



## **HAZARDOUS SUBSTANCE SUBSTITUTION 2000**

### **Making Sensible & Responsible Decisions About Substitution**

**Substitution** – Almost all work involves some contact with substances that could be dangerous to health. Substitution is all about looking at these substances and deciding whether you could use less harmful ones instead or change processes to minimize the hazard in using existing substances. *Your goal should be to keep the risk to workers and others as low as possible.*

**Hazard** – is the potential a substance or process has to harm someone or damage something, either the environment or equipment.

**Risk** – is how likely this is to happen.

#### **Why Substitution?**

- Legal duty to operate business in a way that creates the least possible risk as reasonable to yourself, your workers, your clients and the public.
- Duty to assess how people's health is at risk from substances you use at work
- Duty to take action to prevent or control these risks.
- Responsibility to first aim to **prevent exposure** to hazardous substances in the first place, rather than trying to limit or control their exposure.
- Minimize environmental impact against present and future liabilities.
- Minimize potential for having to comply with environmental discharge regulations (EPA, DOH, NYDEC, NJDEP, etc. and other local entities including).
- Minimize potential for having to comply with occupational exposure regulations (OSHA)
- Avoid excessive or unnecessary pollution.
- Garner public relations credit not debit.
- Make your operations more efficient (reducing need for personal protective equipment, maybe less expensive, less training and oversight is necessary, etc.)
- Simplify stock management. Fewer hazardous substances on site require fewer resources (time, energy, effort, training, oversight, etc.) in handling and storage.
- Substitution can be cheaper.
- (Easier and cheaper to control pollution).

## 7 STEPS TO SUBSTITUTION

1. **Decide whether the substance or process is a hazard. Is there a significant risk involved in storing, using or disposing of a substance?**
  2. **Identify the alternatives.**
  3. **Think about what could happen if you use the alternatives.**
  4. **Compare the alternatives with each other and with the substance or process you are using at the moment.**
  5. **Decide whether to substitute.**
  6. **Introduce the substitute.**
  7. **Assess how it works.**
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### **Step 1: Identifying Hazards & Assessing Risks**

- Review MSDS's and any other product information, labels, etc.
- Review how the substances are used
- Review how they fit into your workplace
- Find out how the way you use them may create risks

*Once you have assessed the health risks of a substance, think about what risks it presents to safety. For example, is there a risk of explosion, fire, or chemical skin burns? You should also assess the risks to the environment.*

### **Step 2: Identifying Alternatives**

*The more creative you are with your thinking the wider the range of alternatives you can find. Decide whether you really need to do the job at all. Try to figure out ways to isolate the substance, minimize handling; reorder processes, change processes to minimize risk and exposure or even cut out a step.*

*Ex: A local authority used a very concentrated solution of sulfuric acid to clear blocked drains in frequently used toilets. It decided to use rods to clear the blockages instead. This means that the workers are no longer exposed to sulfuric acid.*

- Ask for help in identifying alternatives. Consult trade associations, manufacturers, suppliers, governmental departments, Chamber of Commerce, industrial technology assistance centers, cooperative extension centers, universities and colleges.
- Extend discussions and communications with other entities you must work with that may control or demand the specific method of work. Talk about the potential risk and cost reductions.

- Sometimes customers demand and look forward to safer substitution.
- Consider whether pests will become immune to the pesticides you use. Find out whether the pesticide could build up in the environment. Substitute a pesticide you may only need to replace a multi-purpose one with one that is “pest-specific” and is no more hazardous. Or you may avoid using pesticides completely, by using mechanical or biological pest controls.

*Once you have identified a possible alternative, you should find out what harm it could pose, and then consider these questions:*

- How effective is the alternative? How will it affect the quality of your work? Will your customers accept it?
- Is the alternative an immediate threat to people’s health? For example, if you use corrosive substances, the harmful effects are caused by a single dose and they appear soon after the exposure.
- Could using the alternative damage people’s long-term health? For example, you should check if the substance could cause long-term chronic effects, such as cancer.
- Could substances catch fire or explode?
- Will it be easy to dispense of wastes? How much waste will there be? Will it be toxic or poisonous?
- How expensive is the alternative?
- Will it always be available? Certain chemicals are being phased out.

*Ex: Making a bathroom shower unit, a manufacturer used 1,1,1 trichloroethane to soften the rubber taps connectors and make them easier to join to the shower hose. They then found that hot water and soap did the same job equally well.*

- In what form can I use the alternative? Is there less risk in using a solid or liquid form? Will it create dust or vapors?

*Ex: Use of tablets instead of drums of laundry detergent.*

*Ex: To make floor polish a company used to pour liquid ammonia from 10-gallon drums. The company changed from liquid ammonia to a solid, which release ammonia when dissolved. This reduced the risks of being exposed to ammonia vapor.*

- What are the physical and chemical properties of the alternatives? How volatile is it?

### **Step 3: Think About What Could Happen If You Use the Alternative**

*Decide whether they are realistic alternatives and assess their good and bad points. Think about their effects on health, safety and the environment as well as any costs or savings.*

- Think about how likely the risks are as well as what they are.

*Ex: It is not enough to know that substances are hazardous. You need to assess the likelihood of your workers becoming ill because of exposure.*

- Avoid substances that build up in the environment.

### **Step 4: Comparing Alternatives**

- Compare the risks of alternatives with the risks of the current substance.
- You may need to compare the fire risks from a highly flammable substance with the health risks from a highly toxic one. Is it better to risk making somebody ill or to risk burning him or her? These are not easy decisions.

*It is usually easier to compare different alternatives on the basis of the same hazard.*

- Is one substance more likely to poison people than another?
- Is one substance more likely to give people cancer than another is?
- Is process more likely to result in mistakes, short cuts or incidents because of its complexity, or obstacles in the way?
- Can the substitute going to explode, or poison people?
- Will it only affect people who work with it, or could it affect other people in the area?
- How likely is it to cause damage to people or the environment?
- How easy is it to control the risks?
- How will it affect what people need?

***Remember that you are comparing the risks of alternative substances, not the hazards.***

## **Step 5: Deciding Whether to Substitute**

*You should have made a logical decision that you can justify whether to substitute or not to substitute. You may decide that what you have now is still the best option. In this case, you will need to use other ways to control the risks. If you decide to substitute, be careful. Even a simple change may have its problems. In most cases you have to consider several different factors before you substitute.*

- It may be wise, for example, to test the substitute on a small scale.
- It is very important to speak with your workers and safety representatives at this stage. They will have to work with the substitute and may have some useful ideas to help you decide.

## **Step 6: Introducing the Substitute**

*If you decide to substitute you will need to plan the change carefully so that it will go smoothly. It is very important that you give the staff who will be involved enough information and training. They should already know the risks from the original material and process, and the steps they need to take to control them. Now you should explain about the change and any new risks from the substitute.*

- What needs to be done?
- Who should do it?
- When does it need to be done by?

## **Step 7: Assessing the Change**

*Once you have made the substitution, you will need to check to see if it has been successful.*

- Check that what you predicted about the substitution was right and deal with any unexpected problems.
- You may need to reconsider the substitution if there are any changes in work practices, information about health hazards, legal requirements.
- You may even want to substitute the new substitution substance or process you are using if you find an even safer alternative.

*Ex: Changing from latex gloves, to low powder latex gloves, to non-latex gloves and monitoring the rate and severity of dermatitis and latex allergies among staff.*