CERTIFICATION TRAINING FOR
SAFE HANDLING AND USE OF
ANTIFOUling PAINTS
CONTAINING TRIBUTYL Tin (TBT)

Originally Prepared By
The Members of the
National Paint and Coatings Association

To assist in the certification of
applicators of TBT antifouling paint

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TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>MODULE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1. Laws and Regulations</td>
<td>1-1</td>
</tr>
<tr>
<td>Restricted and General Use Pesticides</td>
<td>1-2</td>
</tr>
<tr>
<td>Certified Applicators</td>
<td>1-2</td>
</tr>
<tr>
<td>Penalties</td>
<td>1-3</td>
</tr>
<tr>
<td>Recordkeeping</td>
<td>1-3</td>
</tr>
<tr>
<td>Sample Form</td>
<td>1-5</td>
</tr>
<tr>
<td>Study Questions</td>
<td>1-6</td>
</tr>
<tr>
<td>2. Label and Labeling</td>
<td>2-1</td>
</tr>
<tr>
<td>Registration</td>
<td>2-1</td>
</tr>
<tr>
<td>Labels Versus Labeling</td>
<td>2-1</td>
</tr>
<tr>
<td>Product Identification</td>
<td>2-2</td>
</tr>
<tr>
<td>Signal Words and Symbols</td>
<td>2-4</td>
</tr>
<tr>
<td>Toxicity Statements</td>
<td>2-5</td>
</tr>
<tr>
<td>Precautionary Statements</td>
<td>2-7</td>
</tr>
<tr>
<td>Protective Clothing and Equipment Statements</td>
<td>2-9</td>
</tr>
<tr>
<td>Statement of Practical Treatment</td>
<td>2-10</td>
</tr>
<tr>
<td>Environmental Hazards</td>
<td>2-11</td>
</tr>
<tr>
<td>Physical and Chemical Hazards</td>
<td>2-11</td>
</tr>
<tr>
<td>Classification Statements</td>
<td>2-12</td>
</tr>
<tr>
<td>Storage, Disposal, Spill Cleanup, Transportation and Handling Containers</td>
<td>2-13</td>
</tr>
<tr>
<td>Directions For Use</td>
<td>2-14</td>
</tr>
<tr>
<td>Reading Labeling</td>
<td>2-14</td>
</tr>
<tr>
<td>Study Questions</td>
<td>2-15</td>
</tr>
<tr>
<td>3. Safety</td>
<td>3-1</td>
</tr>
<tr>
<td>Risk</td>
<td>3-1</td>
</tr>
<tr>
<td>Hazards</td>
<td>3-2</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>3-2</td>
</tr>
<tr>
<td>Skin Contact</td>
<td>3-2</td>
</tr>
<tr>
<td>Inhalation</td>
<td>3-2</td>
</tr>
<tr>
<td>Oral Toxicity</td>
<td>3-2</td>
</tr>
<tr>
<td>Effects of Overexposure</td>
<td>3-2</td>
</tr>
<tr>
<td>Precautions</td>
<td>3-3</td>
</tr>
<tr>
<td>Exposure Limits</td>
<td>3-3</td>
</tr>
<tr>
<td>MODULE</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>3. In Case of Emergency</td>
<td>3-4</td>
</tr>
<tr>
<td>Study Questions</td>
<td>3-4</td>
</tr>
<tr>
<td>4. Storage, Handling and Disposal</td>
<td>4-1</td>
</tr>
<tr>
<td>Storage and Handling of TBT Antifouling Paints</td>
<td>4-1</td>
</tr>
<tr>
<td>Disposal of TBT Antifouling Paint</td>
<td>4-2</td>
</tr>
<tr>
<td>Spillage</td>
<td>4-4</td>
</tr>
<tr>
<td>Study Questions</td>
<td>4-6</td>
</tr>
<tr>
<td>5. Environment</td>
<td>5-1</td>
</tr>
<tr>
<td>Why Restrictions</td>
<td>5-1</td>
</tr>
<tr>
<td>Effect of TBT Antifouling Paint on Non-Target Organisms</td>
<td>5-2</td>
</tr>
<tr>
<td>Concepts of Spill Management</td>
<td>5-2</td>
</tr>
<tr>
<td>Study Questions</td>
<td>5-3</td>
</tr>
<tr>
<td>6. Pests and Pesticidal Properties</td>
<td>6-1</td>
</tr>
<tr>
<td>Why Antifouling Paints are Used</td>
<td>6-1</td>
</tr>
<tr>
<td>Marine Fouling Organisms</td>
<td>6-1</td>
</tr>
<tr>
<td>Definitions</td>
<td>6-2</td>
</tr>
<tr>
<td>Biocide</td>
<td>6-2</td>
</tr>
<tr>
<td>Herbicide</td>
<td>6-2</td>
</tr>
<tr>
<td>Mildewcide</td>
<td>6-2</td>
</tr>
<tr>
<td>Fungicide</td>
<td>6-2</td>
</tr>
<tr>
<td>Insecticide</td>
<td>6-2</td>
</tr>
<tr>
<td>Nematicide</td>
<td>6-2</td>
</tr>
<tr>
<td>Invertebrate Animal Poisons and Repellents</td>
<td>6-2</td>
</tr>
<tr>
<td>Antifouling Agents</td>
<td>6-2</td>
</tr>
<tr>
<td>Paint Properties</td>
<td>6-3</td>
</tr>
<tr>
<td>Mechanism</td>
<td>6-3</td>
</tr>
<tr>
<td>Formulations and Categories</td>
<td>6-4</td>
</tr>
<tr>
<td>Free Association Paints</td>
<td>6-4</td>
</tr>
<tr>
<td>Copolymer Paints</td>
<td>6-5</td>
</tr>
<tr>
<td>Ablative Paints</td>
<td>6-5</td>
</tr>
<tr>
<td>Study Questions</td>
<td>6-5</td>
</tr>
<tr>
<td>7. Application Techniques</td>
<td>7-1</td>
</tr>
<tr>
<td>Paint Preparation</td>
<td>7-1</td>
</tr>
<tr>
<td>Literature</td>
<td>7-2</td>
</tr>
<tr>
<td>Preparation for Application</td>
<td>7-2</td>
</tr>
<tr>
<td>Protective Equipment</td>
<td>7-4</td>
</tr>
<tr>
<td>Application</td>
<td>7-5</td>
</tr>
<tr>
<td>Study Questions</td>
<td>7-6</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>A-1</td>
</tr>
</tbody>
</table>
CERTIFICATION TRAINING FOR SAFE HANDLING AND USE OF ANTIFOULING PAINTS CONTAINING TRIBUTYLTIN (TBT)

INTRODUCTION

Tributyltin (TBT) compounds are registered for use in paint formulations as antifoulants on vessel hulls and other marine structures to inhibit the growth of aquatic organisms such as barnacles and algae. TBT antifouling paints are beneficial when used as coatings for underwater hulls of ships since they offer extended operating cycles over other antifoulants between drydockings and improve fuel efficiency by reducing resistance or drag.

The Environmental Protection Agency (EPA) has classified antifouling paint products containing tributyltin (TBT) as "restricted use pesticides" (except for products which are packaged in 16 ounce or less spray can containers and are labeled for use only on outboard motors, propellers and other non-hull underwater aluminum components). This classification limits the sale of the "restricted use" antifouling paints to certified applicators and application either by certified applicators or persons under the direct supervision of an on-site (at the work site) certified applicator. Users must adhere to prescribed safety and environmental precautions for application and disposal procedures in its handling.

The actual techniques required for applying TBT antifouling paints are similar to those required for other types of antifouling paints, or even conventional paints. However, because of its restricted use classification, a certified supervisor must be on-site and available while any activity involving TBT antifouling paints is in progress. Module I of this manual deals more specifically with supervisory responsibilities for restricted use applicators, and with the liabilities and penalties related to noncompliance.

This manual will outline suggested procedures to follow for the safe use and disposal of TBT antifouling paints. In addition, the applicator must comply with those methods and procedures outlined by the shipyard, the paint manufacturer and any applicable Federal, State and Local laws. This document cannot be more specific due to the diversity in size, location and resources of particular application sites. Each State and EPA Region, in certifying its applicators, must consider all of these variables.

However, following the principles outlined here in addition to good painting practices, should provide adequate protection of human/aquatic life and the environment.
A. Learning Objectives

After completion of the study of the laws and regulations, the trainee should:

- Know which federal law applies to the use of pesticides and TBT antifouling paint.
- Know the difference between a "restricted use" and "general use" pesticide.
- Understand the responsibilities of a certified applicator.
- Know the penalties for violating the law.
- Understand the recordkeeping requirements and be able to complete the form.

B. Discussion:

In order to protect the public health and welfare and to prevent adverse effects on the environment, it is essential that pesticides be regulated. The purpose of the federal and state pesticide acts is to regulate the labeling, sale, storage, transportation, application and the disposal of pesticides. EPA has determined that TBT compounds used in antifouling paints exceed the risk criteria for exposure of nontarget aquatic organisms to concentrations which are acutely or chronically toxic to such organisms. State restrictions on pesticides cannot be more liberal than those of FIFRA. Individual states may, however, impose stricter regulations on a pesticide, and applicators must comply with these requirements.

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) regulates the registration, manufacture, transportation and use of pesticides. The law affects the applicator in many ways. Specifically, it provides that:

- All pesticides must be used only as directed on the label;
- All pesticide uses must be classified as "restricted" or "general." Restricted use pesticides are classified under Section 3(d)(1)(c) of FIFRA;
- Persons who buy restricted-use pesticides must be certified pesticide applicators; persons who use restricted use pesticides must either be certified applicators or under the direct supervision of a certified applicator;
persons who do not obey the law will be subject to fines and jail terms.

RESTRICTED AND GENERAL USE PESTICIDES

All pesticides are classified according to their potential hazards under those circumstances in which they are to be used. The two classifications are general use and restricted use. General use pesticides generally have lower toxicity with less potential hazard to humans and the environment than restricted use chemicals. They can be bought and used by the general public without special permit or restriction. They must, however, always be used according to label directions. Restricted use pesticides may be sold only to certified applicators and must be used only by those applicators or by persons working under their direct supervision. Restricted use pesticides and their uses could cause human injury or environmental damage unless they are applied by persons who have demonstrated their competency by obtaining their certification, in the appropriate category, as a pesticide applicator, from an EPA approved State, Federal, or Tribal Certification Program.

TBT antifouling paint has been classified by EPA as a restricted use pesticide. As a result, only applicators who have been certified by the by the applicable state pesticide regulatory agency or those working under the direct supervision of an on-site certified applicator may apply or perform any task associated with the TBT antifouling paint.

CERTIFIED APPLICATORS

From 40 CFR Part 171.2 the term "certified applicator" means any individual who is certified to use or supervise the use of any restricted use pesticides covered by his/her certification.

Persons who are not certified pesticide applicators may not purchase restricted use pesticides; noncertified persons may not apply restricted use pesticides unless they are under the direct supervision of a certified applicator. Certification requires training or testing for competency in the safe and effective handling and use of these pesticides. Your state or a federal agency will conduct the training and/or tests for certification. Certification is proof that you know the safe and correct way to carry out restricted uses. EPA has set minimum standards of competency for all commercial applicators. Your state has developed a plan for competency certification that meets minimum national standards.
The term "under the direct supervision of" means the act or process whereby the application of a pesticide is made by a competent applicator acting under the instructions and control of a certified applicator who is responsible for the actions of that person and who is available if and when needed, even though such certified applicator is not physically present at the time and place the pesticide is applied. Note: Legislative and regulatory trends in 1990-1991 indicate that noncertified applicators will be required to receive special training in order to apply a restricted use pesticide under the supervision of certified applicators. As a result many States may require State registration or licensing of noncertified applicators. Certified supervisors must be aware of their responsibilities when supervising non certified applicators.

To achieve certification all commercial applicators shall demonstrate practical knowledge of the principles and practices of pest control and safe use of pesticides. Testing shall be based on examples of problems and situations appropriate to the particular category or subcategory of the applicator's certification and the following areas of competency: label and labeling comprehension, safety, environment, pests, pesticides, equipment, application techniques.

PENALTIES

In general, any registrant, commercial applicator, wholesaler, dealer, retailer, or other distributor who violates any provision of the Federal Insecticide, Fungicide or Rodenticide Act (FIFRA) may be assessed either a criminal or a civil penalty by the EPA. A criminal penalty of not more than $25,000 and/or 1 year imprisonment may be assessed for knowingly violating any provision of FIFRA. A civil penalty of not more than $5,000 may be assessed for unknowingly violating any provision of FIFRA. State restrictions on pesticides cannot be more liberal than those of FIFRA. Individual states may impose stricter regulations on a pesticide. Each applicator, both certified and noncertified, must know the consequences of violating federal and state laws.

RECORDKEEPING

Certified commercial applicators or users of tributyltin will be required to maintain, at a minimum, for two years, records of the kinds of products, uses, dates and application sites of restricted use products containing TBT. "Uses" will include the disposal site of TBT containing dust, chips, or other waste. Therefore the location and dates of disposal will be a recordkeeping requirement.
"Application site" is determined to be not only the geographic location of the application site, but also the identification of the vessel receiving the application. Below is a sample form for our recordkeeping requirements.
SAMPLE FORM

1. Name of Certified Supervisor _______________________________________

   Name of Applicator or User (if different):

   Address:

   Telephone No.

2. Application of TBT containing paint:

   Paint manufacturer:
   Trade name of paint:
   EPA Registration Number ___________________________________________
   Application date:

   Application Time: _______________________________________________

   Amount of TBT paint applied: _________________________________

   Application Site:

   Geographic location:   City: ___________________ State: _____________
   Vessel identification:

   Name of Vessel Owner __________________________________________
   Address of Vessel Owner ________________________________________

3. Disposal dust, chips or other waste containing TBT:

   Amount or type of Paint waste disposed: __________________________

   # and size of empty containers: _________________________________

   Disposal date:
   Disposal location:
   How Was the Container Disposed? ________________________________

C. STUDY QUESTIONS
1. Does FIFRA regulate who may buy and use restricted use pesticides such as TBT antifouling paints? YES NO

2. Can a state law be less restrictive than FIFRA? YES NO

3. A pesticide or paint that may only be applied by or under the direct supervision of a certified applicator is classified as a __________________ use pesticide.

4. Pesticides, when applied according to label directions, that will not cause unreasonable adverse effects on the environment are classified as __________________ use pesticides.

5. A noncertified person will never be allowed to apply TBT paints. TRUE or FALSE.

6. A person who is not a certified applicator can only buy __________________ use pesticides.

7. When noncertified applicators are applying TBT paint the certified applicator (supervisor) must be __________________.

8. When a noncertified applicator applies TBT paint, who is responsible for that person's actions? "__________________________"

9. A certified applicator who allows his work crew to use a TBT paint in a manner that violates its label directions may be committing a __________________ violation.

10. A fine of not more than $5,000 may be assessed for a __________________ violation.

D. SELECTED REFERENCES

1. 40 CFR Part 171

2. Federal Register October 4, 1988 39022 to 39041


E. VISUAL AIDS None
F. HANDOUTS

Federal Register Notice
A. LEARNING OBJECTIVES:

After completion of the study of the label and labeling, the trainee should:

- Understand what a label and labeling are.
- Understand the contents of a pesticide label and be able to locate and interpret each part.
- Understand the term "Use Inconsistent With Labeling".
- Understand the importance of reading labels and labeling before each use of the pesticide.

B. Discussion

1. Registration

Because antifouling paints prevent, destroy or repel the growth of aquatic plant and animal life on underwater surfaces, they are considered pesticides and are regulated under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, and in the Code of Federal Regulations (40 CFR Parts 150-180). Every pesticide that is bought, sold or used in the United States must, by law, be registered by the U.S. Environmental Protection Agency (EPA). EPA approves not only the product itself, but also each separate use for which it is intended, and the product label and labeling. Each applicator must understand that it is a violation of federal law to use TBT antifouling paints, or any other pesticide products, in a manner not consistent with the product's label.

a. Labels Versus Labeling

Each pesticide you buy has instructions on how to use the product. The label is the information printed on or attached to the pesticide container. Labeling is all information that you receive from the manufacturer about the product. Labeling includes not only the label on the product container, but also any supplemental information accompanying the product. This may include such things as brochures, leaflets and information available from the paint dealer or manufacturer.

As the required user information becomes longer and more complex, some of the information is removed from the pesticide label itself and relocated onto the supplemental labeling. Applicators must read the label and labeling, and
understand all information, prior to using TBT antifouling paints. Both the information contained on the product label itself and on supplemental labeling is registered by EPA. You must comply with both.

b. Product Identification

1) Brand or Trade Name - Each manufacturer has a brand name for its products. Different manufacturers may use different brand names for the same pesticide active ingredient. Most companies register each brand name as a trademark and will not allow any other company to use that name. The brand or trade name is the one used in ads and by company salespersons. The brand name shows up plainly on the front panel of the label. Beware of choosing a pesticide product by brand name alone. Many companies use the same basic name with only minor variations to designate entirely different pesticide chemicals. For example: ITW Philadelphia Resins' "Classic Yacht" products.

Classic Yacht - Copper Coat Cuprous Oxide containing antifouling paint, ATTACHMENT A

Classic Yacht # 625 Tributyltin containing antifouling paint, ATTACHMENT B

2) Ingredient Statement - Each pesticide label must list what is in the product. The list is written so you can see quickly what the active ingredients are and the amount (in percentage) of each ingredient listed. The ingredient statement must list the official chemical names and/or common names for the active ingredients. Inert (inactive) ingredients usually are not named, but the label must show what percent of the total contents they comprise. If the inert ingredients are organic solvents such as xylene or petroleum distillates, the ingredient statement will so state.

3) Chemical Name - The chemical name is a complex name that identifies the chemical components and structure of the pesticide. This name is almost always listed in the ingredient statement on the label. An example of a chemical name is bis(tributyltin) oxide.

4) Common Name - Because some pesticide active ingredients have complex chemical names, many are given a shorter "common name." Only common names that are officially accepted by EPA may be used in the ingredient statement on the pesticide label. The official common
name may be followed by the chemical name in the list of active ingredients.

5) **Type of Pesticide** - The type of pesticide is usually listed on the front panel of the pesticide labeling. This short statement usually indicates, in general terms, what the product will control, such as **antifouling paint**.

6) **Type of Formulation** - The pesticide product you buy is rarely made up of only active ingredients. Usually, other chemicals are combined with the active ingredient before the product is offered for sale. This mixture of active and inert (inactive) ingredients is called a pesticide formulation.

7) **Net Contents** - The front panel of the pesticide label tells you how much is in the container. This can be expressed as gallons, quarts or pints, or in pounds or ounces.

8) **Name and Address of Manufacturer** - The law requires the maker or distributor of a product to put the name and address of the company on labels and labeling. This is so you will know who to contact should you require additional information.

9) **Registration and Establishment Numbers** - These numbers are needed by the pesticide user in case of accidental poisoning, claims of misuse or liability claims.

10) **Registration Numbers** - An EPA registration number (for example, EPA Reg. No. 3120-280-AA) appears on most pesticide labels. This indicates that the pesticide labeling has been approved by the federal government. In cases of special local needs, pesticide products may be approved by a state. These registrations are designated, for example, as EPA SLN No. CA-770009. In this case, SLN indicates "special local need" and CA means that the product is registered for use in California.

11) **Establishment Numbers** - The establishment number (for example EPA Est. No. 5840-AZ-1) appears on either the pesticide labeling or container. It identifies the facility that produced the product. In case something goes wrong, the facility that made the product can be traced.
c. **Signal Words and Symbols**

Every pesticide label contains a signal word that indicates how acutely toxic the pesticide product is to humans. The signal word is based on the acute (immediate) toxicity of the formulated product; therefore it reflects not only the acute toxicity of the active ingredient, but also the acute toxicity of the solvents and inerts that constitute the product as sold.

The signal word represents the **highest** acute toxicity category out of five separate tests: oral toxicity, dermal toxicity, inhalation toxicity, eye irritation potential and skin irritation potential. If any one of the five tests results in a high acute toxicity rating, then the signal word for the pesticide product is **DANGER** - even if the other four test results indicate a moderate or slight acute toxicity rating.

Knowing the product's acute hazard helps you choose the proper precautionary measures for yourself, your workers, and other persons who may be exposed. The signal word must appear in large letters on the front panel of the pesticide label. It immediately follows the statement "Keep Out Of Reach Of Children."

**DANGER** - This word signals you that the pesticide is highly toxic for one or more of the toxicity test categories. Any product that is highly toxic orally, dermally or through inhalation, or causes severe eye burning or severe skin burning will be labeled "DANGER."

**POISON** and the skull and crossbones symbol - All pesticides that are highly toxic orally, dermally or through inhalation will also carry the word "POISON" (printed in red) and the skull and crossbones symbol. Pesticides that have the signal word "DANGER" due to skin or eye irritation potential only do not have the skull and crossbones symbol or the word "POISON" printed in red.

**WARNING** - This word signals you that the product is moderately toxic. Any product whose highest acute toxicity (orally, dermally, through inhalation, or for eye or skin irritation potential) is rated as moderate will have the signal word "WARNING."

**CAUTION** - This word signals you that the product is slightly toxic. Any product whose highest acute toxicity (orally, dermally, through inhalation, or for eye or skin irritation potential) is rated as slight will have the signal word "CAUTION."
THE SIGNAL WORD ON TBT ANTIFOULING PAINTS IS DANGER.

d. Toxicity Statements

Some pesticides are toxic to humans. Accidental exposure to them without proper protection can sicken or kill humans. Other pesticides are much less toxic; large exposures to these poisons would be necessary to cause illness. Other pesticides can irritate the nose, throat, eyes and skin of some people. You should know how to protect yourself and your workers from unnecessary exposure to the pesticides you are handling.

People may be poisoned without realizing the seriousness of the exposure, especially if the pesticide enters through the skin and lungs. Pesticides can enter the body in three major ways:
- through the mouth (orally)
- through the skin and eyes (dermally)
- through the lungs (by inhalation)

1) Acute Toxicity Statement - The statements that immediately follow the signal word, either on the front or the side of the pesticide label, indicate which route or routes of entry (mouth, eyes, skin, lungs) you must particularly protect.

Many pesticide products are hazardous by more than one route, so study these statements carefully. A "DANGER" signal word followed by "May be fatal if swallowed or inhaled" gives you a far different warning than "DANGER: Corrosive. Causes skin burns and eye irritation.

2) Oral Toxicity Statements - The pesticide label usually indicates how hazardous a pesticide product is if it is swallowed. If the pesticide is highly toxic (DANGER) orally, a typical label statement would be: "FATAL if swallowed" or "Can kill you if swallowed." Some labels also specifically warn "Do not swallow" although this statement is often omitted. If the pesticide is moderately toxic (WARNING) orally, a typical label statement would be: "Harmful or fatal if swallowed" or "May be fatal if swallowed." If the pesticide is slightly toxic (CAUTION) orally, a typical label statement would be: "Harmful if swallowed" or "May be harmful if swallowed."

THE ORAL TOXICITY STATEMENT FOR TBT ANTIFOULING PAINT PRODUCTS IS: "MAY BE FATAL IF SWALLOWED."
3) **Dermal (skin) Toxicity Statements** - The pesticide label usually indicates how hazardous a pesticide product is if it enters the body through the skin. If the pesticide is highly toxic (DANGER) dermally, a typical label statement would be: "Fatal if absorbed through the skin" or "Can kill you by skin contact" combined with the statement "Do not get on skin or clothing." If the pesticide is moderately toxic (WARNING) dermally, a typical label statement would be: "Harmful or fatal if absorbed through the skin" or "May be fatal by skin contact" followed by a statement such as, "Do not get on skin or clothing." If the pesticide is slightly toxic (CAUTION) dermally, a typical label statement would be: "Harmful if absorbed through skin" or "May be harmful by skin contact" combined with the statement "Avoid contact with skin or clothing."

**THE DERMAL TOXICITY STATEMENT ASSOCIATED WITH TBT ANTIFOULING PAINTS IS:** HARMFUL IF ABSORBED THROUGH SKIN. DO NOT GET ON SKIN, CLOTHING OR EYES.

4) **Inhalation Toxicity Statements** - The pesticide label usually indicates how hazardous a pesticide product is if it enters the body through breathing. If the pesticide is highly toxic (DANGER) through inhalation, a typical label statement would be: "Poisonous if inhaled" or "Can kill you if breathed" combined with the statement "Do not breathe dusts, vapors or spray mist." If the pesticide is moderately toxic (WARNING) through inhalation, a typical label statement would be: "Harmful or fatal if inhaled" or "May be fatal if breathed" followed by a statement such as "Do not breathe dusts, vapors or spray mist." If the pesticide is slightly toxic (CAUTION) through inhalation, a typical label statement would be: "Harmful if inhaled" or "May be harmful if breathed" combined with the statement "Avoid breathing dusts, vapors or spray mists."

**TBT ANTIFOULING PAINTS HAVE THE INHALATION TOXICITY STATEMENTS:** "HARMFUL IF INHALED. USE IN A WELL VENTILATED AREA.

5) **Eye Irritation Statements** - The pesticide label usually indicates how irritating a pesticide product is if it gets into the eyes. If the pesticide is highly irritating or corrosive (DANGER) to the eyes, a typical label statement would be: "Corrosive. Causes severe eye burns or blindness" combined with the statement "Do not get
in eyes." If the pesticide is moderately irritating (WARNING) to the eyes, a typical label statement would be: "Causes eye irritation" or "Causes eye burns" followed by a statement such as "Do not get in eyes." If the pesticide is slightly irritating (CAUTION) to the eyes, a typical label statement would be: "May irritate eyes" combined with the statement "Avoid contact with eyes."

THE EYE IRRITATION STATEMENT FOR TBT ANTIFOULING PAINTS IS: CORROSIVE. CAUSES SKIN BURNS AND EYE IRRITATION. DO NOT GET ON SKIN, CLOTHING OR IN EYES.

6) Skin Irritation Statements - The pesticide label usually indicates how irritating a pesticide product is to the skin. If the pesticide is highly irritating or corrosive (DANGER) to the skin, a typical label statement would be: "Corrosive. Causes severe skin burns" combined with the statement "Do not get on skin." If the pesticide is moderately irritating (WARNING) to the skin, a typical label statement would be: "Causes skin irritation" or "Causes skin burns" followed by a statement such as "Do not get on skin." If the pesticide is slightly irritating (CAUTION) to the skin, a typical label statement would be: "May irritate skin" combined with the statement "Avoid contact with skin."

THE SKIN IRRITATION STATEMENT FOR TBT ANTIFOULING PAINTS IS: CORROSIVE. CAUSES SKIN BURNS AND EYE IRRITATION. DO NOT GET ON SKIN, CLOTHING OR IN EYES. MAY BE A DERMAL SENSITIZER.

7) Chronic Toxicity Statements - Some pesticides have been identified as possible hazards to humans through chronic (long-term) toxicity. These statements typically cite evidence in laboratory animals as the source of possible risk from chronic effects. Typical statements include: "This product has been determined to cause birth defects in laboratory animals" and "This product has been determined to cause cancer in laboratory animals."

No chronic toxicity statement appears on TBT antifouling paint products at this time.

e. Precautionary Statements

Pesticide labeling contains statements to help you decide the proper precautions to take to protect
yourself, your helpers, and other persons (or domestic animals) that may be exposed. These statements are included under the heading "Hazards to Humans and Domestic Animals."

Most pesticides are designed to poison pests. Unfortunately, many pesticides are also poisonous to people. Therefore, it is important to do everything possible to keep your exposure to an absolute minimum. You also want to protect your workers and other people from pesticide injuries. Most pesticide accidents result from careless practices or lack of knowledge about safe handling of pesticides. The time you spend to learn about and to use safe procedures is an investment in the health and safety of yourself, your family, and others.

1) Special Hazard Precaution - The signal word is repeated at the beginning of the "Hazards to Humans and Domestic Animals" section, unless that section follows immediately after the signal word section on the label. Sometimes the signal word will be followed by a special or specific precaution. This precaution often indicates the main hazard to the user and instructs how to avoid the hazard and/or what to do if you are exposed.

2) Hazard to Humans and Domestic Animals statements for TBT antifouling paints are: "Corrosive. Causes skin burns and eye irritation. Harmful if absorbed through skin or inhaled. Do not get on skin, clothing or in eyes. May be a dermal sensitizer. Wear a face shield and rubber gloves when handling. Wear protective clothing, such as long-sleeved cotton shirt, long pants and hat. Use in a well ventilated area. When used in confined areas or applied by spraying, wear protective clothing and a pesticide respirator jointly approved by the Mining Enforcement and Safety Administration (formerly the U.S. Bureau of Mines) and by the National Institute for Occupational Safety and Health under the provisions of 30 CFR 11. May be fatal if swallowed. If swallowed, promptly drink a large quantity of egg whites, gelatin solution or water. Avoid alcohol. Do not induce vomiting. Do not breathe vapors or spray mist."

3) Wash Hands Precaution - Often pesticide product labeling will contain the statement: "Always wash your hands before eating, drinking, chewing, using tobacco or using the toilet." This precaution is essential; while TBT antifouling paint pesticide
labels do not contain this precaution, you should always heed it.

4) Ventilation - Pesticides that are hazardous if inhaled sometimes require ventilation during indoor use. TBT antifouling paint labels also list a ventilation precaution for outdoor uses of the product: "Use in a well ventilated area. When used in confined areas or applied by spraying wear protective clothing and a pesticide respirator jointly approved by the Mining Enforcement and Safety Administration (formerly the U.S. Bureau of Mines) and by the National Institute for Occupational Safety and Health under the provisions of 30 CFR 11.

5) Application Precautions - Most pesticide labeling contains a statement prohibiting applicators from spraying or dusting workers or other persons. This prohibition applies to workers in the area that is to be coated and to workers and other persons in neighboring areas who may be subjected to exposure. While TBT antifouling paint labels do not contain such a statement, care should always be taken that workers in neighboring areas are not exposed to any hazards caused by spray applications.

6) After-use Precautions - Pesticide labeling often instructs users to remove personal protective equipment and wash thoroughly after handling the pesticide product. TBT antifouling paint labeling does not contain a specific after-use precaution, however, workers should always wash with soap and water after handling TBT antifouling paints, and any contaminated clothing should be cleaned before reuse.

f. Protective Clothing and Equipment Statements

To prevent pesticides from entering the body, you must wear protective clothing and equipment. Follow all advice that appears on the label about protective clothing or equipment. However, the lack of any statement or the mention of only one piece of equipment does not rule out the need for additional protection. No safety recommendations can cover all situations. Your common sense and knowledge of pesticide toxicity should help you assess the hazard and select the kind of protection you need.

While the pesticide label lists the clothing and equipment to wear while handling the pesticide, the best
way to determine the correct type of protective clothing and equipment is to use the signal word, the toxicity statements, and the precautionary statements along with the basic guidelines listed in the chapter on safety.

Protective clothing for use with TBT antifouling paints includes face shield, rubber gloves, long-sleeved cotton shirt, long pants and a hat. An approved pesticide respirator is required for spray applications or any application in confined areas.

g. Statement of Practical Treatment

Pesticides can poison humans as well as the target pests. Some pesticides are highly toxic to humans; only a few drops in the mouth or on the skin can cause severe injury. Other pesticides are less toxic, but overexposure to them will cause injury. You should know the kinds of injury most likely to be caused by the pesticides you use. The TBT antifouling paint label gives first aid instructions in case of an accident or poisoning.

1. Signs and Symptoms of Poisoning - The most highly toxic pesticides (and some other pesticides) list the signs and symptoms of pesticide poisoning on the product labeling. There are no signs or symptoms of poisoning on TBT antifouling paint labeling.

2) First Aid - First aid statements tell you the first aid treatments recommended in case of poisoning by that product. The first aid statements on TBT antifouling paint labeling are: "In case of skin contact, remove contaminated clothing and immediately wash skin with soap and water. Get medical attention. Wash contaminated clothing before reuse. If inhaled, remove to fresh air. Use artificial respiration if breathing has stopped. Get medical attention. If swallowed, do not induce vomiting. If in eyes, immediately flush with plenty of water. Get medical attention.

3) Antidote - An antidote is a medical treatment that will offset or counteract the effects of the pesticide poison. If an antidote is known, it is usually listed on the pesticide label. There is no antidote listed on TBT antifouling paint labels.

4) Note To Physician - All DANGER labeling and some WARNING and CAUTION labeling contains a note to physicians describing the appropriate medical procedures for poisoning emergencies and identifying an antidote, if one exists.
h. Environmental Hazards

Pesticides may be harmful to the environment. Some products are classified RESTRICTED USE because of environmental hazards alone. Special warning statements are included on labeling concerning hazards to the environment.

1) Special Toxicity Statements - If a particular pesticide is especially hazardous to wildlife, that is stated on the labeling. TBT antifouling paint labeling includes the statement: "This product is toxic to aquatic organisms including fish and shellfish." This statement alerts you to the special hazards that the use of these products may pose. It should help you choose the safest product for the job and remind you to take extra precautions.

2) General Environmental Statements - Some of these statements appear on nearly all pesticide labeling. They are reminders of common sense actions to follow to avoid contaminating the environment. Adequate precautions must always be taken to protect the environment. Environmental statements are included on TBT antifouling labeling in the sections on Environmental Hazards, Directions for Use and Storage and Disposal:

"Do not apply directly to water."
"Do not contaminate water by cleaning of equipment or disposal of wastes."
"Do not allow chips and dust generated during paint removal to enter water."
"During and after paint removal and/or application of new TBT paint, methods must be employed which are designed to prevent release of TBT paints into the aquatic environment."
"Do not contaminate water, food or feed by storage or disposal."

i. Physical or Chemical Hazards

This section of labeling tells you of any special fire, explosion or chemical hazards the product may pose. For example:

"Flammable - Do not use, pour, spill, or store near heat or open flame."
"Do not weld or cut container."

2-11
NOTE: Hazard statements (Hazards to Humans and Domestic Animals, Environmental Hazards, and Physical/Chemical Hazards) are not located in the same place on all pesticide labeling. Some labeling groups them in a box under the headings listed above. Other labeling may list them on the front panel beneath the signal word. Still other labeling lists the hazards in paragraph form under headings such as "Note" or "Important." Search the labeling for statements that will help you apply the pesticide more safely and knowledgeably.

j. Classification Statements

Every use of every pesticide product is classified by the U.S. Environmental Protection Agency as either "General Use" or "Restricted Use." If EPA determines that the pesticide, utilized for the purposes for which it is registered, will not generally cause unreasonable adverse effects on the environment when applied in accordance with its directions for use, warnings and cautions, and for the uses for which it is registered, EPA will classify that pesticide, or that particular use of the pesticide, for "general use." When a pesticide is classified for general use, the words "General Classification" will appear immediately below the heading "Directions For Use."

Based on laboratory and field studies, EPA has determined that adverse acute and chronic effects to non-target aquatic organisms may result from the use of TBT antifouling paints. This determination is based on high levels of TBT in the water column in and adjacent to marinas, dry docks and poorly flushed harbors.

For this reason, EPA has determined that unrestricted use of TBT antifouling paints will result in unreasonable adverse effects on the environment, and these products are classified as "Restricted Use Pesticides." As such, they must carry the following statement in a prominent place at the top of the front panel of the pesticide labeling:

"Restricted Use pesticide Due to Toxicity to Aquatic Organisms Including shellfish: For sale only to certified commercial applicators and for use only by certified commercial applicators or by persons under the direct supervision of an on-site (at the work site) certified commercial applicator."
TBT containing antifouling paints may be applied only by a certified applicator or persons under the direct supervision of an on-site (at the work site) certified applicator and subject to such other restrictions as EPA may provide by regulation.

k. Storage, Disposal, Spill Cleanup, Transportation and Handling Containers

One section of the pesticide label usually states specific directions for the storage and disposal of the pesticide product. Often there are also instructions for appropriate cleanup of spills, safe transportation of the product, and directions for the appropriate handling of the pesticide containers.

One or more statements may appear in a special section of labeling titled "Storage and Disposal."

**Storage statement** - "Do not contaminate water, food or feed by storage or disposal."

**Disposal statement** - "Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance."

**Container disposal statement** - "Dispose of empty container in a sanitary landfill, or by other approved state and local procedures. Dispose of product that cannot be used in accordance with its labeling directions following federal, state or local procedures under the Resource Conservation and Recovery Act (RCRA)."

**Excess pesticide disposal statement** - "Do not contaminate water, food or feed by storage or disposal. TBT antifouling paint that cannot be used according to the product's label directions must be disposed of according to federal, state or local procedures under the Resource Conservation and Recovery Act (RCRA)."

This section of the pesticide labeling may also include statements addressing spill cleanup, transportation of the pesticide product and handling of the pesticide containers.
1. **Directions For Use**

The instructions on how to use the pesticide are an important part of labeling. They provide the applicator with information on where the product may be used and the right way to apply it. The use and application directions will tell you:

- the pests which the manufacturer claims the product will control;
- the surface the product is intended to protect;
- the proper equipment to be used to apply the product.

1. **Inconsistent with labeling** - A statement must appear on all pesticide products to indicate that the pesticide must be used as specified and directed on the product label and accompanying labeling information. The statement is: "It is a violation of Federal law to use this product in a manner inconsistent with its labeling."

"Consistent with its labeling" has been indicated by EPA to mean:

- No less personal protective equipment or other label-specified attire than stated; however, more protective attire is allowable.
- No applications to non-aluminum hulled vessels less than 82 feet (25 meters) in length (on deck) except for the outboard motor or lower drive unit of such vessel.
- Cleaning of equipment and disposal of wastes in a manner which will not contaminate water.
- Prevention of chips and dust generated during paint removal from entering water.

Pesticide product labeling, regardless of the manufacturer or supplier, will follow a general format. A sample generic label is enclosed as **Appendix C**.

m. **Reading Labeling**

Before you **buy** a pesticide, read the labeling to determine:

- whether it is the pesticide you need for the job and
- whether the pesticide can be used safely under the application conditions.
Before you apply the pesticide, read the labeling to determine:
what protective equipment you should use;
what safety measures you should follow;
where the pesticide can be used;
how to apply the pesticide; and
whether there are any restrictions for use of the product (it is unlawful to use this product on non-aluminum hulled vessels less than 82 feet (25 meters) in length (on deck) except for the outboard motor or lower drive unit of such vessels).

Before you store or dispose of the pesticide or pesticide container, read the labeling to determine:
how to decontaminate and dispose of the pesticide container and
where to dispose of excess pesticide.

C. STUDY QUESTIONS

1. A label is the information printed on or attached to a pesticide container. TRUE or FALSE

2. Regardless of the SIGNAL word(s) on a label all pesticide labels must carry the statement "__________________________".

3. All formulations and containers of TBT antifouling products will carry the same signal word. TRUE or FALSE

4. Always remove the label from a pesticide container and place it in the file for safe keeping. TRUE or FALSE

5. The Skull and Crossbones will appear on TBT products packaged in 16 ounce or less spray can containers, labeled for use on outboard motors and propellers. TRUE or FALSE

6. The label should be read before:
   a. buying a TBT product
   b. applying a TBT product
   c. storing or disposing a TBT product container
   d. all of the above

7. Use of a TBT product to protect waterfront piling is considered a violation because its use is inconsistent with its labeling. TRUE or FALSE
USE THE LABEL IN ATTACHMENT C FOR THE FOLLOWING

8. The SIGNAL word on this label indicates that the product is "________________________" toxic.

9. If this product is accidentally swallowed you should induce vomiting to prevent further intestinal damage. TRUE or FALSE

10. The EPA Product Registration No. of the product is "________________________." 

11. This product is a restricted use pesticide because "________________________." 

12. When applying this product it is necessary to follow OSHA requirements. TRUE or FALSE

13. The best method of disposing all paint, TBT paint chips, spent and unused abrasives is to dump them into the water because "dilution is the solution to pollution." TRUE or FALSE

14. While spraying this product the applicator should wear a "________________________" approved respirator.

15. If a respirator is worn while applying this product it is not necessary to wear eye protection. TRUE or FALSE
MODULE #3

SAFETY

A. LEARNING OBJECTIVES

After completion of the study of safety the trainee should:

- Know the difference between acute and chronic effects of overexposure to TBT products.
- Know common types of exposure and accidents that may be expected when using TBT paint products.
- Know precautions, protective clothing and equipment to avoid overexposure to TBT paint products.
- Know the symptoms of overexposure/poisoning.
- Know emergency procedures and practical treatment.

B. Discussion

1. Introduction

Pesticides, by their inherent nature, have properties which make them toxic to animals and the environment. The probability that a given exposure to a pesticide will cause an adverse health effect is called "risk." Risk depends on the length of exposure and the toxicity of the pesticide as represented by the following formula:

\[
\text{RISK} = \text{EXPOSURE} \times \text{TOXICITY}
\]

Risk will increase if exposure or toxicity are increased. The applicator has no control over the toxicity of a product but may reduce the extent of exposure thereby reducing pesticidal risk. In order to minimize the potential for employee or environmental exposure to all paints, including TBT antifouling paint, the following recommendations should be considered:

a) Engineering controls and safe work practices should be utilized in order to keep airborne concentrations of TBT, or other hazardous substances, as far below the Permissible Exposure Limit (PEL) as is technically feasible.

b) When practicable, remove all non-essential personnel, equipment and materials from the spraying area.

c) Use airless spray equipment to minimize overspray and the potential for exposure.

2. Specific information for the safe use of TBT antifouling paints:
Hazards:
The following effects may occur as a result of exposure to TBT antifouling paints. They are grouped according to route of exposure.

Eye Contact: May cause immediate or delayed severe eye irritation. The onset of irritation may not occur until several hours after exposure. Exposure through eyes is caused primarily by the chemical being splashed into the eye.

Skin Contact: May produce irritation or contact dermatitis which may be delayed several hours. Prompt and thorough washing with soap and water will minimize or eliminate any potential dermal effects. TBT may be absorbed through the skin. Dermal exposure is usually caused by chemicals being splashed on the skin.

Inhalation: Inhalation of particles or vapors of TBT may irritate the upper respiratory tract. Overexposure may also produce coughing, headache and nausea. The onset of these symptoms may be delayed until several hours after exposure. This route of exposure is primarily from inappropriate respiratory protection.

Oral Toxicity: Acute oral LD₅₀ (rat) = 170 - 500 mg/kg (approx. 350 mg/kg) - (moderately toxic) liver and kidney pathology was observed at all doses in the acute feeding study. The LD₅₀ refers to that dosage of the substance that is most likely to kill one-half of a group of test animals using a specified test procedure. The dose is expressed as the amount per unit of body weight, the most common expression being milligrams of material per kilogram of body weight. Therefore the lower the LD₅₀ value the higher the toxicity; because a smaller amount is required to kill 50% of the test population.

3. Effects of Overexposure:

Acute effects of overexposure refer to the adverse effects that normally are evident immediately or shortly after the exposure to a hazardous material without implying a degree of severity. Acute effects from exposure to tributyl tins are reversible. Chronic effects of overexposure refer to the adverse effects that develop as a result of repeated prolonged exposure to a hazardous material without implying a degree of severity.

Effects of overexposure to TBT antifouling paints include skin
burns, sore throat, coughing, vomiting, persistent headache followed by dizziness, abdominal pain, and urinary retention. Avoid contact with wet or dry paint, overspray or contaminated sandblasting residue.

In order to avoid accidental ingestion or dermal exposure, the applicator should wash before eating, drinking or using gum or tobacco products. Accidental ingestion can occur if the pesticide is mistaken for food or drink, the pesticide accidentally contaminates food, or the pesticide is splashed into one's mouth. Proper respiratory protection should be worn in or near the spraying area to avoid accidental inhalation.

4. **Precautions:**

Use respiratory protection in accordance with 29 CFR 1910.134 (NIOSH/MSHA approved respirator). For spray painters, full coverage supplied air hood shall be used. Workers should be trained in the proper use of respirators.

Wear protective clothing (disposable coveralls and shoe covers) and plastic or rubber gloves and hoods to avoid skin contact. Shower with soap and water immediately after removing protective equipment contaminated with TBT antifouling paint. Discarded disposable clothing and materials should be disposed of in a sanitary landfill.

Wear goggles and face shield to protect eyes from dust, mist, or spray.

Avoid eating and drinking in work areas.

Monitor workplace and workers regularly by using a qualified professional, such as a certified industrial hygienist, physician, plant nurse, etc.

Do not use TBT antifouling paint in ship's interior.

Do not have open flames or sparks near the spraying or storing of TBT antifouling paint.

Always follow any additional precautionary statements on the product label.

5. **Exposure Limits:**

**Permissible Exposure Limit (PEL):** (OSHA's designation for air
contaminant exposure)

0.1 mg/m³ as tin for 8-hour time weighted average.

6. **In Case of Emergency:**

**Eyes:** In case of contact, immediately flush eyes with flowing water for at least 15 minutes. Get medical attention.

**Skin:** Remove contaminated clothing and flush skin with water. Then wash with soap and water. (Never use solvents to remove TBT antifouling paint from the skin). Get medical attention. Note to physician: Application of a corticosteroid cream has been effective in treating severe skin irritation. If blisters develop, they may require abrasion to promote healing.

**Inhalation:** Move exposed individual to fresh air. If not breathing, give mouth-to-mouth respiration. Get medical attention.

**Ingestion:** If swallowed, promptly drink a large quantity of milk, egg whites, or gelatin solution or, if not available, drink large quantities of water. Avoid alcohol. Do not induce vomiting. Get medical attention.

These safety precautions are relevant to TBT antifouling paint. The paint may also contain other hazardous ingredients. Precautions should be taken based on the entire paint product by following the manufacturer's label and material safety data sheet. In case of an emergency involving an individual exposed to TBT, the product label and material safety data sheet should be made available to medical professionals.

C. **STUDY QUESTIONS**

1. Four common routes of TBT entry into the human body are "__________________, ________________, ________________, and ________________." 

2. A respirator should be worn to prevent TBT entry by "__________________________." 

3. Adverse effects of a pesticide that become visible soon after exposure are called "__________________" effects.

4. Adverse effects of overexposure such as a birth defect or cancer are called "__________________" effects.

5. Skin contact with TBT paint can be prevented by coating the skin
TRUE or FALSE

6. It is not permissible to eat or smoke in the area where TBT paint is being applied. TRUE or FALSE

7. Four symptoms of overexposure to TBT paints are ____________________________, and ____________________________.

8. Emergency treatment for an eye that was splashed with TBT paint is to ____________________________.

9. Skin irritation as a result of exposure to TBT paint may be delayed or reduced by ____________________________.

D. SELECTED REFERENCES


3. Documentation of TLV's, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio

E. VISUAL AIDS: Slides from HMIS program.

F. HANDOUTS: HMIS wallet cards
MODULE #4

STORAGE, HANDLING AND DISPOSAL

A. LEARNING OBJECTIVES

After completing the study of storage, handling and disposal of TBT antifouling paints, the trainee should:

- Know how to store, transport, and handle TBT antifouling paints.
- Understand the general guidelines for proper disposal of wastes associated with TBT antifouling paints, and know how to obtain specific information on State and local laws and regulations affecting disposal.
- Know the general guidelines for disposal of paint chips and dust.
- Know the general guidelines for disposal of unused paint, contaminated equipment, and containers.
- Know the practical measures for handling contaminated washwater.

B. Discussion

1. Storage and Handling of TBT Antifouling Paints

Storage and disposal must be done in accordance with a product's label directions. Additional storage and handling precautions include the following:

a. Follow good warehouse storage practices; store paints in a cool, dry area.

b. Pesticides should be stored in their original containers. If the original container is unavailable, the pesticide should be stored in a fully labeled chemical resistant container.

c. Never store pesticides in food or drink containers.

d. Pesticides should be stored away from food, feed, seed, humans and animals.

e. Do not contaminate water, food or feed by storage or disposal.

f. Pesticides should be stored in fully closed containers.

g. Check state and local regulations on pesticide storage areas, which may require locked storage areas and posted warning signs on all entry points.

h. Transportation, mixing, and handling of restricted use pesticides must be done by or under direct supervision of a certified applicator.
2. Disposal of TBT Antifouling Paint Wastes

General disposal directions are provided on the labels of all TBT antifouling paints. For pesticides, "the label is the law", and it is a violation of Federal law to dispose of any pesticide, including a TBT antifouling paint, in a manner which is inconsistent with its labeling. The following statements must now be included in the "Directions for Use" on the product label, under the heading of "Storage and Disposal":

"Paint chips, spent abrasives, and any other waste materials from removal of old paint must be disposed of in a sanitary landfill (or, if required by Federal, State or local regulations, handled as hazardous waste).

"If possible, use all of the contents by application according to label instructions. Manage excess paint, rinsate, and other application wastes in accordance with Federal, State, and local requirements. Consult your State pesticide or environmental control agency, nearest EPA Regional Office, or the RCRA/Superfund Hotline (1-800-424-9346) for waste disposal guidance.

"Triple rinse container if intended for recycling or reconditioning. Empty paint containers with small amounts of dried residue must be disposed of in a sanitary landfill (or, if required by Federal, State, or local regulations, handled as a hazardous waste)."

Paint wastes as hazardous wastes. The TBT antifouling paints, like other oil-based paints, contain solvents which present a certain risk of ignitability. Waste materials containing highly ignitable solvents, such as leftover TBT antifouling paint, are considered under Federal regulations to be hazardous wastes. Federal, and in some cases, State or local laws dictate proper disposal methods for materials that are considered to be hazardous wastes. In general, hazardous wastes cannot be sent directly to a sanitary landfill. Materials which may be considered hazardous wastes include excess liquid paint, rinsate, used chemical paint removers, and rags and brushes which are wet with liquid paint.

Some States have exemptions for businesses that generate only small amounts of hazardous wastes. To find out about how State and local laws apply to the TBT paint wastes you are generating, and about facilities that accept hazardous wastes, it is recommended that you get specific advice from your State hazardous waste agency. Attachment A at the end of this chapter provides contact points for U. S. States and Territories. Another source of information is the RCRA/Superfund Hotline (1-800-424-9346). When seeking
information from these sources, it is best to have the paint label or Material Safety Data Sheet handy.

**Dry wastes.** Once the solvents in your TBT antifouling paint evaporate, as they do when the paint has dried on a boat bottom, the concern about ignitability is greatly lessened. Under Federal regulations, TBT antifouling paints from which the solvents have dissipated would not be considered hazardous waste, although they may still require special disposal methods under State or local law. That is why it is imperative that you be familiar with how State and local laws apply to the paints you are applying and removing. Wastes from application and paint removal procedures which do not contain hazardous solvents may include old paint scraped from the bottom of boats in preparation for applying fresh paint, spent abrasives mixed with dry paint, and empty paint cans in which the paint residue has dried. Although these wastes may not be considered to be hazardous wastes under any applicable law or regulation, they still contain the TBT toxin in amounts which are potentially harmful to the marine environment. These materials *must* be disposed of in a sanitary landfill, where they will not leach or be returned to the water.

Perhaps the simplest method for handling scraped wastes or spent abrasives is to place a tarpaulin or piece of plastic under the section of the vessel that is being worked on to catch the removed paint. The tarp can then be swept clean or rolled up and discarded. Care should be taken that the sweepings are removed for disposal at a sanitary landfill. Paint removal operations which produce a fine dust containing the TBT paint should be performed indoors, in an area that is protected from the wind, or when there is little wind.

**High pressure water.** If old TBT paint is removed from the vessel hull with power washing or high pressure water, there will be particles of the old antifouling paint in the washwater. Under the law, these particles must not be returned to a river, bay, or any body of water where aquatic organisms could be exposed to the TBT in them. There are a number of techniques for treatment of the washwater to remove the paint particles, but the simplest methods involve filtering the paint-laden water. Materials such as hay, straw, gravel, or polypropylene are installed in discharge troughs, scuppers, or drainage pits to catch the paint chips as the water flows through them on its way back to the source. These principles can be applied to existing systems, although some boatyards have installed special concrete pads and sediment traps in their vessel maintenance areas to facilitate the removal of paint waste from washwater.
Containers. While the label refers to the rinsing of containers for recycling or reconditioning, as a practical matter, very few paint cans are reclaimed for re-use. In fact, since cans must be rinsed with a solvent to remove leftover paint, you may actually be creating more hazardous waste if you rinse your container. If a can contains unusable paint, it may be easier to store and dispose of it along with your other related hazardous wastes. Be sure that you follow appropriate disposal methods for your particular State or locality. An empty paint can should be disposed of in a sanitary landfill, or by other approved State and local procedures. Open burning and dumping are prohibited.

Equipment and vessel maintenance areas. Equipment that is worn and used during the application or removal of TBT antifouling paints must be carefully cleaned according to the equipment manufacturer's instructions, or disposed of in accordance with Federal, State, and local laws. Contaminated wastewaters and solvents from the cleaning process must also be disposed of in accordance with these laws and the Clean Water Act.

Dry dock and equipment surfaces should be swept or vacuumed to gather paint overspray and other paint waste, such as paint chips, dust and spent sand-blasting grit for disposal. These wastes, along with any equipment that cannot be economically cleaned, should be disposed of in accordance with local, State, and Federal requirements under the Resource Conservation and Recovery Act (RCRA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

3. Spillage

Adequate supplies of a suitable absorbent to deal with accidental spillage of paint should be available around the work area. Any absorbent which has been used must be disposed of in accordance with Federal, State, and local laws and regulations.

In order to collect waste materials and control spills should they occur, protective coverings (plastic, canvas, etc.) must be used in the immediate work area where a TBT antifouling paint is going to be used. TBT paint spills can be contained by covering the entire spill area with absorbent materials such as sand, kitty litter or pads. Every effort should be made to ensure that there is adequate containment in the event of a spill. If a spill occurs, apply absorbent material to the spill area. Contain the spilled material in as small an area as possible. Try to keep the spill from spreading. Use a shovel or rake to construct a dam of soil or sod, if necessary. If the spilled material is flowing
into a ditch or depression, the flow should be blocked on all sides to reduce further movement. It is important not to allow the spilled material to enter any body of water. After the spill is contained, collect, identify, and dispose of the contaminated absorbent material and soil in accordance with local, State and Federal requirements.
C. STUDY QUESTIONS

1. TBT antifouling paint should be stored in the "___________________" container.

2. Transportation of TBT antifouling paints must be done by or under the supervision of a certified commercial applicator. TRUE or FALSE

3. To determine if a pesticide storage area must be locked and posted you should check "______________________ and ______________" laws.

4. Mixing and handling of TBT antifouling paints should never be done by noncertified persons. TRUE or FALSE

5. Empty TBT antifouling paint containers must be disposed of in a "___________________" or by other approved State and local procedures.

6. TBT antifouling paints contain solvents which present a risk of "___________________".

7. Excess TBT paint is considered a "___________________" waste.

8. A suitable method of disposing unused TBT paint is by burning. TRUE or FALSE

9. TBT antifouling paint that cannot be used and contaminated equipment that cannot be economically cleaned must be disposed of in accordance with local, State and Federal requirements under the "__________________________________" Act and the "__________________________________" Act.

D. SELECTED REFERENCES

1. Federal Register, October 4, 1988, pp. 39022 to 39041.

2. Uniform Industrial Process Instruction, Naval Sea Systems Command, Department of the Navy


E. VISUAL AIDS: None

F. HANDOUTS: None
ATTACHMENT A

December 1, 1989
STATE HAZARDOUS WASTE AGENCIES

ALABAMA

Department of Environmental Management
Land Division
1751 Federal Drive
Montgomery, AL 36130
Phone: (205) 271-7730

AMERICAN SAMOA

Environmental Quality Commission
Government of American Samoa
Pago Pago, American Samoa 96799
Phone: Overseas Operator (Commercial Call 663-2304)

ARKANSAS

Department of Pollution Control and Ecology
Hazardous Waste Division
Box 9583
Little Rock, AK 72219
Phone: (501) 562-7444

ARIZONA

Environmental Quality Commission
Government of American Samoa
Pago Pago, American Samoa 96799
Phone: Overseas Operator (Commercial Call 663-2304)

ARKANSAS

Department of Pollution Control and Ecology
Hazardous Waste Division
Box 9583
Little Rock, AK 72219
Phone: (501) 562-7444

CALIFORNIA

Department of Health Services
Office of Waste and Water Quality
714 P Street, Room 1253
Sacramento, CA 95814
Phone: (916) 324-1826

CONNECTICUT

Department of Environmental Protection
Hazardous Waste Management
State Office Building
165 Capitol Avenue
Hartford, CT 06106
Phone: (203) 566-8843; 8844

DISTRICT OF COLUMBIA

Department of Environmental Protection
Hazardous Waste Management
Materials Division, Room 114
5010 Overlook Avenue, S. W.
Washington, D. C. 20032
Phone: (202) 767-8414
FLORIDA
Department of Environmental Regulation
Solid and Hazardous Waste Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Phone: (904) 488-0300

GEORGIA
Environmental Protection Division
Hazardous Waste Management
Land Protection Branch
Floyd Towers E., Suite 1154
205 Butler Street, S. E.
Atlanta, GA 30334
Phone: (404) 656-2833

GUAM
Environmental Protection Agency
P. O. Box 2999
Agana, GU 96910
Phone: Overseas Operator
(Commercial Call 646-8863)

HAWAII
Department of Health
Hazardous Waste Program
P. O. Box 3378
Honolulu, HI 96801
Phone: (808) 548-2270

IDAHO
Department of Health and Welfare
Bureau of Hazardous Materials
450 W. State Street
Boise, ID 83720
Phone: (208) 334-5879

ILLINOIS
Environmental Protection Agency
Division of Land Pollution Control
2200 Churchill Road, No. 24
Springfield, IL 62706
Phone: (217) 782-6761

INDIANA
Department of Environmental Management
Office of Solid and Hazardous Waste
105 S. Meridan
Indianapolis, IN 46255
Phone: (317) 232-4535

IOWA
U. S. EPA, Region VII
Hazardous Materials Branch
726 Minnesota Avenue
Kansas City, KS 66101
Phone: (913) 236-2888

KANSAS
Department of Health and Environment
Bureau of Waste Management
Forbes Field, Building 740
Topeka, KS 66620
Phone: (913) 296-1590

KENTUCKY
Natural Resources and Environmental Protection Cabinet
Division of Waste Management
18 Reilly Road
Frankfort, KY 40601
Phone: (502) 564-6716

LOUISIANA
Department of Environmental Quality
Hazardous Waste Division
Box 44307
Baton Rouge, LA 70804

MAINE
Department of Environmental Protection
Bureau of Oil & Hazardous Materials
State House Station No. 17
MARYLAND
Department of Environment
Hazardous and Solid Waste Management Administration
2500 Broening Highway
Baltimore, MD 21224
Phone: (301) 225-5709

MASSACHUSETTS
Environmental Quality Engineering
Division of Solid and Hazardous Waste
One Winter Street, 5th Floor
Boston, MA 02108
Phone: (617) 292-5589; 5851

MICHIGAN
Department of Natural Resources
Hazardous Waste Division
Waste Evaluation Unit
Box 30028
Lansing, MI 48909
Phone: (517) 373-2730

MINNESOTA
Hazardous Waste Division
520 Lafayette Road, North
St. Paul, MN 55155
Phone: (612) 296-7282

MISSISSIPPI
Department of Environmental Quality
Hazardous Waste Management Division
Box 10385
Jackson, MS 39289-0385
Phone: (601) 961-5062

MISSOURI
Department of Natural Resources
Waste Management Program
Box 176
Jefferson City, MO 65102
Phone: (314) 751-3176
(800) 334-6946

MONTANA
Health and Environmental Sciences
Solid and Hazardous Waste Bureau
Cogswell Building, Room B-201
Helena, MT 59620
Phone: (406) 444-2821

NEBRASKA
Department of Environmental Control
Hazardous Waste Section
Box 98922 State House Station
Lincoln, NE 68509-8922
Phone: (402) 471-2186

NEVADA
Division of Environmental Protection
Waste Management Program
Capitol Complex
Carson City, NV 89710
Phone: (702) 885-5872

NEW HAMPSHIRE
Department of Health and Human Services
Division of Public Health Services
Office of Waste Management
Health and Welfare Building
6 Hazen Drive
Concord, NH 03301-6527
Phone: (603) 271-2900
NEW JERSEY
Department of Environmental Protection
Division of Hazardous Waste Management
401 E. State Street, CN-028
Trenton, NJ 08625
Hazardous Waste Advisement Program: Phone: (609) 292-8341

NEW MEXICO
Environmental Improvement Division
Ground Water and Hazardous Waste Section
1190 Saint Francis Drive
Santa Fe, NM 87503
Phone: (505) 827-2929

NEW YORK
Department of Environmental Conservation
Hazardous Waste Operations
50 Wolf Road, Room 209
Albany, NY 12233
Phone: (518) 457-0530
HOTLINE: (800) 631-0666

NORTH CAROLINA
Department of Environment, Health and Natural Resources
Hazardous Waste Section
P. O. Box 27687
Raleigh, NV 27611-7687
Phone: (919) 733-2178

NORTH DAKOTA
Department of Health
Division of Waste Management
1200 Missouri Avenue
Bismarck, ND 58502-5520
Phone: (701) 224-2366

NORTHERN MARIANA ISLANDS
Division of Environmental Quality
Department of Public Health and Environmental Services
Commonwealth of the Northern Mariana Islands
Office of the Governor
Saipan, Mariana Islands 96950
Phone: Overseas Operator 6984

OHIO
Environmental Protection Agency
Solid and Hazardous Waste Management
P. O. Box 1049
1800 Water Mark Drive
Columbus, OH 43266-0149
Phone: (614) 644-2917

OKLAHOMA
Waste Management Service
Department of Health
Box 53551
Oklahoma City, OK 73152
Phone: (405) 271-5338

OREGON
Hazardous and Solid Waste Division
811 S. W. 6th Avenue
Portland, OR 97204
Phone: (503) 229-5913
(800) 452-4011

PENNSYLVANIA
Bureau of Waste Management
Division of Compliance Monitoring
Box 2063
Harrisburg, PA 17120
Phone: (717) 787-6239
**PUERTO RICO**

Environmental Quality Board  
Santurce, Puerto Rico  00910-1488  
Phone:  (809) 725-0439

**SOUTH CAROLINA**

Health and Environmental Control  
Bureau of Solid and Hazardous Waste  
2600 Bull Street  
Columbia, SC  29201  
Phone:  (803) 734-5200

**TENNESSEE**

Division of Solid Waste Management  
Department of Public Health  
701 Broadway  
Nashville, TN  37219-5403  
Phone:  (615) 741-3424

**RHODE ISLAND**

Department of Environmental Management  
Division of Air and Hazardous Materials  
291 Promenade Street  
Providence, RI  02908  
Phone:  (401) 277-2797

**SOUTH DAKOTA**

Department of Water and Natural Resources  
Division of Air Quality  
Foss Building, Room 416  
Pierre, SD  57501  
Phone:  (605) 773-3153

**TEXAS**

Water Commission  
Hazardous and Solid Waste Division  
Attn: Program Support Division  
1700 N. Congress  
Austin, TX  78711  
Phone:  (512) 463-7760

**UTAH**

Department of Health  
Bureau of Solid and Hazardous Waste  
Box 16700  
Salt Lake City, UT  84116-0700  
Phone:  (801) 538-6170

**VERMONT**

Agency of Environmental Conservation  
103 S. Main Street  
Waterbury, VT  05676  
Phone:  (802) 244-8702

**VIRGINIA**

Department of Health  
Solid and Hazardous Waste Management Division  
Monroe Building, 11th Floor  
101 N. 14th Street  
Richmond, VA  23219  
Phone:  (804) 225-2667  
Hotline:  (800) 552-2075

**VIRGIN ISLANDS**

Department of Conservation and Cultural Affairs  
P. O. Box 4399, Charlotte  
St. Thomas, VI  00801  
Phone:  (809) 774-6420
WASHINGTON

Department of Ecology
Solid and Hazardous Waste Program
Mail Stop PV-11
Olympia, WA 98504-8711
Phone: (206) 459-6322
Within State: (800) 633-7585

WEST VIRGINIA

Division of Water Resources
Solid and Hazardous Waste/
Ground Water Branch
1201 Breenbrier Street
Charleston, WV 25311
Phone: (304) 348-5935

WISCONSIN

Bureau of Solid Waste
Department of Natural Resources
P. O. Box 7921
Madison, WI 53707
Phone: (608) 266-1327

WYOMING

Department of Environmental Quality
Solid Waste Management Program
122 W. 25th Street
Cheyenne, WY 82002
Phone: (307) 777-7752
A. **OBJECTIVES:**

After completion of the study of Environment the trainee should:

- Understand why there are restrictions on this product.
- Understand the effect of TBT antifouling paint on non-target organisms.
- Know the concepts of spill management.

B. **DISCUSSION:**

1. **WHY RESTRICTIONS:**

   TBT antifouling paints work by releasing their toxicant at a rate high enough to repel or kill organisms at the coating surface. Laboratory testing and field trials have established that tributyltin (TBT) can be toxic at low levels to fish, bivalves (such as oysters), gastropods (such as marine snails), crustaceans (such as shrimp and crab) and algae. In order to determine the extent of TBT contamination several monitoring efforts were conducted in various countries.

   The areas containing significant levels of TBT were primarily concentrated in harbors, marinas and around dry dock facilities. The environmental significance of TBT contamination is that these areas coincide with many estuaries or ecologically sensitive habitats that support fisheries populations either as nursery and breeding areas or as feeding grounds.

   TBT concentrations in some U.S. waters have been found to exceed levels that cause toxic effects in oysters, clams, fish and other aquatic life.

   In 1988, to protect the aquatic environment by reducing the quantities of TBT entering the waters of the U.S, the President signed the Organotin Antifouling Paint Control Act of 1988 (OAPCA). This legislation is independent of FIFRA and has interim and permanent use restrictions such as prohibiting the use of TBT antifouling paints with high release rates. The term "release rate" means the rate at which the TBT is released from the antifouling paint. The act also prohibits the use of TBT products on vessels less than 82 feet except for vessels with aluminum hulls. Aluminum hulls are excluded because of corrosion which can occur if painted with copper based paints, which, at this time is the only available alternative.

   In October 1988, based on a Special Review of TBT paints conducted over the previous two years, EPA determined that the use of TBT products could result in unreasonable adverse effects on
the environment unless that use complied with the requirements promulgated in the Federal Register of October 4, 1988. These requirements include classification of these paints as restricted use pesticides which require that applicators or their supervisors are properly trained and that proper procedures are followed to reduce the risk from inadvertent aquatic contamination.

2. **EFFECT OF TBT ANTIFOULING PAINT ON NON-TARGET ORGANISMS:**

   The uptake of TBT by aquatic organisms appears to be by penetration of body membranes directly from the water column, as well as through ingestion of TBT contaminated food to produce toxic effects:

   - **Acute toxicity** where the organisms may be killed after exposure for a relatively short period of time (less than one week); or

   - **Chronic toxicity** due to long term exposure affecting such functions as growth, reproduction and normal physiological processes.

   Most aquatic organisms appear to be extremely sensitive to TBT toxicity during the time of development from fertilized eggs through various larval stages.

3. **CONCEPTS OF SPILL MANAGEMENT:**

   Antifouling paint should be applied and disposed of in accordance with shipyard practices that minimize contact with the soil, water, and aquatic life, and avoid contamination which could result in damage to non-target organisms. Climatic factors such as wind and rain, and work site factors such as type of terrain, drainage, and soil, can increase the potential of environmental harm from a spill, leak or run-off. Extreme care should be used by the applicator in all aspects of handling TBT antifouling paint.

   If proper procedures are followed during application and disposal, risks to non-target animal species and the environment are minimized. Some procedures that should be followed include:

   - use floor coverings;
   - be sure that there are adequate containment areas and materials and sufficient absorbent material available at the work site to prevent spills from reaching the water;
   - collect used wiping materials, waste paint, empty cans and other contaminated materials and dispose of them in accordance with Federal, State, and local laws and regulations;
   - do not flush out the dock with water to remove spillages (or
scraped paint);
- ensure that wind conditions do not cause overspray or sanded or scraped material to drift into dockside areas and adjacent waters.

C.  STUDY QUESTIONS:

1. Laboratory tests and field trials have established that TBT products can be toxic to fish, bivalves (clams), gastropods (snails), crustaceans (shrimp and crabs), and algae. TRUE or FALSE

2. TBT antifouling paints can have adverse effects on non-target aquatic organisms. TRUE or FALSE

3. To reduce the quantity of TBT entering U.S. waters, the release rate for all TBT antifouling paints must not exceed 4.0 \( \mu g \) TBT/cm\(^2\)/day, according to the "____________________________" Act.

4. Federal law and regulations prohibit the use of TBT on the hulls of vessels less than "__________" feet except for those with "______________" hulls.

5. In case of a TBT paint spill it will be necessary to contain the spill to prevent it from reaching the "__________________".

6. Spills on docks may be flushed into the water in non-coastal states. TRUE or FALSE

7. TBT restrictions do not apply in the Great Lakes. TRUE or FALSE

8. Wind speeds over 25 mph are of no concern when spraying TBT paints on hulls. TRUE or FALSE

D.  SELECTED REFERENCES:

1. Federal Register, Oct. 4, 1988, pp. 39022 to 39041

2. EPA Tributyltin Technical Support Document 2/3 dated October 1987

3. Organotin Antifouling Paint Control Act of 1988, HR 2210

E.  VISUAL AIDS: None
F. HANDOUTS:

Organotin Antifouling Paint Control Act of 1988, HR 2210 (can be obtained from Congress) - Clerk of House of Representatives
A. OBJECTIVES:

After completion of the study of pests and pesticidal properties the trainee should:

- Know why antifouling paints are used
- Know what groups of marine organisms are controlled by antifouling paints
- Know the fouling control mechanism of antifouling paints, why TBT compounds were used in antifouling paints, categories of TBT antifouling paints and the various factors that can affect antifouling performance

B. DISCUSSION:

1. WHY ANTIFOULING PAINTS ARE USED:

   The growth of plant and animal organisms such as barnacles, seaweeds or tube worms on the hulls of ships and other structures submerged in seawater is referred to as "fouling".

   Fouling on the hull of a ship decreases the speed and increases fuel consumption. Fouling can result in enormous penalties. For example, an aircraft carrier must maintain a speed of 40 knots to launch and land aircraft. The 1985-1986 fuel bill of the "QE II" was 17 million dollars. Fouling also increases the weight of buoys and other navigational equipment, interferes with moving equipment and underwater sound devices, clogs underwater pipes and promotes corrosion of underwater surfaces. Fouling also increases time out of service and cost for hull cleaning and painting.

2. MARINE FOULING ORGANISMS:

   Woods Hole Oceanographic Institution in 1952 listed about 2000 species as being found in the fouling community consisting of marine plants and animals. Marine plants include bacteria and diatoms which form a slime film. A wide variety of algae are found such as seaweeds which live in large colonies. Larger animal foulers primarily consist of barnacles, mussels, bryozoans, hydroids, tunicates and tube worms. Every member of the fouling community goes through its own life cycle all of which contribute to the development of the fouling community. The life cycles of such sea animals and plants depend upon permanent anchorage.

3. DEFINITIONS:
The term "pesticide" means any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest. There are different types of pesticide products formulated for different classes of pests. The following are examples of classes of pesticides.

**Biocide:** Chemical which has a wide range of toxic properties, usually to members of both the plant and animal kingdoms.

**Herbicide:** Pesticide for killing or inhibiting plant growth.

**Mildewcide:** Pesticide that inhibits the growth of mildew.

**Fungicide:** Pesticide intended for preventing or inhibiting the growth of, or destroying any fungi declared to be pests.

**Insecticide:** Pesticide intended for preventing or inhibiting the establishment, reproduction, development or growth of, destroying or repelling insects or allied organisms declared to be pests.

**Nematicide:** Pesticides intended for preventing or inhibiting the multiplication or establishment of, preventing or mitigating the adverse effects of, repelling or destroying any members of the Class Nematoda declared to be pests.

**Invertebrate animal poisons and repellents:** Pesticides intended for preventing the establishment of, destroying, repelling or mitigating invertebrate animals declared to be pests except insecticides or nematicides. This category includes antifouling paints intended for use on boat and ship bottoms, pier and deck pilings and similar submerged structures to prevent attachment or damage and destruction by marine invertebrates.

4. **ANTIFOULING AGENTS:**

In the early 1950's, three agents served as the primary toxic control agents. They were compounds of copper, mercury and arsenic. These compounds were physically incorporated into the paints which controlled fouling by leaching a high level of biocide into the water from the paint film when immersed. Federal and state regulations have eliminated the use of mercury and arsenic as antifouling agents in the U.S.

Organotin compounds were first evaluated as antifouling agents in the 1950s and 1960s. They were very rapidly accepted and used by the paint industry for the following reasons:

(1) They exhibit no galvanic corrosion, which can occur when two
dissimilar metals are in contact with each other and seawater, as in the case of an aluminum hull painted with a copper base paint.

(2) A wide spectrum of biological activity.

(3) A lower order of mammalian toxicity than organic mercury and arsenic compounds.

(4) They require a significantly lower level of biocide compared to copper compounds for effective fouling control.

The most commonly used organotins for antifouling paint formulations are in the tributyltin family, with some triphenyltin formulations also being used. Organotin copolymers were first developed in the 1960's but it was not until the 1970's that their superior antifouling properties were recognized and they were fully marketed.

5. **PAINT PROPERTIES:**

The properties required for satisfactory performance of antifouling paints include fouling resistance, durability, and adhesion. The paint should be easily applied, should dry or harden in a relatively short period and should have good film build (desired film thickness with two to four coats of paint).

Sufficient levels of the active ingredients should be released over an extended period of time to provide fouling control as long as possible without requiring removal and/or repainting.

In addition, the paint, properly applied should not adversely affect health, safety and the environment.

6. **MECHANISM:**

The principal function of an antifouling paint is to interrupt the life cycle of marine organisms by preventing or eliminating the settlement and growth of fouling organisms. Tributyltin (TBT) antifouling paints release TBT ions (an electrically charged group of atoms) which act on the early life stages of the fouling organisms preventing the fouling organisms from anchoring and growing on the protected surface.

Like antifouling paints containing copper compounds, release rates of antifouling paints containing organotin compounds into seawater (which is mildly alkaline) can vary depending on the formulation and the environment.

Differences in berthing locations, operating schedules, length of service, condition of paint film surface, temperature,
pH (measure of acidity or alkalinity), and salinity can affect results.

Low concentrations of TBT ions transported beyond the painted surface have been shown to cause adverse effects on non-target aquatic organisms. EPA has classified TBT paint as a restricted use pesticide as one means of reducing environmental contamination with TBT.

7. FORMULATIONS AND CATEGORIES:

A TBT antifouling paint formulation can have a single TBT active ingredient, can be combined with one or more of the other TBT antifoulants, or can be combined alone with copper compounds (especially cuprous oxide). TBT compounds registered for use as antifoulants are: bis(tributyltin) oxide, tributyltin fluoride, and tributyltin methacrylate. Depending on the specific formulation, these paints will cover from 150 to 400 square feet per gallon.

TBT antifouling paints may be classified into three categories according to the way the TBT component is incorporated into the paint coatings and subsequently released.

Free association paints: In these conventional coatings, the TBT is physically incorporated into the paint matrix (which contains the pigment and water-soluble resins (binder)). The TBT leaches from the paint surface by diffusion when immersed in seawater. The film does not dissolve or slough away so that the level of biocide leached out decreases with time.

Copolymer paints: In this category the TBT component is chemically bonded to a polymer (resin molecules which consist of structural units repeated a number of times). The biocide is released by the action of seawater on the TBT bond. These paints are characterized by the slow dissolution from ship hulls and thus achieve a constant but prolonged release of antifoulant toxicant. The micro layer of the hydrolyzed polymer is polished away as the ship moves through the water similar to what occurs with a cake of soap. Service life depends on the dry film thickness (number of coats applied).

Ablative paints: These paints have characteristics of both the free association and copolymer paints. The TBT is not bound to a polymer, but may be incorporated into the paint matrix. Ablative paints are soft paint films with the resin portion of the paint slightly water soluble so that the surface slowly sloughs or ablates away as the painted vessel moves through the water. This exposes a fresh layer of antifouling paint and prevents the buildup of insoluble materials.

These products are specifically formulated and should
be applied according to the manufacturer's instructions to achieve optimum effectiveness. Because the product's effectiveness is directly proportional to the amount applied, it is important not to underdose or apply in an uneven deposit pattern.

C. STUDY QUESTIONS:

1. Growth of barnacles, seaweed or tube worms on the hulls of ships and other submerged structures is called "___________________."

2. Growth of these hull attaching organisms does not affect that vessel's speed or fuel consumption. TRUE or FALSE

3. Marine organisms attaching themselves to vessel hulls are from the PLANT and ANIMAL kingdoms. TRUE or FALSE

4. The two major toxic metallic compounds currently used in antifouling paints are "__________________" and "___________________."

5. TBT compounds are incorporated into paint coating. Their effectiveness is derived when the TBT is "___________________."

6. TBT antifouling paint interrupts the life cycle of marine organisms by preventing or eliminating the settlement and growth of fouling organisms. TRUE or FALSE

D. SELECTED REFERENCES:


(3) CFR, Title 40, Subchapter E, Section 162.3, "Definitions"


(5) "Marine Fouling and Its Prevention", Woods Hole Oceanographic Institute, Annapolis, MD, 1952

E. VISUAL AIDS:

Fouling on ship hull with conventional copper paint after 30 months.

Ship hull with TBT copolymer antifouling paint after 30 months in same service as above.

Fouling organisms

F. HANDOUT MATERIAL:

Military Specification DOD-P-24647A, Antifouling Paint
MODULE #7

APPLICATION TECHNIQUES

A. Learning Objectives

After completion of the study of application techniques, the trainee should:

- Understand the different methods of application;
- Know how to clean and maintain spray equipment;
- Identify the proper personal protective equipment to wear while applying the antifouling paint;
- Know what to do in the event of a paint spill.

B. Discussion:

Paint is not a finished product until it has been applied to the substrate. Proper application of the paint, therefore, is a critical part of the complete paint system. High performance coating systems are especially sensitive to mis-application and may fail drastically, even more than conventional paint systems, which are less sensitive to application variables.

The application techniques described in this section are primarily intended to minimize the potential hazards associated with the use of TBT antifouling paints. Basically, these procedures are identical to the techniques to be used for other antifoulants and coatings applied in shipyards and drydocks. Wetdocks are not applicable because TBT antifouling paints are not applied to submerged vessels. The primary difference between working with TBT antifouling paints and conventional coatings is that the antifouling paints are restricted use pesticides. Therefore, there are different safety precautions and clean-up procedures required. Knowledge of special application practices and understanding of the effects of improper or unnecessary use of TBT antifouling paints are essential for the protection of the applicators and the environment.

Paint Preparation

Organotin antifouling paints are typically proprietary and are to be used only over the manufacturer's recommended anticorrosion coating system. Proprietary solvents and/or other materials may be recommended or required by the manufacturer. Paint preparation and application must also be in accordance with the manufacturer's specifications.
Mixing is generally required to make the paint homogenous and uniform before use by stirring the vehicle, dispersing the settled supernatant liquid, and removing all skins, lumps and other large particles, if any. The paint, if stored at hot or cold temperatures, should be brought to a moderate temperature for application. Two and three component paints must be carefully mixed just prior to use. Check seals to be sure there is no leakage. Check dated products and replace outdated materials.

Literature

Prior to each use, before opening cans, pails or drums containing TBT antifouling paints, carefully read the entire label, the product data sheet and material safety data sheet supplied by the manufacturer. Ask your supervisor or contact the supplier of the antifouling paint to clarify any statements which you may not understand.

TBT antifouling paints have been formulated to meet EPA's release rate standard of not more than 4 ug (millionths of a gram) per square centimeter of painted surface per day. Products registered by EPA leach the lowest level of TBT compounds into the environment while still providing adequate fouling protection. Along with the release rate restriction and classification of TBT antifouling paints as restricted use pesticides, additional labeling and restrictions on the size of the vessels which may be coated with TBT antifouling paints provide further protection to the environment. Such additional labeling may refer to compliance with applicable OSHA regulations and with directions for work practices for application, removal and disposal of TBT paints to reduce the introduction of TBT paint wastes into the aquatic environment.

Preparation for Application

Surface preparation is the same for TBT antifouling paints and conventional paints. Always follow the directions on the product label. Follow good painting procedures and any policies specific to your location. In addition, these points should be noted:

1. Keep all cans, pails or drums tightly closed when not being used. Place them in an area protected by barriers to prevent damage by vehicles, cranes or other plant movement or place them well away from these activities.
2. The content of leaking cans, pails or drums shall immediately be transferred to suitable containers and the spillage absorbed with sand or sawdust. If pesticides are transferred to new containers, those containers must be relabelled with the original label or a facsimile.

3. Place warning signs or placards in and around the area where the TBT antifouling paint is going to be used to inform other workers of the nature of the hazard and whether personal protective equipment is needed.

4. Use protective coverings, such as plastic, canvas, etc. in the immediate work areas where TBT antifouling paints are going to be used. TBT paint spills can be further contained by covering the entire spill area with absorbent materials such as sand, kitty litter or pads. Every effort should be made to ensure that there is adequate containment in the event of spills.

In the case of a spill, apply absorbent material to the spill area, collect, identify and dispose of contaminated absorbent material in accordance with local, state and federal requirements. Contain the spilled material in as small an area as possible. Do everything possible to keep it from spreading or getting worse. Use a hand tool such as a shovel or rake to construct a dam of soil or sod. If the spilled material is flowing into a ditch or depression, the flow should be blocked on all sides to reduce further movement. The important thing to remember is do not allow the spilled material to enter any body of water.

5. Only protected personnel shall remain in the exposure zone of the TBT antifouling application. The exposure zone is the area in which the Permissible Exposure Limit may be surpassed.

6. Remove all unnecessary equipment from the immediate work area to a place where it cannot be contaminated by overspray. Cover all exposed equipment with material that does not allow the liquid paint to pass through and contaminate the equipment. Such material includes rubber, canvas or plastic coverings.

7. Use screens and canopies to prevent overspray reaching areas which are not to be painted. The screens and canopies are placed in such a position as to restrict any overspray from reaching areas that are not to be painted. This method of containment is standard practice for applying paint in a shipyard.
8. Install emergency eyewashes and showers in drydock at TBT antifouling paint work and mixing areas.

9. Contain the spraying area so that the wind will not cause overspray to drift into dockside areas and adjacent waters.

Protective Equipment:

1. Use disposable coveralls, disposable shoe covers, plastic or rubber gloves. Full coverage supplied air hoods shall be worn by all personnel working within a 25-foot radius of spray painting. Tape the protective clothing at the wrists, ankles, and zippers. All discarded disposable items should be accumulated in a closed container and disposed of in a sanitary landfilling or by other approved State or local procedures after use.

2. Disposable coveralls, disposable shoe covers and hoods shall also be worn by all persons working within a 10-foot radius of paint mixing, handling and cleanup. Tape the protective clothing at the wrists, ankles and zippers. The paint mixing area shall not be located downwind of the spraying area. For non-disposable clothing, the following rules apply:
   - Wear clean clothing daily. If clothing gets wet, change clothes immediately.
   - Do not store or wash contaminated clothing with other laundry.
   - Wash gloves daily, inside and out, and hang them to dry.
   - Test gloves for leaks by filling with water and gently squeezing. Discard damaged gloves.
   - Wash goggles or face shields daily.

3. Personnel who must enter the dry-dock during application, but are beyond the work area distances specified in the above paragraphs, shall wear protective eyewear and respirators as specified on posted signs or as specified by an Industrial Hygienist or Safety Engineer.

4. Spray painters, mixing personnel, open bucket handling personnel, cleaners, and brush or roller painters inside the TBT antifouling paint work area exposure zone shall wear approved supplied air hoods. Only NIOSH/MSHA-approved respirators shall be used. Painter's respirator air lines shall be covered with disposable sleeves.
Application:

1. When practicable, apply TBT antifouling paints by airless (pressurized) spray to minimize overspray. Localized touch-up may be done with brush or roller. See pictures of application equipment at the end of this chapter.

2. Do not perform work of any kind that produces flames or sparks within a minimum of 35 feet of the work area during application.

3. Carefully follow the application instructions mentioned on the label, the product data sheets, and the material safety data sheets of the manufacturer. In particular, use the specified amount and type of thinner during mixing and follow the spray equipment guidelines for type of pump, type and length of hoses, pressure, tip size, and fan width.

4. Choose the distance between spray tip and surface to be painted in such a way that a full wet layer of paint is obtained with no overspray or dry spray. To do the job correctly, it is necessary to apply each coating at the wet film thickness recommended by the paint manufacturer. Measure the film thickness as the job progresses using a wet film thickness gauge as illustrated at the end of this chapter.

5. During spraying, keep the gun perpendicular to the surface and make passes parallel to the surface. Avoid any spraying under angles greater than 45 degrees with the horizontal plane and vertical plane to avoid overspray and spray mist.

6. Release the trigger in time to end the pass before overspray occurs. Do not open the nozzle starting a new pass before the correct angle is reached. The maximum allowable angle will differ with the wind conditions in the drydock.

7. Clean tip, gun, hoses, and pump with the specified cleaning thinner. During the cleaning of the equipment, the same protective equipment must be used as for spraying. Used cleaning thinner has to be treated as TBT containing waste and disposed of properly.

8. After the application is completed, move all contaminated equipment, tools, tarpaulins, coverings, etc. to the designated area for further treatment (i.e., for disposal in a sanitary landfill). Spray equipment should be flushed with solvent which is then treated in accordance with procedures under RCRA.

9. Do not flush-out the dock to remove spillages since these may cause adverse effects to the environment (either land, water, or non-target organisms).
10. For small spillages during TBT antifouling paint application, immediately apply absorbent material to the spill area. For large spills (more than one gallon of paint) stop spillage and contain spilled material if this can be done without risk of injury. Keep others out of the spill area. As a spill protection measure, place a disposable drop cloth or plastic sheeting which is impermeable to the liquid paint under each location where an open container of paint is present. Contaminated rags from clean-up operations must be collected, identified and disposed of in a manner specified in the Disposal chapter of this document.

C. STUDY QUESTIONS

1. TBT antifouling paints develop high performance coatings; therefore they will not be affected by mis-applications. TRUE or FALSE

2. A primary difference between TBT paints and conventional coatings is that the TBT paints are restricted use pesticides. TRUE or FALSE

3. Warning signs should be posted where TBT paint will be used to inform other workers of possible hazards and the need for special protective equipment. TRUE or FALSE

4. Only ___________________________ people shall remain in the exposure zone of a TBT paint application.

5. A TBT paint spill in the work area should be covered with ___________________________ to prevent spreading.

6. All contaminated material collected from a TBT paint spill should be disposed in accordance with state, local and federal requirements. TRUE or FALSE

7. Where practicable, apply TBT paints by ___________________________ (pressurized) spray.

8. The application of TBT paint should not be made within __________________ feet of any type of work that may produce flames or sparks.

9. It is not necessary to wear protective equipment when cleaning spray equipment. TRUE or FALSE

10. Used cleaning solvent must be treated as a ___________________________ waste and disposed of in accordance with the ___________________________ Act.
D. References:

1. Uniform Industrial Process Instruction, Naval Sea Systems Command, Department of the Navy.


E. Visual Aids: None

F. Handouts

Binks, DeVilbis, Graco application handout material.
APPENDIX

SUGGESTED SOURCES OF MATERIALS
FOR POSSIBLE USE WITH THE
NPCA CERTIFICATION TRAINING MANUAL

1. Hazardous Materials Identification System

Order From: Labelmaster
5724 N. Pulaski Rd.
Chicago, IL. 60646
Tel: 1-800-621-5808


Order From: National Paint and Coatings Association
1500 Rhode Island Ave., N.W.
Washington, D.C. 20005
Tel: 202/462-6272

3. Professional Spraying Equipment for Painter Maintenance Corrosion Control

Order From: Binks Manufacturing Company
9201 W. Belmont Ave.
Franklin Park, IL 60131-2887
ATTN: Literature Department

4. The ABC's of Spray Equipment for Refinishing.
A Guide to the Selection and Use of Air Spray Finishing Equipment

Order From: The DeVilbiss Company
300 Phillips Ave.
P.O. Box 913
Toledo, OH 43692
Tel: 419/470-2169
5. TLV's. Threshold Limit Values and Biological Exposure Indices  (latest edition)

Order From: American Conference of Government Industrial Hygienists
6500 Glenway Ave., Bldg D-7
Cincinnati, OH  45211
Tel:  513/661-7881

   Position Document 2/3

Order From: Special Review Branch
Registration Division
Office of Pesticide Programs
U.S. Environmental Protection Agency
401 M. St., S.W.
Washington, D.C.  20460