

**CLASS II ADMINISTRATIVE UPDATE TO
REGULATION 13 PERMIT R13-2918
FOR A
METAL CASTING FACILITY**

EdL
13-2918A
011-00029

Prepared for:

Richwood Investment Castings, Inc.

PO Box 6786
Huntington, West Virginia 25773

Prepared by:

Potesta & Associates, Inc.

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Project No. 0101-14-0569

January 2015

POTESTA

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SECTION I - III

GENERAL APPLICANT INFORMATION



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
 Charleston, WV 25304
 (304) 926-0475
www.dep.wv.gov/daq

**APPLICATION FOR NSR PERMIT
 AND
 TITLE V PERMIT REVISION
 (OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):

- CONSTRUCTION MODIFICATION RELOCATION
 CLASS I ADMINISTRATIVE UPDATE TEMPORARY
 CLASS II ADMINISTRATIVE UPDATE AFTER-THE-FACT

PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):

- ADMINISTRATIVE AMENDMENT MINOR MODIFICATION
 SIGNIFICANT MODIFICATION

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS ATTACHMENT S TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office): Richwood Investment Castings, Inc.		2. Federal Employer ID No. (FEIN): 51-0427915	
3. Name of facility (if different from above): Metal Casting Facility		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: PO Box 6786 Huntington, West Virginia 25773		5B. Facility's present physical address: 2140 Pleasant Valley Road Huntington, West Virginia 25701	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO ⇒ If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A. ⇒ If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A.			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation: Not Applicable			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO ⇒ If YES, please explain: Applicant owns the site. ⇒ If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): Metal Casting Facility		10. North American Industry Classification System (NAICS) code for the facility: 331511	
11A. DAQ Plant ID No. (for existing facilities only): 01100029		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): None	

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- ⇒ For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- ⇒ For **Construction or Relocation permits**, please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

Take I64 to Huntington and use Exit 8 and turn left on State Route 152 toward Wayne. Take the first left onto Pleasant Valley Road. Proceed up the road for about 0.2 miles and the facility is located on the left of the road.

12.B. New site address (if applicable): NAP	12C. Nearest city or town: Huntington	12D. County: Cabell
12.E. UTM Northing (KM): 4,250.031	12F. UTM Easting (KM): 373,.201	12G. UTM Zone: 17
13. Briefly describe the proposed change(s) at the facility: See Attachment G. Update Burnout Furnace No. 2 heat rating and update Induction Furnace 2AS installation date.		
14A. Provide the date of anticipated installation or change: Proposed Equipment 2015 ⇒ If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen:	14B. Date of anticipated Start-Up if a permit is granted: NA	
14C. Provide a Schedule of the planned Installation of/Change to and Start-Up of each of the units proposed in this permit application as Attachment C (if more than one unit is involved).		
15. Provide maximum projected Operating Schedule of activity/activities outlined in this application: Hours Per Day 24 Days Per Week 7 Weeks Per Year 52		
16. Is demolition or physical renovation at an existing facility involved? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
17. Risk Management Plans. If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your Risk Management Plan (RMP) to U. S. EPA Region III.		
18. Regulatory Discussion. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as Attachment D .		
Section II. Additional attachments and supporting documents.		
19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).		
20. Include a Table of Contents as the first page of your application package.		
21. Provide a Plot Plan , e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E (Refer to Plot Plan Guidance). ⇒ Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).		
22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F .		
23. Provide a Process Description as Attachment G . ⇒ Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).		
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.		

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.

⇒ For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I**.

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J**.

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K**.

28. Check all applicable **Emissions Unit Data Sheets** listed below:

- | | | |
|--|---|--|
| <input type="checkbox"/> Bulk Liquid Transfer Operations | <input checked="" type="checkbox"/> Haul Road Emissions | <input type="checkbox"/> Quarry |
| <input type="checkbox"/> Chemical Processes | <input type="checkbox"/> Hot Mix Asphalt Plant | <input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities |
| <input type="checkbox"/> Concrete Batch Plant | <input type="checkbox"/> Incinerator | <input type="checkbox"/> Storage Tanks |
| <input type="checkbox"/> Grey Iron and Steel Foundry | <input checked="" type="checkbox"/> Indirect Heat Exchanger | |
- General Emission Unit, specify Autoclave, Burnout Furnace, Metal Furnace, Finishing Equipment

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**.

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

- | | | |
|---|---|--|
| <input type="checkbox"/> Absorption Systems | <input type="checkbox"/> Baghouse | <input type="checkbox"/> Flare |
| <input type="checkbox"/> Adsorption Systems | <input type="checkbox"/> Condenser | <input type="checkbox"/> Mechanical Collector |
| <input type="checkbox"/> Afterburner | <input type="checkbox"/> Electrostatic Precipitator | <input type="checkbox"/> Wet Collecting System |
- Other Collectors, specify

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M**.

30. Provide all **Supporting Emissions Calculations** as **Attachment N**, or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.

➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and **Example Legal Advertisement** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

YES NO

➤ If YES, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "**Precautionary Notice – Claims of Confidentiality**" guidance found in the **General Instructions** as **Attachment Q**.

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

- | | |
|--|---|
| <input type="checkbox"/> Authority of Corporation or Other Business Entity | <input type="checkbox"/> Authority of Partnership |
| <input type="checkbox"/> Authority of Governmental Agency | <input type="checkbox"/> Authority of Limited Partnership |

Submit completed and signed **Authority Form** as **Attachment R**.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned **Responsible Official** / **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE Geoff Stoll GM DATE: 1/20/15
(Please use blue ink) (Please use blue ink)

35B. Printed name of signee: Geoff Stoll		35C. Title: General Manager
35D. E-mail: gstoll@richwood.com	36E. Phone: (304) 781-3465	36F. FAX: (304) 781-3466
36A. Printed name of contact person (if different from above): Same		36B. Title:
36C. E-mail:	36D. Phone:	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate | <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet |
| <input checked="" type="checkbox"/> Attachment B: Map(s) | <input checked="" type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s) |
| <input checked="" type="checkbox"/> Attachment C: Installation and Start Up Schedule | <input checked="" type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s) |
| <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion | <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations |
| <input checked="" type="checkbox"/> Attachment E: Plot Plan | <input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans |
| <input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s) | <input checked="" type="checkbox"/> Attachment P: Public Notice |
| <input checked="" type="checkbox"/> Attachment G: Process Description | <input type="checkbox"/> Attachment Q: Business Confidential Claims |
| <input checked="" type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) | <input type="checkbox"/> Attachment R: Authority Forms |
| <input checked="" type="checkbox"/> Attachment I: Emission Units Table | <input type="checkbox"/> Attachment S: Title V Permit Revision Information |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" type="checkbox"/> Application Fee |

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- Forward 1 copy of the application to the Title V Permitting Group and:
- For Title V Administrative Amendments:
 - NSR permit writer should notify Title V permit writer of draft permit,
- For Title V Minor Modifications:
 - Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,
 - NSR permit writer should notify Title V permit writer of draft permit.
- For Title V Significant Modifications processed in parallel with NSR Permit revision:
 - NSR permit writer should notify a Title V permit writer of draft permit,
 - Public notice should reference both 45CSR13 and Title V permits,
 - EPA has 45 day review period of a draft permit.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT A
BUSINESS CERTIFICATE

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
**RICHWOOD INVESTMENT CASTINGS INC
2140 PLEASANT VALLEY DR
HUNTINGTON, WV 25701-9302**

BUSINESS REGISTRATION ACCOUNT NUMBER: 1030-5595

This certificate is issued on: 07/1/2010

*This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with W.Va. Code § 11-12.*

*The person or organization identified on this certificate is registered
to conduct business in the State of West Virginia at the location above.*

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

**TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of
this certificate displayed at every job site within West Virginia.**

ATTACHMENT B

AREA MAP



7012 MacCorkle Avenue, S.E.
Charleston, West Virginia 25304
Phone: (304) 342-1400
Fax: (304) 343-9031

Metal Casting Facility
Richwood Investment Castings, Inc.
Cabell County, West Virginia
Project No. 0101-14-0569

ATTACHMENT C
INSTALLATION AND STARTUP SCHEDULE

ATTACHMENT C

INSTALLATION AND STARTUP SCHEDULE

Installation of Burnout Furnace No. 2 with an Afterburner (6S), the cyclone collector with a dust collector for the abrasive cut-off saw, the dust collector for the grinders, and the blast machines is expected to begin in February 2015. The new induction furnace (2AS) has not yet been installed; however, Richwood Investment Castings, Inc. still anticipates installing the equipment. We have revised the installation date to 2015.

ATTACHMENT D
REGULATORY DISCUSSION

ATTACHMENT D

REGULATORY DISCUSSION

The permit update requested in this application does not change the applicable regulatory requirements for this site. The facility is required to comply with the requirements contained in the applicable provisions of the following rules.

1. 45SCR2. The rule establishes emissions limitations for smoke and particulate matter which are discharged from fuel burning units. The fuel burning unit at Richwood that is an indirect heat exchanger is the boiler unit (5S). The unit is fueled by natural gas and is less than 10 million BTU/hr and is exempt from Section 4, 5, 8, and 9 (weight emissions standards, control of fugitive particulate matter, registration, testing, monitoring, recordkeeping, and reporting, and requirements on start-ups, shutdowns and malfunctions).
2. 45CSR4. No person shall cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to objectionable odor at any location occupied by the public.
3. 45CSR6. This rule establishes emission standards for particulate matter and requirements for activities involving incineration of refuse which are not subject to, or are exempted from, regulation under a federal counterpart for specific combustion sources. This rule may apply to the burnout ovens/afterburners.
4. 45CSR7 §45-7-4, 4.1. No person shall cause, suffer, allow, or permit particulate matter to be vented into the open air from any type source operation or duplicate source operation, or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity specified under the appropriate source operation type in Table 45-7A of the rule.
5. 45CSR10. The rule is to prevent and control air pollution from emissions of sulfur oxides. Since the unit burns natural gas and is less than 10 million BTU/hr the unit is exempt from Section 3 and 6 through 8 (sulfur dioxide weight emissions standards for fuel burning units, registration, permits, and testing, monitoring, recordkeeping and reporting).
6. 45CSR13 requires the facility to operate within the limits of the permit and in accordance with the permit application.

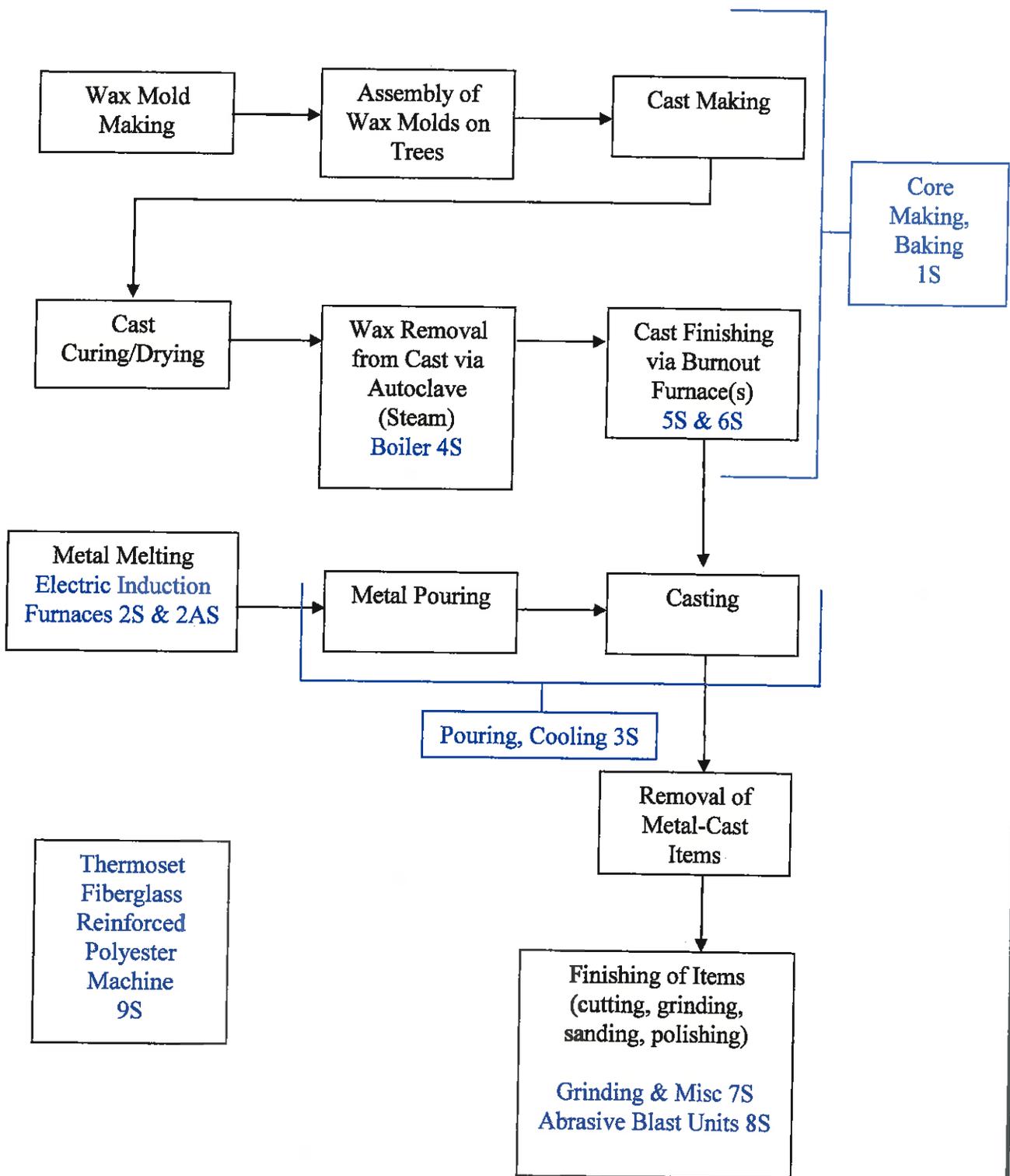
7. 45CSR21. The rule is to prevent and control air pollution from emission of volatile organic compounds by the application of reasonably available control technology. This regulation applies to volatile organic compound sources located in counties including Putnam, Kanawha, Cabell, Wayne, and Wood of West Virginia.

8. 40CFR63, Subpart ZZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources*, which the DAQ has not adopted under 45CSR34. The site is a small foundry with less than 20,000 tons of melted production annually.

ATTACHMENT E

PLOT PLAN

ATTACHMENT F
DETAILED PROCESS FLOW DIAGRAM



7012 MacCorkle Avenue, S.E.
 Charleston, West Virginia 25304
 Phone: (304) 342-1400
 Fax: (304) 343-9031

Metal Casting Facility
 Richwood Investment Castings, Inc.
 Cabell County, West Virginia
 Project No. 0101-14-0569

ATTACHMENT G
PROCESS DESCRIPTION

ATTACHMENT G

PROCESS DESCRIPTION

1. In Regulation 13 Permit R13-2918 issued on June 24, 2012, Richwood Investment Castings, Inc. (RICHWOOD) was permitted to install Burnout Furnace No. 2 with an Afterburner (6S) and an additional Induction Furnace (2AS). The installation of the proposed burnout furnace and additional induction furnace (2AS) was part of a facility expansion proposed for 2012 through 2013. Due to market conditions, the expansion did not occur during the proposed timeframe. RICHWOOD still intends to expand operations when market conditions allow.

RICHWOOD is now proposing to construct the proposed addition and then install the Burnout Furnace No. 2 in the new building. Burnout Furnace No. 2, as proposed in R13-2918, had a heat rating of 750,000 Btu/hr with a 690,000 Btu/hr afterburner. RICHWOOD has ordered, and proposes to install, a 1.0 Million Btu/hr burnout furnace with a 500,000 Btu/hr afterburner. RICHWOOD is requesting a permit update to reflect the change in the heat ratings.

RICHWOOD also proposes to install a cyclone collector with a dust collector for the abrasive cut-off saw and a dust collector for the grinders and the shot blast machines. These units are in the finishing area of the facility and are listed as part of Grinding and Miscellaneous (7S) and Abrasive Blast Units (8S). The air from the cyclone collector and the dust collector may be discharged back into the building.

RICHWOOD is informing the Division of Air Quality (DAQ) of the installation of the new control equipment in this permit application; however, we are not making the additional controls federally enforceable and we are not requesting that the controls be added to the permit. Additional controls under Regulation 13, Section 2.17.f.1., are not considered modifications to the facility.

2. Brief History of the Site

The foundry facility owned by RICHWOOD is located near Huntington, in Cabell County, West Virginia. The facility was installed/constructed by Xcel-Premet, Inc. circa 1976. The facility continues to operate as it was initially installed with some minor changes to equipment such as replacing the autoclave boiler with a smaller boiler. RICHWOOD purchased the facility in 2002 and has operated it since that time. RICHWOOD applied and obtained Regulation 13 Permit R13-2918 on June 24, 2012.

3. Description of the Process

This is a foundry which makes metal parts as required by contracts. The site starts with taking wax and making molds in mold-making machines. Each mold is made individually and then each mold is attached to a tree (a tree holds multiple molds). The tree with the molds attached is then alternately dipped into a binding solution and an aggregate (sand) material to form the outside of the casts. The dipped tree with the green casts on the outside is then air dried. When the air-dried cast is firm enough to stand removal of the internal wax mold, the tree is placed into the autoclave and the boiler quickly heats the autoclave (directly applied steam is placed in the autoclave) to remove the majority of the wax from the inside of the cast. Afterward, the tree is placed in the burnoff oven (cast curing oven) to remove the remainder of the wax and to cure the cast to the appropriate level and heat the cast so molten metal can be poured into it.

Molten metal cannot be poured directly into a cold cast. If a cast has been through the burnoff oven and has cooled prior to being filled, then the cast will be reheated in the oven prior to use. After pouring the molten metal into the cast, they are allowed to sit and cool prior to further work on the parts which have been cast. After appropriate cooling, the cast is taken to the finishing room and each individual part is cut from the tree and finished as required.

The operation is basically a manual process. Wax molds are made on machines with one operator for each machine. The molds are manually attached to the trees; the trees are manually dipped in the dip tanks and then hung on racks to dry. The green casts are then manually placed inside the autoclave and then the burnout furnace. Operators pour the molten metal from the small pot furnace into the finished casts and then place them in bins to cool. After cooling, the parts are cut off by hand tools and then manually finished to the degree of finishing required by the contract.

4. Sources of Emissions – Emissions Estimate

The source of the emissions is the fuel combustion in the boiler for the autoclave and the burnout furnaces, and particulate matter emissions from the process related operations such as heating and processing metal parts. In determining the potential to emit multiple sections of AP 42, Compilation of Air Pollutant Emission Factors (<http://www.epa.gov/ttn/chief/ap42/index.html>), Regulation 7 allowances, and some guidance from suppliers and air quality agencies is used as needed to represent the site potential emissions. The AP-42 sections used include: 12.10 Gray Iron Foundries, 1.4 Natural Gas Combustion, 13.2.6 Abrasive Blasting, and 13.2.2 Unpaved Roads.

Furnace, pouring, cooling, core (cast) making, and baking are estimated from AP-42, Section 12.10 Gray Iron Foundries. Within this section there are several emissions factors which are identified as being part of the process. Other emission factors/processes identified in this AP-42 section are not representative of the process and we have not included them in the emissions estimate.

The boiler and the burnout ovens are operated on natural gas. Emissions from combustion of natural gas are based on AP-42, Section 1.4 Natural Gas Combustion. The emissions from the boiler only include the natural gas combustion. The burnout ovens include wax emissions and the supplier of the new oven indicated that the units are rated to combust 7.8 pounds of wax per run. The supplier stated that the wax material either converts to a particulate or volatile organic compound (VOC) when heated in the burnout ovens. For the burnout ovens, we have estimated that the wax converts to a VOC only and is combusted in the afterburner portion of the burnout oven to a control of 99%. The afterburner is part of the burnout oven.

Although there are emissions identified in AP-42, Section 12.10 Gray Iron Foundries for finishing, etc., we have provided emissions based on the process weight of metal at 534 pounds per hour under Regulation 7 for Grinding and Miscellaneous activities that occur during finishing. These emissions are mostly from handheld or bench equipment. There are also three abrasive blast units (two wheelabrators and a blast station) in the facility. These are small box type units for smaller pieces of metal. We have estimated the emissions from all of these combined using a maximum of 500 pounds per hour of abrasive.

The Thermoset Machine is for thermosetting fiberglass reinforced polyester molding. The compound is heated and inserted into the mold. During the process it is estimated that there is an 11 percent loss ratio of the styrene in the open molding system according to the Minnesota Technical Assistance Program document found at <http://www.mntap.umn.edu/fiber/resources/41-Phoenix.htm>.

Emissions from deliveries of materials and shipping of finished products are estimated based on AP-42, Section 13.2.2 Unpaved Roads.

ATTACHMENT H
MATERIAL SAFETY DATA SHEETS

SECTION 5 - REACTIVITY DATA

STABILITY: STABLE [X] UNSTABLE []	CONDITIONS TO AVOID: Exposure to excessive heat or open flame.
INCOMPATIBILITY (MATERIALS TO AVOID): Oxidizing material & base.	
HAZARDOUS POLYMERIZATION: MAY OCCUR [] WILL NOT OCCUR [X]	CONDITIONS TO AVOID: Exposure to excessive heat or open flame, contamination with oxidizing agent.
HAZAROUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce carbon monoxide and/or carbon dioxide.	

SECTION 6 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section 2
EFFECTS OF OVEREXPOSURE: Breathing excessive concentration of vapor may cause dizziness and/or drowsiness.
EMERGENCY AND FIRST AID PROCEDURES: In case of dizziness and/or drowsiness, remove from exposure.

SECTION 7 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Eliminate all sources of ignition. Sweep up and place material in a suitable container.
WASTE DISPOSAL METHOD: Solidified material may be disposed of in local landfill. Disposal must be made in accordance with federal, state and local regulations.

SECTION 8 - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: The need for respiratory protection should be determined by an industrial hygiene evaluation. If concentration exceeds the OSHA permissible level, wear respiratory protection approved by NIOSH appropriate to the degree of exposure.	
VENTILATION	LOCAL EXHAUST: Preferable
	MECHANICAL: Acceptable
PROTECTIVE GLOVES: Chemical resistant gloves such as neoprene, polyvinyl alcohol, polyethylene etc.	
EYE PROTECTION: Safety glasses with side shields.	
OTHER: Chemical apron, normal work clothing covering arms and legs.	

SECTION 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
MAR-BAL compounds are packaged in special bags impermeable to styrene or vinyl toluene vapor. Do not puncture bag. Close bag tightly after partial use. Store material below 76 degrees Fahrenheit.

OTHER PRECAUTIONS:
Use material within two months. Do not transfer material to unmarked container.

SECTION 10 - FIRST AID MEASURE

SKIN CONTACT: Wash skin with soap and water.

INHALATION: Remove victim to fresh air. Give artificial respiration if breathing has stopped and seek medical aid.

EYE CONTACT: Flush eyes with plenty of water. Seek medical aid if irritation persists.

INGESTION: Do not induce vomiting. Seek medical aid.

SECTION 11 - DATE AND SOURCE OF INFORMATION

PREPARED BY: Francis S. Ng DATE: June 2, 1992.
TITLE: Materials Development Manager
SUPERSEDES: All previous
PHONE: (218) 543-7526

The above information is presented in good faith and is believed to be correct. This data is given without a warranty or representation. Mar-Bal Inc. will not assume any legal responsibility. It is offered solely for your consideration, investigation and verification.

Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> BINDZIL® 830, 1430 colloidal silica	<i>MSDS Code Number</i> 092
<i>Trade Name & Synonyms</i> Colloidal silica	<i>Date of Last Revision</i> 11/2005
<i>Chemical Name</i> Amorphous silica, aqueous colloidal solution	<i>Manufacturer</i> Ransom & Randolph
<i>C.A.S. Number</i>	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i> Investment casting binder	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<u>Hazardous Components</u>	<u>C.A.S. Number</u>	<u>%</u>
Silica, amorphous	7631-86-9	20 – 40%

3. Hazardous Identification

Emergency Overview
A colorless odorless clear liquid, which is a mild skin and eye irritant.

<i>Routes of Exposure</i>	<i>Signs & Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
<i>Eye</i>				May cause irritation	Eyes
<i>Skin</i>				May cause irritation	Skin
<i>Inhalation</i>					
<i>Ingestion</i>				None expected	
<i>Other</i>					

Medical Conditions Aggravated by Exposure

None known.

Carcinogenicity (IARC, NTP)

In the shipped form, this product was not evaluated by the IARC, not listed by NTP, and not regulated by OSHA.

Although amorphous silica is not a carcinogen as purchased in this product, portions of it may convert to crystalline silica (cristobalite) when subjected to higher temperatures (e.g. 1700° F), such as when used in a mold for ferrous and other high temperature alloy castings. The exposure to crystalline silica is highest at the mold knockout stage of the casting process.

The specifics on carcinogenicity of respirable crystalline silica follow:

The exposure limits for respirable crystalline silica; specifically cristobalite, established by OSHA-PEL = 0.05 mg/m³.

The IARC and NTP report the following on the carcinogenicity of respirable crystalline silica:

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on experimental animals and limited evidence in humans.

IARC Monograph Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent is carcinogenic to humans.

For more detailed information on the effects of crystalline silica, contact the manufacturer.

Potential Environmental Effects

4. First Aid Measures

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Immediately flush eyes thoroughly with water for at least 15 minutes		Obtain medical attention if irritation persists.
<i>Skin</i>	Immediately wash with soap and water. Remove all contaminated clothing, which should be laundered before reuse.		
<i>Inhalation</i>	Remove patient to fresh air. Upon irritation or breathing difficulty, consult a physician.		
<i>Ingestion</i>		Consult a physician.	

Other

Never give fluids or induce vomiting if patient is unconscious or having convulsions.

Note to Physicians (Treatment, Testing, and Monitoring)

Symptomatic treatment is advised.

5. Fire-fighting Measures

<i>Flashpoint: (Method)</i> N/A	<i>Flammable (Explosive) Limits in Air</i>		<i>Autoignition Temperature:</i> N/A	<i>Other</i>
	LEL: N/A	UEL: N/A		

<i>Flame Propagation or Burning Rate (for solids):</i>	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFDA Rating:</i>	
<i>Extinguishing Media</i> Water spray, foam, carbon dioxide, dry chemical		<i>Extinguishing Media to Avoid</i> N/A	
<i>Protection and Procedures for Firefighters:</i> Avoid eye and skin contact. Do not breathe fumes.			
<i>Unusual Fire and Explosion Hazards:</i> <p style="text-align: center;">None</p>			
6. Accidental Release Measures			
<i>Containment Techniques</i> Contain spill to prevent spreading.			
<i>Spill/Leak Clean-Up Procedures and Equipment</i> Absorb on solid absorbent materials. Shovel into containers for disposal.			
<i>Evacuation Procedures</i>			
<i>Special Instructions</i> Prevent run-off to sewers, streams, or bodies of water.			
<i>Reporting Requirements</i>			
7. Handling and Storage			
<i>Handling Practices and Warnings</i> Normal handling precautions applicable to industrial chemicals.			
<i>Storage Practices and Warnings</i> Do not freeze.			
8. Exposure Controls/Personal Protection			
<i>Ventilation</i>	<i>Other Engineering Controls</i> General ventilation.		
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>	
<i>Eye/Face</i>	Chemical workers goggles recommended.		
<i>Skin</i>	Rubber/PVC gloves and full workers clothes recommended.		
<i>Inhalation</i>	Use approved respirator for dusty or misty conditions.		
<i>General Hygiene Considerations and Work Practices</i>			
<i>Other Protective Measures and Equipment</i> Eye wash and shower.			

9. Physical and Chemical Properties

<i>Appearance</i> White, translucent liquid		<i>Odor</i> None	
<i>Normal Physical State:</i>		<i>Boiling Point</i>	212° F (100° C)
<i>Liquid</i> X <i>Gas</i>		<i>Melting Point</i>	32° F (0° C)
<i>Solid</i>		<i>Freezing Point</i>	32° F (0° C)
<i>Specific Gravity or Density (H₂O=1)</i> 1.20	<i>Solubility in Water</i> Disperse but is negligibly soluble	<i>pH</i> 9.25 – 10.5	
<i>Vapor Pressure (mm Hg.)</i> 17.5 mm Hg	<i>Vapor Density (AIR = 1)</i> 0.016	<i>Evaporation Rate (water=1)</i> 1	
<i>Other</i> % Volatile by volume: 70% (water)			

10. Stability and Reactivity

<i>Incompatibility (Materials to Avoid)</i> Metal oxide salts			
<i>Hazardous Products Produced During Decomposition</i> None			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i> Y	<i>Conditions to Avoid</i>
<i>Stability?</i>	<i>Stable</i> Y	<i>Unstable</i>	<i>Conditions to Avoid</i> Freezing

11. Toxicological Information

<i>Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data</i>	
<i>Toxicological information</i>	This product is considered to be relatively harmless to man. However, dust from the dry product/spray may irritate the respiratory tract and cause symptoms of bronchitis.
<i>Acute Toxicity</i>	LD50 (oral, rat) = 3160 mg/kg (as 100% Silicon dioxide).
<i>Component Analysis – LD50</i>	No information
<i>Inhalation Effects</i>	Rat TCLo = 50 mg/m ³ /6hr/2Y-I:CAR*
<i>Irritation to skin</i>	No information
<i>Irritation to eyes</i>	No information
<i>Sensitization Data</i>	Not a sensitizer. (Magnusson-Kilgman test).*

12. Ecological Information

<i>Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements</i>	
<i>Biodegradability:</i>	Not applicable for inorganic substances.
<i>Aquatic Toxicity:</i>	LC50 (Brachydanio rerio) 96 hr > 5000 mg/L. EC50 (Ceriodaphnia dubia) 48 hr = 7600 mg/L. Algae: EC50 (selenastrum capricornutum) = 440 mg/L.
This product is not expected to present an environmental hazard.	

13. Disposal Considerations			
<i>Regulations</i>			
In accordance with municipal, provincial, state and federal regulations.			
<i>Properties (Physical/Chemical) Affecting Disposal</i>			
14. Transport Information			
<i>Regulated for shipping?</i> Yes No <input checked="" type="checkbox"/>	<i>Proper Shipping Name</i> Not regulated	<i>Packing Group</i> N/A	
<i>Do changes in quality, packaging, or shipment method change product classification?</i> Yes No <input checked="" type="checkbox"/>	<i>Hazard Class</i> N/A	<i>Identification Number</i> N/A	
<i>Other</i> Not classified as dangerous for transport: ADR, RID, DOT, IMO, IMDG, ICAO, IATA-DGR.			
15. Regulator Information			
<i>Federal Regulations</i>			
US Federal Regulations: In compliance Canada DSL: In compliance			
<i>International Regulations</i>			
<i>Other</i>			
16. Other Information			
NFPA Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
HMIS Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
Personal Protection: Use NIOSH/OSHA approved respirator.			

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Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> Wet-It Wetting Agent	<i>MSDS Code Number</i> 261
<i>Trade Name & Synonyms</i>	<i>Date of Last Revision</i> 03/06
<i>Chemical Name</i> Ethoxylated Alcohol	<i>Manufacturer</i> Ransom & Randolph
<i>C.A.S. Number</i> 68439-46-3	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i> A nonionic surfactant used in colloidal silica based slurries	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<u>Hazardous Components</u>	<u>C.A.S. Number</u>	<u>%</u>
Ethoxylated Alcohol	68439-46-3	100

3. Hazardous Identification

Emergency Overview
This product may cause eye and skin irritation. Avoid contact with eyes and skin.

<i>Routes of Exposure</i>	<i>Signs & Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
<i>Eye</i>				Irritation	
<i>Skin</i>		Irritation			
<i>Inhalation</i>	In high concentrations, vapors may be irritating.				
<i>Ingestion</i>	Nausea				
<i>Other</i>					

Medical Conditions Aggravated by Exposure
May cause eye and skin irritation.

Carcinogenicity (IARC, NTP)
Not listed by IARC, NTP, OSHA, ACGIH

Potential Environmental Effects
Readily Biodegradable

4. First Aid Measures

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Flush with water for 15 minutes. Seek necessary medical aid.		

<i>Other</i>		Never give fluids or induce vomiting if patient is unconscious or having convulsions.	
<i>Note to Physicians (Treatment, Testing, and Monitoring)</i>			
5. Fire and Explosion Data			
<i>Flashpoint: (Method)</i>	<i>Flammable (Explosive) Limits in Air</i>		<i>Autoignition Temperature:</i>
	LEL: N/A	UEL: N/A	
<i>Flame Propagation or Burning Rate (for solids):</i>	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFDA Rating:</i>	<i>Other</i> This product is non combustible
<i>Extinguishing Media</i> Water spray, foam, dry chemical, carbon dioxide	<i>Extinguishing Media to Avoid</i>		
<i>Protection and Procedures for Firefighters:</i> Avoid eye and skin contact. Do not breathe fumes.			
<i>Unusual Fire and Explosion Hazards:</i> Material can splatter above 212°F (100°C). Dried product can burn.			
6. Accidental Release Measures			
<i>Containment Techniques</i> Dike around spilled material.			
<i>Spill/Leak Clean-Up Procedures and Equipment</i> Soak up with absorbent materials and remove to container for disposal. Wash area thoroughly with a detergent and water.			
<i>Evacuation Procedures</i>			
<i>Special Instructions</i>			
<i>Reporting Requirements</i>			
7. Handling and Storage			
<i>Handling Practices and Warnings</i> Normal warehouse handling.			
<i>Storage Practices and Warnings</i> Keep from freezing. Binder stored in transparent or translucent containers should be sheltered from direct sunlight.			
8. Exposure Controls/Personal Protection			
<i>Ventilation</i>	<i>Other Engineering Controls</i>		
Local exhaust	General ventilation		
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>		<i>PPE for Emergencies:</i>
Eye/Face	Safety glasses		
Skin	Protective gloves		
Inhalation			

13. Disposal Considerations

Regulations

Waste material must be disposed of in accordance with federal, state, and local environmental regulatory controls.

Properties (Physical/Chemical) Affecting Disposal

14. Transport Information

<i>Regulated for shipping?</i> Yes No <input checked="" type="checkbox"/>	<i>Proper Shipping Name</i> Cement – High temp bonding - bulk	<i>Packing Group</i> N/A
<i>Do changes in quality, packaging, or shipment method change product classification?</i> Yes No <input checked="" type="checkbox"/>	<i>Hazard Class</i> N/A	<i>Identification Number</i> N/A

Other

15. Regulator Information

Federal Regulations

International Regulations

Other

16. Other Information

NFPA Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
HMIS Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
Personal Protection: C – safety glasses, gloves, apron.			

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<i>Skin</i>	Remove contaminated clothing. Wash thoroughly with soap and water.		
<i>Inhalation</i>	Remove to fresh air. Insure breathing, seek necessary medical aid		
<i>Ingestion</i>		Get medical aid immediately.	
<i>Other</i>			
<i>Note to Physicians (Treatment, Testing, and Monitoring)</i>			
5. Fire-fighting Measures			
<i>Flashpoint: (Method)</i> >212F/100C (C.O.C.)	<i>Flammable (Explosive) Limits in Air</i> LEL: ND UEL: ND		<i>Autoignition Temperature:</i> 150C/302F
<i>Flame Propagation or Burning Rate (for solids):</i>	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFDA Rating:</i> 0	
<i>Extinguishing Media</i> Carbon dioxide, foam, dry chemicals		<i>Extinguishing Media to Avoid</i>	
<i>Protection and Procedures for Firefighters:</i> Do not breathe fumes. Use NIOSH approved respirator and protective clothing. Avoid eye and skin contact.			
<i>Unusual Fire and Explosion Hazards:</i>			
6. Accidental Release Measures			
<i>Containment Techniques</i>			
<i>Spill/Leak Clean-Up Procedures and Equipment</i> Soak up with absorbent materials and remove to container for disposal. Wash area thoroughly with soap and water.			
<i>Evacuation Procedures</i>			
<i>Special Instructions</i>			
<i>Reporting Requirements</i>			
7. Handling and Storage			
<i>Handling Practices and Warnings</i> No special handling requirements.			
<i>Storage Practices and Warnings</i> No special storage requirements.			

8. Exposure Controls/Personal Protection

<i>Ventilation</i> Local exhaust	<i>Other Engineering Controls</i> General ventilation not required but recommended.	
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>
<i>Eye/Face</i>	Safety glasses	
<i>Skin</i>	Gloves	
<i>Inhalation</i>	Normally not necessary	Self contained breathing apparatus recommended in very high concentrations.

General Hygiene Considerations and Work Practices

Other Protective Measures and Equipment
Eyewash and safety shower.

9. Physical and Chemical Properties

<i>Appearance</i> Clear/translucent liquid		<i>Odor</i>
<i>Normal Physical State:</i>		<i>Boiling Point</i> ND
<i>Liquid</i> X <i>Gas</i>		<i>Melting Point</i> NA
<i>Solid</i>		<i>Freezing Point</i>
<i>Specific Gravity or Density (H₂O=1)</i> 0.96 gm/ml @ 20°C	<i>Solubility in Water</i> Emulsifiable	<i>pH</i> 5 – 8 (1% in D.W.)
<i>Vapor Pressure (mm Hg.)</i>	<i>Vapor Density (AIR = 1)</i> ND	<i>Evaporation Rate (Butyl Acetate=1)</i>

Other

10. Stability and Reactivity

<i>Incompatibility (Materials to Avoid)</i> Strong oxidizers			
<i>Hazardous Products Produced During Decomposition</i> CO_x (thermal)			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i> Y	<i>Conditions to Avoid</i> None
<i>Stability?</i>	<i>Stable</i> Y	<i>Unstable</i>	<i>Conditions to Avoid</i> None

11. Toxicological Information

Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data

12. Ecological Information

Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements

13. Disposal Considerations

Regulations

Dispose of in accordance with local, state and federal EPA regulations

Properties (Physical/Chemical) Affecting Disposal

14. Transport Information

Regulated for shipping?

Yes No

Proper Shipping Name

N/A

Packing Group

N/A

Do changes in quality, packaging, or shipment method change product classification?

Yes No

Hazard Class

N/A

Identification Number

N/A

Other

15. Regulator Information

Federal Regulations

Not controlled under the HSC. Not reportable SARA 313 Form R

International Regulations

Other

Not controlled under California Prop 65

16. Other Information

HMIS – Health 2 – Fire 1 – Reactivity 0

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Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> Mulcoa, Mulgrain (M47, M60, M70)	<i>MSDS Code Number</i> 334
<i>Trade Name & Synonyms</i> Alumino silicate, mullite	<i>Date of Last Revision</i> 01/2005
<i>Chemical Name</i> Alumino silicate	<i>Manufacturer (Distributor)</i> Ransom & Randolph
<i>C.A.S. Number</i>	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i> Refractory material	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<u>Hazardous Components</u>	<u>C.A.S. Number</u>	<u>%</u>
Silica (cristobalite)	14464-46-1	<15
Mullite	1302-93-8	<85

3. Hazardous Identification

Emergency Overview These products contain crystalline silica. Do not breathe dust. May cause delayed lung injury (silicosis, pneumoconiosis).

<i>Routes of Exposure</i>	<i>Signs & Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
<i>Eye</i>	Irritation				
<i>Skin</i>	Irritation				
<i>Inhalation</i>	Cough, tightness in chest, shortness of breath, wheezing and sputum production	Silicosis	Silicosis	Silicosis	Lungs
<i>Ingestion</i>	Not likely route.				
<i>Other</i>					

Medical Conditions Aggravated by Exposure

Any pre-existing respiratory or pulmonary disease or condition, such as, but limited to, bronchitis, emphysema, and asthma. Individuals with silicosis are predisposed to develop tuberculosis.

Carcinogenicity (IARC, NTP)

NTP: Yes	The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.
IARC: Yes	IARC Monographs Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent in carcinogenic to humans.

OTHER: California Proposition 65

Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

Potential Environmental Effects

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

4. First Aid Measures

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Flush with plenty of water.	If discomfort or irritation persists, consult a physician.	
<i>Skin</i>	Wash with soap and water.	If discomfort or irritation persists, consult a physician.	
<i>Inhalation</i>	Remove affected person to fresh air.	If discomfort or irritation persists, consult a physician.	
<i>Ingestion</i>	Drink water. Do not induce vomiting.	If discomfort or irritation persists, consult a physician.	
<i>Other</i>			

Note to Physicians (Treatment, Testing, and Monitoring)

5. Fire-fighting Measures

<i>Flashpoint: (Method)</i> N/A	<i>Flammable (Explosive) Limits in Air</i> LEL: N/A UEL: N/A		<i>Autoignition Temperature:</i>	<i>Other</i> Do not inhale dust. Wear respirator.
<i>Flame Propagation or Burning Rate (for solids):</i> This product will not burn.	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFDA Rating:</i> 0		
<i>Extinguishing Media</i> This product is compatible with all extinguishing media.	<i>Extinguishing Media to Avoid</i> Use any media appropriate for the surrounding fire.			

Protection and Procedures for Firefighters:
Do not inhale dust. Avoid eye and skin contact.

Unusual Fire and Explosion Hazards:
None

6. Accidental Release Measures

<i>Containment Techniques</i>
<i>Spill/Leak Clean-Up Procedures and Equipment</i> Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Wear protective equipment.
<i>Evacuation Procedures</i>
<i>Special Instructions</i>
<i>Reporting Requirements</i> Consult and comply with current national, regional, state, and local regulations.

7. Handling and Storage

Handling Practices and Warnings

Avoid breakage of packaged materials or spills of bulk material.

Storage Practices and Warnings

Use dustless systems for handling, storage and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section VIII.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. **WARN YOUR EMPLOYEES (AND CUSTOMERS-USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARD AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.**

See also American Society for Testing and Materials (ASTM) Standard Practice E1132-86, "Standard Practice for Health Requirements Relating to Exposure to Quartz Dust."

8. Exposure Controls/Personal Protection

<i>Ventilation</i>	<i>Other Engineering Controls</i> Use sufficient local exhaust to reduce the level of respirable dust to the permissible exposure limit. See "Industrial Ventilation, A Manual of Recommended Practice," the latest edition.	
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>
<i>Eye/Face</i>	Wear protective shield (safety glasses) when exposed to dust particles.	
<i>Skin</i>	Boots, aprons, protective gloves should be used when necessary to prevent skin contact.	
<i>Inhalation</i>		

General Hygiene Considerations and Work Practices

Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean and fit test respirator in accordance with regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty.

Respirator Protection: The following chart specifies the types of respirators which may provide respiratory protection for crystalline silica.

CONDITION Particulate Concentration	RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA MINIMUM RESPIRATORY PROTECTION*
Up to 5 x PEL	Any dust respirator.
Up to 10 x PEL	Any dust respirator, except single-use or quarter mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
Up to 50 x PEL	A high efficiency particulate filter respirator with a full-face piece. Any supplied-air respirator with a full-face piece, helmet, or hood. Any self-contained breathing apparatus with a full-face piece.
Up to 500 x PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.

Greater than 500 x PEL or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full-face piece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full-face piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Abrasive Blasting	Any Type CE, supplied-air respirator with a full-face piece, hood, or helmet, operated in a positive-pressure mode. (See 29 CFR Section 1910.94 (a).)

***Only NIOSH-approved equipment should be used. (See 29 CFR Section 1910.134).**

See also ANSI standard Z88.2 (latest version) "Practices for Respiratory Protection."

9. Physical and Chemical Properties

<i>Appearance</i> Brown-gray powder or granular material		<i>Odor</i>	
<i>Normal Physical State:</i>		<i>Boiling Point</i>	N/A
<i>Liquid</i>	<i>Gas</i>	<i>Melting Point</i>	N/A
<i>Solid</i>	X	<i>Freezing Point</i>	N.A
<i>Specific Gravity or Density (H₂O=1)</i> 2.65	<i>Solubility in Water</i> <0.5% by weight		<i>pH</i> 6 - 8
<i>Vapor Pressure (mm Hg.)</i> N/A	<i>Vapor Density (AIR = 1)</i> N/A		<i>Evaporation Rate (Butyl Acetate=1)</i>
<i>Other</i>			

10. Stability and Reactivity

<i>Incompatibility (Materials to Avoid)</i> None			
<i>Hazardous Products Produced During Decomposition</i> None			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i> Y	<i>Conditions to Avoid</i> N/A
<i>Stability?</i>	<i>Stable</i> Y	<i>Unstable</i> N	<i>Conditions to Avoid</i> None

11. Toxicological Information

Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data

Crystalline Silica - Prolonged exposure to respirable crystalline silica may cause delayed (chronic) lung injury (silicosis, pneumoconiosis). Acute or rapidly developing silicosis may occur in a short period of time in heavy exposure in certain occupations such as sandblasters. Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death. There is evidence that individuals with silicosis may also experience incidences of scleroderma (immune system disorder), tuberculosis, and nephrotoxicity (kidney lesions).

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

IARC Monographs Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent in carcinogenic to humans.

Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

Alumino Silicate (Mullite) – Long-term inhalation of respirable kaolin dusts has caused lung fibrosis (kaolinosis) in experimental animals and workers. In the absence of crystalline silica, it appears that kaolin causes a relative mild fibrosis which generally will not produce pulmonary disease. Kaolinosis can either be simple or complex in nature with complex kaolinosis being associated with respiratory changes and decreased ability of the lungs to provide oxygen.

12. Ecological Information

Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements

No ecotoxicity data available. This product is not expected to present an environmental hazard.

13. Disposal Considerations

Regulations

Dispose in accordance with national, regional, state, and local regulations.

Properties (Physical/Chemical) Affecting Disposal

14. Transport Information

Regulated for shipping?

Yes No

Proper Shipping Name

Plaster

Packing Group

N/A

Do changes in quality, packaging, or shipment method change product classification?

Yes No

Hazard Class

N/A

Identification Number

N/A

Other

15. Regulator Information

Federal Regulations

International Regulations

Other

WARNING:

Contains respirable crystalline silica (RCS). Do not breathe dust. May cause delayed lung injury (silicosis, pneumoconiosis). The IARC (International Agency for Research on Cancer) reports IARC Monograph 68) there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. The NTP (National Toxicity Program) reports (Ninth Annual Report on Carcinogens) that RCS is known to be a carcinogen based on sufficient evidence from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust. Follow Safety and Health Standards for crystalline silica.

16. Other Information

NFPA Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
HMIS Hazard Rating	Health: 3	Flammability: 0	Reactivity: 0
	Personal Protection: Use NIOSH/OSHA approved respirator.		

The information set forth herein has been gathered from standard reference materials and/or Ransom & Randolph Company test data and is, to the best knowledge and belief of Ransom & Randolph Company accurate and reliable. Such information is offered solely for your consideration, investigation and verification and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. Ransom & Randolph Company makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identifies here in combination with any other material or process, and assumes no responsibility therefore.

TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES

The following table shows the Occupational Exposure Limits (OEL) for quartz, cristobalite and tridymite in application in Europe and in some other countries.

Country	Occupational Exposure Limit (OEL) Name	Adopted by	Quartz (q)	Cristobalite (c)	Tridymite (t)
Australia	National Exposure Standard	Worksafe Australia, National Occupational Health & Safety Commission	0.2	0.1	
Austria	Maximalen Arbeitsplatzkonzentration	Bundesministerium für Arbeit und Soziales	0.15	0.15	0.15
Belgium		Ministère de l'Emploi et du Travail	0.1	0.05	0.05
Denmark	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Finland	Occupational Exposure Standard	National Board of Labour Protection	0.2	0.1	0.1
France	Empoussiérage de référence	Ministère de l'Industrie (RGIE)	5 or 25k/Q		
	Valeur limite de Moyenne d'Exposition	Ministère du Travail	0.1	0.05	0.05
Germany	Maximalen Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Greece		Legislation for mining activities	0.1	0.05	0.05
Ireland		2001 Code of practice for the Safety, Health & Welfare at Work (CoP)	0.05	0.4	0.4
Italy	Threshold Limit Value	Associazione Italiana Degli Igienisti Industriali	0.05	0.05	0.05
Luxembourg	Maximien Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Netherlands	Maximaal Aanvarde Concentratie	Ministerie van Sociale Zaken en Werkgelegenheid	0.075	0.075	0.075
Norway	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Portugal	Threshold Limit Value	Instituto Portuges da Qualidade, Hygiene & Safety at Workplace	0.1	0.05	0.05
Spain	Valores Limites	Instituto Nacional de Seguridad e Higiene en el Trabajo	0.1		
		Instrucciones de Técnicas Complementarias (ITC)	0.1	0.05	0.05
		Reglamento General de Normas Basicas de Seguridad Minera	5 or 25k/Q		
Sweden		National Board of Occupational Safety and Health	0.1	0.05	0.05
Switzerland	Valeur limite de Moyenne d'Exposition		0.15	0.15	0.15
United Kingdom	Maximum Exposure Limit	Health & Safety Executive	0.3	0.3	0.3
	Occupational Exposure Standard				
USA	Permissible Exposure Limit	Occupational Safety & Health Administration	10/(%SiO ₂ +2)	PEL (Quartz)/2	PEL (Quartz)/2
	Threshold Limit Value	American Conference of Governmental Industrial Hygienists	0.05	0.05	0.05

Q: quartz percentage

Source: Adapted from IMA-Europe

Date: 08/05/03, Updated version available at <http://www.ima-eu.org/en/silhsefacts.html>

OELs are applicable to 100 % quartz, cristobalite or tridymite.

Some countries have special rules for mixed dust, e.g. in France the following equation is applied: $C_{ns}/5 + C_q/0.05 + C_t/0.05 \leq 1$ (C = mean concentration, ns = non silicogen)



MATERIAL SAFETY DATA SHEET

CANNON-MUSKEGON CORPORATION
BOX 506 MUSKEGON, MI 49443-0506
616 / 755-1681 - TLX 510/394/4620
FACS/MILE#: 616 / 755-4016

This M.S.D.S. supersedes any previously issued.

Date: September 1987

I. MATERIAL IDENTIFICATION

Material Type: Cobalt Base Alloys

II. HAZARDOUS INGREDIENTS

<u>Element</u>	<u>%</u>	<u>CAS Number*</u>	<u>ACGIH TLV** (mg/m3)</u>
Al Aluminum	<10	7429-90-5	10
B Boron	< 1	1303-86-2	10
C Carbon	< 5	1333-86-4	3.5
Cr Chromium	<40	7440-47-3	0.5
Co Cobalt	BASE	7440-48-4	0.1
Cb Columbium	<10	-	None
Cu Copper	<30	7440-50-8	0.2
Hf Hafnium	< 1	7440-58-6	0.5
Fe Iron	<25	1309-37-1	5
La Lanthanum	< 1	-	None
Mn Manganese	< 5	7439-96-5	1
Mo Molybdenum	<20	7439-98-7	10
Ni Nickel	<40	7440-02-0	1
Re Rhenium	< 5	-	None
Se Selenium	< 1	7782-49-2	0.2
Si Silicon	< 5	7740-21-3	10
S Sulphur	< 1	7446-09-5	5
Ta Tantalum	<10	7740-25-7	5
Ti Titanium	<10	13463-67-7	10
W Tungsten	<30	7440-33-7	5
V Vanadium	< 5	1314-62-1	0.05
Yt Yttrium	< 1	7440-65-5	1
Zr Zirconium	< 1	7440-67-2	5

III. PHYSICAL DATA

Specific Gravity Range: 7.6 - 9.2 g/cc (room temperature)
Appearance and Odor: Silver-gray metallic color, no odor
Melting Point Range: 2200-2900°F
Solubility in Water: Insoluble (room temperature)

* Chemical Abstracts Service Number

** American Conference of Governmental Industrial Hygienists 1985-1986
Threshold Limit Values based on an 8-hour day, 40-hour week.

CANNON-MUSKEGON CORPORATION

----- IV. FIRE AND EXPLOSION HAZARD DATA -----

Metal in bulk form is not combustible. Fire and explosion hazards exist when dust particles are exposed to heat, flames, strong oxidizers, or chemicals that support combustion.

Extinguishing media: Dry chemical or dry sand

----- V. HEALTH HAZARD DATA -----

Normal handling of alloys in solid form presents minimal health hazards. The primary route of entry is through inhalation of dust or fumes. For melting and cutting considerations, see Section II. Local exhaust ventilation should be adequate to keep airborne concentrations below TLV (or use NIOSH approved respiratory equipment). In the case of overexposure, remove the person to fresh air. If breathing has stopped, begin artificial respiration. Seek medical attention.

Research agency studies indicate some increased risk of cancer resulting from exposure to hexavalent chromium compounds and nickel refining operations. Studies of workers exposed to chromium and nickel in alloy production do not indicate a hazard.

Excessive or prolonged skin contact may cause irritation in sensitized persons. Wash with soap and water. In the case of eye contact, flush thoroughly with water. Wear protective clothing.

----- VI. REACTIVITY DATA -----

Avoid damp or wet storage conditions. Molten metal may react violently with water. Avoid contamination with petroleum products. Dust particles may react with strong acids, bases, and oxidizers.

----- VII. SPILL AND DISPOSAL PROCEDURES -----

Large quantities of dust should be vacuumed or swept wet to keep airborne concentrations minimal. Protective clothing should be worn in clean-up operations. Recycle or dispose of according to Federal, State and Local regulations.

----- VIII. SPECIAL PRECAUTIONS -----

Provide local exhaust ventilation adequate to keep airborne metal dust concentrations below TLV. Smoking and food should not be consumed in areas where metal dust is generated.

The information contained in the M.S.D.S. is believed to be valid and accurate. The seller, however, makes no warranty, either expressed or implied, as to the completeness of information in all possible conditions. Reasonable safety precautions must always be observed.

MATERIAL SAFETY DATA SHEET

1. MATERIAL IDENTIFICATION

Manufacturer's Name: The G. A. Avril Company
 Address: 4445 Kings Run Drive
 Cincinnati, Ohio 45232

Telephone Number: 513-641-0566

Material Name: Copper Base Alloy Ingot

11. HAZARDOUS INGREDIENTS

NOTE: Refer to attached chart to determine which of the following are contained in this material. If chemicals below are not listed on the chart for the material, manufacturer reasonably believes they are not present, or present only in amounts less than 1% by weight of the product (if not a carcinogen) or less than 0.1% (if a known or suspected carcinogen).

CHEMICAL	SYMBOL	CAS #	TLV mg/cu.m	PEL mg/cu.m	MELTING PT. F deg.	BOILING PT. F deg.	SPECIFIC GRAVITY g./c.c.
*ALUMINUM**	Al	7429-90-5	10.0-total 5.0-welding fume	15.0-total 5.0-resp. 5.0-welding fume	1220	4521	2.70
ALUMINA		1344-28-1	10.0-total	10.0-total 5.0-resp.			
*ANTIMONY	Sb	7440-36-0	0.5	0.5	1167	2888	6.69
*BERYLLIUM	Be	7440-41-7	0.002	0.002	2354	5018	1.85
BORON	B	7440-42-8	see oxide	see oxide	4172	4622	2.30
BORON OXIDE		1303-86-2	10.0-total 5.0-resp.	10.0-total 5.0-resp.			
*CADMIUM	Cd	7440-43-9	0.05	0.1	610	1412	8.65
*CHROMIUM	Cr	7440-47-3	0.5	1.0	3407	4856	7.14
*COPPER	Cu	7440-50-8	1.0-dust 0.2-fume	1.0-dust 0.1-fume	1982	4678	8.94
IRON	Fe	7439-89-6	See oxide	See oxide	2795	5430	7.87
IRON OXIDE		1309-37-1	5.0-dust & fume	10.0-dust & fume			
*LEAD	Pb	7439-92-1	0.15	0.05	621	3182	11.35

MATERIAL SAFETY DATA SHEET

PAGE: 2

CHEMICAL	SYMBOL	CAS #	TLV mg/cu.m	PEL mg/cu.m	MELTING PT. F deg.	BOILING PT. F deg.	SPECIFIC GRAVITY g./c.c.
*MANGANESE	Mn	7439-96-5	5.0-dust 1.0-fume	5.0-dust 1.0-fume	2273	3803	7.20
MOLYBDENUM	Mo	7439-98-7	10.0-total insoluble compounds	10.0-total 5.0-resp. insoluble compounds	4730	10040	10.20
*NICKEL	Ni	7440-02-0	1.0	1.0	2645	4950	8.85
*PHOSPHORUS	P	7723-14-0	0.1	0.1	111	536	1.82
*SILVER	Ag	7440-22-4	0.01	0.01	1761	3542	10.50
TIN	Sn	7440-31-5	2.0 Inorganics except as oxides for PEL and TLV	2.0	450	5018	7.30
ZINC	Zn	7440-66-6	See oxide	See oxide	787	1661	7.14
ZINC OXIDE		1314-13-2	10.0-total 5.0-fume	10.0-total 5.0-fume 5.0-resp.			

SPECIAL INSTRUCTIONS FOR SARA 313 CHEMICALS

The chemicals present in this product which are marked with an asterisk (*) are subject to the reporting requirements of Section 313 of Title 111 of the Superfund Amendment and Reauthorization Act of 1986 in 40 CFR, Part 372. If no percentage is shown on the attached chart, the chemical represents less than 1% by weight of the product (if the chemical is not a carcinogen) or less than 0.1% (if the chemical is a known or suspected carcinogen). This information must be included in all MSDSs that are copied and distributed for this material.

** Aluminum and Zinc are only reportable as fume or dust.

SHORT TERM EXPOSURE LIMIT (STEL)

The elements above with Short Term Exposure Limits (STELs) are as follows:

Beryllium - 0.005 ppm (30 minutes)
 Manganese Fume - 3 mg/m³
 Zinc Oxide Fume - 10 mg/m³

MATERIAL SAFETY DATA SHEET

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CEILING LIMITS

The elements above with Ceiling Limits are as follows:

Manganese - 5 mg/m³

III. PHYSICAL DATA

Melting Point (F):	See Section 11	Specific Gravity:	See Section 11
Vapor Pressure:	NA	Vapor Density:	NA
% Volatile by Volume:	NA	Evaporation Rate:	NA
Solubility in Water:	Insoluble		
Odor:	No Odor		
Appearance:	Aluminum	-	Silvery ductile metal
	Antimony	-	Silvery or gray lustrous metal
	Boron	-	Monoclinic crystals, yellow or brown amorphous powder
	Cadmium	-	Silver white metal
	Chromium	-	Steel gray
	Copper	-	Distinct reddish metal
	Iron	-	Silvery-white lustrous ductile metal
	Lead	-	Bluish-gray soft metal
	Manganese	-	Reddish-gray or silvery, brittle, metallic element
	Nickel	-	Silvery-white, hard, malleable and ductile metal
	Phosphorus	-	Reddish-brown powder
	Silver	-	Soft, ductile, malleable lustrous metal
	Tin	-	Crystalline metallic element
	Zinc	-	Bluish-white lustrous metal

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: NA Method Used: NA
Flammable Limits: LEL = NA UEL = NA
Extinguishing Media: Mixture of dry chemical and sand.

Special Fire Fighting Procedures:

Aluminum: Solid, massive form is not combustible until melting occurs. Use fire fighting methods that are appropriate for surrounding fire. Small chips, fine turnings, and dust may ignite readily. Use class D extinguishing agents or dry sand on fines. **DO NOT** use halogenated agents, water, foam, carbon dioxide or ammonium phosphate dry chemical on small chips or fines. Dust clouds may be explosive. PREVENT FORMATION OF A DUST CLOUD. Molten metals may explode on contact with water. They may also react violently with water, rust and certain metal oxides (e.g., oxides of copper, iron and lead).
Fire fighters should wear self-contained breathing apparatus and protective clothing.

Others: Solid, massive form is not combustible until melting occurs. Fire and explosion hazards are moderate when material is in the form of dust and exposed to heat, flames, chemical reaction, or contact with powerful oxidizers. Use special mixtures of dry chemical or sand. Fire fighters should wear self-contained breathing apparatus and protective clothing.

Molten metals may explode on contact with water.

V. HEALTH HAZARD DATA

Permissible Exposure Limits and Threshold Limit Values: See Section II

Route(s) of Entry:

Inhalation: Yes

Skin: Yes

Ingestion: Yes

Effects of Overexposure:

*Aluminum/Alumina

Aluminum dust/fines and fumes are a low health risk by inhalation and are normally treated as a nuisance dust in normal operation (e.g., milling, cutting, grinding). The AHA Hygiene guide lists toxicity of ingestion as "none expected". Excessive exposure to aluminum fume and dust has been associated with lung disease, but this effect is probably due to simultaneous silica exposures.

*Antimony

Antimony and its compounds are irritating to the skin and mucous membranes and are systemic poisons. Effects are reported to include a metallic taste in the mouth, vomiting, colic, loss of appetite and weight, and diarrhea. Excessive exposure to antimony has caused dermatitis which starts as an inflammation of the hair follicles and can progress through pus formation and sloughing to leave a contracted scar, rhinitis, eye irritation, pain and tightness in the chest, gastrointestinal disorders and neurological disturbances such as irritability, sleeplessness, dizziness and neuralgia. Chronic inhalation of antimony trioxide is reported to produce a reduction in white blood cells and damage to the liver.

When heated or on contact with acids, antimony emits toxic fumes of SbH₃.

Antimony and its compounds have been identified as suspected cancer-causing agents.

*Beryllium

Beryllium is among the most chemically toxic of the metals. Beryllium and its compounds are severe pulmonary irritants, primary skin irritants, and skin sensitizers. The principal symptom of acute exposure is dyspnea. Chronic inhalation causes "berylliosis", or chronic pulmonary granulomatosis. The disease begins with dyspnea and cough and progresses to anorexia, fatigue, and weakness. Skin contact will result in dermatitis leading to moderate and severe burns. Eye contact produces conjunctivitis. Soluble compounds are both acutely and chronically toxic, insoluble compounds are only chronically hazardous.

MATERIAL SAFETY DATA SHEET

PAGE: 7

*Phosphorus

Red phosphorus does not react with the air and is extremely insoluble making it harmless. Yellow phosphorus is extremely flammable. The liquid ignites spontaneously in the presence of air. It is normally stored as a solid kept under water and is transferred as a liquid. Yellow phosphorus is toxic and may produce poisoning if taken by mouth. Contact with skin may cause severe and painful burns and the contact area turns grayish-white. Often there is infection. Respiratory tract irritation has been caused by inhalation of vapors (oxide). Chronic poisoning takes the form of general weakness, including anemia, loss of appetite, indigestion, and chronic cough resulting from irritation of the gastrointestinal system and fatty degeneration of the liver.

*Silver

The only reported effect from silver comes from small particles in the skin which causes argyria, a permanent discoloration (gray or purple). Silver nitrate dust and solutions are highly corrosive to the skin, eyes, and intestinal tract. Silver nitrate dust may cause local irritation of the skin, burns of the conjunctiva, and blindness. Localized pigmentation of the skin and eyes may occur. The eye lesions are first seen in the caruncle, and then in the conjunctiva and cornea. The nasal septum and tonsillar pillars also may become pigmented. Inhalation of silver may localize the argyria in the respiratory tract with chronic bronchitis as the only symptom.

Tin

The inhalation of inorganic tin fumes or dust may cause an apparent benign pneumoconiosis called stannosis which is reported not to be disabling.

*Zinc (as Oxide)

Zinc is relatively low in toxicity but inhalation of fumes may cause "metal fume fever." Onset of symptoms may be delayed 4-12 hours and include irritation of the nose, mouth, and throat, cough, stomach pain, headache, nausea, vomiting, metallic taste, chills, fever, pains in the muscles and joints, thirst, bronchitis or pneumonia and a bluish tint to the skin. These symptoms go away in 24-48 hours and leave no effect.

Emergency and First Aid Procedures:

Eye Contact: Flush well with running water to remove particulate. Get medical attention.

Skin Contact: Vacuum off excess dust. Wash well with soap and water. Remove contaminated clothing and launder before using again. Avoid blowing particulate into the atmosphere.

Inhalation: Remove to fresh air. Get medical attention.

Ingestion: If particles are ingested, give 1-2 glasses of water or milk. Induce vomiting only if victim is fully conscious and has not convulsed. Seek medical attention if large quantities of material have been ingested. Check airborne levels of lead and employee blood leads in accordance with OSHA standards.

MANGANESE BRONZE AND LEADED MANGANESE BRONZE ALLOYS

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS A RANGE OR MINIMUM)

COPPER ALLOY NO	Cu ⁽⁴⁵⁾⁽⁵³⁾	Sn	Pb	Zn	Fe	Ni ⁽⁴⁵⁾		Al	Mn
						(incl Co)			
C86100	66.0-68.0	.20	.20	Rem	2.0-4.0	-		4.5-5.5	2.5-5.0
C86200	60.0-66.0	.20	.20	22.0-28.0	2.0-4.0	1.0		3.0-4.9	2.5-5.0
C86300	60.0-66.0	.20	.20	22.0-28.0	2.0-4.0	1.0		5.0-7.5	2.5-5.0
C86400	56.0-62.0	.50-1.5	.50-1.5	34.0-42.0	4.0-2.0	1.0		5.0-1.5	1.0-1.0
C86500	55.0-60.0	1.0	.40	36.0-42.0	4.0-2.0	1.0		5.0-1.5	1.0-1.5
C86700	55.0-60.0	1.5	.50-1.5	30.0-38.0	1.0-3.0	1.0		1.0-3.0	1.0-3.5
C86800	53.5-57.0	1.0	.20	Rem.	1.0-2.5	2.5-4.0		2.0	2.5-4.0

COPPER-SILICON ALLOYS (SILICON BRONZES AND SILICON BRASSES)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS A RANGE OR MINIMUM)

COPPER ALLOY NO	Cu	Sn	Pb	Zn	Fe	Al	Si	Mn	Mg	Ni ⁽⁴⁵⁾		S	OTHER NAMED ELEMENTS
										(incl Co)			
C87300	94.0min ⁽¹⁷⁾	-	.20	.25	.20	-	3.5-4.5	8-1.5	-	-	-	-	-
C87400	79.0min ⁽⁴⁸⁾	-	1.0	12.0-16.0	-	.8	2.5-4.0	-	-	-	-	-	-
C87410	79.0min ⁽⁴⁸⁾	-	1.0	12.0-16.0	-	.8	2.5-4.0	-	-	-	-	-	03-06As
C87420	79.0min ⁽⁴⁸⁾	-	1.0	12.0-16.0	-	.8	2.5-4.0	-	-	-	-	-	03-06Sb
C87430	79.0min ⁽⁴⁸⁾	-	1.0	12.0-16.0	-	.8	2.5-4.0	-	-	-	-	-	03-06P
C87500	79.0min ⁽¹⁷⁾	-	.50	12.0-16.0	-	.50	3.0-5.0	-	-	-	-	-	-
C87510	79.0min ⁽¹⁷⁾	-	.50	12.0-16.0	-	.50	3.0-5.0	-	-	-	-	-	03-06As
C87520	79.0min ⁽¹⁷⁾	-	.50	12.0-16.0	-	.50	3.0-5.0	-	-	-	-	-	03-06Sb
C87530	79.0min ⁽¹⁷⁾	-	.50	12.0-16.0	-	.50	3.0-5.0	-	-	-	-	-	03-06P
C87600	88.0min ⁽¹⁷⁾	-	.50	4.0-7.0	.20	-	3.5-5.5	.25	-	-	-	-	-
C87610	90.0min ⁽¹⁷⁾	-	.20	3.0-5.0	.20	-	3.0-5.0	.25	-	-	-	-	-
C87800	80.0min ⁽¹⁷⁾	.25	.15	12.0-16.0	.15	.15	3.8-4.2	.15	.01	.20	.05	.05	.01P .05As .05Sb
C87900	63.0min ⁽¹⁷⁾	.25	.25	30.0-36.0	.40	.15	.8-1.2	.15	-	.50	.05	.05	.01P .05As .05Sb

COPPER-TIN ALLOYS (TIN BRONZES)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS A RANGE OR MINIMUM)

COPPER ALLOY NO	Cu ⁽⁴⁵⁾⁽⁵⁴⁾	Sn	Pb	Zn	Fe	Sb	Ni ⁽⁴⁵⁾		P ⁽⁴⁴⁾	Al	Si	Mn
							(incl Co)	S				
C90200	91.0-94.0 ⁽⁵⁴⁾	6.0-8.0	.30	.50	.20	.20	.50	.05	.05	.005	.005	-
C90250	89.0-91.0	9.0-11.0	.30	.50	.25	.20	.8	.05	.05	.005	.005	.10
C90300	86.0-89.0	7.5-9.0	.30	3.0-5.0	.20	.20	1.0	.05	.05	.005	.005	-
C90500	86.0-89.0 ⁽²³⁾	9.0-11.0	.30	1.0-3.0	.20	.20	1.0	.05	.05	.005	.005	-
C90700	88.0-90.0	10.0-12.0	.50	.50	.15	.20	.50	.05	.30	.005	.005	-
C90710	Rem	10.0-12.0	.25	.05	.10	-	1.0	-	50-1.2	.005	.005	-

**COPPER-TIN-ZINC-AND COPPER-TIN-ZINC-LEAD-ALLOYS
(RED BRASSES AND LEADED RED BRASSES)**

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS A RANGE OR MINIMUM)

COPPER ALLOY NO	Cu(45)(46)	Sn	Pb	Zn	Fe	Sb	As	Ni(45) (incl Co)	S	P(44)	Al	Si	Bi
C83300	92.0-94.0	1.0-2.0	1.0-2.0	2.0-6.0	.5	.5	.	.5	.05	.03	.	.	.
C83400	88.0-92.0	.20	.50	8.0-12.0	.	.	.	.5	.05	.03	.	.	.
C83410	88.0-91.0	1.0-2.0	.10	Rem	.05	.	.	.05	.	.	.005	.005	.
C83420	88.0-92.0	25-7	.50	Rem	.10	.	.	.5	.	.	.	.	.
C83450	87.0-89.0	2.0-3.5	1.5-3.0	5.5-7.5	.30	.25	.	8-2.0	.08	.03	.005	.005	.
C83500	86.0-88.0	5.5-6.5	3.5-5.5	1.0-2.5	.25	.25	.	50-1.0	.08	.03	.005	.005	.
C83520	Rem	3.5-4.5	3.5-4.5	1.5-4.0	.30	.25	.	1.0	.	.	.	.	.
C83600	84.0-86.0	4.0-6.0	4.0-6.0	4.0-6.0	.30	.25	.	1.0	.06	.05	.005	.005	.
C83700	83.0-88.0	.10	.50	Rem	.30	.	.05-20	.30	.	.	.005	.005	.
C83800	82.0-83.8	3.3-4.2	5.0-7.0	5.0-8.0	.30	.25	.	1.0	.08	.03	.005	.005	.
C83810	Rem	2.0-3.5	4.0-6.0	7.5-9.5	50(47)	(47)	(47)	2.0	.	.	.005	.005	.10

SEMI-RED BRASSES AND LEADED SEMI-RED BRASSES

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS A RANGE OR MINIMUM)

COPPER ALLOY NO	Cu(45)(48)	Sn	Pb	Zn	Fe	Sb	Ni(45) (incl Co)	S	P(44)	Al	Si	Bi
C84200	78.0-82.0	4.0-6.0	2.0-3.0	10.0-16.0	.40	.25	.8	.08	.05	.005	.005	.
C84400	78.0-82.0	2.3-3.5	6.0-8.0	7.0-10.0	.40	.25	1.0	.08	.02	.005	.005	.
C84410	Rem	3.0-4.5	7.0-9.0	7.0-11.0	(49)	(49)	1.0	.	.	.05	.20	.05
C84500	77.0-79.0	2.0-4.0	6.0-7.5	10.0-14.0	.40	.25	1.0	.08	.02	.005	.005	.
C84800	75.0-77.0	2.0-3.0	5.5-7.0	13.0-17.0	.40	.25	1.0	.08	.02	.005	.005	.

YELLOW BRASSES AND LEADED YELLOW BRASSES

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS A RANGE OR MINIMUM)

COPPER ALLOY NO	Cu(45)	Sn	Pb	Zn	Fe	Sb	Ni(45) (incl Co)	Mn	As	S	P	Al	Si
C85200	70.0-74.0(54)	.7-2.0	1.5-3.8	26.0-27.0	.6	.20	1.0	.	.	.05	.02	.005	.05
C85210	70.0-75.0(51)	1.0-3.0	2.0-5.0	Rem	.8	.	1.0	.	.02-.06	.	.	.005	.005
C85310	68.0-73.0(51)	1.5	2.0-5.0	Rem	.8(49)	(49)	1.0	.	.02-.06(49)	.	.	.005	.
C85400	65.0-70.0(51)	.50-1.5	1.5-3.8	24.0-32.0	.7	.	1.0	.	.	.	.	.35	.05
C85500	59.0-63.0(51)	.20	.20	Rem	.20	.	.20	.20	.	.	.	.	.
C85700	58.0-64.0(52)	.50-1.5	.8-1.5	32.0-40.0	.7	.	1.0	.	.	.	.	.8	.05
C85710	58.0-63.0(52)	1.0	1.0-2.5	Rem	.8	.	1.0	.50	.	.	.	.20-.8	.05
C85800	57.0min.(52)	1.5	1.5	31.0-41.0	.50	.05	.50	.25	.05	.05	.01	.55	.25

COPPER-TIN ALLOYS (TIN BRONZES) (continued)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu ⁽⁴⁵⁾⁽⁵⁴⁾	Sn	Pb	Zn	Fe	Sb	Ni ⁽⁴⁾ (incl Co)	S	P ⁽⁴⁴⁾	Al	Si	Mn
C90800	85.0-89.0	11.0-13.0	.25	.25	.15	.20	.50	.05	.30	.005	.005	
C90810	Rem	11.0-13.0	.25	.30	.15	.20	.50	.05	15-8	.005	.005	
C90900	86.0-89.0	12.0-14.0	.25	.25	.15	.20	.50	.05	.05	.005	.005	
C91000	84.0-86.0	14.0-16.0	.20	1.5	.10	.20	.8	.05	.05	.005	.005	
C91100	82.0-85.0	15.0-17.0	.25	.25	.25	.20	.50	.05	1.0	.005	.005	
C91300	79.0-82.0	18.0-20.0	.25	.25	.25	.20	.50	.05	1.0	.005	.005	
C91600	86.0-89.0	9.7-10.8	.25	.25	.20	.20	1.2-2.0	.05	.30	.005	.005	
C91700	84.0-87.0	11.3-12.5	.25	.25	.20	.20	1.2-2.0	.05	.30	.005	.005	

COPPER-TIN-LEAD ALLOYS (LEADED TIN BRONZES)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu ⁽⁴⁵⁾⁽⁴⁶⁾	Sn	Pb	Zn	Fe	Sb	Ni ⁽⁴⁵⁾ (incl Co)	S	P ⁽⁴⁴⁾	Al	Si	B
C92200	86.0-90.0	5.5-6.5	1.0-2.0	3.0-5.0	.25	.25	1.0	.05	.05	.005	.005	
C92300	85.0-89.0	7.5-9.0	.30-1.0	2.5-5.0	.25	.25	1.0	.05	.05	.005	.005	
C92310	Rem	7.5-8.5	.30-1.5	3.5-4.5	-	-	1.0	-	-	.005	.005	
C92400	86.0-89.0	9.0-11.0	1.0-2.5	1.0-3.0	.25	.25	1.0	.05	.05	.005	.005	
C92410	Rem	6.0-8.0	2.5-3.5	1.5-3.0	.20	.25	.20	-	-	.005	.005	
C92500	85.0-88.0	10.0-12.0	1.0-1.5	.50	.30	.25	.8-1.5	.05	.30	.005	.005	
C92600	86.0-88.5	9.3-10.5	.8-1.5	1.3-2.5	.20	.25	.7	.05	.03	.005	.005	
C92610	Rem	9.5-10.5	.30-1.5	1.7-2.8	.15	-	1.0	-	-	.005	.005	
C92700	86.0-89.0	9.0-11.0	1.0-2.5	.7	.20	.25	1.0	.05	.25	.005	.005	
C92710	Rem	9.0-11.0	4.0-6.0	1.0	.20	.25	2.0	.05	1.0	.005	.005	
C92800	78.0-82.0	15.0-17.0	4.0-6.0	.8	.20	.25	.8	.05	.05	.005	.005	
C92900	82.0-86.0	9.0-11.0	2.0-3.2	.25	.20	.25	2.8-4.0	.05	.50	.005	.005	

COPPER-TIN-LEAD (HIGH-LEADED TIN BRONZES)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu ⁽⁴⁵⁾	Sn	Pb	Zn	Fe	Sb	Ni ⁽⁴⁵⁾ (incl Co)	S	P ⁽⁴⁴⁾	Al	Si
C93100	Rem (48)	6.5-8.5	2.0-5.0	2.0	.25	.25	1.0	.05	.30	.005	.00
C93200	81.0-85.0(48)	6.3-7.5	6.0-8.0	1.0-4.0	.20	.35	1.0	.08	.15	.005	.00
C93400	82.0-85.0(48)	7.0-9.0	7.0-9.0	.8	.20	.50	1.0	.08	.50	.005	.00
C93500	83.0-86.0(54)	4.3-6.0	8.0-10.0	2.0	.20	.30	1.0	.08	.05	.005	.00

COPPER-TIN-LEAD (HIGH-LEADED TIN BRONZES) (continued)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu ⁽¹⁾	Sn	Pb	Zn	Fe	Sb	Ni ⁽²⁾ (incl. Co)	S	P ⁽³⁾	Al	Si
C93600	79.0-83.0(46)	6.0-8.0	11.0-13.0	1.0	.20	.55	1.0	.08	.15	.005	.005
C93700	78.0-82.0(53)	9.0-11.0	8.0-11.0	.8	.15(55)	.55	1.0	.08	.15	.005	.005
C93720	83.0min(53)	3.5-4.5	7.0-9.0	4.0	.35	.50	.50	-	-	-	-
C93800	75.0-79.0(51)	6.3-7.5	13.0-16.0	.8	.15	.8	1.0	.08	.05	.005	.005
C93900	76.5-79.5(51)	5.0-7.0	14.0-18.0	1.5	.40	.50	.8	.08	1.5	.005	.005
C94000	69.0-72.0(52)	12.0-14.0	14.0-16.0	.50	.25	.50	50-1.0	.08(54)	.05	.005	.005
C94100	72.0-79.0(52)	4.5-6.5	18.0-22.0	1.0	.25	.8	1.0	.08(56)	.05	.005	.005
C94200	68.5-73.5(53)	4.5-6.0	22.0-25.0	.8	.15	.8	1.0	1.0(56)	.08	.005	.005
C94310	Rem(53)	1.5-3.0	27.0-34.0	.50	.50	.50	25-1.0	-	.05	-	-
C94320	Rem(53)	4.0-7.0	24.0-32.0	-	.35	-	-	-	-	-	-
C94330	68.5-75.5(53)	3.0-4.0	21.0-25.0	3.0	.35	.50	.50	-	-	-	-
C94400	Rem(53)	7.0-9.0	9.0-12.0	.8	.15	.8	1.0	.08	.50	.005	.005
C94500	Rem(53)	6.0-8.0	16.0-22.0	1.2	.15	.8	1.0	.08	.05	.005	.005

COPPER-TIN NICKEL ALLOYS (NICKEL-TIN BRONZES)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu	Sn	Pb	Zn	Fe	Sb	Ni (incl. Co)	Mn	S	P	Al	Si
C94700	85.0-90.0(46)	4.5-6.0	.10(57)	1.0-2.5	.25	.15	4.5-6.0	.20	.05	.05	.005	.005
C94800	84.0-89.0(46)	4.5-6.0	.30-1.0	1.0-2.5	.25	.15	4.5-6.0	.20	.05	.05	.005	.005
C94900	79.0-81.0(48)	4.0-6.0	4.0-6.0	4.0-6.0	.30	.25	4.0-6.0	.10	.08	.05	.005	.005

COPPER-ALUMINUM-IRON AND COPPER-ALUMINUM-IRON-NICKEL ALLOYS (ALUMINUM BRONZES)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu	Pb	Fe	Ni (incl. Co)	Al	Mn	Mg	Si	Zn	P	Sn
C95200	86.0min(51)	-	2.5-4.0	-	8.5-9.5	-	-	-	-	-	-
C95210	86.0min(53)	.05	2.5-4.0	1.0	8.5-9.5	1.0	.05	.25	.50	-	.10
C95220	Rem(17)	-	2.5-4.0	2.5	9.5-10.5	.50	-	-	-	-	-
C95300	86.0min(53)	-	.8-1.5	-	9.0-11.0	-	-	-	-	-	-
C95400	83.0min(17)	-	3.0-5.0	1.5	10.0-11.5	.50	-	-	-	-	-
C95410	83.0min(17)	-	3.0-5.0	1.5-2.5	10.0-11.5	.50	-	-	-	-	-
C95420	83.5min(17)	-	3.0-4.3	.50	10.5-12.0	.50	-	-	-	-	-
C95500	78.0min(17)	-	3.0-5.0	3.0-5.5	10.0-11.5	3.5	-	-	-	-	-
700XX	63.0 Min(53)	0.8	0.8	14-16	8-10	0.2	-	-	1.0-1.5	-	-

COPPER-ALUMINUM-IRON AND COPPER-ALUMINUM-IRON-NICKEL ALLOYS (ALUMINUM BRONZES) (continued)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu	Pb	Fe	Ni (incl. Co)	Al	Mn	Mg	Si	Zn	P	Sn
C95510	78.0min (21)	-	2.0-3.5	4.5-5.5	9.7-10.9	1.5	-	-	30	-	20
C95600	88.0min (53)	-	-	25	6.0-8.0	-	-	1.8-3.3	-	-	-
C95700	71.0min (17)	.03	2.0-4.0	1.5-3.0	7.0-8.5	11.0-14.0	-	.10	-	-	-
C95710	71.0min (17)	.05	2.0-4.0	1.5-3.0	7.0-8.5	11.0-14.0	-	.15	50	.05	1.0
C95800	79.0min (17)	.05	3.5-4.5 (32)	4.0-5.0 (32)	8.5-9.5	8-1.5	-	.10	-	-	10
C95810	79.0min (17)	10	3.5-4.5 (32)	4.0-5.0 (32)	8.5-9.5	8-1.5	.05	10	50	-	-
C95900	Rem (17)	-	3.0-5.0	50	12.0-13.5	1.5	-	-	-	-	-

COPPER-NICKEL-IRON ALLOYS (COPPER-NICKELS)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu (17)	Pb	Fe	Ni (incl. Co)	Mn	Si	Nb	C	Be	OTHER NAMED ELEMENTS
C96200	Rem.	.01	1.0-1.8	9.0-11.0	1.5	.50	.50-1.0	.10	-	S.02 P.02
C96300	Rem.	.01	.50-1.5	18.0-22.0	25-1.5	.50	.50-1.5	.15	-	S.02 P.02
C96400	65.0-68.0	.03 (58)	.25-1.5	28.0-32.0	1.5	.50	.50-1.5	.15	-	-
C96600	Rem.	.01	.8-1.1	29.0-33.0	1.0	.15	-	-	.40-7	-
C96700	Rem	.01	7-1.0	29.0-33.0	7	.15	-	-	1.1-1.2	10-20Zr 10-20Ti
C96800	Rem	.005	.50	9.5-10.5	05-30	.05	10-30	-	-	(58)

COPPER-NICKEL-ZINC ALLOYS (NICKEL SILVERS)

COMPOSITION, PER CENT MAXIMUM (UNLESS SHOWN AS RANGE OR MINIMUM)

COPPER ALLOY NO	Cu	Sn	Pb	Zn	Fe	Sb	Ni (incl. Co)	S	P	Al	Mn	Si
C97300	53.0-58.0 (33)	1.5-3.0	8.0-11.0	17.0-25.0	1.5	.35	11.0-14.0	.08	.05	.005	.50	15
C97400	58.0-61.0 (53)	2.5-3.5	4.5-5.5	Rem.	1.5	-	15.5-17.0	-	-	-	.50	-
C97600	63.0-67.0 (23)	3.5-4.5	3.0-5.0	3.0-9.0	1.5	.25	19.0-21.5	.08	.05	.005	1.0	.15
C97800	64.0-67.0 (24)	4.0-5.5	1.0-2.5	1.0-4.0	1.5	.20	24.0-27.0	.08	.05	.005	1.0	15
C99300	68.0-73.0	-	.002	1.40-1.0	-	-	13.5-16.5 Co. 1.0-2.0	-	-	10.7-11.5	-	-

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Information Telephone : 419/865-9497

MATERIAL SAFETY DATA SHEET

FORM NUMBER: 027	ISSUE DATE: 11/85	REVISED DATE: 02/03
PRODUCT TRADE NAME: Core C-1		

SECTION I - GENERAL INFORMATION

Part (Item) Number Chemical Name Synonyms DENTSPLY Contact Formula Chemical Family	Mixture Inorganic
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SECTION II - PRODUCT INGREDIENTS

Chemical Name (Ingredients)	CAS #	%	TLV mg/m ³	OSHA PEL mg/m ³
Silica (fused)	60676-86-0	<40	0.1* 10.0**	0.1* 0.3**
Zirconium Silicate	14940-68-2	<30	5.0* 10.0**	5.0* 15.0**
Ammonium Phosphate	7783-28-0	<15	5.0* 10.0**	5.0* 15.0**
Silica (cristobalite)	14464-46-1	<10	0.05* 5.0**	0.05* 0.15**
Magnesium Oxide	1309-48-4	<10	10.0**	5.0* 15.0**
Silica (quartz)	14808-60-7	<5	0.05* 10.0**	0.1* 0.3**
Titanium Dioxide	13463-67-7		10.0**	10.0**
			* Respirable Dust **Total Dust	
OSHA PEL:	Exposure to airborne crystalline silica shall not exceed an eight hour time weighted average as stated in: (See below for specifics on quartz and cristobalite.)			
QUARTZ:	29 CFR Section 1910.1000 Table Z-1-A, air contaminates, specifically; silica, crystalline quartz (respirable): 0.1mg/m ³ .			
CRISTOBALITE:	29 CFR Section 1910.1001 Table Z-3 as calculated as half of the value of the mass formulae for quartz = 10 mg/m ³ air contaminates, specifically; cristobalite (respirable): 0.05 mg/m ³ .			
ACIGH TLV:	Cristobalite 0.05 mg/m ³ (respirable dust). See Threshold Limit Value and Biological Exposure Indices American Conference of Government Industrial Hygienists, April 2000.			
Other Limits Recommended:	National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentrations = 0.05 mg/m ³ (respirable free silica) as determined by a full shift sample up to 10 hour working day, 40 hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.			

SECTION III - PHYSICAL PROPERTIES

Boiling Point	N/A	Specific Gravity	3.32
Vapor Pressure	N/A	pH	N/A
Vapor Density	N/A	Evaporation Rate	N/A
Critical Temperature	N/A	Viscosity	N/A
Decomposition Temperature	N/A	% Volatile by Volume	N/A
Melting/Freezing Point	N/A	Magnetism	N/A
Solubility in Water	<10%	Autoignition Temperature	N/A
Critical Pressure	N/A	Corrosion Rate	N/A
Permeable Exposure Limit	N/A	Molecular Weight	N/A
Appearance and Odor	Off white powder. Sets like cement (exothermic)		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	N/A		
Flammable (Explosion) Limits:	LEL: N/A	UEL: N/A	
Extinguishing Media -	This product will not burn but is compatible with all extinguishing media. Use any media that is appropriate for the surrounding fire.		
	Water Spray: Y	Carbon Dioxide: Y	Foam: Y
	Dry Chemical: Y	Other:	
Special Fire Fighting Procedures and Equipment	Avoid eye and skin contact: Y		
Do not breathe fumes : Y	Other: Do not inhale dust.		
Unusual Fire and Explosion Hazards: When heated emits very toxic fumes of PO _x , NO _x , and NH ₃ .			

SECTION V - HEALTH HAZARD DATA

Route(s) of Entry	Inhalation: Yes	Skin: Not likely route of exposure
	Ingestion: Not likely route of exposure	
Health Hazards (acute and chronic):	<p>Crystalline Silica - Prolonged exposure to respirable crystalline silica may cause delayed (chronic) lung injury (silicosis, pneumoconiosis). Acute or rapidly developing silicosis may occur in a short period of time in heavy exposure in certain occupations such as sandblasters. Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death. There is evidence that individuals with silicosis may also experience incidences of scleroderma (immune system disorder), tuberculosis and nephrotoxicity (kidney lesions).</p> <p>Titanium Dioxide - Inhalation of excessive amounts of titanium dioxide dust are reported to produce mild and temporary respiration tract irritations with cough, sneezing, and shortness of breath. Grossly excessive and prolonged exposure may lead to lung injury (non-progressive lung fibrosis). Titanium Dioxide is considered to have a low degree of oral and dermal toxicity and to be practically non irritating to skin.</p> <p>Zirconium Silicate - Contains trace quantities of naturally occurring radio active uranium, thorium, and radium (106-120 picocuries/gram) over-exposure to respirable dusts containing radioactive uranium, thorium and radium may cause lung cancer.</p> <p>Zircon is exempt from NRC regulations for source material per 10 CFR 40, since it falls under the definition of unprocessed material containing less than 0.05% uranium or thorium. However, calculations show that observance of 2.2-2.8% mg/m³ of respirable dust will, under voluntary guidelines ensure that intake is less than 10% of the annual limits on intake (ALIS) specified in 10 CFR 20.1502(B) and NRC standards for protection against radiation for uranium, thorium, radium and radioactive daughter decay products.</p>	

Carcinogenicity:	
NTP: Yes	The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.
IARC: Yes	IARC Monographs Volume 68: Silica, silicates, coal dust and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent in carcinogenic to humans.
OSHA:	Not regulated by OSHA.
OTHER: California Proposition 65	Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen.
Signs and Symptoms of Exposure:	Crystalline Silica: Symptoms may not appear until significant injury has occurred. Silicosis (onset may be from 2-30 years); cancer (unknown). Silicosis (onset may be from 2-30 years); cancer (unknown). Acute signs of exposure may be cough, tightness in chest, shortness of breath, eye irritation, wheezing and sputum production. Lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung, which may aggravate other pulmonary tuberculosis. Progressive, massive fibrosis may be accompanied by right heart enlargement, heart failure and pulmonary failure. Smoking aggravates the effects of exposure.
Medical Conditions Aggravated:	Any pre-existing respiratory or pulmonary disease or condition, such as, but not limited to, bronchitis, emphysema and asthma. Individuals with silicosis are predisposed to develop tuberculosis.
Emergency First Aid:	If symptoms of discomfort or irritation occur due to material, remove affected persons to fresh air. If powder enters eyes, flush with plenty of water. If discomfort or irritation persists, consult a physician.

SECTION VI - REACTIVITY DATA

Stability:	Stable: Y	Unstable: N
Conditions to avoid (Stability):	None	
Incompatibility (Materials to Avoid):	None	
Hazardous Decomposition Products:	When heated to decomposition may emit fumes of NO _x , NH ₃ . Zircon disassociates to zirconium oxide (ZrO ₂) and silicosis dioxide (SiO ₂) when heated above 1540°C.	
Hazardous Polymerization:	Will Occur: N	Will Not Occur: Y
Conditions to Avoid (Polymerization):	N/A	

SECTION VII - PRECAUTIONS FOR HANDLING AND USE

Steps to be taken if material is spilled:	Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Wear protective equipment specified below.
Waste disposal:	Dispose in accordance with Federal, State and Local regulations. Zircon may contain traces of radioactive materials, such as uranium and thorium. The combined content of uranium and thorium is less than the 500 ppm limit for source material as set by the Nuclear Regulatory Commission. Zircon mineral products are not currently regulated by the EPA as hazardous wastes, but individual states and localities do have disposal regulations, so it is advisable to check with them for specific disposal instruction.

<p>Precautions to be taken in handling and storage:</p>	<p>Avoid breakage of bagged material or spills of bulk material. See control measures in Section VIII.</p>
<p>Other precautions:</p>	<p>Use dustless systems for handling, storage and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery or equipment. Maintain, clean and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section VIII.</p> <p>See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. WARN YOUR EMPLOYEES (AND CUSTOMERS-USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARD AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.</p> <p>See also American Society for Testing and Materials (ASTM) Standard Practice E1132-86, "Standard Practice for Health Requirements Relating to Exposure to Quartz Dust."</p> <p>Zircon (zirconium silicate) may contain traces of radioactive materials, such as uranium and thorium. The combined content of uranium and thorium is less than the 500 ppm limit for source material as set by the Nuclear Regulatory Commission. Zircon mineral products are not currently regulated by the EPA as hazardous wastes, but individual states and localities do have disposal regulations, so it is advisable to check with them for specific disposal instructions. NOTE: This warning is based on 100% zircon. The actual zircon percentage in this product is diluted to a percentage less than 100.</p>

SECTION VIII - OCCUPATIONAL PROTECTION MEASURES

<p>Respirator Protection: The following chart specifies the types of respirators which may provide respiratory protection for crystalline silica.</p>	
<p>CONDITION Particulate Concentration</p>	<p>RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA MINIMUM RESPIRATORY PROTECTION*</p>
<p>Up to 5 x PEL</p>	<p>Any dust respirator.</p>
<p>Up to 10 x PEL</p>	<p>Any dust respirator, except single-use or quarter mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.</p>
<p>Up to 50 x PEL</p>	<p>A high efficiency particulate filter respirator with a full face piece. Any supplied-air respirator with a full face piece, helmet, or hood. Any self-contained breathing apparatus with a full face piece.</p>
<p>Up to 500 x PEL</p>	<p>A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.</p>
<p>Greater than 500 x PEL or entry and escape from unknown concentrations</p>	<p>Self-contained breathing apparatus with a full face piece operated in pressure-demand or other positive pressure mode.</p> <p>A combination respirator which includes a Type C supplied-air respirator with a full face piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.</p>
<p>Abrasive Blasting</p>	<p>Any Type CE, supplied-air respirator with a full face piece, hood, or helmet, operated in a positive-pressure mode.</p>

	(See 29 CFR Section 1910.94 (a).)
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*Only NIOSH-approved equipment should be used. (See 29 CFR Section 1910.134).	
See also ANSI standard Z88.2 (latest version) "Practices for Respiratory Protection."	
Ventilation:	
Local Exhaust:	Use sufficient local exhaust to reduce the level of respirable dust to the PEL. See ACGIH "Industrial Ventilation, A Manual Recommended Practice," the latest edition.
Mechanical Exhaust:	See "Other Precautions" under Section VII.
Special:	See "Other Precautions" under Section VII.
Other:	See "Other Precautions" under Section VII.
Protective Gloves:	Optional - Impervious cloth, rubber or leather.
Eye Protection:	Wear protective shield (safety glasses) when exposed to dust particles.
Other Protective Clothing:	Boots, aprons or chemical suits should be used when necessary to prevent skin contact.
Work/Hygiene Practices:	Avoid inhalation and ingestion of this material, avoid eye contact. Avoid creating dust.

SECTION IX - TRANSPORTATION INFORMATION

U.S. DOT Hazard Classification	
Proper Shipping Name: Not regulated	Hazard Class/Packing Group: N/A
Technical Name: N/A	Labels Required: None
UN Number: N/A	DOT Packaging Requirements: N/A
Exceptions:	

SECTION X - ECOLOGICAL INFORMATION

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

SECTION XI - OTHER INFORMATION

NFPA Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
HMIS Hazard Rating	Health: 3	Flammability: 0	Reactivity: 0
Personal Protection: Use NIOSH/OSHA approved respirator.			

The information set forth herein has been gathered from standard reference materials and/or Ransom & Randolph Company test data and is, to the best knowledge and belief of Ransom & Randolph Company accurate and reliable. Such information is offered solely for your consideration, investigation and verification and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. Ransom & Randolph Company makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identifies here in combination with any other material or process, and assumes no responsibility therefore.



Engineered Ceramics

MATERIAL SAFETY DATA SHEET

Revised 6/30/10

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **HYCOR ALUMINA PRODUCTS**
TRADE NAME: **ALUMINA REFRACTORIES**
CHEMICAL NAME: **ALUMINA REFRACTORIES**
SYNONYMS: 18-S, TA-530, TA-530 FMS, HYCOR® Plus, TA-540, TA-540F, TA-505, TA-505F, TA-507, TA-507F, TA-510F, T-73, T-82

COMPANY INFORMATION: **Engineered Ceramics**
P.O. Box 365, 24 West End Drive
Gilberts, IL 60136
847.428.4455

EMERGENCY PHONE: **847.428.4455**

2. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENT(S)	CAS. NO.	OSHA PEL (mg/M ³)	ACGIH TLV (mg/M ³)
Aluminum Oxide (Alumina)	CAS 1344-28-1	15.0 (5.0 Respirable)	10.0
Alumina Silicates (as nuisance dust)	CAS 1302-93-8	5.0	5.0

3. PHYSICAL/CHEMICAL CHARACTERISTICS

MELTING POINT: 3700°F SOLUBILITY IN WATER: Insoluble
BOILING POINT: 4000°F SPECIFIC GRAVITY: 2.7-2.8
VAPOR PRESSURE (mm Hg): None EVAPORATION RATE (BvOAC = 1): None
VAPOR DENSITY (Air = 1): None APPEARANCE AND ODOR: White, odorless, hard refractory

4. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-Flammable
FLAMMABLE LIMITS: None (LEL: None UEL: None)
EXTINGUISHING MEDIA: N/A
SPECIAL FIRE FIGHTING PROCEDURES: N/A
UNUSUAL FIRE AND EXPLOSION HAZARDS: None

5. REACTIVITY DATA

STABILITY: Stable (Conditions to avoid: None)
INCOMPATIBILITY (Materials to Avoid): None
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: None
HAZARDOUS POLYMERIZATION: Will Not Occur (Conditions to avoid: None)

6. HEALTH HAZARD DATA

***** The material as received presents no health hazard *****

The following pertains to dust generated by further grinding or fabrication.

ROUTE(S) OF ENTRY

INHALATION?	Yes
SKIN?	No
INGESTION?	No

HEALTH HAZARDS (Acute & Chronic): Low Health Risk by Inhalation. Mild Skin Irritation From Prolonged Exposure.

CARCINOGENICITY:

NTP?	No
IARC Monographs?	No
OSHA Regulated?	No

SIGNS AND SYMPTOMS OF EXPOSURE: The Dust May Cause Eye, Skin, And Upper Respiratory Irritation. Ingestion May Cause Irritation To The Gastrointestinal Tract.

EMERGENCY FIRST AID PROCEDURES: For Material In Eyes, Wash Immediately With Water. For Skin Irritation, Wash With Water. For Inhalation, Remove From Source Of Exposure. Seek Medical Attention If Irritations Persist.

7. PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: N/A

WASTE DISPOSAL METHOD: Dispose Of As Solid Waste In Accordance With Federal, State, And Local Laws.

PRECAUTIONS TO BE TAKEN IN HANDLING & STORAGE: Avoid Dusting

OTHER PRECAUTIONS: None

8. CONTROL MEASURES

RESPIRATORY PROTECTION: NIOSH Approved Respirator In Dusty Conditions (Such As Where Further Fabrication Takes Place)

VENTILATION: LOCAL EXHAUST: Yes
OTHER: None

PROTECTIVE GLOVES: Can Be Used To Protect Against Abrasions

EYE PROTECTION: Normal Protection Against Foreign Substances

OTHER PROTECTIVE EQUIPMENT: None

WORK/HYGIENIC PRACTICES: Standard Practices. Keep Dust to a Minimum

UNITED MSDS #2
CUTTING WHEELS, RESINOID

MATERIAL SAFETY DATA SHEET

PRODUCT IDENTITY/TRADE NAME: CUTTING WHEELS, RESINOID
MANUFACTURER: UNITED ABRASIVES INC.
ADDRESS: P.O. BOX 75, ROUTE 66, WILLIMANTIC, CT. 06226
INFORMATION PHONE NUMBER: 203-456-7131
EMERGENCY PHONE NUMBER: 203-456-7131

INGREDIENTS:

<u>HAZARDOUS COMPONENTS</u>	<u>CAS NUMBER</u>	<u>OSHA PEL</u>	<u>ACGIH TLV</u>	<u>%</u>
ALUMINUM OXIDE	1344-28-1	15 MG/M3	10 MG/M3 *	0-85
AND/OR SILICON CARBIDE	409-21-2	15 MG/M3	10 MG/M3 *	0-80
CURED PHENOLIC RESIN	N/A	NON EST.	NON EST.	0-20
AND/OR CRYOLITE	15096-52-3	2.5 MG/M3	2.5 MG/M3	0-10
		(AS FLUORIDES)		
AND/OR CALCIUM CARBONATE	1317-65-3	15 MG/M3	10 MG/M3 *	0-2
AND/OR CARBON BLACK	1333-86-4	3.5 MG/M3	3.5 MG/M3 *	0-0.1
AND/OR WOVEN FIBERGLASS	N/A	15 MG/M3	10 MG/M3 *	-20
AND/OR IRON SULFIDE	1317-37-9	15 MG/M3	10 MG/M3 *	-20

* INERT OR NUISANCE DUST - TOTAL DUST

BOILING POINT: N/A VAPOR PRESSURE (mm Hg): N/A
SOLUBILITY IN WATER: N/A VAPOR DENSITY (AIR = 1): N/A
SPECIFIC GRAVITY: N/A EVAPORATION RATE: N/A
 (ETHER = 1)

APPEARANCE AND ODOR: SOLID WHEEL, BLACK COLOR, ODORLESS

PHYSICAL HAZARD DATA:

FLASH POINT: N/A FLAMMABLE LIMITS: N/A
EXTINGUISHING MEDIA: ANY MEDIA APPROPRIATE FOR SURROUNDING FIRE
SPECIAL FIREFIGHTING PROCEDURES: NONE
UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE FROM THIS PRODUCT, HOWEVER, CONSIDERATION MUST BE GIVEN TO THE POTENTIAL FIRE/EXPLOSION HAZARD FROM THE BASE MATERIAL BEING PROCESSED. MANY MATERIALS CREATE FLAMMABLE/EXPLOSIVE DUSTS OR TURNINGS WHEN CUT OR GROUND.

REACTIVITY/INCOMPATIBILITY (MATERIALS OR CONDITIONS TO AVOID): N/A
HAZARDOUS DECOMPOSITION PRODUCTS: DUST FROM GRINDING COULD CONTAIN INGREDIENTS AS LISTED IN SECTION 2 AND OTHER POTENTIALLY MORE HAZARDOUS COMPONENTS OF THE BASE MATERIAL BEING GROUND OR COATINGS APPLIED TO THE BASE MATERIAL.
SPECIAL STORAGE PRECAUTIONS: STORE IN ACCORDANCE WITH ANSI B7.1

HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE: RESPIRATORY AND EYE IRRITATION
CHRONIC EFFECTS OF OVEREXPOSURE: LONG-TERM EXCESSIVE EXPOSURE MAY RESULT IN A CHRONIC PULMONARY CONDITION (FIBROSIS) WHICH IS AGGRAVATED BY SMOKING. ELEVATED NOISE LEVELS MAY AFFECT HEARING.
SIGNS AND SYMPTOMS OF EXPOSURE: COUGHING, SHORTNESS OF BREATH, RESPIRATORY IRRITATION, DIMINISHED BREATHING CAPACITY. A GREATER HAZARD IN MOST CASES, HOWEVER, IS THE EXPOSURE TO DUST/FUMES FROM THE MATERIAL OR PAINT/COATINGS BEING GROUND. A MAJORITY OF THE DUST GENERATED DURING GRINDING IS FROM THE BASE MATERIAL BEING GROUND AND THE POTENTIAL HAZARD FROM THIS EXPOSURE MUST BE EVALUATED.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: RESPIRATORY DISEASE;
PRIMARY ROUTE (S) OF EXPOSURE: INHALATION, EYES
CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN: OSHA: NO
NATIONAL TOXICOLOGY PROGRAM: NO I.A.R.C. MONOGRAPHS: NO

FIRST AID: INHALATION - REMOVE TO FRESH AIR, OBTAIN FIRST AID & MEDICAL ASSISTANCE. EYES - DUST MAY IRRITATE EYES, FLUSH WITH LARGE AMOUNTS OF WATER, OBTAIN MEDICAL ATTENTION FOR IRRITATION OR FOREIGN BODY IN THE EYE. SKIN - WASH DUST FROM SKIN. INGESTION - THIS IS AN UNLIKELY ROUTE OF EXPOSURE BUT SHOULD GRINDING DUST BE SWALLOWED, GET MEDICAL ADVICE.

SAFE HANDLING PROCEDURES

HYGIENIC PRACTICES: WASH WELL WITH SOAP & WATER BEFORE EATING, DRINKING, SMOKING, OR USING TOILET FACILITIES.

SPILL HANDLING/CLEAN-UP: TREAT AS INERT DRY SOLID. SWEEP-UP OR VACUUM IN SUCH A MANNER AS TO MINIMIZE DUST GENERATION.

WASTE DISPOSAL: STANDARD LANDFILL METHODS IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

CONTROL MEASURES

RECOMMENDED ENGINEERING CONTROLS (VENTILATION): LOCAL EXHAUST AS NEEDED TO KEEP DUST CONCENTRATION BELOW ALL APPLICABLE TLV'S FOR ALL POSSIBLE CONTAMINANTS.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY PROTECTION: NIOSH APPROVED DUST RESPIRATORS, OR SUPPLIED AIR DEPENDING ON CONTAMINANT AND CONCENTRATION. GET PROFESSIONAL ADVICE FOR SELECTION.

GLOVES: CLOTH OR LEATHER

EYE PROTECTION: WEAR SAFETY GOGGLES OR FACE SHIELD

OTHER: HEARING PROTECTION MAY BE REQUIRED IN GRINDING OPERATIONS

DATE PREPARED/UPDATED: 11/1/88

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372 (SARA 313-Toxic Chemical Releases Reporting):
Aluminum Oxide

This product does not contain chemicals regulated under California Proposition 65.

4. First Aid Measures			
<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Flush with flowing water at least 15 minutes.		
<i>Skin</i>	No first aid should be necessary.		
<i>Inhalation</i>	No first aid should be necessary.		
<i>Ingestion</i>	No first aid should be necessary.		
<i>Other</i>			
<i>Note to Physicians (Treatment, Testing, and Monitoring)</i>			
Test symptomatically.			
5. Fire-fighting Measures			
<i>Flashpoint: (Method)</i> >213.8F (closed cup)	<i>Flammable (Explosive) Limits in Air</i> LEL: N/A UEL: N/A		<i>Autoignition Temperature: N/D</i>
<i>Flame Propagation or Burning Rate (for solids):</i>	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFPA Profile: 1</i>	
<i>Extinguishing Media</i> Carbon dioxide, foam, dry powder, fire water spray	<i>Extinguishing Media to Avoid</i> None known.		
<i>Protection and Procedures for Firefighters:</i> Self-contained breathing apparatus and protective clothing should be worn when fighting large fires involving chemicals.			
<i>Unusual Fire and Explosion Hazards:</i> None			
6. Accidental Release Measures			
<i>Containment Techniques</i> Provide dike or other appropriate containment and keep material from spreading.			
<i>Spill/Leak Clean-Up Procedures and Equipment</i> Use absorbent material to collect and contain for salvage and disposal.			
<i>Evacuation Procedures</i> Determine the need to evacuate or isolate the area according to your local emergency plan.			
<i>Special Instructions</i> The spilled product procedures on extremely slippery surface.			
<i>Reporting Requirements</i>			
7. Handling and Storage			
<i>Handling Practices and Warnings</i> Avoid eye contact. General ventilation is recommended.			
<i>Storage Practices and Warnings</i> Do not store with oxidizing agents. Keep from freezing.			

8. Exposure Controls/Personal Protection			
<i>Ventilation</i> General ventilation is recommended.	<i>Other Engineering Controls</i>		
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>	
<i>Eye/Face</i>	Safety glasses as a minimum.		
<i>Skin</i>	Protective.		
<i>Inhalation</i>	Respiratory protection is not normally required.		
<i>General Hygiene Considerations and Work Practices</i> Wash after handling, especially before eating, drinking or smoking.			
<i>Other Protective Measures and Equipment</i>			
9. Physical and Chemical Properties			
<i>Appearance</i>	White	<i>Odor</i>	N/A
<i>Normal Physical State:</i>		<i>Boiling Point</i>	>35C/95F
X <i>Liquid</i>	<i>Gas</i>	<i>Melting Point</i>	N/A
<i>Solid</i>		<i>Freezing Point</i>	N/A
<i>Specific Gravity or Density (H₂O=1)</i>	<i>Solubility in Water</i>	<i>pH</i>	
1	Not determined	Not determined	
<i>Vapor Pressure (mm Hg.)</i>	<i>Vapor Density (AIR = 1)</i>	<i>Evaporation Rate (Butyl Acetate=1)</i>	
Not determined	Not Determined		
<i>Other</i> Viscosity: 500 cSt @ 25°C			
10. Stability and Reactivity			
<i>Incompatibility (Materials to Avoid)</i> Oxidizers			
<i>Hazardous Products Produced During Decomposition</i> Silicon dioxide, carbon dioxide and traces of incompletely burned carbon products.			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i>	<i>Conditions to Avoid</i>
		X	None
<i>Stability?</i>	<i>Stable</i>	<i>Unstable</i>	<i>Conditions to Avoid</i>
	X		Oxidizers
11. Toxicological Information			

Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data

No known applicable information.

12. Ecological Information

Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements

Siloxanes are removed from water by sedimentation or binding to sewage sludge.

This product is not expected to present an environmental hazard.

13. Disposal Considerations

Regulations

All local, state and federal regulations concerning health and pollution should be reviewed to determine approved disposal procedures.

Properties (Physical/Chemical) Affecting Disposal

14. Transport Information

Regulated for shipping?

Yes No

Proper Shipping Name

Compounds defoaming NOI

Packing Group

Do changes in quality, packaging, or shipment method change product classification?

Yes No

Hazard Class

None

Identification Number

Other

15. Regulator Information

Federal Regulations

EPA SARA III Chemical Listings:

Section 302 Extremely Hazardous Substances: None

Section 304 CERCLA Hazardous Substances: None

Section 312 Hazard Class: None

International Regulations

Other

16. Other Information

NFPA Hazard Rating	Health: 1	Flammability: 1	Reactivity: 0
HMIS Hazard Rating	Health: 1	Flammability: 1	Reactivity: 0

The information set forth herein has been gathered from standard reference materials and/or Ransom & Randolph Company test data and is, to the best knowledge and belief of Ransom & Randolph Company accurate and reliable. Such information is offered solely for your consideration, investigation and verification and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. Ransom & Randolph Company makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identifies here in combination with any other material or process, and assumes no responsibility therefore.

Material Safety Data Sheet

E204 Light Duty Silicone Release™

Stoner

Copying and/or downloading of this information for the purpose of properly utilizing Stoner Inc. product is allowed provided that: (1) the information is copied in full with no changes unless prior agreement is obtained from Stoner Inc., & (2) neither the copy nor the original is resold or otherwise distributed with intention of earning profit thereon.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Stoner Incorporated 1070 Robert Fulton Hwy. Quarryville, PA 17566 1-800-227-5538	Product Name: Light Duty Silicone Release™ Product Code: E204 Version Date: 01/09/08 24-hour emergency phone: 1-800-424-9300 [CHEMTREC]
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2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	ACGIH TLV	Exposure Limits	
			OSHA PEL	OTHER
Halogenated hydrocarbon	75-37-6	None established	None established	None established
Ether propellant	115-10-6	None established	None established	None established
NJ Trade Secret Registry	# 80100382-5037P	None established	None established	None established

3. HAZARDS IDENTIFICATION

POTENTIAL ACUTE [single or short term] HEALTH EFFECTS OF OVEREXPOSURE

Eye : May cause eye irritation. Symptoms may include stinging, tearing, and redness.
 Skin : Liquid may cause frostbite.
 Ingestion : Ingestion is not considered a potential route of exposure.
 Inhalation : Breathing large amounts may be harmful. Inhalation of concentrations above the recommended limits may cause temporary central nervous system depression with anesthetic effects such as dizziness, headache, incoordination, and loss of consciousness. Exposure to high concentrations can cause irregular heartbeat, cardiac arrest and death.

POTENTIAL CHRONIC [long term] HEALTH EFFECTS OF OVEREXPOSURE:

General Effects: No chronic health effects known.
 Cancer Information: THIS PRODUCT CONTAINS NO COMPONENTS LISTED AS CARCINOGENIC BY IARC, NTP, OR OSHA 1910(Z)
 Mutagenicity: No data available to indicate product or any components present at greater than 0.1% is mutagenic or genotoxic.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

Individuals with preexisting diseases of the central nervous or cardiovascular system may have increased susceptibility to the toxicity of excessive exposures.

HMIS® III* HAZARDOUS WARNINGS:

Health: 1 Flammability: 2 Physical: 1 Personal Protective Equipment See Section 8

* See www.paint.org/hmis or call the NPCA at 1 (202) 462-6272 for more info on this current rating system.

4. FIRST AID MEASURES

Eyes: Immediately flush eyes gently with plenty of water for at least 15 minutes while holding eyelids apart. If symptoms persist or there is visual difficulty, seek medical attention.
 Skin Contact: In case of contact, immediately wash contaminated area with plenty of water for at least 15 minutes. Remove contaminated clothing. Seek medical attention if symptoms persist. Wash clothing before reuse. Treat for frostbite if necessary.
 Ingestion: Ingestion is an unlikely route of exposure. Contact a physician, medical facility, or poison control center for advice on whether to induce vomiting.
 Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention.

NOTES TO PHYSICIAN:

Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used only in situations of emergency life support.

5. FIRE FIGHTING MEASURES

Fire and/or Explosion Hazards: Contains an Extremely Flammable Gas: can readily form explosive air/gas mixture at room temperature or at lower temperatures that are above the flash point. Containers may rupture or explode under fire conditions. Hazardous decomposition products may be formed (see Sec.10).
 Fire Fighting Instructions: Use dry chemical, foam, or CO2; water may be ineffective but should be used to keep exposed containers cool. Fire fighters should wear normal protective equipment and positive-pressure self-contained breathing apparatus. Apply water from a safe distance to cool container and protect surrounding area.
 Aerosol Flame Projection Test: Non-flammable aerosol, as determined by ASTM D3065-94. However, this product contains components which may be ignited under certain circumstances. Do not use near ignition sources such as sparks or open flames.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Ventilate contaminated area. Remove all sources of ignition. Wear appropriate personal protective equipment (PPE). Stop or reduce discharge if it can be done safely. Avoid run-off into storm sewers and ditches which may lead to natural waterways. Clean up with absorbent material. Place absorbent materials into container and close it tightly. Dispose of container properly.

7. HANDLING AND STORAGE

Handling: Use with adequate ventilation. Do not use near ignition sources. Avoid prolonged or repeated breathing of vapor. Normal precautions common to safe manufacturing practice should be followed in handling and storage.
 Storage: Store in a cool, dry, well ventilated area away from all sources of ignition. Do not store at temperatures above 120 degrees F. Empty container may contain residues which are hazardous.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Ventilation should be adequate to prevent exposures above the limits indicated in "Section 2" of this MSDS (from known, suspected or apparent adverse effects).

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying liquid or airborne material. Do not wear contact lenses. Have an eye wash station available.

Skin Protection: The use of chemically resistant gloves is recommended if there is any possibility of prolonged or repeated liquid contact with skin.

Respiratory Protection: None required for well ventilated situations. A supplied air respirator should be used if ventilation is not sufficient to maintain exposure limits. Use NIOSH approved respirator where there is likelihood of inhalation of the product mist, spray or aerosol.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Aerosol can	Vapor Density:	[air = 1] 1.95
Appearance:	Clear Colorless	Evaporation Rate:	<0.020 (n-Butyl acetate = 1)
Odor:	Slight ethereal.	Solubility in Water:	Negligible; 0-1%
Specific Gravity:	0.8 (H ₂ O=1)	Boiling Point:	-13 deg F
Vapor Pressure:	4551.4 mmHg @ 70 deg F	pH:	Not applicable

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Conditions to Avoid: Avoid contact with: Alkali. Alkaline earth metals. Powdered metals. Avoid open flames and high temperatures. Oxidizers. Acetic acids. Organic acid anhydrides.

Decomposition Products: This material can be decomposed by extremely high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and carbonyl fluoride. If heated with peroxides present, violent decomposition can occur. Burning can produce the following combustion products: Carbon dioxide and carbon monoxide.

11. DISPOSAL CONSIDERATIONS

Disposal : Dispose according to Federal, State and local regulations.

12. TRANSPORTATION INFORMATION

Agency	Proper Shipping name	UN Number	Hazard Class	Packing Group
DOT	Consumer commodity	Not applicable	ORM-D	Not applicable
IATA	Consumer commodity	Not applicable	9	Not applicable

13. REGULATORY INFORMATION

Warning: This product contains the following chemicals that are subject to reporting requirements for the following regulatory bodies listed below:

COMPONENT	CAS #	% BY WEIGHT	Regulatory Body
No components listed in this section.			SARA Section 313

Warning: This product may contain chemicals known to the State of California to cause cancer. See list below.
No components listed in this section. Prop65 Cancer

Warning: This product may contain chemicals known to the State of California to cause birth defects. See list below.
No components listed in this section. Prop65 Birth Defects

All components of this product are listed on the TSCA inventory.

This information contained in this MSDS is believed to be accurate as of the version date, but is not warranted to be. Since the use of this information and the conditions of use of this product are not within the control of Stoner Inc, it is the user's obligation to determine the conditions of safe use.

UNITED ABRASIVES
COATED ABRASIVE PRODUCT

MATERIAL SAFETY DATA SHEET

PRODUCT IDENTITY/TRADE NAME: COATED ABRASIVE PRODUCT - RESIN OVER
RESIN. COTTON CLOTH, FIBER, OR POLYESTER BACKING

MANUFACTURER: UNITED ABRASIVES INC.

ADDRESS: P.O. BOX 75, ROUTE 66, WILLIMANTIC, CT. 06226

INFORMATION PHONE NUMBER: 203-456-7131

EMERGENCY PHONE NUMBER: 203-456-7131

INGREDIENTS:

COTTON CLOTH OR VULCANIZED FIBER OR POLYESTER BACKING

HAZARDOUS COMPONENTS	CAS NUMBER	OSHA PEL	ACGIH TLV	
ALUMINUM OXIDE	1344-28-1	15 MG/M3	10 MG/M3	40
CURED PHENOLIC RESIN AND/OR SILICON CARBIDE	N/A	NONE EST.	NONE EST.	10
AND/OR ZIRCONIUM OXIDE	409-21-2	15 MG/M3	10 MG/M3	40
AND/OR CRYOLITE	15096-52-3	5 MG/M3	5 MG/M3	30
		(AS FLUORIDES)		1-5
AND/OR CALCIUM CARBONATE	1317-65-3	15 MG/M3	10 MG/M3	0-1
AND/OR CUBITRON	1344-28-1	15 MG/M3	10 MG/M3	10

* INERT OR NUISANCE DUST - TOTAL DUST

BOILING POINT: N/A VAPOR PRESSURE (mm Hg) N/A
SOLUBILITY IN WATER: N/A VAPOR DENSITY (AIR = 1) N/A
SPECIFIC GRAVITY: N/A EVAPORATION RATE N/A
 (ETHER = 1)

APPEARANCE AND ODOR: CLOTH COATED WITH ABRASIVE MATERIAL.

PHYSICAL HAZARD DATA:

FLASH POINT: N/A

FLAMMABLE LIMITS: N/A

EXTINGUISHING MEDIA: ANY MEDIA APPROPRIATE FOR SURROUNDING FIRE

SPECIAL FIREFIGHTING PROCEDURES: NONE

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE FROM THIS PRODUCT, HOWEVER, CONSIDERATION MUST BE GIVEN TO THE POTENTIAL FIRE/EXPLOSION HAZARD FROM THE BASE MATERIAL BEING PROCESSED. MANY MATERIALS CREATE FLAMMABLE/EXPLOSIVE DUSTS OR TURNINGS WHEN MACHINED OR GROUND.

REACTIVITY/INCOMPATIBILITY (MATERIALS OR CONDITIONS TO AVOID): N/A

HAZARDOUS DECOMPOSITION PRODUCTS: DUST FROM GRINDING COULD CONTAIN INGREDIENTS AS LISTED IN SECTION 2 AND OTHER POTENTIALLY MORE HAZARDOUS COMPONENTS OF THE BASE MATERIAL BEING GROUND OR COATINGS APPLIED TO THE BASE MATERIAL.

SPECIAL STORAGE PRECAUTIONS: STORE IN ACCORDANCE WITH ANSI B7.1 AT ROOM TEMPERATURE, RELATIVE HUMIDITY 50-55%.

HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE: RESPIRATORY AND EYE IRRITATION

CHRONIC EFFECTS OF OVEREXPOSURE: LONG-TERM EXCESSIVE EXPOSURE MAY RESULT IN A CHRONIC PULMONARY CONDITION (FIBROSIS) WHICH IS AGGRAVATED BY SMOKING.

SIGNS AND SYMPTOMS OF EXPOSURE: COUGHING, SHORTNESS OF BREATH, RESPIRATORY IRRITATION, DIMINISHED BREATHING CAPACITY. A GREATER HAZARD IN MOST CASES, HOWEVER, IS THE EXPOSURE TO DUST/FUMES FROM THE MATERIAL PAINT/COATINGS BEING GROUND. A MAJORITY OF THE DUST GENERATED DURING GRINDING IS FROM THE BASE MATERIAL BEING GROUND AND THE POTENTIAL HAZARD FROM THIS EXPOSURE MUST BE EVALUATED.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: RESPIRATORY DISEASE

PRIMARY ROUTE (S) OF EXPOSURE: INHALATION, EYES

CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN: OSHA: NO

NATIONAL TOXICOLOGY PROGRAM: NO I.A.R.C. MONOGRAPHS: NO

FIRST AID: INHALATION - REMOVE TO FRESH AIR, OBTAIN FIRST AID & MEDICAL ASSISTANCE. EYES - DUST MAY IRRITATE EYES, FLUSH WITH LARGE AMOUNTS OF WATER, OBTAIN MEDICAL ATTENTION FOR IRRITATION OR FOREIGN BODY IN THE EYE. SKIN - WASH DUST FROM SKIN. INGESTION - THIS IS AN UNLIKELY ROUTE OF EXPOSURE BUT SHOULD GRINDING DUST BE SWALLOWED, GET MEDICAL ADVICE.

SAFE HANDLING PROCEDURES

HYGIENIC PRACTICES: WASH WELL WITH SOAP & WATER BEFORE EATING, DRINKING SMOKING, OR USING TOILET FACILITIES.

SPILL HANDLING/CLEAN-UP: TREAT AS INERT DRY SOLID. SWEEP-UP OR VACUUM IN SUCH A MANNER AS TO MINIMIZE DUST GENERATION.

WASTE DISPOSAL: STANDARD LANDFILL METHODS IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

CONTROL MEASURES

RECOMMENDED ENGINEERING CONTROLS (VENTILATION): LOCAL EXHAUST AS NEEDED TO KEEP DUST CONCENTRATION BELOW ALL APPLICABLE TLV'S FOR ALL POSSIBLE CONTAMINANTS.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY PROTECTION: NIOSH APPROVED DUST RESPIRATORS, OR SUPPLIED AIR DEPENDING ON CONTAMINANT AND CONCENTRATION. GET PROFESSIONAL ADVICE FOR SELECTION.

GLOVES: CLOTH OR LEATHER

EYE PROTECTION: WEAR SAFETY GOGGLES OR FACE SHIELD

OTHER: HEARING PROTECTION MAY BE REQUIRED IN GRINDING OPERATIONS

DATE PREPARED/UPDATED: 11/1/88

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372 (SARA 313-Toxic Chemical Releases Reporting:
Aluminum Oxide

This product does not contain chemicals regulated under California Proposition 65.



MATERIAL SAFETY DATA SHEET

CANNON-MUSKEGON CORPORATION
BOX 508 MUSKEGON, MI 49443-0506
616 / 755-1681 — TLX 510/394/4620
FACS | MILE#: 616 / 756-4016

This M.S.D.S. supersedes
any previously issued.

Date: September 1987

I. MATERIAL IDENTIFICATION

Material Type: Iron Base Alloys

II. HAZARDOUS INGREDIENTS

<u>Element</u>	<u>%</u>	<u>CAS Number*</u>	<u>ACGIH TLV**</u> <u>(mg/m3)</u>	
Al	Aluminum	<10	7429-90-5	10
B	Boron	< 1	1303-86-2	10
C	Carbon	< 5	1333-86-4	3.5
Cr	Chromium	<40	7440-47-3	0.5
Co	Cobalt	<30	7440-48-4	0.1
Cb	Columbium	< 5	-	None
Cu	Copper	<10	7440-50-8	0.2
Hf	Hafnium	< 1	7440-58-6	0.5
Fe	Iron	BASE	1309-37-1	5
La	Lanthanum	< 1	-	None
Mn	Manganese	<20	7439-96-5	1
Mo	Molybdenum	<20	7439-98-7	10
Ni	Nickel	<50	7440-02-0	1
Re	Rhenium	< 1	-	None
Se	Selenium	< 1	7782-49-2	0.2
Si	Silicon	< 5	7740-21-3	10
S	Sulphur	< 1	7446-09-5	5
Ta	Tantalum	<10	7740-25-7	5
Ti	Titanium	<10	13463-67-7	10
W	Tungsten	<20	7440-33-7	5
V	Vanadium	< 5	1314-62-1	0.05
Yt	Yttrium	< 1	7440-65-5	1
Zr	Zirconium	< 1	7440-67-2	5

III. PHYSICAL DATA

Specific Gravity Range: 7.6 - 9.2 g/cc (room temperature)
Appearance and Odor: Silver-gray metallic color, no odor
Melting Point Range: 2200-2900°F
Solubility in Water: Insoluble (room temperature)

* Chemical Abstracts Service Number

** American Conference of Governmental Industrial Hygienists 1985-1986
Threshold Limit Values based on an 8-hour day, 40-hour week.

CANNON-MUSKEGON CORPORATION

----- IV. FIRE AND EXPLOSION HAZARD DATA -----

Metal in bulk form is not combustible. Fire and explosion hazards exist when dust particles are exposed to heat, flames, strong oxidizers, or chemicals that support combustion.

Extinguishing media: Dry chemical or dry sand

----- V. HEALTH HAZARD DATA -----

Normal handling of alloys in solid form presents minimal health hazards. The primary route of entry is through inhalation of dust or fumes. For melting and cutting considerations, see Section II. Local exhaust ventilation should be adequate to keep airborne concentrations below TLV (or use NIOSH approved respiratory equipment). In the case of overexposure, remove the person to fresh air. If breathing has stopped, begin artificial respiration. Seek medical attention.

Research agency studies indicate some increased risk of cancer resulting from exposure to hexavalent chromium compounds and nickel refining operations. Studies of workers exposed to chromium and nickel in alloy production do not indicate a hazard.

Excessive or prolonged skin contact may cause irritation in sensitized persons. Wash with soap and water. In the case of eye contact, flush thoroughly with water. Wear protective clothing.

----- VI. REACTIVITY DATA -----

Avoid damp or wet storage conditions. Molten metal may react violently with water. Avoid contamination with petroleum products. Dust particles may react with strong acids, bases, and oxidizers.

----- VII. SPILL AND DISPOSAL PROCEDURES -----

Large quantities of dust should be vacuumed or swept wet to keep airborne concentrations minimal. Protective clothing should be worn in clean-up operations. Recycle or dispose of according to Federal, State and Local regulations.

----- VIII. SPECIAL PRECAUTIONS -----

Provide local exhaust ventilation adequate to keep airborne metal dust concentrations below TLV. Smoking and food should not be consumed in areas where metal dust is generated.

The information contained in the M.S.D.S. is believed to be valid and accurate. The seller, however, makes no warranty, either expressed or implied, as to the completeness of information in all possible conditions. Reasonable safety precautions must always be observed.



The Kindt-Collins Company LLC

12651 Elmwood Ave
Cleveland, Ohio 44111

Like-Nu Sprue Wax

DATE PREPARED: 4/21/2005

LAST REVISION: 1/5/2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: Kindt-Collins Company LLC
12651 Elmwood Ave
Cleveland, OH 44111

INFORMATION PHONE: (216) 252-4122

EMERGENCY PHONE: (800) 424-9300
(Chemtrec)

PRODUCT NAME: Like-Nu Sprue Wax

PRODUCT NUMBER:

UPC NUMBER:

SYNONYMS:

PREPARED BY Kathy Louney-Bilski

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Ingredient %	OSHA PEL	ACGIH TLV
WAX BLEND - Microcrystalline wax	63231607	100	2 ppm (mg/m ³)	TWA 2 ppm (mg/m ³)

This Product is completely colophony free with no detectable trace elements.

3. HAZARDOUS IDENTIFICATION

EMERGENCY OVERVIEW:

POTENTIAL HEALTH EFFECTS

EYE CONTACT: Fumes from molten product may cause irritation. Contact with molten product may cause severe thermal burns.

INHALATION: Product dust may cause respiratory tract irritation. Molten wax may cause irritation to the respiratory tract

INGESTION: Low order of acute systematic toxicity

SKIN CONTACT: Contact with molten wax may cause severe thermal burns.

SIGNS AND SYMPTOMS OF EXPOSURE:

4. FIRST AID MEASURES

EYE CONTACT: Ambient wax - flush wax particles with tepid water. Hot wax - seek medical attention

INHALATION: When fume or mist occurs remove to fresh air. If person is not breathing provide oxygen or artificial respiration. Seek medical attention.

INGESTION: Small quantities - permit to pass through system. Large quantities - seek medical attention

SKIN CONTACT: Ambient wax - wash with soap and water. Molten wax - cool wax immediately - do not remove wax from skin. Seek medical attention.

AGGRAVATED MEDICAL CONDITIONS:

SUPPLEMENTAL HEALTH INFORMATION:

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: > 200° C

FLASH POINT METHOD USED: Open Cup

AUTOIGNITION: Not Determined

LEL: N/A

UEL: N/A

EXTINGUISHING MEDIA:

Use water fog, alcohol-type foam, dry chemical, or CO2. Do not use direct stream of water.

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

As with most solid or particulate organic material, extremely high dust concentration in air may result in a potential fire hazard. Good housekeeping practices will prevent any significant accumulations.

COMBUSTION PRODUCTS:

N/A

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED:

Sweep up material and place in appropriate disposal container. If molten wax-contain spill as much as possible and let molten wax cool. Once solid, place material in appropriate disposal container.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

OTHER PRECAUTIONS:

N/A

8. EXPOSURE CONTROL/PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Normally none required. For mist and fumes used approved NIOSH/MSHA organic respirator.

VENTILATION:

Provide exhaust ventilation sufficient to keep the airborne concentration of this product below its exposure limits. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination

PROTECTIVE GLOVES:

Ambient wax- cotton gloves /Molten wax- Impervious heat protective gloves

EYE PROTECTION:

Safety glasses with side shields (or goggles) and a face shield.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

N/A

WORK / HYGENIC PRACTICES:

Use good personal hygiene when handling this product. Wash hands after use, before smoking, or using the toilet.

ENGINEERING CONTROLS: Good ventilation should be sufficient to control airborne levels.

EXPOSURE GUIDELINES:

9. PHYSICAL AND CHEMICAL PROPERTIES

SOLUABILITY IN WATER: Insoluble

APPEARANCE AND ODOR: Waxy Solid, little or no odor.

BOILING POINT: N/A

FREEZING POINT: N/A

VAPOR PRESSURE: N/A

PERCENT VOLATILE: N/A

EVAPORATION: N/A

PH: N/A

POUNDS PER GALLON: N/A

MOLECULAR WEIGHT: N/A

SPECIFIC GRAVITY: ~.938

VAPOR DENSITY: N/A

MELTING POINT: 150+/-6°F

OTHER PROPERTIES: N/A

10. STABILITY AND REACTIVITY

STABLE: Stable

INCOMPATIBILITY: Strong oxidizing materials.

HAZARDOUS DECOMPOSITION OR BY PRODUCTS: Carbon dioxide (Carbon monoxide with incomplete combustion)

HAZARDOUS POLYMERIZATION: Will Not Occur

11. TOXICOLOGY INFORMATION

12. ECOLOGICAL INFORMATION

13. DISPOSAL CONSIDERATIONS

Any disposal practice must be in compliance with federal, state, and local regulations. Do not dump into sewers, ground, or any body of water.

14. TRANSPORTATION INFORMATION

DOT CLASS: Non-Hazardous

HAZARD CLASS: Non-Hazard

UN NUMBER: Non-Hazard

PACKING: Non-Hazard

GUIDE NUMBER: N/A

PROPER SHIPPING NAME: Non-Hazardous

15. REGULATORY INFORMATION

EC Classification: A component or components of this product are listed on the TSCA Inventory of existing chemical substances

SARA Title III **Section 302 : Extremely Hazardous (If Section is blank - then it is N/A (not applicable))**

per 40 CFR 372.45(f) toxic chemicals if so listed here in the mixture do not exceed the specified upper bound concentration value listed as Wt%

Chemical Name	CAS number	Wt. %
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Section 311-312: Hazardous Categorization (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
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Section 313: Toxic Chemical (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
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WHIMIS (If Section is blank - then it is N/A (not applicable))

Chemical name	CAS number	Wt. %
---------------	------------	-------

Proposition 65 (If Section is blank - then it is N/A (not applicable))

Chemical name	CAS number	Wt. %
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16. OTHER INFORMATION

HMIS INFORMATION: HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0 PROTECTIVE:

DISCLAIMER

The information contained herein is based on the data available to The Kindt-Collins LLC and is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results obtained from the use thereof. We assume no responsibilities for injury from the use of this product described herein.

We only warrant to you, but no other persons, that the product herein shall conform to our Quality Assurance specifications on the date of shipment to you. Any technical advise, information, or recommendations given to you is given gratis without any warranty, expressed or implied.

MATERIAL SAFETY DATA SHEET

Page 1 of 4
Revised 6/25/02
Replaces 6/25/02
Printed 6/26/02

CONFIDENCE 10

MSDS ID: 04880

I. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: CONFIDENCE 10
Product Descriptor: BOILER WATER TREATMENT
MANUFACTURER: JOHNSON DIVERSEY, INC.
3630 E. KEMPER ROAD
CINCINNATI, OH. 45241
EMERGENCY PHONE NUMBERS: MEDICAL (COLLECT): (303) 592-1024
CHEMTREC: (800) 424-9300
JOHNSON DIVERSEY: (800) 543-4906

II. HAZARDOUS COMPONENTS

Component Name	CAS Number	%	Exposure Limits	Units
POTASSIUM HYDROXIDE	1310-58-3	5 - 15%	TWA - C 2	MG/M3
SODIUM HYDROXIDE	1310-73-2	1 - 5%	TLV-C 2	MG/M3

III. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

CORROSIVE - Contains strong alkali. Causes severe burn to skin and eyes. May be fatal if swallowed. Do not contact eyes, skin or clothing. Wear goggles, face shield, rubber gloves, and protective clothing and boots when handling product. Avoid breathing dust or spray mist. Contain spill or runoff, which may cause environmental damage. Contact with aluminum or soft metals may release flammable hydrogen fumes.

POSSIBLE ROUTES OF ENTRY: All Routes of Entry/Exposure

SIGNS AND SYMPTOMS OF OVEREXPOSURE

ACUTE: EYES: Severe burns, tissue damage, or irritation with pain, swelling, blurred or impaired vision, blindness. SKIN: Severe burns, tissue destruction, blisters or rash with swelling and pain. INGESTION: May be fatal. Severe burns to mouth and throat may result with pain, gastric perforation and difficulty in swallowing or breathing. INHALATION: Spray or mists cause burns or severe irritation to nose, throat and respiratory tract with pain, choking, and experience difficulty in breathing.

CHRONIC: Same as acute effects.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermatitis, sensitive skin, pulmonary function and asthma.

TARGET ORGAN(S) OF CHEMICAL HAZARD(S): Eyes, skin, respiratory tract, and gastrointestinal tract.

IV. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Hold eyelids apart to completely flush all chemicals from entire eye surface. Get immediate medical attention.

SKIN: Flush thoroughly with plenty of water. Wash with mild soap and water. Remove contaminated clothes and shoes and clean before reuse. Get medical attention for any painful, red or injured

MATERIAL SAFETY DATA SHEET

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Printed 6/26/02

CONFIDENCE 10

MSDS ID: 04880

IV. FIRST AID MEASURES (Cont.)

skin.

INGESTION: If swallowed, rinse mouth with water. Dilute by drinking several glasses of water. DO NOT induce vomiting. If patient vomits, rerinse mouth. Get immediate medical attention. NOTE: Never give fluids by mouth to an unconscious person.

INHALATION: If inhaled, move to fresh air. If patient is not breathing, give artificial respiration. If breathing is difficult, give oxygen under the direction of trained personnel or a physician. Get immediate medical attention.

V. FIRE FIGHTING MEASURES

FLASH POINT (degrees F): N/A FLAME EXTENSION: N/A
FLAMMABLE LIMITS IN AIR BY VOLUME: LEL: NONE UEL: NONE
UNUSUAL FIRE OR EXPLOSIVE HAZARDS: Toxic fumes or vapor may form during fire.
EXTINGUISHING MEDIA: Water, water spray, CO₂, foam or dry powder.
FIRE FIGHTING INSTRUCTIONS: Wear full protective gear and positive pressure breathing apparatus (SCBA) in fire area.
SPECIAL INSTRUCTIONS: Avoid use of water, which may spread fire.

VI. ACCIDENTAL RELEASE MEASURES

IF MATERIAL IS RELEASED OR SPILLED:
Confine spilled product to prevent environmental contamination. Keep out of storm sewers or surface waters. Small amount should be swept or mopped up and used for related cleaning tasks where possible. Larger amounts should be absorbed on vermiculite, clay, etc., and disposed in accordance with local, State and Federal regulations.
This product does not contain a reportable quantity (RQ) under CERCLA.

VII. HANDLING AND STORAGE

HANDLING AND STORAGE PRECAUTIONS: Store in a cool, dry area, keep away from acids. Keep container closed when not in use. Wear protective gear when handling or using. Do not pressurize container to empty.

VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE/FACE PROTECTION: Face shields.
PROTECTIVE GLOVES: Alkali resistant.
RESPIRATORY PROTECTION: Product does not have any established exposure limits. NIOSH/MSHA approved respirator recommended in enclosed or confined spaces where high air concentration or long exposure may occur.
OTHER PROTECTIVE CLOTHING/EQUIPMENT: Wear chemical resistant apron when handling. Eyewash and safety shower in area if contact or splash hazard exists.
ENGINEERING CONTROLS:
VENTILATION: Good general ventilation should be sufficient to control airborne levels.

MATERIAL SAFETY DATA SHEET

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Revised 6/25/02
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Printed 6/26/02

CONFIDENCE 10

MSDS ID: 04880

IX. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Amber liquid, mild organic odor.

BOILING POINT (DEG F): 215
SPECIFIC GRAVITY/BULK DENSITY: 1.18
pH: 13.97
VOLATILE BY VOLUME: 81.13
SOLUBILITY IN WATER: Soluble
VAPOR PRESSURE (mmHg): 17.5 at 20 C

FREEZING POINT: 0 C
pH 1% SOLUTION: 12
VAPOR DENSITY: 17.3

X. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Product stable.
INCOMPATIBILITY WITH OTHER MATERIALS: Acids; Oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion forms; oxides of sulfur; oxides of nitrogen; oxides of carbon
HAZARDOUS POLYMERIZATION: None known.

XI. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL TESTING: Toxicological testing has not been performed on the product. Listed below is the available toxicology test data for components of the product.

TOXICITY TEST DATA:

Sodium Hydroxide:

Acute Oral LD50 (rat) 500 mg/kg (RTECS)
Acute Skin LD50 (rabbit) 1350 mg/kg (MSI)

Potassium Hydroxide:

Acute Oral LD50 (rat) - 365 mg/kg (RTECS)
Acute Skin LD50 (rabbit) - 1260 mg/kg (MSI)

XII. ECOLOGICAL INFORMATION

Toxicological testing has not been performed on the product. Listed below is the available toxicology test data for components of the product.

ECOTOXICITY TEST DATA:

Potassium Hydroxide:

Acute LC50 (96 hr.) (Pimephles promelas) - 179 mg/l
Acute LC50 (96 hr.) (Daphnia magna) - 60 mg/l

ENVIRONMENTAL FATE: No data available.

XIII. DISPOSAL CONSIDERATIONS

RCRA REGULATED: CONCENTRATED PRODUCT WOULD BE CONSIDERED D002 - CORROSIVE, IF DECLARED HAZARDOUS WASTE.
Spent or excess product is hazardous waste. Do not discharge to sewer or environment. Arrange disposal through a licensed disposal company or treat by special Waste Disposal Sheet. Recycle or dispose of containers by product labeling or governmental regulations.

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CONFIDENCE 10

MSDS ID: 04880

XIV. TRANSPORT INFORMATION

CAUSTIC ALKALI LIQUIDS, N.O.S., (POTASSIUM HYDROXIDE, SODIUM HYDROXIDE), 8, UN 1719, PG III, ERG #60, NAERG #154.

XV. REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA: All ingredients in this product are on TSCA inventory.

HAPS: NONE

VOC CONTENT (EPA Method 24A): % VOC: 0 Lb/Gal VOC: 0

CERCLA/EPCRA:

Section 313 Toxic Chemicals:

NONE

SARA Section 311/312:

ACUTE: YES CHRONIC: NO FIRE: NO REACTIVITY: NO

SUDDEN RELEASE OF PRESSURE: NO

LISTED CARCINOGEN: NONE

NTP: NO IARC: NO OSHA: NO

HMIS RATINGS: HEALTH: 3 FIRE: 0 REACTIVITY: 0

PERSONAL PROTECTIVE EQUIPMENT: D

NFPA RATING: HEALTH: 3 FIRE: 0 REACTIVITY: 0 SPECIAL: ALKALINE

STATE RIGHT-TO-KNOW INFORMATION:

POTASSIUM HYDROXIDE - CAS #1310-58-3

SODIUM HYDROXIDE - CAS #1310-73-2

WATER - CAS #7732-18-5

SODIUM CARBONATE - CAS #497-19-8

SODIUM SULFITE - CAS #7757-83-7

CALIFORNIA PROPOSITION 65:

None of the ingredients are on the California proposition 65 list.

XVI. OTHER INFORMATION

Disclaimer: The information contained in this material safety data sheet is based on the knowledge of this specific product and current national legislation. It applies to the product as sold, use dilutions may be less hazardous. It may not be valid for this material if used in combination with any other materials or in a process. It is the user's responsibility to evaluate the handling, and use.

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ELIM-IRON

MSDS ID: 01896

I. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: ELIM-IRON
Product Descriptor: Water Treatment
MANUFACTURER: JOHNSON DIVERSEY, INC.
3630 E. KEMPER ROAD
CINCINNATI, OH. 45241
EMERGENCY PHONE NUMBERS: MEDICAL (COLLECT): (303) 592-1024
CHEMTREC: (800) 424-9300
JOHNSON DIVERSEY: (800) 543-4906

II. HAZARDOUS COMPONENTS

Component Name	CAS Number	%	Exposure Limits	Units
NONE		>30%	None established	

III. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

CAUTION- Contains ingredients that may cause slight eye irritation. May be harmful if swallowed. Do not get in eyes or on clothing. Do not take internally. Clean up spill and any runoff to prevent possible environmental damage.

POSSIBLE ROUTES OF ENTRY: Ingestion and Inhalation.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

ACUTE: EYES: Irritation with pain, swelling and redness may develop. SKIN: Irritation or dryness develop with long contact. INGESTION: If swallowed, diarrhea, nausea and vomiting may occur.

CHRONIC: Same as Acute Effects.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermatitis and sensitive skin.

TARGET ORGAN(S) OF CHEMICAL HAZARD(S): Eyes and skin.

IV. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for 15 minutes. Get medical attention.

SKIN: Flush thoroughly with plenty of water. Wash with soap and water. Remove contaminated clothes and shoes and clean before reuse. Get medical attention for any painful, red or injured skin.

INGESTION: Do not take internally. If swallowed, drink several glasses of water. Do not induce vomiting. Contact a physician or poison control center.

INHALATION: Remove to fresh air. If breathing difficulties arise, get medical attention.

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ELIM-IRON

MSDS ID: 01896

V. FIRE FIGHTING MEASURES

FLASH POINT (degrees F): N/A
FLAMMABLE LIMITS IN AIR BY VOLUME: LEL: NONE UEL: NONE
UNUSUAL FIRE OR EXPLOSIVE HAZARDS: Toxic fumes or vapor may form during fire.
EXTINGUISHING MEDIA: Water spray, CO2, foam or dry powder.
FIRE FIGHTING INSTRUCTIONS: Wear full protective gear and positive pressure breathing apparatus (SCBA) in fire area.
SPECIAL INSTRUCTIONS: Contain runoff. Prevent from entering sewer or storm drain.

VI. ACCIDENTAL RELEASE MEASURES

IF MATERIAL IS RELEASED OR SPILLED:
Flush small amounts to drain. Collect and return large amounts to container.
This product does not contain a reportable quantity (RQ) under CERCLA.

VII. HANDLING AND STORAGE

HANDLING AND STORAGE PRECAUTIONS: Store in a cool, dry area. Keep from freezing. If frozen, warm to thaw and mix for use. Keep container closed when not in use. Wear protective gear when handling or using. Do not pressurize container to empty.

VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE/FACE PROTECTION: Safety glasses.
PROTECTIVE GLOVES: Not normally required.
RESPIRATORY PROTECTION: Not normally required.
OTHER PROTECTIVE CLOTHING/EQUIPMENT: Not normally required.
ENGINEERING CONTROLS:
MECHANICAL VENTILATION: Normal room ventilation should be sufficient to control airborne levels.
LOCAL VENTILATION: Not usually required.

IX. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Clear amber liquid with mild organic odor.

BOILING POINT (DEG F): >212
SPECIFIC GRAVITY/BULK DENSITY: 1.34
pH: 7.3
VOLATILE BY VOLUME: ND
SOLUBILITY IN WATER: Soluble
VAPOR PRESSURE (mmHg): 17.5 at 20 C
FREEZING POINT: <32
pH 1% SOLUTION: 7.1
VAPOR DENSITY: ND

X. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Product stable.
INCOMPATIBILITY WITH OTHER MATERIALS: None known.
HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion forms oxides of carbon, nitrogen and sulfur.

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X. STABILITY AND REACTIVITY (Cont.)

HAZARDOUS POLYMERIZATION: None known.

XI. TOXICOLOGICAL INFORMATION

No data available.
TOXICITY TEST DATA:
No data available.

XII. ECOLOGICAL INFORMATION

ECOTOXICITY DATA: No data available.
ECOTOXICITY TEST DATA: No data available.
ENVIRONMENTAL FATE: No data available.

XIII. DISPOSAL CONSIDERATIONS

RCRA REGULATED: Not Regulated.
Discharge diluted product to industrial sewer. Use product in container until empty. Triple rinse container with water and add to process. Recycle or dispose of container by product labeling or governmental regulations.

XIV. TRANSPORT INFORMATION

COMPOUND, INDUSTRIAL PROCESS WATER TREATING, N.O.I., LIQUID.

XV. REGULATORY INFORMATION

U.S. Federal Regulations:
TSCA: All ingredients in this product are on TSCA inventory.
HAPS: Contains no hazardous air pollutants.
VOC CONTENT (EPA Method 24A): % VOC: N/A Lb/Gal VOC:
CERCLA/EPCRA:
Section 313 Toxic Chemicals: None
SARA Section 311/312:
ACUTE: YES CHRONIC: NO FIRE: NO REACTIVITY: NO
SUDDEN RELEASE OF PRESSURE: NO
LISTED CARCINOGEN: NONE
NTP: NO IARC: NO OSHA: NO
HMIS RATINGS: HEALTH: 1 FIRE: 0 REACTIVITY: 0
PERSONAL PROTECTIVE EQUIPMENT: A
NFPA RATING: HEALTH: 1 FIRE: 0 REACTIVITY: 0 SPECIAL:
STATE RIGHT-TO-KNOW INFORMATION:
WATER - CAS #7732-18-5
TRADE SECRET REGISTRATION: 694954-00-1-5035P, 694954-00-1-5036P
CALIFORNIA PROPOSITION 65:
None of the ingredients are on the California proposition 65 list.

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XVI. OTHER INFORMATION

DISCLAIMER: The information contained in this material safety data sheet is based on the knowledge of this specific product and current national legislation. It applies to the product as sold, use dilutions may be less hazardous. It may not be valid for this material if used in combination with any other materials or in a process. It is the user's responsibility to evaluate the handling, and use.

MATERIAL SAFETY DATA SHEET



CANNON-MUSKEGON CORPORATION
 BOX 506 MUSKEGON, MI 49443-0506
 616 / 755-1681 — TLX 510/394/4620
 FACSIMILE#: 616 / 755-4016

This M.S.D.S. supersedes
 any previously issued.

Date: September 1987

----- I. MATERIAL IDENTIFICATION -----

Material Type: Nickel Base Alloys

----- II. HAZARDOUS INGREDIENTS -----

<u>Element</u>	<u>%</u>	<u>CAS Number*</u>	<u>ACGIH TLV** (mg/m3)</u>	
Al	Aluminum	<10	7429-90-5	10
B	Boron	< 1	1303-86-2	10
C	Carbon	< 5	1333-86-4	3.5
Cr	Chromium	<50	7440-47-3	0.5
Co	Cobalt	<30	7440-48-4	0.1
Cb	Columbium	< 5	-	None
Cu	Copper	<30	7440-50-8	0.2
Hf	Hafnium	< 1	7440-58-6	0.5
Fe	Iron	<40	1309-37-1	5
La	Lanthanum	< 1	-	None
Mn	Manganese	< 5	7439-96-5	1
Mo	Molybdenum	<40	7439-98-7	10
Ni	Nickel	BASE	7440-02-0	1
Re	Rhenium	< 1	-	None
Se	Selenium	< 1	7782-49-2	0.2
Si	Silicon	< 5	7740-21-3	10
S	Sulphur	< 1	7446-09-5	5
Ta	Tantalum	<10	7740-25-7	5
Ti	Titanium	<10	13463-67-7	10
W	Tungsten	<20	7440-33-7	5
V	Vanadium	< 1	1314-62-1	0.05
Yt	Yttrium	< 1	7440-65-5	1
Zr	Zirconium	< 1	7440-67-2	5

----- III. PHYSICAL DATA -----

Specific Gravity Range: 7.6 - 9.2 g/cc (room temperature)
 Appearance and Odor: Silver-gray metallic color, no odor
 Melting Point Range: 2200-2900°F
 Solubility in Water: Insoluble (room temperature)

* Chemical Abstracts Service Number

** American Conference of Governmental Industrial Hygienists 1985-1986
 Threshold Limit Values based on an 8-hour day, 40-hour week.

CANNON-MUSKEGON CORPORATION

----- IV. FIRE AND EXPLOSION HAZARD DATA -----

Metal in bulk form is not combustible. Fire and explosion hazards exist when dust particles are exposed to heat, flames, strong oxidizers, or chemicals that support combustion.

Extinguishing media: Dry chemical or dry sand

----- V. HEALTH HAZARD DATA -----

Normal handling of alloys in solid form presents minimal health hazards. The primary route of entry is through inhalation of dust or fumes. For melting and cutting considerations, see Section II. Local exhaust ventilation should be adequate to keep airborne concentrations below TLV (or use NIOSH approved respiratory equipment). In the case of overexposure, remove the person to fresh air. If breathing has stopped, begin artificial respiration. Seek medical attention.

Research agency studies indicate some increased risk of cancer resulting from exposure to hexavalent chromium compounds and nickel refining operations. Studies of workers exposed to chromium and nickel in alloy production do not indicate a hazard.

Excessive or prolonged skin contact may cause irritation in sensitized persons. Wash with soap and water. In the case of eye contact, flush thoroughly with water. Wear protective clothing.

----- VI. REACTIVITY DATA -----

Avoid damp or wet storage conditions. Molten metal may react violently with water. Avoid contamination with petroleum products. Dust particles may react with strong acids, bases, and oxidizers.

----- VII. SPILL AND DISPOSAL PROCEDURES -----

Large quantities of dust should be vacuumed or swept wet to keep airborne concentrations minimal. Protective clothing should be worn in clean-up operations. Recycle or dispose of according to Federal, State and Local regulations.

----- VIII. SPECIAL PRECAUTIONS -----

Provide local exhaust ventilation adequate to keep airborne metal dust concentrations below TLV. Smoking and food should not be consumed in areas where metal dust is generated.

The information contained in the M.S.D.S. is believed to be valid and accurate. The seller, however, makes no warranty, either expressed or implied, as to the completeness of information in all possible conditions. Reasonable safety precautions must always be observed.



The Kindt-Collins Company LLC

12651 Elmwood Ave
Cleveland, Ohio 44111

KC 3818 A

DATE PREPARED: 7/6/2008
LAST REVISION: 1/5/2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: Kindt-Collins Company LLC
12651 Elmwood Ave
Cleveland, OH 44111

INFORMATION PHONE: (216) 252-4122
EMERGENCY PHONE: (800) 424-9300
(Chemtrec)

PRODUCT NAME: KC 3818 A
PRODUCT NUMBER:
UPC NUMBER:

SYNONYMS:
PREPARED BY Craig Mackey

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Ingredient %	OSHA PEL	ACGIH TLV
WAX BLEND WITH RESINS AND FILLERS		100	2mg/m ³	2mg/m ³

This Product is completely colophony free with no detectable trace elements.

3. HAZARDOUS IDENTIFICATION

EMERGENCY OVERVIEW:

POTENTIAL HEALTH EFFECTS

EYE CONTACT: Fumes from molten product may cause irritation. Contact with molten product may cause severe thermal burns.

INHALATION: Product dust may cause respiratory tract irritation. Molten wax may cause irritation to the respiratory tract

INGESTION: Low order of acute systematic toxicity

SKIN CONTACT: Contact with molten wax may cause severe thermal burns.

SIGNS AND SYMPTOMS OF EXPOSURE:

4. FIRST AID MEASURES

EYE CONTACT: Ambient wax - flush wax particles with tepid water. Hot wax - seek medical attention

INHALATION: When fume or mist occurs remove to fresh air. If person is not breathing provide oxygen or artificial respiration. Seek medical attention.

INGESTION: Small quantities - permit to pass through system. Large quantities - seek medical attention

SKIN CONTACT: Ambient wax - wash with soap and water. Molten wax - cool wax immediately - do not remove wax from skin. Seek medical attention.

AGGRAVATED MEDICAL CONDITIONS:

SUPPLEMENTAL HEALTH INFORMATION:

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: >200°C

FLASH POINT METHOD USED: COC, ASTM D-92

AUTOIGNITION: Not Determined

LEL: N/A

UEL: N/A

EXTINGUISHING MEDIA:

Use water fog, alcohol-type foam, dry chemical, or CO2. Do not use direct stream of water.

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

As with most solid or particulate organic material, extremely high dust concentration in air may result in a potential fire hazard. Good housekeeping practices will prevent any significant accumulations.

COMBUSTION PRODUCTS:

N/A

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED:

Sweep up material and place in appropriate disposal container. If molten wax-contain spil as much as possible and let molten wax cool. Once solid, place material in appropriate disposal container.

7. HANLDING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

OTHER PRECAUTIONS:

N/A

8. EXPOSURE CONTROL/PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Normally none required. For mist and fumes used approved NIOSH/MSHA organic respirator.

VENTILATION: Provide exhaust ventilation sufficient to keep the airborne concentration of this product below its exposure limits. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination

PROTECTIVE GLOVES: Ambient wax- cotton gloves /Molten wax- Impervious heat protectivegloves

EYE PROTECTION: Safety glasses with side shields (or goggles) and a face shield.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: N/A

WORK / HYGENIC PRACTICES:

Use good personal hygiene when handling this product. Wash hands after use, before smoking, or using the restroom facilities.

ENGINEERING CONTROLS: Good ventilation should be sufficient to control airborne levels. Do not let molten product stand unused in melt tanks and injection machines. Stir molten product at all times.

EXPOSURE GUIDELINES:

9. PHYSICAL AND CHEMICAL PROPERTIES

SOLUABILITY IN WATER: Insoluable

APPEARANCE AND ODOR: Waxy Solid, little or no odor.

BOILING POINT: 660-730° F

FREEZING POINT: N/A

VAPOR PRESSURE: N/A

PERCENT VOLATILE: N/A

EVAPORATION: N/A

PH: N/A

POUNDS PER GALLON: N/A

MOLECULAR WEIGHT: N/A

SPECIFIC GRAVITY: ~.980

VAPOR DENSITY: N/A

MELTING POINT: 147+/-8 °F

OTHER PROPERTIES:

10. STABILITY AND REACTIVITY

STABLE: Stable

INCOMPATIBILITY: Strong oxidizing materials.

HAZARDOUS DECOMPOSITION OR BY PRODUCTS: Carbon dioxide (Carbon monoxide with incomplete combustion)

HAZARDOUS POLYMERIZATION: Will Not Occur

11. TOXICOLOGY INFORMATION

12. ECOLOGICAL INFORMATION

13. DISPOSAL CONSIDERATIONS

Any disposal practice must be in compliance with federal, state, and local regulations. Do not dump into sewers, ground, or any body of water.

14. TRANSPORTATION INFORMATION

DOT CLASS: Non-Hazardous

HAZARD CLASS: Non-Hazard

UN NUMBER: Non-Hazard

PACKING: Non-Hazard

GUIDE NUMBER: N/A

PROPER SHIPPING NAME: Non-Hazardous

15. REGULATORY INFORMATION

EC Classification: No hazardous ingredients as defined by OSHA 29 CFR 1910.1200

SARA Title III Section 302 : Extremely Hazardous (If Section is blank - then it is N/A (not applicable))

per 40 CFR 372.45(f) toxic chemicals if so listed here in the mixture do not exceed the specified upper bound concentration value listed as Wt%

Chemical Name CAS number Wt. %

Section 311-312: Hazardous Categorization (If Section is blank - then it is N/A (not applicable))

Chemical Name CAS number Wt. %

Section 313: Toxic Chemical (If Section is blank - then it is N/A (not applicable))

Chemical Name CAS number Wt. %

WHIMIS (If Section is blank - then it is N/A (not applicable))

Chemical name CAS number Wt. %

Proposition 65 (If Section is blank - then it is N/A (not applicable))

Chemical name CAS number Wt. %

16. OTHER INFORMATION

HMIS INFORMATION: HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0 PROTECTIVE:

DISCLAIMER

The information contained herein is based on the data available to The Kindt-Collins LLC and is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results obtained from the use thereof. We assume no responsibilities for injury from the use of this product described herein.

We only warrant to you, but no other persons, that the product herein shall conform to our Quality Assurance specifications on the date of shipment to you. Any technical advice, information, or recommendations given to you is given gratis without any warranty, expressed or implied.

Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> Primcote® Binder	<i>MSDS Code Number</i> 096
<i>Trade Name & Synonyms</i> Silica Sol formulation	<i>Date of Last Revision</i> 07/03
<i>Chemical Name</i>	<i>Manufacturer</i> Ransom & Randolph
<i>C.A.S. Number</i>	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i> Colloidal silica based primary binder for investment casting	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<u>Hazardous Components</u>	<u>C.A.S. Number</u>	<u>%</u>
Silica (amorphous)	7631-86-9	<50
Dipotassium flourescein	6417-85-2	<10
Oxirane polymer with 2 ethyl hexyl dihydrogen phosphate	68460-10-6	<10

3. Hazardous Identification

Emergency Overview

Contains alkaline material. May cause irritation. Avoid contact with eyes, skin, and clothing.

<i>Routes of Exposure</i>	<i>Signs & Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
<i>Eye</i>	Irritation				
<i>Skin</i>	May tend to dry out skin.				
<i>Inhalation</i>					
<i>Ingestion</i>					
<i>Other</i>					

Medical Conditions Aggravated by Exposure

None known

Carcinogenicity (IARC, NTP)

In the shipped form, this product was not evaluated by the IARC, not listed by NTP, and not regulated by OSHA.

Although amorphous silica is not a carcinogen as purchased in this product, portions of it may convert to crystalline silica (cristobalite) when subjected to higher temperatures (e.g. 1700° F), such as when used in a mold for ferrous and other high temperature alloy castings. The exposure to crystalline silica is highest at the mold knockout stage of the casting process.

The specifics on carcinogenicity of respirable crystalline silica follow:

The exposure limits for respirable crystalline silica; specifically cristobalite, established by OSHA-PEL = 0.05 mg/m³.

The IARC and NTP report the following on the carcinogenicity of respirable crystalline silica:

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on experimental animals and limited evidence in humans.

IARC Monograph Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent is carcinogenic to humans.

For more detailed information on the effects of crystalline silica, contact the manufacturer.

Potential Environmental Effects

4. First Aid Measures

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Flush with flowing water for at least 15 minutes.	If irritation persists, call a physician.	
<i>Skin</i>	Wash with soap and water.		
<i>Inhalation</i>	Remove to fresh air.	Call a physician.	
<i>Ingestion</i>		Call a physician.	

Other

Never give fluids or induce vomiting if patient is unconscious or having convulsions.

Note to Physicians (Treatment, Testing, and Monitoring)

5. Fire-fighting Measures

<i>Flashpoint: (Method)</i>	<i>Flammable (Explosive) Limits in Air</i>		<i>Autoignition Temperature:</i>	<i>Other</i>
N/A	LEL: N/A	UEL: N/A		
<i>Flame Propagation or Burning Rate (for solids):</i>	<i>Properties Contributing to Fire Intensity</i>		<i>Flammability Classification NFDA Rating:</i>	

<i>Extinguishing Media</i> Foam, dry chemical, carbon dioxide, water spray		<i>Extinguishing Media to Avoid</i>	
<i>Protection and Procedures for Firefighters:</i>			
<i>Unusual Fire and Explosion Hazards:</i> None			
6. Accidental Release Measures			
<i>Containment Techniques</i> Spills should be contained and placed in suitable containers for disposal in a licensed facility.			
<i>Spill/Leak Clean-Up Procedures and Equipment</i> Clean up promptly as spills are a slipping hazard.			
<i>Evacuation Procedures</i>			
<i>Special Instructions</i>			
<i>Reporting Requirements</i>			
7. Handling and Storage			
<i>Handling Practices and Warnings</i>			
<i>Storage Practices and Warnings</i> Keep from freezing. Binder stored in transparent or translucent containers should be sheltered from direct sunlight.			
8. Exposure Controls/Personal Protection			
<i>Ventilation</i> General		<i>Other Engineering Controls</i> Local exhaust	
<i>Routes of Entry:</i>		<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>
<i>Eye/Face</i>	Nor normally necessary but recommended. Chemical workers goggles.		
<i>Skin</i>	Protective gloves.		
<i>Inhalation</i>	Use NIOSH approved respirator for dust and particulates, N95 filter classification (e.g. 3M 8210).		
<i>General Hygiene Considerations and Work Practices</i>			
<i>Other Protective Measures and Equipment</i> Eye wash and shower.			
9. Physical and Chemical Properties			
<i>Appearance</i> Yellow liquid		<i>Odor</i>	
<i>Normal Physical State:</i> Liquid X Gas Solid		<i>Boiling Point</i>	212° F (100° C)
		<i>Melting Point</i>	32° F (0° C)
		<i>Freezing Point</i>	32° F (0° C)
<i>Specific Gravity or Density (H₂O=1)</i> 1.180	<i>Solubility in Water</i> 100%	<i>pH</i> 10.6 (typical)	
<i>Vapor Pressure (mm Hg.)</i> 17.5 mm Hg	<i>Vapor Density (AIR = 1)</i> 0.016	<i>Evaporation Rate (Butyl Acetate=1)</i>	
<i>Other</i> % Volatile by Volume: 65%			

10. Stability and Reactivity			
<i>Incompatibility (Materials to Avoid)</i> Acids. Metal salts will coagulate product.			
<i>Hazardous Products Produced During Decomposition</i>			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i> Y	<i>Conditions to Avoid</i>
<i>Stability?</i>	<i>Stable</i> Y	<i>Unstable</i>	<i>Conditions to Avoid</i> Freezing
11. Toxicological Information			
<i>Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data</i>			
12. Ecological Information			
<i>Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements</i> No ecotoxicity data is available. This product is not expected to present an environmental hazard.			
13. Disposal Considerations			
<i>Regulations</i> Dispose of waste materials and containers in a licensed facility.			
<i>Properties (Physical/Chemical) Affecting Disposal</i>			
14. Transport Information			
<i>Regulated for shipping?</i> Yes No X	<i>Proper Shipping Name</i> Not Regulated	<i>Packing Group</i> N/A	
<i>Do changes in quality, packaging, or shipment method change product classification?</i> Yes No X	<i>Hazard Class</i> N/A	<i>Identification Number</i> N/A	
<i>Other</i>			
15. Regulator Information			
<i>Federal Regulations</i>			
<i>International Regulations</i>			
<i>Other</i> This product contains trace amounts of 1, 3 Butadiene, a chemical known to the State of California to cause cancer.			
16. Other Information			
NFPA Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
HMIS Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
Personal Protection: Use NIOSH/OSHA approved respirator.			

The information set forth herein has been gathered from standard reference materials and/or Ransom & Randolph Company test data and is, to the best knowledge and belief of Ransom & Randolph Company accurate and reliable. Such information is offered solely for your consideration, investigation and verification and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. Ransom & Randolph Company makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identifies here in combination with any other material or process, and assumes no responsibility therefore.

Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> Ranco-Sil™ fused silica 1, 2, 4, 6, A, B, C, 150i, -140, -170, -20+32, 270	<i>MSDS Code Number</i> 007
<i>Trade Name & Synonyms</i> Fused silica, silicon dioxide	<i>Date of Last Revision</i> 12/02
<i>Chemical Name</i> Inorganic oxide	<i>Manufacturer</i>
<i>C.A.S. Number</i>	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i> Investment casting refractory material	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<i>Hazardous Components</i>	<i>C.A.S. Number</i>	<i>%</i>
Silica (cristobalite)	14464-46-1	<0.75
Fused silica (amorphous)	60676-86-0	>80

3. Hazardous Identification

Emergency Overview
Ranco-Sil fused silica contains crystalline silica. Do not breathe dust.

<i>Routes of Exposure</i>	<i>Signs & Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
<i>Eye</i>	Irritation				
<i>Skin</i>	Irritation				
<i>Inhalation</i>	Cough, tightness in chest, shortness of breath, wheezing and sputum production	Silicosis	Silicosis	Silicosis	Lungs
<i>Ingestion</i>	Not likely route				
<i>Other</i>					

Medical Conditions Aggravated by Exposure

Any pre-existing respiratory or pulmonary disease or condition, such as, but not limited to, bronchitis, emphysema and asthma. Individuals with silicosis are predisposed to develop tuberculosis.

Carcinogenicity (IARC, NTP)

IARC: Yes

IARC Monograph Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent is carcinogenic to humans.

Amorphous Silica has been designated by IARC as a Group 3, "not classifiable as to human carcinogenicity." This means that evidence is insufficient to link that fiber to cancer.

NTP: Yes

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline respirable" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

Potential Environmental Effects

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

4. First Aid Measures

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Flush with plenty of water.	If discomfort or irritation persists, consult a physician.	
<i>Skin</i>	Wash with soap and water.	If discomfort or irritation persists, consult a physician.	
<i>Inhalation</i>	Remove affected persons to fresh air.	If discomfort or irritation persists, consult a physician.	
<i>Ingestion</i>	Drink water. Do not induce vomiting.	If discomfort or irritation persists, consult a physician.	

5. Fire-fighting Measures

<i>Flashpoint: (Method)</i> N/A	<i>Flammable (Explosive) Limits in Air</i> LEL: N/A UEL: N/A		<i>Autoignition Temperature:</i>	<i>Other</i> Do not inhale dust.
<i>Flame Propagation or Burning Rate (for solids):</i> This product will not burn.	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFDA Rating:</i>		
<i>Extinguishing Media</i> This product is compatible with all extinguishing media. Use any media appropriate for the surrounding fire.		<i>Extinguishing Media to Avoid - None</i>		

Protection and Procedures for Firefighters:

Avoid eye and skin contact. Do not breathe fumes.

Unusual Fire and Explosion Hazards:

N/A

6. Accidental Release Measures

Containment Techniques

Spill/Leak Clean-Up Procedures and Equipment

Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Do not use compressed air to clean spills. Wear protective equipment.

Evacuation Procedures

Special Instructions

Reporting Requirements

7. Handling and Storage

Handling Practices and Warnings

Avoid breakage of bagged material or spills of bulk materials.

Storage Practices and Warnings

Normal warehouse storage.

Other precautions:

Use dustless systems for handling, storage and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean, and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section 8.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. **WARN YOUR EMPLOYEES (AND CUSTOMERS-USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARD AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.**

See also American Society for Testing and Materials (ASTM) Standard Practice E1132-86, "Standard Practice for Health Requirements Relating to Exposure to Quartz Dust."

8. Exposure Controls/Personal Protection

<i>Ventilation</i>	<i>Other Engineering Controls</i> Use sufficient local exhaust to reduce the level of respirable dust to the PEL. See ACGIH "Industrial Ventilation, A Manual Recommended Practice," the latest edition.	
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>
<i>Eye/Face</i>	Wear protective shield (safety glasses) when exposed to dust particles.	
<i>Skin</i>		
<i>Inhalation</i>		

General Hygiene Considerations and Work Practices

Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain clean and fit test respirator in accordance with regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty.

Other Protective Measures and Equipment

We recommend that smoking be prohibited in all areas where respirators must be used. See attached table entitled "TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES."

OCCUPATIONAL PROTECTION MEASURES

Respirator Protection: The following chart specifies the types of respirators which may provide respiratory protection for crystalline silica.

CONDITION Particulate Concentration	RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA MINIMUM RESPIRATORY PROTECTION*
Up to 5 x PEL	Any dust respirator.
Up to 10 x PEL	Any dust respirator, except single-use or quarter mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
Up to 50 x PEL	A high efficiency particulate filter respirator with a full-face piece. Any supplied-air respirator with a full-face piece, helmet, or hood. Any self-contained breathing apparatus with a full-face piece.
Up to 500 x PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 x PEL or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full-face piece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full-face piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Abrasive Blasting	Any Type CE, supplied-air respirator with a full-face piece, hood, or helmet, operated in a positive-pressure mode. (See 29 CFR Section 1910.94 (a).)

*Only NIOSH-approved equipment should be used. (See 29 CFR Section 1910.134). See also ANSI standard Z88.2 (latest version) "Practices for Respiratory Protection."

9. Physical and Chemical Properties

<i>Appearance</i> White powder or grain		<i>Odor</i>
<i>Normal Physical State:</i>		<i>Boiling Point</i> N/A
<i>Liquid</i>	<i>Gas</i>	<i>Melting Point</i> N/A
<i>Solid</i>	<i>Powder X</i>	<i>Freezing Point</i> N/A
<i>Specific Gravity or Density (H₂O=1)</i> 2.19	<i>Solubility in Water</i> Insoluble	<i>pH</i> @ 6 - 7
<i>Vapor Pressure (mm Hg.)</i> N/A	<i>Vapor Density (AIR = 1)</i> N/A	<i>Evaporation Rate (Butyl Acetate=1)</i>
<i>Other</i>		

10. Stability and Reactivity

Incompatibility (Materials to Avoid)

Silicon dioxide is incompatible with strong oxidizers (i.e.: fluorine, oxygen difluoride, and chlorine trifluoride).

Hazardous Products Produced During Decomposition

Thermal decomposition will produce silica and aluminum oxides.

<i>Hazardous Polymerization?</i>	<i>May Occur</i> N	<i>May Not Occur</i> Y	<i>Conditions to Avoid</i> N/A
<i>Stability?</i>	<i>Stable</i> Y	<i>Unstable</i> N	<i>Conditions to Avoid</i> None

11. Toxicological Information

Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data

Crystalline Silica - Prolonged exposure to respirable crystalline silica may cause delayed (chronic) lung injury (silicosis, pneumoconiosis). Acute or rapidly developing silicosis may occur in a short period of time in heavy exposure in certain occupations such as sandblasters. Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death. There is evidence that individuals with silicosis may also experience incidences of scleroderma (immune system disorder), tuberculosis, and nephrotoxicity (kidney lesions).

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

IARC Monograph Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent is carcinogenic to humans.

Amorphous Silica has been designated by IARC as a Group 3, "not classifiable as to human carcinogenicity." This means that evidence is insufficient to link that fiber to cancer.

Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

Properties (Physical/Chemical) Affecting Disposal

12. Ecological Information

Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

13. Disposal Considerations

Regulations

Dispose in accordance with federal, state, and local regulations.

Properties (Physical/Chemical) Affecting Disposal

14. Transport Information

<i>Regulated for shipping?</i> Yes No <input checked="" type="checkbox"/>	<i>Proper Shipping Name</i> Sand NOI	<i>Packing Group</i> N/A
<i>Do changes in quality, packaging, or shipment method change product classification?</i> Yes No <input checked="" type="checkbox"/>	<i>Hazard Class</i> N/A	<i>Identification Number</i> N/A

Other

15. Regulator Information

Federal Regulations

International Regulations

Other

CANADIAN WHMIS: D2A

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200: This product is hazardous under the criteria of this rule.

EPCRA Section 302 (EHSs): This product does not contain ingredients subject to reporting requirements of 40 CFR Part 355, Appendices A and B (Extremely Hazardous Substances).

CERCLA, Section 304: This product does not contain ingredients subject to state and local reporting under Section 304 of SARA Title III as listed in 40 CFR Part 302, Table 302.4.

SARA 313 REPORTING REQUIREMENTS: This product does not contain ingredients subject to the reporting requirements of Section 313 SARA, and Section 6607 of the Pollution Prevention Act.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and by definition meets the requirements of the following category:
Chronic Health Hazard

CALIFORNIA PROPOSITION 65: This product contains crystalline silica, an ingredient known to the State of California to cause cancer.

TSCA (Toxic Substances Control Act): All ingredients contained in this product are on the TSCA inventory.

16. Other Information

The information set forth herein has been gathered from standard reference materials and/or Ransom & Randolph Company test data and is, to the best knowledge and belief of Ransom & Randolph Company accurate and reliable. Such information is offered solely for your consideration, investigation and verification and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. Ransom & Randolph Company makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identifies here in combination with any other material or process, and assumes no responsibility therefore.

TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES

The following table shows the Occupational Exposure Limits (OEL) for quartz, cristobalite and tridymite in application in Europe and in some other countries.

Country	Occupational Exposure Limit (OEL) Name	Adopted by	Quartz (q)	Cristobalite (c)	Tridymite (t)
Australia	National Exposure Standard	Worksafe Australia, National Occupational Health & Safety Commission	0.2	0.1	
Austria	Maximalen Arbeitsplatzkonzentration	Bundesministerium für Arbeit und Soziales	0.15	0.15	0.15
Belgium		Ministère de l'Emploi et du Travail	0.1	0.05	0.05
Denmark	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Finland	Occupational Exposure Standard	National Board of Labour Protection	0.2	0.1	0.1
France	Empoussiérage de reference	Ministère de l'Industrie (RGIE)	5 or 25k/Q		
	Valeur limite de Moyenne d'Exposition	Ministère du Travail	0.1	0.05	0.05
Germany	Maximalen Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Greece		Legislation for mining activities	0.1	0.05	0.05
Ireland		2001 Code of practice for the Safety, Health & Welfare at Work (CoP)	0.05	0.4	0.4
Italy	Threshold Limit Value	Associazione Italiana Degli Igienisti Industriali	0.05	0.05	0.05
Luxembourg	Maximien Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Netherlands	Maximaal Aanvarde Concentratie	Ministerie van Sociale Zaken en Werkgelegenheid	0.075	0.075	0.075
Norway	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Portugal	Threshold Limit Value	Instituto Portugues da Qualidade, Hygiene & Safety at Workplace	0.1	0.05	0.05
Spain	Valores Limites	Instituto Nacional de Seguridad e Higiene en el Trabajo	0.1		
		Instrucciones de Técnicas Complementarias (ITC)	0.1	0.05	0.05
		Reglamento General de Normas Basicas de Seguridad Minera	5 or 25k/Q		
Sweden		National Board of Occupational Safety and Health	0.1	0.05	0.05
Switzerland	Valeur limite de Moyenne d'Exposition		0.15	0.15	0.15
United Kingdom	Maximum Exposure Limit	Health & Safety Executive	0.3	0.3	0.3
	Occupational Exposure Standard				
USA	Permissible Exposure Limit	Occupational Safety & Health Administration	10/(%SiO ₂ +2)	PEL (Quartz)/2	PEL (Quartz)/2
	Threshold Limit Value	American Conference of Governmental Industrial Hygienists	0.05	0.05	0.05

Q: quartz percentage

Source: Adapted from IMA-Europe

Date: 08/05/03, Updated version available at <http://www.ima-eu.org/en/silhsefacts.html>

OELs are applicable to 100 % quartz, cristobalite, or tridymite.

Some countries have special rules for mixed dust, e.g. in France the following equation is applied: $C_{ns}/5 + C_q/0.05 + C_t/0.05 \leq 1$ (C = mean concentration, ns = non silicogen)



The Kindt-Collins Company LLC

12651 Elmwood Ave
Cleveland, Ohio 44111

9 A Red Extrusion Wax

DATE PREPARED: 1/31/2003

LAST REVISION: 1/5/2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: Kindt-Collins Company LLC
12651 Elmwood Ave
Cleveland, OH 44111

INFORMATION PHONE: (216) 252-4122

EMERGENCY PHONE: (800) 424-9300
(Chemtrec)

PRODUCT NAME: 9 A Red Extrusion Wax

PRODUCT NUMBER:

UPC NUMBER:

SYNONYMS:

PREPARED BY Kathy Louney-Bilski

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Ingredient %	OSHA PEL	ACGIH TLV
A BLEND OF WAX AND RESIN		100		

This Product is completely colophony free with no detectable trace elements.

3. HAZARDOUS IDENTIFICATION

EMERGENCY OVERVIEW:

POTENTIAL HEALTH EFFECTS

EYE CONTACT: Fumes from molten product may cause irritation. Contact with molten product may cause severe thermal burns.

INHALATION: Product dust may cause respiratory tract irritation. Molten wax may cause irritation to the respiratory tract

INGESTION: Low order of acute systematic toxicity

SKIN CONTACT: Contact with molten wax may cause severe thermal burns.

SIGNS AND SYMPTOMS OF EXPOSURE:

4. FIRST AID MEASURES

EYE CONTACT: Ambient wax - flush wax particles with tepid water. Hot wax - seek medical attention

INHALATION: When fume or mist occurs remove to fresh air. If person is not breathing provide oxygen or artificial respiration. Seek medical attention.

INGESTION: Small quantities - permit to pass through system. Large quantities - seek medical attention

SKIN CONTACT: Ambient wax - wash with soap and water. Molten wax - cool wax immediately - do not remove wax from skin. Seek medical attention.

AGGRAVATED MEDICAL CONDITIONS:

SUPPLEMENTAL HEALTH INFORMATION:

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: >260°C

FLASH POINT METHOD USED: COC, ASTM D-92

AUTOIGNITION: Not Determined

LEL: N/A

UEL: N/A

EXTINGUISHING MEDIA:

Use water fog, alcohol-type foam, dry chemical, or CO2. Do not use direct stream of water.

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

As with most solid or particulate organic material, extremely high dust concentration in air may result in a potential fire hazard. Good housekeeping practices will prevent any significant accumulations.

COMBUSTION PRODUCTS:

N/A

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED:

Sweep up material and place in appropriate disposal container. If molten wax-contain spill as much as possible and let molten wax cool. Once solid, place material in appropriate disposal container.

7. HANLDING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

OTHER PRECAUTIONS:

N/A

8. EXPOSURE CONTROL/PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Normally none required. For mist and fumes used approved NIOSH/MSHA organic respirator.

VENTILATION:

Provide exhaust ventilation sufficient to keep the airborne concentration of this product below its exposure limits. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination

PROTECTIVE GLOVES:

Ambient wax- cotton gloves /Molten wax- Impervious heat protectivegloves

EYE PROTECTION:

Safety glasses with side shields (or goggles) and a face shield.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

N/A

WORK / HYGENIC PRACTICES:

Use good personal hygiene when handling this product. Wash hands after use, before smoking, or using the restroom facilities.

ENGINEERING CONTROLS: Good ventilation should be sufficient to control airborne levels. Do not let molten product stand unused in melt tanks and injection machines. Stir molten product at all times.

EXPOSURE GUIDELINES:

9. PHYSICAL AND CHEMICAL PROPERTIES

SOLUABILITY IN WATER: Insoluable

APPEARANCE AND ODOR: Waxy Solid, little or no odor.

BOILING POINT: 660-730° F

FREEZING POINT: N/A

VAPOR PRESSURE: N/A

PERCENT VOLATILE: N/A

EVAPORATION: N/A

PH: N/A

POUNDS PER GALLON: N/A

MOLECULAR WEIGHT: N/A

SPECIFIC GRAVITY: ~.930

VAPOR DENSITY: N/A

MELTING POINT: 144+/-6°F

OTHER PROPERTIES:

10. STABILITY AND REACTIVITY

STABLE: Stable

INCOMPATIBILITY: Strong oxidizing materials.

HAZARDOUS DECOMPOSITION OR BY PRODUCTS: Carbon dioxide (Carbon monoxide with incomplete combustion)

HAZARDOUS POLYMERIZATION: Will Not Occur

11. TOXICOLOGY INFORMATION

12. ECOLOGICAL INFORMATION

13. DISPOSAL CONSIDERATIONS

Any disposal practice must be in compliance with federal, state, and local regulations. Do not dump into sewers, ground, or any body of water.

14. TRANSPORTATION INFORMATION

DOT CLASS: Non-Hazardous

HAZARD CLASS: Non-Hazard

UN NUMBER: Non-Hazard

PACKING: Non-Hazard

GUIDE NUMBER: N/A

PROPER SHIPPING NAME: Non-Hazardous

15. REGULATORY INFORMATION

EC Classification: No hazardous ingredients as defined by OSHA 29 CFR 1910.1200

SARA Title III
per 40 CFR 372.45(f) toxic chemicals if so listed here in the mixture do not exceed the specified upper bound concentration value listed as Wt%

Section 302 : Extremely Hazardous (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
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Section 311-312: Hazardous Catergorization (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
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Section 313: Toxic Chemical (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
---------------	------------	-------

WHIMIS (If Section is blank - then it is N/A (not applicable))

Chemical name	CAS number	Wt. %
---------------	------------	-------

Proposition 65 (If Section is blank - then It is N/A (not applicable))

Chemical name	CAS number	Wt. %
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16. OTHER INFORMATON

HMIS INFORMATION: HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0 PROTECTIVE:

DISCLAIMER

The information contained herein is based on the data available to The Kindt-Collins LLC and is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results obtained from the use thereof. We assume no responsibilities for injury from the use of this product desribed herein.

We only warrant to you, but no other persons, that the product herein shall conform to our Quality Assurance specifications on the date of shipment to you. Any technical advise, information, or recommendations given to you is given gratis without any warranty, expressed or implied.

Material Safety Data Sheet

May be used to comply with
 OSHA's Hazard Communication Standard
 29 CFR 1910.1200. Standard must be
 consulted for specific requirements

U.S. Department of Labor

Occupational Safety and Health Administration
 (Non-Mandatory Form)
 Form Approved
 OMB No. 1218-0072



IDENTITY (As Used on Label and List) Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name Durasteel Abrasive Company	Emergency Telephone Number (412) 471-2911
Address (Number, Street, City, State, and ZIP Code) 105 26TH Street	Telephone Number for Information (412) 471-2911
Pittsburgh, PA 15222	Date Prepared October 1, 1990
Signature of Preparer (optional)	

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
IRON (1309-37-1)	10mg/m ³	5mg/m ³	15mg/m ³	97%
Balance of 3% comprised of ingredients each under 1% of total				3%

SPECIFIC CHEMICAL IDENTITY	COMMON NAME(S)
Carbon Steel Scrap - FeSi - FeMn	Steel Shot or Steel Grit

Section III — Physical/Chemical Characteristics

Boiling Point	3000°C	Specific Gravity (H ₂ O = 1)	7.75
Vapor Pressure (mm Hg)	N/A	Melting Point	1371-1482°C
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in Water	N/A		
Appearance and Odor	Metallic Grey appearance in circular and angular form		

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	N/A	Flammable Limits	N/A	LEL	N/A	UEL	N/A
Extinguishing Media	N/A						
Special Fire Fighting Procedures	N/A						

Special Fire and Explosion Hazards
 Care should be taken - In use steel shot and grit break down from repetitive use, dust may develop and may cause moderate fire and explosion hazards.

Section V — Reactivity Data

N/A

Stability	Unstable	Conditions to Avoid
	Stable	

Incompatibility (Materials to Avoid)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur	Conditions to Avoid
	Will Not Occur	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion?

Health Hazards (Acute and Chronic)

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure

Under normal handling, exposure to steel shot and grit in the form in which it is shipped creates few health hazards. However, when used in a blasting capacity, dust may develop and cause irritation to eyes, and mucous membranes of the respiratory tract. Protective clothing (hoods) should be worn.

Emergency and First Aid Procedures

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Normal Housekeeping - If spill or leakage from machine should occur, care should be taken as steel shot is globular.

Waste Disposal Method

Recycle if possible. Dispose of in accordance with local, state, and federal regulations.

Precautions to Be Taken in Handling and Storage

Other Precautions

Section VIII — Control Measures

Respiratory Protection (Specify Type)

(When used in blasting capacity) MSHA approved respirable dust mask

Ventilation	Local Exhaust	N/A	Special	None
	Mechanical (General)	Dust Collector	Other	None

Protective Gloves

Blast Room Protection

Eye Protection

Goggles - Blast Room Protection

Other Protective Clothing or Equipment

When used in a blasting capacity - use good housekeeping practices to prevent

Work/Hygiene Practices

accumulations of dust.



The Kindt-Collins Company LLC

12651 Elmwood Ave
Cleveland, Ohio 44111

KC 4265P Soluble Wax

DATE PREPARED: 1/29/2009

LAST REVISION: 1/5/2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: Kindt-Collins Company LLC
12651 Elmwood Ave
Cleveland, OH 44111

INFORMATION PHONE: (216) 252-4122

EMERGENCY PHONE: (800) 424-9300
(Chemtrec)

PRODUCT NAME: KC 4265P Soluble Wax

PRODUCT NUMBER:

UPC NUMBER:

SYNONYMS: Polyethylene glycol wax blend

PREPARED BY: Craig Mackey

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Ingredient %	OSHA PEL	ACGIH TLV
WAX, POLYETHYLENE GLYCOL MIXTURE		100	2mg/m ³	2mg/m ³

This Product is completely colophony free.

3. HAZARDOUS IDENTIFICATION

EMERGENCY OVERVIEW: N/A

POTENTIAL HEALTH EFFECTS

EYE CONTACT: Fumes from molten product may cause irritation. Contact with molten product may cause severe thermal burns.

INHALATION: Product dust may cause respiratory tract irritation. Molten wax may cause irritation to the respiratory tract

INGESTION: Low order of acute systematic toxicity

SKIN CONTACT: Contact with molten wax may cause severe thermal burns.

SIGNS AND SYMPTOMS OF EXPOSURE:

N/A

4. FIRST AID MEASURES

EYE CONTACT: Ambient wax - flush wax particles with tepid water. Hot wax - seek medical attention

INHALATION: When fume or mist occurs remove to fresh air. If person is not breathing provide oxygen or artificial respiration. Seek medical attention.

INGESTION: Small quantities - permit to pass through system. Large quantities - seek medical attention

SKIN CONTACT: Ambient wax - wash with soap and water. Molten wax - cool wax immediately - do not remove wax from skin. Seek medical attention.

AGGRAVATED MEDICAL CONDITIONS:

N/A

SUPPLEMENTAL HEALTH INFORMATION:

N/A

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: >424° F

FLASH POINT METHOD USED: COC, ASTM D-92

AUTOIGNITION: Not Determined

LEL:

UEL:

EXTINGUISHING MEDIA:

Use water fog, alcohol-type foam, dry chemical, or CO2. Do not use direct stream of water.

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

As with most solid or particulate organic material, extremely high dust concentration in air may result in a potential fire hazard. Good housekeeping practices will prevent any significant accumulations.

COMBUSTION PRODUCTS:

Carbon Dioxide, Carbon Monoxide

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED:

Sweep up material and place in appropriate disposal container. If molten wax-contain spil as much as possible and let molten wax cool. Once solid, place material in appropriate disposal container.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

OTHER PRECAUTIONS:

N/A

8. EXPOSURE CONTROL/PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Normally none required. For mist and fumes used approved NIOSH/MSHA organic respirator.

VENTILATION: Provide exhaust ventilation sufficient to keep the airborne concentration of this product below its exposure limits. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination

PROTECTIVE GLOVES: Ambient wax- cotton gloves /Molten wax- Impervious heat protectivegloves

EYE PROTECTION: Safety glasses with side shields (or goggles) and a face shield.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: N/A

WORK / HYGENIC PRACTICES:

Use good personal hygiene when handling this product. Wash hands after use, before smoking, or using the restroom facilities.

ENGINEERING CONTROLS: Good ventilation should be sufficient to control airborne levels. Do not let molten product stand unused in melt tanks and injection machines. Stir molten product at all times.

EXPOSURE GUIDELINES: N/A

9. PHYSICAL AND CHEMICAL PROPERTIES

SOLUABILITY IN WATER: Soluble (70%) in water @ 20° C **APPEARANCE AND ODOR:** Waxy Solid, little or no odor.

BOILING POINT:	660-730° F	FREEZING POINT:	117° F
VAPOR PRESSURE	<.01 mmHg	PERCENT VOLATILE:	N/A
EVAPORATION:	N/A	PH:	N/A
POUNDS PER GALLON:		MOLECULAR WEIGHT:	N/A
SPECIFIC GRAVITY:	N/A	VAPOR DENSITY:	N/A
MELTING POINT:	150+/-6 °F	OTHER PROPERTIES:	

10. STABILITY AND REACTIVITY

STABLE: Stable

INCOMPATIBILITY: Strong oxidizing materials.

HAZARDOUS DECOMPOSITION OR BY PRODUCTS: Carbon dioxide (Carbon monoxide with incomplete combustion)

HAZARDOUS POLYMERIZATION: Will Not Occur

11. TOXICOLOGY INFORMATION

N/A

12. ECOLOGICAL INFORMATION

N/A

13. DISPOSAL CONSIDERATIONS

Any disposal practice must be in compliance with federal, state, and local regulations. Do not dump into sewers, ground, or any body of water.

14. TRANSPORTATION INFORMATION

DOT CLASS:	Non-Hazardous
HAZARD CLASS:	Non-Hazard
UN NUMBER:	Non-Hazard
PACKING:	Non-Hazard
GUIDE NUMBER:	N/A
PROPER SHIPPING NAME:	Non-Hazardous

15. REGULATORY INFORMATION

EC Classification: No hazardous ingredients as defined by OSHA 29 CFR 1910.1200

SARA Title III **Section 302 : Extremely Hazardous** (If Section is blank - then it is N/A (not applicable))

per 40 CFR 372.45(f) toxic chemicals if so listed here in the mixture do not exceed the specified upper bound concentration value listed as Wt%

Chemical Name CAS number Wt. %

Section 311-312: Hazardous Categorization (If Section is blank - then it is N/A (not applicable))

Chemical Name CAS number Wt. %

Section 313: Toxic Chemical (If Section is blank - then it is N/A (not applicable))

Chemical Name CAS number Wt. %

WHIMIS (If Section is blank - then it is N/A (not applicable))

Chemical name CAS number Wt. %

Proposition 65 (If Section is blank - then it is N/A (not applicable))

Chemical name CAS number Wt. %

16. OTHER INFORMATION

HMIS INFORMATION: HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0 PROTECTIVE:

DISCLAIMER

The information contained herein is based on the data available to The Kindt-Collins LLC and is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results obtained from the use thereof. We assume no responsibilities for injury from the use of this product described herein.

We only warrant to you, but no other persons, that the product herein shall conform to our Quality Assurance specifications on the date of shipment to you. Any technical advise, information, or recommendations given to you is given gratis without any warranty, expressed or implied.



The Kindt-Collins Company LLC

12651 Elmwood Ave
Cleveland, Ohio 44111

STICKY WAX YELLOW, BLUE GREEN

DATE PREPARED: 11/22/2002

LAST REVISION: 1/5/2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: Kindt-Collins Company LLC
12651 Elmwood Ave
Cleveland, OH 44111

INFORMATION PHONE: (216) 252-4122
EMERGENCY PHONE: (800) 424-9300
(Chemtrec)

PRODUCT NAME: STICKY WAX YELLOW, BLUE GREEN
PRODUCT NUMBER:
UPC NUMBER:

SYNONYMS:

PREPARED BY Kathy Louney-Bilski

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Ingredient %	OSHA PEL	ACGIH TLV
A BLEND OF WAX AND RESIN		100		

This Product is completely colophony free with no detectable trace elements.

3. HAZARDOUS IDENTIFICATION

EMERGENCY OVERVIEW: N/A

POTENTIAL HEALTH EFFECTS

EYE CONTACT: Fumes from molten product may cause irritation. Contact with molten product may cause severe thermal burns.

INHALATION: Product dust may cause respiratory tract irritation. Molten wax may cause irritation to the respiratory tract

INGESTION: Low order of acute systematic toxicity

SKIN CONTACT: Contact with molten wax may cause severe thermal burns.

SIGNS AND SYMPTOMS OF EXPOSURE:

N/A

4. FIRST AID MEASURES

EYE CONTACT: Ambient wax - flush wax particles with tepid water. Hot wax - seek medical attention

INHALATION: When fume or mist occurs remove to fresh air. If person is not breathing provide oxygen or artificial respiration. Seek medical attention.

INGESTION: Small quantities - permit to pass through system. Large quantities - seek medical attention

SKIN CONTACT: Ambient wax - wash with soap and water. Molten wax - cool wax immediately - do not remove wax from skin. Seek medical attention.

AGGRAVATED MEDICAL CONDITIONS:

N/A

SUPPLEMENTAL HEALTH INFORMATION:

N/A

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: >200°C

FLASH POINT METHOD USED: COC, ASTM D-92

AUTOIGNITION: Not Determined

LEL: N/A

UEL: N/A

EXTINGUISHING MEDIA:

Use water fog, alcohol-type foam, dry chemical, or CO2. Do not use direct stream of water.

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

As with most solid or particulate organic material, extremely high dust concentration in air may result in a potential fire hazard. Good housekeeping practices will prevent any significant accumulations.

COMBUSTION PRODUCTS:

Carbon Dioxide, Carbon Monoxide

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED:

Sweep up material and place in appropriate disposal container. If molten wax-contain spil as much as possible and let molten wax cool. Once solid, place material in appropriate disposal container.

7. HANLDING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

OTHER PRECAUTIONS:

N/A

8. EXPOSURE CONTROL/PERSONAL PROTECTION

RESPIRATORY PROTECTION:

Normally none required. For mist and fumes ussed approved NIOSH/MSHA organic respirator.

VENTILATION: Provide exhaust ventilation sufficient to keep the airborne concentration of this product below its exposure limits. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination

PROTECTIVE GLOVES: Ambient wax- cotton gloves /Molten wax- Impervious heat protectivegloves

EYE PROTECTION: Safety glasses with side shields (or goggles) and a face shield.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: N/A

WORK / HYGENIC PRACTICES:

Use good personal hygiene when handling this product. Wash hands after use, before smoking, or using the restroom facilities.

STICKY WAX YELLOW, BLUE GREEN

ENGINEERING CONTROLS: Good ventilation should be sufficient to control airborne levels. Do not let molten product stand unused in melt tanks and injection machines. Stir molten product at all times.

EXPOSURE GUIDELINES: N/A

9. PHYSICAL AND CHEMICAL PROPERTIES

SOLUABILITY IN WATER: Insoluable

APPEARANCE AND ODOR: Waxy Solid, little or no odor.

BOILING POINT: 660-730° F

FREEZING POINT: N/A

VAPOR PRESSURE: N/A

PERCENT VOLATILE: N/A

EVAPORATION: N/A

PH: N/A

POUNDS PER GALLON: N/A

MOLECULAR WEIGHT: N/A

SPECIFIC GRAVITY: .940

VAPOR DENSITY: N/A

MELTING POINT: 152 +/-6°F

OTHER PROPERTIES:

10. STABILITY AND REACTIVITY

STABLE: Stable

INCOMPATIBILITY: Strong oxidizing materials.

HAZARDOUS DECOMPOSITION OR BY PRODUCTS: Carbon dioxide (Carbon monoxide with incomplete combustion)

HAZARDOUS POLYMERIZATION: Will Not Occur

11. TOXICOLOGY INFORMATION

N/A

12. ECOLOGICAL INFORMATION

N/A

13. DISPOSAL CONSIDERATIONS

Any disposal practice must be in compliance with federal, state, and local regulations. Do not dump into sewers, ground, or any body of water.

14. TRANSPORTATION INFORMATION

DOT CLASS: Non-Hazardous

HAZARD CLASS: Non-Hazard

UN NUMBER: Non-Hazard

PACKING: Non-Hazard

GUIDE NUMBER: N/A

PROPER SHIPPING NAME: Non-Hazardous

15. REGULATORY INFORMATION

EC Classification: A component or components of this product are listed on the TSCA Inventory of existing chemical substances

SARA Title III
per 40 CFR 372.45(f) toxic chemicals if so listed here in the mixture do not exceed the specified upper bound concentration value listed as Wt%

Section 302 : Extremely Hazardous (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
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Section 311-312: Hazardous Categorization (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
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Section 313: Toxic Chemical (If Section is blank - then it is N/A (not applicable))

Chemical Name	CAS number	Wt. %
---------------	------------	-------

WHIMIS (If Section is blank - then it is N/A (not applicable))

Chemical name	CAS number	Wt. %
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Proposition 65 (If Section is blank - then it is N/A (not applicable))

Chemical name	CAS number	Wt. %
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16. OTHER INFORMATION

HMIS INFORMATION: HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0 PROTECTIVE:

DISCLAIMER

The information contained herein is based on the data available to The Kindt-Collins LLC and is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results obtained from the use thereof. We assume no responsibilities for injury from the use of this product described herein.

We only warrant to you, but no other persons, that the product herein shall conform to our Quality Assurance specifications on the date of shipment to you. Any technical advise, information, or recommendations given to you is given gratis without any warranty, expressed or implied.

Material Safety Data Sheet

A555 Cleaner & Degreaser

Stoner

Copying and/or downloading of this information for the purpose of properly utilizing Stoner Inc. product is allowed provided that: (1) the information is copied in full with no changes unless prior agreement is obtained from Stoner Inc., & (2) neither the copy nor the original is resold or otherwise distributed with intention of earning profit thereon.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Stoner Incorporated
1070 Robert Fulton Hwy.
Quarryville, PA 17566
1-800-227-5538

Product Name: Cleaner & Degreaser
Product Code: A555
Version Date: 01/03/06
24-hour emergency phone: 1-800-424-9300 [CHEMTREC]

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	ACGIH TLV	Exposure Limits	
			OSHA PEL	OTHER
Aliphatic Hydrocarbons	8052-41-3	100 ppm	500 ppm	None established
Hydrocarbon propellant	115-10-6	None established	None established	None established

3. HAZARDS IDENTIFICATION

POTENTIAL ACUTE [single or short term] HEALTH EFFECTS OF OVEREXPOSURE

Eye : May cause eye irritation. Symptoms may include stinging, tearing, and redness.
Skin : Skin contact may cause irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying and cracking, and other skin damage. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.
Ingestion : Swallowing small amounts during handling is not likely to cause harmful effects. Swallowing large amounts may be harmful. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage. Ingestion is not considered a potential route of exposure.
Inhalation : Breathing large amounts may be harmful. Symptoms are more typically seen at air concentrations exceeding the recommended exposure limits. Symptoms of exposure may include: initial Central Nervous System excitation (euphoria, exhilaration, light-headedness) followed by CNS depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness) and other CNS effects. Confusion, impaired coordination, coma, and death. Inhalation of concentrations above the recommended limits may cause temporary central nervous system depression with anesthetic effects such as dizziness, headache, incoordination, and loss of consciousness.

POTENTIAL CHRONIC [long term] HEALTH EFFECTS OF OVEREXPOSURE:

General Effects: Exposure to this material (or a component) has been found to cause kidney damage in male rats. The mechanism by which this toxicity occurs is specific to the male rat and the kidney effects are not expected to occur in humans.
Cancer Information: Based on available information, this material cannot be classified with regard to carcinogenicity. This material is not listed as a carcinogen with IARC, NTP or OSHA.
Mutagenicity: No data available to indicate product or any components present at greater than 0.1% is mutagenic or genotoxic.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

Individuals with preexisting diseases of the central nervous or cardiovascular system may have increased susceptibility to the toxicity of excessive exposures.

HAZARDOUS WARNINGS HMIS:

Health: 1 Flammability: 4 Reactivity: 0 Personal Protective Equipment See Section 8

4. FIRST AID MEASURES

Eyes: Immediately flush eyes gently with plenty of water for at least 15 minutes while holding eyelids apart. If symptoms persist or there is visual difficulty, seek medical attention.
Skin Contact: In case of contact, immediately wash contaminated area with plenty of water for at least 15 minutes. Remove contaminated clothing. Seek medical attention if symptoms persist. Wash clothing before reuse. Treat for frostbite if necessary.
Ingestion: Ingestion is an unlikely route of exposure. Do not induce vomiting. Aspiration into the lungs can cause serious damage. Seek medical attention immediately. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs.
Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention.

NOTES TO PHYSICIAN:

This material is an aspiration hazard. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions). Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used only in situations of emergency life support.

5. FIRE FIGHTING MEASURES

Fire and/or Explosion Hazards: Containers may rupture or explode under fire conditions.
Fire Fighting Instructions: Fire fighters should wear normal protective equipment and positive-pressure self-contained breathing apparatus. Use dry chemical, foam, or CO₂; water may be ineffective but should be used to keep exposed containers cool.
Aerosol Flame Projection Test: Flammable aerosol, as determined by ASTM D 3065-94. Do not use near ignition sources such as sparks or open flames.

Material Safety Data Sheet

A555 Cleaner & Degreaser

Stoner

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Ventilate contaminated area. Remove all sources of ignition. Wear appropriate personal protective equipment (PPE). Stop or reduce discharge if it can be done safely. Avoid run-off into storm sewers and ditches which may lead to natural waterways. If runoff occurs, notify authorities as required. Clean up with absorbent material. Place absorbent materials into container and close it tightly. Dispose of container properly.

7. HANDLING AND STORAGE

Handling: Avoid prolonged or repeated contact with skin. Avoid prolonged or repeated breathing of vapor. Do not use near ignition sources. All 5 gallon and larger containers should be grounded and/or bonded when material is transferred. Use with adequate ventilation.

Storage: Store in a cool, dry, well ventilated area away from all sources of ignition. Keep container closed when not in use. Empty container may contain residues which are hazardous. Do not store at temperatures above 120°F.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Ventilation should be adequate to prevent exposures above the limits indicated in "Section 2" of this MSDS (from known, suspected or apparent adverse effects).

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.

Skin Protection: The use of chemically resistant gloves is recommended if there is any possibility of prolonged or repeated liquid contact with skin.

Respiratory Protection: None required for well ventilated situations. Use NIOSH approved respirator where there is likelihood of inhalation of the product mist, spray or aerosol. A supplied air respirator should be used if ventilation is not sufficient to maintain exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Aerosol can	Vapor Density:	[air = 1] 3.90
Appearance:	Clear Colorless	Evaporation Rate:	0.02-0.1 (n-Butyl acetate = 1)
Odor:	Slight Citrus Odor	Solubility in Water:	Insoluble Negligible; 0-1%
Specific Gravity:	0.75 @ 70 deg F	Boiling Point:	-13 deg F
Vapor Pressure:	2.00 mmHg mmHg @ 70 deg F	pH:	Not applicable

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Conditions to Avoid: Ignition sources such as open flames, sparks, static discharges or glowing metal surfaces. Avoid contact with strong oxidizing agents. Oxidizers. Carbon monoxide. Acetic acids. Organic acid anhydrides. Powdered metals.

Decomposition Products: Burning can produce the following combustion products: Carbon dioxide and carbon monoxide. Various Hydrocarbons. If heated with peroxides present, violent decomposition can occur.

11. DISPOSAL CONSIDERATIONS

Disposal : Dispose according to Federal, State and local regulations.

12. TRANSPORTATION INFORMATION

DOT Name:	Aerosols, flammable, n.o.s.	UN Number:	UN1950
IATA Name:	Aerosols, flammable, n.o.s.	Hazardous Class:	2.1
		Packing Group:	Not applicable

13. REGULATORY INFORMATION

Warning: This product contains the following chemicals that are subject to reporting requirements for the following regulatory bodies listed below:

COMPONENT	CAS #	% BY WEIGHT	Regulatory Body
No components listed in this section.			SARA Section 313

Warning: This product may contain chemicals known to the State of California to cause cancer. See list below.

No components listed in this section. Prop65 Cancer

Warning: This product may contain chemicals known to the State of California to cause birth defects. See list below.

No components listed in this section. Prop65 Birth Defects

All components of this product are listed on the TSCA inventory.

This information contained in this MSDS is believed to be accurate as of the version date, but is not warranted to be. Since the use of this information and the conditions of use of this product are not within the control of Stoner Incorporated, it is the user's obligation to determine the conditions of safe use.

Material Safety Data Sheet

B251 Citrus Pattern Wash

Stoner

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Stoner Incorporated
1070 Robert Fulton Hwy.
Quarryville, PA 17566
1-800-227-5538

Product Name: Citrus Pattern Wash
Product Code: B251
Version Date: 08/09/06
24-hour emergency phone: 1-800-424-9300 [CHEMTREC]

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	ACGIH TLV	OSHA PEL	OTHER
Water Deionized	7732-18-5	None established	None established	None established
NJ Trade Secret Registry	#80100382-5124-P	None established	None established	None established
Citrus Distillates	5989-27-5	None established	None established	FDA-GRAS
Dimethylcarbinol	67-63-0	400 ppm	400 ppm	500 ppm STEL

3. HAZARDS IDENTIFICATION

POTENTIAL ACUTE [single or short term] HEALTH EFFECTS OF OVEREXPOSURE

- Eye :** Eye contact may include mild eye irritation with discomfort, tearing, or blurring of vision. May cause eye irritation. Symptoms may include stinging, tearing, and redness.
- Skin :** Skin contact may cause irritation. Prolonged or repeated exposure may dry the skin. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use. Symptoms may include redness, discomfort, drying and cracking, or rash.
- Ingestion :** Swallowing large amounts may be harmful. Swallowing small amounts during handling is not likely to cause harmful effects. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage.
- Inhalation :** Breathing large amounts may be harmful. Symptoms are more typically seen at air concentrations exceeding the recommended exposure limits. Symptoms of exposure may include: initial Central Nervous System excitation (euphoria, exhilaration, light-headedness) followed by CNS depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness) and other CNS effects. Confusion, impaired coordination, coma, and death.

POTENTIAL CHRONIC [long term] HEALTH EFFECTS OF OVEREXPOSURE:

General Effects: This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies. Harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain. Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals: mild, reversible kidney effects; mild, reversible liver effects; Exposure to this material (or a component) has been found to cause kidney damage in male rats. The mechanism by which this toxicity occurs is specific to the male rat and the kidney effects are not expected to occur in humans.

Cancer Information: THIS PRODUCT CONTAINS NO COMPONENTS LISTED AS CARCINOGENIC BY IARC, NTP, OR OSHA 1910(Z)

Mutagenicity: No data available to indicate product or any components present at greater than 0.1% is mutagenic or genotoxic.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

Skin contact may aggravate an existing dermatitis.

HAZARDOUS WARNINGS HMIS:

Health: 1 Flammability: 3 Reactivity: 0 Personal Protective Equipment See Section 8

4. FIRST AID MEASURES

- Eyes:** Immediately flush eyes gently with plenty of water for at least 15 minutes while holding eyelids apart. If symptoms persist or there is visual difficulty, seek medical attention.
- Skin Contact:** In case of contact, immediately wash contaminated area with plenty of water for at least 15 minutes. Remove contaminated clothing. Seek medical attention if symptoms persist. Wash clothing before reuse.
- Ingestion:** Do not induce vomiting. Have victim drink 8 to 10 ounces of water to dilute the material in the stomach. Obtain medical attention immediately. Do not induce vomiting unless instructed by a physician. Contact a physician, medical facility, or poison control center for advise on whether to induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs. Do not induce vomiting. Aspiration into the lungs can cause serious damage. Seek medical attention immediately.
- Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention. Keep the victim warm and quiet.

NOTES TO PHYSICIAN:

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin; lung (for example, asthma-like conditions); This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity when deciding whether to induce vomiting; kidney; liver;

5. FIRE FIGHTING MEASURES

Fire and/or Explosion Hazards: Combustible liquid: keep away from heat, sparks, and open flame. Vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by heat, pilot lights, other flames and ignition sources at locations distant from material handling point. Empty" containers retain product residue and can be dangerous." Flammable Liquid: can release vapors that may be ignited at temperatures above or at the flash point.

Fire Fighting Instructions: Use water spray, foam, dry chemical, or CO2. Use alcohol foam, water fog, dry chemical, or CO2. Water is generally not effective and may spread fire; however, water spray may be used to cool closed containers. Fire fighters should wear normal protective equipment and positive-pressure self-contained breathing apparatus.

Flash Point: 80.0 deg. F PMCC

Lower Flammability Limit: 0.7 %

Upper Flammability Limit: Not listed %

Autoignition Temperature: 458.0 deg. F

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Wear appropriate personal protective equipment (PPE). Clean up with absorbent material. Place absorbent materials into container and close it tightly. Dispose of container properly. Ventilate contaminated area. Remove all sources of ignition. Stop or reduce discharge if it can be done safely. Avoid run-off into storm sewers and ditches which may lead to natural waterways. If runoff occurs, notify authorities as required.

7. HANDLING AND STORAGE

Handling: Avoid prolonged or repeated contact with skin. All 5 gallon and larger containers should be grounded and/or bonded when material is transferred. Use with adequate ventilation. If ventilation is not sufficient, wear proper respiratory equipment. Avoid prolonged or repeated breathing of vapor. Do not store containers in excessive heat or direct sunlight. Normal precautions common to safe manufacturing practice should be followed in handling and storage.

Storage: Store in a cool, dry, well ventilated area away from all sources of ignition. Keep containers tightly closed when not in use. Empty container may contain residues which are hazardous.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Ventilation should be adequate to prevent exposures above the limits indicated in "Section 2" of this MSDS (from known, suspected or apparent adverse effects). Local exhaust should be used in areas where exposure limits may be exceeded.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.

Skin Protection: The use of chemically resistant gloves is recommended if there is any possibility of prolonged or repeated liquid contact with skin.

Respiratory Protection: None required for well ventilated situations. A supplied air respirator should be used if ventilation is not sufficient to maintain exposure limits. Use NIOSH approved respirator where there is likelihood of inhalation of the product mist, spray or aerosol.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Bulk liquid	Vapor Density:	[air = 1] 1.35
Appearance:	Clear with yellow tint	Evaporation Rate:	0.5-2 (n-Butyl acetate = 1)
Odor:	Citrus Odor	Solubility in Water:	Minimal; 1-9%
Specific Gravity:	1 @ 70 deg F	Boiling Point:	180.0 deg F
Vapor Pressure:	1.0 mmHg @ 70 deg F	pH:	Not applicable

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Conditions to Avoid: Ignition sources such as open flames, sparks, static discharges or glowing metal surfaces. Avoid contact with strong oxidizing agents. Avoid contact with: Acetaldehyde. Acids. Chlorine. Ethylene oxide. Isocyanates. Strong oxidizing agents. Do not use with aluminum equipment at temperatures above 120°F.

Decomposition Products: Burning can produce the following combustion products: Carbon dioxide and carbon monoxide. Various Hydrocarbons.

11. DISPOSAL CONSIDERATIONS

Disposal: Dispose according to Federal, State and local regulations.

12. TRANSPORTATION INFORMATION

DOT Name:	Flammable liquids, N.O.S (Isopropanol, terpene hydrocarbons)	UN Number:	UN1993
IATA Name:	Flammable liquids, N.O.S (Isopropanol, terpene hydrocarbons)	Hazardous Class:	3
		Packing Group:	III

13. REGULATORY INFORMATION

Warning: This product contains the following chemicals that are subject to reporting requirements for the following regulatory bodies listed below:

COMPONENT	CAS #	% BY WEIGHT	Regulatory Body
No components listed in this section.			SARA Section 313

Warning: This product may contain chemicals known to the State of California to cause cancer. See list below.

No components listed in this section.	Prop65 Cancer
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Warning: This product may contain chemicals known to the State of California to cause birth defects. See list below.

No components listed in this section.	Prop65 Birth Defects
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All components of this product are listed on the TSCA inventory.

This information contained in this MSDS is believed to be accurate as of the version date, but is not warranted to be. Since the use of this information and the conditions of use of this product are not within the control of Stoner Incorporated, it is the user's obligation to determine the conditions of safe use.

Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> Victawet® 12 wetting agent	<i>MSDS Code Number</i> 005
<i>Trade Name & Synonyms</i> Phosphoric acid, mono (2-ethylhexyl) ester, polymer with oxirane	<i>Date of Last Revision</i> 6/25/03
<i>Chemical Name</i> BIS (Polyoxyethylene), 2-Ethylhexyl phosphate	<i>Manufacturer</i> Ransom & Randolph
<i>C.A.S. Number</i>	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i>	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<i>Hazardous Components</i>	<i>C.A.S. Number</i>	<i>%</i>
Phosphoric acid, mono (2-ethylhexyl) ester, polymer with oxirane	68460-10-6	100

3. Hazardous Identification

Emergency Overview

Causes eye irritation. May cause skin and respiratory tract irritation.

<i>Routes of Exposure</i>	<i>Signs & Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
Eye				Severe irritator. Irritation. Irritating to mucous membranes (irritation, vomiting digestive tract, and diarrhea.	
Skin					
Inhalation					
Ingestion					
Other					

Medical Conditions Aggravated by Exposure

There are no data available that addresses medical conditions that are generally recognized as being aggravated by exposure to this product.

Carcinogenicity (IARC, NTP)

IARC: No
NTP: No

Potential Environmental Effects

4. First Aid Measures

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Immediately flush eyes with large quantities of running water for a minimum of 15 minutes. If the victim is wearing contact lenses, remove them. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids with water. Do not let victim rub eye(s). Do not attempt to neutralize with chemical agents. Oils or ointments should not be used at this time.	Get medical attention immediately	
<i>Skin</i>	Immediately remove contaminated clothing and shoes. Wash skin with soap and plenty of water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Get medical attention. Wash contaminated clothing before reuse. Thoroughly clean or destroy contaminated shoes.	Get medical attention.	
<i>Inhalation</i>	Remove victim to fresh air. If respiratory irritation occurs or if breathing is difficult, get medical attention. Maintain airway and administer oxygen if available.	Get medical attention immediately.	
<i>Ingestion</i>	Call a physician or a poison control center immediately. Give victim plenty of water to drink. Induce vomiting as directed by medical personnel. Never give anything by mouth to an unconscious or convulsing person. Get medical attention immediately.	Call a physician or a poison control center immediately.	

<i>Other</i>			
<p><i>Note to Physicians (Treatment, Testing, and Monitoring)</i> Attending physician should treat exposed patients symptomatically. Chemical burns on the skin should be treated as thermal burns. Flush eyes with buffered or plain irrigating solutions. If any ulceration or conjunctival injury is present, have an ophthalmologist examine the patient.</p>			
5. Fire-fighting Measures			
<p><i>Flashpoint: (Method)</i> As in any fire, prevent human exposure to fire, smoke, fumes or products of combustion. Evacuate non-essential personnel from the fire area. Firefighters should wear full-face, self-contained breathing apparatus and impervious protective clothing. If possible, move containers from the fire area. If not leaking, keep fire-exposed containers cool with a water fog or spray to prevent rupture due to excessive heat. High-pressure water may spread product from broken containers increasing contamination of fire hazard.</p> <p>Contaminated buildings, areas and equipment must not be used until they are properly decontaminated. Dike fire water for later disposal. Do not allow contaminated water to enter waterways.</p>	<p><i>Flammable (Explosive) Limits in Air</i></p> <p>LEL: No UEL: No</p>		<p><i>Autoignition Temperature:</i></p>
			<p><i>Other</i></p>
<p><i>Flame Propagation or Burning Rate (for solids):</i></p>	<p><i>Properties Contributing to Fire Intensity</i></p>	<p><i>Flammability Classification NFPA Rating:</i> 1</p>	

<p><i>Extinguishing Media</i> Water, foam, dry powder, carbon dioxide</p>	<p><i>Extinguishing Media to Avoid</i></p>	
<p><i>Protection and Procedures for Firefighters:</i></p>		
<p><i>Unusual Fire and Explosion Hazards:</i> This product is not defined as flammable or combustible. However, it may decompose under fire conditions to give off toxic materials such as phosphorus oxides and flammable organic substituents. The product is self-extinguishing once the source of ignition is removed.</p> <p>No other explosion hazards of this product are known.</p> <p>Under fire conditions, this product may support combustion and decompose to give off flammable alkene and phosphoric oxides as well as carbon oxides. The product is self-extinguishing once the source of ignition is removed. It is not sensitive to static discharge.</p>		
<p>6. Accidental Release Measures</p>		
<p><i>Containment Techniques</i></p>		
<p><i>Spill/Leak Clean-Up Procedures and Equipment</i> Stop source of spill. Dike area to prevent spill from spreading. Soak up liquid with a suitable absorbent such as clay, sawdust, or kitty litter. Sweep up absorbed material and place in a chemical waste container for disposal. CAUTION! The spill area may be slippery.</p>		
<p><i>Evacuation Procedures</i></p>		
<p><i>Special Instructions</i></p>		
<p><i>Reporting Requirements</i></p>		
<p>7. Handling and Storage</p>		
<p><i>Handling Practices and Warnings</i> Keep away from heat, sparks and open flames. Avoid contact with eyes and skin. Avoid inhalation of vapors and mists. Personnel handling this product should wash thoroughly after contact with this product.</p>		
<p><i>Storage Practices and Warnings</i> Store away from foodstuffs or animal feed. Containers should be stored in a cool, dry, well-ventilated area away from flammable or incompatible materials and sources of heat or flame. Exercise due caution to prevent damage to or leakage from the container.</p> <p>To prevent acid build-up, do not store the product at temperatures above 120F (49C).</p>		

8. Exposure Controls/Personal Protection

<p><i>Ventilation</i> NIOSH-approved organic vapor/acid gas respirator (OVAG) with dust, mist, and fume filters to reduce potential for inhalation exposure if use conditions generate vapor, mist, or aerosol and adequate ventilation (e.g., outdoor or well ventilated area) is not available. Where exposure potential necessitates a higher level of protection (e.g., if breakthrough resulting in dizziness or numbness is experience) use a NIOSH-approved, positive-pressure demand, air-supplied respirator.</p> <p>Respirator cartridges or canisters must be changed frequently (following each use or at the end of the work shift) to assure breakthrough exposure does not occur.</p>	<p><i>Other Engineering Controls</i> At elevated processing temperatures, or in the event that use conditions generate airborne vapor, aerosol or mist, the material should be handled in a well-ventilated area.</p> <p>Where adequate ventilation is not available, use a NIOSH-approved filter to reduce exposure. Where exposure potential under use conditions is greater, use a NIOSH-approved, positive-pressure air-supplied respirator.</p>	
<p><i>Routes of Entry:</i> <i>Eye/Face</i></p>	<p><i>Personal Protective Equipment (PPE) for Normal Use:</i> Wear safety glasses or chemical goggles during handling to avoid eye contact.</p>	<p><i>PPE for Emergencies:</i></p>

<i>Skin</i>	Skin contact with liquid or its aerosol must be prevented through the use of permeation resistant clothing, gloves and footwear. Unprotected skin exposed to vapor, aerosol or mist must be thoroughly washed before eating, drinking, smoking and at the end of the workshift.		
<i>Inhalation</i>			
<i>General Hygiene Considerations and Work Practices</i>			
<i>Other Protective Measures and Equipment</i> Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather. Long sleeved clothing may be used to minimize skin contact.			
9. Physical and Chemical Properties			
<i>Appearance</i>	Slightly hazy liquid		<i>Odor</i> Mild
<i>Normal Physical State:</i>	<i>Boiling Point</i>	325°F (163°C)	
X <i>Liquid</i> <i>Gas</i>	<i>Melting Point</i>	ND	
<i>Solid</i>	<i>Freezing Point</i>	ND	
<i>Specific Gravity or Density (H₂O=1)</i> 1.120 @ 25C	<i>Solubility in Water</i> 7 Ug/ml	<i>pH</i> ND	
<i>Vapor Pressure (mm Hg.)</i> 0.02 mm Hg @ 20C (68F)	<i>Vapor Density (AIR = 1)</i> ND	<i>Evaporation Rate (Butyl Acetate=1)</i> ND	
<i>Other</i> Viscosity = 440 SUS @ 100F (38C).			
10. Stability and Reactivity			
<i>Incompatibility (Materials to Avoid)</i> This product is incompatible with strong oxidizers, strong acids and strong alkalis. It hydrolyzes slowly at ambient temperatures in acidic or alkaline aqueous solutions.			
<i>Hazardous Products Produced During Decomposition</i> Under fire conditions the product supports combustion and decomposes to give off toxic materials such as phosphorus oxides and oxides of carbon.			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i> X	<i>Conditions to Avoid</i> Under wet alkaline or acidic conditions, prolonged storage at elevated temperatures should be avoided.
<i>Stability?</i>	<i>Stable</i>	<i>Unstable</i>	<i>Conditions to Avoid</i>

11. Toxicological Information

Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data

Inhalation – Inhalation toxicity data are not available for this product. However, inhalation may be expected to cause irritation to the upper respiratory system.

Inhalation Chronic Exposure – There is no specific information available for this product. However, overexposure may cause irritation of the nose, throat and upper respiratory tract.

Toxicological – Dermal

Dermal toxicity data is not available for this product. However, skin contact, especially if prolonged or repeated, may cause moderate to severe irritation.

Skin Contact – CHRONIC

Skin contact may cause severe irritation. Prolonged or repeated contact may cause defatting of the skin with drying and cracking.

Toxicological – Eye

The acute eye effects of this product have not been determined. However, eye contact is expected to cause severe irritation or possibly burns.

?Toxicological – Ingestion

The acute oral LD50 (rate) is > 4640 mg/kg.

Ingestion – CHRONIC

Chronic ingestion effects of this product are not known. However, ingestion can result in severe irritation or burns of the mouth, throat, esophagus and stomach.

CARCINOGENICITY MUTAGENICITY

The carcinogenic/mutagenic properties of this product are not known.

REPRODUCTIVE EFFECTS

The reproductive toxicity of this product is not known.

NEUROTOXICITY

The neurotoxic effects of this product are not known.

Other Toxicological Effects

The primary routes of exposure to ETHYLENE OXIDE are inhalation and skin contact. This material is an irritant to mucous membranes and corrosive to skin and eyes. It is a skin sensitizer. Ethylene oxide is toxic by ingestion, moderately toxic by inhalation. Poisoning may affect the liver, kidneys, blood, and reproductive system. It is a central nervous system depressant. Poisoning may produce vomiting, recurring periodically for hours. Poisoning may produce vomiting, recurring periodically for hours, accompanied by nausea and headache. Delayed central nervous systems symptoms may occur with dyspnea, cyanosis, drowsiness, weakness, incoordination, disorientation and unconsciousness. Ethylene oxide has been classified as a carcinogen by the Occupational Safety and Health Administration (OSHA).

Zirconium Silicate ACGIH STEL ACGIH TWA OSHA TWA PEL	-Zirconium compound, as Zr -Zirconium compound, as Zr -Zirconium compound, as Zr	10 mg/m ³ 5 mg/m ³ 5 mg/m ³
See TABLE OF OCCUPATIONAL EXPOSURE LIMITS VALUES for quartz, cristobalite, and tridymite.		
<i>General Hygiene Considerations and Work Practices</i>		
Avoid inhalation and ingestion of this material. Avoid eye contact. Avoid creating dust.		
<i>Other Protective Measures and Equipment</i>		
Other precautions:	<p>Use dustless systems for handling, storage and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty.</p> <p>See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. WARN YOUR EMPLOYEES (AND CUSTOMERS- USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARD AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.</p> <p>See also American Society for Testing and Materials (ASTM) Standard Practice E1132-86, "Standard Practice for Health Requirements Relating to Exposure to Quartz Dust."</p>	
Respirator Protection: The following chart specifies the types of respirators, which may provide respiratory protection for crystalline silica.		
CONDITION Particulate Concentration	RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA MINIMUM RESPIRATORY PROTECTION*	
Up to 5 x PEL	Any dust respirator.	
Up to 10 x PEL	Any dust respirator, except single-use or quarter mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.	
Up to 50 x PEL	A high efficiency particulate filter respirator with a full-face piece. Any supplied-air respirator with a full-face piece, helmet, or hood. Any self-contained breathing apparatus with a full-face piece.	
Up to 500 x PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.	
Greater than 500 x PEL or entry and escape from unknown concentrations	<p>Self-contained breathing apparatus with a full-face piece operated in pressure-demand or other positive pressure mode.</p> <p>A combination respirator which includes a Type C supplied-air respirator with a full-face piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.</p>	
Abrasive Blasting	Any Type CE, supplied-air respirator with a full-face piece, hood, or helmet, operated in a positive-pressure mode. (See 29 CFR Section 1910.94 (a).)	

TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES

The following table shows the Occupational Exposure Limits (OEL) for quartz, cristobalite and tridymite in application in Europe and in some other countries.

Country	Occupational Exposure Limit (OEL) Name	Adopted by	Quartz (q)	Cristobalite (c)	Tridymite (t)
Australia	National Exposure Standard	Worksafe Australia, National Occupational Health & Safety Commission	0.2	0.1	
Austria	Maximalen Arbeitsplatzkonzentration	Bundesministerium für Arbeit und Soziales	0.15	0.15	0.15
Belgium		Ministère de l'Emploi et du Travail	0.1	0.05	0.05
Denmark	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Finland	Occupational Exposure Standard	National Board of Labour Protection	0.2	0.1	0.1
France	Empoussiérage de reference	Ministère de l'Industrie (RGIE)	5 or 25k/Q		
	Valeur limite de Moyenne d'Exposition	Ministère du Travail	0.1	0.05	0.05
Germany	Maximalen Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Greece		Legislation for mining activities	0.1	0.05	0.05
Ireland		2001 Code of practice for the Safety, Health & Welfare at Work (CoP)	0.05	0.4	0.4
Italy	Threshold Limit Value	Associazione Italiana Degli Igienisti Industriali	0.05	0.05	0.05
Luxembourg	Maximlen Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Netherlands	Maximaal Aanvarde Concentratie	Ministerie van Sociale Zaken en Werkgelegenheid	0.075	0.075	0.075
Norway	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Portugal	Threshold Limit Value	Instituto Portuges da Qualidade, Hygiene & Safety at Workplace	0.1	0.05	0.05
Spain	Valores Limites	Instituto Nacional de Seguridad e Higiene en el Trabajo	0.1		
		Instrucciones de Técnicas Complementarias (ITC)	0.1	0.05	0.05
		Reglamento General de Normas Basicas de Seguridad Minera	5 or 25k/Q		
Sweden		National Board of Occupational Safety and Health	0.1	0.05	0.05
Switzerland	Valeur limite de Moyenne d'Exposition		0.15	0.15	0.15
United Kingdom	Maximum Exposure Limit	Health & Safety Executive	0.3	0.3	0.3
	Occupational Exposure Standard				
USA	Permissible Exposure Limit	Occupational Safety & Health Administration	10/(%SiO ₂ +2)	PEL (Quartz)/2	PEL (Quartz)/2
	Threshold Limit Value	American Conference of Governmental Industrial Hygienists	0.05	0.05	0.05

Q: quartz percentage

Source: Adapted from IMA-Europe

Date: 08/05/03, Updated version available at <http://www.ima-eu.org/en/silhsefacts.html>

OELs are applicable to 100 % quartz, cristobalite or tridymite.

Some countries have special rules for mixed dust, e.g. in France the following equation is applied: $C_{ns}/5 + C_q/0.05 + C_t/0.05 \leq 1$ (C = mean concentration, ns = non silicogen)

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
1S	1E	Core Making, Baking	Original	NA	None	NA
2S/2AS	1E	Electric Induction Furnaces	Original/2015	534 LB/HR (Total for Both)	None/New	NA
3S	1E	Pouring, Cooling	Original	NA	None	NA
4S	2E	Autoclave (Boiler)	Replaced Boiler 2006	1.675 MM BTU/HR	None	NA
5S	3E	Burnout Furnace No. 1 with Afterburner	2009	0.75 MM BTU/HR (Main) 0.69 MM BTU/HR (Afterburner)	None	NA
6S	4E	Burnout Furnace No. 2 with Afterburner	2015	1.0 MM BTU/HR (Main) 0.5 MM BTU/HR (Afterburner)	New	NA
7S	1E	Grinding & Miscellaneous	NA	NA	None	NA
8S	1E	Abrasive Blast Units	NA	NA	None	NA
9S	5E	Thermoset Fiberglass Reinforced Polyester Molding	2011	20 LB/HR	New	NA
10S	Fugitive	Unpaved Haulroad	Original	NA	NA	NA

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S, or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, or other appropriate designation.

³ New, modification, removal

⁴ For Control Devices use the following numbering system: 1C, 2C, 3C, or other appropriate designation.

ATTACHMENT J

EMISSION POINTS DATA SUMMARY SHEET

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1E	Vent	1S	Core Making, Baking	NA	NA	NA	NA	PM/PM10/PM2.5	0.29	1.28	0.29	1.28	Solid	AP-42	NA
1E	Vent	2S/2AS	Electric Induction Furnaces	NA	NA	NA	NA	PM/PM10/PM2.5	0.24	1.05	0.24	1.05	Solid	AP-42	NA
1E	Vent	3S	Pouring, Cooling	NA	NA	NA	NA	PM/PM10/PM2.5	1.12	4.91	1.12	4.91	Solid	AP-42	NA
2E	Stack	4S	Autoclave Boiler	NA	NA	NA	NA	PM/PM10/PM2.5 SO2 NOx CO VOC HAPS-VOC HAPS-Metal	0.02 0.01 0.17 0.15 0.01 0.01 0.01	0.06 0.01 0.75 0.63 0.05 0.02 0.01	0.02 0.01 0.17 0.15 0.01 0.01 0.01	0.06 0.01 0.75 0.63 0.05 0.02 0.01	Solid Gas Gas Gas Gas Gas Solid	AP-42	NA

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

¹ Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

² Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (e.g., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

⁴ Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁵ Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁶ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of

milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

Attachment J EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data																
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)		Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr			
3E	Stack	5S	Burnout Furnace No. 1	NA	NA	NA	NA	PM/PM10/PM2.5	0.02	0.05	0.02	0.05	Solid	AP-42	NA	
								SO ₂	0.01	0.01	0.01	0.01	Gas			
								NOx	0.15	0.66	0.15	0.66	Gas			
								CO	0.13	0.56	0.13	0.56	Gas			
								VOC	31.21	5.04	0.32	0.09	Gas			
								HAPS-VOC	0.01	0.02	0.01	0.02	Gas			
HAPS-Metal	0.01	0.01	0.01	0.01	Solid											
4E	Stack	6S	Burnout Furnace No. 2	NA	NA	NA	NA	PM/PM10/PM2.5	0.02	0.05	0.02	0.05	Solid	AP-42	NA	
								SO ₂	0.01	0.01	0.01	0.01	Gas			
								NOx	0.15	0.66	0.15	0.66	Gas			
								CO	0.13	0.56	0.15	0.56	Gas			
								VOC	31.21	5.04	0.32	0.09	Gas			
								HAPS-VOC	0.01	0.02	0.01	0.02	Gas			
HAPS-Metal	0.01	0.01	0.01	0.01	Solid											
1E	Vent	7S	Grinding & Misc.	NA	NA	NA	NA	PM	0.64	2.81	0.64	2.81	Solid	Reg. 7 (estimate)	NA	
								PM10/PM2.5	0.31	1.34	0.31	1.34	Solid			

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

¹ Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
² Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.
⁴ Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
⁵ Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
⁶ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1E	Vent	8S	Abrasive Blast Units	NA	NA	NA	NA	PM PM10 PM2.5	13.50 6.50 0.65	59.13 28.47 2.85	0.27 0.13 0.01	1.18 0.57 0.06	Solid	AP-42	NA
5E	Vent	9S	Thermo FRPM	NA	NA	NA	NA	VOC Styrene	0.33 0.22	0.02 0.01	0.33 0.22	0.02 0.01	Vapor Vapor	EE	NA

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

- 1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- 2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.
- 4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 VOC/20 minute batch).
- 6 Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
- 7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

ATTACHMENT K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS	
1.) Will there be haul road activities?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."	

FUGITIVE EMISSIONS SUMMARY		All Regulated Pollutants - Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
			lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads							
Unpaved Haul Roads		PM PM10 PM2.5	0.48 0.13 0.01	2.12 0.57 0.06	0.48 0.13 0.01	2.12 0.57 0.06	AP-42
Storage Pile Emissions							
Loading/Unloading Operations							
Wastewater Treatment Evaporation & Operations							
Equipment Leaks			Does not apply		Does not apply		
General Clean-up VOC Emissions							
Other							

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

² Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁴ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L
EMISSION UNIT DATA SHEETS

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 1S

<p>1. Name or type and model of proposed affected source:</p> <p>Core Making, Baking.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>NA</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>NA</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NA			
(a) Type and amount in appropriate units of fuel(s) to be burned:			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@	°F and	psia.	
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:			
(g) Proposed maximum design heat input:			× 10 ⁶ BTU/hr.
7. Projected operating schedule:			
Hours/Day	24	Days/Week	7
		Weeks/Year	52

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 2S/2AS

1. Name or type and model of proposed affected source:

Electric Induction Furnaces: Inductotherm Model DA-100-1818T and Inductotherm Model VIP PowerTrack 125-30 (original).

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

534 pounds of metal.

4. Name(s) and maximum amount of proposed material(s) produced per hour:

534 pounds of molten metal.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and	psia		
a. NO _x			lb/hr	grains/ACF
b. SO ₂			lb/hr	grains/ACF
c. CO			lb/hr	grains/ACF
d. PM ₁₀	0.24		lb/hr	NA grains/ACF
e. Hydrocarbons			lb/hr	grains/ACF
f. VOCs			lb/hr	grains/ACF
g. Pb			lb/hr	grains/ACF
h. Specify other(s)			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

Track amount of metal processed/melted in the units per year

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 3S

<p>1. Name or type and model of proposed affected source:</p> <p>Pouring, Cooling.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>534 lbs of molten metal.</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Molten metal is poured into casts and cooled.</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NA

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input:

× 10⁶ BTU/hr.

7. Projected operating schedule:

Hours/Day

24

Days/Week

7

Weeks/Year

52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:				
@		°F and		psia
a. NO _x			lb/hr	grains/ACF
b. SO ₂			lb/hr	grains/ACF
c. CO			lb/hr	grains/ACF
d. PM ₁₀	1.12		lb/hr	NA grains/ACF
e. Hydrocarbons			lb/hr	grains/ACF
f. VOCs			lb/hr	grains/ACF
g. Pb			lb/hr	grains/ACF
h. Specify other(s)			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

None

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 4S

1. Name or type and model of proposed affected source:

Autoclave – Boiler – Lattner Model WLF with autoclave chamber by Melco Steel Model 3013-1 build 982.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Wax molds with sand casts are placed in the autoclave to steam out the majority of the wax used to make the casts.

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Casts

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): Boiler			
(a) Type and amount in appropriate units of fuel(s) to be burned:			
Natural Gas at an estimated 1,675 scf/hr.			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
Pipeline quality natural gas.			
(c) Theoretical combustion air requirement (ACF/unit of fuel): NA			
@		°F and	
		psia.	
(d) Percent excess air: NA			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
1,675,000 BTU/hr			
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:			
NA			
(g) Proposed maximum design heat input:			
		1.675	× 10 ⁶ BTU/hr.
7. Projected operating schedule:			
Hours/Day	24	Days/Week	7
		Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and		psia	
a. NO _x	0.17	lb/hr	NA	grains/ACF
b. SO ₂	0.01	lb/hr	NA	grains/ACF
c. CO	0.15	lb/hr	NA	grains/ACF
d. PM ₁₀	0.02	lb/hr	NA	grains/ACF
e. Hydrocarbons	NA	lb/hr	NA	grains/ACF
f. VOCs	0.01	lb/hr	NA	grains/ACF
g. Pb	NA	lb/hr	NA	grains/ACF
h. Specify other(s)				
HAPs – VOC	0.01	lb/hr	NA	grains/ACF
HAPs – Metal	0.01	lb/hr	NA	grains/ACF
		lb/hr		grains/ACF
		lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

None

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 5S

<p>1. Name or type and model of proposed affected source:</p> <p>Burnout Furnace No. 1 – Linder Model 11-MT.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>The burnout furnace is fed the casts that have been sent through the autoclave. The burnout furnace removes the rest of the wax and sets the casts.</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>NA</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural Gas at an estimated 1,440 scf/hr.

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Pipeline Quality Natural Gas.

(c) Theoretical combustion air requirement (ACF/unit of fuel): NA

@

°F and

psia.

(d) Percent excess air: NA

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Main Burner 750,000 BTU/hr

Afterburner 690,000 BTU/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 1.44 × 10⁶ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52
-----------	----	-----------	---	------------	----

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	NA	°F and	NA	psia
a. NO _x		0.15 lb/hr	NA	grains/ACF
b. SO ₂		0.01 lb/hr	NA	grains/ACF
c. CO		0.13 lb/hr	NA	grains/ACF
d. PM ₁₀		0.02 lb/hr	NA	grains/ACF
e. Hydrocarbons		NA lb/hr	NA	grains/ACF
f. VOCs		31.21 lb/hr	NA	grains/ACF
g. Pb		NA lb/hr	NA	grains/ACF
h. Specify other(s)				
HAPs – VOC		0.01 lb/hr	NA	grains/ACF
HAPs – Metal		0.01 lb/hr	NA	grains/ACF
		lb/hr		grains/ACF
		lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

Total amount of natural gas burned at the site.

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 6S

<p>1. Name or type and model of proposed affected source:</p> <p>Burnout Furnace No. 2 – Tru-Heat Box Furnace 5x5x3.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>The burnout furnace is fed the casts that have been sent through the autoclave. The burnout furnace removes the rest of the wax and sets the casts.</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>NA</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural Gas at an estimated 1,500 scf/hr.

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Pipeline Quality Natural Gas.

(c) Theoretical combustion air requirement (ACF/unit of fuel): NA

@

°F and

psia.

(d) Percent excess air: NA

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Main Burner 1,000,000 BTU/hr

Afterburner 500,000 BTU/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 1.50 × 10⁶ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52
-----------	----	-----------	---	------------	----

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:				
@	NA	°F and	NA	psia
a. NO _x		0.15 lb/hr	NA	grains/ACF
b. SO ₂		0.01 lb/hr	NA	grains/ACF
c. CO		0.13 lb/hr	NA	grains/ACF
d. PM ₁₀		0.02 lb/hr	NA	grains/ACF
e. Hydrocarbons		NA lb/hr	NA	grains/ACF
f. VOCs		31.21 lb/hr	NA	grains/ACF
g. Pb		NA lb/hr	NA	grains/ACF
h. Specify other(s)				
HAPs – VOC		0.01 lb/hr	NA	grains/ACF
HAPs – Metal		0.01 lb/hr	NA	grains/ACF
		lb/hr		grains/ACF
		lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

Total amount of natural gas burned at the site.

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 7S

<p>1. Name or type and model of proposed affected source:</p> <p>Grinding and Miscellaneous – Various pieces of equipment.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Metal which has had the cast removed and has been removed from the tree is cleaned via grinding and other activities to the required finish.</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>NA</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NA

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input:

× 10⁶ BTU/hr.

7. Projected operating schedule:

Hours/Day 24

Days/Week 7

Weeks/Year 52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and	psia
a. NO _x	lb/hr	grains/ACF
b. SO ₂	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM ₁₀	0.31 lb/hr	NA grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

None

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 8S

<p>1. Name or type and model of proposed affected source:</p> <p>Abrasive Blast Units – Various pieces of equipment.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>The blast cabinets are used as needed to clean parts or provide the required finish. Each unit has an integral dust collector.</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>NA</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NA

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input:

× 10⁶ BTU/hr.

7. Projected operating schedule:

Hours/Day

24

Days/Week

7

Weeks/Year

52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:				
@		°F and		psia
a.	NO _x		lb/hr	grains/ACF
b.	SO ₂		lb/hr	grains/ACF
c.	CO		lb/hr	grains/ACF
d.	PM ₁₀	6.50	lb/hr	NA grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs		lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)		lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

None

RECORDKEEPING

None

REPORTING

None

TESTING

None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

None

**Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 9S

<p>1. Name or type and model of proposed affected source:</p> <p>Thermo Fiberglass Resin – Walsh Model DA: 100-1818T (large machine) and Stokes Model 741-2 (small machine).</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>20 lbs/hr</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>20 lbs/hr</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NA			
(a) Type and amount in appropriate units of fuel(s) to be burned:			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@		°F and	psia.
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:			
(g) Proposed maximum design heat input:			× 10 ⁶ BTU/hr.
7. Projected operating schedule:			
Hours/Day	24	Days/Week	7
		Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:				
@	°F and			psia
a. NO _x		lb/hr		grains/ACF
b. SO ₂		lb/hr		grains/ACF
c. CO		lb/hr		grains/ACF
d. PM ₁₀		lb/hr		grains/ACF
e. Hydrocarbons		lb/hr		grains/ACF
f. VOCs	0.33	lb/hr	NA	grains/ACF
g. Pb		lb/hr		grains/ACF
h. Specify other(s)				
Styrene	0.22	lb/hr	NA	grains/ACF
		lb/hr		grains/ACF
		lb/hr		grains/ACF
		lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

Attachment L
FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

		PM	PM-10
k =	Particle size multiplier	.80	0.36
s =	Silt content of road surface material (%)		
p =	Number of days per year with precipitation >0.01 in.		

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Trucks	10-18	30	10	0.1	1	8,760	NA	0
2									
3									
4									
5									
6									
7									
8									

Source: AP-42 Fifth Edition – 13.2.2 Unpaved Roads

$$E = k \times 5.9 \times (s \div 12) \times (W + 3)^{0.7} \times ((365 - p) \div 365) =$$

lb/Vehicle Mile Traveled (VMT)

Where:

		PM	PM-10
k =	Particle size multiplier	4.9	1.5
s =	Silt content of road surface material (%)	6	6
S =	Mean vehicle speed (mph)	10	10
W =	Mean vehicle weight (tons)	30	30
w =	Mean number of wheels per vehicle	Varies	Varies
p =	Number of days per year with precipitation >0.01 in.	157	157

For lb/hr: $[lb \div VMT] \times [VMT \div trip] \times [Trips \div Hour] =$ lb/hr

For TPY: $[lb \div VMT] \times [VMT \div trip] \times [Trips \div Hour] \times [Ton \div 2000 lb] =$ Tons/year

SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	0.48	2.12	0.48	2.12	0.13	0.57	0.13	0.57
2								
3								
4								
5								
Note: Item No.2 is double counting of raw coal trucking emissions and is not included in the total below.								
TOTALS	0.48	2.12	0.48	2.12	0.13	0.57	0.13	0.57

FUGITIVE EMISSIONS FROM PAVED HAULROADS - NA

INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1							
2							
3							
4							
5							
6							
7							
8							

Source: AP-42 Fifth Edition – 11.2.6 13.2.1.3 Industrial Paved Roads

$$E = 0.077 \times I \times (4 \div n) \times (s \div 10) \times (L \div 1000) \times (W \div 3)^{0.7} = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	
W =	Average vehicle weight (tons)	

For lb/hr: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] = \text{lb/hr}$

For TPY: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] \times [\text{Ton} \div 2000 \text{ lb}] = \text{Tons/year}$

SUMMARY OF PAVED HAULROAD EMISSIONS (PM/PM10)

Item No.	Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY
1				
2				
3				
4				
5				
6				
7				
8				
TOTALS				

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

By: PEW
Date: 1/4/2012

Checked By: CCS
Date: 1/4/2012

Furnace, Pouring, Cooling, Cleaning, Finishing, and Core Making, Baking

The following emissions estimate is to provide the potential emissions from the sources identified as existing at the site. The estimate is based on the total amount of metal that could be melted if the batch system was in operation 8,760 hours per year at 45 minutes per batch.

Operational Hours =	8,760	hours/year
Minutes per Hour =	60	minutes/hour
Maximum Batch Weight =	200	pounds/batch
Number of Induction Units =	2	
Batch Time =	45	minutes/batch
Yearly Weight =	2,336	tons (assumes constant operation of unit)
Hourly Capacity =	0.267	tons/hr (assumes constant operation of unit)
	534	lbs/hr (assuming constant operation of unit)

Emission Sources	PM EF	Reference	Emissions	
	lb/ton of steel/gray iron		lb/hr	tpy
Electric Induction Furnaces (2S & 2AS)	0.9	AP-42 Table 12.10-3	0.24	1.05
Pouring, Cooling (3S)	4.2	AP-42 Table 12.10-7	1.12	4.91
Core Making, Baking (1S)	1.1	AP-42 Table 12.10-7	0.29	1.28
		Total PM =	1.65	7.24
		Total PM10 ⁽³⁾ =	1.65	7.24
		Total PM2.5 ⁽³⁾ =	1.65	7.24

Notes:

- There is no lead at the site neither in stock as lead nor as a portion of the mixture of the metals being utilized.
- The following sources from Table 12.10-7 are not included in the emissions estimate based on the reason stated with each:
Scrap and Charge Handling, Heating - the facility moves material by hand without preheat.
Magnesium Treatment since the facility melts metal stock and does not modify the metal.
Refining since the facility does not refine the metals.
Shakeout since the facility manually conducts removal of the casting.
Sand Handling is manual and is placed into the required containers from bagged material.
- It is assumed that PM10 and PM2.5 are equal to TSP (PM).

Richwood Investment Castings, Inc.
Metal Casting Facility

Potesta & Associates, Inc.
Project No. 0101-14-0569

By: PEW
Date: 1/4/2012

Checked By: CCS
Date: 1/4/2012

Natural Gas Fired Boiler for Autoclave (4S)

Fuel Use = 1,675 scf/hr Estimated
Heat Content of Fuel = 1,000 Btu/scf Standard
Maximum Burner Rating = 1,675,000 Btu/hr Provided
Hours of Operation = 8,760 hrs/year
Fuel Usage = 0.0017 10⁶ scf per hour
14.90 10⁶ scf/year

Note: the flames do not have any controls for emissions: therefore, uncontrolled is equal to potential maximum emissions.

Rounding to = 2

Emission Type	EF lb/10 ⁶ scf	Emissions		EF Reference
		lb/hr	tons/year	
PM	7.6	0.02	0.06	Table 1.4-2
PM10 ⁽¹⁾	7.6	0.02	0.06	See Note 1
PM2.5 ⁽¹⁾	7.6	0.02	0.06	See Note 1
SO ₂	0.6	0.01	0.01	Table 1.4-2
NOx	100	0.17	0.75	Table 1.4-1
CO	84	0.15	0.63	Table 1.4-1
VOC	5.5	0.01	0.05	Table 1.4-2
Hazardous Air Pollutants				
HAPS- VOC ⁽²⁾	1.88	0.01	0.02	Table 1.4-3
HAPS - METAL ⁽³⁾	0.00556	0.01	0.01	Table 1.4-4

Notes:

- 1 - It is assumed that PM10 and PM2.5 are equal to TSP (PM).
- 2 - Total VOC HAPS as listed in Table 1.4-3 (AP-42).
- 3 - Total METAL HAPS as listed in Table 1.4-4 (AP-42).

By: PEW
Date: 1/4/2012

Checked By: CCS
Date: 1/4/2012

Burnout Furnace No. 1 (5S)

Burner Operation on Natural Gas

Fuel Use = 1,440 scf/hr · Estimated
Heat Content of Fuel = 1,000 Btu/scf Standard
Main Burner = 750,000 Btu/hr Provided
Afterburner = 690,000 Btu/hr Provided
Total Burner Rating = 1,440,000 Btu/hr
Hours of Operation = 8,760 hrs/year
Fuel Usage = 0.0015 10⁶ scf per hour
13.14 10⁶ scf/year

Note: the flames do not have any controls for emissions: therefore, uncontrolled is equal to potential maximum emissions.

Rounding to = 2

Emission Type	EF ⁽⁶⁾ lb/10 ⁶ scf	Emissions		EF Reference
		lb/hr	tons/year	
PM	7.6	0.02	0.05	Table 1.4-2
PM10 ⁽¹⁾	7.6	0.02	0.05	See Note 1
PM2.5 ⁽¹⁾	7.6	0.02	0.05	See Note 1
SO ₂	0.6	0.01	0.01	Table 1.4-2
NOx	100	0.15	0.66	Table 1.4-1
CO	84	0.13	0.56	Table 1.4-1
VOC	5.5	0.01	0.04	Table 1.4-2
Hazardous Air Pollutants				
HAPS- VOC ⁽²⁾	1.88	0.01	0.02	Table 1.4-3
HAPS - METAL ⁽³⁾	0.00556	0.01	0.01	Table 1.4-4

- 1 - It is assumed that PM10 and PM2.5 are equal to TSP (PM).
- 2 - Total VOC HAPS as listed in Table 1.4-3 (AP-42).
- 3 - Total METAL HAPS as listed in Table 1.4-4 (AP-42).

Wax Combustion

To estimate the PTE we are using the maximum loading of the chamber provided by the manufacturer and the total wax usage of 200,000 pounds (actual 2011 usage was approximately 53,000 pounds). According to site personnel the wax remaining in the molds when placed in the burnout oven is estimated at 5% of the wax used to make molds. According to the manufacturer the wax is converted either to particulate matter or volatilizes to a volatile organic compound (VOC) when the molds are placed in the burnout furnace. The nature of the emissions is based on the temperature when the wax material leaves the mold. At a lower temperature the wax volatilizes to VOC and at higher temperatures the wax turns to a particulate matter based on combustion.

Estimated Total VOC or Particulate per Run = 7.8 lbs/run
Number of Runs per Hour = 4
Uncontrolled VOC or Particulate per Hour = 31.2 lbs/hr
Total Yearly Wax Usage = 200,000 lbs/yr
Estimated Amount of Wax Remaining in Molds = 5 Percent
5 tpy
Uncontrolled VOC or Particulate per Year = 5 tpy
Control Efficiency = 99 %
Controlled VOC or Particulate per Hour = 0.312 lbs/hr
Controlled VOC or Particulate per Year = 0.05 tpy

Total Uncontrolled VOC (including combustion) = 31.21 lbs/hr
5.04 tpy
Total Controlled VOC (including combustion) = 0.32 lbs/hr
0.09 tpy

NOTE: Wax Combustion emissions are reported as VOC emissions in the facility PTE.

By: ADM
Date: 12/15/2014

Checked By: CCS
Date: 12/18/2014

Burnout Furnace No. 2 (6S)

Burner Operation on Natural Gas

Fuel Use =	1,500	scf/hr	Estimated
Heat Content of Fuel =	1,000	Btu/scf	Standard
Main Burner =	1,000,000	Btu/hr	Provided
Afterburner =	500,000	Btu/hr	Provided
Total Burner Rating =	1,500,000	Btu/hr	
Hours of Operation =	8,760	hrs/year	
Fuel Usage =	0.0015	10 ⁶ scf per hour	
	13.14	10 ⁶ scf/year	

Note: the flames do not have any controls for emissions: therefore, uncontrolled is equal to potential maximum emissions.

Rounding to = 2

Emission Type	EF ^(a) lb/10 ⁶ scf	Emissions		EF Reference
		lb/hr	tons/year	
PM	7.6	0.02	0.05	Table 1.4-2
PM10 ⁽¹⁾	7.6	0.02	0.05	See Note 1
PM2.5 ⁽¹⁾	7.6	0.02	0.05	See Note 1
SO ₂	0.6	0.01	0.01	Table 1.4-2
NO _x	100	0.15	0.66	Table 1.4-1
CO	84	0.13	0.56	Table 1.4-1
VOC	5.5	0.01	0.04	Table 1.4-2
Hazardous Air Pollutants				
HAPS- VOC ⁽²⁾	1.88	0.01	0.02	Table 1.4-3
HAPS - METAL ⁽³⁾	0.00556	0.01	0.01	Table 1.4-4

- 1 - It is assumed that PM10 and PM2.5 are equal to TSP (PM).
- 2 - Total VOC HAPS as listed in Table 1.4-3 (AP-42).
- 3 - Total METAL HAPS as listed in Table 1.4-4 (AP-42).

Wax Combustion

To estimate the PTE we are using the maximum loading of the chamber provided by the manufacturer and the total wax usage of 200,000 pounds (actual 2011 usage was approximately 53,000 pounds). According to site personnel the wax remaining in the molds when placed in the burnout oven is estimated at 5% of the wax used to make molds. According to the manufacturer the wax is converted either to particulate matter or volatilizes to a volatile organic compound (VOC) when the molds are placed in the burnout furnace. The nature of the emissions is based on the temperature when the wax material leaves the mold. At a lower temperature the wax volatilizes to VOC and at higher temperatures the wax turns to a particulate matter based on combustion.

Estimated Total VOC or Particulate per Run =	7.8 lbs/run
Number of Runs per Hour =	4
Uncontrolled VOC or Particulate per Hour =	31.2 lbs/hr
Total Yearly Wax Usage =	200,000 lbs/yr
Estimated Amount of Wax Remaining in Molds =	5 Percent
	5 tpy
Uncontrolled VOC or Particulate per Year =	5 tpy
Control Efficiency =	99 %
Controlled VOC or Particulate per Hour =	0.312 lbs/hr
Controlled VOC or Particulate per Year =	0.05 tpy
Total Uncontrolled VOC (including combustion) =	31.21 lbs/hr
	5.04 tpy
Total Controlled VOC (including combustion) =	0.32 lbs/hr
	0.09 tpy

NOTE: Wax Combustion emissions are reported as VOC emissions in the facility PTE.

By: PEW
Date: 1/4/2012

Checked By: CCS
Date: 1/4/2012

Grinding & Miscellaneous (7S)

This following methodology for estimating emissions is used for particulate matter from grinding, cutting, and cleaning in the Finishing Area. The Regulation 7 particulate mass standard limit is used to estimate these emissions. Using 534 lbs/hour as the maximum weight of process material processed through the operations and assuming that 534 pounds can be processed in a single hour, for an 'a' source Table 45-7A results in a particulate matter emission rate of 0.64 lbs/hour ((3 pph/2500 pounds)*534 pounds). It should be noted that the 0.64 lbs/hour emission rate is the total for all possible grinding and miscellaneous operations, stationary and portable.

	Regulation 7 Mass Weight Limit (lbs/hr)	Requested Permit Limits	
		lbs/hr	tons/yr
PM	0.64	0.64	2.81
PM ₁₀ ⁽²⁾	0.31	0.31	1.34
PM _{2.5} ⁽²⁾	0.31	0.31	1.34

- (1) For calculation purposes it is assumed that grinding and miscellaneous operations are conducted for 8,760 hrs/year.
 (2) PM₁₀=PM/2.1 and PM_{2.5}=PM/10

Abrasive Blast Units (Wheelabrators and Blast Cabinet) with Filters (8S)

Abrasive Usage Total = 500 lbs/hr
 Hours of Operation = 8,760 hrs/year
 Emission Factors⁽¹⁾ =
 PM = 27 lb/1,000 lbs of media
 PM₁₀ = 13 lb/1,000 lbs of media
 PM_{2.5} = 1.3 lb/1,000 lbs of media
 Control Efficiency of Collectors = 98 % (Assumed)

	Emissions			
	Uncontrolled		Controlled	
	(lbs/hr)	tons/yr	(lbs/hr)	tons/yr
PM	13.50	59.13	0.27	1.18
PM ₁₀	6.50	28.47	0.13	0.57
PM _{2.5}	0.65	2.85	0.01	0.06

1. AP42 Table 13.2.6-1.

Richwood Investment Castings, Inc.
Metal Casting Facility

Potesta & Associates, Inc.
Project No. 0101-14-0569

By: PEW

Date: 1/4/2012

Checked By: CCS

Date: 1/4/2012

Vehicular Traffic - 10S

Emission factor equation:

$$E = k(s/12)^a (W/3)^b ((365-p)/365)$$

From AP-42 Fifth Edition, Section 13.2.2, Fugitive Sources

	PM	PM10	PM2.5	
E =	?	?	?	lb/VMT
k =	4.9	1.5	0.15	particle size multiplier
a =	0.7	0.9	0.9	constant
b =	0.45	0.45	0.45	constant
s =	6	6	6	% silt in road surface
W =	30.0	30.0	30.0	mean vehicle weight
p =	157	157	157	# days with 0.01" rain
E =	4.84	1.29	0.13	lb/VMT

Estimated Trucks for Delivery and Shipping	
Vehicle Wt	Load Wt
15	30

Rounding to =

2

Vehicular Traffic ID	Miles/Trip (miles)	Number of Trips/Hour (trips/hour)	Number of Trips/Year* (trips/year)	Control Device		PM Emissions			
				Type	Effic(%)	Uncontrolled		Controlled	
						(lb/hr)	(tpy)	(lb/hr)	(tpy)
Trucks	0.10	1	8,760	NA	0	0.48	2.12	0.48	2.12
Total						0.48	2.12	0.48	2.12

Vehicular Traffic ID	Miles/Trip (miles)	Number of Trips/Hour (trips/hour)	Number of Trips/Year* (trips/year)	Control Device		PM10 Emissions			
				Type	Effic(%)	Uncontrolled		Controlled	
						(lb/hr)	(tpy)	(lb/hr)	(tpy)
Trucks	0.10	1	8,760	NA	0	0.13	0.57	0.13	0.57
Total						0.13	0.57	0.13	0.57

Vehicular Traffic ID	Miles/Trip (miles)	Number of Trips/Hour (trips/hour)	Number of Trips/Year* (trips/year)	Control Device		PM2.5 Emissions			
				Type	Effic(%)	Uncontrolled		Controlled	
						(lb/hr)	(tpy)	(lb/hr)	(tpy)
Trucks	0.10	1	8,760	NA	0	0.01	0.06	0.01	0.06
Total						0.01	0.06	0.01	0.06

* Assumes one delivery or shipment made to/from the site each hour of each day.

ATTACHMENT O

**MONITORING, RECORDKEEPING, REPORTING,
TESTING PLANS**

ATTACHMENT P
PUBLIC NOTICE

LEGAL ADVERTISEMENT

AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Richwood Investment Castings, Inc. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Class II Administrative Update to Regulation 13 Permit R13-2918 to update the heat rating of a proposed burnout furnace (Burnout Furnace No. 2) located on Pleasant Valley Road near Huntington, Cabell County, West Virginia. The latitude and longitude coordinates are: 38.3895; -82.4519.

The applicant estimates the proposed burnout furnace has the potential to discharge the following Regulated Air Pollutants: PM of 0.05 tons per year (tpy), PM₁₀ of 0.05tpy, PM_{2.5} of 0.05 tpy, VOC of 0.04 tpy, NO_x of 0.66 tpy, SO₂ of 0.01 tpy, CO of 0.56 tpy, and total HAPS of 0.03 tpy.

Startup of the burnout furnace is planned to begin on or about 15th day of February 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the (PLEASE INSERT DATE) day of January, 2015.

By: Richwood Investment Castings, Inc.
Geoff Stoll
General Manager
PO Box 6786
Huntington, West Virginia 25773