.

Unstable (reactive): A chemical which is in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

Water-reactive: A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Appendix B: Terms and Definitions

Chemical: Any specialized solution or material for a specific use.

Chemical Hazard: Any known hazard of a reagent that could cause harm to an individual's health, including but not limited to respiratory ailments, burn hazards, or damage to mucous membranes.

Chemical Hygiene Plan: The plan which is approved by the faculty, staff and administration of DSU on appropriate procedures and policies concerned with safety in laboratories.

Corrosive: Any chemical that causes erosion of skin and/or matter such as containers or surfaces.

Experiment: Any procedure in which the outcome is either not known in advance, or in which the outcome is to drive those performing the procedure to a given conclusion through experience.

Explosive: Any chemical known to react violently creating excessive force and/or heat.

Fumes: Toxic and/or corrosive airborne chemicals from reagents that are typically in liquid or solid state in the form of either gases or small particles (mist).

Flammable: Chemicals with a flash point below 200oF (93.3oC).1

Flashback: flame extending back to the source of the flammable material

Flash Point: That temperature at which a liquid or solid will begin to burn when exposed to a source of ignition (spark or flame).

Hazardous: Any reagent or situation that exposes an individual or group to chemical or physical hazards.

HAZMAT Team: Professionals specifically trained to deal with spillage of hazardous materials.

Heavy Metal: A heavy metal (such as lead, Pb or mercury, Hg, for example) with special hazards including lifetime cumulative effects.

Material Safety Data Sheet: Obtained from the reagent's manufacturer, the Material Safety Data Sheet is a listing of all known hazards and appropriate safety responses.

Organic: Any chemical or mixture containing one or more compounds with carbon and hydrogen. Organics tend to have safety hazards associated with health risks and flammability.

Permissible Exposure Limit: A limit of exposure as a function of concentration and time as set by OSHA and reported on a chemical's MSDS.

Physical Hazards: Any hazard associated with a reagent that could cause physical harm, including but not limited to corrosive properties, flammability, or explosion hazards.

Appendix C: Index of Abbreviations

ANSI: American National Standards Institute
BCHO: Building Chemical Hygiene Officer
BSO: Building Safety Officer
CHP: Chemical Hygiene Plan
CSO: Campus Safety Officer
DSU: Dakota State University
HS: Health Services
IARC: International Agency for Research on Cancer
LI: Laboratory Instructor
LP: Laboratory Personnel
MSDS: Material Safety Data Sheet
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit
PO: Procurement Officer

Appendix D: List of Key Personnel

Title	Name	Office Phone
CSO	VP for Business / Admin. Services	256-5127
BSO/Beadle Hall	Dean, Liberal Arts	256-5270
BSO/Comm Ctr	Community Center Director	256-5837
BSO/DPP	Conference Coordinator	256-5666
BSO/East Hall	Dean, Business & Info Systems	256-5165
BSO/Emry Hall	Resident Director	256-5639
BSO/Fieldhouse	Athletic Director	256-5229
BSO/Girton House	President	256-5317
BSO/Heston Hall	VP for Business / Admin. Services	256-5127
BSO/Higbie Hall	Resident Director	256-5640
BSO/Kennedy Ctr	Dean, Education	256-5177
BSO/Library	Director of Library	256-5203
BSO/Lowry	Director of Bus & Educ Institute	256-5555
BSO/Museum	Museum Curator	256-5308
BSO/Physical Plant	Director of Physical Plant	256-5222
BSO/Richardson Hall	Resident Director	256-5149
BSO/Sci Ctr	Chemistry Instructor	256-5822
BSO/Tech Bldg	Director of E-Education Services	256-5049
BSO/Trojan Ctr	Director of Student Union	256-5146
BSO/Zimmermann	Resident Director	256-5234
CC	Chemistry Instructor	256-5822

- 1 Only building safety officers are listed for any individual building. Contact the BSO for further information on BCHO's and BPO's.
- 2 These areas have adopted their own modified CHP's.

Bibliography

1. Jay A. Young, Warren K. Kingsley, and George H. Wahl, Jr., Developing a Chemical Hygiene Plan (American Chemical Society, USA, 1990).
2. Federal Registry 55, number 21, Jan. 31, 1990 as reproduced in reference (1).