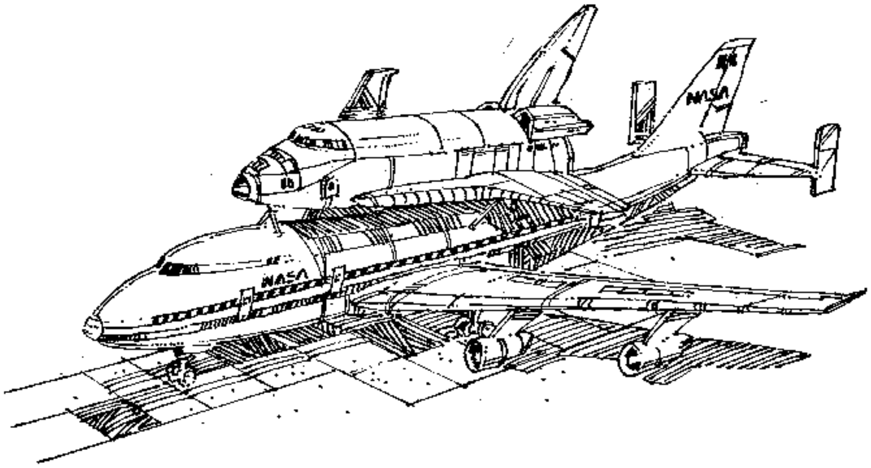
Senate Bill 1731
Risk Reduction Audits and Plans



Guidelines for the Aerospace Industry Facilities

California Environmental Protection Agency
Air Resources Board

Stationary Source Division
Emissions Assessment Branch

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These guidelines have been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the view and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Table of Contents

Appendices

Tables and Figures

Section I
Introduction

In 1987, the Governor signed into law Assembly Bill (AB) 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Hot Spots Program). This law established a statewide program for the inventory of air toxics emissions from individual facilities as well as requirements for risk assessment and public notification of potential health risks (risks). In 1992, the Governor signed into law Senate Bill (SB) 1731. SB 1731 amended AB 2588. Among other things, it adds a risk reduction element to the Hot Spots Program.

The paragraphs below explain the requirements of SB 1731. The purpose of this document is to guide you through the SB 1731 requirements so that you complete a risk reduction audit and plan and reduce your facility's risk to below the significant risk level. You must work with your air pollution control or air quality management district (district) during this process.

What does SB 1731 require?

This law requires:

> facilities which have risks above a significant risk level, or an unreasonable risk level, to develop Risk Reduction Audits and Plans,
>
> *and*
>
> that the Risk Reduction Plans identify the actions a facility will take to reduce its risk to below the significant risk level within five years.

For your convenience, a copy of SB 1731 is included in Appendix F.

What are these guidelines?

These guidelines will assist you in complying with the requirements of SB 1731. The guidelines contain a self conducted audit and checklist and will help you determine possible actions to reduce risk. A completed self-conducted audit and checklist can serve as a risk reduction plan.

What is a significant risk?

Significant risk levels are risk levels above which emissions from a facility can potentially have adverse impacts on the health of the neighboring community. Any facility above the significant risk level is considered a "significant risk facility." Significant risk levels are established by the district. For example, some districts have identified significant risk levels of 10 per million cancer risk and a noncancer total acute or chronic hazard index of 1.0. Please contact your district to determine the significant risk level for your area.

What is an unreasonable risk?

Unreasonable risk levels may be considered to be more severe then significant risk levels. They are risk levels above which emissions from your facility potentially pose an unreasonable risk to the neighboring community. Unreasonable risk levels are also established by the district. For example, some districts have identified unreasonable risk levels of 100 per million cancer risk with significant risk levels of 10 per million cancer risk. Other districts have identified unreasonable risk levels that are identical to the significant risk levels. The requirements for facilities with an unreasonable risk are slightly different from the requirements for facilities with a significant risk. A facility with an unreasonable risk must reduce the risk as soon as possible. Please contact your district to determine the unreasonable risk level for your area.

How is the risk from my facility estimated?

Under AB 2588, the Air Toxics Hot Spot Act, the district determines which facilities will prepare a health risk assessment. The district will approve the risk assessment you conducted for the Hot Spots Program and inform you of the result.

How do I know if I am a significant risk facility?

Your district will notify you if you are a significant risk facility. The district will probably let you know the following:

what your risk is,
and
what chemicals you are emitting cause the risk,
and
what the district significant risk level is.

Appendix E contains an example notification letter. This will give the districts and facilities an idea of what significant risk notification letters may contain.

How much risk reduction is required to get below the significant risk level?

Each facility will need to review the emissions contributing to their health risk assessment. The amount of reduction is dependent upon the individual characteristics of each facility. A very simple calculation is presented in Step 2 to estimate the percent risk reduction required. A reduction in the emissions will result in a decrease in the facility's health risk assessment. For this very simple calculation, the percent risk reduction is assumed to be equivalent to the percent emissions reduction. This is not the case due to varying potencies of various chemicals. Very simple examples of calculations to determine if the risk reduction options will reduce a facility's health risk assessment below the significant risk level are provided in Appendix C.

What am I required to do to comply if I am an unreasonable or significant risk facility?

- Initially, you must conduct a risk reduction audit. The risk reduction audit will help you identify various risk reduction options that are available for your facility. Section II entitled, "Risk Reduction Audit and Plan Instructions, Forms, and Plan Summary" provides additional information on conducting an audit.

- Once you have identified the risk reduction options available for your operation, you need to evaluate them based on:

  √ Risk reduction potential
  √ Technological feasibility
  √ Economic practicability

  Technical feasibility and economic practicability are dependent upon your specific facility. You can work with district staff to help you choose which options are most appropriate for your facility.

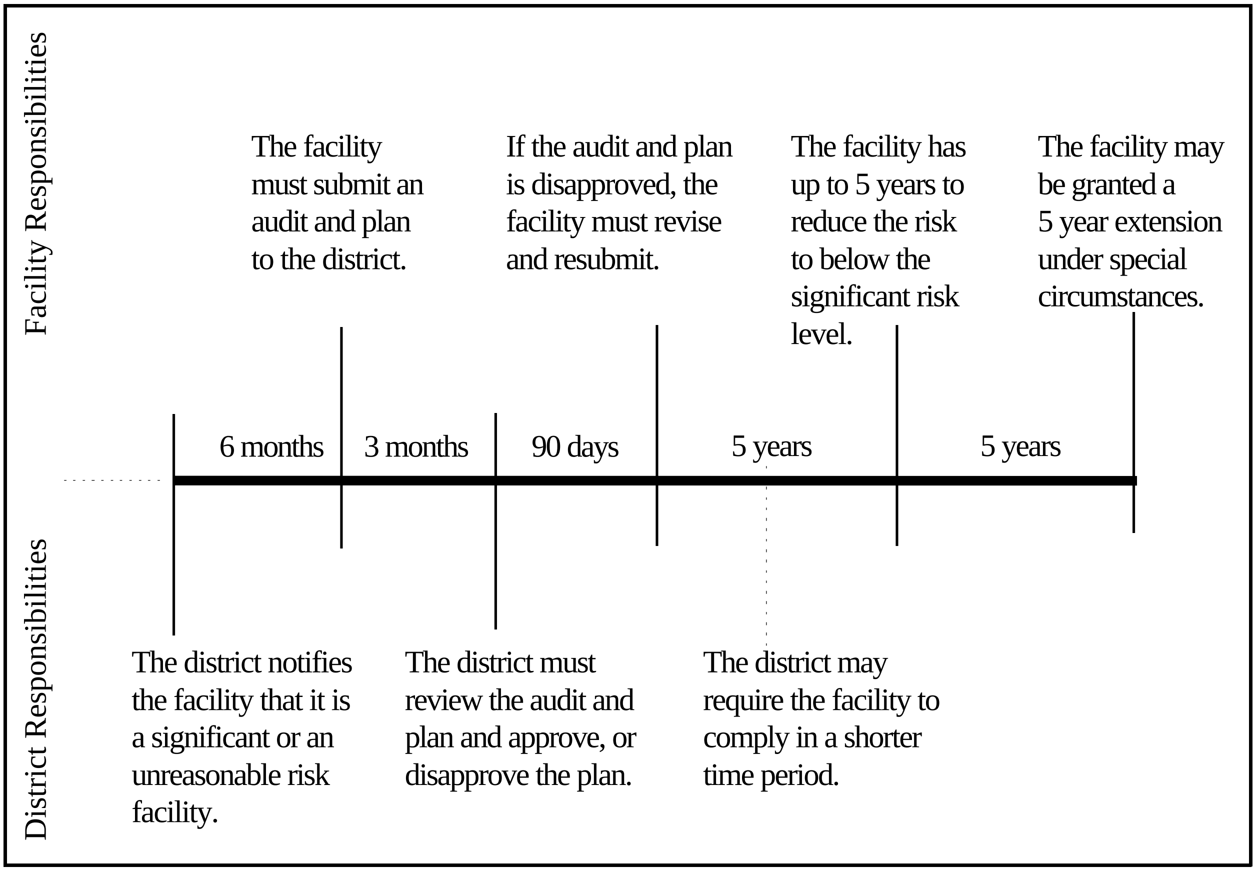
- Once you have evaluated the available options, select those options that will reduce your facility's risk below the significant risk level.

- If the district has indicated they will accept the self-conducted audit and checklist in this Risk Reduction Guideline, complete the forms enclosed in Section II, "Risk Reduction Audit and Plan Instructions, Forms, and Plan Summary" and send them to your district.

When is my risk reduction plan due to the district?

The risk reduction plan must be submitted to the district for approval within six months of receiving notice of being declared an unreasonable or significant risk facility. Figure I-1 illustrates the timeline for compliance with SB 1731. Once the risk reduction plan has been submitted to the district, the district has three months to notify you if the plan was approved or not. If the plan was not approved, you have ninety days to resubmit a revised plan to the district.

Figure I-1: Timeline for Compliance



The facility must submit an audit and plan to the district.

If the audit and plan is disapproved, the facility must revise and resubmit.

The facility has up to 5 years to reduce the risk to below the significant risk level.

The facility may be granted a 5 year extension under special circumstances.

The district notifies the facility that it is a significant or an unreasonable risk facility.

The district must review the audit and plan and approve, or disapprove the plan.

The district may require the facility to comply in a shorter time period.

When must the risk reduction be implemented?

SB 1731 requires that the risk associated with the emissions from your facility be below the district identified significant risk level within five years of the risk reduction plan submittal date. There are provisions for the district to shorten this time frame for technically feasible and economically practicable risk reduction options. Also, the district may shorten the time frame if the risk associated with the emissions from your facility exceeds a district identified unreasonable risk. There are also provisions for the district to lengthen this time frame. The district may lengthen the time frame if the risk associated with the emissions from your facility is below the unreasonable risk identified by the district. The implementation of the risk reduction options must not place an unreasonable economic burden on the facility operator and must be technically feasible. (See Figure I-1.)

What risk reduction options are available?

Table II-3 lists the risk reduction options for the aerospace industry facilities. If your facility has already implemented the described option then that option is **not** available to your facility for further risk reduction.

How were the risk reduction options chosen?

The ARB, districts, and industry representatives formed a workgroup. The goal of the workgroup was to research and identify risk reduction options available to the aerospace industry for controlling toxic air pollutant emissions. The process used to identify chemicals and processes contributing to significant risk at aerospace facilities is described in Appendix A. The risk reduction options that the workgroup identified are listed in Table II-3. If you have identified alternative risk reduction options at your facility, the district will consider these as alternatives. Submit these alternative risk reduction options and supporting documentation with your risk reduction audit and plan for district approval.

How do I choose the appropriate risk reduction options?

Section II of this report contains instructions and forms to assist you in choosing risk reduction options. Table II-3 (pages II-6 through II-23) lists several possible risk reduction options that may reduce your facility risk to below the significant risk level. Evaluate each option for use at your facility. Risk reduction options selected for the purposes of complying with SB 1731 must be techniques or technologies that reduce risk to below the significant risk level.

What if the options I have chosen do not get me below the significant risk level?

If the options you have selected from Table II-3 do not reduce your risk below the significant risk level, there are several things that you can do.

- As mentioned earlier, you can perform a facility specific health risk assessment to obtain a more detailed analysis of your facility risk. This health risk assessment may indicate that your facility risk is different from previously determined.
- You can propose control options that will result in greater emission reductions.
- If you are unable to develop a plan that would reduce your risk to below the significant risk level within five years, contact the district for further guidance.

Section II

Risk Reduction Audit and Plan Instructions, Forms, and Plan Summary

Section II contains forms and instructions to assist you in conducting a risk reduction audit and preparing a risk reduction plan. You are required to prepare a plan if the district notifies you that your facility's health risk assessment is above the district significant risk level. You should contact the district to determine if these forms will meet the district's requirements for a plan. There are five steps in conducting the audit and preparing the plan.

Step 1 - Summarizing the Facility Risk: In this step, identify the district's significant risk levels and your facility health risk assessment results. In most cases, you will need to transfer the information provided by the district into Table II-1. In some cases, the district will complete the information in Table II-1 and send it to you along with the district notification letter.

Step 1A-B - Identifying the Facility Risk Drivers: Table II-2 is provided to help you identify process(es) and emissions that drive the risk at your facility. This step is optional but it may save you time identifying risk reduction options.

Step 2 - Estimating the Risk Reduction Required: This step provides a simple example calculation to help you estimate the risk reduction required for your facility.

Step 3 - Identifying the Risk Reduction Options: In this step, evaluate possible risk reduction options that may reduce your facility risk to below the significant risk level. Table II-3 lists a number of possible risk reduction options. Table II-3 is organized by process. Therefore, evaluate the risk reduction options associated with the process or processes that drive your facility's risk. Review the remaining risk reduction options for additional risk reduction and/or possible cost savings for your facility. You may also want to evaluate risk reduction options not included in Table II-3. (Appendix B has additional information about risk reduction options.)

Note: If you are considering a risk reduction option that involves substitution of one chemical for another, you should contact your district for guidance.

Step 4 - Selecting the Risk Reduction Options: In this step, summarize on Table II-4 the risk reduction options you have selected for your risk reduction plan. You must write in the date you plan to implement each of the selected risk reduction options. Each facility must implement enough risk reduction options to reduce the facility health risk assessment below the significant risk. If you cannot identify sufficient risk reduction measures, you should contact your district for guidance.

Note: You may include risk reduction options implemented subsequent to your facility's health risk assessment on Table II-4: Selection of Risk Reduction Options.

Step 5 - Completing the Risk Reduction Plan: In this step, summarize the information for your facility and the risk reduction options you have selected. If the plan meets the district requirements, you may forward this information to the district for their approval.

STEP 1
SUMMARIZING THE FACILITY RISK

☞ Identify the current facility risk, the district significant risk levels, the district's unreasonable risk levels, and write them in Table II-1. Note that this information should have been included in the notification letter sent to you by the district. If you do not have this information, contact your district.

Table II-1: Summary of Facility Risk

	Facility Risk [c]	**Significant Risk Level [d]**	**Unreasonable Risk Level [d]**
Maximum Individual Cancer Risk per Million [a]			
Chronic Noncancer Hazard Index [b]			
Acute Noncancer Hazard Index [b]			

[a] The maximum individual cancer risk is the estimated probability of an individual contracting cancer as a result of constant exposure to ambient concentrations which result from facility emissions of carcinogenic toxic air contaminants over a 70 -year lifetime at a receptor or at a site where a receptor could reside. The risk is expressed in chances per million.

[b] The hazard index is an indicator of the potential for noncancer health effects. It is derived from the ratio of ambient air concentrations of toxicants to reference exposure levels, summed for all toxicants emitted by the facility which affect the same target organ or system (such as kidney, respiratory system, etc.). Chronic impacts are evaluated over long-term periods, while acute impacts are evaluated for a worst-case one-hour period.

[c] The facility risk is estimated by the methodology defined in the CAPCOA Air Toxics "Hot Spot" Program Risk Assessment Guidelines or other guidelines that may supersede these guidelines.

[d] Significant and unreasonable risk levels are determined by the district.

STEP 1A-B
IDENTIFYING THE FACILITY RISK DRIVERS

This step is optional.

☞ From your health risk assessment, identify the process(es) and emission(s) that are driving your facility risk and write them in Table II-1A and Table II-1B.

Table II-1A: Risk By Process

▨	**Risk of Process** ________ **[name of process]**	**Risk of Process** ________ **[name of process]**	**Risk of Process** ________ **[name of process]**
Maximum Individual Cancer Risk per Million [a]			
Chronic Noncancer Hazard Index [b]			
Acute Noncancer Hazard Index [b]			

Table II-1B: Risk By Chemical

▨	**Risk of Chemical** ________ **[name of chemical]**	**Risk of Chemical** ________ **[name of chemical]**	**Risk of Chemical** ________ **[name of chemical]**
Maximum Individual Cancer Risk per Million [a]			
Chronic Noncancer Hazard Index [b]			
Acute Noncancer Hazard Index [b]			

[a] The maximum individual cancer risk is the estimated probability of an individual contracting cancer as a result of constant exposure to ambient concentrations which result from facility emissions of carcinogenic toxic air contaminants over a 70 -year lifetime at a receptor or at a site where a receptor could reside. The risk is expressed in chances per million.

[b] The hazard index is an indicator of the potential for noncancer health effects. It is derived from the ratio of ambient air concentrations of toxicants to reference exposure levels, summed for all toxicants emitted by the facility which affect the same target organ or system (such as kidney, respiratory system, etc.). Chronic impacts are evaluated over long-term periods, while acute impacts are evaluated for a worst-case one-hour period.

STEP 2
ESTIMATING THE RISK REDUCTION REQUIRED

☞ Calculate the risk reduction required using the following equation.

$$\text{Risk Reduction Required (\%)} = \frac{\text{Facility Risk - Significant Risk}}{\text{Facility Risk}} \times 100$$

☞ Transfer the results to the appropriate box in Table 1.

For example, if the facility cancer risk is 40 per million and the district significant risk is 10 per million, then subtract 10 from 40: (40) - (10) = 30

Then divide by 40: (40-10)/40 = 30/40 = 0.75

Finally multiply by 100:
(40-10)/(40) x 100 = 30/40 x 100 = 0.75 x 100 = 75

The result is the percent risk reduction that is required. In this example, 75 percent risk reduction is required.

Note: ***The risk you calculate is an estimate. Please work with your district to get an accurate risk assessment. Your district will also make the final risk reduction calculation. The district will then notify you of your actual risk reduction after carrying out the recommendations you have chosen from the checklist.***

STEP 3
IDENTIFYING THE RISK REDUCTION OPTIONS

☞ Review Table II-3 for processes you have at your facility.

☞ For processes that you have at your facility, review the corresponding risk reduction options.

For example, if your facility operations do not include "Material Receiving, Storage, and Handling," then skip to the following section, "Metal Cleaning." If your facility operations do not include "Metal Cleaning," then skip to "Metal Surface Preparation," et cetera.

☞ Circle "Yes" or "No" to the question in Table II-3, "Was this Risk Reduction Option included in the health risk assessment (HRA)?"

If you circled "Yes" go to the next risk reduction option. The risk reduction option will not reduce your facility's health risk assessment. If the risk reduction option was implemented after you submitted your facility health risk assessment (a risk reduction option was implemented and your emissions have been reduced), you may select "No" and include the risk reduction option in Table II-4. Make sure to include the date it was implemented and supporting information demonstrating that your emissions were reduced.

If you circled "No" to the question in Table II-3, "Was this Risk Reduction Option included in the HRA?" then evaluate the risk reduction option for use at your facility. Check (√) the risk reduction options in column two that you plan to implement.

Table II-3: Risk Reduction Options

Process	**Risk Reduction Option**	**Was this Risk Reduction Option included in the HRA? Circle Yes or No.**	
I. Material Receiving, Storage, and Handling			
Do you use temporary protective coatings that require organic solvents or aqueous cleaning to remove them?	☐ Use a material that does not contain the organic solvents identified in your risk assessment to reduce organic solvent emissions 100%.	**Yes**	**No**
	☐ Work with vendors to use temporary protective coatings that reduce the need for strong cleaners. Emission reduction is dependent upon the reduction of the cleaning agent.	**Yes**	**No**
	☐ Substituting organic solvents with an alternative cleaning substances may reduce your risk from cleaning organic solvents up to 100%. Refer to the SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvent Degreasing Operations.		
	☐ Other ______________________________	**Yes**	**No**
II. Metal Cleaning			
Do you use organic solvents (especially methylene chloride, methyl chloroform, and perchloroethylene that may drive your facility's risk) to clean your parts and equipment?	☐ Use "no-clean" technology or prevent the part from contamination to reduce emissions 100%.	**Yes**	**No**
	☐ Minimize the need and amount of cleaning needed by cleaning "just in time" to use the part. Emission reduction is dependent upon reducing the use of the cleaning agent.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use organic solvents to clean your parts and equipment? (Cont.)	☐ Use water-only cleaning to reduce organic solvent emissions 100%.	**Yes**	**No**
	☐ Use emulsification cleaning to eliminate organic solvent cleaning.	**Yes**	**No**
	☐ Use acid cleaning to eliminate organic solvent cleaning.	**Yes**	**No**
	☐ Use alkaline cleaning to replace organic solvent cleaning.	**Yes**	**No**
	☐ Use a managed organic solvent distribution system to reduce emissions. Emission reductions will vary at each facility.	**Yes**	**No**
	☐ Use a zero-emission organic solvent cleaning machine to reduce organic solvent emissions 100%.	**Yes**	**No**
	☐ Use a vacuum deoiling system.	**Yes**	**No**
	☐ Use a vacuum degreasing system.	**Yes**	**No**
	☐ Use a closed container to hold rags and wipes that contain organic solvent used for parts cleaning where organic solvent containing rags and wipes are used.	**Yes**	**No**
	☐ Use flip top plastic bottles instead of squirt bottles to reduce drips and evaporation from bottles.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use organic solvents to clean your parts and equipment? (Cont.)	☐ Substituting organic solvents with an alternative cleaning substances may reduce your risk from cleaning organic solvents up to 100%. Refer to the SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvents Degreasing Operations.		
Do you use solvent that contains 1,4-dioxane?	☐ Purchase 1,4-dioxane free solvent to reduce your emissions from solvent cleaning by 100%.	**Yes**	**No**
Do you use abrasive cleaning?	☐ Use abrasive media that do not affect tolerances such as plastic media, glass beads, and agricultural abrasives, e.g., wheat starch to reduce organic solvents by 100%.	**Yes**	**No**
	☐ Use abrasive media such as silica sand, steel grit, aluminum oxide, nut shells, and glass beads on large sturdy parts to displace heavy soils and oxide scales to reduce organic solvents by 100%.	**Yes**	**No**
	☐ Use self-contained sodium bicarbonate-based media in a blast cabinet system to reduce organic solvents by 100%.	**Yes**	**No**
	☐ Other ______________________________	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
III. Metal Surface Preparation			
Do you use etchants that contain chrome?	☐ Use non-chromium containing etchant such as ferric chloride, ammonium persulfate, or hydrogen peroxide/sulfuric acid to reduce chromium emissions by 100%.	**Yes**	**No**
	☐ Use sulfuric acid and hydrogen peroxide cleaners to replace chromic acid pickles, deoxidizers, and bright dips to reduce chromium emissions by 100%.	**Yes**	**No**
Do you use anodizers with chromium?	☐ Use thin film sulfuric anodize in place of chromic acid anodize to reduce chromium emissions by 100%.	**Yes**	**No**
	☐ Use a sulfuric acid solution at elevated temperature by a step-wise current density procedure, and sealing the resulting anodized surface to reduce chromium emissions by 100%.	**Yes**	**No**
	☐ Use an organic acid sealant, such as isopropyl alcohol-stearic acid system or a chelating agent dissolved in isostearic acid to reduce chromium emissions by 100%.	**Yes**	**No**
	☐ Use a non-chrome sealer such as nickel acetate on aluminum alloys to reduce chromium emissions by 100%.	**Yes**	**No**
	☐ Use phosphoric acid anodize to reduce chromium emissions by 100%.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use anodizers with chromium? (Cont.)	☐ Use boric/sulfuric acid anodize to reduce chromium emissions by 100%.	**Yes**	**No**
	☐ Refer to SB 1731 Risk Reduction Audits and Plans: Guidelines for Chrome Electroplating Facilities.		
	☐ Other ______________________________	**Yes**	**No**
IV. Electroplating and Related Processes			
Do you have chrome plating processes at your facility?	☐ Refer to SB 1731 Risk Reduction Audits and Plans: Guidelines for Chrome Electroplating Facilities.		
Do you have nickel plating processes at your facility?	☐ Use lower nickel concentration in plating.	**Yes**	**No**
	☐ Use electroless nickel plating to reduce nickel emissions 100%.	**Yes**	**No**
Do you have cadmium plating processes at your facility?	☐ Substitute cadmium with zinc graphite, titanium dioxide, or aluminum.	**Yes**	**No**
Do you have electroplating tank(s) at your facility?	☐ Use anti-mist additives to reduce the plating bath surface tension or by creating a thick layer of foam on the plating bath surface.	**Yes**	**No**
	☐ Use floating polyballs or plastic chips which float on the plating solution surface.	**Yes**	**No**
	☐ Use composite mesh-pad (CMP) system.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you have electroplating tank(s) at your facility? (Cont.)	☐ Use packed-bed scrubbers (PBS).	**Yes**	**No**
	☐ Use a PBS/CMP System: A combination of a packed-bed scrubber and a composite mesh pad system.	**Yes**	**No**
	☐ Use fiber-bed mist eliminator (demisters).	**Yes**	**No**
	☐ Use a Chrome Dome Emission Elimination Device (EED) [Merlin Hood].	**Yes**	**No**
	☐ Use a high efficiency particulate arresting (HEPA) filter: HEPA filters have a 99.97% reduction efficiency for 0.3 micron aerosol.	**Yes**	**No**
	☐ Other ______________________________	**Yes**	**No**
V. Maskant and Related Processes			
Do you have maskant operations at your facility?	☐ Use a waterborne maskant instead of an organic solvent-based maskant.	**Yes**	**No**
	☐ Use a toluene/xylene-based maskant instead of a perchloroethylene-based maskant. **Note:** Use of toluene/xylene maskants may be subject to volatile organic compound limits and fire code restrictions.	**Yes**	**No**
	☐ Enclose maskant operations and use a carbon absorber to reduce organic emissions 81 to 85%.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you have maskant operations at your facility? (Cont.)	☐ Spray maskants within a paint booth with an emission control system. Refer to subsection VI (below) Coating Application and Related Processes, for emission control options.	**Yes**	**No**
	☐ Organic solvent-based maskant removal may require organic solvents to soften the maskant for manual removal. Refer to the SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvents Degreasing Operations.		
	☐ Other ______________________________	**Yes**	**No**
VI. Coating Application and Related Processes			
Do you use chromate conversion coatings on aluminum surfaces?	☐ Use non-chromate formulations such as phosphoric acid cleaners, wash primers, iron, and zinc phosphates.	**Yes**	**No**
	☐ Use a two-stage red garnet abrasive blasting and cleaning process for armor-grade, 5000 series aluminum alloy.	**Yes**	**No**
	☐ Use a non-chromate conversion coating.	**Yes**	**No**
Do you apply conversion coatings on cadmium, magnesium?	☐ Use non-chrome conversion coating (refer section III. Metal Surface Preparation).	**Yes**	**No**
Do you use primers and/or topcoats that contain chromate?	☐ Use primers that do not contain chromates. Alternatives to chromate pigment include molybdate, nitrites, borates, silicates, phosphates and metal cation.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process		Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use primers and/or topcoats that contain chromate? (Cont.)	☐	Use self-priming topcoats to eliminate the need to apply a primer coat between the substrate and topcoat. This option reduces organic solvents and chromium emissions.	**Yes**	**No**
	☐	Use resin seal anodizing to replace the dichromate seal, priming and topcoat operation for many parts and assemblies. This process reduces chromium emissions 20 to 30% over the conventional process of anodizing, priming, and top coating.	**Yes**	**No**
Do you use primers that contain metal pigments?	☐	Use waterborne polyurethanes, waterborne epoxies, reactive diluents, and corrosion inhibiting mixed-metal pigments to eliminate heavy-metal pigments.	**Yes**	**No**
Do you use primers that contain volatile organic compounds (VOCs)?	☐	Use waterborne polyurethanes, waterborne epoxies, reactive diluents, and corrosion inhibiting mixed-metal pigments to reduce or eliminate VOCs.	**Yes**	**No**
Do you use coatings that contain organic solvents?	☐	Use waterborne coatings to reduce organic solvent emissions.	**Yes**	**No**
	☐	Use nonhazardous air pollutant high-solids coatings to reduce hazardous air pollutant (HAP) emissions.	**Yes**	**No**
	☐	Use low organic solvent high solid coatings to reduce organic solvent emissions.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	**Risk Reduction Option**	**Was this Risk Reduction Option included in the HRA? Circle Yes or No.**	
Do you use coatings that contain organic solvents? (Cont.)	☐ Use catalyzed polymer coatings.	**Yes**	**No**
	☐ Use powder coating, if the base material can tolerate the oven temperature.	**Yes**	**No**
Do you use coatings that contain ethylene-based glycol ethers?	☐ Use waterborne coatings without ethylene-based glycol ethers to reduce ethylene-based glycol ether emissions.	**Yes**	**No**
Do your coating application processes use high volume low pressure (HVLP) or electrostatic spray systems?	☐ HVLP spray guns operated at 10.0 psig or less at the air cap and a fluid delivery pressure of 10 psig or less can reduce emissions from 10 to 40%.	**Yes**	**No**
	☐ HVLP spray gun and high solids coating can reduce emissions from 22 to 30%.	**Yes**	**No**
	☐ HVLP and electrostatic spray systems can reduce emission from 35 to 50%.	**Yes**	**No**
	☐ Electrostatic spray guns can reduce emissions from 30 to 40%.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	**Risk Reduction Option**	**Was this Risk Reduction Option included in the HRA? Circle Yes or No.**	
Does your coating process have a control device that controls organic emissions? (When you upgrade your emissions control to incorporate organic emission control, it is usually cost-effective to upgrade your inorganic emissions control system at the same time.)	☐ Use a carbon adsorber will reduce organic solvent emissions by 81 to 99%.	**Yes**	**No**
	☐ Use a carbon adsorber and less stripper to reduce organic solvent emissions by 95%.	**Yes**	**No**
	☐ Use a thermal incinerator to reduce organic solvent emissions by 98 to 99% or greater.	**Yes**	**No**
	☐ Use a catalytic incinerator to reduce organic solvent emissions by 90 to 99%.	**Yes**	**No**
	☐ Use ultraviolet oxidation (UVOX) or ultraviolet/activated oxygen (UV/AO) to reduce organic solvent emissions by 95%.	**Yes**	**No**
	☐ Use activated carbon fiber adsorbent to reduce organic solvent emissions 90 to 98%.	**Yes**	**No**
	☐ Use a catalyst-coated filter media to reduce organic solvent emissions.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Does your coating process have a control device that controls inorganic/particulate emissions? (When you upgrade your emissions control to incorporate inorganic emissions control, it is usually cost-effective to upgrade your organic emissions control system at the same time.)	☐ Use a paint booth with a three-stage dry particulate filter to reduce chromium and cadmium emissions up to 99.9%.	**Yes**	**No**
	☐ Use a paint booth with a two-stage dry particulate filter to reduce inorganic emission up to 99%.	**Yes**	**No**
	☐ Use a paint booth with a HEPA filter to reduce inorganic emissions up to 99.9%.	**Yes**	**No**
	☐ Use a baghouse using 50 micron cartridge filter to reduce inorganic emissions up to 99%.	**Yes**	**No**
	☐ Use a water wash booth to reduce inorganic emissions from 80 to 99%.	**Yes**	**No**
Did you estimate your chromium emissions?	☐ Use a source test to determine the actual chromium emissions from your application and control equipment.	**Yes**	**No**
	☐ Use a source test and mass balance to demonstrate the fraction of the paint that falls out and is not filtered though the paint booth filtration system. This “fall out” fraction can be as much as 22 to 35% of the overspray.	**Yes**	**No**
Does your coating process have a control device that controls both organic and inorganic/particulate emissions?	☐ Use a paint booth with dry particulate filters followed by a UV/AO (ultraviolet/activated oxygen) photolytic reactor.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	**Risk Reduction Option**	**Was this Risk Reduction Option included in the HRA? Circle Yes or No.**	
Do you apply coatings in uncontrolled areas (such as assembly areas)?	☐ Use portable air pollution control equipment with a HEPA filter to reduce fugitive chromium emissions by 99% and a carbon absorption filter to reduce organic compound emissions by 85%.	**Yes**	**No**
Do you clean spray guns?	☐ Use an enclosed spray gun cleaner to reduce organic solvent emissions.	**Yes**	**No**
	☐ Use non-atomized flushing.	**Yes**	**No**
	☐ Disassemble the spray gun to clean.	**Yes**	**No**
	☐ Use atomized cleaning with a collection system.	**Yes**	**No**
	☐ Other ______________________________	**Yes**	**No**
VII. Coating Removal and Related Processes			
	A. Chemical Paint Removal Options		
Do you use chemical paint removal?	☐ Use alkaline stripper solution containing benzyl alcohol with amine or ammonia compounds.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use chemical paint removal? (Cont.)	☐ Use an acid stripper solution containing benzyl alcohol with formic acid as an accelerator.	**Yes**	**No**
	☐ Use a stripper without methylene chloride.	**Yes**	**No**
	☐ Use a stripper solution with less methylene chloride and with phenol.	**Yes**	**No**
	☐ Use benzoyl alcohol stripper solution to soften paint and follow with medium pressure water blasting.	**Yes**	**No**
	☐ Use a stripper solution containing methylene chloride, methyl alcohol, and ammonium hydroxide.	**Yes**	**No**
	☐ Use a stripper solution containing methylene chloride, phenol, and formic acid.	**Yes**	**No**
	☐ Use a stripper with less methylene chloride on a limited basis with an add-on emission control device.	**Yes**	**No**
	☐ Use nonchemical paint removal. See subsection VII. B. (below).	**Yes**	**No**
	☐ Use emissions control system. See subsection VII. C. (below).	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	**Risk Reduction Option**	**Was this Risk Reduction Option included in the HRA? Circle Yes or No.**	
	B. Nonchemical Paint Removal Options		
(Some of these non-chemical paint removal options may reduce risk further than the non-chemical paint removal option that you currently use.)	☐ Use a higher grade of aluminum which can be polished instead of painted.	**Yes**	**No**
	☐ Use plastic media blasting (PBM) with high-pressure nozzles at 20 to 40 psi.	**Yes**	**No**
	☐ Use wheat starch blasting for aluminum skins with thickness equal to or greater than 0.016 inch.	**Yes**	**No**
	☐ Use high pressure water jet removal system.	**Yes**	**No**
	☐ Use heat or flame cleaning/stripping ovens which are used to remove paint and other organic soils from a surface by burning them off.	**Yes**	**No**
	☐ FLASHJET™ (formerly know as FLASHBLAST™) paint removal system uses an intense flash of light leaving a condensed carbonate residue.	**Yes**	**No**
	☐ Use a sodium bicarbonate (baking soda)-based media formulation for part paint stripping/removal in a specialized blast cabinet.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use chemical paint removal? (Cont.)	The following options are considered emerging technologies: ☐ Use UV/ozone oxidation followed by a scrubber with activated carbon control regeneration system. Treat with dry ice to remove residues. The scrubber/carbon control removal efficiency is about 85 to 95%.	**Yes**	**No**
	☐ High intensity light from a tubular quartz flash lamp filled with xenon gas at low pressure with carbon dioxide pellets (dry ice).	**Yes**	**No**
	☐ Use of carbon dioxide pellets.	**Yes**	**No**
	☐ Use laser paint stripping using light from a pulsed ultraviolet eximer laser to break the chemical bonds that hold the molecules together.	**Yes**	**No**
	C. Emissions Control Systems for Organic Emissions		
Do you use control devices to reduce organic emissions from decal and/or paint removal?	☐ Thermal oxidation with regenerative heat recovery using large, heavy beds of ceramic materials for heat recovery and storage. The removal efficiency ranges from 95 to 99%.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use control devices to reduce organic emissions from decal and/or paint removal? (Cont.) (You may want to upgrade your control device if organic emissions from decal and/or paint removal operations is contributing to your facility health risk assessment.)	☐ Thermal oxidation with recuperative heat recovery using a metallic shell and tube heat exchangers for direct heat recovery. Recuperative units are best suited for smaller process applications with moderate-to-high VOC loadings. The removal efficiency ranges from 95 to 99%.	**Yes**	**No**
	☐ Carbon adsorption with steam regeneration. The removal efficiency ranges from 90-99%.	**Yes**	**No**
	☐ Use a thermal incinerator to reduce organic solvent emissions by 98 to 99% or greater.	**Yes**	**No**
Do you use control devices to reduce inorganic emissions from decal and/or paint removal? (You may want to upgrade your control device if inorganic emissions from decal and/or paint removal operations is contributing to your facility health risk assessment.)	☐ Use a baghouse using 50 micron cartridge filter to reduce emissions 99%.	**Yes**	**No**
	☐ Use an aspirated cartridge dust collection system to reduce emissions 99.9%.	**Yes**	**No**
	☐ Use a baghouse using a fabric bag filter to reduce emissions 99 to 99.5%.	**Yes**	**No**
	☐ Use a dry fabric filter to reduce emissions 99%.	**Yes**	**No**
	☐ Use a particulate filter to reduce emissions 95%.	**Yes**	**No**
	☐ Use a baghouse with a centrifuge to reduce emissions 95%.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	Risk Reduction Option	Was this Risk Reduction Option included in the HRA? Circle Yes or No.	
Do you use control devices to reduce inorganic emissions from decal and/or paint removal? (Cont.)	☐ Use a wheat starch blast media dust collector to reduce emissions 95%.	**Yes**	**No**
	☐ Other ______________________________	**Yes**	**No**
VIII. Fuel Usage			
Do you use diesel fuel?	☐ Use natural gas or propane.	**Yes**	**No**
	☐ Convert to electricity.	**Yes**	**No**
	☐ Use a high efficiency burner. The amount of reduction varies with the type and configuration of the combustion unit. Work with your district to determine your emission reduction.	**Yes**	**No**
Do you use diesel fuel that contains arsenic?	☐ Determine the arsenic content in your diesel fuel. Work with your supplier to reduce, minimize, or eliminate the arsenic contained in your diesel fuel.	**Yes**	**No**

Table II-3: Risk Reduction Options

Process	**Risk Reduction Option**	**Was this Risk Reduction Option included in the HRA? Circle Yes or No.**	
Do you use gasoline?	☐ Use natural gas or propane.	**Yes**	**No**
	☐ Convert to electricity.	**Yes**	**No**
Do you use natural gas?	☐ Convert to electricity.	**Yes**	**No**
	☐ Use a high efficiency burner. The amount of reduction varies with the type and configuration of the combustion unit. Work with your district to determine your emission reduction.	**Yes**	**No**
	☐ Other ______________________________	**Yes**	**No**
IX. General			
Have you conducted a source-specific source test to determine the actual emissions from your facility?	☐ Work with your district. Demonstrate, using a source specific source test that your facility emissions are less than estimated.	**Yes**	**No**
Have you performed a site-specific health risk assessment?	☐ Work with your district. Demonstrate, using a site-specific health risk assessment that your facility emissions are less than estimated.	**Yes**	**No**
	☐ Other ______________________________	**Yes**	**No**

STEP 4
SELECTING THE RISK REDUCTION OPTIONS

☞ Evaluate the risk reduction options in Table II-3 that you answered “No” to the question, “Was this Risk Reduction Option included in the HRA?”

☞ Write in Table II-4, column two, “Risk Reduction Options” the risk reduction options that you have checked (√) in Table II-3, column two, “Risk Reduction Options.” Include the process that the risk reduction will apply to in column one, “Process.”

You may include risk reduction measures that are not included in Table II-3. Make sure to provide data to support the amount of reduction you anticipate from your risk reduction measure and attach it to this plan.

Each facility must implement enough risk reduction options to reduce the facility health risk assessment below the significant level.

☞ Write in the date you plan to implement the risk reduction option in Table II-4, column four, “Date of Implementation.”

☞ Add any explanation, if needed.

Have you selected enough risk reduction options?

If you cannot implement enough risk reduction options to reduce your facility’s health risk assessment below the significant risk level determined by your district within five (5) years from the date the district notified your facility, you may want to consider the following:

- Have you reduced your facility emissions/risk since the health risk assessment?
- Have you performed a facility site specific health risk assessment?
- Can you reduce your risk assessment by providing a better emission estimate, e.g., source testing for actual emissions instead of estimating?
- Have you carefully evaluated your risk assessment for errors?
- Can you relocate your emission source farther from the maximum exposed individual (MEI)?

Making these changes does not actually reduce your emissions, so please contact your district for further guidance prior to taking action. The district staff may be able to provide alternative options and guidance on how to revise your facility’s health risk assessment.

Table II-4: Selection of Risk Reduction Options

Process	Risk Reduction Option	% Risk Reduction	Expected Date of Implementation

STEP 5
COMPLETING THE RISK REDUCTION PLAN

☞ Write in your facility name, facility location, facility mailing address, and standard industrial code.

☞ Attach Table II-1 “Summary of Facility Risk.”
Attach Table II-4 “Selection of Risk Reduction Options.”

☞ If the selected risk reduction options will not reduce your facility risk to below the significant risk level, you must justify your rejection of the risk reduction options associated with processes at your facility. If you have determined that any of the risk reduction options evaluated are not technically feasible or economically practicable, identify the risk reduction option and state the reasons for your determination.

☞ Print or type the name and title of the responsible individual for your facility.

The responsible individual must certify that all of the information presented in this initial report is accurate and true.

AEROSPACE INDUSTRY
RISK REDUCTION AUDIT AND PLAN SUMMARY

Facility Name: ______________________________

Facility Location Address: ______________________________

____

____

Facility Mailing Address: ______________________________

(if different from location) ______________________________

____

Summary of Facility Risk: (Attach Table II-1)

Selection of Risk Reduction Options: (Attach Table II-4)

☞ Complete Table II-5 “Not technically feasible or economically practicable finding” only if selected risk reduction options will not decrease risk to below the significant risk level. If you have determined that any of the risk reduction options listed for processes that exist at your facility are not technically feasible or economically practicable, identify the risk reduction option and state the reasons for your determination.

Table II-5: Not Technically Feasible or Economically Practicable Finding

Process	Risk Reduction Option	Reason/Explanation (attach any support data as needed)

Signature and Authorization of Responsible Individual:

This audit and plan must be reviewed and certified as meeting the requirements of Health and Safety Code (HS&C) section 44390 - 44394 by an engineer who is registered as a professional engineer pursuant to Section 6762 of the Business and Professions Code, by an individual who is responsible for the processes and operations of the site, or by an environmental assessor registered pursuant to Section 25570.3.

Name____Date_______________

__ I certify that this plan meets the requirements of H&SC section 44390 - 44394.

Appendix A
Identification of Aerospace Processes and Toxic Emissions

How were aerospace processes and toxic emissions identified?

Aerospace facilities may consist of a wide variety of different operations and multiple processes. The SB 1731 Risk Reduction Audit and Plans Aerospace workgroup utilized the following evaluation process to determine which processes and toxic emissions most likely contribute significantly to aerospace facility's health risk assessment.

- determined which ***standard industrial classification (SIC) codes*** represent the aerospace industry (refer to Table A-1 SIC Codes for the Aerospace Industry)
- determined which ***chemicals contribute*** to an aerospace facility's health risk assessment
- determined which ***processes contribute*** to a facility's health risk assessment (refer to Table A-2 Processes that Contribute to an Aerospace Facility's Health Risk Assessment)
- reviewed ***emission reduction options*** that can be utilized to reduce an aerospace facility's health risk assessment (refer to Table II-3 List of Risk Reduction Options)

Two sources of toxic emissions information from the AB 2588 Toxic Hot Spots Program were used to evaluate the SIC codes, processes, and toxic emissions for the aerospace industry. The first database, the ARB's Air Toxics Emissions Database (ATED) contains toxic emission inventory information. The ATED information was used to evaluate the processes and related toxic emissions from the aerospace industry. The second database, contains information from facility health risk assessment sent to the Office of Environmental Health Hazard Assessment (OEHHA) from the districts. The OEHHA information was used to determine what toxic emissions contributed to an aerospace facility health risk assessment.

The SB 1731 Risk Reduction Audit and Plans Aerospace workgroup members helped to identify SIC codes, processes, toxic emissions, and risk reduction options. Processes that were no longer in operation or unique one-of-a-kind process were eliminated from this plan.

Which SIC codes represent the aerospace industry?

The aerospace industry is represented by numerous SIC codes. Table A-1 represents the number of facilities for each SIC code that were reported in the ATED and OEHHA databases.

Table A-1
SIC Codes for the Aerospace Industry

SIC CODE	NAME	AB 2588 No. Fac. [a]	OEHHA No. Fac. [b]
3728	Aircraft parts, & equipment, nec	48	24
9711	National security	42	15
3812	Search & navigation equipment	22	6
3721	Aircraft	17	11
3471	Plating and polishing	100	11
3452	Bolts, nuts, rivets & washers	14	5
3764	Space propulsion units & parts	7	5
3999	Manufacturing industries, nec	23	2
3083	Laminated plastic plate & sheet	11	0
3769	Space vehicle equipment, nec	3	3
3479	Metal coating & allied services	131	7
3679	Electronic components, nec	135	3
3069	Fabricated rubber products, nec	18	3
3724	Aircraft engines & engine parts	13	4
3511	Turbines & turbine engines, nec	4	2
3761	Guided missiles & space vehicles	19	2
4581	Airports, flying fields, & services	11	1
3489	Ordnance & accessories, nec	4	1
3469	Metal Stampings	13	1
3674	Semiconductors & related devices	145	0
3496	Misc. fabricated wire products	7	0
3082	Unsupported plastic film sheet	1	0
8731	Commercial physical research	18	0
3671	Electron tubes	10	1
3760	Guided missiles, space vehicles, parts	0	0
3499	Fabricated metal products, nec	31	0
3571	Electronics computers	4	0
TOTAL Number of Aerospace Facilities		851	107
TOTAL Number of Facilities in the Database		7834	672
% Aerospace Facilities		11%	15%

[a] 1995 AB 2588 Air Toxics Emissions Database.

[b] 1995-96 Office of Environmental Health Hazard Assessment (OEHHA) Database. The purpose of this database is to allow us to examine trends in California. Data from OEHHA's risk assessment database do not necessarily represent final district approval, and are subject to change. Data as of April 1995.

Which chemicals can contribute to an aerospace facility’s health risk assessment?

The following chemicals have been identified as toxic air contaminants that are major contributors to an aerospace facility’s health risk assessment.

chromium
nickel and nickel compounds
cadmium
arsenic
1,4-dioxane
perchloroethylene
formaldehyde
methylene chloride
ethylene-based glycol ethers
methyl chloroform (1,1,1-trichloroethane)
benzene

Which process(es) emit the chemicals that can contribute to an aerospace facility's health risk assessment?

Table A-2
Chemicals and Processes
That Can Contribute to an Aerospace Facility's Health Risk Assessment

Chemical [a]	Risk Driver [b, c]	Process Emitting Chemical
chromium	c, ch	electroplating and related processes metal cleaning/finishing coating application and related processes
nickel & nickel compounds	c, a	coating application and related processes electroplating and related processes [d]
cadmium	c	coating application and related processes electroplating and related processes [d]
perchloroethylene (PCE)	c, ch	metal cleaning [e] maskants and related processes
formaldehyde	c, ch, a	natural gas
methylene chloride	c, a	metal cleaning [e]
ethylene-based glycol ethers	a	coating application and related processes
methyl chloroform (1,1,1-trichloroethane, TCA)	ch	solvent cleaning
arsenic	c	diesel fuel, jet fuel
benzene	c	natural gas, fuel, gasoline
1,4-dioxane	c, a, ch	stabilizer in chlorinated solvent

[a] Chemical risk drivers from the Office of Environmental Health Hazard Assessment, 1995

[b] c = cancer; ch = chronic; a = acute

[c] risk driver is a compound that contributes the largest part of a facility risk - a risk drivers may or may not result in a significant facility risk

[d] may be a risk driver for a small facility

[e] Refer to SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvents Degreasing Operations

Appendix B
Aerospace Process Descriptions and Risk Reduction Options

Each facility should carefully evaluate these options prior to selecting an option to reduce the facility's risk. In some cases it may be appropriate for the facility to discuss the selected risk reduction options with the district staff prior to final selection. In addition, other environmental effects should be considered prior to final selection. For example, reducing air emissions may occasionally increase hazardous waste or decreasing hazardous waste may increase air emissions. In most cases, substitution of a toxic chemical with a non-toxic or a less-toxic chemical will reduce both air emissions and hazardous waste. Contract specifications may influence your final decision. In some cases, the risk reduction option may require add-on emission control equipment. Contact the district for guidance. Risk reduction options are indicated with a "❑." Risk reduction options with a quantifiable emission reduction are included on the risk reduction audit check list. The following process descriptions and associated risk reduction options are discussed in this appendix.

Material Receiving, Storage, and Handling

Temporary Protective Coating: A temporary protective coating or marking may be used on a part as soon as it is received or prior to storage. Temporary protective coatings, markings, or oil is used to protect or prevent oxidation of material while in storage or in transit. While the applications of temporary protective coatings do not contribute significantly to a facility's risk, the removal of the temporary coating may contribute to a facility's risk. (6)[1]

Risk Reduction Options

- ☐ Use temporary protective coatings that do not require organic solvents and strong aqueous cleaners to remove the coating. Some examples are peel coating or shrink wrapping with polymeric sheeting. (6)(46)

- ☐ Work with vendors to use temporary protective coatings that reduce the need for strong cleaners, e.g., shrink wrapping with polymeric sheeting.

- ☐ Refer to the SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvents Degreasing Operations for alternatives to organic solvent cleaners used to remove temporary protective coatings.

Metal Cleaning

General: Cleaning is an extremely important step to most processes. There are several questions you should ask prior to cleaning. The answer to these questions can help you to determine the types of cleaning you need and if you can reduce or even prevent the need for cleaning through preplanning. Some examples are:

- Why are you cleaning?
- What base metals are pretreated?
- What soils are on the material?
- Can I prevent the soils from getting on my part and eliminate the need for cleaning?
- If I clean my part and store it, will it have to be recleaned?
- If I don't clean my part and store it until I need it, will the soils be more difficult to remove?
- What are the physical size or configuration limitations of my part?
- How many parts do I need to clean?
- Is the soil caused by welding/welding residue?
- Do I need to physically clean with a wire brush and/or abrasive prior to cleaning?
- Is my part fragile or sensitive to cleaning substrates?
- Do I have any specific customer requirements and how will I meet the requirements?
- How will my choice of cleaning methods affect the next pretreatment or finishing process?

Metal Cleaning is the removal of contaminants such as rust, paint, old plating, temporary

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[1] References are listed at the end of this section.

protective coating, and a wide variety of "soils." Metal cleaning and stripping are accomplished by four different means: 1) aqueous cleaning, 2) organic solvent cleaning, 3) abrasive cleaning, and 4) heat or flame cleaning/stripping. (4)(5)

Risk Reduction Options

☐ Use no-clean technology or prevent the part from needing cleaning.

☐ Minimize the need and amount of cleaning needed by cleaning "just in time" to use a part.

☐ Water-only cleaning can by used for ionic contaminants and water-soluble fluxes. Water-only cleaning usually uses hot water and/or steam cleaning.

Aqueous Cleaning: Aqueous cleaning covers a wide variety of cleaning methods which include detergents, acids, and alkaline compounds to displace soil rather than dissolving it as in organic solvent cleaning. Aqueous cleaners are used in cleaning baths, ultrasonic baths, sprayed, and used in steam cleaning. Aqueous cleaning is a viable substitute for organic solvent cleaning. (6)

In the aerospace industry, considerable effort has been expended to determine how to replace organic solvent cleaning. The facilities that have successfully switched from organic solvent cleaning to an alternative cleaning are generally pleased with the results. The benefits are less toxic air pollutants, less toxic or lower toxic waste, and less toxic exposure to employees. It may take more than one aqueous cleaning process to replace an organic solvent cleaning process. The three types of aqueous cleaning processes outlined below are emulsification cleaning, acid cleaning, and alkaline cleaning.

- **Emulsification Cleaning:** Emulsification cleaning uses water-immiscible solvents, surfactant, and emulsifiers. Emulsion cleaning can be used with ultrasonics or fluid circulation. The factors affecting emulsification are type of oil, choice of surfactant used in the cleaner, pH, temperature, and concentration of the cleaning solution. (22)

- **Acid Cleaning:** Acid cleaners are sometimes called acid pickling baths. Sulfuric acid or hydrochloric acid is used to remove scale from metal. Acid cleaning solutions may contain other mineral acids such as nitric, hydrofluoric, or phosphoric; organic acids such as acetic, citric, oxalic, or sulfamic; detergents; chelating agents; and small amounts of organic solvents. This process removes up to 1.5 percent of the metal and dissolves it in a pickling liquor. When the metal part is removed some residual acid and dissolved metal is dragged out. (6) Acid cleaners work best on inorganic soils such as rust, smut, heat scale, and inorganic particulate, abrasives, flux, and shop dust. (5)

- **Alkaline Cleaning:** Alkaline cleaning solutions (usually hot) contain builders (sodium salts of phosphate, carbonate, and hydroxide) and surfactants (detergents and soap). The builders promote chemical reactions which will remove the metal oxides from the surface and the surfactant will tie up the metal oxide causing it to remain in solution and not recombine with the metal surface of the part being cleaned. (6) Alkaline cleaners work best on organic soils such as mill oils, rust inhibitors, coolants, and lubricants. (5)

Risk Reduction Options

☐ Use emulsification cleaning to eliminate organic solvent cleaning.

☐ Use acid cleaning to eliminate organic solvent cleaning.

☐ Substitute ammonium bifluoride for a low concentration of hydrofluoric acid. (20)

☐ Use alkaline cleaning to replace organic solvent cleaning.

Organic Solvent Cleaning: Work pieces are either wiped with an organic solvent soaked cloth or dipped in liquid organic solvent to remove soluble soils. (6) Examples of organic solvents used in the aerospace industry that drive the risk include methyl chloroform (1,1,1-trichloroethane), perchloroethylene, and methylene chloride. Occasionally, a trace contaminant or stabilizer included is found in a product. 1,4-dioxane was found in methyl chloroform as a stabilizer and contributed significantly to aerospace health risk assessments.

Risk Reduction Options

☐ Refer to the SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvents Degreasing Operations for alternatives to organic solvent cleaners.

☐ Use managed organic solvent distribution system can reduce your chemical emissions by 30 to 40 percent.

☐ Use Zero-emission organic solvent cleaning machines to reduce organic solvent emissions by 100%.

☐ Use a vacuum deoiling system. In this process, oil is removed from parts by placing them in a vacuum chamber with hot walls. The chamber is evacuated to remove oxygen and to degas the oils. The oil vaporizes from the part surfaces as the chamber pressure is reduced. The vacuum deoiling method is suitable for parts contaminated with grease and oil. (48)

☐ Use a vacuum degreasing system.

☐ Use a closed container to hold rags and wipes that contain organic solvent used for parts cleaning where organic solvent containing rags and wipes are used. (13)

☐ Use flip top plastic bottles instead of squirt bottles to reduce drips and evaporation from bottles.

☐ Purchase 1,4-dioxane free solvents.

Abrasive Cleaning: Abrasive cleaning is mechanical cleaning using abrasives. Abrasives are used in tumbling barrels, buffing wheels, and in blasting equipment. Sometimes abrasives are added to acid or alkaline cleaning solutions to improve cleaning action. Abrasive cleaning can be used to replace organic solvent and aqueous cleaning. In the aerospace industry it is often critical to maintain the original dimensions of a part.

Risk Reduction Options

☐ Use abrasive media that do not affect tolerances are plastic media, glass beads, and agricultural abrasives, e.g., wheat starch. (5)

☐ Use abrasive media used on large hardy parts to displace heavy soils and oxide scales include silica sand, steel grit, aluminum oxide, nut shells, and glass beads. (30)

☐ Use self-contained sodium bicarbonate (baking soda)-based media in a blast cabinet system. (3)

Heat or Flame Cleaning/Stripping: Refer to Coating Removal/Decal and/or paint removal section.

Metal Surface Preparation

Surface preparation is accomplished by dipping a part into baths containing various chemicals. The bath is specially formulated to provide specific surface conditions for specific plating operations. Surface preparation includes chemical and electrochemical conversion, electroplating, metallic coatings, and case hardening. (4)(6) The three types of metal surface preparation processes outlined below are chemical and electrochemical conversion, electroplating and related processes, and anodizing.

Chemical and Electrochemical Conversion: Chemical and electrochemical conversions are used for corrosion resistance and primarily to form an absorptive base for the adhesion of paints, etc. Typical chemicals used are phosphates, chromates, nitric acid, hydrochloric acid, and metal coloring. (Preparation for painting will be covered under Coating Application and Related Process.)

Risk Reduction Options

☐ Use non-chromium containing etchant such as ferric chloride, ammonium persulfate, or hydrogen peroxide/sulfuric acid.

☐ Use sulfuric acid and hydrogen peroxide cleaners to replace chromic acid pickles, deoxidizers, and bright dips.

Electroplating and Related Processeses: Typical metals used in electroplating are brass, bronze, cadmium, chromium, copper, iron, nickel, tin, zinc and precious metals. (Electroplating and related processes are discussed below.)

Anodizing: Anodizing is an electrochemical process generally applied to aluminum and its alloys to produce an adherent oxide film to prevent corrosion or provide surface hardness. Anodizing is required for aluminum parts and assemblies by the United States Government Military Specification, MIL-A-8625, after all heat treatment, machining, welding, forming and perforating processes. (12)

Risk Reduction Options

☐ Use thin film sulfuric anodize in place of chromic acid anodize. (13)(23)(28)

☐ Anodize aluminum or its alloys in a sulfuric acid solution at elevated temperature by a step-wise current density procedure, and seal the resulting anodized surface. (35)

☐ Use an organic acid sealant, such as isopropyl alcohol-stearic acid system or a chelating agent dissolved in isostearic acid. (24)

☐ Use a non-chrome sealer such as nickel acetate on aluminum alloys. (47)

☐ Use phosphoric acid anodize.

☐ Use boric/sulfuric acid anodize. (49)

Electroplating (Plating) and Related Processes

Electroplating is a process in which metal is either attracted to a part and plated or metal is removed for a high shine. The part is an anode or a cathode in a galvanic cell. Three plating types and related processes are discussed below.

Chrome Plating: Electrodeposition of chromium is usually applied to steel for a decorative surface to provide a hard surface. Chromium is usually applied on top of a nickel deposit.

Risk Reduction Options

☐ Refer to SB 1731 Risk Reduction Audits and Plans Guidelines for Chrome Electroplating Facilities

Nickel Plating: Electrodeposition of nickel which is generally used as an undercoating for subsequent deposits. There are three common solutions used in nickel electroplating; Watt's solution, sulfamic acid, and electroless plating. (4)(6)

Risk Reduction Options

☐ Use a solution with lower concentration of nickel, e.g., Watt's solution: 300 grams/liter (g/l) nickel sulfate, 50 g/l nickel chloride, and 35 g/l boric acid, or nickel sulfamate plating: 500 g/l nickel sulfamate, 5 g/l nickel chloride, and 30 g/l boric acid.

☐ Use electroless nickel plating. This process uses an alloy of nickel and phosphorous. Prior to nickel deposition, the work piece must be cleaned to a very high standard and then "etched" or "sensitized" before it is immersed in the electroless nickel plating solution.

Cadmium Plating: Electrodeposition of cadmium for protection from corrosion.

Risk Reduction Options

☐ Substitute cadmium with zinc graphite, titanium dioxide, or aluminum: Converting to other plating substitutes that contain less toxic chemicals can reduce a facility's toxic emissions. The amount of reduction must be determined by evaluating the new emission and toxicity of the new chemical. Some examples of substitutions are: (4)
  - Zinc-Nickel
  - Zinc-Cobalt for fasteners
  - Zinc-Iron for fasteners
  - Zinc-Tin for electrical connectors
  - Cadmium Fluoborate: operates at a low pH, therefore is highly corrosive and is expensive.

Potential tank modifications: Tank modifications involve changes to the plating process to reduce emissions from the plating tank. (17) Although these tank modifications are from the SB 1731 Risk Reduction Guidelines for Chrome Electroplating Facilities, they may be applicable in other plating operations. If you choose one of the following tank modifications, make sure to discuss your selection with the district staff prior to final selection.

Risk Reduction Options

☐ Use anti-mist additives to reduce the plating bath surface tension or by creating a thick layer of foam on the plating bath surface. Reducing the surface tension of the plating bath reduces the amount of mist formed and a foam blanket traps the mist as it is formed.

☐ Use floating polyballs or plastic chips which float on the plating solution surface to reduce misting from the tank. (17)

Potential control devices: Equipment installed in the ventilation system of electroplating and anodizing tanks for the purpose of collecting and containing chromium emissions from the tank. (17) Although these control devices are from the SB 1731 Risk Reduction Guidelines for Chrome Electroplating Facilities, they can also be applied in other plating operations. If you choose one of the following tank modifications make sure to discuss your selection with the district staff prior to final selection.

Risk Reduction Options

☐ Use a composite mesh-pad (CMP) system which is an add-on air pollution control device typically consisting of several mesh-pad stages. The purpose of the first stage is to remove large particles. Smaller particles are removed in the second stage, which consists of the composite mesh pad. A final stage may remove any reentrained particles not collected by the composite mesh pad. (18) A composite mesh pad is composed of differing layers of more than one monofilament diameter and/or interlocked fibers densely packed between two supporting grids and can replace packed-beds.

☐ Use a packed-bed scrubber (PBS) which is an add-on air pollution control device consisting of a single or double packed-bed that contains packing media on which the emission droplets impinge. The packed-bed section of the scrubber is followed by a mist eliminator to remove any water entrained from the packed-bed section. (18) Also, a packed-bed scrubber is continuously flushed by recirculating water. (19)

☐ Use a PBS/CMP system which is a combination of a packed-bed scrubber and a composite mesh pad system.

☐ Use a fiber-bed mist eliminator (de-mister) which is an add-on air pollution control device that removes contaminants from a gas stream through the mechanisms of inertial impaction and Brownian diffusion. These devices are typically installed downstream of another control device, which serves to prevent plugging, and consist of one or more fiber beds. Each bed consists of a hollow cylinder formed from two concentric screens. The fiber between the screens may be fabricated from glass, ceramic, plastic, or metal. (18) The "impaction" type collector works by placing a barrier in the path of the aerosol particles in the flowing gas to intercept them and remove them from the gas stream. These devices are frequently added at scrubber outlets to capture water droplets entrained in the exiting gas. (19)

- ☐ Use a Chromium Dome Emission Elimination Device (EED) [Merlin Hood] which is a sealable interconnecting cover for plating tanks that prevents the escape of most metal atoms released from the plating solution and returns them to the solution by force of gravity. Strategically located and appropriately sized membranes allow the free passage of hydrogen gas while effectively blocking the escape of water vapor and chemical mist.
- ☐ Use a high efficiency particulate arresting (HEPA) filter which has a 99.97 percent reduction efficiency for 0.3 micron aerosols. (2)

Maskants Operations and Related Processes

There are two types of operations that use maskants - chemical milling and chemical processing. Prior to applying maskants, parts are prepared with alkaline cleaning, pickling with inorganic acids to remove scale, and surface passivation to form an oxide layer. Maskants are applied to parts to protect a portion of a part from chemical milling and chemical processing. Organic solvents may be used to aid in the removal of the maskants after chemical milling or chemical processing.

Chemical Milling Maskant Operations: Maskants are coatings that are applied to parts to protect the surface from chemical milling. (10) There are two types of chemical milling maskants: they are referred to as type I and type II. The types refer to the etchants, type I and type II etchant. Type I chemical milling maskants are used for aluminum parts immersed in strong sodium hydroxide solutions. Type II chemical milling maskants are used for aluminum parts immersed in strong sodium hydroxide solutions containing amines. Maskants are also used in chemical milling of other metals such as titanium parts immersed in nitric acid and hydrofluoric acid, magnesium in nitric acid, and stainless steel in hydrochloric acid. (29)

Chemical Processing Maskant Operations: Chemical processing maskants are applied to protect surfaces from chemical processing operations subsequent to chemical milling. The maskants are used to protect surfaces from strong acid or alkaline solutions used in etching, anodizing, plating and bonding. (10)(29)

Maskants can be organic solvent-based or waterborne. Organic solvent-based maskants generally contain perchloroethylene or a toluene/xylene mixture. Maskants can be applied by brushing, dipping spraying or flow coating. Organic solvent-based maskants can be cured at room temperature, while most waterborne maskants are cured in ovens. Generally, waterborne maskants are not considered as chemically resistant as organic solvent-based maskants. (29)

Risk Reduction Options

☐ Use a waterborne maskant instead of an organic solvent-based maskant. (45)(46)

☐ Use a toluene/xylene maskant instead of a perchloroethylene-based maskant. (20)
Note: Use of toluene/xylene maskants may be subject to volatile organic compound limits and fire code restrictions.

☐ Enclose maskant operations and use a carbon absorber to reduce organic emissions 81 to 85 percent. (2)(26)(45)

☐ Spray maskants within a paint booth with an emission control. Refer to Coating Application and Related Processes, Control Devices for emission control options.

☐ Organic solvent-based maskant removal may require organic solvents to soften the maskant for manual removal. (46) Refer to the SB 1731 Risk Reduction Audits and Plans: Guidelines for Halogenated Solvents Degreasing Operations for alternatives to organic solvent cleaners.

Coating Application and Related Processes

Coating application and related processes include surface preparation, coatings, application of coatings, control devices, and spray gun cleaning.

Surface Preparation: Metal finishing is often needed on aluminum, cadmium, magnesium, titanium, and other aerospace metals, depending on the anticipated environmental conditions or performance requirements. Metal finishing can improve corrosion protection, electrochemical insulation, adhesion bonding, and surface hardness. Metal finishing includes abrasion, etching, conversion coating, and anodizing.

Aluminum Surfaces: Aluminum surfaces are treated with various conversion coatings depending upon the anticipated environmental conditions or performance requirements, e.g., corrosion, electrochemical insulation, and abrasion. Conversion coatings are also used to enhance adhesive bonding. A chemical conversion coating is required by the United States Government Military Specification, MIL-C-5541E, on surfaces of aluminum and aluminum alloys for components of military weapon systems for maximum corrosion resistance. The conversion coating also provides a surface which has better paint adhesion. (21) Typical treatments include chromate phosphates, chromate oxides, anodizing, and non-chromate formulations. A typical chromate conversion coating in military specifications is Alodine. Alodine is used to promote adhesion and corrosion resistance for organic coating systems. (13)(47)

Risk Reduction Options

☐ Use a non-chromate formulation. These are relatively new. Phosphoric acid cleaners, wash primers, iron and zinc phosphates have also been used as paint pretreatments.

☐ Use a two-stage red garnet abrasive blasting and cleaning process for armor-grade, 5000 series aluminum alloy. (25)

☐ Use a non-chromate conversion coating (refer to Metal Surface Preparation, Chemical and electrical conversions)

Cadmium Surfaces: Cadmium surfaces require either a phosphate or a chromate conversion coating prior to painting. The phosphate conversion is designed to be painted. The chromate conversion coating is designed to add corrosion resistance to the cadmium and it may be painted. The Military Specification QQ-P-416, type II requires the chromium conversion coating. (5)

Risk Reduction Options

☐ Use non-chrome conversion coating (refer to Metal Surface Preparation, Chemical and electrical conversions)

Magnesium Surfaces: Magnesium must be treated with a conversion coating or anodized before painting to prevent corrosion and to prevent environmental damage by abrasion. There are two types of Military Specification for magnesium. One is for mild environments, MIL-M-3171, type III and the other is for severe environments and where mechanical abuse is likely, MIL-M-45202. Both Military Specifications utilize sodium dichromate solutions. (5)

Risk Reduction Options

☐ Use non-chromate conversion coating (refer to Metal Surface Preparation, Chemical and electrical conversions)

Titanium Surfaces: Titanium must be treated with a conversion coating or anodized to protect it from corrosion and to improve adhesion bonding strength. An emersion bath for applying a conversion coating typically contains 6-7 oz/gal sodium phosphate, 2-3 oz/gal potassium fluoride, and 2-3 oz/gal hydrofluoric acid.

Risk Reduction Options

☐ Use conversion coating that minimizes or does not contain hydrofluoric acid.

Coatings: Coatings used in aerospace cover a broad category. Many of the coatings are formulated for specialized functions such as corrosion protection, temperature resistance, radar avoidance, and camouflage. Most aerospace coatings contain organic solvents such as toluene, xylene, methyl ethyl ketone, trichloroethylene, and 1,1,1 trichloroethane. (10) Waterborne coatings contain ethylene-based glycol ethers. (29) Aerospace coatings also contain inorganic chemicals such as chromium and cadmium. (29) The preventive measures for reducing emissions from coating operations are product substitution, process modification, and equipment changes to eliminate or reduce the generation of emissions. (10)

Risk Reduction Options

☐ Replace a coating with a coating which contains no toxic chemicals, less toxic chemicals, or a less toxic component. Substitution of a coating with more solid content may also decrease the amount of toxic emissions.

☐ Use primers that do not contain chromates. A thicker film application of the primer may be necessary. (8) Alternatives to chromate pigment include molybdate, nitrites, borates, silicates, phosphates and metal cation. (1)

☐ Use self-priming (or primerless) topcoats to eliminate the need to apply a primer coat between the substrate and topcoat. This option reduces organic solvents and chromium emissions. (1)(10)

☐ Use resin seal anodizing to replace the dichromate seal, priming and topcoat operation for many parts and assemblies. The aerospace component is immersed in a resin seal anodize bath that contains 7 percent solids of a colloidal polyurethane resin. This process reduces 20 to 30 percent over the conventional process of anodizing, priming, and top coating. (10)

☐ Use waterborne polyurethanes, waterborne epoxies, reactive diluents, and corrosion inhibiting mixed-metal pigments help to eliminate both VOCs and heavy-metal pigments. (1)

☐ Use waterborne coatings to reduce organic solvent emissions.

☐ Use non-HAP high-solids coatings. For example, non-HAP ketones used in high-solids coatings are methyl amyl ketone and methyl isoamyl ketone. Methyl amyl ketone and methyl isoamyl ketone can also replace toluene and xylene. (7)
Caution: Make sure to check with your district when substituting one toxic chemical for another.

☐ Use low organic solvent high solid coatings to reduce organic solvent emissions. (7)(10)

☐ Use catalyzed polymer coatings.
☐ Use powder coating, if the base material can tolerate the oven temperature.

☐ Use waterborne coatings without ethylene-based glycol ethers. For example propylene glycol ethers and acetates (P-series) are non-HAP alternatives to ethylene-based glycol ethers. (7)(11)(31)

Application of Coatings: Coatings are applied by spraying, brushing, rolling, flow coating and dipping using a variety of application equipment including conventional air spray, high volume low pressure (HVLP) spray, and electrostatic spray. Emission reductions can vary because of the size and configuration of the substrate being coated. Actual efficiency will also depend on the design of the application equipment/system and/or control device. Many of the conventional methods such as rolling, flow coating, dip coating, and brushing are limited to the size and configuration of the part being painted. (10)

Risk Reduction Options

☐ High volume low pressure (HVLP) spray guns operated at 10.0 psig or less at the air cap and a fluid delivery pressure of 10 psig or less can reduce emissions from 10 to 40 percent. (10)

☐ HVLP spray gun and high solids coating can reduce emissions from 22 to 30 percent. (10)

☐ HVLP and electrostatic spray systems can reduce emission from 35 to 50 percent. (10)

☐ Electrostatic spray guns can reduce emissions from 30 to 40 percent. (10)

Control Devices: Control devices are typically used where product substitution and equipment changes are not feasible or if the remaining emissions require additional emission control. The emissions from coating operations can be organic solvent-based or inorganic emissions.

Control Devices for Organic Solvent Emissions: The predominant organic solvent emission control devices are carbon adsorbers, incineration, and ultraviolet oxidation. The selection of the control device and the ability of the control device to reduce emissions is dependent upon the stream-specific characteristic such as flow rate, moisture content, temperature, molecular weight, and the concentration of the organic solvent emissions. (32)

Risk Reduction Options

☐ Use a carbon adsorber to reduce organic solvent emissions by 81 to 99 percent. (2)(10)(32)

☐ Use a carbon adsorber and less stripper to reduce organic solvent emissions by 95 percent. (2)

☐ Use a thermal incinerator to reduce organic solvent emissions by 98 to 99 percent or greater. (2)(9)(10)(32)

☐ Use a catalytic incinerator to reduce organic solvent emissions by 90 to 99 percent. (2)(9)(10)(32)
A catalyst can be poisoned by masking agents including lead, zinc, chromates, mercury, other heavy metals, silicone, or halogens contained in any of the paints or coatings applied. (36)

☐ Use ultraviolet oxidation or ultraviolet/activated oxygen to reduce organic solvent emissions by 95 percent. (2)(8)(10)

☐ Use activated carbon fiber adsorbent to reduce organic solvent emissions 90 to 98 percent. (10)(32)

☐ Use a catalyst-coated filter media to reduce organic solvent emissions. (10)

Control Devices for Inorganic Emissions: Paint booths are typically used to control particulate matter emissions. The most cost effective option to reduce air emission and the associated cost using the paint booth technology has been to reduce the air flow. The reduction of air flow cannot be reduced below minimum ventilation flow rates set by the Federal Occupational Safety and Health Administration and the National Fire Protection Association for a safe working environment. (37)(38)

Risk Reduction Options

☐ Use a paint booth with a three-stage dry particulate filter to reduce chromium and cadmium emissions up to 99.9 percent. (2)

☐ Use a paint booth with a two-stage dry particulate filter to reduce inorganic emission up to 99 percent. (2)

☐ Use a paint booth with a high efficiency particulate air (HEPA) filter to reduce inorganic emissions up to 99.9 percent. (2)

☐ Use a baghouse using 50 micron cartridge filter to reduce inorganic emissions up to 99 percent. (2)

☐ Use a water wash booth to reduce inorganic emissions from 80 to 99 percent. (2)

☐ Use a source test to determine the actual chromium emissions from your application and control equipment. (39)(40)(41)(42)(43)

☐ Use a source test and mass balance to demonstrate the fraction of the paint falls out and is not filtered though the paint booth filtration system. This “fall out” fraction can be as much as 22 to 35 percent of the over spray. (43)

Combination Controls: Combination controls can reduce both organic and inorganic/particulates.

Risk Reduction Options

☐ Use portable air pollution control equipment for the reduction of fugitive chromium and VOC emissions from the spray coating touch-up operations to reduce organic emissions of captured over spray (by as much as 85%) by using a carbon filter, and reduce particulate emissions (chromium) by 99.97 percent of captured over spray by using primary and secondary arrestors, carbon filters and HEPA filters. (44)

☐ Use a paint booth with dry particulate filters followed by a UV/AO (ultraviolet/activated oxygen) photolytic reactor. (8)

Spray Gun Cleaning: Spray guns are typically cleaned at the end of each job and between color changes. (2)

Risk Reduction Options

☐ Use an enclosed spray gun cleaner to reduce organic solvent emissions. Clean the spray gun in an enclosed system that is closed at all times except when inserting or removing the spray gun. Cleaning shall consist of forcing solvent through the gun.

☐ Use non-atomized flushing. Clean the spray gun by placing the cleaning solvent in the pressure pot and forcing it through the gun with the atomizing cap in place. No atomizing air is to be used. Direct the cleaning solvent from the spray gun into a vat, drum, or other waste container that is closed when not in use.

☐ Disassemble the spray gun to clean. Disassemble the spray gun and clean the components by hand in a vat, which shall remain closed at all times except when in use. Alternatively, soak the components in a vat, which shall remain closed during the soaking period and when not inserting or removing components.

☐ Use atomized cleaning with a collection system. Clean the spray gun by forcing the cleaning solvent through the gun and direct the resulting atomized spray into a waste container that is fitted with a device designed to capture the atomized cleaning solvent emissions.21

Coating Removal, Decal and/or Paint Removal

Coating removal is accomplished by chemical and non-chemical means. Chemical removal of paint is usually referred to as “stripping.” Stripping is the removal of a coating, maskant for chemical processing, cured paint, and cured paint residue using a volatile liquid. Non-chemical removal of a coating, maskant for chemical processing, cured paint, and cured paint residue using a mechanical means. (26)

The U.S. EPA NESHAP for the aerospace industry uses the term “decal and/or paint removal” to describe removal of a permanent coating such as primers and topcoats from the outer surface of an aerospace vehicle or component. (2)

Chemical Removal/Stripping: Methylene chloride has been the primary chemical used in stripping/decal and/or paint removal in the aerospace industry. The strippers used by the aerospace industry traditionally are methylene chloride based. Methylene chloride is not considered photochemically reactive and is not classified as a VOC. (29) Methylene chloride is a toxic substance and is listed as a toxic air contaminant by the ARB and a hazardous air pollutant by the U.S. EPA. The recently promulgated U.S. EPA NESHAP restricts the use of organic HAPs for “depainting” which is decal and/or paint removal. If organic HAP strippers are needed for stripping control equipment is required.

If a non-chemical stripping abrasive method is used to remove aerospace coatings, inorganic chemicals can become airborne. Aerospace coatings often contain chromium and cadmium. Particulate control equipment is required to reduce the airborne emissions.

When evaluating emerging technologies, determining if airborne emissions will be generated or if chemicals can convert or change into molecules of unknown structure is important. A detailed characterization of the technology and by-products should be made.

- **Alternative chemical stripping substances:** When selecting alternative decal and/or paint removal methods, consider the following:

  √ What is the characteristic of the substance you are trying to remove?
  √ Will the alternative removal method damage my part?
  √ Will the alternative method produce different toxic emissions?
  √ If the chemical is a VOC, does the district’s rules restrict or prohibit the use of the material?
  √ Will the new removal method increase pollution in another media such as water or hazardous waste?
  √ What impact will the alternative have on energy demand?

Risk Reduction Options

☐ Use alkaline stripper solution containing benzyl alcohol with amine or ammonia compounds. Many polyurethane and epoxy coatings may be resistant to alkaline solutions. Alkaline solutions usually take longer to work. (3)

☐ Use an acid stripper solution containing benzyl alcohol with formic acid as an accelerator. Potential embrittlement of steel and titanium substrates, may be prohibited by the manufacturer or owner. (3) Acid stripper containing phenol may work more aggressively. (29)

☐ Use a stripper without methylene chloride. (51)

- Lockheed Martin has completed a market and vendor survey to identify paint strippers and softeners that contain no methylene chloride. Those products are: EZE 541 and EZE 542 from Calgon Corp., 5337 from Zep Manufacturing, EP921 from Inland Technology, Ardrox 5564 from Ardrox Corp., Strip Off C539 from Alpha Genisis Corp., Stripper from AMAX Corp., Turco 6813 and Turco 6840 from Turco Corp. , Citristrip from Specialty Envir. Tech., PrepRite from ISP Engineered Products, 10-i band 10W/V from Polychem Corp., Safe-Strip from Ecolink, Safety-Strip from Brulin Corp., and PR3140A and PR3170A from Eldorado Chemical.

☐ Use a stripper solution containing methylene chloride and phenol.

☐ Use benzoyl alcohol stripper solution to soften paint and follow with medium pressure water blasting.

☐ Use a stripper solution containing methylene chloride, methyl alcohol and ammonium hydroxide. (50)

- One such product is Ardrox 679-W.

☐ Use a stripper solution containing methylene chloride, phenol, and formic acid.

☐ Use a stripper with less methylene chloride on a limited basis with an add-on emission control device.

Non-Chemical Removal: Non-chemical removal of coatings, cured paint, and cured paint residue can be used in place of chemical removal. The most common inorganic coating removal process uses plastic media or wheat starch blasting. (2) Non-chemical decal and/or paint removal such as blasting may cause inorganic toxic emission to become airborne. If inorganic toxic emissions becomes airborne, control devices must be installed. The inorganic toxic emissions of concern are chromium and cadmium.

Risk Reduction Options

❑ Use higher grade aluminum for aircraft. Decals can be used instead of paint. (3) The aircraft must be washed and buffed more frequently. The decal removal and replacement may require the use of some organic solvents. (30)

❑ Use plastic media blasting (PBM) with high-pressure nozzles at 20 to 40 psi. The plastic spheres are usually made of polycarbonate. (3) Plastic media come in a variety of sizes and hardness grades. PBM is used in many different applications, and may reduce costs.

❑ Use wheat starch blasting for aluminum skins with thickness equal to or greater than 0.016 inch. (3)

❑ Use high pressure water jet removal system. (3)

❑ Use heat or flame cleaning/stripping ovens which are used to remove paint and other organic soils from a surface by burning them off. Disadvantages to this option include: 1) the part may be damaged by the heat, 2) high energy costs, 3) toxic pollutants and by-products are emitted to the air, and 4) air control devices maybe required to control the air emissions. (3)

❑ FLASHJET^{TM} (formerly know as FLASHBLAST^{TM}) paint removal system uses an intense flash of light leaving a condensed carbonate residue. The condensed carbonate residue can be removed by several methods such as washing, wiping or brushing, or using CO_2 frozen pellet or snow blast cleaning. (27)

❑ Use a sodium bicarbonate (baking soda)-based media formulation for part paint stripping/removal in a specialized blast cabinet, Armex Cleaning & Coating Removal Systems. (16) To prevent corrosion, parts can be immersed in a mildly acidic formulation to neutralize the basic soda ash formed in the process. (30)

Emerging Technologies: Use an emerging technology such as robotic blasting with lasers, baking soda, dry ice, and liquid nitrogen. The percent risk reduction should be suggested by the facility with appropriate backup data provided. The allowable reduction will be determined by the district. (3)

Risk Reduction Options

❑ Use UV/ozone oxidation followed by a scrubber with activated carbon control regeneration system. Use additional treatment with dry ice to remove residual coating. The scrubber/carbon control removal efficiency is about 85 to 95%. It may not be applicable with certain configurations that are more complex.

☐ Use high intensity light from a tubular quartz flash lamp filled with xenon gas at low pressure in conjunction with carbon dioxide pellets (dry ice). (30) The Xenon flash lamp imparts pulsing light energy, while the dry ice pellets aid in residue removal and keeps the temperature down. (3)

☐ The use of carbon dioxide pellets was tested at Lockheed in California. A potential environmental inpact of this technology is increased emission of carbon dioxide, a greenhouse gas. (30)

☐ Laser paint stripping uses light from a pulsed ultraviolet eximer laser to break the chemical bonds that hold the molecules together. Vapors and waste products are formed when the laser breaks the chemical bonds in the paint removal process. The concern with laser paint stripping is the potential formation of vapors of unknown composition and the formation of waste of unknown composition. (30)

Control Devices for Decal and/or Paint Removal: The choice of air pollution control equipment should consider the type of stripper used, the ventilation requirements, the destruction efficiency required, retrofit verses new construction, and the type of control equipment installed. Control devices for decal and/or paint removal operations control organic solvent emission or inorganic particulate emissions.

Risk Reduction Options

- **Organic solvent emission controls:**

☐ Thermal oxidation with regenerative heat recovery uses large, heavy beds of ceramic materials for heat recovery and storage. The removal efficiency ranges from 95 to 99%. (9)(33)

☐ Thermal oxidation with recuperative heat recovery uses a metallic shell and tube heat exchangers for direct heat recovery. Recuperative units are best suited for smaller process applications with moderate-to-high VOC loadings. The removal efficiency ranges from 95 to 99%. (33)

☐ Carbon absorption with steam regeneration. The removal efficiency ranges from 90 to 99 percent. (9)(33)

☐ Use a thermal incinerator to reduce organic solvent emissions by 98 to 99 percent or greater. (2)(9)(10)(32)

- **Inorganic particulate emission controls:**

☐ Use a baghouse using 50 micron cartridge filter to reduce emissions 99 percent. (2)

☐ Use an aspirated cartridge dust collection system to reduce emissions 99.9 percent. (2)

☐ Use a baghouse using a fabric bag filter to reduce emissions 99 to 99.5 percent. (2)(34)

☐ Use a dry fabric filter to reduce emissions 99 percent. (2)

☐ Use a particulate filter to reduce emissions 95 percent. (2)

☐ Use a baghouse with a centrifuge to reduce emissions 95 percent. (2)

☐ Use a wheat starch blast media dust collector to reduce emissions 95 percent. (2)

Fuels

Fuels are used for process energy, comfort heating, facility vehicles, and jet fuels.

Diesel Fuel: Diesel fuel #2 is often used due to its availability and cost. Other alternatives may result in lower over all risks.

Risk Reduction Options

☐ Use natural gas.

☐ Use methanol.

☐ Use electricity.

☐ Use a high efficiency burner. The amount of reduction varies with the type and configuration of the combustion unit. Work with the district to determine your emission reduction.

Gasoline: Gasoline is used in vehicles. Other alternatives may result in lower overall risk and may result in cost savings. For example, at $1.15 per gallon, the operating cost for a lift truck operation is $0.97 per hour; natural gas at $3.00 per million cubic feet is $0.54 per hour of operation. (14)

Risk Reduction Options

☐ Use natural gas.

☐ Use electricity.

Natural gas: Natural gas is less expensive than other fuel alternatives such as propane or gasoline (14), and will likely result in lower overall risk than liquid fuels.

Risk Reduction Options

☐ Use electricity.

☐ Use a high efficiency burner. The amount of reduction varies with the type and configuration of the combustion unit. Work with the district to determine your emission reduction.

General

Site Specific Analyses: A few facilities estimated their facility emissions or used worse case senarios to determine their facility HRA. Site-specific information may provide a more accurate HRA that may have a lower risk. Make sure to work with the district.

Risk Reduction Options

☐ Use source specific source tests with a mass balance approach to demonstrate the reduction in actual emissions.

Work with the district staff. Demonstrations have been made which measure a “drop out” or “fall out” of particulates before it enters the pollution control device. Another demonstration showed that the respiratory particulate fraction varied with different systems. Both types of demonstrations may provide reduction in emissions by demonstrating the source specific actual emission using a mass balance approach.

☐ Demonstrate, using a site-specific health risk assessment, that your facility emissions are less than estimated. Work with the district.

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46. Caspian, Inc., letter to Ms. Linda Nunn dated January 9, 1995.
47. Non-Chromate Conversion Coatings and Sealers for Aluminum Alloys, Envirosense, U.S. EPA, 1994.
48. Solvents Cleaning, Degreasing, Recycling, and Disposing; Compliance Assistance Program, ARB; Compliance Division, December 1995.
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    Alternate Anodizing Processes, Ralph Werley, Rohr Industries Inc. Riverside, California.
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Appendix C
Example Calculations of Risk Reductions

Equation 1: How to determine a site specific emission rate at which the significant risk level is exceeded.

$$Q = \frac{SRL}{(X/Q)(URF)}$$

where: Q = emission rate for a carcinogen air contaminant in grams per second (g/sec)
SRL = significant risk level (specified by your local district)
X/Q = (chi over Q) site specific dispersion factor obtained through air dispersion modeling at the maximum exposed individual receptor or point of maximum impact (g/m^3 per gram/sec)
URF = unit risk factor for a carcinogenic air contaminant given in units of probability per g/m^3 exposure for 70 years [i.e., ($g/m^3)^{-1}$] found in the current version of risk assessment guidelines or consult the district

Assumptions:

- Single source of pollutant
- Single pollutant
- Not a multipathway exposure pollutant (i.e., not Cr, Ni, Cd, Be, Pb, dioxin, PCB, or PAH)
- Hours of operation are identical to those specified in the facility health risk assessment
- The significant risk level is 10 per million (1×10^{-5}) for the maximum offsite individual excess cancer risk per million for this example. Use the significant risk level specified by your district.
- The chi over Q value is 12.83 g/m^3 per ton/year. This value was taken from the "Risk Assessment Procedures for Rules 1401 and 212," available from the South Coast Air Quality Management District. The chi over Q value selected is for a volume source operating 12 hours/day or less with 3,000 to 10,000 square feet of area and a building height of 20 feet. The nearest receptor is approximately 50 meters away.
- The unit risk factor for methylene chloride is 1×10^{-6}.

Conversion of chi over Q from g/m^3 per ton/year to g/m^3 per gram/second:

$$(\frac{tons}{2000\ lbs}) \times (\frac{lbs}{454\ grams}) = (\frac{ton}{908{,}000\ grams})$$

$$(\frac{year}{365\ days}) \times (\frac{day}{24\ hours}) \times (\frac{hour}{3600\ seconds}) = (\frac{year}{31{,}536{,}000\ seconds})$$

$$(\frac{12.83\quad g/m^3}{tons/year}) \times (\frac{tons/year}{908{,}000\ grams/31{,}536{,}000\ second}) = \frac{445.9952\quad g/m^3}{grams/second}$$

Calculation of emission rate at which the significant risk level is exceeded:

$$Q = SRL \div X/Q \div URF$$

$$Q = (10x10^{-6}) \div (\frac{446\quad g/m^3}{grams/second}) \div (1\ \ x10^{-6})\ \frac{m^3}{g}$$

$$Q = 2.242 \times 10^{-2}\ \frac{grams}{second}$$

Conversion of emission rate from grams/second to lbs/year:

[These equations are provided so that you can work with the emission rate in the units that you prefer.]

$$Q = 2.242 \times 10^{-2} \, \frac{grams}{second} \times \left(\frac{lb}{454 \; grams}\right) \times \left(\frac{3600 \; seconds}{hour}\right) = \frac{0.1778 \; lbs}{hour}$$

$$Q = \frac{0.1778 \; lbs}{hour} \times \left(\frac{12 \; hours}{day}\right) = \frac{2.1336 \; lbs}{day}$$

$$Q = \frac{2.1336 \; lbs}{day} \times \left(\frac{261 \; days}{year}\right) = \frac{557 \; lbs}{year}$$

Conclusion: This facility must emit less than 557 lbs/year of methylene chloride to meet a significant risk level of 10 per million.

Conversion of emission rate in lbs/year to usage in gallons/year:

$$Q = \frac{557 \; lbs}{year} \times \left(\frac{gallon}{11.07 \; lbs}\right) = \frac{50 \; gallons}{year}$$

Conclusion: This source can use up to 50 gallons/year of methylene chloride uncontrolled and meet a significant risk level of 10 per million.

Equation 2: How can I determine the emission reduction from a selected risk reduction option?

If your emission is 0.5 pounds per hour of methylene chloride and you choose to install a carbon absorption unit as your risk reduction option your new emission will be as follows:

$$\Delta Q = Q_1 \text{ x } R$$

where ΔQ = the amount of emissions reduced by the addition of a selected risk reduction option
Q_1 = emission rate prior to the addition of a risk reduction option
Q_2 = emission rate after the addition of a risk reduction option (new emission rate)
R = the decimal fraction of total emissions reduced by a selected risk reduction option

- Assume the emission prior to the addition of a risk reduction option is 0.5 lb/hr of methylene chloride
- Assume district staff concurs that your carbon absorption unit reduces your emission by 80%.

$$\Delta Q = Q_1 \ x \ R$$
$$\Delta Q = 0.5 \ lb/hr \ x \ 0.8$$
$$\Delta Q = 0.4 \ lb/day$$

Your new emission rate (Q_2) would be calculated as follows:

$$Q_2 = Q_1 - \Delta Q$$
$$Q_2 = 0.5 \ lb/hr - 0.4 \ lb/hr$$
$$Q_2 = 0.1 \ lb/hr$$

In Equation 1 you determined that you may emit up to 2.1336 pounds per day or 0.1778 pounds per hour of methylene chloride to keep the facility health risk below 10 in a million. If your new emission rate (Q_2) is less than the emission rate (Q) required to reduce methylene chloride risk below the significant level, you have reduced your risk below the significant risk level.

For this example:

If $Q_2 < Q$, your facility's risk is below the significant risk level.

0.1 lb/hr < 0.1778 lb/hr, therefore the risk reduction option of adding a carbon absorption unit will decrease the facility's health risk assessment below the significant risk level set by district.

In some cases the risk reduction option is an estimated amount or range. This is because the actual amount of reduction is dependent upon the site specific conditions and operation. The actual risk reduction may depend upon the operating efficiency after the installation and implementation of the risk reduction option. The district staff can provide guidance on the risk reduction options you have selected for your facility.

Appendix D
Some Helpful Information and Contacts

California Air Resources Board (ARB)
Stationary Source Division, Emissions Assessment Branch
(916) 323-4327
http://www.arb.ca.gov

United States Environmental Protection Agency
Technology Transfer Network (TTN 2000)
http://www.epa.gov/ttn

Office of Environmental Health Hazard Assessment
Air Toxicology and Epidemiology Section
(510) 540-3324
http://www.calepa.cahwnet.gov/oehha

Department of Toxics Substances Control (DTSC)
(916) 324-1826

Material Safety Data Sheet Websites
http://haz1.siri.org/msds/index.html
http://haz2.siri.org/msds/index.html
http://www.pdc.cornell.edu/ISSEARCH/MSDSsrch.HTM

California Occupational Safety and Health (Cal/OSHA) Consultation Service
(916) 263-2855

Air Pollution Control and Air Quality Management Districts
(please check your local phone book’s county government listings, or call the **ARB Business Assistance Helpline at (800) 272-4572** for the phone number of your district)

Aerospace Industry Association:

California Aerospace Environmental Association (CAEA)
Curtis Coleman
(310) 348-8186
e-mail: ccoleman@deltanet.com

Aerospace Industrial Association (AIA)
Glynn Rountree
1250 Eye Street, N.W.
Washington, D.C. 20005
(202) 371-8401
e-mail: glynn@aia_aerospace.org

Electroplating and Related Processes:

Metal Finishing Association of Southern California
(818) 995-7338

Surface Technology Association
(415) 399-9702

National Metal Finishing Resource Center
http://www.nmfrc.org

Coating Application and Related Processes:

Steve Mayer
McClellan AFB
(916) 643-2517 ext. 320

Appendix E
Sample District Notification of Facility Risk Letter

Dear _______________,

We are sending you this letter to notify you that the risk associated with air emissions from your facility exceeds the significant risk level established by the ____________ [place the district name here]. The cancer risk associated with your facility is listed in the table below. These risk levels were determined using the risk assessment methodology developed under Assembly Bill (AB) 2588, Air Toxics Hot Spots Information and Assessment Act.

Estimated Facility Risk and District significant and Unreasonable Risk Levels

	Facility Risk [c]	**Significant Risk Level [d]**	**Unreasonable Risk Level [d]**
Maximum Individual Cancer Risk per Million [a]			
Chronic Noncancer Hazard Index [b]			
Acute Noncancer Hazard Index [b]			

[a] The maximum individual cancer risk (MICR) is the estimated probability of an individual contracting cancer as a result of constant exposure to ambient concentrations which result from facility emissions of carcinogenic air contaminants over a 70 year lifetime. The risk is expressed chances per million. For example, a value of 10 refers to a probability of 10 per million. The MICR is the determined at the maximum exposed individual (MEI), usually outside your facility.

[b] The hazard index is an indicator of the potential for noncancer health effects. It is derived from the ratio of ambient air concentrations of toxicants to reference exposure levels, summed for all toxicants emitted by the facility which affect the same target organ or system (such as kidney, respiratory system, etc.). Chronic impacts are evaluated over long-term periods, while acute impacts are evaluated for a worst-case one-hour period.

[c] The facility risk is estimated by the methodology defined in the CAPCOA Air Toxics “Hot Spot” Program Risk Assessment Guidelines or other guidelines that may supersede these guidelines.

[d] Significant and unreasonable risk levels are assigned by the District.

In accordance with Senate Bill (SB) 1731 (Health and Safety Code sections 44390 through 44394), you are required to reduce your facility risk to below the significant risk level within five years.

To reduce your facility risk, related provisions of SB 1731 require you to audit your facility for risk reduction opportunities and create a risk reduction plan. The risk reduction plan will document the options you plan to implement to reduce your risk to below the significant risk level. The risk reduction plan is to be submitted to the district for approval, and then followed when implementing risk reduction options to reduce the risk from your facility.

We have enclosed SB 1731 Risk Reduction Audits and Plans Guidelines for the Aerospace Industry Facilities. This document will assist you in complying with SB 1731 by providing information about the requirements of SB 1731 and by providing forms to use to prepare your risk reduction plan. The completed forms can serve as your facility's risk reduction audit and plan.

If you have any questions, please contact _____________ [Put district contact name] at _________________[district phone number].

Sincerely,

____

Enclosure

Appendix F
SB 1731 Legislation

Senate Bill No. 1731

CHAPTER 1162

An act to amend Section 44360 of, to add Section 44380.5 to, and to add Chapter 6 (commencing with Section 44390) to Part 6 of Division 26 of, the Health and Safety Code, relating to toxic air contaminants, and making an appropriation therefor.

[Approved by Governor September 29, 1992.
Filed with Secretary of State September 30, 1992.]

LEGISLATIVE COUNSEL'S DIGEST

SB 1731, Calderon. Toxic air contaminants.

(1) Existing law required each air quality management district and each air pollution control district, within 90 days of completion of the review of emissions inventory data, but not later than December 1, 1990, to prioritize and categorize facilities for purposes of health risk assessment into high, intermediate, and low priority categories, taking specified matters into account. Existing law further requires the operator of every high-priority category facility, within 150 days of categorization, to prepare and submit to the district a health risk assessment utilizing scientific methodologies, as specified, and specifies what the health risk assessment is to contain and how it is to be prepared.

This bill would require health risk assessments to be prepared in accordance with described guidelines established by the Office of Environmental Health Hazard Assessment, as specified.

The bill would require facility operators to conduct an airborne toxic risk reduction audit and develop a plan to implement airborne toxic risk reduction measures, and would require the facility operator to implement the measures set forth in the plan, as specified. By imposing new duties on the districts with respect to the review of those plans and assisting small businesses with compliance, the bill would impose a state-mandated local program. The bill would authorize the district, the State Air Resources Board, or the office to assess a specified supplemental fee on a facility operator. The bill would subject the facility operator to specified civil penalties for failure to submit a complete audit and plan or to implement the measures set forth in the plan, and for knowingly submitting a false statement or representation in connection with the audit or plan.

(2) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

(3) The bill would appropriate $948,000 from the Air Toxics Inventory and Assessment Account in the General Fund for purposes of the bill, with $188,000 to be allocated to the state board and $760,000 to be allocated to the Office of Environmental Health Hazard Assessment

Appropriation: yes.

The people of the State of California do enact as follows:

SECTION 1. Section 44360 of the Health and Safety Code is amended to read:

44360. (a) Within 90 days of completion of the review of all emissions inventory data for facilities specified in subdivision (a) of Section 44322, but not later than December 1, 1990, the district shall, based on examination of the emissions inventory data and in consultation with the state board and the State Department of Health Services, prioritize and then categorize those facilities for the purposes of health risk assessment. The district shall designate high, intermediate, and low priority categories and shall include each facility within the appropriate category based on its individual priority. In establishing priorities pursuant to this section, the district shall consider the potency, toxicity, quantity, and volume of hazardous materials released from the facility, the proximity of the facility to potential receptors, including, but not limited to, hospitals, schools, day care centers, worksites, and residences, and any other factors that the district finds and determines may indicate that the facility may pose a significant risk to receptors. The district shall hold a public hearing prior to the final establishment of priorities and categories pursuant to this section.

(b) (1) Within 150 days of the designation of priorities and categories pursuant to subdivision (a), the operator of every facility that has been included within the highest priority category shall prepare and submit to the district a health risk assessment pursuant to Section 44361. The district may, at its discretion, grant a 30-day extension for submittal of the health risk assessment.

(2) Health risk assessments required by this chapter shall be prepared in accordance with guidelines established by the Office of Environmental Health Hazard Assessment. The office shall prepare draft guidelines which shall be circulated to the public and the regulated community and shall adopt risk assessment guidelines after consulting with the state board and the Risk Assessment Committee of the California Air Pollution Control Officers Association and after conducting at least two public workshops, one in the northern and one in the southern part of the state. The adoption of the guidelines is not subject to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The scientific review panel established pursuant to Section 39670 shall evaluate the guidelines adopted under this paragraph and shall recommend changes and additional criteria to reflect new scientific data or empirical studies.

(3) The guidelines established pursuant to paragraph (2) shall impose only those requirements on facilities subject to this subdivision that are necessary to ensure that a required risk assessment is accurate and complete and shall specify the type of site-specific factors that districts may take into account in determining when a singe health risk assessment may be allowed under subdivision (d). The guidelines shall, in addition, allow the operator of a facility, at the operator's option, and to the extent that valid and reliable data are available, to include for consideration by the district in the health risk assessment any or all of the following supplemental information:

(A) Information concerning the scientific basis for selecting risk parameter values that are different than those required by the guidelines and the likelihood distributions that result when alternative values are used.

(B) Data from dispersion models, microenvironment characteristics, and population distributions that may be used to estimate maximum actual exposure.

(C) Risk expressions that show the likelihood that any given risk estimate is the correct risk value.

(D) A description of the incremental reductions in risk that occur when exposure is reduced.

(4) To ensure consistency in the use of the supplemental information authorized by subparagraphs (A), (B), (C), and (D) of paragraph (3), the guidelines established pursuant to paragraph (2) shall include guidance for use by the districts in considering the supplemental information when it is included in the health risk assessment.

(c) Upon submission of emissions inventory data for facilities specified in subdivisions (b) and (c) of Section 44322, the district shall designate facilities for inclusion within the highest priority category, as appropriate, and any facility so designated shall be subject to subdivision (b). In addition, the district may require the operator of any facility to prepare and submit health risk assessments, in accordance with the priorities developed pursuant to subdivision (a).

(d) The district shall, except where site specific factors may affect the results, allow the use of a single health risk assessment for two or more substantially identical facilities operated by the same person.

(e) Nothing contained in this section, Section 44380.5, or Chapter 6 (commencing with Section 44390) shall be interpreted as requiring a facility operator to prepare a new or revised health risk assessment using the guidelines established pursuant to paragraph (2) of subdivision (a) of this section if the facility operator is required by the district to begin the preparation of a health risk assessment before those guidelines are established.

SEC. 2. Section 44380.5 is added to the Health ant Safety Code, to read:

44380.5. In addition to the fee assessed pursuant to Section 44380, a supplemental fee may be assessed by the district, the state board, or the Office of Environmental Health Hazard Assessment upon the operator of a facility that, at the operator's option, includes supplemental information authorized by paragraph (3) of subdivision (b) of Section 44360 in a health risk assessment, if the review of that supplemental information substantially increases the costs of reviewing the health risk assessment by the district, the state board, or the office. The supplemental fee shall be set by the state board in the regulation required by subdivision (a) of Section 44380 and shall be set in an amount sufficient to cover the direct costs to review the information supplied by an operator pursuant to paragraph (3) of subdivision (b) of Section 44360.

SEC 3. Chapter 6 (commencing with Section 44390) is added to Part 6 of Division 26 of the Health and Safety Code, to read:

CHAPTER 6. FACILITY TOXIC AIR CONTAMINANT RISK REDUCTION AUDIT AND PLAN

44390. For purposes of this chapter, the following definitions apply:

(a) "Airborne toxic risk reduction measure" or "ATRRM" means those in-plant changes in production processes or feedstocks that reduce or eliminate toxic air emissions subject to this part. ATRRM's may include:

(1) Feedstock modification.
(2) Product reformulations.
(3) Production system modifications.
(4) System enclosure, emissions control, capture, or conversion.
(5) Operational standards and practices modification.

(b) Airborne toxic risk reduction measures do not include measures that will increase risk from exposure to the chemical in another media or that increase the risk to workers or consumers.

(c) "Airborne toxic risk reduction audit and plan" or "audit and plan" means the audit and plan specified in Section 44392.

44391. (a) Whenever a health risk assessment approved pursuant to Chapter 4 (commencing with Section 44360) indicates, in the judgment of the district, that there is a significant risk associated with the emissions from a facility, the facility operator shall conduct an airborne toxic risk reduction audit and develop a plan to implement airborne toxic risk reduction measures that will result in the reduction of emissions from the facility to a level below the significant risk level within five years of the date the plan is submitted to the district. The facility operator shall implement measures set forth in the plan in accordance with this chapter.

(b) The period to implement the plan required by subdivision (a) may be shortened by the district if it finds that it is technically feasible and economically practicable to implement the plan to reduce emissions below the significant risk level more quickly or if it finds that the emissions from the facility pose an unreasonable health risk.

(c) A district may lengthen the period to implement the plan required by subdivision (a) by up to an additional five years if it finds that a period longer than five years will not result in an unreasonable risk to public health and that requiring implementation of the plan within five years places an unreasonable economic burden on the facility operator or is not technically feasible.

(d) (1) The state board and districts shall provide assistance to smaller businesses that have inadequate technical and financial resources for obtaining information, assessing risk reduction methods, and developing and applying risk reduction techniques.

(2) Risk reduction audits and plans for any industry subject to this chapter which is comprised mainly of small businesses using substantially similar technology may be completed by a self-conducted audit and checklist developed by the state board. The state board, in coordination with the districts shall provide a copy of the audit and checklist to small businesses within those industries to assist them to meet the requirements of this chapter.

(e) The audit and plan shall contain all the information required by Section 44392.

(f) The plan shall be submitted to the district, within six months of a district's determination of significant risk for review of completeness. Operators of facilities that have been notified prior to January 1, 1993, that there is a significant risk associated with emissions from the facility shall submit the plan by July 1, 1993. The district's review of completeness shall include a substantive analysis of the emission reduction measures included in the plan, and the ability of those measures to achieve emission reduction goals as quickly as feasible as provided in subdivisions (a) and (b).

(g) The district shall find the audit and plan to be satisfactory within three months if it meets the requirements of this chapter, including, but not limited to, the requirements of subdivision (f). If the district determines the audit and plan does not meet those requirements, the district shall remand the audit and plan to the facility specifying the deficiencies identified by the district. A facility operator shall submit a revised audit and plan addressing the deficiencies identified by the district within 90 days of receipt of a deficiency notice.

(h) Progress on the emission reductions achieved by the plan shall be reported to the district in the biennial updates of emission inventories required pursuant to Section 44344.

(i) If new information becomes available after the initial risk reduction audit and plan, on air toxics risks posed by a facility, or emission reduction technologies that may be used by a facility that would significantly impact risks to exposed persons, the district may require the plan to be updated and resubmitted to the district.

(j) This section does not authorize the emission of a toxic air contaminant in violation of an airborne toxic control measure adopted pursuant to Chapter 3.5 (commencing with Section 39650) or in violation of Section 41700.

44392. A facility operator subject to this chapter shall conduct an airborne toxic risk reduction audit and develop a plan which shall include at a minimum all of the following:

(a) The name and location of the facility.

(b) The SIC code for the facility.

(c) The chemical name and the generic classification of the chemical.

(d) An evaluation of the ATRRM’s available to the operator.

(e) The specification of, and rationale for, the ATRRMs that will be implemented by the operator. The audit and plan shall document the rationale for rejecting ATRRMs that are identified as infeasible or too costly.

(f) A schedule for implementing the ATRRMs. The schedule shall meet the time requirements of subdivision (a) of Section 44391 or the time period for implementing the plan set by the district pursuant to subdivision (b) or (c) of Section 44391, whichever is applicable.

(g) The audit and plan shall be reviewed and certified as meeting this chapter by an engineer who is registered as a professional engineer pursuant to Section 6762 of the Business and Professions Code, by an individual who is responsible for the processes and operations of the site, or by an environmental assessor registered pursuant to Section 25570.3.

44393. The plan prepared pursuant to Section 44391 shall not be considered to be the equivalent of a pollution prevention program or a source reduction program, except insofar as the audit and plan elements are consistent with source reduction, as defined in Section 25244.14, or subsequent statutory definitions of pollution prevention.

49394. Any facility operator who does not submit a complete airborne toxic risk reduction audit and plan or fails to implement the measures set forth in the plan as set forth in this chapter is subject to the civil penalty specified in subdivision (a) of Section 44381, and any facility operator who, in connection with the audit or plan, knowingly submits any false statement or representation is subject to the civil penalty specified in subdivision (b) of Section 44381.

SEC. 4. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act. Notwithstanding Section 17580 of the Government Code, unless otherwise specified in this act, the provisions of this act shall become operative on the same date that the act takes effect pursuant to the California Constitution.

SEC. 5. The sum of nine hundred forty-eight thousand dollars ($948,000) is hereby appropriated from the Air Toxics Inventory and Assessment Account in the General Fund for the purposes of this act, to be allocated as follows:

(a) One hundred eighty-eight thousand dollars ($188,000) to the State Air Resources Board.

(b) Seven hundred sixty thousand dollars ($760,000) to the Office of Environmental Health Hazard Assessment.