	McMaster University Risk Management Manual	RMM # 500 Designated Substances Control Program	Final Date: July / 03 Page: A-1
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**Appendix A Designated Substance Assessment Form
RECORD OF DESIGNATED SUBSTANCE ASSESSMENT**

SUBSTANCE: Butyl Isocyanate
DATE: May 15, 2006

COMPANY: McMaster University - Chemical Engineering
DEPARTMENT OPERATIONS:
LOCATIONS: JHE 057B (John Hodgins Engineering)
ASSESSMENT PREPARED BY: Naomi Klinghoffer
TITLE: undergraduate summer research (chemical Engineering)
DATE PREPARED: May 15, 2006

**APPLICATION - WORKSHEET 1: IS THE DESIGNATED
SUBSTANCE PRESENT?**

1. Do any material safety data sheets from your suppliers indicate the presence of the substance?

YES

NO

2. If substance is present, indicate the department where it is used, nature of the use (i.e. Direct or indirect) and the quantity used per month or year:

<u>Product Name</u>	<u>Department</u>	<u>How Used?</u> <u>Direct / Indirect</u>	<u>Quantity</u> <u>Per Month / Year</u>
butyl isocyanate synonyms: BI, n-butyl isocyanate, n-BIC, BIC, Isocyanic acid, butyl ester, 1-Isocyanatobutane	Chemical Engineering	Direct; transferred with Eppendorf pipettes and glass pipettes into vials	-not used on a regular basis, only for some experiments 12.5 mL per experiment ~ 2-3 experiments in 2 months

CONCLUSIONS

Read statements and check applicable box:

Substance not present anywhere in workplace; regulation does not apply
No Assessment needed

Processes / activities have been identified where substance present.
Proceed to worksheet 2.

APPLICATION - WORKSHEET 2: IS WORKER EXPOSURE LIKELY

1. In what form does the substance enter the plant? *liquid*
 Product Title: *butyl isocyanate, 98%*
 Type of Container: *glass bottle* Size of Container: *25ml. (~100ml bottle)*

2. Is this form altered during use or in the operation: YES NO
 If YES, indicate altered form: *Mixed with HEMA to form MBSC*
(2-methacryloyloxyethyl n-butyl acrylate)
2-hydroxyethyl methacrylate

3. Is there a possibility of the substance being released into the workplace environment during normal use? YES NO
 If YES, indicate the stage of the operation or areas where this can occur.

4. If YES, to Question 3, specify the job functions and approximate number of employees who might be exposed:

Job Function	Number of Employees

5. If YES, to Question 3, Indicate how workers could be exposed:
 Inhalation Ingestion Skin Absorption
 Skin Contact

6. If NO, to Question 3, is there a likelihood of escape due to leaks, accidents, etc.?
 YES NO *all work is done in the fumehood so accidents should be contained in the hood*

7. Are workers likely to be exposed? YES NO

CONCLUSIONS

Are there any activities / situations where exposure by any route is likely

YES NO

If NO, no further action is necessary. Date Completed _____

If YES, an assessment is necessary – **proceed to Section III**

Note: If protection against exposure has been left up to some engineering control measure which can fail, or deteriorate for any reason, or to a work hygiene practice, an assessment is necessary -**Proceed to Section III**

ASSESSMENT - WORKSHEET 3: PROCESS DESCRIPTIONNAME OF PROCESS: MBC Synthesis

Process Flow	Description	Likely Exposure Yes / No
1. set up flask with Nitrogen inlet and outlet	I will be using butyl isocyanate and HEMA to synthesize MBC	- if bottle is dropped and breaks, then exposure is possible, however the bottle is stored in a can, suit will be contained
2. add n-butyl isocyanate to the flask	- processes carried out in fume hood	- no
3. add equimolar amount of HEMA dropwise	- measurements done with Eppendorf pipettes	- no
4. allow liquid to react	- samples are measured into and held within glass vials prior to being put into a round-bottom flask (with pasteur pipettes)	- no
5. store in fridge	- samples transferred between vials and flasks with glass pipettes	- no

* BI = butyl isocyanate

* HEMA = 2-hydroxyethyl methacrylate

* MBC = 2-methacryloyloxyethyl n-butylcarbamate

ASSESSMENT – WORKSHEET 4: EXISTING CONTROLS

<u>Process Flow Stage</u>	<u>Control Description</u>	<u>Problems / Recommendations</u>
	<p><u>Engineering Controls:</u></p> <ul style="list-style-type: none"> → works in fumehood → check → HVAC maintains laboratory temperature/humidity at reasonable (normal) values <p><u>Work Practices</u></p> <ul style="list-style-type: none"> - only one person working in fumehood while substance is being used - post sign so others are aware that BI is being used - do not mix BI with oxidizers, alcohols, acids, amines, bases, iron, steel, tin, zinc, copper, or salts of these metals - do not mix BI with water - do not use if laboratory heat and humidity are not in a reasonable range - use double gloves (nitrile) - use respirator 3M full facepiece Respirator 6000 series, cartridge <p><u>Other Emergency Equipment</u></p> <ul style="list-style-type: none"> - safety shower, eye wash station 	<p>that hood is functioning properly before beginning</p> <p>OVISD/HCL CLIFE/HLS</p>

ASSESSMENT – WORKSHEET 4: - EXISTING CONTROLS (cont'd)

<u>Process Flow Stage</u>	<u>Control Description</u>	<u>Problems / Recommendations</u>
	<p>Hygiene Facilities and Practices:</p> <ul style="list-style-type: none"> - work in the fume hood - wear all protective equipment. - dispose gloves as hazardous waste - wash hands after use <p>Training / Information:</p> <ul style="list-style-type: none"> - WHMIS training - fire safety training - MSDS sheets in lab + easily accessible <p>Emergency Procedures / Equipment</p> <p>oral exposure: wash out mouth</p> <p>inhalation: remove to fresh air + call physician if victim is unconscious</p> <p>dermal exposure: wash skin with soap + copious amounts of water</p> <p>eye exposure: flush eyes with copious amount of water for at least 15 min</p> <p>Personal Protective Equipment</p> <ul style="list-style-type: none"> - respirator ^{3M full face piece} Respirator 6000 series - gloves (double, nitrile) ^{cartridge: OV/SAP/HC} - lab coat ^{CL/HF/HS} - safety goggles - inform someone nearby that you are working with BSI in case of emergency (where assistance is needed) 	<ul style="list-style-type: none"> - for a small spill, cover with vermiculite + use decontaminant solution (see p A11), ventilate area, contain spill in hazardous waste container - advise others of spills - for fire: use carbon dioxide dry chemical powder/alcohol foam to put out fire; water can be used as spray to absorb heat and disperse vapors - call 88 if emergency is beyond my control - if fume hood fails (because of power failure or malfunction) stop experiment immediately, cover all containers, evacuate room, warn others (sign on door) and call x88

ASSESSMENT – WORKSHEET 5: JOB EXPOSURE ANALYSIS

Process Flow Stage	Job Title	Total Number of Employees	Tasks Where Exposure Likely	Duration Hrs per Week	PPE Req'd To Be Used
1.	1.				
			during routine work, exposure to BI is unlikely to occur		is unlikely
CONCLUSIONS					
<p>Jobs/ tasks to be noted during walk through survey:</p> <ul style="list-style-type: none"> - store BI in the flammables cabinet, in a sealed container under nitrogen gas and away from heat and water - MBC stored in a glass vial that is contained within another container in the refrigerator 					

ASSESSMENT – WORKSHEET 6: HEALTH EFFECTS

1. Any reported health effects? If so, describe.

No

2. Any current Medical Program? If so, describe.

No

3. Previous exposure monitoring results? If so, describe.

No

CONCLUSIONS

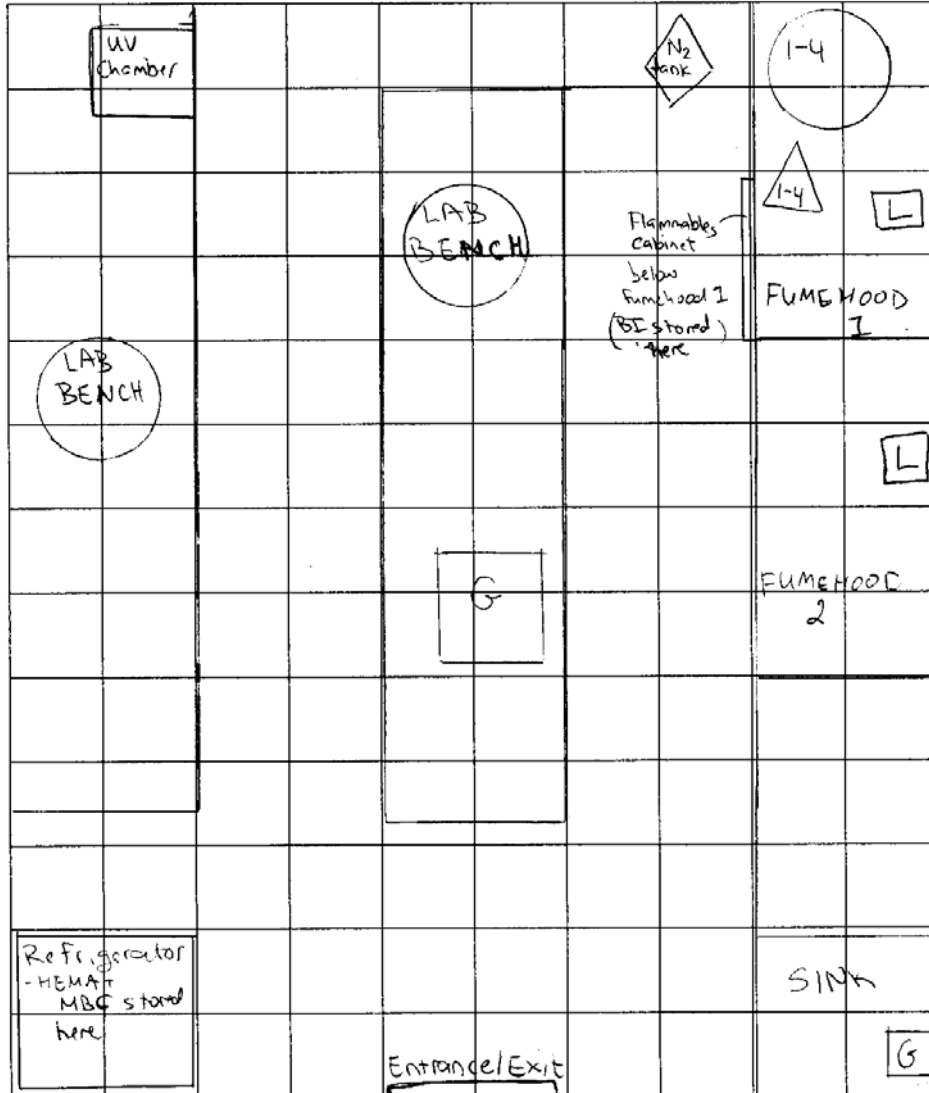
Health effects known at this stage: YES NO

Further information required: YES NO

ASSESSMENT – WORKSHEET 7: FLOOR PLAN

LOCATION: SHE 257B

DATE: May 15, 2006



DIMENSIONS: L ~ 40ft W ~ 15ft H ~ 10ft

- WORK STATION – enter number from job title – Worksheet 5
- △ EXPOSURE SOURCE – enter number from Process Flow – Worksheet 3
- VENTILATION – enter L for local exhaust & G for general ventilation

ASSESSMENT - WORKSHEET 8: WALK THROUGH**Evidence of Contamination:**

None

Hygiene Facilities and Work Practices:

- eye wash station + shower in lab in case of exposure
- double glove (nitrile)
- safety goggles + labcoat (must remain in lab)
- wash hands after use
- do not inhale; use respirator 3M full facepiece respirator 6000 series
partic. dse. OV/SB/H/CL/HR/HS
- only one person working in the fumehood; post sign on fumehood indicating that BI is being used

Ventilation Systems:

- all work will be done in a fumehood (local)
this will prevent contamination of the substance.
- general ventilation in lab room

Storage Facilities:

- stored under nitrogen gas, in a flammables cabinet
- prevent direct exposure of FBI to light
- keep lab locked
- store MBC in a glass vial that is contained in another plastic container in the refrigerator

ASSESSMENT – WORKSHEET 8: WALK THROUGH (cont'd)**Dispensing Procedures:**

- immerse used Eppendorf pipettes and glass pipettors in fumehood container that has water; dispose of used tips in hazardous waste
- dispose of empty, sealed BI vial, stored under nitrogen, in hazardous waste

Housekeeping:

- when not using BI, keep bottles and vials closed, and seal with parafilm
- decontaminate empty BI containers/handling equipment with decontaminant solution (concentrated ammonium hydroxide (4-8%), liquid detergent (2%) + water (90-94%))
- dispose of BI as hazardous waste
- store vermiculite on the floor near the fumehood

Personal Protective Equipment:

- double glove (nitrile)
- safety goggles
- lab coat (must remain in lab)
- respirator - 3M Full facepiece Respirator 6000 series
Cartridge: OV/SB/HC/CL/HF/H3

Emergency Facilities / Procedures:

- in case of leaks/spills, alert others (including coworkers, supervisors, safety committee, EOHSS)
- in case of eye contact, wash with copious amounts of water
- in case of skin contact, wash with soap and copious amounts of water
- if inhaled, remove to fresh air and call physician if victim is unconscious
- blot away BI on clothing, discard if clothing is very contaminated
- if swallowed, do not induce vomiting; drink water instead
- call 88 for spills, fire, or other emergencies

ASSESSMENT – WORKSHEET 9: WALK THROUGH CONCLUSIONS

1(a). Were any areas found where controls are required or where existing controls may require improvement?

YES NO

1(b). If YES, indicate the areas where the controls may be required or where existing controls may require improvement.

AREA	SUGGESTED IMPROVEMENTS

2(a). Personal exposure monitoring is required. YES NO

2(b). If YES, Indicate where:

3. Indicate any workers for whom medical testing and / or examinations may be required.

CONCLUSION: WORKSHEET 10: IS A CONTROL PROGRAM NECESSARY?

<input checked="" type="checkbox"/> CONCLUSION A: NO WORKER'S HEALTH MAY BE AFFECTED.
<input type="checkbox"/> CONCLUSION B: A WORKER'S HEALTH MAY BE AFFECTED.
OVERALL CONCLUSION
A control program is necessary. YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Improvements needed in existing program:

DATE: May 15, 2006

SIGNED Naomi Klingluff