POLLUTION PREVENTION OPPORTUNITY DATA SHEET

BICARBONATE OF SODA STRIPPING (BOSS)

Revision: 4/95
Process/Product: Mechanical Paint Stripping
Process Code: ID-01-01, ID-01-99
Substitute for: Solvent Stripping
Waste Stream: Aircraft Chemical Stripping and Paint Wastes
Applicable EPA Hazardous Waste Codes: D007, D008, D035
Applicable EPCRA Targeted Constituents: Toluene, Xylene, Methyl Ethyl Ketone, Acetone, n-Butyl Alcohol, Lead, Chromium, Zinc Compounds, Phenols, Cloroacetic Acids, Methylene Chloride

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Introduction: Bicarbonate of soda stripping (BOSS) is used as an alternative to traditional chemical paint stripping. Chemical paint stripping is primarily used by applying chemical gels to the painted surfaces or by dipping the component into a tank of unquelled stripper. The paint and solvent mixture are scraped and washed off with water. The process generates large quantities of paint/solvent sludge which may contain chromium, other toxic metals, and toxic organic substances (i.e., phenols, chloroacetic acids, and methylene chloride) from the stripping solvents.

Description: The BOSS process can be used with or without water. The BOSS process is most frequently used with sodium bicarbonate as the blasting media and water primarily as the dust suppressant. In this form, BOSS is a process where compressed air delivers sodium bicarbonate media from a pressure pot to a nozzle, where the media mixes with a stream of water. The soda/water mixture impacts the coated surface and removes old coatings from the substrate. The water used dissipates the heat generated by the abrasive process, reduces the amount of dust in the air, and aids the paint removal by hydraulic action. Sodium bicarbonate (baking soda) is a soft blast media with a heavier specific gravity and less hardness than most plastic abrasives. Workers do not need to prewash or mask the surface. The dust is not an explosive hazard, nor is sodium bicarbonate toxic in this form. However, the airborne particulate generated from the stripping operation can contain toxic elements from the paint being removed.

The effectiveness of bicarbonate of soda blasting depends on optimizing a number of operating parameters, including nozzle pressure, standoff distance, angle of impingement, medium flow rate, water pressure, and traverse speed. In general, sodium bicarbonate blasting systems remove paint slower than most methods currently used.

Use of BOSS in its dry form can create a cloud of dust which will require monitoring and may require containment to meet air standards. The BOSS process should be performed in areas where wastewater and/or exhaust particulates can be contained and/or exhaust ventilation system controls are present to remove hazardous airborne metals.

Because of the noise and dust produced (with or without water), the BOSS system should only be operated in an isolated area outdoors or indoors in an abrasive blast room. Operators must wear double hearing protection equipment; an air-hood blast helmet with an air-supplied respirator and optional half mask for nuisance dust, or a full-faced air purification respirator with HEPA filters; and protective clothing (e.g., rain suits, rubber gloves, and safety-toed rubber boots). (Note: The protective equipment required will be dependent upon the substrate coating.) If the BOSS system is operated outdoors, air monitoring of dust (e.g., for metals) will be necessary to ensure that air standards are met.

The specific application must be reviewed on a case-by-case basis and the following limitations considered: (1) BOSS removes one layer at a time; (2) BOSS does not remove corrosion; (3) BOSS requires subsequent washing of the item; thus, electrical components cannot be exposed to this stripping process; and (4) the substrates to be removed will impact personal protection and waste collection/disposal considerations.

The waste generated from use of BOSS in the wet form is a wet slurry consisting of sodium bicarbonate media, water, paint chips, and miscellaneous residues such as dirt and grease. In its dry form, waste generated by BOSS includes nuisance dust, paint chips, and miscellaneous residues such as dust and grease. Filtered wastewater containing dissolved sodium bicarbonate may be treated at an industrial waste treatment plant. The solid waste may be suitable for a sanitary landfill. Verification of wastewater and solid treatment/disposal is required for each process. Wastewater and bicarbonate residue disposal requirements will depend on the toxicity of the coatings and pigments to be removed. The sodium bicarbonate media cannot be recycled. The paint chip and miscellaneous residue wastes may be considered a hazardous waste.

Currently, BOSS is not approved by NAVAIR as an alternative for depainting aircraft. The NAVAIRs primary concern is that at temperatures of 140 to 160 degrees F, sodium bicarbonate may convert to sodium carbonate, which is corrosive. BOSS is being considered for use in degreasing parts where parts can subsequently be rinsed and

residual sodium bicarbonate/sodium carbonate removed.

The type of equipment used in this stripping process may have significantly different results (e.g., Accustrip System' vs. Aqua Miser*). In general, the information provided in this datasheet focuses on the original/traditional BOSS process (e.g., Accustrip System). Some of the disadvantages of the original process have been eliminated through the use of much lower amounts of sodium bicarbonate with medium pressure water. This application is discussed in greater detail in the Pollution Prevention Opportunity Data Sheet, "High and Medium Pressure Water Processes."

Materials Compatibility: In general, material compatibility is not a concern, but it must be specifically evaluated with respect to the item being cleaned. Uninhibited sodium bicarbonate and water residue can corrode substrates; however, current testing indicates that the corrosion potential of inhibited formulations is similar to that of organic solvent strippers. Results from an Air Force test program (Tasking Directive 1- 90) indicated that there was excessive erosion of aluminum cladding materials when BOSS was used.

Safety and Health: Health concerns are dependent on the variety of paint that is used. Inhalation of lead- and zinc chromate-based paints can lead to irritation of the respiratory system. Some lead compounds are carcinogenic. Solvent-based paints can irritate the lungs and mucous membranes. Prolonged exposure can affect respiration and the central nervous system. Proper personal protective equipment should be used.

Consult your local Industrial Health specialist, your local health and safety personnel, and the appropriate MSDS prior to implementing any of these technologies.

Benefits:

- Significant reduction in amount of hazardous waste generated compared to chemical stripping.
- Selectively removes individual coating-layers.
  Prewashing and masking is not needed in most applications.
  No size limitations for parts being stripped.
  Wastewater stream is compatible with conventional wastewater plants available to many installations.
  Blast media is usually less expensive than PMB, wheat starch, and CO, pellets.

Economic Analysis: Annual operational costs for depainting 228 aircraft wheels with BOSS (ACCUSTRIP) versus chemical paint stripping were evaluated at the

Lyndon B. Johnson Space Center, Houston, Texas, as shown below.

Accustrip System:	$20,000
Compressor, trailer mounted:	$20,000
Materials and installation:	$125,000
Other significant costs (engineering, contingency, startup	$60,000

	ACCUSTRIP	Chemical Paint Stripping
Labor hours	$2180	$16150
Waste disposal	$2,300	$41,200
Raw Materials	$2,650	$1,600
Total	$7,130	$58,950

Annual costs savings for aircraft wheel depainting: $51,820.

The Marine Corps tested sodium bicarbonate media in three types of commercial off-the-shelf equipment. The cost of these systems ranged from $15,000 (Accustrip 16W) to $40,000 (Aqua Miser E25 and Jet Stripper DP-1). The AquaMiser and Jet Stripper use high/medium-pressure water to remove paint with sodium bicarbonate injected to aid removal effectiveness. The Accustrip can be used dry or water can be added at the nozzle when dust control is required. Accustrip uses high pressure air to propel sodium bicarbonate against the surface, and the sharp edges of the media cut paint away from the base metal.

Major Assumptions: N/A

Points of Contact:

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Vendors: The following is a list of sodium bicarbonate paint removal system manufacturers. This is not meant to be a complete list, as there may be other manufacturers of this type of equipment.

Accustrip System
Schmidt Manufacturing, Inc.
P.O. Box 37
Fresno, TX 77545
Phone: (800) 231-2085 or (713) 431-1717, Fax: (713) 431-1717

Aqua Misef
Carolina Equipment and Supply
E. Larry Fulmer
7251 Cross Country Rd.
N. Charleston, SC 29418
Phone: (800) 394-4987 Ext. 20 or (803) 760-3000, Fax: (803) 760-3500

JETSTRIPPER
WhiteMetal, Incorporated
6300 Midvale
Houston, TX 77087
Phone: (800) 728-8861

SOBI System
Friess Equipment
2222 Akron-Peninsula Rd.
Akron, OH 44313
Phone: (800) 899-7624 or (216) 945-9440, Fax: (216) 923-5833

ARMEX Blast Media
Church and Dwight Specialty Cleaning
469 N. Harrison St.
Princeton, NJ 08540
Phone: (800) 221-0453, Fax: (609) 497-7176

Approving Authority:	Approving authority has not made by NAVAIR for application on aircraft and aircraft components without pretreatment of aircraft substrate to eliminate all blast media. NAVAIR, (703) 692-6025.
Note:	This recommendation should be implemented only after engineering approval has been granted by cognizant authority.

Sources: **Vendors**
Points of Contact (M. Seybold and W. Akers)
Joint Paint Removal Study, Final Report Sodium Bicabonate Paint Stripping Joint Depot Maintenance Analysis Group, Technology Assessment Division (Daton, Ohio) Tasting Directive l-90, February 1995. (513) 296-8296