

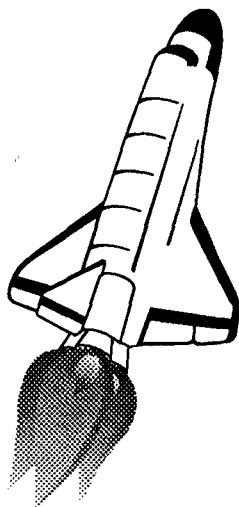
FACT SHEET

FM 695

California Department of Health Services
Toxic Substances Control Program
Alternative Technology Division

August 1989

Waste Reduction for the Aerospace Industry



Background

The aerospace industry utilizes and generates a large number and amount of hazardous materials and wastes in its numerous manufacturing operations. These diverse operations involve the use, transportation, treatment, disposal, regulatory compliance, and environmental liability related to these materials and wastes but can be reduced by a number of source reduction, recycling, resource recovery, and treatment options.

Over 300 waste streams have been identified in the aerospace industry. Typical wastes generated include:

- Halogenated solvents associated with metal parts cleaning, degreasing, painting, and paint cleanup;
- Ferric chloride in printed circuit board etching;
- Photodeveloping solutions;
- Cooling/cutting oils;
- Heavy metal waste treatment sludge;
- Plating/etching/stripping/plating line cleaning solutions; and
- Laboratory packs and scrap metals.

This fact sheet pin-points strategies and areas to reduce or eliminate the use of hazardous materials and the generation, discharge, and disposal of hazardous wastes in the aerospace industry. It is intended to stimulate interest and ideas from individuals in the aerospace industry who are responsible for the hazardous materials and wastes.

WASTE REDUCTION

Waste reduction can reduce the amount of hazardous materials used to make a product as well as the resultant wastes generated. Some methods may require capital investments, although short-term cost savings have been demonstrated in similar industries. These practices can save industry money in the areas of manufacturing, treatment, disposal, liability and place the industry firmly within regulatory compliance.

Both state (Health and Safety Code, Article 11.8, Section 25244.4) and federal (40 CFR, Part 262, Subpart D) regulations require that generators of hazardous waste file a biennial generator's report. Among other things, this report must include a description of the efforts undertaken and achievements accomplished, during the reporting period to reduce the volume and toxicity of waste generated.

California state law also permits the Department of Health Services (DHS) to request that generators of recyclable wastes provide a written statement to justify not recycling the waste (California Code of Regulations (CCR), Title 22, Article 12, Section 66763).

The Uniform Hazardous Waste Manifest requires that large generators certify that they “have a program in place to reduce the volume and toxicity of waste generated... determined to be economically practicable” and that they have selected the “practicable method of treatment, storage, or disposal currently available... which minimizes the present and future threat to human health and the environment.” Small quantity generators must certify that they have made a “good faith effort to minimize... waste generation” and have selected the best affordable waste management method available.

Executive Commitment

Reducing the use and generation of hazardous materials and wastes requires an executive commitment to examine holistically the structure and function of the environmental operations throughout the company. Waste reduction starts with a strong pollution prevention approach advocated at the top. Compliance with all statutory and regulatory requirements should be the minimum standard of performance. The ultimate goal should be to reduce the generation of hazardous wastes as much as practicable.

Division and Program Management Responsibilities

All levels of management and supervision must convey to their staff the importance of implementing a waste reduction program which will ensure proper identification, collection, storage, and disposal of hazardous waste in the short term while providing for the neutralization, reduction, and elimination of hazardous wastes in the long term.

These can be accomplished by the following:

- Identify any environmental effluent or pollutant and its resultant effect.
- Eliminate or limit to the lowest practical level any hazardous environmental effect.
- Implement all necessary safeguards, tests, measurements, operating and maintenance procedures, and

other precautions for the effective control of potential environmental pollutants.

- Conduct reviews of current processes requiring hazardous materials and reduce or eliminate their use where feasible.
- Review current practices for marketing unused or recyclable hazardous materials and the disposal of hazardous waste to assure regulatory compliance.
- Prepare long range plans, and prepare and update appropriate justification for recycling and for treatment equipment.
- Incorporate every phase of the business and involve every department of the division to achieve zero discharge.
- Muster the resources to accomplish goals.
- Strengthen the company’s financial future through waste minimization accomplishments.

Employee’s Responsibilities

Employees should be charged with the responsibility to save the company money whenever possible, thereby saving money and protecting the environment. Each employee should:

- Become knowledgeable about materials and equipment being utilized.
- Ensure that all materials entrusted to them are handled, stored, and disposed in a proper manner.
- Identify and implement waste reduction goals.

The following is a list of possible waste reduction strategies and methods.

Keys to Waste Reduction

- Eliminate all multi-media offsite activity.
- Focus on source reduction, not end-of pipe treatment.
- Move ahead of the “regulatory avalanche” by setting your own standards.
- Distinguish between discretionary practices and mandatory requirements.
- Approve all capital and property acquisition plans.
- Staff with hands-on specialists.
- Analyze waste stream as part of overall waste audit.

Facility Modifications

- Provide direct recovery of copper sulfate from etch/strip processes by cooling and crystallization.
- Substitute drip pans for rinse tanks in circuit board facility.
- Implement metal recovery with state-of-the-art ion exchange approach to reduce sludge production.
- Implement electrochemical extraction of heavy metals from water to reduce sludge generation.

Electronic and Final Assembly

- Utilize in-line solvent recovery on CFC-113 vapor degreasing.
- Extend solvent life by using molecular sieve and GC-MS analysis to avoid unnecessary additions of solvent.
- Implement recycling of glycol coolants and hydraulic oil.
- Change to low VOC conformal coating operations.
- Install centralized halogenated solvent recovery system.
- Implement shelf-life sensitive material reduction program to save material and money and avoid disposal of materials as a hazardous waste.

Detail Part Painting

- Convert to water-based primers.
- Convert to low-volatility paints and solvents.
- Use proportional mixers for multi-component paints.
- Eliminate all water wall spray booths by using fiber or deep bed air filters.
- Use plastic beads for paint stripping.
- Use electrostatic paint application methods.
- Use low-solvent topcoat paints.
- Install solvent recovery system for waste paints and sludges.
- Install oxidative destruction system for volatile emissions.

Machine Shop

- Improve general housekeeping to minimize spills and to segregate non-hazardous and hazardous wastes to save on raw materials, and to reduce disposal and liability costs.
- Replace cutting oils with water soluble coolants.
- Convert to water-based cutting fluids.
- Separate dye penetrants from water.
- Consider ultrafiltration for water/organic mixtures.
- Phase out TCA and flammable solvents and convert to water-based cleaners.

Metal Surface Finishing and Plating

- Install water recirculating/solids separating vapor hone and blast equipment.
- Replace chromium based chemistry in bright dip, passivation, deoxidation, and anodize with non-metal chemistry.
- Replace dip and counter-current rinses with on-demand spray systems when structure of part allows.
- Replace ventilation scrubber systems with on-demand exhaust systems.
- Upgrade aluminum etch and surface treatment acid processes with purification units for life extension benefits.

Printed Circuit Board Fabrication

- Extend chemical process bath replacement period through filtration, analysis, and maintenance.
- Introduce low water demand spray rinses on conveyorized processes.
- Replace common chemical precipitation with electrochemical reduction processes resulting in minimized sludge production.
- Reduce chemical oxidation demand loading of sewer by changing manufacturing process chemistries.
- Replace electrochemical reduction with ion exchange, crystallization, and heavy metal extraction/recovery through electrodeposition techniques.

ADDITIONAL PUBLICATIONS / / / / /

Some additional publications that may be helpful are available from DHS' Alternative Technology Division:

Directory of Recyclers.

The California Waste Exchange Newsletter Catalog.

Aerospace Waste Minimization Report. June, 1987.

Metal Finishing Waste Audit.

Printed Circuit Board Manufacturers Waste Audit.

Automotive Repairs Waste Audit and Checklist.

Solvent Waste Reduction Alternatives Report.

FURTHER INFORMATION / / / / / / / / /

For more information, contact the Technology Clearinghouse Unit of the Alternative Technology Division at:

Department of Health Services
Toxic Substances Control Program
Alternative Technology Division
714/744 P Street
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 324-1807

To obtain an EPA Identification Number, call: DHS, Toxics Program, Program and Administrative Support Division at (916) 323-3418.

For more information about regulatory requirements, contact your local environmental health offices and the DHS regional office nearest you.

Region 1	Sacramento	(916) 739-3145
	Fresno	(209) 445-5938
Region 2	Emeryville	(415) 540-2043
Region 3	Burbank	(818) 567-3000
Region 4	Long Beach	(213) 590-4868

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DEPARTMENT OF HEALTH SERVICES

Toxic Substances Control Program

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