TOXICS USE REDUCTION PLAN
SMITH VOCATIONAL AND AGRICULTURAL HIGH SCHOOL
Northampton, MA
1997

Developed with funding from a grant provided by the
Toxics Use Reduction Institute, University of Massachusetts at Lowell

INTRODUCTION

Smith Vocational and Agricultural High School is a public high school, student population of approximately 500, which provides vocational training in:

Agriculture	Culinary Arts	Metal Fabrication
Auto Body	Electrical	Plumbing
Automotive	Forestry/Horticulture	Printing Technology
Carpentry	Health Technology	
Cosmetology	Machine Technology.	

The School's mission is to provide an environment that will lead to the development of the individual. The specific and most important goal is to prepare students to become occupationally skilled persons.

As a vocational institution, the campus necessarily uses a wide variety of products and materials with varying degrees of toxicity. This Toxics Use Reduction Plan is intended to describe the role of toxics in the school, the ways in which toxics use reduction has already been implemented, and to propose ways for further reductions in use. The Plan includes consideration of each of the vocational shops, as well as custodial, administrative, and nursing services.

This Plan does not adopt the same approach to formal toxics use reduction planning as would a manufacturing or other commercial sector facility. As a public school it has very different priorities and goals than a private sector facility. Further, neither the school nor the team that engaged in this planning effort has the chemical, process, or toxics use reduction background that would be available to a private sector facility. We necessarily relied on the voluntary cooperation of school staff and its ability to fully support this process varied. Therefore, we were not able to develop consistent information for each department or to necessarily gain the same level of understanding about the operations of different shops. Instead, an informal and collaborative approach was used.

In many shops toxics use reduction has already been aggressively pursued and may have reached its practical limits. In other instances, the planning team was able to offer many recommendations. Whether the recommendations put forward in this Plan are implemented will be left to the discretion of school and city administration, and the attendant budgetary and educational constraints.
The Plan was developed as the direct result of survey results, comments and recommendations provided by department heads, and the observations and recommendations from a team of technical

advisors who volunteered their time and expertise for this project. Site visits and interviews were conducted in each of the vocational shops by small teams of technical experts, in conjunction with students from Michael Quinlan's Science Class and administrative representatives. The surveys, comments, observations and recommendations form the basis of this Plan.

While many suggestions are provided in this document for toxics use reduction, as well as other general health, safety, and environmental recommendations, all outside participants in this project were impressed by the level of knowledge and awareness of the instructors both concerning their fields and the alternative less toxic materials that are available. We were also very impressed and grateful for the tremendous cooperation of the administration, staff and students in this project. While this project necessarily intruded on their already stressed schedules and educational obligations, we were universally welcomed, provided information, and given thoughtful responses and suggestions.

Toxics Use Reduction Recommendations

The Curriculum for Toxics Use Reduction Planners, eighth edition, identifies six primary toxics use reduction strategies: input substitution; product reformulation; production unit redesign or modification; production unit modernization; improved operation and maintenance; and recycling, reuse, or extended use of toxics. As a school, the toxics use reduction strategy of product reformulation was not applicable. As a practical matter, the strategies that were most appropriate were those of input substitution; production unit modernization; improved operation and maintenance; and recycling, reuse, or extended use of toxics. In addition, while there may be "cutting edge" technologies or equipment available which could reduce or eliminate the use of toxics, as an educational institution whose responsibility is to prepare students for the general work place, it would not be practical to exclude the most common equipment, products, or materials from the students' experience. Another factor relating to toxics use reduction is the reality that students use more material than a skilled laborer might to accomplish the same task. Finally, schools do not recover the cost of equipment change the way a manufacturing enterprise might. Any changes must make immediate fiscal or educational sense. Long term price recovery or depreciation does not have a practical role in this setting.

DEPARTMENT OBSERVATIONS AND RECOMMENDATIONS

1. Administration
2. Agriculture
3. Auto Body
4. Automotive
5. Carpentry
6. Cosmetology
7. Culinary Arts
8. Custodial
9. Electrical
10. Forestry/Horticulture
11. Health Technology
12. Machine Technology
13. Metal Fabrication
14. Plumbing
15. Printing Technology
16. School Nurse
17. Science Lab
18. Technology Assistance

ADMINISTRATION

Chemicals Used

Laser printer toner (approximately 40 cartridges/year)
Copying machine toner (approximately 18 cartridges/year)
Fax machine toner (approximately 1 cartridge/year)
Laser printer cleaning fluid
Copying machine cleaning fluid

Observations

In the Faculty lounge in the brick building there is an old fashioned duplicating machine with 3 - 4 gallons of fluid and no ventilation.

Exhausted toner cartridges are disposed of in the trash.

Toxics Use Reduction Recommendations

1. Evaluate number of copying machines and laser printers in use to determine if some could be eliminated to avoid redundant purchases of toner and cleaning fluid.

2. Eliminate use of duplicating machine.

Other Environmental/Health/Safety Recommendations

1. If the duplicating machine is to remain in use, the room where it is housed needs to be ventilated.

2. Removing and replacing un-used or outdated office equipment and the left over chemicals should be a priority.

3. Laser printer toner cartridges should be sent for recycling and re-use.

AGRICULTURE

Shop Chemicals Used	Shop Chemicals Used
Grease/Valvoline	Grease/Superior
Grease/#2176	Diesel fuel conditioner - Siloo
Gasoline antifreeze - Pitt Penn	Transmission fluid - Pitt Penn
Motor Oil - Amalie	Penetrating oil & rust remover/Superior
Brake Part Cleaner/ CRC	Bolt Dressing/Share
Starting Fluid/Gold Eagle	Carburetor cleaner/Cyclo
Spray penetrate/Safety-Kleen	Retardo rust inhibitive paint/Iron Clad
Skid Text/Gamma	Power Steering fluid/Gunk
Brake Fluid/Quaker State	Cutting Fluid/Relton
Automatic transmission fluid/Wolf Head	Battery saver cleaner/Clark
Mystery oil top cylinder lubricator/Marvel	Spray brake cleaner/Safety-Kleen
SAE 30 motor oil/Valvoline	SAE 10w40 motor oil/Valvoline
SAE 15w40 motor oil/Valvoline	Antifreeze/Pitt Penn
Paint thinner/Sterline	Solvent cleaner/ACME
Paint thinner/Kleen strip	Tire inflator/Sentry Pach
Pipe threat compound/Rector Seal	Brake cleaner/Bendix
Hydraulic oil/New Holland	All purpose carburetor cleaner/Berryman
Antifreeze/Uni-Guard	Fleetweld 35
Walter Stealacier A-24-HP	EZ Weld 1/8 and 5/32
Soil test kit/Lamotte Chemicals	Plant tissue test kit/Lamotte Chemicals
Lincolnweld L-56 wire	Welding rods 6013 rods
C-1-3 sico 1/8 rod	Spoolarc 86 wire
Flux	Fleetwood 37 1/8 rod/Lincoln
Superweld 1/8 rod	Superweld 3/22 and 5/32 rod
Carbon dioxide gas	Argon gas
Acetylene gas	Oxygen gas
Abrasive wheels	Envirosplat
Gasoline	Auto batteries

Observations - Agricultural Shop

The Instructor indicated that IPM is used in the greenhouse, but it was not apparent from the practices described. For example, there seemed to be a heavy reliance on pesticides, and plants are grown in a soiless mix with fertilizer added in order to avoid pulling weeds. It was indicated that IPM sticky cards are used to determine the insects present. The only persistent problem is fungus gnats.

Ten different welding techniques are taught. Welding rods that contain flux are used so extra flux is not necessary. Acetylene, argon, carbon dioxide, and oxygen are used for cutting and welding.

Students learn how to use dye grinders with abrasive wheels. This can result in metal dust.

A Safety-Kleen parts cleaner unit is in use that uses hydrocarbon solvents.

Grease guns are used to grease the equipment. Only one type of grease is used, which contains lithium.

An effort is made to fully use all containers of materials. The instructor makes the decision when to throw out empty containers and not the students.

Several different weight motor oils are used for the different engines. Waste oil is collected in 55- gallon drums and sent to the DPW for disposal.

Oil filters are not changed very frequently, but when they are old ones are thrown in the trash.

Many different spray cleaners are purchased from Safety-Kleen. They may not all be necessary.

The shop uses a variety of dry gas products for the different engines.

^Envirosplat` is used to limit welding spattering.

The shop does a small amount of painting. Both latex and oil based paints are used. The oil based paints are particularly used on metal. The instructor indicated that switching to a latex paint on metal was not realistic.

Paint brushes are not cleaned. Instead, cheap brushes are purchased and thrown out after use. They are dried first.

Oil rags go in the trash.

The wood glue is water based.

A small amount of two part ^loctite` adhesive mix is used.

A rechargeable battery drill is used.

Toxics Use Reduction Already Being Practiced

1. Switched to Safety-Kleen system for parts cleaners rather than mixing diesel and solvent.

2. An effort is made to fully use all containers of materials. The instructor makes the decision when to throw out empty containers and not the students.

3. Wood glue for gluing wood products is water based.

Toxics Use Reduction Recommendations

1. Truly implement IPM in the greenhouse which would reduce or eliminate the use of pesticides and fertilizers.

2. Reduce use of fertilizer by using the farmEs own compost mix (can reduce weeds by mulching).

3. Ask Safety-Kleen if they offer a less toxic parts cleaning system. If not, there are several suppliers of these units, and maybe another of them would have an aqueous cleaner they could use.

4. There are several spray cleaning products from Safety-Kleen that are not being used very much. The use of these products should be evaluated and a decision made whether to continue purchasing and holding these materials. Any materials which are not actually used or needed should be returned to Safety-Kleen or discarded as a hazardous waste if necessary.

5. Consider whether an electric drill might be used instead of a rechargeable drill when the battery is no longer holding a charge.

6. Consider changing type of grease if there is a product available which is less toxic (i.e., no lithium).

7. Oil might be changed less frequently in the engines by tracking the number of hours the engine is used and changing the oil on a schedule based on actual use.

8. Consider using vegetable-based fluids instead of oil-based cutting fluids.

9. Rather than throwing out paint brushes, clean brushes with a non solvent based cleaner.

Other Environmental/Health/Safety Recommendations

1. Oil filters should be drained before being disposed. Participate in an oil filter recycling program.

2. It may be possible to lengthen the life of paint brushes by wrapping them in plastic and freezing them between uses.

3. Review policies and practices regarding use of eye and respiratory protection.

4. The rechargeable drill should be sent for battery recycling at the end of its usable life.

Farm Chemicals Used Farm Chemicals Used

Gasoline Antifreeze
Hydraulic Tractor Fluid Diesel Fuel Antifreeze Additive
Epoxy glue (isocyanate) Gasoline Antifreeze (isopropyl alcohol)
Multi-purpose lithium compound grease
Starter Fluid Carburator Choke
Protecto Flex (metal parts paint - petroleum distillates)
Automatic Transmission Fluid
Pump engine oil (light weight) (2-1/2 gallons/year)
Utter Wash (glycerin, iodine, phosphoric acid) (12 gallons/year)
Liquid CIP Soap Systems Cleaner (sodium hydroxide) (40 gallons/year)
Acid Cleaner (sulphuric and phosphoric acid) (45 gallons/year)
Liquid Chlorinated Sanitizer (sodium hypochlorite) (45 gallons/year)
Hoofpro Liquid (copper sulfate) (10 gallons/year)
Hand cleaner
Teat Dip (5% iodine) (50 gallons/year)
Powder copper sulfate (75 pounds on hand)
Sodium bicarbonane (50 pounds/year)
Miscellaneous veterinary supplies
Lorsban fungicide (0 pound bag on hand)
Liquid nitrogen (10 gallons/year)
Miscellaneous leather supplies, shampoos, soaps (less than 1 gallon)
Lanolin based livestock soap (4 gallons/year)
Iodine 7% (1 gallon)
Atroban delice (2 -1/2 gallons/year)
Isopropyl alcohol (1 gallon/year)
Mineral oil (1 gallon/several years)
Kopertox (combustible, copper napthenate) (1 gallon on hand)
Pyretherin Flyband
Hog feed (copper)
Salt licks

Observations - Farm

Automotive type products are kept in a locked hazardous chemical storage locker. The Farm Manager believed that all of the materials were essential to farm operations and equipment maintenance. When oil needs to be changed, the piece of equipment or machinery is taken to the Automotive Shop. There was about 1 gallon of used oil in a make-shift one gallon container as well as some spill into the containment portion of the storage locker.

The Utter Wash, Liquid CIP Soap, Acid Cleaner, Liquid Chlorinated Sanitizer, Hoofpro, powdered copper sulfate, and sodium bicarbonate were all essential parts of the dairy operation.

The cows are milked twice a day. Before each milking the milking system is sanitized (Liquid Chlorinated Sanitizer). The cows are then milked and after each milking the system is washed, cleaned and rinsed (Liquid CIP Soap, Acid Cleaner). The cows have their teats treated with Utter Wash and teat dip after each milking. In addition, each time they enter and exit the barn they walk through a hoof wash system that is designed to present fungus and warts from growing on their hooves. The sodium bicarbonate is occasionally used as a nutritional supplement. The milking system's pump requires a special light weight oil. This is replenished as needed after consulting a visible gage.

The agriculture instructor specializing in animals noted that several toxics use reduction practices had been implemented in previous years. These included: 1) improved milk line cleaning practices (better training and closer attention to detail, as well as the conspicuous posting of directions) which resulted in a decreased used of Liquid CIP Soap and Acid Cleaner; 2) eliminating the use of detergents for livestock cleaning. A biodegradable, lanolin soap is used instead; 3) purchase only the minimum amount of product needed at a time; 4) no longer purchase leather supplies or miscellaneous soaps and shampoos. These are donated by the public; and 5) students only use chemicals under close supervision (and never veterinary medicines). Safety gear is used when chemicals are being used. The instructor suggested that there could be a further decreased use of milking related chemicals by replacing the current manual milking system with an automated one. This would result in exact measurement of supplies and would eliminate human error and possible over use.

MSDS sheets were not available.

The bag of Lorsban (fungicide) is a left over product. There was discussion about how to get rid of it ranging from use it to donating it to a farmer who could use it.

The semen tank is filled twice a year with liquid nitrogen. The nitrogen needs to be replaced because it escapes into the atmosphere when the vial containing the semen is lifted out of the container.

With the exception of the materials directly related to milking, all hazardous materials where kept locked in secure locations. The milking shed is not always locked.

There were three gallons of antifreeze in the tack room. These should be re-located to the locked flammable storage locker.

The classroom had kitchen type cleaners provided by Custodial Services. The hand soap in the bathrooms and milking shed were also provided by Custodial Services.

Kopertox is a fungicide used for foot maintenance. This is not regularly applied using gloves, but the instructor indicated that it might be a good idea, although not a standard practice. Wash up is with soap and water.

AUTO BODY

Chemicals Used	Chemicals Used
Butoxyethanol	Acetone
Toluene	Diethylene glycol monobutyl ether
Diisobutyl ketone	Methyl ether acetate
Ethylene glycol monobutyl ether acetate	
Naphtha	Aromatic hydrocarbon
Polyamide resin	Diacetone alcohol
Isopropyl alcohol	Methyl amyl ketone
Propylene glycol methyl ether	Xylene
Isopropyl acetate	Mineral spirits
Calcium carbonate	Glass beads
Polyester resin	Styrene
Talc	Iron oxide
Aliphatic polyisocryanate resin	Hexamethylene diisocyanate monomer
Titanium dioxide	Thinners
Fillers	Primers
Colors	Caladist

Observations

The course of auto body study includes frame straightening, body repair, and painting. The primary steps involved in auto painting include: 1) removal of wax and grease; 2) body repair (application of plastic body filler); 3) sanding (using aluminum oxide sanding discs); 4) application of a two stage urethane primer, adhesives, vinyl etching and phosphate acid; 5) masking/sanding; 6) washing surfaces with Tech Wash to remove sanding sludge (did not see MSDS for Tech Wash); 7) application of a two or three-stage polyurethane paint (base coat and clear topcoat), as well as acrylic enamels. Also, polishing and waxing with silicones; 8) cleaning of paint gun using lacquer thinner. The department head reported that the students complete approximately ten complete paint jobs per year.

As expected, polyurethane paints (primers, base coat, clear coat), lacquer thinners, and reducers (thinners) constituted the greatest part of hazardous materials observed in auto body. Other materials that are used in lesser quantities include wax/grease removers (to remove oil, etc. during surface preparation), plastic body fillers (containing styrene resin). The department head provided a copy of the 1996-1997 auto body budget request listing the quantities of various materials for general use during the school year. Additional quantities of paint, reducers, stabilizers, catalyst, are purchased on an as-needed basis depending on jobs to be performed in the shop during the year. (These quantities are indicated in parentheses on the budget sheet.) The department head indicated that he does not purchase "extra` materials. He commented that students use more material than experienced auto body personnel.

Although MSDS E s are kept in a file, they are not cataloged in such a way as to be immediately available.

Hazardous materials associated with painting and cleanup present the greatest risk of exposure to students. Two-part polyurethane paints are sprayed on using high volume low pressure (HVLP) guns inside of a down draft spray booth. The HVLP system reduces the amount of overspray and rebound; thus, reducing the amount of paint needed to paint a vehicle. The down draft booth captures much of the overspray and vapors, and passes the captured air through a series of filters. These engineering controls reduce, but do not eliminate, risk of exposure to organic solvents (e.g., toluene, xylene) and the diisocyanate activator (1,6-hexamethylene diisocyanate (HDI)) that are used in these paints (polyurethane paint systems are used throughout the auto body industry.) HDI, and other diisocyanates, have been identified as occupational asthmagens, which can cause sensitization of exposed individuals. Overexposure to organic solvents can result in eye/respiratory system irritation, central nervous system depression, and possible effects on liver, kidney and other organs. Skin exposure can result in defatting of the skin.

Lacquer thinner, containing toluene, xylene, and other organic solvents, is used to clean the HVLP guns. Cleaning occurs in a small, closed, unventilated unit where lacquer thinner is passed through the gun to remove paint. Students were observed cleaning the HVLP guns by putting their hands into the thinner without using gloves. According to the department head, the unit has been retrofitted to accommodate the HVLP guns. (It is located in the mixing room.) Students clean this machine. The department head would like to hire an outside contractor (Safety Kleen) to install and maintain a new unit. It is possible that the new unit would be more efficient than the retrofitted unit, thus reducing the quantity of lacquer thinner needed. Also, the unit would be maintained by an outside contractor, which would eliminate student exposure during maintenance. The new unit would be vented to the out of doors.

Silica sand is used to abrasive-blast rusty metal for surface preparation. This is done outdoors and is not a common operation. The abrasive blasting guns would need to be modified if another abrasive material were to be substituted for silica sand. Repeated exposure to respirable crystalline silica can result in silicosis, a progressive respiratory disfunction characterized by decreased pulmonary function.

Welding is sometimes performed during auto body work. The teacher felt the largest problem was the odor.

Most materials are stored in the mixing room. The containers and room are kept closed when not in use. Chemicals are kept in a flammable storage cabinet or hood.

There is no Toxic Materials Action Plan.

Toxics Use Reduction Already Being Practiced

1. Purchase only the amount of materials that are necessary.

2. Spray booth used for painting. The HVLP system reduces the amount of overspray and rebound; thus, reducing the amount of paint needed to paint a vehicle.

Toxics Use Reduction Recommendations

1. Eliminate the use of silica sand. Possible substitutes might include coal slag (not ideal, but eliminates silica exposure), or possibly a new abrasive. There may be plastic beads that could be used. There are several less toxic alternatives which are available, but the capital costs tend to be high and usually require that the equipment be changed as well.

2. Contract with Safety Kleen to install and maintain a new gun-cleaning machine. Alternatively, students should not clean the HVLP gun.

3. Explore use of non-organic solvent based HVLP gun cleaner.

Other Environmental/Health/Safety Recommendations

1. Wear gloves when cleaning the HVLP gun.

2. Respirators should be worn when sand blasting.

3. Sand blasting should be done in a contained area to avoid dust migration.

AUTOMOTIVE

Chemicals Used

Gasoline
Motor Oil
Antifreeze
Freon
Safety-Kleen parts cleaner
Latex paint
Spray paint

Observations

The hazards presented by toxic materials and the activities involving them were well recognized and addressed. Concerns discussed included: gasoline spills, empty gasoline tanks, use of torches, running of rebuilt engines, asbestos brakes, parts cleaning, waste oil handling, antifreeze coolant handling, freon procedures, car batteries, and rag usage.

The Survey indicated that hazardous waste was dealt with five years ago. There is no written Toxic Materials Action Plan.

There is no direct handling of gasoline. It is pumped into the training engines. The shop does not deal with contaminated gasolines. Empty gas tanks are purged with carbon dioxide or dry ice because vapors are still present.

Waste oil is taken across the street to Public Works to be burned in its space heater. Used transmission fluid is mixed in with waste oil. One half of the used oil comes from the city police cruisers.

One Safety-Kleen unit is used for parts cleaning and it is used under a hood.

Car batteries are direct exchanged with the battery supplier.

Antifreeze that contains ethylene glycol is recycled and used in cars. It is kept in a 55 gallon container but is recycled frequently enough that the drum rarely is more than a quarter full. Antifreeze must be changed because of electrolysis. Silicone additives are introduced into the antifreeze to bond it to the metal to reduce the electrolysis process.

Catalytic converters contain pellets of radium, platinum, and palladium.

Pneumatic air tools are used to remove hardware.

Exhaust systems are slip fit and then clamped together and not brazed or welded.

The shop tries to limit cooling system work. Air conditioning systems are generally not worked on. The shop is equipped with a R-12 freon recycling system, but is not equipped to handle the new 134A coolant.

Oil filters are drained for 12 hours. Then filters are thrown out in the garbage.

A wet brake washer method is used to for asbestos brakes.

Latex paint is used to paint lines on the floor. A solvent based spray paint is used on the engines.

Regular paper towels are used instead of rags.

Small spills of gasoline and oil spills are dealt with by using Speedy Dry. The head custodian deals with the contaminated Speedy Dry.

MSDS sheets were available and generally accessible.

Chemicals are kept in closed containers when not in use. Chemicals are stored in flammable storage cabinets or hoods.

Toxics Use Reduction Already Being Practiced

1. Antifreeze is re-used, which limits the amount purchased.

2. Coolant work is consciously limited to minimize the use of antifreeze.

3. Latex paint is used to paint lines on the floor.

4. Floor cleaners are biodegradable and nonflammable.

5. Pneumatic air tools are used to remove hardware.

6. Exhaust systems are slip fit and then clamped together and not brazed or welded.

Toxics Use Reduction Recommendations

1. It might be possible to share a parts cleaner system with Auto Body or another shop.

2. Explore the possibility of using a non-organic solvent based parts cleaner. Safety Kleen may offer such an alternative product.

3. Get necessary equipment to recycle 134A coolant.

Investigate when and why spills of gasoline and oil occur to determine if a change in procedure could decrease frequency or size of spills.
Other Environmental/Health/Safety Recommendations

1. There was a floor exhaust system for hookup to vehicles. One extension was pulled out at random. Air flow rate into its four inch hose was approximately 1,300 feet per minute. This is a volume air flow rate of approximately 100 cubic feet per minute (CFM). The ACGIH for this design recommends 100 CFM for vehicles under 200 hp. Before a hookup is used, a simple check of its flow should be done. If the flow appears low, it should not be used.

2. Remove old eye wash bottle by parts cleaning area and install a hard-plumbed eyewash.

3. Participate in an oil filter recycling program.

4. Develop a written Toxic Material Action Plan.

5. Investigate how to deal with the three kinds of antifreeze; Dexcool (GM), Sierra, traditional Ethylene Glycol. The instructor wanted to know if there was a proven technology that could deal with all three for recycling.

6. MSDS sheets should be organized and readily usable.

7. Consider using reusable rags rather than paper towels.

CARPENTRY

Chemicals Used

Latex paint
Oil based paint
Oil based wood stain/varnish
Urethane (solvent and water based)
Automotive enamels
Paint thinner
Paint stripper
Wood glue
Lubricant
WD-40
Acetone
Shellac
Kilz
Linseed oil

Observations

The instructor indicated that there is no written Toxic Materials Action Plan. The shop primarily uses oak, pine, birch, maple and poplar. Mahogany is not used. Pressure treated wood is only used a few times a year and it is always used outside. They do not do fit testing of respirators. Dry sweeping is used instead of vacuuming due to the dust that was generated by the vacuum.

The separator/centrifuge for collecting, separating, and venting sawdust and particles is 20 years old. Aercology vents are used for air exchange. The filters are changed three times/year. The system seems to be clogging and lessening the air velocity. The dust bags are full and there is a buildup on the outside of the vent screens.

There is a dust collector installed at each machine. Toxic woods (few used) are stored separately. There is a minimal amount of lamination done. Wood glue is used for lamination. It is water based.

A little light oil, obtained from the Automotive Shop, is used for tool lubrication. WD 40 is used at the end of the year for machines.

The formica brand has been changed due to levels of formaldehyde.

All shops are alerted to any student's health problems.

Masks are used during sweeping and tool use. Safety goggles are worn with tool use. Floors are swept and dry mopped daily. No sweeping agent is used. There is an occasional use of shop vac.

The local exhaust system for the woodworking equipment appeared to be in good condition and well designed. Flow rates at the different pickups were not checked.
Hearing protection, ear muffs, were available.

Waste materials are stored at the central campus facility for storage of hazardous materials.

There is a new state of the art spray booth that keeps particulates and volatiles from the shop area. It is vented through screen filters with high powered fans.

Paints

Some oil based paints are used but most of the exterior and interior paints are latex based. The Instructor has had a problem with the disposal of paints. He has been told that paint can only be thrown out if it is solid. On the other hand, some paints which are still needed dry out. He has tried to eliminate the problem of paint drying out by pouring small amounts of paint into smaller containers. The smaller containers are Benjamin Moore Cans and they are cleaned out with Acetone. Shellacs are only used once or twice a year.

Miniwax is used as the stain/varnish for product consistency. The Instructor feels that water based stains are less predictable. For mildew prevention the Kilz product is used. Paints are stored in a cabinet with top shelf ventilation pipe to the outside. Empty containers are saved and stored next to the cabinet with their lids off for future. They are used for the storage of smaller quantities of paints and varnish to ensure they will not dry out in larger cans.

Thinex or acetone is used as paint thinner. Brushes are stored in linseed oil in a can painted red to denote flammability.

In the spray paint booth a dust and mist mask is used. If the paints are more volatile, then a cartridge respirator is used.

Toxics Use Reduction Already Being Practiced

1. Decreased use of shellacs.

2. Attempting to prevent waste by pouring paint into smaller containers.

3. Changed type of formica being used.

4. Sharing of materials, such as lubricating oils, with Automotive Shop.

5. Dominant use of latex paint.

6. Decreased used of thinner to less than 70 gal/year. Thinner is now stored with other hazardous

materials in a central location.

Toxics Use Reduction Recommendations

1. Instead of transferring paints into containers that need to be cleaned out, other alternatives could be:

a. Cover the liquid paint with plastic wrap or a tight fitting plastic cover.

b. Cover the liquid paint with a cover that floats directly on top of the paint.

c. Buy small containers to transfer paint into that are one use containers so that no cleaning is required with acetone.

2. Reconsider use of solvent based stains.

3. Brushes can be wrapped in plastic and/or put in a freezer for future use rather than storing them in thinner.

4. Use latex based paints more frequently.

5. Reuse paint thinner by allowing solids to separate out and pouring off.

6. There may be a safer, citrus-based solvent suitable as a paint thinner such as that used for oil painting with artists materials.

Other Environmental/Health/Safety Recommendations

1. Use the Household Hazardous Waste Collection Day to dispose of oil paints.

2. Paint must be dried out to be put in the trash. Latex paint can be intentionally dried by mixing kitty litter, speedy dry, or wood shavings. Oil based paints should not be intentionally dried out.

3. Be sure that cartridge respirators are used when needed. Need the name of the "dust mist" mask that only has two straps on each side.

4. For any student who will be using an air purifying respirator, ensure they are:

a. Trained (respirator supply or manufacturing companies will often do this for free);

b. Fit tested (respirator supply or manufacturing companies will often do this for free);

c. Medically screened. Use of an air purifying respirator puts an additional strain on the cardiovascular system. A letter from an occupational medicine doctor is attached which should be passed onto the school nurse; and

d. Have their own respirator. (Respirator supply or manufacturing companies will send a few half face respirators with cartridges for free. All you have to do is explain that you are working with students. A list of suppliers is in the Appendix)

5. Develop a written Toxic Materials Action Plan.

6. The practice of transferring paints from larger containers to smaller ones for other than immediate use purposes should be discontinued, particularly for oil based paints. The risk of spills and the use of solvents to clean out the containers for reuse are reasons for this recommendation. If it is necessary to continue this practice, containers should always be labeled with product, date, and name of person to contact for more information.

7. The practice of leaving containers open in the general shop area to allow evaporation for easier disposal should be discontinued. If this must continue, an exhaust ventilated separate room for the purpose of drying out paint cans and for allowing furniture and other painted, shellacked, etc., objects to dry should be established. It may be possible to modify the spray booth so that it can be operated at a low exhaust rate as well as the regular rate for the purpose of drying. Small items could be on a moveable cart so they could be rolled in and out of the spray room.

8. It did not appear that all oil based, flammable, paints were stored in the flammable storage cabinets. Except when in use, they should be.

9. There appeared to be appropriate respiratory protection for the different activities in the paint shop.

10. One strap dust masks were available for students. Better quality dust masks should be available, especially for student activities where fine wood dust is generated for extended periods. A procedure for disposal when the masks are exhausted should also be implemented.

11. A sweeping compound should always be used to hold down dust. Alternatively, a HEPA filtered vacuum cleaner or several extension hoses off the dust collection system could be used. The vacuum methods lend themselves to easy pickup of dust and clean out of wood dust buildup within the various machines.

12. Oil and water based paints and stains contain toxins, and must be carefully handled and labeled. Containers should be sealed tightly.

COSMETOLOGY

Chemicals Used	Frequency	Purpose
Acetone (4 gallons/year)	Daily	nail polish remover
Sodium hydroxide	Quarterly	add or remove curl
Ammonium	Daily	add or remove curl
Chlorine bleach	Weekly (1/40)	sterilization of manicure tools
Barbicide (1 - 2 gallons/year)		sterilization
Tru Test Glass Cleaner (ammonia)	Daily	cleaning
Tru Test Ultracare (quaternary ammonium compound)		sterilization of combs & brushes
Ultronics Instrument cleaner bactericide (phenol/phenates)		sterilization
Comet cleanser		cleaning sinks
Acrylic polymer liquid (ethylene glycol dimethacrylate)	1 - 2 times/year	combine with powder to form acrylic nails
Acrylic polymer powder	1 - 2 times/year	combine with liquid to form acrylic nails
Primex Super Primer (glacial methacrylic acid)		acrylic nails
Jelly tip bonder - super glue (cyanoacrylate)		acrylic nails
Ethylene glycol dimethacrylate (56 ounces/year)		acrylic nails
Isopropyl alcohol (Clairol and Wella)		hair dyes
Propylene glycol (Clairol)		hair dyes
Diethanolamine (Clairol)		hair dyes
Nonoxynol-4 (Clairol)		hair dyes
Ammonium hydroxide (Clairol)		hair dyes
P-phenylenediamine (Wella)		hair dyes
Resorcinol (Wella)		hair dyes
Ammonia (Wella)		hair dyes
Ethoxydiglycol		hair dyes
HC Blue 2,2-Amino-4-Nitrophenol		hair dyes
4,6 Bix (hydroxyethoxyl)-m-phenylenediamine dihydrochloride		
Peroxide		hair dyes
Hydrogen peroxide		color remover
Phosphoric acid		color remover
Dalicylic acid		color remover
Ammonium persulfates		color remover
Potassium persulfates		color remover
Disodium persulfates		color remover

Observations

A thorough investigation of each chemical and its effects on health may be a very powerful force for change. This information is available in various sources including the Merck Index, The Consumer E s

Dictionary of Cosmetic Products, by Ruth Winter.

MSDS E s were not organized such that they could be used to identify materials. There were gallon plastic containers of a flammable nail polish remover on a bottom shelf in the storage closet.

"Odorless" acrylic nail products are used once or twice a year. It seems that ethyl glycol dimethacrylate might be a substitute for ethyl methacrylate, which is the odiferous component in most acrylic nail formulations. Even though it is odorless, it appears that it is not entirely without risk. A journal abstract listed this acrylate (among others) as possibly causing allergic contact dermatitis. The students wore powder free latex gloves while working on nails.

Sculptured nails are part of the curriculum. The materials used include methacrylates which have a strong noxious odor. Commercial beauty salons have had trouble successfully dealing with this problem. There does not appear to be any suitable substitute for the current chemicals. Local exhaust ventilation is recommended. There are portable and fixed tables with local exhaust ventilation commercially available. Down draft tables are probably the best design. Some units pass the air through charcoal filters before exhausting the air back into the room. These units have had design and maintenance problems. Units that exhaust air directly to the outside can be the most effective.

Suspended above the false ceiling was a HEPA and charcoal air filtration system. These units are commonly installed to reduce background concentrations of fine dust and odors. Air pickups for the system were at ceiling level.

Artificial nails may contain the most hazardous products. Air filters are serviced on a schedule of every four to six months. Masks and protective glasses were not worn consistently by students. Masks are the 1501 nuisance dust masks. Protective outer cloth garment is worn by students. Standard latex gloves are used. Although the students wore latex gloves, their forearms were still exposed when they were sanding nails.

The New York CHIP Program has written that the methacrylates are possible sensitizers which can cause allergic contact dermatitis (skin problems). Some products that can cause skin sensitization may also cause asthma. "For the nail sculptor, exposures can result from the methacrylate vapors and from the dust of the nail powder during mixing/preparation and during grinding to smooth and shape the nails. Dust on the arms, face or torso of nail sculptors has caused itching or rashes and should be minimized." (Health Hazard Manual for Cosmetologists, Hairdressers, Beauticians and Barbers, by Nellie J. Brown, Chemical Hazard Information Program (CHIP), printed by the New York State Department of Health, Bureau of Occupational Health).

It is unclear if ethylene glycol dimethacrylate would definitely be a safer alternative. It appears to be a better alternative. If students had been previously sensitized to a methacrylate, there may be cross sensitivity to other related products.

Cyanoacrylate, super glue, can bond skin. Injury may occur in attempting to separate skin improperly.

Information should be sought about precautions and appropriate ways to deal with a small splash or inadvertent skin contact.

Two members of the technical team experienced physical discomfort during their site visits: one experienced tongue swelling and throat irritation and another experienced throat constriction and light headed. There was no ventilation in the small room where bactericide is mixed and used. Chemicals that can produce toxic or flammable vapors are not stored in hoods or flammable storage cabinets. A storage cabinet has been requested. There is no written Toxic Materials Action Plan.

The cleaning area was a closet with a sink and no air ventilation. Combs were put in ultronics liquids, a phenate/phenol derivative, in an open container. They were then pulled out with a stick and a strainer at the bottom that is intended to drain the liquid back into the liquid container. No hand protection was used.

Hair Dyes

Permanent dyes usually are two-part preparations in which an alkaline solution is mixed with an oxidizing agent, peroxide, as described above for the Wella product. The dye intermediate reacts with the peroxide to form a large pigment molecule inside the hair shaft that sticks inside the hair cuticle. It is not clear if products with ammonium hydroxide are better or worse than sodium hydroxide. There is insufficient information to indicate a best choice.

The CHIP manual reports that p-phenylenediamine (in the Wella product) is an allergen (capable of causing allergies), as are other p- or para dyes. Henna is also an allergen, but is considered safer than other permanent dyes. There is concern that permanent dyes may be mutagens.

Resorcinol, another ingredient of Wella Color Charm, is a skin, eye, upper respiratory system, nose and throat irritant. It can cause methemoglobinemia, an alteration in the blood that prevents hemoglobin from releasing oxygen.

Both isopropyl alcohol and ammonia in Wella Color Charm are irritants. Irritants in the Clairol product include isopropyl alcohol and ammonium hydroxide. The main health hazards from permanent dyes include: (1) serious injury if hair coloring chemicals accidentally get in the eyes; (2) skin allergic reactions form ?phenylene diamine; (3) possible respiratory sensitization from some dye ingredients (such as p-aminophenol) or henna; and (4) the potential for unexpected ingredients like lead.

The CHIP Manual suggests that many hair dye components have been found to be mutagenic. If a chemical can break a gene, it may also be capable of causing cancer or reproductive harm. Chemicals in hair dyes that are mutagenic include:

4-amino-2-nitrophenol	2-amino-5-nitrophenol
2-amino-4-nitrophenol	2,4 and 2,5-diaminoanisole sulfate
1,2-diamino-4 nitrobenzene	1,4-diamino-2-nitrobenzene

2,4 and 2,5 diaminotoluene m-phenylenediamine
p-phenylenediamine.
Bleaching and color removal

Wella Corrector is mixed with another product. The shop uses about one box/year. The second product contains persulfates. The CHIP manual states that:

The ammonium and potassium persulfate boosters have been found to cause a variety of reactions. Skin reactions include irritant dermatitis and allergic eczematous dermatitis of a delayed variety. It has been suggested that potassium persulfate is more likely to cause irritant dermatitis than ammonium persulfate. However, ammonium persulfate appears to be more frequently implicated in allergic type responses.

This product contains potassium, ammonium and sodium persulfate.

Permanents

The CHIP Manual describes the hazards of permanent waves and straighteners.

Permanent liquids tend to be irritating or corrosive to the skin and can be especially damaging to the eye, possibly causing blindness. This is due to the high alkalinity of waving solutions, as well as to the presence of thioglycollates. Dermatitis from wave solutions tends to particularly affect the fingertips, but usually does not involve the web spaces. Skin and eye damage is facilitated by the detergent/surfactant additives which defat the skin and assist in skin penetration. Thioglycollates may also cause dermatitis or eczema of the hands with reddening, or swelling . . . possibly due to prolonged or repeated contact with the skin . . . allergic reactions to thioglycerol have been observed.

Miscellaneous products

"Many allergic reactions to products involve fragrances and dyes used to color products which can be forestalled by using unscented products including those without masking fragrances, and by changing colors." (CHIP Manual)

Glass cleaners often contain 2-butoxyethanol which can be absorbed through the skin.

Toxics Use Reduction Already Being Practiced

1. Avoiding aerosol sprays in favor of pump sprays eliminates chlorofluorocarbons and reduces the aerosol of all the hair spray ingredients.

2. Avoiding formaldehyde Steri-dry and other formaldehyde containing shampoos. Formaldehyde is an occupational carcinogen and sensitizer.

3. Use of products, such as Paul Mitchell that seek to eliminate the most hazardous ingredients.

Toxics Use Reduction Recommendations

1. Switch to a less toxic product line, such as Aveda. Changing products and techniques may be a large step for the department. A trial run with a few alternative products for a long enough trial time to get an idea of cost and usage. Companies may even be willing to sponsor these trials.

2. Strongly recommend removal of products containing phenol, petroleum distillates, and quaternary ammonium compounds (dyes, barbicide, perm products, Tru Test products).

3. Ethylene glycol dimethacrylate may be a safer alternative than ethylene glycol dimethacrylate with artificial nails, but may also prove to have some toxic effects.

4. Minimize use of artificial nails. Whenever possible use press-on nails or linen strips.

5. Compare Clairol to Wella dyes to see if it is possible to avoid the most hazardous ingredients.

6. Avoid the use of permanent dyes. Bleaching or blonding are safer than dyeing with darker tones. Use highlighting for color instead of dying.

7. Try to use non-permanent dyes more regularly: for example, henna, chamomile, or saffron.

8. Use an alternative glass cleaner (no ammonia) and other alternative cleaning products, including for hand washing.

9. Use heat straightening rather than chemical straightening.

10. Use bleaches without persulfate boosters.

11. Call a technical representative from each company to see if they can provide additional information.

12. Explore the possibility of using a bleach and water mixture in place of the Ultronics Instrument disinfectant.

13. Use unscented products when possible.

14. Use up old stock before it expires.

15. Select re-usable products whenever possible, such as cloth towels instead of disposal neckbands or drapes.

Other Environmental/Health/Safety Recommendations

1. A thorough investigation of each chemical and its effects on health may be a very powerful force for change.

2. Cyanoacrylate, super glue, can bond skin. Injury may occur in attempting to separate skin improperly.

3. Explore purchase of manicure tables that vent to the outside. Ensure charcoal is changed regularly.

4. Encourage early reporting of dermatitis, breathing problems, conjunctivitis or other early indications of sensitization.

5. Teach students about the health hazardous associated with methacrylates.

6. Obtain information about cyanoacrylate skin and eye safety procedures.

7. Patch test students regularly (perhaps once a year) to enhance early identification of sensitization.

8. Use gloves when hair dyes are applied.

9. Do not eat when using dyes.

10. Lids and caps of products should be on bottles at all times.

11. Avoid open containers.

12. Be sure that all gallon mixing bottles are marked.

13. Any students or instructors complaining of eye, nose, throat irritation, headache, dizziness, inability to concentrate, or other symptoms exhibited with chemical exposure should leave the space immediately, and there should be a log book kept recording any such incidents.

14. Be sure to carefully clean up any product residue left in sinks, on counters, or in sponges.

15. Ensure that there is fresh air intake with a ventilation system that meets an ASHRAE recommendation level for use in public spaces where heavy solvents are used.

16. NIOSH approved particulate 2-band masks should be used instead of dust masks.

17. Several MSDS are missing (having fallen behind a filing cabinet). These should be replaced. MSDS E s should also be organized for easy use.

18. The CHIP Manual suggests avoiding permanents with triethanolamine, diethanolamine and monoethanolamine. They also recommend ammonium thioglycolate rather than glycerol monothioglycolate to avoid possible allergic reaction. (Check the box or MSDS for X-0 Permanent Wave. It may contain glycerol monothioglycolate. The Paul Mitchell The Solution Perm contained the ammonium thioglycolate, which would make it a safer alternative to the X-0.)

19. Use hair straighteners containing bisulfite rather than sodium hydroxide.

20. Use hair neutralizers with hydrogen peroxide rather than bromates.

21. Use potassium persulfate rather than ammonium persulfate (CHIP Manual). It appeared that Wella products were more likely to include these ingredients.

22. Compare the MSDS E s from bleaches from Wella, Clairol and other suppliers to see if some are safer. The CHIP manual suggests that sodium perborate, sodium percarbonate or magnesium carbonate might be safer boosters.

23. Wear gloves for bleaching.

24. Avoid touching the face during the use of products.

25. Replace current latex gloves with low latex allergen gloves without powder.

26. Replace nickel plated scissors with scissors with plastic handles to minimize risk of students acquiring nickel allergy. (The composition of scissors was not determined during this visit.)

27. Identify and use mild shampoos to minimize risk of dermatitis, skin irritation, and allergic reactions.

28. The instructor has requested that a flammable storage locker be provided and this should be provided.

29. The observed positioning of the HEPA and charcoal air filtration system significantly reduces the systems effectiveness for two reasons. The three pickup vents were in a line over only one of the two lines of work stations. Also, the three pickup vents were close to the general ventilation system air supply vents. The supply vents blow air across the filtration pickup vents. A more effective layout would have been to position the pickup vents in the center ceiling area between the lines of work stations. It may be that obstructions above the ceiling prevented this from being done. Check out the possibility of relocating the air filtration system and its air pickups so as to improve its effectiveness. The supplier should be contacted.

CULINARY ARTS

Chemicals Used	Chemicals Used
Cleaners	Pesticides
Disinfectants	Laundry powder
Concentrated liquid detergent	Bleach
Hand soap	
Murphy's oil soap to wash woodwork in the dining room (one - 16 ounce bottle a year)	
Degreasers: potassium hydroxide to clean fryalator and another to spot clean greasy spots on the floor	
D-7 stainless steel cleaner - polish (mineral oil and detergent)	
Mr. Muscle oven cleaner - 12 cans a year	
Rinse aid	Diverpak dishwasher soap - chlorinated high pH
Tide Detergent	soap

Observations

Most of the products used in Culinary Arts are common household products.

Bleach is used in the laundry, and to clean wood benches and floors.

Pest management is the most significant source of toxins. The kitchen floors, hall, and storeroom are sprayed once a month (September to July) by Minute Man Pest Control service to help control ants and cockroaches. There are two to three food deliveries a week and these can be infested with bugs. The deliveries are visually inspected, but it is difficult to initially identify infestations. The kitchen had roaches 18 years ago, and ants twice but these are the only reported ^outbreaks.` There has not been any experimentation with less frequent pesticide application. They did try bug traps in the past, but the results were inconsistent. In the winter (November to April) ants and moths are not really an issue. One can of Raid a year is used for spot application.

The kitchen has four floor drains, two or three of which have grease traps. Grease is collected in a grease barrel that either goes to the school farm or to a rendering company.

There is hard water that causes spotting on dishes and glasses. RinseAid is used to eliminate spots.

Toxics Use Reduction Recommendations

1. Implement Integrated Pest Management. At a minimum, pesticide application during November to April might be decreased or eliminated.

2. Switch to a dishwasher detergent without chlorine.

3. Arm & Hammer Oven Cleaner is reported to be nontoxic. Replace Mr. Muscle with this product

and see if it works.

4. Research possibility of industrial self-cleaning ovens.

5. Return Task P44 to janitor.

6. Might there be ways to store or handle food deliveries in such a way that pests are eliminated or killed? For example, could boxes be stored in the freezer for a period of time to kill insects.

7. Switch laundry detergent to laundry soap. See custodial discussion.

8. Are there any dishwasher soaps which include a spot remover system?

9. Try an aqueous based degreaser for the fryolator and floor.

10. While additional management strategies to limit dirt and grease might result in a decreased use of toxins, it may not be practical.

11. Would a water softening system be toxics use reduction?

CUSTODIAL

Chemicals Used	Amount Used/Year
Latex Paint	
Oil Paint	30 gallons
Paint Thinner	1 gallon
Water based floor sealant	14 gallons
Salt	
Spray buff wax	30 gallons
Laundry Detergent	500 pounds
(Ingredients include: sodium sulfate, sodium carbonate, sodium metasilicate, and nonylphenopolyethyleneoxyethanol)	
WD-40	
Aerosol Germicide	36 cans
3M Chemical Mixers	15 - 2 gallon containers
Windshield washer fluid	
Ammonium hydroxide	
Aerosol Censor Vandalism Mark Remover	
(Contains: toluene, acetone, methylethyl ketone)	
Powder foaming cleanser with bleach	
Disinfectant deodorant spray	
Contains 0-phenylphenol, ethyl alcohol	
Liquid hand cleaner (contains paraffinic ethoxyulated chemicals and phenol)	

Observations

Latex paint is used for classroom walls. Oil based paint is used for hallways and door jams because it stands up to repeated washings better. Brushes are not regularly cleaned. Instead, they are wrapped in plastic wrap so they can be reused without cleaning.

A water based sealant is used on the gym floor. While more expensive to purchase than traditional polyurethane based sealants, this product has the advantages of no odor and four coats can be done in one day instead of a week. This results in a significant labor savings.

Salt, rather than sand, is used on an as-needed basis for ice management. Sand was used before, but it was ruining the vacuum cleaners. The salt is obtained from the DPW department across the street. Propylene glycol pellets were tried, but they did not work well.

Spray buff wax is used to maintain the floors. All floors are degreased and cleaned once in the summer.

Mats made from recycled tires have been added at the school entryway. These mats remove dirt from

feet. The benefits have included reduced floor cleaning and an associated decrease in waxing frequency.

Charcoal filters, used in the cosmetology air filtration system, require disposal as a hazardous waste.

All batteries are exchanged or recycled.

The School owns its own vehicles. Maintenance is done in the Automotive Department. Waste oil is managed by students and taken to DPW.

Lubricants, such as WD 40, are used for air handling equipment to keep lubricated.

An aerosol germicide foam cleanser is used on desk tops to remove ink and as an antibacterial. The MSDS should be reviewed for this product.

A 3M chemical mixer is used which makes 15 different products. Materials produced include degreaser and window cleaner. MSDS E s were not available. The chemical mixers come in ready to use two gallon jugs. It is water soluble and used in every department. The highest use mixes are "B" and "D" chemicals. These should be reviewed for quantity, ingredients, and for their purpose.

The 3M degreaser product is used in plumbing three to four times/year and on the print shop floor.

The waste product goes to a floor grease trap which separates oil from the water. These traps are cleaned annually and produce about two gallons of solids, which are mostly sand. Very little oil is found. The solids are disposed of in the dumpster.

Liquid hand cleaner is provided to the various shops.

Forestry occasional applies RoundUp on sidewalk cracks to control weeds.

The classroom buildings do not have rodent problems, but the farm does.

Ongoing health and safety practices include: asbestos removal by licensed staff; air conditioning filters are checked three times/year or more; freon in air conditioning units is handled by a professional service; ceiling tiles are removed when they become wet to avoid mold growth; and doors and windows are open while painting. It seems that safety gear such as goggles, gloves, masks and respirators are not regularly used.

Toxics Use Reduction Already Being Practiced

3M cleaning system used instead of purchasing many different products.

2. Latex paint used for all applications except door jams and hallways.

Rather than regularly cleaning paint brushes, they are wrapped in plastic between uses.

4. A water based sealant is used for the gym floor.

5. Latex glue is used to replace floor tiles instead of solvent based adhesives.

6. Mats are used at the school entryway, which resulted in reduced cleaning needs for floors. It also results in a reduction in dust which is an indoor air pollutant.

7. Compost is used for fertilizer on the athletic fields.

8. No floors are stripped.

9. Outdoor winter use of salt only where needed.

Toxics Use Reduction Recommendations

1. Replace 3M system with Rochester Midland Envirocare, or similar, dispenser system.

2. Explore new latex paints designed for use in areas requiring heavy clean-up or potential graffiti.

3. Decrease cleaning needs by further assessing where and how dirt enters the building and maybe by adding rugs to these entrances for longer runs (15 feet?).

4. Evaluate current spraying schedule for ants and cock roaches. It may be possible to decrease frequency; for example, by implementing IPM.

5. Get copies of MSDS E s for the 3M machine. Review MSDS E s to see the ingredients. Contact 3M to find out if they have changed the toxicity of the base products over time and whether less toxic materials are available.

6. Only use markers in the school that can be removed with water and soap. In this way when students use the markers for graffiti, it will be easier to remove.

7. Remove and do not replace urinal deodorants with products containing phenol and other masking ingredients. Find alternatives.

8. Replace foaming powder cleanser with Bon Ami or other nontoxic scouring powder. Consider mechanical means of scouring with hand held power brush.

9. Replace hand cleaner used in all departments with nontoxic alternative.

10. Replace bleach with hydrogen peroxide whenever possible for laundry.

11. Use alternative nontoxic disinfectants in place of chlorine or ammonia.

12. Replace vandalism remover with less toxic alternative (i.e.Geo or -AFM product, painting over, or baking soda power spray systems).

13. Partially used containers should be tightly closed to avoid evaporation.

14. Consider switching to a soap laundry cleaner. If making this change, wash items once with washing soda only. This removes detergent residues in clothes, which could react with soap to cause a yellowing of fabrics.

15. Repair cracks in sidewalks and asphalt so that vegetation cannot get established.

Other Environmental/Health/Safety Recommendations

1. Fluorescent lights should be recycled.

2. Carpet removal is being considered because of mold problems and this may be a good idea.

3. Replace coolant in air conditioners.

4. Ensure that respirators, masks, goggles and gloves are used whenever any product MSDS recommends safety precautions.

5. Obtain the MSDS sheets for all materials used, including the 3M system.

6. There is the potential for mold build-up, especially in buildings with flat roofs since they frequently leak.

7. Review MSDS for all products and attempt to replace with safer alternatives.

ELECTRICAL

Chemicals Used	Amount Used/Year	Purpose
Cutting oil	1 gallon	lubricant
Hydraulic fluid (AW-30)	1 gallon/5 years	presses & benders
Solder 60/40 tin/lead	2 pounds	circuit boards
WD 40	10 ounces	lubricant
Solder flux (chromate oxide)	1/2 pint	solder paste
Copper wire	200 pounds	circuit
Tetrahydrofuran	2 quarts	PVC glue
Methyl Ethyl Ketone (MEK)	2 quarts	PVC glue
Isopropyl alcohol	11 ounces	clean VCR Es
Cantex		conduit solvent cement
Hexachloripine	11 ounces	
Electroclean (paraffin-glycol ether)	15 ounces	degreaser
Contact Cleaner (Trichloroflorethane)	15 ounces	cleaner
Lubricant (butyl stearate fatty ester)	14 ounces	
Florescent light bulbs (mercury)	12 - 4 foot tubes/school-wide	lighting
Cable free (petroleum distillate)	1 quart/two years	conduit solvent
Aquagel		lubricant
Lecraclean (petroleum distillates)	15 ounces/2 years	spray into motors to clean, no cfc's

Observations

Labs are done once or twice a month. Cutting oil is used to cut rigid conduit. All cutting is done at the end of the school year. The oil is reclaimed and reused. Rags are used to clean the pipes which have been cut. No solvents are used and the rags are used several times before being disposed in the trash. The filings associated with the cutting are disposed of in the trash.

The shop generates about 20 pounds per year of filings. These are recyclable, but the shop does not generate enough material on its own to make recycling feasible. Larger pieces of waste metal and wire are sent for scrap recycling. The plastic sheathing from insulated wire is separated and disposed of in the trash. The question was asked whether this plastic is recyclable. This thermal set plastic represents the largest volume of waste generated in the shop.

MEK is used as a PVC piping glue. This application is always done outside and no respiratory protection is used. The instructor was not aware of any alternative product available to achieve the same quality of results. The glue has a limited shelf life so it is bought in the smallest volume possible.

Cantex conduit solvent cement is used to simultaneously clean and glue conduits. This material represents toxics use reduction because the other choice would be to clean the conduit with a solvent

and then apply a cement. The instructor indicates that no other product does both steps. It is only used on outside projects and it is bought in small containers because of the short shelf life.

Cable Free is a solvent used occasionally to loosen cables. This is a petroleum distillate. The 1/2 gallon container has been in service for five years and is expected to last another five.

Waste oil is collected and taken to the DPW for burning.

The contact cleaner contains trifloroethane. The individual can is fully used each year and then thrown out. It would be worth exploring if there is a less toxic alternative.

MSDS's were available.

The shop uses approximately a pack of paper rags to clean oil and throw in trash. Most of the cutting oil is strained and reused. Any sludge buildup is wiped with a paper rag and thrown in the trash once a year.

There is one pint can of Rustoleum paint in the shop. It is used to paint tools to prevent rust. This can has lasted for many years.

There is a supply of gear grease in the shop that is never used. It should be disposed of or given to another shop which will use it.

The chemicals are stored fairly well. There is a wide variety of materials in small quantities.

Toxics Use Reduction Already Being Practiced

1. Products bought in smallest appropriate quantities.

2. Cutting oil is reclaimed and reused.

3. The one step Cantex conduit solvent cement is used instead of a two part process.

4. No solvents are used for cleaning.

Toxics Use Reduction Recommendations

1. A mechanical de-soldering station would reclaim old solder.

2. Contact vendors of products and/or do literature searches for ^greener` substitutes. In particular, finding alternative products to replace the MEK glue and Trichloroflorethane contact cleaner would be valuable.

Find a degreasing substitute for Electroclean that is aqueous based.

4. Consider replacing oil-based cutting fluids with vegetable-based fluids.

5. Could a lead free solder, such as is used in plumbing, be substituted for the lead/tin solder?

Other Environmental/Health/Safety Recommendations

1. Recycle florescent light bulbs.

2. Further exploration of recycling metal filings and plastic sheathing.

3. Bring miscellaneous, old and unwanted chemicals to the Household Hazardous Waste Collection or give to another shop that will use them.

FORESTRY/HORTICULTURE

Chemicals Used	Amount Used/Year	Purchased	Purpose
Oxamyl	1/2 pound	1 pound	insecticide/nematicide
Captan 50W	5 pounds	60 pounds	pesticide - orchard
Benlate	1/2 pound	5 pounds	fungicide - greenhouse
Imidan 50-WP	5 pounds	60 pounds	pesticide - orchard
Princep 80W	1/4 pound	5 pounds	herbicide
BanRot	1/2 pound	2 pounds	fungicide
Carbamate	1/4 pound	5 pounds	fungicide
Pramitol 25E	0	1 gallon	herbicide
Safer Soap	1/4 gallon	2 gallons	pesticide - greenhouse
Round-up	1/4 gallon	1/2 gallon	herbicide/weed killer
Vapor Gard	1 gallon	3 gallons	foliage spray
Mavrik aquaflow	0	8 ounces	insecticide
State kling & kill	4 gallons	6 gallons	herbicide
Malathion	1/3 gallon	1 gallon	pesticide
Dithane DF		50 pounds	fungicide
Muriatic acid	3/4 gallon	1 gallon	cleaner - greenhouse floor
Paint spray cans	6 cans	24 cans	signs
Dithane (dry powder)			
Dormant oil			
Gasoline			
Diesel fuel			
Kerosene			
Machine Oil			
Antifreeze			
Fertilizers			
Paint (spray and house)			
Waste oil in five gallon cans from tractor oil changes and for the chain saw.			
Latex house paint (about seven gallon containers)			
Turpentine (less than 1 quart)			
Ammonium hydroxide (to be disposed)			
Varnish			
Silicone sealant			
Carpenters Wood Glue			
Fly bait			

Observations

The school is exploring implementation of an Integrated Pest Management Plan (IPM) in the orchard,

greenhouse and in turf care. This approach would reduce the use of pesticides.

Sawdust is used to clean up spills. There is no written Toxic Materials Action Plan. There are two outdoor hazardous materials storage cabinets. They are used to store flammables and oil, and other materials. The cabinets are grounded. They are designed to contain spills.

Gasoline is stored at the DPW across the street and in the metal hazardous materials storage locker at the barn. No solvents are regularly used. When necessary, they are borrowed from the automotive shop Safety Kleen program. Students do not do any pesticide application. Any application is done by licensed staff over the weekend so that it has time to dissipate. Sprayers used were not labeled. The instructor used personal protective equipment during application including boots, goggles, rain gear, and a respirator.

Used oil is sent to the DPW and burned as heating oil.

Classroom work includes safety, regulations, monitoring and testing related to pesticides. The students also learn about IPM principles.

Proper storage was available for the pesticides and other chemicals in use in a locked cabinet in a locked room.

Gasoline and gas/oil mixtures are stored in one outside flammable storage shed; another holds oils, gas line antifreeze, and some other items.

An air quality issue concerning classroom instruction in the warmer months was discussed. The ventilation system for the classroom takes outside air from a courtyard formed by the greenhouse and the building. Nearby are compost windrows containing barnyard waste, restaurant waste, and other materials. Reportedly, in warm weather strong odors and flies adversely affect student health and education when in the classroom. Instructors cannot stand to be in their office.

Toxics Use Reduction Already Being Practiced

1. Using Safety Kleen supplies from another shop rather than having its own set-up.

Toxics Use Reduction Recommendations

1. Aggressive reduction of pesticide use, especially in greenhouse.

2. Implement comprehensive IPM program.

Other Health/Safety/Environmental Recommendations

1. A Toxic Materials Action Plan should be written and made known to every staff member and

student.

2. Compost project is too close to forestry classrooms, inviting stench, flies, and potential rodents. While not likely to be possible, the best solution for the classroom and office air quality problem would be to move the composting operation to another location a further distance away from any regularly occupied buildings. Moving the ventilation system to the other side of the building or blowing air in through the windows on that side would help somewhat, but there still would be some bad days.

3. Better ventilation is needed where pesticides are stored, including a fan for fresh air intake.

4. Classroom should include fresh air intake and venting away from the compost site.

5. Proper storage and ventilation in room where pesticides are stored.

6. Proper cleaning and handling of protective gear.

7. Testing of carbon monoxide levels in the greenhouse when starting or running kerosene heat source.

8. Proper labeling on every container.

9. Building design seemed a bit problematic for smooth operations and classroom learning. A review may provide a long range re-design program.

10. There was a box containing several different chemicals and other items for hazardous waste disposal. The items in the box should be reviewed to ensure there are no incompatibilities, leaking containers, or flammables that should be stored in a safety cabinet.

11. Within a plastic sheeted section of the greenhouse a kerosene heater was in use as a carbon dioxide generator for an experiment. Carbon monoxide should be monitored inside and outside the section. Although the ceiling limit for carbon monoxide (OSHA) is 200 ppm, levels above 25 within the section should raise questions about whether the experiment should continue. Levels outside the section above 25 ppm should trigger additional measures to ventilate the greenhouse. Levels above 50 ppm should result in shutting down the heater and clearing the area.

HEALTH TECHNOLOGY

Chemicals	Frequency	Purpose
Wescodyne (iodine)	as needed	soak thermometers
Foaming cleanser with bleach	once/week	clean sinks
Hibclens	daily	hand washing
Hydrogen peroxide	twice/year	dilute mouthwash
Air Freshen	monthly	clean air
Profess	daily	hand and body lotion
Betadine	once/year	skin preparation
Isopropyl alcohol	whenever blood pressure taken	sterilize stethoscope
Nail polish remover (acetone)	once/year	nail care

Observations

A commercial air freshener is used on a regular basis. This may not be necessary. Nail polish remover is used on a very limited basis. Nevertheless, nail polish remover may contain several significant toxins. It may be possible to buy a product without acetone or toluene. Nail polish remover is obtained from cosmetology.

There are several mercury cleanup kits. It was reported that there are no mercury thermometers in use. The only equipment currently using mercury is the blood pressure measuring machine (sphygmomanometer).

Greenfield Community College uses the same facilities. We do not know what equipment or toxics they may be using.

Toxics Use Reduction Already Being Practiced

1. No mercury bearing thermometers being used.

2. Using nail polish remover from Cosmetology Shop.

Toxics Use Reduction Recommendations

1. Do not use a commercial air freshener. These products are likely to contain many toxins, including isobutane, methylene chloride, o-phenyl-phenol, p-dichlorobenzene, propane, paradichlorobenzene, naphthalene, and formaldehyde. If air freshness is a problem, other solutions to consider include: leaving baking soda in bowls or open containers in strategic locations and opening windows on a regular basis.

2. Potentially use non-acetone nail polish remover after checking the label and comparing ingredients.

There is also a toluene-free nail polish available commercially that is somewhat less toxic.

3. Immersing items in boiling water, in some circumstances, may be an effective substitute to chemical sterilization. An autoclave can also serve this purpose.

4. Use a less toxic foaming bath cleaner such as Bon Ami, Ecover Cream Cleaner, AFM Safety Clean or Super Clean.

5. Whenever possible, mercury bearing instruments should be replaced by equivalent technology, for example using alcohol, flex tape, electronics.

MACHINE TECHNOLOGY

Chemicals Used
WD 40
Machine Oil
Blue Dye (Ethanol)
Black oxidizing agent (Nickel penetrator)
Welding rods
Acetylene
Flux

Toxics Use Reduction Already Being Practiced

1. Changed from an oil based coolant to a synthetic water soluble coolant that is biodegradable.

Toxics Use Reduction Recommendations

1. None offered.

Other Environmental/Health/Safety Recommendations

1. The shop needs a better air ventilation system in the welding and heat treatment areas.

2. There is no control over the heat in the shop. When the heat is turned on it becomes excessively hot.

3. A black oxide metal treatment bath and heat treatment ovens were noted in a corner of the shop. The black oxide bath had a perimeter local exhaust system. An in-line booster fan was inoperative. The duct work was tied to an exhaust blower that also exhausts a canopy hood over a large heat treatment oven. The canopy hood did not overlap the heat treatment oven properly. Air current tube tests showed inadequate air capture of alkaline air emissions around the black oxide bath.

4. Although both the black oxide bath and the heat treatment oven are not used often, their exhaust ventilation systems need to be improved to reduce the release of toxic material into shop air. Until more complete changes can be made, the following items will reduce the potential hazards of using these two processes. Shutoff dampers should be installed so ventilation will be increased at the active process by closing the duct damper at the inactive process. The inoperative booster fan should be fixed. Process use should be at the end of the instruction day.

METAL FABRICATION

Chemicals Used	Amount Used/Year	Purpose
steel	1 - 2 tons	basic metal
galvanized steel	1/2 ton	basic metal
aluminum	200 pounds	basic metal
stainless steel	100 pounds	basic metal
copper	100 pounds	basic metal
solid steel wire	110 pounds	unfluxed welding wire
silver brazing wire	1/2 pound	silver soldering wire
smaw low alloy	200 pounds	flux covered welding wire
smaw mild steel	200 pounds	flux covered welding wire
copper brazing rod	50 pounds	brazing wire
wearshield	2 pounds	hard facing rod
alum 4043	25 pounds	hard facing road
bronze 25m	50 pounds	alum welding rod
ss arc rod	10 pounds	flux covered ss rod
ss tig rod	25 pounds	silver solder
acetylene		fuel gas
oxygen		consumed oxidizer
argon		inert gas
carbon dioxide		welding gas
CO2-argon/25-75		welding gas mix
nitrogen		cutting gas
O2-Argon/2%-98%		welding gas mix
helium		inert gas
brazo	1 pound	flux for brazing
sta silver flux	1 pound	flux used in silver soldering
organic grind wheels	200 discs	sanding metal
bio soft cleaner	1 gallon	general cleaning
abrasive wheels	500 discs	cutting and grinding metal
scrubs	1/2 case	hand cleaning
dte oil x heavy	5 gallons	lubrication
dte oil heavy	5 gallons	lubrication
dte oil 25	5 gallons	lubrication
95-5 lead free	10 pounds	soldering metal
spray paint	5 cans	occasional marking
cutting fluid aqua	1 gallon	cutting fluid for saw
pure tungsten	30 rods	tig welds
thoriated tungsten	10 rods	tig welds
ceriated tungsten	20 rods	tig welds

polishing rouge	1 stick	final finish
polishing emery	1 stick	final finish
paint remover	1 quart	remove paint before welding
silicone II caulking	2 tubes	repair holes in wall
wet works lens	400 towels	clean glasses

Observations

In Metal Fabrication students learn how to manufacture items by cutting, bending, welding, and brazing metals. Metals used include cold steel, galvanized steel, aluminum, and some stainless steel (alloy steel). As solids, these metals do not present a health hazard. During welding, however, fumes are generated by the base and filler metals. When doing stick welding, flux and other constituents of the welding rod are released. The type of metal, size of weld, and other characteristics determine the type of rod that must be used. Other types of welding performed in this shop include metal inert gas (MIG) and tungsten inert gas (TIG) welding. These use an inert gas (carbon dioxide, argon, nitrogen, or helium) as a shielding gas.

There are 10 welding booths that are equipped with a recirculating local exhaust ventilation system. This system recirculates contaminated air through a pre-filter, bag filter, and high efficiency particulate air (HEPA) filter. Unlike many recirculating systems, this system appeared to effectively remove welding smoke and fume. No smoke was noticeable while a student was doing stick welding (which is perhaps the smokiest of all welding operations.) Portable HEPA units are used for hot work that must be done outside the booths.

Water soluble metal working fluid at the metal band saw, a quart of paint stripper, and a few cans of spray paint, lubricating oils were all that were noted. The chemical exposures of greatest concern are the air contaminants from hot work: metal fumes, nitrogen dioxide, ozone, and possibly fluorides from some fluxes. The use of spray paint and stripper could be characterized as "incidental.` The instructor uses the spray paint to identify pad locks used to lockout equipment, and the paint stripper is used only if paint needs to be removed in an area to be welded. The silver solder is cadmium free.

The ingredients and contaminants in metalworking fluids (MWFEs) may pose health hazards, such as dermatitis, respiratory problems, and occupational asthma. MWFEs commonly become contaminated with metal fragments from the metal which is being worked. Water soluble MWFEs can become contaminated by bacteria. In this shop, the limited use of MWF seems to indicate a low risk from problems arising from MWF.

It should be noted that the paint stripper that was selected does not contain methylene chloride (classified as a potential occupational carcinogen by NIOSH). The active chemical in this stripper is n-methyl-2-pyrrolidone (NMP), which is now found in a number of paint strippers in place of methylene chloride. However it does not appear to be risk free, as a report in the literature describes evidence of potential human fetotoxicity. The NIOSH database, RTECS, classifies NWP as a mutagen, reproductive effector, and primary irritant. Please note that this digression on NWP is not meant to indicate a hazard in Metal Fabrication, but merely to point to one of the difficulties encountered when trying to identify a "less toxic" substitute.

Toxics Use Reduction Already Being Practiced

1. Changed from an oil based coolant to a synthetic water soluble coolant that is biodegradable.

2. Several aggressive and successful efforts have already been made to eliminate all unnecessary chemicals either being stored or used. In particular, the instructor has tried to limit projects to product, materials and chemicals (especially in the form of almost elemental metal products) that would be used at the entry level of employment.

Toxics Use Reduction Recommendations

1. Buy latex based spray paint.

2. Coordinate purchasing with other departments.

3. Consider replacing vegetable-based fluids for oil-based cutting fluids.

Other Environmental/Health/Safety Recommendations

1. MSDS sheets were difficult to find.

2. Concerns were expressed about asbestos around the heating pipes that was cracked in places.

3. A sound meter to monitor noise should be available.

PLUMBING

Chemicals Used	Amount Used/Year
Cutting oil	2 gallons
PVC glue (contains toluene)	2 quarts
Rectorseal (flammable)	12 pints
Soldering flux (contains aluminum chloride and petroleum products)	2 - 3 pounds

Observations

The management approach for cutting oil is very similar to that seen in the Electrical Shop. The oil is re-used and the sludge put in the trash. Speedy dry is used on the floor to absorb spills and drips. The speedy dry is then put in the trash. Paper rags are used to wipe parts and the sludge is thrown out. Spills are collected on shredded newsprint.

PVC is rarely used. ABS pipe is used instead. PVC glue is not used inside. It can dry on skin and burn it. It has a limited shelf life and so the smallest amount possible is purchased.

No lead solder is used (antimony and copper in its place).

No soldering is done during the winter because it is only done outside.

Rectorseal is used to make pipe fittings watertight. This material is only used by beginners. More advanced students use Teflon tape. The Rectorseal is poured into small cans. This has resulted in a decreased loss of material. The cans are re-used.

Copper and brass fittings are re-used and recycled.

The ventilation air filters are changed on a maintenance schedule by custodial staff. No respirators are used. Safety glasses are worn at all times.

A water based 3M floor degreaser is used on the floors. It is washed down the floor drown and goes through a grease trap. Once a year, all of the shop equipment is degreased with the same 3M aqueous degreaser product. The degreaser is rinsed off the machines onto the grass outside. More information is needed about this practice. Where is it draining to, what does it contain, is there a potential environmental contamination problem?

Acetylene gas is used for welding. Flux is poured into smaller containers for use by students. These has resulted in a decreased loss of material.

The Instructor is very efficiency conscious. Almost all metal waste is recycled.

Toxics Use Reduction Already Being Practiced

1. No lead solder is used.

2. Rags are used three times (hands, tools, oil drains).

3. Solvents are not used to degrease floor or equipment.

4. The fact that the work is done right on the floor instead of on rubber grates means you can see the oil spilled. This may cause students to be more careful about spills.

5. Cutting oil is re-used in the shop.

6. A limited amount of PVC glue is used and the smallest amount possible is purchased.

7. There has been a 50% decrease in the amount of acetylene used due to recycling plumbing supplies rather than dismantling them.

8. Fittings are re-used.

9. Rectorseal is poured into small cans. This has resulted in a decreased loss of material. The cans are re-used.

Toxics Use Reduction Recommendations

1. Since Rector seal is just for beginners, is there is a less toxic product to learn with?

2. Increase efforts to reduce cutting oil spillage on the floor by students.

3. Consider replacing oil-based cutting fluids with vegetable-based fluids.

Other Environmental/Health/Safety Recommendations

1. Do not discharge degreaser and associated waste onto ground outside. It should be collected and disposed of through internal drain systems.

PRINTING

Chemicals	Used/Year	Purchased/Year	Purpose
P.O.S.CO Typewash	15 gallons	15 gallons	cleaning presses
Blanket wash (1, 1, 1-trichloroethane, trimethylbenzene, and naphtha)	25 gallons	25 gallons	cleaning presses
AB Dick Cylinder cleaner	1 pint	0	cleaning cylinders
Kodak 3M Developer (sulfites)	10 gallons	15 gallons	darkroom
Kodak 3M Mixer	5 gallons	10 gallons	darkroom
Kodak 3M Stop bath	1 gallons	2 gallons	darkroom
Many others used in very small quantities			

Observations

This shop has several offset presses. There is no lead-work done. The principal chemical products used are blanket wash, type wash, and darkroom chemicals. The blanket wash is used more frequently than type wash. It would be unlikely that the use of blanket wash would result in air concentrations exceeding the NIOSH RELEs or OSHA PELEs. Skin contact should be minimized by wearing gloves. Gloves, however, are reportedly not widely used in the printing industry, and, therefore, are not widely use in vocational schools. Type wash is only used to wash ink from equipment (i.e., somewhat limited use). Both blanket wash and type wash are applied using a rag.

Oil based inks are becoming less common. Rubber-based and soybean-based (Megalaser) inks are being used more frequently. Infrequently used colors or ink may result in leftover inks. The school was given inks and some other materials from a Veterans' Administration print shop that closed. There are numerous small containers of printing supplies in the cabinets of this shop.

The darkroom is being used less frequently and will be replaced by computer based technology. Chemicals used in the darkroom include the Kodak developer, fixer, and stop bath. The developer contained sulfites. Sulfites in darkroom chemicals have been reported to cause or aggravate eczema asthma in darkroom workers.

Chemicals are kept closed when not in use and are stored in a flammable storage cabinet or hood.

There is no written Toxic Materials Action Plan.

Toxics Use Reduction Already Being Practiced

1. The presses are not washed every day. The shop is run like a real production shop where colors and press washing is scheduled accordingly.

Darkroom use is limited and carefully scheduled to do all negatives at one time.

3. Use of soy and rubber based inks.

4. Obtaining left over supplies from other print shops.

5. Saving left over inks for future jobs.

6. No lead work is done.

Toxics Use Reduction Recommendations

1. If available, non-sulfite darkroom products should be substituted for those containing sulfites.

2. Continue to expand use of soy and rubber based inks.

3. Eliminate darkroom use if feasible within the context of a full educational experience.

4. Can type wash be substituted for blanket wash in any instances? What is in type wash? Would this be an improvement?

Other Environmental/Health/Safety Recommendations

1. Develop a written Toxic Material Action Plan.

2. Review miscellaneous chemicals being stored. Determine if there are any storage incompatibilities. Get rid of chemicals not being used by either giving them to someone who will use them, or taking them to the annual Household Hazardous Waste Collection.

3. Gloves should be warn when using blanket or type wash for press cleaning.

4. Be sure that the darkroom is properly ventilated and meets ASHRAE standards.

SCHOOL NURSE

Chemicals Used

Acetane HimCO
PT 550 Resmethrin Insect Fogger
Industrial Insecticide - Crunch Bird
RAID
Mercury thermometers
Spray disinfectant
Bleach
Isopropyl alcohol

Observations

The acetane and pesticides had not been used for at least four years. The school nurse was planning to bring these containers to the Custodial staff.

Needles are disposed of in "Sharp" container. The filled containers are stored in a cabinet.

Small amounts of blood waste are sprayed with 10% bleach, then double bagged and dated and disposed of with normal waste. This follows DPH guidelines. There has not been a situation where there has been a large amount of biological waste that has needed to be disposed of in red biological bags. The school nurse has reviewed these procedures with the custodial staff.

Respirator use and medical screening issues were discussed with the nurse. All students are required to have had a physical exam within the past year prior to admission or a signed waiver from their doctor.

Toxics Use Reduction Recommendations

1. Try a non-aerosol can of disinfectant to see if it is as effective on surfaces. It may not linger in the air as long since the droplets are bigger and therefore have less impact on students with asthma.

2. Whenever possible, mercury bearing instruments should be replaced by equivalent technology, for example using alcohol, flex tape, electronics.

3. Coordinate purchasing with Health Technology.

Other Environmental/Health/Safety Recommendations

1. If this information is not yet available, all areas that use respirators should be collected. The school nurse and the "safety officer" should have this list readily available.

2. Ensure that students are medically fit to wear respirators and are fit-tested.

3. The "Waiver for Admission Physical Examination" Form should be modified to include that the patient/student is cleared to wear a respirator.

4. As a part of the physical examination, physicians should be screening prospective students about their capabilities to wear a respirator.

5. For students who are on a medical alert list, a questionnaire should be administered by the school health nurse to ensure there are no contraindications to respirator use.

SCIENCE LAB

Chemicals Used

HCl		NaOH	NaCO3
Ca(OH)2		H2So4	HNO3
Ammonia		Crystal Violet	Safranin
Strontium Chloride		Glycerine	Formaldehyde
Phenolphthalein	Iodine	Hydrogen Peroxide	
Calcium		Sodium Bromathol Blue	

The Science Laboratory is not in operation, so very few chemicals are used in a year. HCl and NaOH are used the most frequently; primarily for water testing. The acids are used for rock laboratories. There is no coordinated purchasing of chemicals within the school. The chemicals are kept in a locked cabinet and room. There are two buckets, approximately eight gallons, of frogs in formaldehyde. These are about five years old. The frogs will eventually be used up and the formaldehyde will need to be disposed. It may be possible to discharge the formaldehyde into the sewer system. This needs to be discussed with the Department of Public Works.

Chemicals are stored in shelves that hang from the walls. These have glass fronts that slide back and forth for access. Much of this storage is above shoulder height and requires stepping on a stool to reach the chemicals.

No chemistry labs are currently offered. Some chemicals were purchased in anticipation of beginning a new chemistry and lab program. There are other chemicals that are not being used due to curriculum changes. Some of the chemicals are old and have not been used in many years. These were segregated out and put on the top shelf of the storage area. Finally, some chemicals were purchased in bulk (like acids) so there was quite a bit of it.

Micro-scale chemistry is not used and is not planned for use in the new chemistry curriculum.

Toxics Use Reduction Already Being Practiced

1. Products generally bought in smallest appropriate quantities.

2. New thermometers being purchased are alcohol based, although there remains a supply of mercury thermometers.

Toxics Use Reduction Recommendations

1. Coordinate purchasing of materials with other shops and departments to avoid redundant purchases.

2. Avoid ordering any more specimens in formaldehyde.

3. Do not buy chemicals unless there is an active use for them.

4. When the chemistry labs do start, begin use micro-scale chemistry immediately.

5. Either use up or dispose of the two five-gallon buckets of frogs and ask the local water treatment facility whether the formaldehyde can be poured down the drain. Frog specimens themselves require special disposal because of formaldehyde content.

6. Develop a purchasing policy that limits chemical purchases to a two or five year limit. This will help ensure that chemical overstocking does not happen.

Other Environmental/Health/Safety Recommendations

1. Do not store acids and bases on same shelf.

2. Bring miscellaneous or old chemicals, and any material that will not be used, to the Household Hazardous Waste Collection.

3. Chemicals should, preferably, be stored at or below shoulder height. This may mean moving some of them or lowering storage shelves.

4. Keep a complete file of MSDS's.

5. Date all chemicals when they come in so you have some idea of how old they are.

6. Develop a Toxic Material Action Plan.

TECHNICAL ASSISTANT

Chemicals Used	Amount Used/Year
Stripeze	5 gallons
ThinX	8 gallons
Lubricating Oils	12 - 20 quarts

Observations

This shop was not visited. The Department Head provided a complete survey and this narrative is based on those responses.

Chemicals are kept in closed containers when not in use. Chemicals are stored in a flammable storage cabinet or hood.

There is no written Toxic Material Action Plan and none has been practiced during class time.

All waste is properly disposed of or recycled.

Almost all of the chemicals used result in an equivalent amount of waste. The oils are sent to the DPW for waste oil burning.

Toxics Use Reduction Recommendations

1. Paint thinners and strippers can be set aside to allow solids to settle. Once the solids have settled, the clear thinner or stripper can be poured off for re-use and the sludge disposed of as solid waste.

2. Use paint thinners and strippers which do not contain methylene chloride.

Other Environmental/Health/Safety Recommendations

1. A written Toxic Material Action Plan should be prepared and practiced.

2. Be sure that appropriate health and safety gear is worn by students when using paint thinner or strippers.

RECOMMENDED TOXICS USE REDUCTION POLICIES

1. Adopt a policy of decision making which includes a toxic use reduction evaluation component.

2. Integrated Pest Management should be adopted by the school for general indoor and outdoor use, as well as by Custodial Services, Culinary Arts, Agriculture, Forestry/Horticulture programs.

3. Consolidate purchasing of materials and establish inventory control mechanism. For example, the following materials were used in multiple locations:

cutting oil
acetylene
WD-40
motor oil
lubricants
degreaser.

4. Make a conscious effort to fully use up all of materials. The instructor should make the decision when to throw out empty containers and not the students.

5. Purchase in smallest amounts that are necessary for that academic year.

6. Consider consolidation of equipment and supply use. For example, it might be possible for shops to share Safety-Kleen degreasing units rather than having multiple units. There may be cases where by spooling of computers laser printers could be shared.

7. There is a fair amount of waste oil being transported to the DPW for burning. It might go to be possible to use a space heater on campus and burn the oil as a replacement fuel for another heating source.

8. Be sure that there is a scheduled maintenance system for all equipment. This helps to eliminate the risk of accidental loss of product.

9. Standardize materials being used, such as paints, cleaning agents, oils, etc. to facilitate interchangeable use and reuse.

10. Allow departments to keep any savings that result from decreasing the use of toxic materials or generation of hazardous waste.

11. Adopt a policy of integrating toxic use reduction into the curriculum wherever practicable.

MISCELLANEOUS GENERAL
ENVIRONMENTAL/HEALTH/SAFETY RECOMMENDATIONS

1. Carbon monoxide tracking in Plumbing and a redesign of the Cosmetology ventilation system would benefit health and safety of staff and students.

2. MSDS E s should be available for all materials in each room. They should be well organized and readily accessible. Someone in each area should be clearly responsible for being familiar with the MSDS E s, how to use them, how to access them, and keeping track of old ones.

3. All MSDS E s should be kept for three years, per the Massachusetts Right to Know law.

4. Develop and implement and oil filter recycling program.

5. There should be a school wide policy pertaining to respirators. There should be a designated individual or group to assist instructors and to ensure good practices. This could be done with a separate short course on respiratory protection for students and one stop shopping within the school system for selection, ordering, and storing of respirators.

6. There should be a hearing conservation program for teachers. Noise evaluations should be done in the various shops and a selection of hearing protection provided. Instructors in high noise shops, such as carpentry, should have annual audiometric tests.

7. Complete replacement of florescent light ballasts so that none with PCB E s remain.

8. Use re-usable products whenever possible, such as ceramic coffee cups, wire or cloth coffee filters, washable silverware and plates.

9. There should be a school-wide policy that all spent batteries are brought to the Custodial Dept. for proper disposal or recycling.

10. There should be Toxic Materials Action Plans for each department. These plans should be familiar to faculty and students and readily available in each Department.

TIME LINE FOR IMPLEMENTATION OF RECOMMENDATIONS

Most of the recommendations found in this Plan will require further research and consideration by the staff directly affected and the Administration which makes financial decisions. It was the belief of the Technical Advisory Team that within one academic year all of the recommendations could be implemented or rejected.

In most cases, toxics use reduction will require changing brands of products. This may not prove to be feasible in many instances. Another major category of change would come about by centralizing purchasing and increased sharing of equipment and supplies. While primarily an Administrative decision, such changes would have significant practical impacts on the faculty and staff. School wide cooperation and a willingness to perhaps be ^inconvenienced` or required to take another administrative step will be necessary. Whether these types of changes are practical within the context of an already burdened educational setting will be determined by the schoolEs administration and School Board.

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APPENDICES

APPENDIX I

SUGGESTED ALTERNATIVE APPROACHES TO
ELIMINATE THE USE OF CERTAIN MATERIALS

SCOURING POWDER can be replaced by baking soda, salt, or a mixture of vinegar and salt. Bon Ami, a commercially prepared scouring powder is chlorine-free, but is no better than others for heavy metals and has a relatively high chromium content.

AMMONIA BASED CLEANERS typically contain ammonia, ethylene glycol monobutyl acetate, sodium hypochlorite, ethanol, and trisodium phosphate. To avoid these toxins, the following options could be used:

Vinegar, like ammonia, will cut through grease and grime.

Vinegar and salt mixed together make a good surface cleaner.

Baking Soda used on a damp sponge will clean and deodorize kitchen and bathroom surfaces.

A mixture of 1 teaspoon castile soap (liquid), 1 teaspoon borax, 1 teaspoon vinegar, and 1 quart of water is an excellent all purpose cleaner, and can be stored for later use.

A mixture of 1/4 cup baking soda, 1/2 cup borax, 1/2 cup vinegar, 1 gallon of water is an excellent all purpose cleaner, and can be stored for later use.

GLASS CLEANER may be replaced by using a refillable pump spray with one of the following solutions:

Washing windows or glass with a mixture of equal parts of white vinegar and warm water. Dry with a soft cloth. Leaves windows and glass streakless. To remove stubborn hard water sprinkler spots and streaks, use undiluted vinegar.

Two tablespoons of washing soda mixed into 3 cups water makes a good window cleaner. Apply to surface and wipe dry.

Mix 3 tablespoons cornstarch and 1/2 cup white vinegar into 1 gallon warm water. Apply to surface and wipe dry.

Mix 1 tablespoon lemon juice in 1 quart water. Apply to surface and wipe dry.

HAND CLEANERS can be avoided by keeping your hands clean by wearing nitrile or other gloves suited to the job. Other suggestions include:

Massaging hands with a few drops of baby oil or margarine. Wipe dry and wash with soap and water.

Use a nontoxic lanolin and glycerin-based hand cleaner.

Coat hands with hand lotion before doing auto work. Wash hands afterwards.

LUBRICATING OIL in some applications can be replaced by:

Using plain castor oil or mineral oil on hinges, doorknobs, and latches.

For locks, use dry powdered graphite.

APPENDIX II

INTEGRATED PEST MANAGEMENT FOR SCHOOLS

Here are some steps that may be taken, when appropriate, to decrease the likelihood of insect and rodent problems from developing. It is possible that many, or all, of these steps are already practiced at Smith Vocational and Agricultural High School. This information is extracted from Pest Control in the School Environment: Adopting Integrated Pest Management, EPA, office of Pesticide Programs, EPA 735-F-93-012, August, 1993.

Entryways

C/ Keep doors shut when not in use.

C/ Place weather stripping on doors.

C/ Caulk and seal openings in walls.

C/ Install or repair screens.

C/ Install air curtains.

C/ Keep vegetation, shrubs and wood mulch at least one foot away from structures.

Classrooms and Offices

C/ Routinely clean lockers and desks.

C/ Frequently vacuum carpeted areas.

Food Preparation and Serving Areas

C/ Store food and waste in containers that are inaccessible to pests. Containers must have tight lids and be made of plastic, glass, or metal. Waste should be removed at the end of each day.

C/ Place screens on vents, windows, and floor drains to prevent cockroaches and other pests from using unscreened ducts or vents as pathways.

C/ Create inhospitable living conditions for pests by reducing availability of food and water. Remove food debris, sweep up all crumbs, fix dripping faucets and leaks, and dry out wet areas. Sweating pipes should be insulated.

C/ Promptly clean up food preparation equipment after use and remove grease accumulation from vents, ovens, and stoves. Use caulk or paint to sea cracks and crevices.

C/ Capture rodents by using mechanical traps. These must be checked daily. Dispose of killed rodents within 24 hours.

Areas or Rooms with Extensive Plumbing

C/ Promptly repair leaks and correct other plumbing problems to deny pests access to water.

C/ Routinely clean floor drains, strainers, and grates. Seal pipe chases.

C/ Keep areas dry. Avoid conditions that allow formation of condensation.

C/ Store paper products or cardboard boxes away from moist areas and direct contact with the floor or the walls.

Maintenance Areas

Promptly clean mops and mop buckets. Dry mop buckets and hang mops vertically on a rack above a floor drain.

Clean trash cans regularly. Use plastic liners in trash cans and use secure lids.

Keep areas clean and as dry as possible. Remove debris.

Outdoor areas: Athletic Fields, Parking Lots, Loading Docks, Refuse Dumpsters

C/ Regularly clean trash containers and gutters and remove all waste, especially food and paper debris.

C/ Have secure lids on trash containers.

C/ Repair cracks in pavements and sidewalks.

C/ Provide adequate drainage away from the structure and ont eh grounds.

C/ Maintain healthy turf by selecting a mixture of turf types best adapted for the area.

C/ Raise mowing height for turf to enhance its competition with weeds. Sharpen mower blades. Vary mowing patters to help reduce soil compaction.

C/ Water turf infrequently but sufficiently during early morning hours to let turf dry out before nightfall.

Let soil dry slightly between waterings.

C/ Allow grass clippings to remain in the turf.

C/ Prune branches on ornamental shrubs and trees to improve plants and prevent access by pests to structures.

C/ Correctly identify the pest in question.

C/ Apply pesticides judiciously.

APPENDIX III

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Waste Reduction Audit Report: Hairstyling Shop, Waste Reduction Assistance Program, Alaska Health Project, July, 1992

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APPENDIX IV

SAMPLE LIST OF RESPIRATOR SUPPLIERS AND MANUFACTURERS

Respirators are extremely limited as a control device. Their use must be carefully monitored. Here are some of the major problems:

Respirators

C/ are hot and uncomfortable

C/ often fit poorly (allowing toxic substances to get in)

C/ put extra stress on the heart and lungs

C/ limit conversation (and therefore safety)

C/ do not offer any protection whatsoever against many chemicals

C/ do not stop the toxic chemical from entering the environment

C/ do not prevent skin exposure.

Also, half-face respirators do not prevent eye exposure.

In a sense, wearing a respirator to stop a dangerous chemical exposure is like wearing a bulletproof vest to stop a bullet. You are a lot safer if you stop the gun from firing than you are if you wear a vest for protection.

Here E s what OSHA says in its Respiratory Protection Standard (29 CFS 1910.134):

In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used.

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Allegro Industries
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Paramount, CA 90723
Tel. 800-622-3530
Fax 310-633-2224

Bilsom Group
5300 Region Court
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Tel. 800-733-1177

Cabot Corp.
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Southbridge, MA 01550
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Fax. 800-488-8007

Cairns Air
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New Castle, DE 19720
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Fax 302-325-1198

Dynamation (supplied air)
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Ann Arbor, MI 48108
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Louis M. Gerson Co., Inc.
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Interspiro
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Branford, CT 06405
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ISI, Inc.
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Mine Safety Appliances (MSA)
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National Drager
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Neoterik Health Technologies, Inc.
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North Safety Products
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Pro-Tech Respirators
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Racal Health and Safety, Inc.
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Survivair
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Santa Ana, CA 92704
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U.S. Safety
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APPENDIX V

WASTE MINIMIZATION OPTIONS FOR AUTOMOTIVE REPAIR SHOPS

Excerpted from Guides to Pollution Prevention: The Automotive Repair Industries, EPA Doc. # EPA/625/7-91/013, Office of Research and Development, October 1991