Material Safety Data Sheet
Smoke Generating Tubes

SECTION I - MANUFACTURER AND CONTACT INFORMATION
Manufacturer: RAE Systems Inc.  Telephone Number: 408-952-8200
Address: 3775 North First Street  FAX Number: 408-952-8480
San Jose, CA 95134  USA  Date Prepared: 3 August 1999
Date Reviewed: 15 March 2006

SECTION II - HAZARDOUS COMPONENTS
Component  Formula  CAS No  EC No  UN No  TWA
a. Stannic Chloride  5-15%  SnCl4  7646-78-8  231-588-9  UN1827  n/a
Synonyms: Tin(IV) Chloride, Tin tetrachloride, Libavius Fuming Spirit

b. Inert ingredients  85-95%  (non-Hazardous)

SECTION III - PHYSICAL & CHEMICAL PROPERTIES
Component:  SnCl4  HCl  Inert Ingredients
Description: Slightly yellowish clear liquid  Colorless gas  Inorganic solids
Melting Point: -33°C  -114.2°C  n/a*
Boiling Point: 114°C  -85.1°C  n/a
Vapor Press.: 20 mm Hg @ 20°C  41.6 mm Hg @ 20°C  n/a
Vapor Density: n/a*  1.268 (air=1.000)  n/a
Density: 2.226 g/cc  n/a  n/a
Water solubil: Decomposes  37% by weight  n/a

*n/a = not available

SECTION IV - FIRE AND EXPLOSION HAZARDS
Stannic chloride and HCl are non-flammable and have no known upper and lower explosion limits.
Excessive heat may be released on contact with water. Fire hazard caused indirectly by release of HCl on
exposure of broken tubes to moist air.

FIRE FIGHTING MEASURES - Dry powder. Wear SCBA and protective clothing.

SECTION V - REACTIVITY
STABILITY: Reacts with water and moisture in the air to form a smoke of HCl and tin oxychlorides.
CONDITIONS TO AVOID: Do not expose to air until use.
INCOMPATIBILITIES: Bases, ethylene oxide, water alcohols, metals
HAZARDOUS POLYMERIZATION: Will not occur, but HCl may catalyze the polymerization of other
compounds

SECTION VI - HEALTH HAZARD DATA
PRIMARY ROUTES OF ENTRY: INHALATION? Yes.  SKIN? Yes.  INGESTION? Yes.

HEALTH HAZARDS (Acute & Chronic):
Stannic Chloride is considered Highly Toxic (USA) or Toxic (EU) and is corrosive to the skin, eyes and
respiratory tract. Contact with moisture releases hydrochloric acid fumes, which is also highly corrosive.
Contact with moist air also releases tin compounds, which may be toxic. Symptoms of inhalation
exposure include severe coughing, wheezing, shortness of breath, headaches, nausea, and vomiting.
Produces lung irritation and damage to the mucous membranes of the upper respiratory tract. In extreme cases, pulmonary edema can occur. Exposure to skin causes irritation or tissue burns. May be fatal if swallowed or on excessive contact.

<table>
<thead>
<tr>
<th>Component</th>
<th>SnCl4</th>
<th>Tin Oxides and Compounds</th>
<th>HCl</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. 8-hr TWA</td>
<td>n/a</td>
<td>2 mg/m³ as Sn</td>
<td>5 ppm ceiling OSHA</td>
</tr>
<tr>
<td>Carcinogen</td>
<td>Inadequate data</td>
<td>Inadequate data</td>
<td>2 ppm ceiling ACGIH</td>
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<td></td>
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<td>No</td>
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</tbody>
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FIRST AID PROCEDURES
Skin & Eyes: Wash thoroughly with water and in severe cases seek medical attention.
Ingestion: Wash out mouth with water. Do not induce vomiting. Seek medical attention.
Inhalation: Remove from exposure, rest and keep warm. Seek medical attention. Provide oxygen therapy for persistent coughing or difficult breathing.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE
Users are not exposed to the hazardous components until the tubes are broken open.

- Read, understand and comply with all labels, warnings and instructions accompanying these tubes before use. Failure to comply may cause serious injury or death.
- For use in respirator fit testing according to OSHA 29 CFR 1910.134 (App A) and OSHA 1910.139.
- Wear safety glasses and gloves to protect against chemical exposure and flying glass. Wear a respirator when exposed to smoke. Vapors are corrosive to skin and overexposure can result in serious injury or death.
- DO NOT inhale smoke directly. If inhaled enough to cause coughing, remove victim to fresh air. If coughing persists, provide oxygen and contact a physician.
- Use only in a well-ventilated area. DO NOT use in a confined space.
- DO NOT use under a respirator fit testing hood or other enclosed space, because fume concentrations may build up to levels that can cause serious injury or death.
- Avoid contact of smoke with skin. DO NOT direct smoke stream directly at the skin during fit testing. If smoke contacts skin for a prolonged time, flush with copious amounts of water for 15 minutes and contact a physician.
- If smoke contacts eyes, immediately flush with water for 15 minutes and contact a physician. Eyes should be kept tightly closed during fit testing.
- Use only the pump(s) at the flow rates specified in OSHA CFR 1910.134 and 29 CFR 1910.139. If the pump is operated at non-specified flow rates it could increase the smoke and fume concentrations and cause serious injury or death.
- Do not use for fit testing on persons with pre-existing respiratory or related medical conditions or are allergic to tin compounds or hydrochloric acid.

LEAK & DISPOSAL PROCEDURES
Contain any large leaks using a plastic vessel. Cover with solid adsorbent such as vermiculite or alkaline adsorbent. Dilute and wash with plenty of water or soapy water. Dispose of washings and/or solids according to local regulations regarding hazardous waste. Each tube contains ~0.7 g SnCl₄ before use.

SECTION VIII - CONTROL MEASURES
Store in the box at <40°C when not in use.