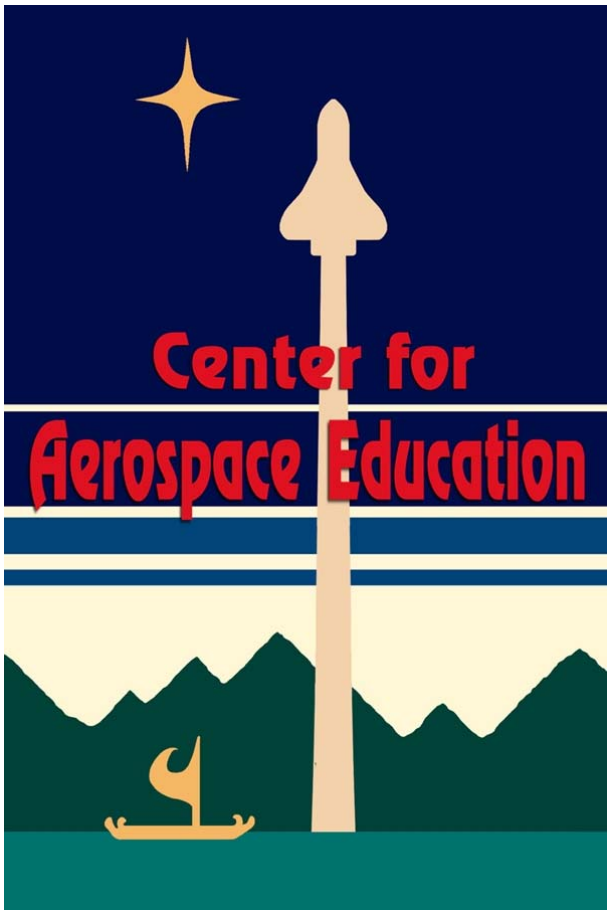
Center for Aerospace Education Windward Community College

leo hano

Voice of Authority & Respect

NASA

USLI Proposal 2009-2010



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Project Concept

In order to continue its efforts at promulgating interests in science, technology, engineering, and mathematics, the Center for Aerospace Education (CAE) would like to acquire a re-usable rocket to perform diagnostic testing for several of our education outreach projects. The rocket would be designed to carry a non-specific payload, of limited weight and size, to a specific altitude of 1 mile (5280'), and then return safely to its launchers. The payload carrier would have an on-board data acquisition system capable of determining where the payload compartment is, how fast it is going, how high above ground level it is, and what angle the payload section is above the horizon. In addition, the payload carrier electronics will also include the ability to perform a 'voice–over' to a ground PA system to inform all observers of the status of the rocket. To ensure re-usability, the rocket would deploy a drogue chute at apogee, and a larger main chute at a lower altitude – high enough for a safe landing, yet low enough to ensure retrieval in a limited area.

Several projects that would benefit from the lifting body are discussed below:

- **CanSat:** The WCC CanSat program is a project based learning opportunity to instill an interest in science, technology, engineering, and mathematics in college students that would otherwise not pursue such endeavors. Students are tasked with designing, building, and the subsequent testing of a fully operational device that will emulate a space probe gathering an array of data. There are strict physical limitations to the design volume of the CanSat, usually confined to fitting inside of a standard 350 ml soda can. Students are usually required to interact with experts in the engineering community, or faculty experts on other campuses of the University of Hawaii system. Since the majority of students attending the satellite Community Colleges are pursuing a liberal arts certificate, the CanSat program is ideally suited to for these students. Aside from acting as a resource, the CAE would like to be able to provide a means of *in-situ,* rigorous, testing of the involved electronics previous to departure for the competition.

- **ARLISS:** Among the many variants of CanSat is ARLISS (A Rocket Launch for International Students Satellites). ARLISS is hosted by AeroPAC (a recognized high powered rocketry organization) and Prof. Robert Twiggs (recently retired from Stanford University), and takes place in Black Rock Nevada, primarily to foster relations between universities around the Pacific Rim. Students are tasked with designing, building, and testing, an electronics package that emulates a planetary probe. The goals for ARLISS are well defined - the electronic package must, when deployed from a payload bay, autonomously make its way to a GPS target site, all the while gathering external data and transmitting it to a passive ground station. A low-altitude rocket would provide a marvelous opportunity for the multi-faceted testing required for a successful endeavor.

- **Curriculum Development:** Current efforts to develop a rocketry certificate program, requires curriculum development for two courses; Rocket Principles, and Ground Safety Protocols. A re-usable rocket, launched in conjunction with the above two projects, utilizing students from the two classes, provides a *hands-on* situation that can only be beneficial to the learning environment. By having one to two launches a semester, students can come away with a greater understanding of the rocketry principles involved, and the safety procedures followed.

- **High School Science Fair:** Preliminary data collected by the CAE indicates that there is a wide interest in student lead research involving rocketry. By soliciting proposals from High Schools that have flight ready projects, the CAE could host launches involving the students in the Rocketry certificate program. Interested High Schools would submit a proposal to the CAE for a flight request. The accepted High Schools would then submit a Preliminary Design Review, a Critical Design Review, followed by a Flight Readiness Review prior to the project being flown. These would be reviewed, and commented upon, by the students in the Safety Protocols class. Any recommendations would be conveyed back to the particular High School. At the time of launch, interested High School classes would be invited to observe the launch, with the on-board payload carrier electronics performing a 'voice-over' of what the rocket is doing at all phases of is flight profile.

In essence, not only will the construction of this rocket provide an educational opportunity for the students involved (through a project-based outcome), but the finished project will continue to promote educational out-reach at several levels.

1. School Information

Name: Center for Aerospace Education
Windward Community College
Hale Imiloa 112
45-720 Kea'ahala Rd.
Kaneohe HI 96744

Title of Project: "leo hano", Voice Authority & Respect

Team Official: Dr. Jacob V. Hudson Jr., CAE Aerospace Education Lab Coordinator

Safety Officer: Patrick J. Lancaster, Student

Project Participants:

WCC will have approximately four students committed to the USLI project. WCC will welcome additional students to the project should any additional students wish to participate.

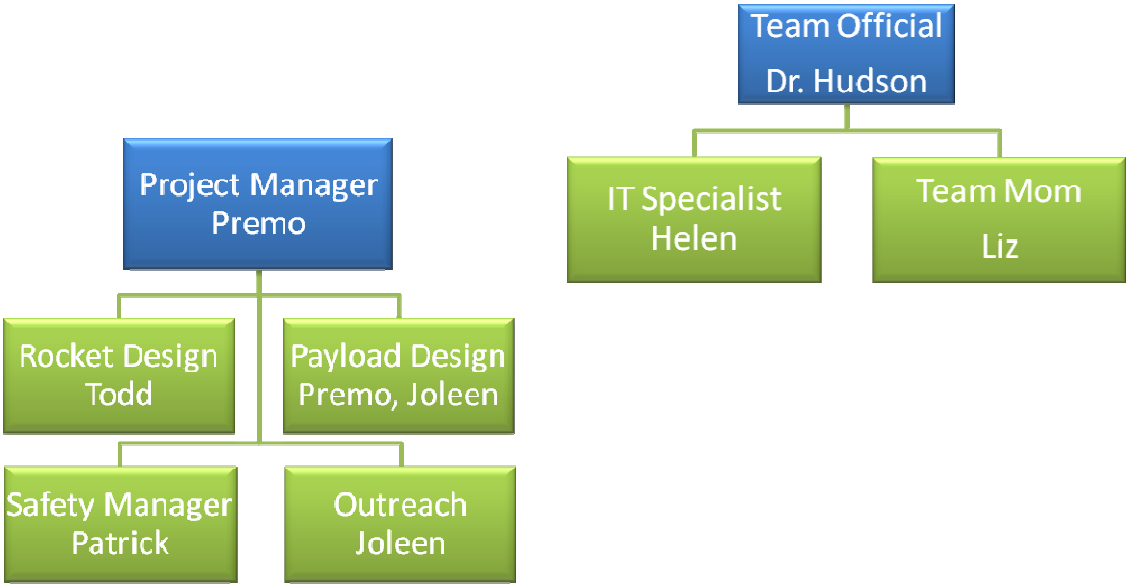

Figure 1: Organizational Chart for CAE WCC USLI Team

Key Managers:

Project Manager:	Premo
Safety Manager:	Patrick
Rocket Design:	Todd
Payload Design:	Premo
Outreach:	Joleen

Key Technical Personnel:

Principle Investigator:	Joe
Team Official:	Dr. Hudson
IT Specialist:	Helen
Team Mom:	Liz

NAR/TRA affiliation:

NAR: Section # 542	Sky Performance Rocket Club Hawaii
TRA: Aero-Pac	Association of Experimental Rocketry of the Pacific.

CAE WCC USLI Team Bios

Team Official

Dr. Jacob V. Hudson Jr. is a lecturer of Physics and Astronomy at the University of Hawaii at the Windward Campus. After receiving his Ph.D. in High Energy Particle Astrophysics, Dr. Hudson has maintained an active interest in aerospace studies and, in particular, rocket propulsion. Dr. Hudson is the Coordinator for the NASA Aerospace Education Laboratory (AEL), part of the Center for Aerospace Education, and is also an Associate Director for the Hawaii Space Grant Consortium

Principle Investigator

Dr. Joseph Ciotti is a Professor of Physics, Astronomy and Mathematics at Windward Community College. He is the founder and director of WCC's Center for Aerospace Education and acts as the college's Associate Director for the Hawai'i Space Grant Consortium. He designed WCC's Lanihuli Observatory as well as the planetariums at both WCC (Hokulani Imaginarium) and UH-Hilo ('Imiloa Astronomy Center). He also established the college's NASA AEL. He was selected as one of Hawai'i's Teacher-in-Space finalists and continues to serve as a NASA Space Ambassador. Among his other recognitions are the Robert H. Goddard Memorial scholarship, the Carnegie Foundation's Hawai'i Professor of the year and the Christa McAuliffe National Aerospace Educator of the Year.

Project Manager

Premo Ames II is an undergraduate student at Windward Community College (WCC). Premo has been involved with the ARLISS (A Rocket Launch for International Student Satellites) Can Sat program at WCC for three years as the Project Manager. During his time in the ARLISS program he has taken the lead in construction and integration of the electronics and control systems. Premo is now the Project Manager for the current USLI project under a fellowship with the Hawaii Space Grant Consortium. Premo recently achieved his level 2 high-powered rocketry certification at the Black Rock desert during ARLISS 2009. Premo is actively pursuing his Tripoli Rocketry Association level 3 certification for High-Powered Rocketry.

Education Outreach Manager

Joleen is currently a sophomore at the school of Electrical Engineering at the University of Hawaii Manoa. She has her level two certification with the TRIPOLI Rocketry Association and is the founder of the Kids In Technology and Sciences program (K.I.T.S.)

which was developed for educational outreach. As such she is the Educational Engagement events Coordinator.

Rocket Design Manager

Todd is an undergraduate student with WCC and is working toward a mechanical and aerospace engineering degree. Todd has participated in the NASA ARLISS program as a airframe designer for the CanSat. Todd continues with the USLI program as technical designer, construction, and testing for the rocket.

Safety Manager

Patrick is currently an undergraduate student at Windward Community College majoring in Physics and Astronomy. Patrick also assists Dr. Joe Ciotti with the Lanihuli Observatory and Hoku Lani Imaginarium.

IT Specialist

Helen is an Information Specialist at Honolulu Community College and helps the team with using the University of Hawaii collaboration software tools, public web page, taking photographs and keeping spare batteries for just in case.

2. Facilities/Equipment

2.1) Main Facility:

a. Location: Windward Community College, Hale ʻImiloa Room 112 houses the CAE's NASA Flight Training Aerospace Education Lab (NASA AEL) and Hawaiʻi Space Grant Consortium at Windward.
b. The NASA Flight Training AEL is a high-tech computer classroom designed to give students in grades 7-12 a project-based learning environment for applying skills in math and science.
c. The NASA AEL is accessible to all USLI students and mentors during normal school hours, 7:00 AM – 9:00 PM. The NASA AEL is also accessible on Saturdays from 8:00 AM – 1:00 PM. The NASA AEL is also accessible after hours as well as weekends.
d. The NASA AEL is a semi-secure room as it normally closed and electronically locked. It is considered semi-secure because it is also being accessed by other students.
e. USLI team members have access via electronic key card.

Auxiliary Facilities:

a. USLI team members may use the NASA AEL for assembly of rocket & payload parts, however construction, fabrication, and/or alteration of said parts may not be suitable for the NASA AEL. As WCC has no machine shop facility construction, fabrication, and/or alteration of said parts shall be completed at team members' residence or otherwise suitable area.
b. WCC hosts Sky Performance Rocketry Club of Hawai'i's launches on the third Saturday of each month from the hours of 2:30 p.m. – 5:30 p.m. from which the USLI team can do small launches for testing.
c. CAE WCC, with permission, has launched from the Kaneohe Marine Corps Air Station in the past and will most likely be able to do so in the future. The KMCAS has considerably more space available for larger launches not capable at WCC.
d. WCC is a liberal arts community college known for its Hawaiian language and science programs and does not have an Industrial program or machine shop. WCC will partner with sister college Honolulu Community College (HCC) in hopes of recruiting students for the USLI program, or to at least have HCC students fabricate parts for the WCC USLI program as needed.

2.2a) Necessary Personnel shall include:

Jacob Hudson – Mentor, Team Official, Tripoli Rocketry Association & National Association of Rocketry Level 3 Certified.

Premo Ames II – Student, Project Manager, Tripoli Rocketry Association Level 2 Certified.

Joleen Iwaniec – Student, Education Outreach Manager, Tripoli Rocketry Association Level 2 Certified.

Todd Esposito – Student, Rocket Design, National Association of Rocketry Level 2 Certified.

Patrick Lancaster – Student, Safety Manager

Helen Rapozo – Staff, IT Specialist

2.2b) Equipment needed shall include but are not limited to:

Basic hand & power tools required for wood, fiberglass, composite & metal working, construction & fabrication.

Electronic /computer specific tools for electronic circuit fabrication, construction & testing.

Most if not all tools will be team members' own tools to be used for construction and fabrication. Specialty tools not owned or available to team members may be purchased when need arises provided funding is available.

2.2c) Supplies needed shall include but are not limited to:

Rocket components:

Phenolic tubing, Blue Tube tubing, G-10 fiberglass, fiberglass weave, carbon fiber, carbon fiber weave, birch plywood, plastics epoxy, paint, cyanoacrylate, resin.

Payload components:

In addition to rocket component supplies, electrical supplies to include but not limited to: switches, battery connectors, electrical wiring, connectors, screws, bolts, nuts & solder.

2.2d) Provisions for verifying altitude of rocket will include but not limited to:

Perfect Flight MAWD altimeter, Gee-Wiz HCX Flight Computer, & GPS Flight transmitter and receiver modules.

2.3a) Computer Equipment accessible to team members are:
NASA AEL Computers:

12 desktop computer stations designed for the NASA AEL
8 running Windows 2000.
4 running Mac OS.
1 desktop computer with Windows 2000 & Office 2003.
1 laptop computer with Windows XP & Office 2007.

The USLI team is currently seeking funds from the Hawaii Space Grant Consortium for a new laptop computer to run the following software to be acquired:

Rock Sim, Smart Sim, Space CAD, Auto CAD, Solid Works & Microsoft Project Manager.

In addition to the school computer mentioned team members will use personal computers to communicate via e-mail, Skype & Laulima, the Learning and Collaboration Server for the University of Hawaii Community.

The Laulima server shall also host the web presence for the USLI project and be updated with the status of the project, list of needed materials and/or expertise throughout the project life.

The team official, Dr. Hudson, will be in contact with NASA USLI Project Manager, Premo, via daily e-mail & text messaging.

2.3b) Team provided computer equipment needed for Web casting or video teleconferencing is the NASA AEL computer laptop with the following specifications:

a. Broadband connection
b. Windows XP
c. Built in microphone and speakers
d. Firewall, USB, and built in video camera
e. Personnel for firewall issues will be handled through WCC's Academic Computing Department,
Bryan Tokuda, Information Technology Specialist
Phone: (808) 235-7307
Email: btokuda@hawaii.edu

Should communication with MSFC via Skype not be possible a Polycomm unit is available. CAE WCC's preferred method of communication with MSFC is via Skype.

3. Safety & Mission Assurance

The team's current mentor is Dr. Hudson, who is one of the peer mentors of the Center for Aerospace Education at Windward Community College. He is also a level (3) certified member for both National Association of Rocketry (NAR) and Tripoli Rocket Association (TRA). As the Team Official Dr. Hudson will oversee all launch operations and motor handling. His contact information is provided below:

Contact Information:
Name - Dr. Hudson Hudson
Phone Number – (808) 347-8246
E-mail – jacobh@hawaii.edu

The CAE WCC USLI team has a level three (3) certified member for both NAR and TRA. It also has three (3) level two (2) certified members of NAR/TRA. A list of the entire team and their current certification is shown in the table below (Figure 2).

Name	Title	Certification Level
Dr. Hudson	Team Official	TRA Level 3
Premo	Project Manager	TRA Level 2
Todd	Rocket Design	NAR Level 2
Joleen	Outreach Manager	TRA Level 2
Patrick	Safety Manager	N/A
Helen	IT Specialist	NAR Level 0
Joe	Principle Investigator	N/A

Figure 2: CAE WCC USLI Team Member Certifications

Safety information of all the materials that will be used in this project will be addressed in the Material Safety Data Sheets (MSDS) in Appendix D. The team will be following all the NAR/TRA safety protocols. Dr. Hudson, our peer mentor, has briefed students on hazard recognition, accident avoidance, and will be conducting pre-launch briefings.

As seen in Figure 2 our team consists of one (1) level three (3) certified member and three (3) level two (2) certified members of NAR/TRA. These certifications ensure that the team is adequately acquainted with Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C (Appendix C), and also have sufficient knowledge on handling and using low-explosive (Ammonium Perchlorate Rocket Motors, APCP), fire prevention, Code of Federal Regulation Part 55, and NFPA 1127. All noncertified team members have been briefed, are aware, and will abide by all of these laws and regulations. In addition to these rules and regulations the entire team is knowledgeable and compliant of all federal, state, and local laws concerning the use of unmanned rockets and their components. A flight card will be used before each launch. The team's peer mentor, Dr. Hudson, is in charge of purchasing, storage, transport, and use of the rocket motors. Any flammable material will be stored in type 3/4 indoor magazine storage device. The only person with access to this storage device will be Dr. Hudson.

Windward Community College's Center for Aerospace Education
Safety Agreement

All the participants at the Center for Aerospace Education (CAE) at Windward Community College (WCC) are required and held responsible for knowing the following:

Before each launch the certified NAR members will perform a pre-launch inspection of the rocket and all the relevant components to determine that the rocket is not only launch ready but also complies with all local, state, and federal laws concerning unmanned rockets. All team members are responsible for knowing these rules and regulations. Assembly of the rocket motors and igniters will be performed in designated areas, which provide a safe environment for the handling of these materials. In addition, these materials will be handled and transported in a safe and responsible way that abides with federal and state laws and safety regulations.

We are aware that the Range Safety Officer (RSO) has the final authority on issues on any and all rocket safety matters. The RSO may refuse the launch of any rocket if the RSO feels that the rocket is not safe, even if the rocket passes pre-launch inspections.

By signing below I agree that I have read and understand the Safety Agreement above and am aware of all state and federal laws regarding these procedures.

Print Name	Sign Name	Date
Premo Ames II		6 OCT 09
Todd Esposito		10-6-09
Joleen Iwaniec		10-6-09
Jacob Hudson		10/6/09
Helen Rapozo		10/7/09
Joseph Ciotti	Joseph E. Ciotti	10-6-09
Patrick Lancaster		10-6-09

Figure 3: CAE WCC USLI Team Written Safety Statement

4. Technical Design

4a) The Center for Aerospace Education (CAE) at Windward Community College (WCC) would like to acquire a re-usable rocket to perform diagnostic testing for several of our education outreach projects. The WCC University Student Launch Initiative (USLI) Team will design a rocket to carry a non-specific payload, of limited weight and size, to a specific altitude of 1 mile (5,280') and then return safely. The projected vehicle dimensions for the WCC USLI team rocket would be about a 4 inch diameter tube, about 7 foot 10 inch overall length, and weigh about 20kgs.

4b) The projected motor that we plan to use would be an Aerotech Composite Rocket motor L1420R using a 75mm/5120 motor casing.

4c) The science payload projected to be would include an electronic "voice-over" system coupled to a ground PA system that would inform all observers of the status of the rocket through the course of its accent and decent phases. The payload carrier would have an on-board data acquisition system capable of determining where the payload compartment is, how fast it is going, how high above ground level it is, and at what angle the payload section is above the horizon.

Our rocket will help facilitate other Community College CanSat (Can Satellite) Teams under the ARLISS (A Rocket Launch for International Student Satellites) programs and also to include High School teams and their electronic or biological payloads.

4d) The primary requirements for the rocket and payload will help foster a better understanding of science, technology, engineering, and mathematics and also to help facilitate safety protocols throughout the phases of this program.

4e) A major challenge for our WCC team would be the launching facility, flight testing, and recovery portion of this program. We our limited on land space and air space clearance on our island. It is difficult to launch and receive air space clearance for rockets of this design we our proposing. A solution we have conceived would be to launch at the U.S. Marine base that we live near. The Marine base would help facilitate the ease of launch, flight, and recovery of our rocket because of the increased area a rocket of this proposed design would need. Another challenge would be working with students who have little to no experience with rocketry concepts and principles. The solution to this challenge would be through the different phases of this program and to work in a team environment to tackle the challenges as they arise and to find solutions that work for the betterment of the program.

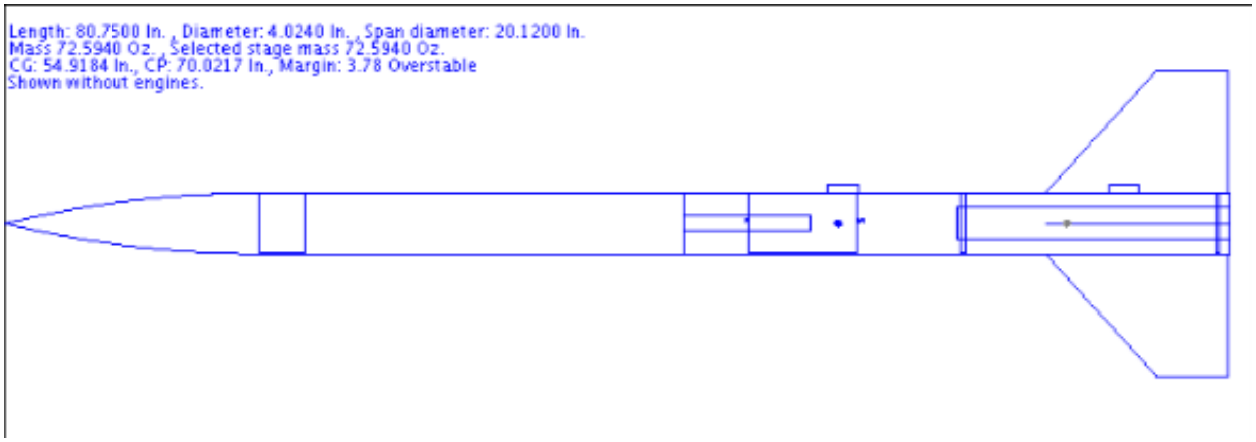

Figure 4: Proposed Rocket Dimensions

5. Educational Engagement

Man's quest for the advancement of technology has always been rooted in a desire to better the human condition. To make more of the world around us and to improve our interrelations with it has been the cornerstone of technological studies since their inception and remains so today. But just as technological advancement and discovery serves the human race, it also requires the human race to push its boundaries and constantly seeks to explore, discover, and challenge the world around them. As such, we believe it is of vital importance that we begin exposing the youngest members of our society to the critical role technological advancement has for our future as human beings. Unfortunately many people misconstrue the term Technology for that of its artifacts; computers, cell phones, and your typical toaster rather than realizing that technological advancement can take place within the industrial arts and all forms of engineering. Young adults must have their eyes opened to a world of opportunity within technological studies and educated as to their possible contributions to it. Through the power of community and educational outreach we have already begun to reach the lives of the next generation and have planted the seeds for the STEM researchers for tomorrow.

5.1) Community Support

The Marine Corps Base Hawaii has offered the use of its airfields for aerodynamics testing and community events. Since safety is our number one priority, there is always an on call fire truck for any incidentals. With their aid we are able to launch with an approximately 2500ft. ceiling, which is the highest available to date on the island of Oahu. We are looking into several local sponsors and high powered rocketry sponsors as listed, but not limited to the following:

- Fiberglass Hawaii
- Parallax.com
- Oceanit
- Performance Kites
- Aerotech
- AeroPAC
- Model Rockets – Rocket Building Supply
- Rocketmotion – High power rockets – motors- Accessories
- Vern's Rocketry Association
- The Taylor Shop

We also plan to utilize the Honolulu Community College machine shop with hopes of recruiting certified operational personnel as well as assistance from faculty and staff.

Sponsorship solicitation will begin with explanation and education of our outreach goals to those targeted. Included with the solicitation for support will be offers for advertisement of said sponsor at outreach events, local launches, demonstration launches, and special events through various means to include but not limited to: "over the air thank you to said sponsor" at events where a public address system is available and in use, visual signage of banners and/or posters at launch tents, visual advertisement via clothing or patches of said sponsor on team clothing, visual advertisement on team public Web page, & arranged press coverage of events.

5.2 Outreach Projects

Our entire project is based on educational outreach and the possibilities of students not only utilizing the altitude of rockets for their own projects (a payload bay) but also learning about the different phases a rocket goes though flight (hence the voice over) . It is our goal to encourage interest in STEM programs by using programs such as K.I.T.S., Kids In Technology and Science, which would reach out to young students everywhere and demonstrate the technology employed at NASA and available for students at the elementary and secondary levels. Participants' would be educated as to the plethora of varied career paths within NASA including those in fields of aerospace engineering, electrical engineering, horticulture, nutrition, physics, astronomy, and even cosmetology! Their potential roles within these applied fields would be examined and encouraged through hands-on tactile activities and guided study devised for just that purpose.

NASA Aerospace Education Labs are currently located in thirty-eight states nationwide and one mobile unit that travels throughout the continental United States. In the state of Hawaii we are fortunate to have one of these treasures located at Windward Community College and the K.I.T.S. program would provide the tools, experience, and opportunities to enhance their knowledge of these labs. It is our goal to increase both the general public awareness and the specific number of students involved in the Aerospace Education Lab in hopes that it will inspire, and motivate students to pursue higher levels of study in technology and science.

In following our ambitions of public outreach we are currently developing a Space week demonstration to be held on the tenth of October where we will be both launching several model rockets of programs we have and are representing through the Windward Community College system as well as those affiliated with the Hawaii Space Grant Consortium and local rocketry groups. The children may also participate in a small scimitar construction, design and flight competition. Afterwards they have a momentum of the day's events and something to remind them of the opportunities that lie ahead of them. We also have several public and private school events that will follow the same procedure.

This program will develop a diverse portfolio of educational initiatives that target students at all levels and through different revenues be it school, to the YMCA or their Boys or Girls Scouts. But most importantly we want to reach out to America's traditionally undeserved and underrepresented communities because they deserve our greatest support.

6. Project Plan

6.1) Tentative Schedule:

Aug.	Initial concept design (brain-storm)
Sept.	Finalize Concept
	Start Request for Proposal (RfP)
Oct.	Complete and submit RfP
	10/8 RfP due
Nov.	Set-up Internet site
	11/12 Web site complete
	Design testing
Dec.	Complete Preliminary Design Review (PDR)
	12/4 - Teleconference
Jan.	Submit Critical Design Review (CDR)
	1/20 - teleconference
Feb.	Complete construction
Mar.	Final Testing
	3/17 - Teleconference
Apr.	Submit Flight Readiness Review (FRR)
	Complete Competition Preparations
May.	Compete
	5/7 - Post-Launch Assessment Review (PLAR)

6.2) Preliminary Budget:

Structure	$ 1,200
Propulsion	$ 900
Recovery	$ 200
Avionics	$ 700
Payload	$ 2,000
Subtotal	$ 5,000
Travel	$10,000

Appendix A:

Center for Aerospace Education

Established in 1986, the Center for Aerospace Education (CAE) supports WCC's credit and community outreach programs in aerospace science. The mission of the CAE is to inspire students to actively engage in science activities through formal education and informal experiences, to explore career options in aerospace science and industry, and to become informed, contributing citizens by becoming science-literate.

The following facilities and services are offered by the CAE:

- Aerospace Exploration Lab
- Hokulani Imaginarium
- NASA Flight Training Aerospace Education Laboratory
- Lanihuli Observatory
- Hawai'i Space Grant–Windward

The CAE serves over 12,000 visitors annually through these facilities. It also sponsors teacher workshops and offers consultation to students and teachers on aerospace education and science projects.

The goals of the CAE are to:

- generate greater interest in careers in science and help facilitate the successful transition of students from high school to post-secondary institutions; and,
- increase the number of underserved students entering college who choose to major in science, technology, engineering and mathematics (STEM) and have the skills necessary to successfully complete their higher education. help students develop high-tech skills to succeed in a knowledge-based global economy;
- increase enrollment and success of K-12 students in science, mathematics and technology courses in high schools;
- help students develop high-tech skills to succeed in a knowledge-based global economy;

For more information, http://aerospace.wcc.hawaii.edu

Appendix B:

National Association of Rocketry High Power Rocket Safety Code

Certification. I will only fly high power rockets or possess high power rocket motors that are within the scope of my user certification and required licensing.

Materials. I will use only lightweight materials such as paper, wood, rubber, plastic, fiberglass, or when necessary ductile metal, for the construction of my rocket.

Motors. I will use only certified, commercially made rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer. I will not allow smoking, open flames, nor heat sources within 25 feet of these motors.

Ignition System. I will launch my rockets with an electrical launch system, and with electrical motor igniters that are installed in the motor only after my rocket is at the launch pad or in a designated prepping area. My launch system will have a safety interlock that is in series with the launch switch that is not installed until my rocket is ready for launch, and will use a launch switch that returns to the "off" position when released. If my rocket has onboard ignition systems for motors or recovery devices, these will have safety interlocks that interrupt the current path until the rocket is at the launch pad.

Misfires. If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.

Launch Safety. I will use a 5-second countdown before launch. I will ensure that no person is closer to the launch pad than allowed by the accompanying Minimum Distance Table, and that a means is available to warn participants and spectators in the event of a problem. I will check the stability of my rocket before flight and will not fly it if it cannot be determined to be stable.

Launcher. I will launch my rocket from a stable device that provides rigid guidance until the rocket has attained a speed that ensures a stable flight, and that is pointed to within 20 degrees of vertical. If the wind speed exceeds 5 miles per hour I will use a launcher length that permits the rocket to attain a safe velocity before separation from the launcher. I will use a blast deflector to prevent the motor's exhaust from hitting the ground. I will ensure that dry grass is cleared around each launch pad in accordance with the accompanying Minimum Distance table, and will increase this distance by a factor of 1.5 if the rocket motor being launched uses titanium sponge in the propellant.

Size. My rocket will not contain any combination of motors that total more than 40,960 N-sec (9208 pound-seconds) of total impulse. My rocket will not weigh more at liftoff than one-third of the certified average thrust of the high power rocket motor(s) intended to be ignited at launch.

Flight Safety. I will not launch my rocket at targets, into clouds, near airplanes, nor on trajectories that take it directly over the heads of spectators or beyond the boundaries of the launch site, and will not put any flammable or explosive payload in my rocket. I will not launch my rockets if wind speeds exceed 20 miles per hour. I will comply with Federal Aviation Administration airspace regulations when flying, and will ensure that my rocket will not exceed any applicable altitude limit in effect at that launch site.

Launch Site. I will launch my rocket outdoors, in an open area where trees, power lines, buildings, and persons not involved in the launch do not present a hazard, and that is at least as large on its smallest dimension as one-half of the maximum altitude to which rockets are allowed to be flown at that site or 1500 feet, whichever is greater.

Launcher Location. My launcher will be 1500 feet from any inhabited building or from any public highway on which traffic flow exceeds 10 vehicles per hour, not including traffic flow related to the launch. It will also be no closer than the appropriate Minimum Personnel Distance from the accompanying table from any boundary of the launch site.

Recovery System. I will use a recovery system such as a parachute in my rocket so that all parts of my rocket return safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.

Recovery Safety. I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places, fly it under conditions where it is likely to recover in spectator areas or outside the launch site, nor attempt to catch it as it approaches the ground.

Revision of July 2008

Appendix C:

Tripoli Rocketry Association Safety Code

The following is a condensed version of the TRIPOLI HIGH POWER SAFETY CODE. The complete code can be found in the TRIPOLI handbook.

The Tripoli High Power Safety Code is based on NFPA 1127. You may view the current version of NFPA 1127 on the NFPA Website.

Only a person who is a certified flyer shall operate or fly a high power rocket.

Must comply with United States Code 1348, "Airspace Control and Facilities", Federal Aviation Act of 1958 and other applicable federal, state, and local laws, rules, regulations, statutes, and ordinances.

A person shall fly a high power rocket only if it has been inspected and approved for flight by a Safety Monitor for compliance with the applicable provisions of this code.

Motors

Use only certified commercially made rocket motors.

Do not dismantle, reload, or alter a disposable or expendable high power rocket motor, not alter the components of a reloadable high power rocket motor or use the contents of a reloadable rocket motor reloading kit for a purpose other than that specified by the manufacture in the rocket motor or reloading kit instructions.

A high power rocket shall be constructed to withstand the operating stresses and retain structural integrity under conditions expected or known to be encountered in flight.

A high power rocket vehicle intended to be propelled by one or more high power solid propellant rocket motor(s) shall be constructed using lightweight materials such as paper, wood, plastic, fiberglass, or, when necessary, ductile metal so that the rocket conforms to the other requirements of this code.

A person intending to operate a high power rocket shall determine its stability before flight, providing documentation of the location of the center of pressure and center of gravity of the high power rocket to the Safety Monitor, if requested.

Weight and Power Limits.

Ensure that the rocket weighs less than the rocket motor manufacturer's recommended maximum liftoff weight for the rocket motor(s) used for the flight. During pre-flight inspection, The Safety Monitor may request documentary proof of compliance.

Do not install a rocket motor or combination of rocket motors that will produce more than 40,960 newton-seconds of total impulse (4.448 newtons equals 1.0 pound).

Recovery.

Fly a high power rocket only if it contains a recovery system that will return all parts of it safely to the ground so that it may be flown again.

Install only flame resistant recovery wadding if wadding is required by the design of the rocket.

Do not attempt to catch a high power rocket as it approaches the ground.

Do not attempt to retrieve a high power rocket from a place that is hazardous to people.

Payloads

Do not install or incorporate in a high power rocket a payload that is intended to be flammable, explosive, or cause harm.

Do not fly a vertebrate animal in a high power rocker.

Launching Devices

Launch from a stable device that provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path.

Incorporate a jet deflector device if necessary to prevent the rocket motor exhaust from impinging directly on flammable materials.

A launching device shall not be capable of launching a rocket at an angle more than 20 degrees from vertical.

Place the end of the launch rod or rail above eye level or cap it to prevent accidental eye injury. Store the launch rod or rail so it is capped, cased, or left in a condition where it cannot cause injury.

Ignition Systems

Use an ignition system that is remotely controlled, electrically operated, and contains a launching switch that will return to "off" when released.

The ignition system shall contain a removable safety interlock device in series with the launch switch.

The launch system and igniter combination shall be designed, installed, and operated so the liftoff of the rocket shall occur within three (3) seconds of actuation of the launch system. If the rocket is propelled by a cluster of rocket motors designed to be ignited simultaneously, install an ignition scheme that has either been previously tested or has a demonstrated capability of igniting all rocket motors intended for launch ignition within one second following ignition system activation.

Install an ignition device in a high power rocket motor only at the launch site and at the last practical moment before the rocket is placed on the launcher.

Launch Site.

Launch a high power rocket only in an outdoor area where tall trees, power lines, and buildings will not present a hazard to the safe flight operation of a high power rocket in the opinion of the Safety Monitor.

Do not locate a launcher closer to the edge of the flying field (launch site) than one-half the radius of the minimum launch site dimension.

The flying field (launch site) shall be at least as large as the stated in Table 1. *or* Not less than one-half the maximum altitude expected, calculated, or simulated, or as granted by an FAA waiver or the authority having jurisdiction.

Launcher Location

Locate the launcher more than 1,500 feet from any occupied building.

Ensure that the ground for a radius of 10 feet around the launcher is clear of brown grass, dry weeds, or other easy-to-burn materials that could be ignited during launch by the exhaust of the rocket motor.

Safe Distances

No person shall be closer to the launch of a high power rocket than the person actually launching the rocket and those authorized by the Safety Monitor.

All spectators shall remain within an area determined by the Safety Monitor and behind the Safety Monitor and the person launching the rocket.

A person shall not be closer to the launch of a high power rocket than the applicable minimum safe distance set forth in Table 2.

Launch Operations.

Do not ignite and launch a high power rocket horizontally, at a target, or so the rocket's flight path goes into clouds or beyond the boundaries of the flying field (launch site).

Do not launch a high power rocket if the surface wind at the launcher is more than twenty (20) miles per hour.

Do not operate a high power rocket in a manner that is hazardous to aircraft.

Launch Control.

Launch a high power rocket only with the immediate knowledge, permission, and attention of the Safety Monitor.

All persons in the launching, spectator, and parking areas during a countdown and launch shall be standing and facing the launcher if requested to do so by the Safety Monitor.

Precede the launch with a five (5) second countdown audible throughout the launching, spectator, and parking areas. This countdown shall be given by the person launching the rocket, the Safety Monitor, or other flying site operating personnel.

Do not approach a high power rocket that has misfired until the safety inter-lock has been removed or the battery has been disconnected from the ignition system, one minute has passed, and the Safety Monitor has given permission for only a single person to approach the misfired rocket to inspect it.

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Distance (feet)	Equivalent Distance (miles)
160.01 - 320.00	H	1,500	.28
320.01 - 640.00	I	2,500	.50
640.01 - 1280.00	J	5,280	1.00
1280.01 - 2560.00	K	5,280	1.00
2560.01 - 5120.00	L	10,560	2.00
5120.01 - 10240.00	M	15,480	3.00
10240.01 - 20480.00	N	21,120	4.00
20480.01 - 40960.00	O	26,400	5.00

TABLE 1: LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Safe Distance (feet)	Complex Minimum Safe Distance (feet)
160.01 - 320.00	H	50	100
320.01 - 640.00	I	100	200
640.01 - 1280.00	J	100	200
1280.01 - 2560.00	K	200	300
2560.01 - 5120.00	L	300	500
5120.01 - 10240.00	M	500	1,000
10240.01 - 20480.00	N	1,000	1,500
20480.01 - 40960.00	O	1,500	2,000

TABLE 2: SAFE DISTANCE

Appendix D:

Additional Safety Regulations

Additional Safety Regulations may be found on the following Websites:

Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C:

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=14:2.0.1.3.10&idno=14#14:2.0.1.3.10.3

Code of Federal Regulation Part 55:

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=03c9459678c94e51c2fae38c3346cf93&rgn=div5&view=text&node=40:5.0.1.1.3&idno=40

NFPA 1127:

http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1127

Appendix E:

Material Safety Data Sheets

BUEHLER LTD -- 20-3100 PHENOLIC POWDER-BLACK -- 9330-00-166-0250
========== Product Identification ==========

Product ID:20-3100 PHENOLIC POWDER-BLACK
MSDS Date:01/01/1985
FSC:9330
NIIN:00-166-0250
MSDS Number: BDDZJ
=== Responsible Party ===
Company Name:BUEHLER LTD
Address:41 WAUKEGAN RD
Box:1
City:LAKE BLUFF
State:IL
ZIP:60044-1687
Country:US
CAGE:09410
=== Contractor Identification ===
Company Name:BUEHLER LTD.
Address:41 WAUKEGAN RD.
Box:City:LAKE BLUFF
State:IL
ZIP:60044-1687
Country:US
Phone:847-295-8500
CAGE:09410

========== Composition/Information on Ingredients ==========

Ingred Name:PHENOL
CAS:108-95-2
RTECS #:SJ3325000
Fraction by Wt: 3%
OSHA PEL:S, 5 PPM
ACGIH TLV:S, 5 PPM; 8990
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:NON HAZARDOUS INGREDIENTS (AS SPECIFIED BY MFR)
Fraction by Wt: 97%

========== Hazards Identification ==========

Effects of Overexposure:NONE SPECIFIED BY MFR.POSS.SKIN,EYE,RESPIRATORY IRRIT DUE TO DUST

========== First Aid Measures ==========

First Aid:SKIN:WASH W/SOAP & WATER.EYES:FLUSH W/WATER FOR 15 MIN. AVOID
INGESTION.CONSULT A DR.

========== Fire Fighting Measures ==========

Extinguishing Media:DRY CHEMICAL,WATER,CARBON DIOXIDE
Fire Fighting Procedures:SELF CONT BREATHING GEAR IN ENCLOSED AREA
Unusual Fire/Explosion Hazard:AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES-DUST/AIR MIXTURES ARE EXPLOSIVE

========== Accidental Release Measures ==========

Spill Release Procedures:VACUUM OR SWEEP WITH SAWDUST,SAND OR SWEEPING
COMPOUND.AVOID GENERATING DUST.

========== Handling and Storage ==========

Handling and Storage Precautions:AVOID TEMP EXTREMES & MOISTURE-CAN AFFECT PRODUCT PERFORMANCE.AVOID PROLONGED OR REPEATED SKIN & EYE
CONTACT OR BREATHING OF VAPORS.
Other Precautions:USE ADEQUATE VENTILATION.USE GOOD PERSONAL HYGIENE.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH APPROVED RESPIRATORS RECOMMENDED FOR NUISANCE DUST
Ventilation:LOCAL RECOMMENDED TO REMOVE DUST & FUMES
Protective Gloves:RECOMMENDED
Eye Protection:SAFETY GLASSES
Other Protective Equipment:AS NECESSARY FOR GOOD HYGIENE & CLEAN WORK ENVIRONMENT.
Supplemental Safety and Health
EXPLOSVIE LIMITS (AS POWDER) EQUALS 0.030 OZ/CU FT.

========== Physical/Chemical Properties ==========

HCC:T3
NRC/State Lic Num:EXPLOSIVE LIMIT
Boiling Pt:B.P. Text:NONE
Solubility in Water:NEGLIGIBLE
Appearance and Odor:GRANULAR-SLIGHT PHENOLIC ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE SPECIFIED BY MFR
Hazardous Decomposition
Products:CO*2,CO,PHENOLS,AMMONIA,FORMALDEHYDE

========== Disposal Considerations ==========

Waste Disposal Methods:BURY OR INCINERATE IN ACCORDANCE WITH LOCAL,STATE OR FEDERAL REGS.

Disclaimer (provided with this information by the compiling agencies):
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CHEMRAY COATING CORP -- VARNISH, SPAR, PHENOLIC RESIN -- 8010-00-251-6980
========== Product Identification ==========

Product ID:VARNISH, SPAR, PHENOLIC RESIN
MSDS Date:10/27/1989
FSC:8010
NIIN:00-251-6980
MSDS Number: BHVZW
=== Responsible Party ===
Company Name:CHEMRAY COATING CORP
Address:209 N MICHIGAN AVE
City:KENILWORTH
State:NJ
ZIP:07033
Country:US
Info Phone Num:201-245-1111
Emergency Phone Num:800-424-9300 (CHEMTREC)
Preparer's Name:FRED ARMSTRONG
CAGE:33832
=== Contractor Identification ===
Company Name:CHEMRAY COATING CORP
Address:209 N MICHIGAN AVE
Box:City:KENILWORTH
State:NJ
ZIP:07033
Country:US
Phone:201-245-1111
CAGE:33832

========== Composition/Information on Ingredients ==========

Ingred Name:STODDARD SOLVENT
CAS:8052-41-3
RTECS #:WJ8925000
Fraction by Wt: 41%
OSHA PEL:500 PPM
ACGIH TLV:100 PPM; 9293

Ingred Name:VOC=3.07 LBS/GAL OR 368 GRAMS/LITER
RTECS #:9999999VO

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Health Hazards Acute and Chronic:OVEREXPOSURE-NAUSEA, HEADACHE,

DIZZINESS CAUSED BY OVER INHALATION. HIGH VAPOR CONCENTRATIONS (>1000 PPM) ARE IRRITATING TO THE EYES AND RESPIRATORY TRACT, ARE ANESTHETIC, AND MAY HAVE OTHER CENTRAL N ERVOUS SYSTEM EFFECTS.
Effects of Overexposure:OVEREXPOSURE-NAUSEA, HEADACHE, DIZZINESS CAUSED BY OVER INHALATION. HIGH VAPOR CONCENTRATIONS (>1000 PPM) ARE IRRITATING TO THE EYES AND RESPIRATORY TRACT, ARE ANESTHETIC, AND MAY HAVE OTHER CENTRAL N ERVOUS SYSTEM EFFECTS.
Medical Cond Aggravated by Exposure:NONE GENERALLY KNOWN.

========== First Aid Measures ==========

First Aid:EYE CONTACT: FLUSH WITH WATER 15 MINUTES OR UNTIL IRRITATION SUBSIDES. IF IRRITATION PERSISTS, CALL PHYSICIAN. SKIN CONTACT: REMOVE CONTAMINATED CLOTHING AND WASH THOROUGHLY WITH SOAP AND WATER. INHAL ATION: IF OVERCOME BY VAPORS. REMOVE TOFRESH AIR, CALL PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING, CALL PHYSICIAN.

========== Fire Fighting Measures ==========

Flash Point Method:SCC
Flash Point:103 F/40 C
Autoignition Temp:Autoignition Temp Text:473 F
Lower Limits:0.9
Upper Limits:7
Extinguishing Media:CARBON DIOXIDE, FOAM, WATER FOG OR DRY CHEMICAL.
Fire Fighting Procedures:USE AIR SUPPLIED BREATHING EQUIPMENT. COOL ENCLOSED CONTINERS WITH WATER SPRAY. AVOID BREATHING VAPORS OR FUMES. .
Unusual Fire/Explosion Hazard:IF LEAK OR SPILL HAS IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS FROM FIRE FIGHTERS.

========== Accidental Release Measures ==========

Spill Release Procedures:REMOVE ALL IGNITION SOURCES. KEEP FROM HEAT, SPARKS AND OPEN FLAME. ADD ABSORBENT (SAND, EARTH, SAWDUST) TO SPILL. VENTILATE AREA (OPEN WINDOWS, DOORS). LARGE SPILL: KEEP FROM ENTERING SEWERS/WATERCOU RSES BY DIKING. ADVISE AUTHORITIES IF DOES ENTER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE AWAY FROM IGNITION SOURCES, KEEP IN COOL, DRY, WELL VENTILATED AREAS. AVOID DIRECT SUNLIGHT AND EXTREME TEMPERATURES, HOT OR COLD.
Other Precautions:AVOID EYE, SKIN CONTACT, INHALATION &/OR INGESTION OF MISTS, SPRAY OR VAPORS. AVOID BREATHING SANDING OR BLASTING DUST.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:USE HYDROCARBON VAPOR CANISTER OR SUPPLIED AIR RESPIRATOR IN CONFINED AREAS.
Ventilation:LOCAL EXHAUST: FACE VELOCITY 60FPM. SPECIAL: USE ONLY W/ADEQUATE VENTILATION. MECHANICAL: USE EXPLOSION PROOF EQUIPMENT.
Protective Gloves:CHEMICAL RESISTANT.
Eye Protection:SPLASH GOGGLES OR FACE SHIELD.
Other Protective Equipment:USE CHEMICAL RESISTANT APRON OR CLOTHING.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:308F,153C
Melt/Freeze Pt:M.P/F.P Text:O F(-17.8C)
Decomp Temp:Decomp Text:600 F(316C)
Vapor Pres:<10 @ 68 F
Vapor Density:4.8 @ 77 F
Spec Gravity:.90 (H2O=1)
Viscosity:C-F@77F G.H.
Evaporation Rate & Reference:0.09 (BUTYL ACETATE=1)
Solubility in Water:NEGLIGIBLE
Appearance and Odor:CLEAR CARAMEL LIQUID WITH SOLVENT ODOR.
Percent Volatiles by Volume:47.7

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
CAN REACT WITH OXIDIZING MATERIAL WHEN HEATED TO DECOMPOSITION.
Stability Condition to Avoid:HIGH TEMPERATURES.
Hazardous Decomposition Products:CARBON MONOXIDE.

========== Disposal Considerations ==========

Waste Disposal Methods:ASSURE CONFORMITY WITH APPLICABLE DISPOSAL

REGULATIONS. DISPOSE OF ABSORBED MATERIAL AT AN APPROVED DISPOSAL
SITE OR FACILITY. DISPOSE IN CONFORMITY WITH STATE AND FEDERAL REGULATIONS.

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AeroTech Division, RCS Rocket Motor Components, Inc.

Material Safety Data Sheet & Emergency Response Information

Prepared in accordance with 29 CFR § 1910.1200 (g)

Section 1. Product Identification

Copperhead™ igniter, FirstFire™ igniter, FirstFire Jr.™ igniter. These products contain varying percentages of Ammonium or Potassium Perchlorate, carbon black and carbon fibers dispersed in a flammable binder with lesser amounts of proprietary ingredients such as burn rate modifiers and a metal fuel.

Section 2. Physical Characteristics

Narrow copper foil strips or yellow wires coated with a small amount of black igniter composition on one end, little or no odor

Section 3. Physical Hazards

Igniters are flammable and may give off varying amounts of Hydrogen Chloride and Carbon Monoxide gas, soot and carbon fibers when burned.

Section 4. Health Hazards

Igniter coating may be hazardous in the case of ingestion, and may be toxic to kidneys, lungs and the nervous system. Symptoms may include respiratory irritation, skin irritation, muscle tightness, vomiting, diarrhea, abdominal pain, muscular tremors, weakness, labored breathing, irregular heartbeat, convulsions. Inhalation of large amounts of combustion products may produce similar but lesser symptoms as ingestion.

Section 5. Primary Routes of Entry

Ingestion, inhalation.

Section 6. Permitted Exposure Limits

None established for manufactured product.

Section 7. Carcinogenic Potential

None known.

Section 8. Precautions for Safe Handling

Keep away from flames and other sources of heat. Do not smoke within 25 feet of product. Do not ingest. Do not breathe combustion products. Keep in original packaging until ready for use.

Section 9. Control Measures

See section 8.

Section 10. Emergency & First Aid Procedures

If ingested, induce vomiting and call a physician. If combustion products are inhaled, move to fresh air and call a physician if ill effects are noted. For mild burns use a first aid burn ointment. For severe burns immerse the burned area in cold water at once and see a physician immediately.

Section 11. Date of Preparation or Revision

October 12, 2008

Section 12. Contact Information

AeroTech Division, RCS Rocket Motor Components, Inc.
2113 W. 850 N. St.
Cedar City, UT 84721
(435) 865-7100 (Ph)
(435) 865-7120 (Fax)
Email: customerservice@aerotech-rocketry.com
Web: http://www.aerotech-rocketry.com
Emergency Response: (800) 535-5053 (US), (352) 323-3500 (Int'l)

AeroTech Division, RCS Rocket Motor Components, Inc.

Material Safety Data Sheet & Emergency Response Information

Prepared in accordance with 29 CFR § 1910.1200 (g)

Section 1. Product Identification

Model rocket motor, high power rocket motor, hobby rocket motor, composite rocket motor, rocket motor kit, rocket motor reloading kit, containing varying amounts of solid propellant with the trade names White Lightning™, Blue Thunder™, Black Jack™, Black Max™, Redline™, Warp-9™ or Mojave Green™. These products contain varying percentages of Ammonium Perchlorate, Strontium and/or Barium Nitrate dispersed in synthetic rubber with lesser amounts of proprietary ingredients such as burn rate modifiers and metal fuels. Rocket motor ejection charges contain black powder.

Section 2. Physical Characteristics

Black plastic cylinders or bags with various colored parts, little or no odor

Section 3. Physical Hazards

Rocket motors and reload kits are flammable, rocket motors may become propulsive in a fire. All propellants give off varying amounts of Hydrogen Chloride and Carbon Monoxide gas when burned, Mojave Green propellant also produces Barium Chloride.

Section 4. Health Hazards

Propellant is an irritant in the case of skin and eye contact, may be extremely hazardous in the case of ingestion, and may be toxic to kidneys, lungs and the nervous system. Symptoms include respiratory irritation, skin irritation, muscle tightness, vomiting, diarrhea, abdominal pain, muscular tremors, weakness, labored breathing, irregular heartbeat, convulsions. Inhalation of large amounts of combustion products may produce similar but lesser symptoms as ingestion.

Section 5. Primary Routes of Entry

Skin contact, ingestion, inhalation.
Section 6. Permitted Exposure Limits

None established for manufactured product.

Section 7. Carcinogenic Potential

None known.

Section 8. Precautions for Safe Handling

Disposable rubber gloves are recommended for handling Mojave Green propellant. Keep away from flames and other sources of heat. Do not smoke within 25 feet of product. Do not ingest. Do not breathe exhaust fumes. Keep in original packaging until ready for use.

Section 9. Control Measures

See section 8.

Section 10. Emergency & First Aid Procedures

If ingested, induce vomiting and call a physician. If combustion products are inhaled, move to fresh air and call a physician if ill effects are noted. In the case of skin contact, wash area immediately and contact a physician if severe skin rash or irritation develops. For mild burns use a first aid burn ointment. For severe burns immerse the burned area in cold water at once and see a physician immediately.

Section 11. Date of Preparation or Revision

October 11, 2008

Section 12. Contact Information

AeroTech Division, RCS Rocket Motor Components, Inc.
2113 W. 850 N. St.
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(435) 865-7100 (Ph)
(435) 865-7120 (Fax)
Email: customerservice@aerotech-rocketry.com
Web: http://www.aerotech-rocketry.com
Emergency Response: (800) 535-5053 (US), (352) 323-3500 (Int'l)

EMS CATALOG NO: 13000
EMS PRODUCT: DER 736 Epoxy Resin
DATE: 03/06/96
PAGE NUMBER: One of 5

MATERIAL SAFETY DATA SHEET

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

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ELECTRON MICROSCOPY SCIENCES
321 MORRIS ROAD
P.O. BOX 251
FORT WASHINGTON, PA 19034 24 HOUR EMERGENCY PHONE NUMBER
(215) 646-1566 CHEMTREC: (800) 424-9300

FOR PRODUCT AND SALES INFORMATION

CONTACT ELECTRON MICROSCOPY SCIENCES OFFICE ABOVE.

PRODUCT IDENTIFICATION

PRODUCT NAME: D.E.R.(R) 736 Epoxy Resin

INGREDIENTS: Epichlorohydrin-polyglycol reaction product

(% w/, unless otherwise noted)

CAS NUMBER: 041638-13-5

PERCENT: 100

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

PHYSICAL DATA

BOILING POINT: Greater than 225oC at 760 mm Hg
VAPOR PRESSURE: 5.6 mm Hg at 20oC
VAPOR DENSITY: Not applicable
SOLUBILITY IN WATER: 11.0 wt.%
SPECIFIC GRAVITY: 1.14
VISCOSITY: 30-60 cps at 25oC
APPEARANCE: Near water white liquid
ODOR: Slight ethereal.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 320oF

METHOD USED: PMCC, ASTM D-93

FLAMMABLE LIMITS: LFL: Not determined
UFL: Not determined
EXTINGUISHING MEDIA:

Foam, CO2, dry chemical, alcohol-resistant foam

FIRE AND EXPLOSION HAZARDS: None known

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained breathing apparatus.

REACTIVITY DATA

STABILITY (CONDITIONS TO AVOID):

None; but for maximum product life do not exceed 55oC (131oF) during storage.

INCOMPATIBILITY (SPECIFIC MATERIALS TO AVOID):

Base or strong acid, amines and oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS:

The by-products expected in incomplete pyrolysis or combustion of epoxy resins are mainly phenolics, carbon monoxide, hydrogen chloride, and water. The thermal decomposition products of epoxy resins therefore should be treated as potentially hazardous substances, and appropriate precautions should be taken.

HAZARDOUS POLYMERIZATION:

Will not occur by itself, but masses of more than 1 pound of product plus an aliphatic amine will cause irreversible polymerization with considerable heat buildup.

ENVIRONMENTAL AND DISPOSAL INFORMATION

ACTION TO TAKE FOR SPILLS/LEAKS:

Soak up in absorbent material such as sand and collect in suitable containers. Residual resin may be removed using steam or hot soapy water. Solvents are not recommended for cleanup unless the recommended exposure guidelines and safe handling practices for the specific solvent are followed. Consult appropriate solvent MSDS for handling information and exposure guidelines. Keep spark producing equipment away. For large spills, evacuate upwind of spills and contain with dike.

DISPOSAL METHOD:

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. For unused or uncontaminated material, the preferred disposal options are to send to a licensed recycler, reclaimer, or incinerator. For used or contaminated material, the preferred disposal options remain the same, although additional evaluation is required (see, for example, 40 CFR, Part 261, "Identification and Listing of Hazardous waste.") Any disposal practice must be

in compliance with Federal, State, Provincial, and Local laws and regulations.

HEALTH HAZARD DATA

EYE: May cause moderate irritation with corneal injury.

SKIN CONTACT:

Short single exposure not likely to cause significant skin irritation. Prolonged exposure may cause skin irritation. Repeated exposure may cause skin burns. May cause more severe response if confined to skin or skin is abraded (scratched or cut). May cause allergic skin reaction in susceptible individuals.

SKIN ABSORPTION:

A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The LD50 for skin absorption in rabbits is >2000mg/kg.

INGESTION:

Single dose oral toxicity is low. The oral LD50 for rats is >2000 mg/kg. Amounts ingested incidental to normal handling operations are not likely to cause injury; swallowing larger amounts may cause injury.

INHALATION:

Elevated temperatures may generate vapor levels sufficient to cause irritation and other effects.

MUTAGENICITY (EFFECTS ON GENETIC MATERIAL):

Results of in vitro ("test tube") mutagenicity tests have been positive.

FIRST AID

EYES: Irrigate immediately with water for at least 15 minutes.

SKIN: Wash off in flowing water or shower.

INGESTION:

Induce vomiting if large amounts are ingested. Consult medical personnel.

INHALATION:

Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN:

If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgement of the physician in response to reactions of the patient.

HANDLING PRECAUTIONS

EXPOSURE GUIDELINE(S): None established.

VENTILATION:

Good general ventilation should be sufficient for most conditions.

RESPIRATORY PROTECTION:

No respiratory protection should be needed. If respiratory irritation is experienced, use an approved air-purifying respirator.

SKIN PROTECTION:

For brief contact, no precautions other than clean body-covering clothing should be needed. When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron or full-body suit will depend on operation.

EYE PROTECTION:

Use safety glasses. Where contact with this material is likely, chemical goggles are recommended because eye contact may cause pain even though it is unlikely to cause injury.

ADDITIONAL INFORMATION

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

None except normal handling care. Practice good caution and personal cleanliness to avoid eye and skin contact. Avoid breathing vapors if generated.

ITW DEVCON CORP -- 5-MINUTE EPOXY RESIN -- 8040-00-264-6816
========== Product Identification ==========

Product ID:5-MINUTE EPOXY RESIN
MSDS Date:12/14/1989
FSC:8040
NIIN:00-264-6816
MSDS Number: BLJGZ
=== Responsible Party ===
Company Name:ITW DEVCON CORP
Address:30 ENDICOTT ST
City:DANVERS
State:MA
ZIP:01923
Country:US
Info Phone Num:508-777-1100
Emergency Phone Num:800-424-9300 CHEMTREC
CAGE:EO352
=== Contractor Identification ===
Company Name:DEVCON CORP
Address:30 ENDICOTT ST
Box:City:DANVERS
State:MA
ZIP:01923-3753
Country:US
Phone:1-508-777-1100
CAGE:16059
Company Name:ITW DEVCON CORP
Address:30 ENDICOTT ST
City:DANVERS
State:MA
ZIP:01923
Country:US
Phone:508-777-1100
CAGE:EO352

========== Composition/Information on Ingredients ==========

Ingred Name:BISPHENOL A DIGLYCIDYL ETHER RESIN (POTENTIAL SKIN SENSITIZER)
CAS:25068-38-6
RTECS #:KD4380000
Fraction by Wt: >60%
Other REC Limits:NONE SPECIFIED

Ingred Name:VOC: 0 LBS/GAL (EPA REFERENCE METHOD 24)

RTECS #:9999999VO
Other REC Limits:NONE SPECIFIED

========== Hazards Identification ==========

LD50 LC50 Mixture:ORAL LD50 RAT: 11,400 MG/KG; DERM LD50 *
Routes of Entry: Inhalation:NO Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:PROLONGED OR REPEATED SKIN CONTACT MAY
CAUSE SENSITIZATION WITH ITCHING, SWELLING OR RASHES ON LATER EXPOSURE.
Explanation of Carcinogenicity:*RABB: >20,000 MG/KG; INHALATION LC50
RAT: NO DEATHS IN SATURATED AIR; EXPOSURE TIME: 8 HRS.
Effects of Overexposure:EYES: MILD IRRITATION. SKIN: MILD IRRITATION.
INHALATION. THE LOW VAPOR PRESSURE OF THE RESIN MAKES INHALATION
UNLIKELY IN NORMAL USE. INGESTION: ACUTE ORAL TOXICITY IS LOW. MAY CAUSE GASTRIC DISTRESS .
Medical Cond Aggravated by Exposure:ALLERGIES, ECZEMA OR OTHER SKIN DISORDERS.

========== First Aid Measures ==========

First Aid:EYES: FLUSH W/CLEAN WATER-15 MIN. WHILE GENTLY HOLDING EYELIDS OPEN. GET IMMED MEDICAL ATTENTION. SKIN: WASH THOROUGHLY
W/SOAP & WARM WATER. CONSULT PHYSICIAN IF IRRIT DEVELOPS. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING IS DIFFICULT. GET MEDICAL ATTENTION IF SYMPTOMS PERSIST. INGESTION: DO
NOT INDUCE VOMITING. GIVE 2 GLASSES WATER TO DILUTE (UNLESS UNCONSCIOUS). GET MEDICAL ATTEN.

========== Fire Fighting Measures ==========

Flash Point Method:PMCC
Flash Point:>400F,>204C
Lower Limits:N/D
Upper Limits:N/D
Extinguishing Media:CO2, DRY CHEMICAL, FOAM.
Fire Fighting Procedures:FIREFIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.
Unusual Fire/Explosion Hazard:NONE

========== Accidental Release Measures ==========

Spill Release Procedures:PREVENT SKIN AND EYE CONTACT. LARGE SPILLS MAY
BE ABSORBED ON INERT MATERIAL SUCH AS SAND OR VERMICULITE.
SCRAPE
SPILL UP INTO NONPOROUS CONTAINERS. CLEAN SPILL AREA WITH
STRONG
DETERGENT AND WATER; U SE SOLVENTS ONLY WITH APPROPRIATE
CAUTION.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN A COOL, DRY PLACE. HANDLE
MIXED RESIN & HARDENER IN ACCORDANCE W/POTENTIAL HAZARD OF THE
CURING AGENT USED. DISCARD CONTAM LEATHER ARTICLES.
Other Precautions:REMOVE CONTAMINATED CLOTHING AND PROTECTIVE GEAR;
CLEAN THOROUGHLY BEFORE USING AGAIN. IF CURED MATERIAL IS
SANDED OR
MACHINED, USE ADEQUATE PRECAUTIONS AGAINST NUISANCE
PARTICULATES.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE REQUIRED AT NORMAL HANDLING TEMPERATURES.
Ventilation:LOCAL EXHAUST IS RECOMMENDED FOR CONFINED AREAS.
GENERAL
MECHANICAL VENTILATION IS ADEQUATE FOR NORMAL USE.
Protective Gloves:IMPERVIOUS GLOVES.
Eye Protection:SAFETY GLASSES WITH SIDE SHIELDS.
Other Protective Equipment:OTHER GEAR AS REQUIRED.
Work Hygienic Practices:WASH THOROUGHLY AFTER USING, PARTICULARLY
BEFORE EATING OR SMOKING.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

HCC:N1
Boiling Pt:B.P. Text:N/D
Melt/Freeze Pt:M.P/F.P Text:N/D
Vapor Pres:NIL @ 70 F
Vapor Density:>1
Spec Gravity:1.2
pH:7 (5%)
Evaporation Rate & Reference:<<1 (BUAC = 1)
Solubility in Water:NIL
Appearance and Odor:THICK, AMBER LIQUID WITH LITTLE ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG ACIDS AND STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:OPEN FLAME AND EXTREME HEAT.
Hazardous Decomposition Products:OXIDES OF CARBON, ALDEHYDES AND ACIDS FROM INCOMPLETE COMBUSTION.
Conditions to Avoid Polymerization:HEAT IS GENERATED WHEN THIS RESIN IS MIXED WITH AMINES OR EPOXY HARDENERS; BE CAREFUL WHEN MIXING.

========== Disposal Considerations ==========

Waste Disposal Methods:REMOVE TO A WASTE FACILITY OPERATING IN COMPLIANCE WITH STATE AND LOCAL REGULATIONS.

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SPECIALTY COMPOUNDS INC -- SINMAST 4 EPOXY MORTAR MIX - NORMAL CURE -- 5610-00N078857
========== Product Identification ==========

Product ID:SINMAST 4 EPOXY MORTAR MIX - NORMAL CURE
MSDS Date:08/01/1995
FSC:5610
NIIN:00N078857
MSDS Number: CGGQS
=== Responsible Party ===
Company Name:SPECIALTY COMPOUNDS INC
Address:3300 EAST 84TH PLACE
City:MERRILVILLE
State:IN
ZIP:46410
Country:US
Info Phone Num:219-947-1070
Emergency Phone Num:800-255-3924
CAGE:7T163
=== Contractor Identification ===
Company Name:SPECIALTY COMPOUNDS INC
Address:3300 E 84TH PL
Box:City:MERRILLVILLE
State:IN
ZIP:46410-6551
Country:US
Phone:219-947-1070
CAGE:7T163

========== Composition/Information on Ingredients ==========

Ingred Name:COMPONENT "A" (CONSISTING OF INGREDIENTS 2 & 3)
RTECS #:9999999ZZ
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:BISPHENOL A-EPICHLOROHYDRIN COPOLYMER; (BISPHENOL A EPICHLOROHYDRIN EPOXY RESIN)
CAS:25068-38-6
RTECS #:SL6475000
Fraction by Wt: 90%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:PROPANE, 1-BUTOXY-2,3-EPOXY-; (BUTYL GLYCIDYL ETHER) (BGE)
CAS:2426-08-6

RTECS #:TX4200000
Fraction by Wt: 10%
OSHA PEL:50 PPM
ACGIH TLV:25 PPM

Ingred Name:COMPONENT "B" (CONSISTING OF INGREDIENTS 5 - 8)
RTECS #:9999999ZZ
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:TOFA REACT WITH TEPA
CAS:68953-36-6
Fraction by Wt: 55%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:DIETHYLENETRIAMINE
CAS:111-40-0
RTECS #:IE1225000
Fraction by Wt: 15%
OSHA PEL:1 PPM
ACGIH TLV:1 PPM, S

Ingred Name:1,2-ETHANEDIAMINE, N-(2-AMINOETHYL)-N'-(2-
((2-AMINOETHYL)AMINO)ETHYL)-; (TETRAETHYLENEPENTAMINE)
CAS:112-57-2
RTECS #:KH8585000
Fraction by Wt: 15%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:PHENOL, 4,4'-ISOPROPYLENEDI-; (BISPHENOL A) (SARA 313)
CAS:80-05-7
RTECS #:SL6300000
Fraction by Wt: 10%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:SUPP DATA:WHEN PRODUCT COMES IN CONTACT W/NITROUS ACID,
NITRITES OR ATMOSPHERES W/HIGH NITROUS OXIDE CONCENTRATIONS.
RTECS #:9999999ZZ

Ingred Name:SPILL PROC:OR DISP. EVACUATE ALL PERS UPWIND FROM SPILL.
PVNT SPILL PROD FROM ENTERING STREAMS/DRINKING WATER (ING 11)
RTECS #:9999999ZZ

Ingred Name:ING 10:SUPPLIES. NOTIFY LOCAL HEALTH AUTHORITIES & OTHER
APPROPRIATE AGENCIES IF SUCH CONTAMINATION SHOULD OCCUR.
RTECS #:9999999ZZ

Ingred Name:PROT GLOVES:SITUATIONS, WEAR IMPERMEABLE GLOVES
W/CUFFS TO
PVNT SPREAD OF MATL ABOVE WRISTS. EXAMINE PROT GLOVES(ING 13)
RTECS #:9999999ZZ

Ingred Name:ING 12:BEFORE USING. DISCARD IF THERE IS EVIDENCE OF HOLES
OR CRACKS.
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:NO Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:EYE CONTACT:MODERATELY IRRITATING.
SKIN CONTACT:MODERATELY IRRITATING - POSSIBLE SENSITIZATION.
INHALATION:DUE TO LOW VOLATILITY, NOT LIKELY TO BE INHALED.
INGESTION:CAN CAUSE BLEEDING IN GASTROINTEST INAL TRACT.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:EYES:FLUSH W/PLENTY OF WATER FOR AT LST 15 MINS HOLDING LIDS
OPEN. GET MED ATTN. SKIN:REMOVE PROD FROM SKIN. FLUSH AFFECTED
AREA
W/WATER. REMOVE CONTAM CLTHG & GLOVES. FOLLOW BY WASHING
W/SOAP &
WATER . IF IRRIT PERSISTS GET MED ATTN. INHAL:REMOVE TO FRESH AIR &
PROVIDE OXYG IF BRTHG IS DFCLT. GET MED ATTN. INGEST:DO NOT
INDUCE
VOMIT. ADMIN 3-4 GLASSES OF MILK/WATER. OBTAIN MED CARE
IMMEDIATELY.

========== Fire Fighting Measures ==========

Flash Point Method:PMCC
Flash Point:156F,69C
Extinguishing Media:WATER FOG, CO*2, DRY CHEMICAL OR FOAM. MATERIAL
WILL NOT BURN UNLESS PREHEATED.

Fire Fighting Procedures:USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT . COOL FIRE W/WATER FOG.
Unusual Fire/Explosion Hazard:NONE SPECIFIED BY MANUFACTURER.

========== Accidental Release Measures ==========

Spill Release Procedures:SHUT OFF/REMOVE ALL IGNIT SOURCES. CONSTRUCT DIKE TO PVNT SPREADING. PERS SHOULD BE EQUIPPED W/NIOSH APPRVD SCBA
& BUTYL RUBBER PROT CLTHG. COVER MINOR SPILLS W/SODIUM BISULFITE &
REDUCE VAPS. SPRAY W /WATER. PLACE IN METAL CNTNRS FOR RECOVERY(ING
10)
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:CORR. KEEP AT ROOM TEMP, DRY, VENTED STOR IN CLSD CNTNRS. KEEP AWAY FROM OXIDIZERS, HEAT/FLAMES. STORE
IN STEEL CNTNRS. AVOID CONT W/SKIN OR EYES.
Other Precautions:HANDLE IN WELL VENTED WORK SPACE. AVOID BRTHG VAPS. ADHERE TO WORK PRACTICE RULES ESTABLISHED BY GOVT REGS (E.G. OSHA).
DO NOT USE SODIUM NITRITE/OTHER NITROSATING AGENTS IN FORMULATIONS.
CANCER-CAUSI NG NITROSAMINES COULD BE FORMED.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:IN POORLY VENTED AREAS, A NIOSH APPRVD CARTRIDGE MASK APPRVD FOR ORG VAPS IS REC UNDER FOLLOWING CNDTNS:EMER SITUATIONS, WHEN PROD VAP CONC IS >20 PPM FOR PERIOD >15 MINS, DURING REPAIR & CLEANING OF EQUIP, DURING TRANSFER/DISCHARGE(SUPDAT)
Ventilation:ADEQUATE GENERAL & LOCAL EXHAUST.
Protective Gloves:NITRILE RUBBER GLOVES. IN EMER (ING 12)
Eye Protection:ANSI APPRVD CHEM WORKERS GOGGS &(SUPDAT)
Other Protective Equipment:EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET
ANSI DESIGN CRITERIA . LONG SLEEVE CLTHG, SLICKER SUIT, RUBBER BOOTS.
Work Hygienic Practices:CONTACT LENSES SHOULD NOT BE WORN. WASH AT END
OF EACH WORK SHIFT & BEFORE EATING, SMOKING/USING TOILET.

LAUNDER(SUPDAT)
Supplemental Safety and Health
PH:ALKALINE. WASTE DISP METH:LONG TERM ENVIRON HAZS, THUS LANDFILL DISPS MUST BE CONSIDERED LESS ACCEPT THAN INCIN. RESP PROT:& USE OF
PROD. EYE PROT:FULL LGTH FSHLD . HYGIENE PRACT:OR DISCARD C ONTAM
CLTHG. DISCARD CONTAM LEATHER ARTICLES INCL SHOES. MATLS TO AVOID:ARE KNOWN TO BE CARCINS, MAY BE FORMED (ING 9)

========== Physical/Chemical Properties ==========

pH:SUPDAT
Appearance and Odor:CLEAR, LIGHT AMBER, FLOWABLE LIQUID; AMMONIACAL ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
CAN REACT VIGOROUSLY W/STRONG OXIDIZING AGENTS, STRONG LEWIS/MINERAL
ACIDS. CAUT:N-NITROSAMINES, MANY OF WHICH (SUPDAT)
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:N-NITROSAMINES MAY BE FORMED.

========== Disposal Considerations ==========

Waste Disposal Methods:COMPLY W/ALL FED, STATE & LOC REGS. INCIN IS ACCEPT & PREF METH OF DISP. INCIN IN ADMIXT W/FUEL EQUIPPED W/SCRUBBER TO REMOVE NITROGEN OXIDES & CARBON MONOXIDE. DISP OF IN
APPRVD LANDFILL IF ALLOWED L OCALLY. WASTE FROM THIS PROD MAY PRESENT (SUPDAT)

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GARLOCK INC -- COMPRESSED CARBON FIBER SHEET, STYLE MTC-9850 -- 5330-00N064992
========== Product Identification ==========

Product ID:COMPRESSED CARBON FIBER SHEET, STYLE MTC-9850
MSDS Date:08/11/1993
FSC:5330
NIIN:00N064992
MSDS Number: BZKXB
=== Responsible Party ===
Company Name:GARLOCK INC
Address:1666 DIVISION ST
City:PALMYRA
State:NY
ZIP:14522
Country:US
Info Phone Num:315-597-4811
Emergency Phone Num:315-597-4811
Preparer's Name:HAROLD R HUGHES
CAGE:76380
=== Contractor Identification ===
Company Name:GARLOCK INC
Address:1666 DIVISION ST
Box:City:PALMYRA
State:NY
ZIP:14522
Country:US
Phone:315-597-4811
CAGE:76380
Company Name:GARLOCK INC MECHANICAL PACKING DIV
Address:1666 DIVISION ST
City:PALMYRA
State:NY
ZIP:14522-9343
Country:US
Phone:315-597-4811
CAGE:73680

========== Composition/Information on Ingredients ==========

Ingred Name:MINERAL WOOL; (ROCK WOOL (MAN MADE MINERAL FIBER))
RTECS #:PY8070000
Fraction by Wt: 2-6%
OSHA PEL:N/K
ACGIH TLV:10 MG/M3 (TWA) (MFR)

Ingred Name:SILICA, CRYSTALLINE - QUARTZ (CRYSTALLINE SILICA - NOT A HAZARD UNLESS AIRBORNE)
CAS:14808-60-7
RTECS #:VV7330000
Fraction by Wt: <2.5%
OSHA PEL:SEE TABLE Z-3
ACGIH TLV:0.1 MG/M3 RDUST;9495

Ingred Name:GRAPHITE; (NATURAL GRAPHITE - NOT A HAZARD UNLESS AIRBORNE)
CAS:7782-42-5
RTECS #:MD9659600
Fraction by Wt: 2-5%
OSHA PEL:15 MPPCF; Z-3
ACGIH TLV:2 MG/M3 RDUST; 9495

Ingred Name:FIBERS, SYNTHETIC; (SYNTHETIC FIBERS)
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:BINDER SYSTEM; (ELASTOMERIC BINDERS)
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:STYRENE-BUTADIENE; (STYRENE-BUTADIENE ELASTOMER)
OSHA PEL:N/K
ACGIH TLV:N/K

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
Health Hazards Acute and Chronic:PRODUCT DOES NOT POSE A HEALTH HAZARD UNDER ORDINARY CONDITIONS OF USE. A HAZARD WOULD ARISE ONLY IF THE PRODUCT WAS SUBJECT TO MECHANICAL ACTIONS WHICH COULD CAUSE FIBERS AND/OR DUST TO RELEASED FROM THE ELASTOMER MATRIX. INHALATION OF SUFFICIENT QUANTITIES OF FIBERS AND/OR DUST COULD CAUSE (EFTS OF OVEREXP)
Explanation of Carcinogenicity:CRYSTALLING SILICA:NTP 7TH ANNUAL RPT ON CARCINS, 1994: ANTIC TO BE CARCIN. IARC MONOGRAPHS, SUPP. VOL 7, PG 341(SUPDAT)

Effects of Overexposure:HLTH HAZ:RESPIRATORY PROBLEMS AND HAS THE POTENTIAL TO CAUSE LASTING LUNG DAMAGE.
Medical Cond Aggravated by Exposure:BREATHING AIRBORNE FIBERS OR PARTICULATES MAY AGGRAVATE ANY EXISTING LUNG DISORDERS OR BRONCHITIS.

========== First Aid Measures ==========

First Aid:INGEST:CALL MD IMMEDIATELY . EYES:IMMEDIATELY FLUSH W/POTABLE
WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD . SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER. CALL MD . INHAL:IF O VERCOME
BY THERMAL DECOMPOSITION PRODUCTS FROM A FIRE, MOVE TO FRESH AIR.
IF VICTIM IS UNCONSCIOUS, EXHIBITS BREATHING DIFFICULTY OR IF RECOVERY IS NOT PROMPT, CONTACT A PHYSICIAN FOR TREATMENT.

========== Fire Fighting Measures ==========

Extinguishing Media:WATER, FOAM, CARBON DIOXIDE, DRY CHEMICAL.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE
EQUIPMENT .
Unusual Fire/Explosion Hazard:PRODUCES SMOKE AND SOME HAZARDOUS DECOMPOSITION PRODUCTS WHEN BURNED.

========== Accidental Release Measures ==========

Spill Release Procedures:NO SPECIAL ACTION FOR SOLID PIECES OF PRODUCT. VACUUM UP ANY DUST FROM OPERATIONS SUCH AS GASKET CUTTING. ALTERNATELY, DAMPEN AREA BEFORE WIPING OR SWEEPING. DO NOT DRY WIPE
OR SWEEP.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN CLEAN DRY PLACE AWAY FROM STRONG OXIDIZING AGENTS. DO NOT GRIND OR MACHINE PRODUCT. NORMAL
WASH UP AFTER HANDLING IS RECOMMENDED.
Other Precautions:WHEN REMOVING USED GASKETS, AVOID EXCESSIVE MECHANICAL ACTIONS AND PLACE RESIDUE IN A PLASTIC BAG FOR DISPOSAL.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NO SPECIAL REQUIREMENTS UNDER NORM CONDITIONS OF
USE. HALF-FACE RESP W/HIGH EFFICIENTY FILTERS SHOULD BE WORN BY INDIVIDUALS WHEN ENGAGING IN REMOVAL OF USED GASKETS THAT ARE FRIABLE/WHICH REQ AGGRESS IVE SCRAPING &/WIRE BRUSHING TO REMOVE.
Ventilation:NO SPECIAL REQUIREMENTS UNDER NORMAL CONDITIONS OF USE.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:ANSI APPROVED CHEM WORKERS GOGGS .
Other Protective Equipment:NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices:NO SPECIAL RECOMMENDATIONS.
Supplemental Safety and Health
EXPLAN OF CARCIN: 1987: GROUP 2A. ANIMAL: LUNG. HAZ DECOMP PROD:
HYDROGEN CYANIDE. THERE MAY BE OTHERS UNKNOWN TO US.

========== Physical/Chemical Properties ==========

Solubility in Water:INSOLUBLE
Appearance and Odor:BLACK SHEET OR GASKETS - SLIGHT ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:NO
AVOID STORAGE WITH STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:DIRECT FLAME WILL IGNITE PRODUCT.
Hazardous Decomposition Products:IN A FIRE:CARBON MONOXIDE UNDER
CERTAIN CIRCUMSTANCES, POSSIBLY ACRYLONITRILE MONOMER FUMES AND
POSSIBLY SOME (SUPDAT)

========== Disposal Considerations ==========

Waste Disposal Methods:NORMAL LANDFILL. COMPLY WITH ANY LOCAL DISPOSAL
REGULATIONS. DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND
LOCAL REGULATIONS .

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CLARK-SCHWEBEL FIBER GLASS CORP -- FIBER GLASS CLOTH -- 8305-01-276-9043
========== Product Identification ==========

Product ID:FIBER GLASS CLOTH
MSDS Date:06/28/1989
FSC:8305
NIIN:01-276-9043
MSDS Number: BWRFR
=== Responsible Party ===
Company Name:CLARK-SCHWEBEL FIBER GLASS CORP
Box:2627
City:ANDERSON
State:SC
ZIP:29622
Country:US
Info Phone Num:803-224-3506
Emergency Phone Num:800-424-9300 (CHEMTREC)
CAGE:1H193
=== Contractor Identification ===
Company Name:CLARK-SCHWEBEL FIBER GLASS CORP
Box:City:ANDERSON
State:SC
ZIP:29622
Country:US
Phone:803-224-3506
CAGE:1H193

========== Composition/Information on Ingredients ==========

Ingred Name:GLASS OXIDE
Fraction by Wt: >99%
OSHA PEL:15 MG/M3 (MFR)
ACGIH TLV:5 MG/M3 (MFR)

Ingred Name:METHACRYLATO CHROMIC CHLORIDE
Fraction by Wt: <1%
OSHA PEL:N/K
ACGIH TLV:N/K

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE: IF IN EYES OR ON SKIN, MAY

CAUSE MILD IRRITATION. IF INHALED, MAY CAUSE UPPER RESPIRATORY TRACT IRRITATION. CHRONIC HEALTH EFFECTS: NONE MENTIONED.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE.

========== First Aid Measures ==========

First Aid:INGEST: CALL MD IMMEDIATELY . EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES WHILE LIFTING UPPER & LOWER EYELIDS. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION. SKIN: WASH THOROUGHLY WITH SOAP A
ND COOL WATER. INHAL: IF INHALED AND AFFECTED, REMOVE INDIVIDUAL TO
FRESH AIR. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION.

========== Fire Fighting Measures ==========

Flash Point:NONE
Extinguishing Media:USE APPROPRIATE EXTINGUISHING MEDIA FOR PRIMARY SOURCE OF FIRE. PRODUCT IS NOT COMBUSTIBLE.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .
Unusual Fire/Explosion Hazard:NONE.

========== Accidental Release Measures ==========

Spill Release Procedures:NO SPECIAL PRECAUTIONS.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:FIBER GLASS CLOTH IS DENSE AND EVEN SMALL ROLLS ARE HEAVY. USE LIFT DEVICES TO PREVENT INJURIES. DO NOT
ALLOW CLOTH TO CRUSH LIMBS OR EXTREMITIES.
Other Precautions:NONE KNOWN.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:IF AIRBORNE FIBERGLASS CONCENTRATIONS EXCEED PERMISSIBLE EXPOSURE LEVELS, NIOSH/MSHA APPROVED RESPIRATORY PROTECTION FOR NUISANCE DUST IN ACCORDANCE WITH OSHA 1910.134 SHOULD BE USED. NONE NORMALLY RE QUIRED.
Ventilation:USE LOCAL EXHAUST VENTILATION IF NECESSARY TO MAINTAIN AIRBORNE LEVELS TO BELOW ESTABLISHED LIMITS.

Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:ANSI APPRVD CHEM WORKERS GOGGLES .
Other Protective Equipment:IN SOME CIRCUMSTANCES, IT MAY BE ADVISABLE TO WEAR LONG SLEEVED, LOOSE FITTING CLOTHING.
Work Hygienic Practices:USE RECOM SFTY EQUIP. WASH W/SOAP & WATER AFTER HNDLG. WASH WORK CLOTHES SEPARATELY FROM OTHER CLTHG. WIPE OUT (SUPDAT)
Supplemental Safety and Health
HYGIENE PRACT: WASHING MACHINE.

========== Physical/Chemical Properties ==========

Spec Gravity:2.54 (H*2O=1)
Solubility in Water:INSOLUBLE
Appearance and Odor:WHITE TO LIGHT GREEN, ODORLESS CLOTH.
Percent Volatiles by Volume:NONE

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG BASES AND ACIDS (OXIDIZING MINERAL, ESPECIALLY OXALIC AND HYDROFLUORIC ACID).
Stability Condition to Avoid:NONE.
Hazardous Decomposition Products:GLASS CLOTHG: NONE. SMALL AMOUNTS OF OXIDES OF CARBON AND NITROGEN MAY BE EVOLVED IF EXPOSED TO FIRE.

========== Disposal Considerations ==========

Waste Disposal Methods:AN INERT, SOLID WASTE. DISPOSE OF IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

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SCIENTIFIC POLYMER PRODUCTS, INC -- POLYSTYRENE, 400 -- 6810-00N047324
========== Product Identification ==========

Product ID:POLYSTYRENE, 400
MSDS Date:03/01/1991
FSC:6810
NIIN:00N047324
MSDS Number: BTQVW
=== Responsible Party ===
Company Name:SCIENTIFIC POLYMER PRODUCTS, INC
Address:6265 DEAN PARKWAY
City:ONTARIO
State:NY
ZIP:14519
Country:US
Info Phone Num:716-265-0413
Emergency Phone Num:716-265-0413
CAGE:0MW60
=== Contractor Identification ===
Company Name:SCIENTIFIC POLYMER PRODUCTS, INC
Address:6265 DEAN PARKWAY
Box:City:ONTARIO
State:NY
ZIP:14519
Country:US
Phone:716-265-0413
CAGE:0MW60

========== Composition/Information on Ingredients ==========

Ingred Name:SYTRENE POLYMER; (POLYSTYRENE)
CAS:9003-53-6
RTECS #:WL6475000
Fraction by Wt: 99.9%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:ADDITIVES
Fraction by Wt: <0.1%
OSHA PEL:N/K
ACGIH TLV:N/K

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:NO Skin:NO Ingestion:NO

Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:NONE SPECIFIED BY MANUFACTURER.
Explanation of Carcinogenicity:NOT RELEVANT.
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:INGEST:CALL MD IMMEDIATELY . INHAL:REMOVE FROM EXPOSURE. IF BREATHING STOPS, BEGIN MOUTH TO MOUTH. EYES:FLUSH WITH WATER FOR AT LEAST 15 MINUTES. SKIN:WASH AFFECTED AREA WITH SOAP AND WATER. REM OVE DIRTY CLOTHING. IN ALL CASES, IF IRRITATION DEVELOPS, SEEK MEDICAL ASSISTANCE.

========== Fire Fighting Measures ==========

Flash Point Method:COC
Flash Point:977F,525C
Extinguishing Media:DRY CHEMICAL, CO*2, WATER.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT .
Unusual Fire/Explosion Hazard:DECOMPOSITION MAY RESULT IN RELEASE OF CO*2 AND ORGANICS OF UNKNOWN CHEMICAL COMPOSITION. FLAMMABLE DUST WHEN FINELY DIVIDED & SUSPENDED IN AIR.

========== Accidental Release Measures ==========

Spill Release Procedures:SWEEP UP SPILL AND PLACE IN CONTAINERS FOR SALVAGE OR DISPOSAL.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:TREAT AS A COMBUSTIBLE SOLID. STORE AWAY FROM OXIDIZING MATLS IN A COOL, DRY PLACE WITH ADEQUATE VENTILATION.
Other Precautions:KEEP AWAY FROM HEAT AND OPEN FLAMES. KEEP CONTAINERS TIGHTLY CLOSED. NOTE:THIS MATERIAL IS INTENDED FOR LABORATORY USE ONLY. IT IS NOT INTENDED FOR DRUG, HOUSEHOLD OR OTHER USES.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN .
Ventilation:LOCAL EXHAUST ADEQUATE.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:ANSI APPRVD CHEM WORKER GOGGLES .
Other Protective Equipment:ANSI APPRVD EMERGENCY EYE WASH & DELUGE SHOWER .
Work Hygienic Practices:GOOD HYGIENE PRACTICES SHOULD BE STRICTLY FOLLOWED.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

Melt/Freeze Pt:M.P/F.P Text:>212F,>100C
Spec Gravity:1.05
Solubility in Water:INSOLUBLE
Appearance and Odor:COLORLESS, ODORLESS PELLET

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS.
Hazardous Decomposition Products:CO AND ORGANICS OF UNKNOWN CHEMICAL COMPOSITION.

========== Disposal Considerations ==========

Waste Disposal Methods:IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

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DOW CHEMICAL CO -- 05536 DOW GRAYBOARD EXTRUDED POLYSTYRENE FOAM INSULATION -- 5640-00F024892
========== Product Identification ==========

Product ID:05536 DOW GRAYBOARD EXTRUDED POLYSTYRENE FOAM INSULATION
MSDS Date:06/13/1990
FSC:5640
NIIN:00F024892
MSDS Number: BNYRD
=== Responsible Party ===
Company Name:DOW CHEMICAL CO
Address:2030 DOW CENTER
City:MIDLAND
State:MI
ZIP:48674
Country:US
Info Phone Num:(517) 636-4410
Emergency Phone Num:(517) 636-4410
CAGE:0BG07
=== Contractor Identification ===
Company Name:DOW CHEMICAL CO THE
Address:1801 DOW CTR
City:MIDLAND
State:MI
ZIP:48674-1801
Country:US
Phone:517-636-4400 / 800-258-2436
CAGE:0BG07
Company Name:DOW CHEMICAL U.S.A.
City:MIDLAND
State:MI
ZIP:48674
Country:US
Phone:517-636-4400
CAGE:71983

========== Composition/Information on Ingredients ==========

Ingred Name:ETHENE-1-OCTENE COPOLYMER; POLYETHYLENE
CAS:26227-73-8
Fraction by Wt: 0-10%

Ingred Name:STYRENE POLYMER, POLYSTYRENE
CAS:9003-53-6
RTECS #:WL6475000

Fraction by Wt: BALANCE

Ingred Name:DICHLORODIFLUOROMETHANE, FREON 12
CAS:75-71-8
RTECS #:PA8200000
Fraction by Wt: 0-7.5%
Other REC Limits:1000 PPM
OSHA PEL:4950 MG/CUM
ACGIH TLV:4950 MG/CUM
EPA Rpt Qty:5000 LBS
DOT Rpt Qty:5000 LBS
Ozone Depleting Chemical:1

Ingred Name:ETHANE, 1-CHLORO-1,1-DIFLUORO-, CHLORODIFLUOROETHANE (DOT),
FREON 142, DIFLUORORomonochloroethane
CAS:75-68-3
RTECS #:KH7650000
Fraction by Wt: 0-10%
Ozone Depleting Chemical:2

Ingred Name:POLYETHYLENE, POLYETHYLENE RESIN (HOMOPOLYMER)
CAS:9002-88-4
RTECS #:TQ3325000
Fraction by Wt: 0-10%

Ingred Name:HEXABROMOCYCLODODECANE *92-2*
CAS:3194-55-6
Fraction by Wt: 0-2%

Ingred Name:1,2,3,4,5-PENTABROMO-6-CHLOROCYCLOHEXANE *92-2*
CAS:87-84-3
Fraction by Wt: 0-2%

Ingred Name:ETHYL CHLORIDE, CHLOROETHANE
CAS:75-00-3
RTECS #:KH7525000
Fraction by Wt: 0-4.5%
Other REC Limits:2600 MG/CUM
OSHA PEL:1000 PPM
ACGIH TLV:1000 PPM
EPA Rpt Qty:100 LBS
DOT Rpt Qty:100 LBS

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:EYES: IRRITATION OR CORNEAL INJURY.
SKIN: MECHANICAL INJURY. INGESTION: LIVER & KIDNEY EFFECTS,
INCREASE IN TISSUE LEVELS OF BROMINE, PHYSICAL INJURY, CHOKING.
INHALATION: SEVERE RESPIRATORY EFFECTS, UPPER RESPIRATORY TRACT
IRRITATION, CNSDEPRESSION, ANESTHETIC EFFECTS, IRREGULAR HEARTBEATS
& CARDIAC SENSITIZATION.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:EYES: IRRITATION OR CORNEAL INJURY. SKIN:
MECHANICAL INJURY. INGESTION: LIVER & KIDNEY EFFECTS, INCREASE IN
TISSUE LEVELS OF BROMINE, PHYSICAL INJURY, CHOKING. INHALATION:
SEVERE RESPIRATORY EFFECTS, UPPER RESPIRATORY TRACT IRRITATION,
CNSDEPRESSION, ANESTHETIC EFFECTS, IRREGULAR HEARTBEATS & CARDIAC
SENSITIZATION.

========== First Aid Measures ==========

First Aid:EYES: IRRIGATE W/WATER FOR 5 MIN. INHALATION: REMOVE TO FRESH
AIR. SKIN/INGESTION: OBTAIN MEDICAL ATTENTION IN ALL CASES.

========== Fire Fighting Measures ==========

Flash Point Method:PMCC
Flash Point:670F
Extinguishing Media:WATER FOG
Fire Fighting Procedures:WEAR POSITIVE-PRESSURE SCBA. APPLY LARGE
VOLUME OF WATER DIRECTLY ON FLAME OR BURNING SURFACE.
Unusual Fire/Explosion Hazard:EMITS DENSE, BLACK SMOKE WHEN BURNED.
GRINDING OR CUTTING MAY LEAD TO A BUILDUP OF DUST SUSPENDED IN AIR
WHICH CAN CAUSE A DUST EXPLOSION IF IGNITED.

========== Accidental Release Measures ==========

Spill Release Procedures:PICK UP, OR IF DUST/SMALL PIECES, SWEEP UP &
PLACE IN SUITABLE CONTAINER FOR DISPOSAL.

========== Handling and Storage ==========

Handling and Storage Precautions:DON'T STORE OR USE IN CONFINED,
VIRTUALLY AIRTIGHT SPACES TO PREVENT BUILDUP OF COMBUSTIBLE VAPORS.
Other Precautions:USE ONLY AS DIRECTED BY THE SPECIFIC INSTRUCTIONS FOR
THIS PRODUCT. PROVIDE ADEQUATE VENTILATION, & APPROPRIATE DUST HANDLING SYSTEMS.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:USE AN APPROVED AIR-PURIFYING/APPROVED DUST RESPIRATOR.
Ventilation:GENERAL/LOCAL EXHAUST
Eye Protection:GLASSES/CHEMICAL GOGGLES
Supplemental Safety and Health
GAS FIRED RECIRCULATING AIR FURNACES/HEATERS, GAS WATER HEATERS CAN BE
SUBJECTED TO RUST/CORROSION PROBLEMS. THIS INSULATION CONTAINS A
FLAME RETARDANT ADDITIVE TO INHIBIT ACCIDENTAL IGNITION FROM FIR E SOURCES. PRODUCT MAY CONTAIN EITHER 9002-88-4 OR 26221-73-8.

========== Physical/Chemical Properties ==========

Spec Gravity:0.027 TO 0.064
Solubility in Water:INSOLUBLE
Appearance and Odor:RIGID CELLULAR FOAM BOARD, NO ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
AROMATIC HYDROCARBONS, HIGHER (>C5) ALIPHATIC HYDROCARBONS, ESTERS,
AMINES, HIGHER ALDEHYDES.
Stability Condition to Avoid:FIRE, HIGH TEMPS. TEMPERATURES OVER 572F
WILL RELEASE COMBUSTIBLE GASES.
Hazardous Decomposition Products:CO, CO2, HYDROGEN
BROMIDE/CHLORIDE/FLUORIDE & SMALL AMOUNTS OF AROMATIC HYDROCARBONS
SUCH AS STYRENE & ETHYLBENZENE.
Conditions to Avoid Polymerization:FLAME OR OTHER IGNITION SOURCES

========== Disposal Considerations ==========

Waste Disposal Methods:BURY IN AN APPROVED LANDFILL, OR BURN IN AN ADEQUATE INCINERATOR W/EXCESS OXYGEN, IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS.

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KING ADHESIVES CORP -- 11-282 DUCT TAPE ADHESIVE -- 8040-00F038125
========== Product Identification ==========

Product ID:11-282 DUCT TAPE ADHESIVE
MSDS Date:02/07/1992
FSC:8040
NIIN:00F038125
MSDS Number: BWKRB
=== Responsible Party ===
Company Name:KING ADHESIVES CORP
Address:5231 NORTHRUP AVE
City:ST LOUIS
State:MO
ZIP:63110-5000
Country:US
Info Phone Num:314-772-9953/800-233-8171
Emergency Phone Num:314-772-9953/800-233-8171
CAGE:KINGG
=== Contractor Identification ===
Company Name:KING ADHESIVES CORP
Address:5231 NORTHRUP AVE
Box:City:ST LOUIS
State:MO
ZIP:63110-5000
Country:US
Phone:314-772-9953/800-233-8171
CAGE:KINGG

========== Composition/Information on Ingredients ==========

Ingred Name:NON HAZARDOUS INGREDIENTS

========== Hazards Identification ==========

Routes of Entry: Inhalation:NO Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:EYES: IRRITATION, DAMAGE TO MUCOUS LININGS. SKIN: IRRITATION. INHALATION: NASAL & RESPIRATORY IRRITATION. INGESTION: GI IRRITATION.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:REDNESS, TEARING, BLURRED VISION, IRRITATION.

========== First Aid Measures ==========

First Aid:EYES: FLUSH W/WATER FOR 15 MINS. INHALATION: REMOVE TO FRESH AIR. INGESTION: DON'T INDUCE VOMITING. OBTAIN MEDICAL ATTETION IN

ALL CASES.

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:>203F
Extinguishing Media:FOAM, CO2, DRY CHEMICAL, WATER FOG
Fire Fighting Procedures:WEAR SELF CONTAINED BREATHING APPARATUS W/FULL
FACE PIECE OPERATED IN A PRESSURE DEMAND/OTHER POSITIVE PRESSURE
MODE. DRY FILM WILL BURN.

========== Accidental Release Measures ==========

Spill Release Procedures:DIKE AREA TO PREVENT FROM SPREADING. COLLECT
MATERIAL IN SALVAGE CONTAINER. MATERIAL WILL FLOW.

========== Handling and Storage ==========

Handling and Storage Precautions:DON'T STORE IN TEMP >125F/BELOW
FREEZING. WHEN HANDLING MATERIAL, ALWAYS FOLLOW PERSONAL PROTECTION
INSTRUCTION & NEVER TRANSFER.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE REQUIRED
Ventilation:GENERAL MECHANICAL
Protective Gloves:IMPERVIOUS ARE RECOMMENDED
Eye Protection:SAFETY GLASSES
Work Hygienic Practices:REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE
REUSE.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:212F
Vapor Density:>1
Spec Gravity:1.03
Evaporation Rate & Reference:SLOWER THAN ETHER
Solubility in Water:COMPLETE
Appearance and Odor:WHITE COLORED THIN VISCOSITY LIQUID W/BLAND ODOR
Percent Volatiles by Volume:45-53

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
SULFURIC ACID/ALKALI MATERIALS/SODIUM/METAL HYDRIDES.
Stability Condition to Avoid:FREEZING, TEMP <125F.
Hazardous Decomposition Products:CO2, CO, CARBON, ACETIC ACID/ACETALDEHYDE

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF IAW/FEDERAL, STATE & LOCAL REGULATIONS.

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SECTION 1: PRODUCT AND COMPANY IDENTIFICATION
PRODUCT NAME: SCOTCH BRAND #232 HIGH PERFORMANCE MASKING TAPE
MANUFACTURER: 3M
DIVISION: Industrial Tape And Specialties Division
ADDRESS: 3M Center
St. Paul, MN 55144-1000
EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)
Issue Date: 01/11/2005
Supercedes Date: 07/24/2003
Document Group: 07-0454-4
Product Use:
Intended Use: Used in medium temperature paint bake operations.
Limitations on Use: 250ºF for up to one hour.
SECTION 2: INGREDIENTS
Ingredient C.A.S. No. % by Wt
SATURATED PAPER BACKING MIXTURE 35 - 50
RUBBER / RESIN ADHESIVE MIXTURE 5 - 20

SECTION 3: HAZARDS IDENTIFICATION
3.1 EMERGENCY OVERVIEW
Specific Physical Form: Roll of Tape
Odor, Color, Grade: Tan color paper with unpigmented adhesive
General Physical Form: Solid
Immediate health, physical, and environmental hazards: The environmental properties of this product present a low environmental hazard. This product, when used under reasonable conditions and in accordance with the 3M directions for use, shouldnot present a health hazard. However, use or processing of the product in a manner not in accordance with the product's directions for use may affect the performance of the product and may present potential health and safety hazards.
3.2 POTENTIAL HEALTH EFFECTS
Eye Contact:
No health effects are expected.
Skin Contact:
No health effects are expected.
Inhalation:
No health effects are expected.
Ingestion:
No health effects are expected.

3.3 POTENTIAL ENVIRONMENTAL EFFECTS
This substance does not leach metals or other RCRA (Resource Conservation and Recovery Act) listed TCLP (Toxic Characteristic Leaching Procedure) hazardous substances at concentrations that would make the product a hazardous waste.

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: No need for first aid is anticipated.

Skin Contact: No need for first aid is anticipated.

Inhalation: No need for first aid is anticipated.

If Swallowed: No need for first aid is anticipated.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Autoignition temperature 451 ºF

Flash Point *No Data Available*

Flammable Limits - LEL *Not Applicable*

Flammable Limits - UEL *Not Applicable*

5.2 EXTINGUISHING MEDIA Ordinary combustible material. Use fire extinguishers with class A extinguishing agents (e.g., water, foam). Use fire extinguishers with class B extinguishing agents (e.g., dry chemical, carbon dioxide).

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: See Hazardous Decomposition section for products of combustion. Nonflammable. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: Not applicable. No unusual fire or explosion hazards are anticipated. Non-flammable: ordinary combustible material.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Collect as much of the spilled material as possible. Reclaim undamaged product.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING

Do not ingest. Do not breathe thermal decomposition products. Avoid skin contact with hot material. Avoid eye contact with vapors, mists, or spray. This product is considered to be an article which does not release or otherwise result in exposure to a hazardous chemical under normal use conditions. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below Occupational Exposure Limits. If ventilation is not adequate, use respiratory protection equipment.

7.2 STORAGE

Store out of direct sunlight. Not applicable. Store under normal warehouse conditions.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS

Not applicable. Provide appropriate local exhaust for molten or extruded material.

Provide appropriate local exhaust when product is
heated. General ventilation adequate below 400 C. Local exhaust recommended above 400 C.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection

Avoid eye contact. Not applicable. Avoid eye contact with vapors, mists, or spray.

8.2.2 Skin Protection

Wear appropriate gloves, such as Nomex, when handling this material to prevent thermal burns. Not applicable. Avoid skin contact.
Avoid prolonged or repeated skin contact. Avoid skin contact with hot material. Gloves are not required. Select and use gloves
and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or
protective clothing manufacturer for selection of appropriate compatible materials.

8.2.3 Respiratory Protection

Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection. **8.2.4 Prevention of Swallowing**
Not applicable. Do not ingest.

8.3 EXPOSURE GUIDELINES

None Established

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form: Roll of Tape
Odor, Color, Grade: Tan color paper with unpigmented adhesive
General Physical Form: Solid
Autoignition temperature 451 ºF
Flash Point *No Data Available*
Flammable Limits - LEL *Not Applicable*
Flammable Limits - UEL *Not Applicable*
Boiling point *Not Applicable*
Density 0.84 - 0.88 g/ml
Vapor Density *Not Applicable*
Vapor Density Negligible
Vapor Pressure *Not Applicable*
Vapor Pressure Negligible
Specific Gravity Approximately 0.85 g/ml
pH *Not Applicable*
Melting point *Not Applicable*
Solubility In Water *Not Applicable*
Solubility in Water Negligible
Evaporation rate *Not Applicable*
Hazardous Air Pollutants *No Data Available*
Volatile Organic Compounds <=0.2 %
Percent volatile *Not Applicable*
VOC Less H2O & Exempt Solvents <=0.2 %
Viscosity *Not Applicable*

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.
Materials and Conditions to Avoid: None known Additional Information: Excessive heat
Hazardous Polymerization: Hazardous polymerization will not occur.
Hazardous Decomposition or By-Products
Substance Condition
Hydrocarbons Not Specified
Carbon monoxide Not Specified
Carbon dioxide Not Specified**Hazardous Decomposition:** Under recommended usage conditions, hazardous decomposition products are not expected. Hazardous decomposition products may occur as a result of oxidation, heating, or reaction with another material.

SECTION 11: TOXICOLOGICAL INFORMATION
Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

SECTION 12: ECOLOGICAL INFORMATION
ECOTOXICOLOGICAL INFORMATION
Not determined. Not applicable.
CHEMICAL FATE INFORMATION
Not determined. Not applicable.

SECTION 13: DISPOSAL CONSIDERATIONS
Waste Disposal Method: Reclaim if feasible. If product can't be reclaimed, dispose of waste product in a sanitary landfill.
Alternatively, incinerate the waste product in an industrial, commercial, or municipal incinerator. Dispose of waste product in a sanitary landfill. As a disposal alternative, incinerate in an industrial or commercial facility.
EPA Hazardous Waste Number (RCRA): Not regulated
Since regulations vary, consult applicable regulations or authorities before disposal.

SECTION 14:TRANSPORT INFORMATION
Please contact the emergency numbers listed on the first page of the MSDS for Transportation Information for this material.

SECTION 15: REGULATORY INFORMATION
US FEDERAL REGULATIONS
Contact 3M for more information.
311/312 Hazard Categories:
Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - No Delayed Hazard – No
STATE REGULATIONS
Contact 3M for more information.
CHEMICAL INVENTORIES
The components of this product are in compliance with the chemical notification requirements of TSCA.

All applicable chemical ingredients in this material are listed on the European Inventory of Existing Chemical Substances (EINECS),
or are exempt polymers whose monomers are listed on EINECS.
This product is an article as defined by TSCA regulations, and is exempt from TSCA Inventory listing requirements.
Contact 3M for more information.

INTERNATIONAL REGULATIONS
Contact 3M for more information.
WHMIS: Hazardous

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.
SECTION 16: OTHER INFORMATION
NFPA Hazard Classification
Health: 0 **Flammability:** 1 **Reactivity:** 0 **Special Hazards:** None
National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are
presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the
inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to
be generated in significant quantities.

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particular purpose and suitable for user's method of use or application.
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In addition, information obtained from a database may not be as current as the information in the MSDS available directly from 3M.

SUPER GLUE CORP -- SUPER GLUE -- 8040-00N056030
========== Product Identification ==========

Product ID:SUPER GLUE
MSDS Date:08/18/1993
FSC:8040
NIIN:00N056030
MSDS Number: BWBXW
=== Responsible Party ===
Company Name:SUPER GLUE CORP
Address:184-08 JAMACA AVE
City:HOLLIS
State:NY
ZIP:11423
Country:US
Info Phone Num:718-454-4747
Emergency Phone Num:800-424-9300 (CHEMTREC)
CAGE:0ACS9
=== Contractor Identification ===
Company Name:SUPER GLUE CORP
Address:184-08 JAMAICA AVE
Box:City:HOLLIS
State:NY
ZIP:11423
Country:US
Phone:800-221-4478
CAGE:0ACS9

========== Composition/Information on Ingredients ==========

Ingred Name:2-PROPENOIC ACID, 2-CYANO-, ETHYL ESTER; (ETHYL CYANOACRYLATE)
CAS:7085-85-0
RTECS #:UD3330000
Fraction by Wt: 60-100%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:HYDROQUINONE (SARA III)
CAS:123-31-9
RTECS #:MX3500000
Fraction by Wt: 0-1%
OSHA PEL:2 MG/M3
ACGIH TLV:2 MG/M3
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:POLYMETHYLMETHACRYLATE
CAS:9011-14-7
RTECS #:TR0400000
Fraction by Wt: 10-30%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:SUPDAT:(DO NOT PULL) LIPS APART. IT IS ALMOST IMPOSSIBLE TO SWALLOW CYANOACRYLATE AS ADHESIVE SOLIDIFIES UPON (ING 5)
RTECS #:9999999ZZ

Ingred Name:ING 4:CONT W/SALIVA & MAY ADHERE TO INSIDE OF MOUTH. SALIVA
WILL LIFT ADHESIVE IN 1-2 DAYS, AVOID SWALLOWING (ING 6)
RTECS #:9999999ZZ

Ingred Name:ING 5:ADHESIVE AFTER DETACHMENT.
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:LD50:(ORAL) 12.2 CC/KG
Routes of Entry: Inhalation:YES Skin:NO Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE:IRRITATES EYES, MUCOUS MEMBRANES. CHRONIC:NO RESIDUAL AFFECTS OF ACUTE PROPERTIES.
Explanation of Carcinogenicity:NOT RELEVANT.
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:PRE-EXISTING SKIN, EYE AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE.

========== First Aid Measures ==========

First Aid:EYE:TEARING FROM EYE IRRIT. REMOVE TO FRESH AIR. FLUSH AREAS OF CONT W/WATER FOR @ LEAST 15 MINS. ADHESIVE WILL DISASSOCIATE FROM EYE/EYELIDS OVER TIME, USUALLY W/IN SEVERAL HRS. TEMPORARY WEEPING OF EYES/DOUBLE VISION MAY BE EXPERIENCED UNTIL CLEARANCE
IS ACHIEVED. SKIN:IMMERSE BONDED AREAS IN WARM, SOAPY WATER. PEEL/ROLL SKIN APART. REMOVE SECURED ADHESIVE W/SEVERAL APPLIC OF
WARM, SOAPY(SUPDAT)

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:176F,80C
Extinguishing Media:FLUSH WITH LARGE AMOUNTS OF WATER OR DRY CHEMICAL
EXTINGUISHER.
Fire Fighting Procedures:NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP . FUMES MAY BE IRRITATING IF NOT BURNING & REQ AIR SUPPLY W/GOGG WHILE APPLYING LG AMTS OF WATER/DRY (SUPDAT)
Unusual Fire/Explosion Hazard:NONE. COMBUSTIBLE REQUIRING THE ABOVE PROCEDURES.

========== Accidental Release Measures ==========

Spill Release Procedures:POLYMERIZE WITH WATER. SOLID MATERIAL MAY BE SCRAPED FROM SURFACE.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:AVOID MOISTURE, DIRECT UV=SUNLIGHT AND DO NOT STORE ABOVE 25C. KEEP CNTNRS CLSD TIGHTLY WHEN NOT IN USE.
AVOID BRTHG VAP, CONT WITH EYES/SKIN.
Other Precautions:DO NOT SOTRE AT -5C WHICH FREEZES PRODUCT TO USELESS
STATE. PRODUCT NOT DAMAGED BY FREEZING.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NORMALLY NOT NECESSARY. A NIOSH/MSHA APPROVED ORGANIC VAPOR CANISTER MAY BE USED.
Ventilation:LOCAL EXHAUST:TO PREVENT EYE IRRITATION. MECHANICAL (GENERAL):LARGE AMOUNT:USED TO 2PPM.
Protective Gloves:VINYL (POLYETHYLENE)NON-STICKING GLOVES.
Eye Protection:SAFETY GLASSES & SIDE SHIELD.
Other Protective Equipment:RUBBER APRON TO PROTECT CLOTHING.
Work Hygienic Practices:SOAP AND WATER HELPS REMOVE ADHESIVE FROM SKIN.
Supplemental Safety and Health
SOL IN H*20:INSOLUBLE, MATL REACTS TO HARDENED MASS FOR NON-HAZ WASTE.
FIRE FIGHT PROC:CHEM EXTING. FIRST AID PROC:WATER. INHAL:IRRIT OF MUC MEMB/COUGHING. REMOVE TO FRESH AIR. INGEST:LIPS MAY BECOME STUCK TOGETHER:APPLY COPIOUS AMTS OF WARM WATER & ENCOURAGE

SWETTING/PRESS FROM SALIVA INSIDE MOUTH. PEEL/ROLL (ING 4)

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:149F,65C
Vapor Pres:1 @ 20C
Spec Gravity:1.05 (H*20=1)
Evaporation Rate & Reference:NOT KNOWN
Solubility in Water:SUPP DATA
Appearance and Odor:TRANSPARENT WATER-WHITE TO STRAW COLORED LIQUID
WITH STIMULATIVE ODOR

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
POLYMERIZED BY WATER, ALCOHOL, AMINES, ALKALINE MATERIALS AND DIRECT
UV.
Stability Condition to Avoid:EXCESSIVE HEAT ABOVE 176F, MOISTURE AND
ALKALINES. STABLE UP TO 122F. STORE IN COOL DRY PLACE.
Hazardous Decomposition Products:COMBUSTIBLE BY-PRODUCTS OF CARBON
MONOXIDE/DIOXIDE.

========== Disposal Considerations ==========

Waste Disposal Methods:INCINERATE SOLID COMBUSTIBLE WASTE OR DUMP AS
CHEMICAL WASTE ACCORDING TO LOCAL, STATE AND FEDERAL REGULATIONS.

EMS CATALOG NO: 10000
EMS PRODUCT: Acetone
DATE: 4/22/96
PAGE NUMBER: One of 7

MATERIAL SAFETY DATA SHEET

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

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321 MORRIS ROAD
P.O. BOX 251
FORT WASHINGTON, PA 19034 24 HOUR EMERGENCY PHONE NUMBER
(215) 646-1566 CHEMTREC: (800) 424-9300

FOR PRODUCT AND SALES INFORMATION
CONTACT ELECTRON MICROSCOPY SCIENCES OFFICE ABOVE.

PRODUCT IDENTIFICATION

PRODUCT NAME: Acetone
CAS NO.: 67-64-1
COMMON NAMES/SYNONYMS: 2-Propanone Dimethyl Ketal, Dimethyl Ketone
FORMULA: C3H6O
MOLECULAR WEIGHT: 58.08

NFPA RATING (MANUFACTURER): HAZARD RATING SCALE:
HEALTH: 1 0 = NONE
FIRE: 3 1 = MINIMAL
REACTIVITY: O 2 = MODERATE
SPECIAL: None 3 = SERIOUS
4 = SEVERE

HAZARDOUS INGREDIENTS

			EXPOSURE LIMITS,PPM			
			OSHA	ACGIH	OTHER	
COMPONENT	CAS NO.	%	PEL	TLV	LIMIT	HAZARD
Acetone	67-64-1	>99	750	750	1,000	Flammable/Irritant

(ACGIH STEL)

PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: 133F
MELTING POINT: 142F
SPECIFIC GRAVITY (WATER=1): O.79
VAPOR PRESSURE, mm Hg: 184
pH: No data found
VAPOR DENSITY (AIR=1): 2.O
WATER SOLUBILITY : 100%
EVAPORATION RATE (BUTYL ACETATE=1): 5.6
% VOLATILE (BY VOLUME): 100
APPEARANCE AND ODOR: Clear, colorless liquid; sweet odor.

FIRST AID MEASURES

INHALATION: Remove to fresh air. Give artificial respiration if not breathing. Get immediate medical attention.

EYE CONTACT: Immediately flush eyes with lots of running water for 15 minutes, lifting the upper and lower eyelids occasionally. Get immediate attention.

SKIN CONTACT: Immediately wash skin with lots of soap and water. Remove contaminated clothing and shoes; wash before reuse. Get medical attention if irritation persists after washing.

INGESTION: Do not induce vomiting. If conscious, give lots of water. Get immediate medical attention. Do not give anything by mouth to an unconscious or convulsing person.

NOTES TO PHYSICIAN: The danger of aspiration must be weighed against toxicity when considering emptying the stomach. Stomach contents should be emptied quickly in a manner which avoids the vomitus from entering the lungs.

HEALTH HAZARD INFORMATION

PRIMARY ROUTES OF EXPOSURE: Inhalation, skin or eye contact.

SIGNS AND SYMPTOMS OF EXPOSURE:

INHALATION: Prolonged or repeated exposure or breathing very high concentration may cause headaches, nausea, vomiting, dizziness, other central nervous system effects, convulsions, and in extreme cases, unconsciousness and death.

EYE CONTACT: Vapors will irritate the eyes. Liquid and mists will irritate and may burn the eyes.

SKIN CONTACT: Brief contact may dry the skin. Prolonged or repeated contact may irritate the skin causing dermatitis.

INGESTION: Swallowing large quantities causes headaches, nausea, vomiting, and perhaps unconsciousness. Can also cause liver and kidney injury.

CHRONIC EFFECTS OF EXPOSURE: No specific information available.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:

Preexisting eye or skin disorders may be aggravated by acetone exposure. Also, use of alcoholic beverages enhances toxic effects.

TOXICITY DATA

ORAL: Rat LD50 = 9750 MG/KG
DERMAL: Rabbit LD50 = 20 G/KG
INHALATION: Rat LC50 = 16,000 PPM/4 HR

CARCINOGENICITY: This material is not considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or The Occupational Safety and Health Administration.

OTHER DATA: Development of cataracts has been reported in laboratory animals after prolonged repeated skin exposure.

ECOLOGICAL INFORMATION SECTION
No data found

PERSONAL PROTECTION

VENTILATION: Local mechanical exhaust ventilation capable of maintaining emissions at the point of use below the PEL.

RESPIRATORY PROTECTION: If use conditions generate vapors or mists, wear a NIOSH- approved respirator appropriate for those emission levels.

Appropriate respirators may be a full facepiece or half mask air-purifying cartridge respirator equipped for organic vapors/mists, a self-contained breathing apparatus in the pressure demand mode, or a supplied-air respirator.

EYE PROTECTION: Chemical goggles unless a full facepiece respirator is also worn. It is generally recognized that contact lenses should not be worn when working with chemicals because contact lenses may contribute to the severity of an eye injury.

PROTECTIVE CLOTHING: Long-sleeved shirt, trousers, safety shoes, rubber gloves, and rubber apron.

OTHER PROTECTIVE MEASURES: An eyewash and safety shower should be nearby and ready for use.

FIRE AND EXPLOSION INFORMATION

FLASH POINT: -15oF METHOD USED: TCC
FLAMMABLE LIMITS IN AIR: LOWER: 2% UPPER: 13%
AUTOIGNITION TEMPERATURE: No data found
EXTINGUISHING MEDIA: Use water spray, dry chemical, CO2 or alcohol foam.

SPECIAL FIREFIGHTING PROCEDURES: Fire fighters should wear self-contained breathing apparatus and full protective clothing. Use water spray to cool nearby containers and structures exposed to fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Acetone is extremely flammable. Extinguish all nearby sources of ignition. Avoid accumulation of water or acetone vapors because aqueous solutions containing more than 2.5% acetone vapors are flammable. Vapors formed from this product are heavier than air and may travel along the surface to a distant sources of ignition and flashback. Explosive vapor-air mixtures may be formed above the flash point or between the lower and upper flammable limits.

HAZARDOUS REACTIVITY

STABILITY: Stable
POLYMERIZATION: Will not occur
CONDITIONS TO AVOID: Heat, Sparks, and Open Flames.

MATERIALS TO AVOID: Oxidizers, acids, alkalis, chlorinated compounds.

HAZARDOUS DECOMPOSITION PRODUCTS: May liberate carbon monoxide, carbon dioxide, and unidentified organic compounds in black smoke.

SPILL, LEAK AND DISPOSAL PROCEDURES

Action to take for spills or leaks: wear protective equipment including rubber boots, rubber gloves, rubber apron, and a self-contained breathing apparatus in the pressure demand mode or a supplied-air respirator. If the spill or leak is small, a full facepiece air-purifying cartridge respirator equipped for organic vapors may be satisfactory. In any event, always wear eye protection. Extinguish all ignition sources and ensure that all handling equipment is electrically grounded. For small spills or drips, mop or wipe up and dispose of in DOT-approved waste containers. For large spills, contain by diking with soil or other non-combustible absorbent materials and then pump into DOT-approved waste containers; or absorb with non-combustible sorbent material, place residue in DOT-approved waste containers. Keep out of sewers, storm drains, surface waters, and soil.

Comply with all applicable governmental regulations on spill reporting, and handling and disposal of waste.

DISPOSAL METHODS: Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult with appropriate Federal, State and local regulatory agencies.

NOTE: Empty containers can have residues, gases and mists and are subject to proper waste disposal, as above.

SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS: Keep away from heat, sparks, and flames.
Store in a cool, dry, well-ventilated place away from incompatible materials. Vent container frequently, and more often in warm weather, to relieve pressure. Electrically ground all equipment when handling this product and use only non-sparking tools. Keep container tightly closed when not in use.

Do not use pressure to empty container. Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing.

REPAIR AND MAINTENANCE PRECAUTIONS: Do not cut, grind, weld, or drill on or near this container.

OTHER PRECAUTIONS: Containers, even those that have been emptied, will retain product residue and vapors. Always obey hazard warnings and handle empty containers as if they were full.

OTHER REGULATORY INFORMATION

SECTION 313 - This product is a toxic chemical 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.

PROPOSITION 65 (WITH CHEMICALS LISTED) - This product contains the following chemical(s) considered by the state of California's safe drinking water and Toxic Enforcement Act of 1986 (Proposition 65) as causing cancer or reproductive toxicity and for which warnings are required:

CHEMICALS	CAS NO.	% WT
Benzene	71-43-2	30 PPM

MASSACHUSETTS - Under the Massachusetts right-to know law, hazardous substance and extraordinarily hazardous substances components present in this product which requires reporting are:

HAZARDOUS SUBSTANCE	CAS NO.	CONC.(>1%)
Acetone	67-64-1	100

PENNSYLVANIA - Under the Pennsylvania right-to-know law, hazardous substances and special hazardous substances components present in this product which require reporting are:

HAZARDOUS SUBSTANCE	CAS NO.	CONC. (>1%)
Acetone	67-64-1	100

CALIFORNIA SCAQMD: Rule 443.1 VOC'S
VOC: 790 G/L Vapor Pressure: 184 MMHG AT 68oF.

TSCA: THE INGREDIENTS OF THIS PRODUCT ARE ON THE TSCA INVENTORY.

EMS CATALOG NO: 14810
EMS PRODUCT: EM GLASS
DATE: 09/24/96
PAGE NUMBER: One of 6

MATERIAL SAFETY DATA SHEET

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FOR PRODUCT AND SALES INFORMATION

CONTACT ELECTRON MICROSCOPY SCIENCES OFFICE ABOVE.

PRODUCT IDENTIFICATION

PRODUCT NAME: EM Glass

CHEMICAL NAME: Merckoglas(R) Liquid Cover Glass

CHEMICAL FAMILY: Organic substances in toluene

FORMULA: Organic substances in toluene

MOLECULAR WEIGHT: N/A

COMPONENT CAS # APPR %

Toluene 108-88-3 N/A

Also contains organic substances not disclosed by the manufacturer.

HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Flammable liquid and vapor.
Harmful or fatal if swallowed.
Vapor harmful.
May be irritating to skin, eyes and mucous membranes.
May cause damage to central nervous system, liver, kidneys and lungs.

APPEARANCE: Colorless, viscous liquid.

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

Symptoms of Exposure:

Quantitative data on the toxicity of this product is not available.
Expected properties on the grounds of the components:
Harmful or fatal if swallowed. Vapor harmful if inhaled.

Symptoms: Headache, dizziness, hallucinations, distorted perceptions, changes in motor activity, nausea, diarrhea, respiratory irritation, central nervous system depression, unconsciousness, liver, kidney and lung damage. Contact can cause severe eye irritation. May cause skin irritation.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Data not available.

ROUTES OF ENTRY: Inhalation, ingestion.

CARCINOGENICITY: The material is not listed (IARC, NTP, OSHA) as cancer causing agent.

FIRST AID MEASURES

EMERGENCY FIRST AID:

GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.

SKIN: Wash thoroughly with soap and water.

EYES: Immediately flush thoroughly with water for at least 15 minutes.
INHALATION: Remove to fresh air; give artificial respiration if breathing has stopped.

INGESTION: If conscious, drink water and induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

FIRE FIGHTING MEASURES

FLASH POINT (F): 47oF
FLAMMABLE LIMITS LEL (%): N/A
FLAMMABLE LIMITS UEL (%): N/A

EXTINGUISHING MEDIA: Dry chemical, C02, or "alcohol" foam.

FIREFIGHTING PROCEDURES: Wear self-contained breathing apparatus and protective clothing.

FIRE & EXPLOSION HAZARDS: Dangerous fire and explosion hazard. Vapor can travel distances to ignition source and flash back.

ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:

Evacuate the area of all unnecessary personnel. Wear suitable protective equipment listed under Exposure/Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and

eliminate its source, if this can be done without risk. Take up and containerize for proper disposal as described under Disposal. Comply with Federal, State, and local regulations on reporting releases. Refer to Regulatory Information for reportable quantity and other regulatory data.

The following Electron Microscopy Sciences clean up kit is recommended for this product:

SX0863 Solvent Spill Treatment Kit

HANDLING AND STORAGE

Keep container closed.
Store in a cool, dry area away from ignition sources and oxidizers.
Do not breath vapor or mist.
Do not get in eyes, on skin, or on clothing.
Electrically ground all equipment when handling this product.
Retained residue may make empty containers hazardous; use caution!

EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

Ventilation, Respiratory Protection, Protective Clothing, Eye Protection

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves should be worn to prevent skin contact (Viton or equivalent).

Safety glasses with side shields should be worn at all times.

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/ MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other

NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

WORK/HYGIENIC PRACTICES:

Wash thoroughly after handling. Do not take internally.
Eye wash and safety equipment should be readily available.

EXPOSURE GUIDELINES:

TWA STEL CL
COMPONENT PPM MG/M3 PPM MG/M3 PPM MG/M3 SKIN
Toluene 100 375 150 560

ACGIH - TLV:
TWA STEL CL
COMPONENT PPM MG/M3 PPM MG/M3 PPM MG/M3 SKIN
Toluene 50 188 X

PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 mmHg): N/A
MELTING POINT (C): N/A
SPECIFIC GRAVITY (H20 = 1): .91
VAPOR PRESSURE (mm Hg) N/A
PERCENT VOLATILE BY VOL (%): N/A
VAPOR DENSITY (AIR =1): N/A
EVAPORATION RATE (BuAc = 1): N/a
SOLUBILITY IN WATER (%): Soluble
APPEARANCE: Colorless, viscous liquid.

STABILITY AND REACTIVITY

STABILITY: Stable.
HAZARDOUS POLYMERIZATION: Does not occur.
HAZARDOUS DECOMPOSITION: C02, hydrocarbons.
CONDITIONS TO AVOID: Heat; contact with ignition sources.
MATERIALS TO AVOID: Oxidizers.

TOXICOLOGICAL INFORMATION

TOXICITY DATA: None established.

TOXICOLOGICAL FINDINGS: None-Cited in Registry of Toxic Effects of Substances (RTECS).

DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS: D001 U220
TREATMENT:
Incineration, fuels blending or recycle. Contact your local permitted waste disposal site (TSD) for permissible treatment sites. Always contact a permitted waste disposer (TSD) to assure compliance with all current local, State and Federal regulations.

TRANSPORT INFORMATION

DOT SHIPPING NAME: Flammable liquid, n.o.s. (contains Toluene)

DOT NUMBER: UN1993

REGULATORY/OTHER INFORMATION

TSCA STATEMENT: This product is a "Mixture". CAS number(s) of component(s) NOT listed on TSCA Inventory.

For Research and Development Use only; Not for Manufacturing or Commercial purposes.

COMPONENT: SARA EHS (302) SARA EHS TPQ (lbs) CERCLA RQ (lbs)

Toluene 1000

OSHA Floor List SARA 313 DeMinimis for SARA 313
%
Toluene Y Y 1.0

NFPA Hazard Ratings: Health - 1

Flammability - 3
Reactivity - 0

UNION OIL CO OF CALIFORNIA, CORP. DIV-EASTERN -- MINERAL SPIRITS 75 -- 8010-01-127-6897
========== Product Identification ==========

Product ID:MINERAL SPIRITS 75
MSDS Date:01/01/1985
FSC:8010
NIIN:01-127-6897
MSDS Number: BGNCM
=== Responsible Party ===
Company Name:UNION OIL CO OF CALIFORNIA, CORP. DIV-EASTERN
Address:1650 EAST GOLF ROAD
City:SCHAUMBURG
State:IL
ZIP:60195
Country:US
Info Phone Num:708-619-2644
Emergency Phone Num:708-619-2644
CAGE:77416
=== Contractor Identification ===
Company Name:UNION OIL CO OF CALIFORNIA, CORP. DIV-EASTERN
Address:1650 EAST GOLF ROAD
Box:City:SCHAUMBURG
State:IL
ZIP:60195
Country:US
Phone:708-619-2644
CAGE:77416

========== Composition/Information on Ingredients ==========

Ingred Name:NAPHTHA (PETROLEUM SPIRITS OR BENZIN)
CAS:8030-30-6
RTECS #:SE7555000
Fraction by Wt: 100%
OSHA PEL:100 PPM

========== Hazards Identification ==========

Effects of Overexposure:EYES:SEVERE IRRIT. SKIN: DRYNESS.
INH:HDCH,DIZZ,NAUSEA.

========== First Aid Measures ==========

First Aid:EYES: FLUSH W/WATER 15 MINS,CALL MD. SKIN:WASH W/MILD SOAP & WATER,APPLY SKIN CREAM. INH:MOVE TO FRESH AIR & CALL MD. APPLY

ARTIFICIAL RESP IF NEC.

========== Fire Fighting Measures ==========

Flash Point:108F.42C PCC
Lower Limits:1.0
Upper Limits:6.0
Extinguishing Media:WATER SPRAY, CO*2,FOAM,DRY CHEMICAL
Fire Fighting Procedures:WEAR SCBA. USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.
Unusual Fire/Explosion Hazard:A DANGEROUS FIRE HAZARD IF HEATED OR SPRAYED IN AIR.

========== Accidental Release Measures ==========

Spill Release Procedures:FLUSH WITH WATER INTO RETAINING AREA OR CONTAINER. AVOID EXPOSURE TO SPARKS,FIRE, OR HOT METAL SURFACES.
VENTILATE AREA.

========== Handling and Storage ==========

Handling and Storage Precautions:KEEP AWAY FROM HEAT, SPARKS & OPEN FLAME. USE WITH ADEQUATE VENTILATION. AVOID PROLONGED OR REPEATED
CONTACT W/SKIN. KEEP CNTNRS CLSD WHEN NOT IN USE.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:SCBA FOR CONCENTRATIONS ABOVE TLV LIMITS.
Ventilation:LOCAL EXHAUST
Protective Gloves:YES
Eye Protection:YES
Other Protective Equipment:EYE BATH AND SAFETY SHOWER.
Supplemental Safety and Health
CONFORMS TO TT-T-291E,TYPE II, GRADE A. BP:156-198C. EVAP RATE:<0.1,N-BUAC PER GE MSDS #1257.CONTAINER SIZE:1 QT. CAN.

========== Physical/Chemical Properties ==========

HCC:F4
Boiling Pt:B.P. Text:313F-388F
Vapor Pres:2.0
Vapor Density:4.9
Spec Gravity:0.781
Evaporation Rate & Reference:SEE SUPP DATA

Solubility in Water:NEGLIGIBLE
Appearance and Odor:CLEAR LIQUID,CHARACTERISTIC ODOR.
Percent Volatiles by Volume:100

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS
Stability Condition to Avoid:HEAT,SPARKS, OPEN FLAMES & FIRE.
Hazardous Decomposition Products:THERMAL DECOMP MAY YIELD CO.

========== Disposal Considerations ==========

Waste Disposal Methods:INCINERATE UNDER SAFE CONDITIONS OR DISPOSE OF IN ACCORDANCE WITH LOCAL,STATE, OR FEDERAL REGULATIONS.

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HENRY SCHEIN INC -- ALCOHOL-DENATURED -- 6810-00F012186
========== Product Identification ==========

Product ID:ALCOHOL-DENATURED
MSDS Date:01/01/1987
FSC:6810
NIIN:00F012186
MSDS Number: BJBWG
=== Responsible Party ===
Company Name:HENRY SCHEIN INC
Address:5 HARBOR PARK DR
City:PORT WASHINGTON
State:NY
ZIP:11050
Info Phone Num:(516) 621-4300
Emergency Phone Num:(516) 621-4300
CAGE:64682
=== Contractor Identification ===
Company Name:HENRY SCHEIN INC
Address:5 HARBOR PARK DR
Box:City:PORT WASHINGTON
State:NY
ZIP:11050
Phone:(516) 621-4300
CAGE:64682

========== Composition/Information on Ingredients ==========

Ingred Name:METHYL ALCOHOL (METHANOL) (SARA III)
CAS:67-56-1
RTECS #:PC1400000
Other REC Limits:200 PPM
OSHA PEL:S,200PPM/250STEL
ACGIH TLV:S,200PPM/250STEL; 93
EPA Rpt Qty:5000 LBS
DOT Rpt Qty:5000 LBS

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:INHALATION: MAY CAUSE SYSTEMIC POISONING.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:INHALATION: MAY CAUSE SYSTEMIC POISONING.

========== First Aid Measures ==========

First Aid:EYES: FLUSH W/PLENTY OF WATER. CONTACT PHYSICIAN. SKIN: WASH CONTAMINATED AREA W/SOAP & WATER. INGESTION: INDUCE VOMITING. GIVE
2 GLASSES WATER & STICK FINGER DOWN THROAT OR DILUTE POINT W/WATER.
INHA LATION: REMOVE FROM CONTAMINATED AREA IMMEDIATELY.

========== Fire Fighting Measures ==========

Flash Point Method:TOC
Flash Point:60F
Lower Limits:5.5%
Upper Limits:36.5
Extinguishing Media:ALCOHOL OR POLYMER FOAM, CO2 OR DRY CHEMICAL
Fire Fighting Procedures:ADDITION OF WATER TO BURNING FUEL WILL REDUCE THE INTENSITY OF FLAME.
Unusual Fire/Explosion Hazard:NONE

========== Accidental Release Measures ==========

Spill Release Procedures:ELIMINATE IGNITION SOURCE. CONTAIN SPILL FOR SALVAGE OR DISPOSAL. USE OF ANY DILUTION WATER SHOULD BE CLOSELY
CONTROLLED TO MINIMIZE SPILL VOLUME. AVOID RUN-OFF INTO STORM SEWERS & DITCHES WHICH LEAD TO NATURAL WATERWAYS. ADVISE AUTHORITIES OF SPILL.

========== Handling and Storage ==========

Handling and Storage Precautions:DON'T LEAVE CONTAINER OPEN. USE W/ADEQUATE VENTILATION. AVOID PROLONGED/REPEATED CONTACT W/SKIN.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:SELF-CONTAINED BREATHING APPARATUS.
Ventilation:MECHANICAL: ACCEPTABLE. LOCAL EXHAUST: PREFERABLE
Protective Gloves:NEOPRENE, RUBBER
Eye Protection:CHEMICAL SAFETY GOGGLES
Other Protective Equipment:IMPERVIOUS APRON, BOOTS, EYE BATH & SAFETY SHOWER.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:64.6F
Vapor Pres:96.0
Vapor Density:1.11
Spec Gravity:0.7925
Evaporation Rate & Reference:(BU AC = 1): 1
Solubility in Water:COMPLETE
Appearance and Odor:WATER-WHITE LIQUID; CHARACTERISTIC ODOR.
Percent Volatiles by Volume:100%

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
Stability Condition to Avoid:HEAT, SPARKS & FIRE

========== Disposal Considerations ==========

Waste Disposal Methods:CHEMICAL INCINERATOR; BIOLOGICAL TREATMENT; LANDFILL.

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GOEX INC -- BLACK POWDER -- 1376-00N037788
========== Product Identification ==========

Product ID:BLACK POWDER
MSDS Date:09/01/1988
FSC:1376
NIIN:00N037788
MSDS Number: BQWTX
=== Responsible Party ===
Company Name:GOEX INC
Address:1002 SPRINGBROOK AVE
City:MOOSIC
State:PA
ZIP:18507
Country:US
Info Phone Num:717-457-6724
Emergency Phone Num:717-457-6724;800-424-9300(CHEMTREC)
CAGE:51580
=== Contractor Identification ===
Company Name:GOEX INC
Address:1002 SPRINGBROOK AVE
Box:City:MOOSIC
State:PA
ZIP:18507
Country:US
Phone:717-457-6724
CAGE:51580

========== Composition/Information on Ingredients ==========

Ingred Name:POTASSIUM NITRATE
CAS:7757-79-1
RTECS #:TT3700000
Fraction by Wt: 70-76%

Ingred Name:CHARCOAL
CAS:16291-96-6
RTECS #:FL7243500
Fraction by Wt: 8-18%

Ingred Name:SULFUR; (SULPHUR)
CAS:7704-34-9
RTECS #:WS4250000
Fraction by Wt: 9-20%

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Explanation of Carcinogenicity:NOT RELEVANT

========== First Aid Measures ==========

First Aid:INGEST:CALL MD IMMEDIATELY . INHAL:REMOVE TO FRESH AIR.
SUPPORT BREATHING (GIVE O*2/ARTF RESP) . EYES:IMMEDIATELY FLUSH
W/POTABLE WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE
FROM
MD . SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER. CALL MD .

========== Fire Fighting Measures ==========

Extinguishing Media:WATER.
Fire Fighting Procedures:DO NOT FIGHT FIRES. EVACUATE AREA.
Unusual Fire/Explosion Hazard:DO NOT FIGHT FIRES. BLACK POWDER MAY
DEFLAGRATE OR EXPLODE IN A FIRE WHILE CONFINED. EVACUATE AREA.

========== Accidental Release Measures ==========

Spill Release Procedures:CAREFULLY PICK UP SPILLS W/NONSPARKING &
NONSTATIC PRODUCING TOOLS. SUPERVISION ONLY BY A PERSON
KNOWLEDGEABLE IN EXPLOSIVES.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:NO SMOKING. STORE IN A COOL, DRY
PLACE.
Other Precautions:AFFECTED EQUIPMENT MUST BE THOROUGHLY WATER
CLEANED
BEFORE ATTEMPTING REPAIRS. USE ONLY NONSPARKING TOOLS.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE
FOR EXPOSURE OF CONCERN .
Ventilation:NOT REQUIRED IN OPEN, UNCONFINED AREAS.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:CHEMICAL WORKERS GOGGLES .
Other Protective Equipment:METAL FREE & NONSTATIC PRODUCING CLOTHES.
Work Hygienic Practices:WASH HANDS/SHOWER.
Supplemental Safety and Health

SPEC GRAV:1.7-1.82 (H*2O=1).

========== Physical/Chemical Properties ==========

Spec Gravity:SUPP DATA
pH:6-8
Solubility in Water:HIGH
Appearance and Odor:BLACK; NO ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
Stability Condition to Avoid:KEEP AWAY FROM HEAT, SPARKS & OPEN FLAME.
AVOID IMPACT, FRICTION & STATIC ELECTRICITY.
Hazardous Decomposition Products:NONE SPECIFIED BY MANUFACTURER.

========== Disposal Considerations ==========

Waste Disposal Methods:DE-SENSITIZE BY DILUTING IN WATER. OPEN TRAIN
BURNING OF SMALL UNCONFINED QUANTITIES. ALL PROCEDURES MUST BE IN
COMPLIANCE W/ALL LOCAL, STATE & FEDERAL REGULATIONS.

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BUCKEYE FIRE EQUIPMENT CO -- CARBON DIOXIDE (CO2) -- 4210-00-203-0217
========== Product Identification ==========

Product ID:CARBON DIOXIDE (CO2)
MSDS Date:12/01/1990
FSC:4210
NIIN:00-203-0217
MSDS Number: BXWLF

=== Responsible Party ===
Company Name:BUCKEYE FIRE EQUIPMENT CO
Address:102 INDUSTRIAL DR
City:KINGS MOUNTAIN
State:NC
ZIP:28086
Country:US
Info Phone Num:704-739-7415
Emergency Phone Num:704-739-7415
CAGE:57658
=== Contractor Identification ===
Company Name:BUCKEYE FIRE EQUIPMENT CO
Address:110 KINGS RD
Box:428
City:KINGS MOUNTAIN
State:NC
ZIP:28086
Country:US
Phone:704-739-7415
CAGE:57658

========== Composition/Information on Ingredients ==========

Ingred Name:CARBON DIOXIDE
CAS:124-38-9
RTECS #:FF6400000
Other REC Limits:NONE RECOMMENDED
OSHA PEL:5000 PPM
ACGIH TLV:5000PPM/30000STEL;95

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE: DIRECT CONTACT WITH LIQUID OR SOLID WILL CAUSE BURNS, FROSTBITE OR BLINDNES. CARBON DIOXIDE IS AN ASPHYXIANT (DISPLACES OXYGEN). CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Explanation of Carcinogenicity:NO INGREDIENT OF A CONCENTRATION OF 0.1% OR GREATER IS LISTED AS A CARCINOGEN OR SUSPECTED CARCINOGEN.
Effects of Overexposure:INHALED-SHORTNESS OF BREATH, INGREASED INHALATION RATE, UNCONSCIOUSNESS, POSSIBLE DEATH. CONTACT (SKIN, EYES): BURNS, FROSTBITE, PAIN.
Medical Cond Aggravated by Exposure:NONE KNOWN.

========== First Aid Measures ==========

First Aid:SKIN/EYES-TREAT AREA EXPOSED TO SOLID OR LIQUID AS FROSTBITE.
GET IMMEDIATE MEDICAL ATTENTION. INHALED-REMOVE TO FRESH AIR. RESTORE BREATHING IF REQUIRED. GET MEDICAL ATTENTION.

========== Fire Fighting Measures ==========

Extinguishing Media:NONE, THIS MATERIAL IS AN EXTINGUISHING AGENT. DLA-HMIS: USE MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures:NONE. DLA-HMIS: WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR. COOL FIRE EXPOSED CONTAINERS
WITH WATER.
Unusual Fire/Explosion Hazard:NONE.

========== Accidental Release Measures ==========

Spill Release Procedures:RELEASED GAS WILL DISSIPATE RAPIDLY AND HARMLESSLY TO ATMOSPHERE, IN OPEN AREAS. IN CONFINED OR ENCLOSED
AREAS, MOVE PERSONNEL AND VENTILATE AREA. VENT TO ATMOSPHERE.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE AWAY FROM DIRECT HEAT OR FLAME.
Other Precautions:NONE.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:IF ENGINEERING CONTROLS FAIL OR NON-ROUTINE USE OR AN EMERGENCY OCCURS; WEAR AN MSHA/NIOSH APPROVED AIR-SUPPLIED
RESPIRATOR OR SCBA, AS REQUIRED. USE IN ACCORDANCE WITH 29 CFR 1910.134 AND MANUFACTURE R'S RECOMMENDATIONS.
Ventilation:USE ADEQUATE MECHANICAL VENTILATION OR LOCAL EXHAUST TO MAINTAIN EXPOSURE BELOW TLV(S).
Protective Gloves:USE INSULATED GLOVES IF LIQUID OR SOLID.
Eye Protection:SAFETY GLASSES.
Other Protective Equipment:NONE REQUIRED.
Work Hygienic Practices:USE GOOD HYGIENE AND GOOD HOUSEKEEPING PRACTICES.
Supplemental Safety and Health
CONTAINS 15 POUNDS, NOMINAL.

========== Physical/Chemical Properties ==========

HCC:G3
Boiling Pt:B.P. Text:-109F,-78C
Vapor Pres:GAS @ 70F
Vapor Density:1.52
Evaporation Rate & Reference:HIGH (N-BUTYL ACETATE=1)
Solubility in Water:SLIGHT
Appearance and Odor:COLORLESS LIQUID OR GAS; NO ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE SPECIFIED BY MANUFACTURER.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:NONE SPECIFIED BY MANUFACTURER.
Conditions to Avoid Polymerization:WILL NOT OCCUR.

========== Disposal Considerations ==========

Waste Disposal Methods:DLA-HMIS: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL ENVIRONMENTAL REGULATIONS.

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AERVOE-PACIFIC CO INC -- 936 SILICONE LUBE, 50A -- 6850-00N078808
========== Product Identification ==========

Product ID:936 SILICONE LUBE, 50A
MSDS Date:01/14/1993
FSC:6850
NIIN:00N078808
MSDS Number: CGGPN
=== Responsible Party ===
Company Name:AERVOE-PACIFIC CO INC
Address:1198 SAWMILL RD
City:GARDNERVILLE
State:NV
ZIP:89410
Country:US
Info Phone Num:702-782-0100
Emergency Phone Num:800-424-9300(CHEMTREC)
Preparer's Name:MIKE A. TRAQUINA
CAGE:0UPL1
=== Contractor Identification ===
Company Name:AERVOE-PACIFIC CO INC
Address:1198 SAWMILL RD
Box:City:GARDNERVILLE
State:NV
ZIP:89410
Country:US
Phone:702-782-0100
CAGE:0UPL1

========== Composition/Information on Ingredients ==========

Ingred Name:HEXANE; (N-HEXANE) (CERCLA). LD50:(ORAL,RAT) 28710 MG/KG.
CAS:110-54-3
RTECS #:MN9275000
Fraction by Wt: 30%
OSHA PEL:500 PPM
ACGIH TLV:50 PPM
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:VM & P NAPHTHA; (PETROLEUM NAPHTHA). LD50:(ORAL,RAT) >25 MG/KG.
CAS:64742-89-8
Fraction by Wt: 35%
OSHA PEL:400 PPM (MFR)
ACGIH TLV:400 PPM (MFR)

Ingred Name:PROPANE
CAS:74-98-6
RTECS #:TX2275000
Fraction by Wt: 15%
OSHA PEL:1000 PPM
ACGIH TLV:ASPHYXIANT

Ingred Name:PROPANE, 2-METHYL-; (ISOBUTANE)
CAS:75-28-5
RTECS #:TZ4300000
Fraction by Wt: <5%
OSHA PEL:800 PPM (MFR)
ACGIH TLV:800 PPM (MFR)

Ingred Name:BUTANE; (NORMAL BUTANE)
CAS:106-97-8
RTECS #:EJ4200000
Fraction by Wt: 10%
OSHA PEL:800 PPM
ACGIH TLV:800 PPM

Ingred Name:VOLATILE ORGANIC COMPOUNDS (COATING): 5.09 LBS/GAL (610 G/L).
RTECS #:9999999VO

========== Hazards Identification ==========

LD50 LC50 Mixture:SEE INGREDIENTS.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:INHALATION:ANESTHETIC, IRRITATION OF THE RESPIRATORY TRACT OR NERVOUS SYSTEM DEPRESSION-CHARACTERIZED BY HEADACHE, DIZZINESS, NAUSEA OR POSSIBLE UNCONSCIOUSNESS. EYE CONTACT:PRIMARY IRRITATION. SKIN:C ONTACT OR ABSORPTION MAY CAUSE IRRITATION OR BURNING SENSATION. PROLONGED OR REPEATED CONTACT MAY CAUSE(EFTS OF OVEREXP)
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:HLTH HAZ:DERMATITIS - EXERCISE DUE CARE. INGESTION:NOT APPLICABLE.
Medical Cond Aggravated by Exposure:NONE KNOWN.

========== First Aid Measures ==========

First Aid:INGEST:CALL MD IMMEDIATELY . INHAL:REMOVE FROM EXPOSURE & RESTORE BREATHING, SEEK MEDICAL ATTENTION. SKIN:WASH AFFECTED AREA.
REMOVE CONTAMINATED CLOTHING. SEE MD IF ANY IRRITATION PERSISTS. EYE S:FLUSH IMMEDIATELY W/WATER FOR AT LEAST 15 MINUTES & TAKE TO MD.

========== Fire Fighting Measures ==========

Flash Point:-0F,-18C
Lower Limits:1%
Upper Limits:9.5%
Extinguishing Media:FOAM, ALCOHOL FOAM, CO*2, DRY CHEMICAL, WATER FOG.
Fire Fighting Procedures:USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT . WATER SPRAY MAY BE USED TO COOL CONTAINERS EXPOSED TO
HEAT OR FIRE.
Unusual Fire/Explosion Hazard:CLSD CNTNRS MAY EXPLODE DUE TO BUILD UP OF PRESS FROM EXTREME HEAT/FIRE. AEROSOL SPRAY IS EXTREMELY FLAMM.
SENSITIVITY TO IMPACT:DO NOT PUNCTURE. (SUPP DATA)

========== Accidental Release Measures ==========

Spill Release Procedures:REMOVE ALL SOURCES OF IGNITION, FLAMES, SPARKS, STATIC ELECTRICITY & ELECTRICAL. VENTILATE AREA & SOAK UP W/INERT ABSORBENT USING NON-SPARKING TYPE TOOLS.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:DO NOT STORE ABOVE 120F. DO NOT STORE OR USE NEAR HEAT, SPARKS OR FLAME. DO NOT GET IN EYES. DO NOT BREATHE VAPORS. AVOID SKIN CONTACT.
Other Precautions:DO NOT TAKE INTERNALLY. SMOKING WHILE USING THIS PRODUCT MUST BE STRICTLY PROHIBITED. AVOID PROLONGED OR REPEATED
CONTACT.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:IN RESTRICTED AREAS W/POOR VENTILATION USE A NIOSH APPROVED RESPIRATOR W/ORGANIC VAPOR CARTRIDGE.
Ventilation:ALL APPLICATION AREAS SHOULD BE ADEQUATELY VENTILATED IN ORDER TO KEEP INGREDIENTS BELOW THEIR EXPOSURE LIMITS.

Protective Gloves:IMPERVIOUS GLOVES.
Eye Protection:ANSI APPROVED CHEM WORKERS GOGGS .
Other Protective Equipment:EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET
ANSI DESIGN CRITERIA . IMPERVIOUS APRON IS REC TO PREVENT SKIN CONT.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
EXPLO HAZ:SENSITIVITY TO STATIC DISCHARGE: PRIMARILY VAPORS.

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:10F,-12C
Vapor Density:HVR/AIR
Spec Gravity:0.7 (H*2O=1)
Evaporation Rate & Reference:FASTER/N-BUTYL ACETATE
Solubility in Water:NEGLIGIBLE
Appearance and Odor:CLEAR LIQUID; SOLVENT BASED ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:HIGH TEMPERATURES.
Hazardous Decomposition Products:CARBON MONOXIDE & CARBON DIOXIDE.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF I/A/W LOCAL, STATE & FEDERAL REGULATIONS. DO NOT INCINERATE CLOSED CONTAINERS.

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BOWMAN DISTRIBUTION, BANRES GROUP INC -- 21911 WHITE LUBE LITHIUM GREASE -- 9150-00F014116
========== Product Identification ==========

Product ID:21911 WHITE LUBE LITHIUM GREASE
MSDS Date:10/18/1988
FSC:9150
NIIN:00F014116
MSDS Number: BJTPZ
=== Responsible Party ===
Company Name:BOWMAN DISTRIBUTION, BANRES GROUP INC
Address:850 EAST 72ND STREET
City:CLEVELAND
State:OH
ZIP:44103
Info Phone Num:(216) 391-7200
Emergency Phone Num:(216) 391-7200
CAGE:05575
=== Contractor Identification ===
Company Name:BOWMAN DISTRIBUTION, BARNES GROUP INC
Address:1301 EAST 9TH ST, SUITE 700
Box:City:CLEVELAND
State:OH
ZIP:44114-1824
Country:US
Phone:216-416-7200
CAGE:05573
Company Name:BOWMAN DISTRIBUTION, BARNES GROUP INC.
Address:850 EAST 72ND STREET
City:CLEVELAND
State:OH
ZIP:44103
Phone:(216) 391-7200
CAGE:05575

========== Composition/Information on Ingredients ==========

Ingred Name:METHYL CHLOROFORM (1,1,1-TRICHLOROEHANE) (SARA III)
CAS:71-55-6
RTECS #:KJ2975000
Fraction by Wt: 15.0%
Other REC Limits:350 PPM (CL)
OSHA PEL:350 PPM/450 STEL
ACGIH TLV:350 PPM/450STEL;9192
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ozone Depleting Chemical:1

Ingred Name:HEXANE (N-HEXANE)
CAS:110-54-3
RTECS #:MN9275000
Fraction by Wt: 22.0%
Other REC Limits:50 PPM
OSHA PEL:500 PPM
ACGIH TLV:50 PPM; 9293
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:GREASE
Fraction by Wt: 38.0%

Ingred Name:ISOBUTANE, 2-METHYLPROPANE
CAS:75-28-5
RTECS #:TZ4300000
Fraction by Wt: <25.0%
Other REC Limits:1000 PPM
OSHA PEL:1800 MG/CUM
ACGIH TLV:1000 PPM

Ingred Name:PROPANE
CAS:74-98-6
RTECS #:TX2275000
Fraction by Wt: <25.0%
Other REC Limits:1800 MG/CUM
OSHA PEL:1000 PPM
ACGIH TLV:ASPHYXIANT; 9192

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:INHALATION: DIZZINESS OR NARCOSIS.
SKIN: DEFATTING, EFFECTS ARE REVERSIBLE. LONG TERM EXPOSURE VAPOR
MAY CAUSE LUNG, LIVER OR KIDNEY DAMAGE. THE SOLVENTS LISTED HAVE
BEEN REPORTED TO AFFECT THE CENTRA L NERVOUS SYSTEM. INGESTION:
HARMFUL.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:INHALATION: DIZZINESS, NARCOSIS. SKIN:
DEFATTING, EFFECTS ARE REVERSIBLE. LONG TERM EXPOSURE VAPOR MAY
CAUSE LUNG, LIVER OR KIDNEY DAMAGE. THE SOLVENTS LISTED HAVE

BEEN
REPORTED TO AFFECT THE CENTRAL NERVOUS SYSTEM. INGESTION: HARMFUL.
Medical Cond Aggravated by Exposure:HEART DISEASE, RESPIRATORY DISORDER.

========== First Aid Measures ==========

First Aid:INHALATION: IF UNCONSCIOUS, REMOVE PERSON TO FRESH AIR. EYES:
FLUSH W/LARGE QUANTITIES OF WATER. OBTAIN MEDICAL ATTENTION IN ALL
CASES.

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:-40F
Lower Limits:1.8%
Upper Limits:12.0%
Extinguishing Media:WATERFOG, FOAM, CO2, OR DRY CHEMICAL
Fire Fighting Procedures:KEEP CONTAINERS COOL. USE EQUIPMENT OR SHIELDING REQUIRED TO PROTECT PERSONNEL AGAINST BURSTING OR VENTING
CONTAINERS.
Unusual Fire/Explosion Hazard:AT ELEVATED TEMPERATURES >130F CONTAINERS
MAY VENT, RUPTURE OR BURST.

========== Accidental Release Measures ==========

Spill Release Procedures:USE ABSORBENT SWEEPING COMPOUND TO SOAK UP MATERIAL. PUT INTO CONTAINER. DISPOSE AS HAZARDOUS WASTE.

========== Handling and Storage ==========

Handling and Storage Precautions:DON'T STORE AT TEMPERATURES >120F.
Other Precautions:NONE

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:AVOID BREATHING CONCENTRATED VAPORS OR PARTICLES
FROM ALL PRODUCTS NOT SPECIFICALLY DESIGNED TO BE INHALED.
Ventilation:LOCAL EXHAUST: NORMAL USE-NORMAL VENTILATION
Eye Protection:SAFETY GLASSES REQUIRED

Other Protective Equipment:LONG SLEEVES/PANTS.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:-40 - >600F
Vapor Pres:55 PSI
Vapor Density:4.0
Spec Gravity:0.8
pH:NONE
Appearance and Odor:LIQUID GAS, WHITE & SOLVENT ODOR.
Percent Volatiles by Volume:60.0%

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
Stability Condition to Avoid:PRESSURIZED CONTAINERS COULD RUPTURE >130F.
Hazardous Decomposition Products:CO, CO2, WATER, PHOSGENE & HALOGEN ACIDS.

========== Disposal Considerations ==========

Waste Disposal Methods:DON'T PUNCTURE OR INCINERATE CONTAINERS. DISPOSE AS HAZARDOUS WASTE IN ACCORDANCE W/EPA RCRA. CONSUMER COMMODITY, ORM-D, UN 1954. RCRA HAZARDOUS WASTE: D001.

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CHESTER LABORATORIES -- ISOPROPYL RUBBING ALCOHOL, USP -- 6810-00-311-0192
========== Product Identification ==========

Product ID:ISOPROPYL RUBBING ALCOHOL, USP
MSDS Date:08/20/1993
FSC:6810

NIIN:00-311-0192
MSDS Number: CHHNG
=== Responsible Party ===
Company Name:CHESTER LABORATORIES
Address:3208 DIXIE HWY
City:ERLANGER
State:KY
ZIP:41018
Country:US
Info Phone Num:800-354-9709
Emergency Phone Num:606-578-4550
Preparer's Name:KENNETH P. REED, PH.D,CIH
CAGE:JO149
=== Contractor Identification ===
Company Name:CHESTER LABORATORIES
Box:UNKNOW
CAGE:87879
Company Name:CHESTER LABORATORY INC
Address:3208 DIXIE HIGHWAY
Box:City:ERLANGER
State:KY
ZIP:41018-1876
Country:US
Phone:606-341-7972
CAGE:JO149
Company Name:ROCHESTER MIDLAND CORP, INDUSTRIAL DIV
Address:321 COMMERCIAL AVE
Box:City:PALISADES PARK
State:NJ
ZIP:07650
Country:US
Phone:201-947-9880
CAGE:0D8W2

========== Composition/Information on Ingredients ==========

Ingred Name:ISOPROPYL ALCOHOL (SARA III)
CAS:67-63-0
RTECS #:NT8050000
Fraction by Wt: 70%
Other REC Limits:NONE SPECIFIED
OSHA PEL:400 PPM/500 STEL
ACGIH TLV:400 PPM/500STEL;9192

========== Hazards Identification ==========

LD50 LC50 Mixture:TLV = 400 PPM
Routes of Entry: Inhalation:YES Skin:NO Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE: OVEREXPOSURE MAY LEAD TO CENTRAL NERVOUS SYSTEM DEPRESSION, LEADING TO HEADACHES AND DIZZINESS. EYE: MAY LEAD TO IRRITATION AND WILL INJURE EYE TISSUE IF NOT REMOVED PROMPTLY. SKIN: MAY LEAD TO DERMATITIS. INGESTION:
MAY LEAD TO VOMITING. CHRONIC: PROLONGED SKIN CONTACT MAY CAUSE
DERMATITIS.
Explanation of Carcinogenicity:THIS CHEMICAL IS NOT LISTED AS HAVING ANY EVIDENCE OF BEING CARCINOGENIC.
Effects of Overexposure:OVEREXPOSURE MAY LEAD TO DIZZINESS, HEADACHES, DERMATITIS AND EYE IRRITATION. HIGH VAPOR CONCENTRATIONS ARE ANESTHETIC AND MAY HAVE OTHER CENTRAL NERVOUS SYSTEM EFFECTS, SUCH
AS LIGHTHEADEDNESS, HEADA CHE AND DIZZINESS.
Medical Cond Aggravated by Exposure:PERSONS WITH SKIN, HEART, RESPIRATORY, OR ANY OTHER MEDICAL CONDITION SHOULD USE CAUTION WHEN
HANDLING OR USING THIS PRODUCT.

========== First Aid Measures ==========

First Aid:SKIN: IMMEDIATELY FLUSH WITH SOAP AND WATER. GET MEDICAL ATTENTION IF NECESSARY. INHALATION: IMMEDIATELY REMOVE VICTIM TO FRESH AIR. GIVE CPR IF BREATHING HAS STOPPED. GET MEDICAL ATTENTION. EYE: IMME DIATELY FLUSH WITH WATER FOR 15 MINUTES.GET MEDICAL ATTENTION. INGESTION: GET PROMPT MEDICAL ATTENTION. DO NOT
INDUCE VOMITING. KEEP AT REST.

========== Fire Fighting Measures ==========

Flash Point Method:SCC
Flash Point:53.0F,11.7C
Lower Limits:2
Upper Limits:13
Extinguishing Media:USE FOAM, OR DRY CHEMICAL. USE WATER SPRAY TO COOL
FIRE EXPOSED CONTAINERS AND TO PROTECT PERSONNEL.
Fire Fighting Procedures:WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS.
Unusual Fire/Explosion Hazard:COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS. VAPORS HEAVIER

THAN
AIR, CAN TRAVEL ALONG GROUND AND FLASHBACK.

========== Accidental Release Measures ==========

Spill Release Procedures:VENTILATE. ELIMINATE IGNITION SOURCES. ABSORB MATERIAL WITH CLAY, VERMICULITE, OR SIMILAR ABSORBENT MATERIAL. PLACE IN DISPOSAL CONTAINERS. FLUSH AREA WITH WATER.

========== Handling and Storage ==========

Handling and Storage Precautions:USE ONLY IN WELL VENTILATED WORK AREA. KEEP CONTAINERS CLOSED WHEN NOT IN USE. FLAMMABLE LIQUID. DO NOT
STORE ABOVE 120F.
Other Precautions:DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. EXPLOSION HAZARD.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE NORMALLY REQUIRED. USE NIOSH/MSHA APPROVED
RESPIRATOR. AIR-SUPPLIED OR FILTERING TYPE WITH ORGANIC VAPOR CARTRIDGES IF TLV IS EXCEEDED.
Ventilation:LOCAL AND MECHANICAL EXHAUST RECOMMENDED. AVOID OPEN ELECTRICAL SOURCES NEAR PRODUCT VAPOR AREAS.
Protective Gloves:NEOPRENE, NITRILE, OR POLYVINYL ALCOHOL
Eye Protection:USE CHEMICAL SAFETY GOGGLES & FACESHIELD
Other Protective Equipment:SAFETY SHOES, EYE WASH STATION AND SAFETY SHOWER.
Work Hygienic Practices:DO NOT TAKE INTERNALLY. AVOID SKIN CONTACT. WASH SKIN AFTER USING PRODUCT. DO NOT EAT, DRINK OR SMOKE IN WORK
AREA.
Supplemental Safety and Health
NONE

========== Physical/Chemical Properties ==========

HCC:F2
Boiling Pt:B.P. Text:194F,90C
Vapor Pres:38
Vapor Density:2.0
Spec Gravity:0.82
Evaporation Rate & Reference:2.8 (BUTYL ACETATE = 1)

Solubility in Water:100%
Appearance and Odor:CLEAR, COLORLESS LIQUID WITH AN ALCOHOL ODOR.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS, REACTIVE ALKALI METALS.
Stability Condition to Avoid:HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION. ALSO AVOID VAPOR ACCUMULATION.
Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE, INCOMPLETELY BURNED CARBON PRODUCTS.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF ALL WASTE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. INCINERATION IS RECOMMENDED.

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