

UNITED STATES DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration NATIONAL MARINE FISHERIES SERVICE ALASKA FISHERIES SCIENCE CENTER NATIONAL MARINE MAMMAL LABORATORY 7600 Sand Point Way NE, Bin C15700 Seattle, Washington 98115-0070

	Project Instructions
Date Submitte	ed: January 8, 2014
Platform:	NOAA Ship Oscar Dyson R-224
Project Numb	DY-14- 04 (OMAO)
Project Title:	Ecology of Ice-associated Seals in the Bering Sea, DY-14-04
Project Dates	April 4, 2014 to May 1, 2014
Prepared by:	Dated:Jan. 8, 2014 Michael Cameron Chief Scientist
Approved by:	Polar Ecosystems Program, NMML BOVENG.PETER. LAURENS.136587836 Dated:
	Peter Boveng Leader Polar Ecosystems Program, NMML
Approved by:	Douglas Demaster Dated: 1/14/2014
14	Science and Research Director Alaska Fisheries Science Center, NMFS

Approved by:

Dated:

Captain Wade J. Blake, NOAA Commanding Officer Marine Operations Center – Pacific



I. Overview

A. Brief Summary and Project Period

This project is a study of the habitat requirements and ecological relationships with sea ice, of ribbon and spotted seals in the core of their Bering Sea breeding area. The seals' movements, haul-out behavior, diet, genetic population structure, health will be investigated and monitored. A particular focus of the work in 2014 will be on health and condition of young-of-the-year seals and potential impacts of diminishing sea ice. Science operations are anticipated to commence on April 4 and end on May 1.

B. Days at Sea (DAS)

Of the 28 DAS scheduled for this project, 28 DAS are funded by an OMAO allocation. This project is estimated to exhibit a Low Operational Tempo.

C. Operating Area

The location of science operations will depend upon the extent and concentration of sea ice at the time, but it is expected to be in the marginal ice zone as outlined by the green box in Figure 1.



Figure 1. Area of operations (green box). April 2013 sea ice concentration is shown in shades of blue, the red line is the median ice extent for April. The yellow shaded areas depict Steller Sea Lion Critical Habitat.

The project methods will primarily be satellite tracking and telemetry, and the collection of samples that are available during the process of handling and attaching tracking tags to seals. Seals on ice floes will be approached using inflatable skiffs (project owned) launched from the ship, and then captured on the ice in hand-held nets. Samples of skin, blood, hair, and whiskers will be collected, along with swabs for disease assays. Feces and urine will be collected occasionally when they are available. Seals with tracking tags will continue to provide data on movements, diving behavior, and haul-out timing (crucial for abundance and trend monitoring) for several months to several years following the conclusion of the project.

E. Participating Institutions

NOAA Fisheries

Name (Last,	Title	Date	Date	Gender	Affiliation	Nationality
First)		Aboard	Disembark			
Barbieri,	Dr.					
Michelle	(D.M.V.)	4-Apr-14	1-May-14	F	NMFS	USA
Boveng, Peter	Dr. (PI)	4-Apr-14	1-May-14	М	NMFS	USA
	Mr.					
Brady, Gavin	(Biologist)	4-Apr-14	1-May-14	М	NMFS	USA
Cameron,	Dr.					
Michael	(ChiefSci)	4-Apr-14	1-May-14	М	NMFS	USA
	Mr.					
Dahle, Shawn	(Biologist)	4-Apr-14	1-May-14	М	NMFS	USA
	Mr.					
Jansen, John	(Biologist)	4-Apr-14	1-May-14	М	NMFS	USA
	Dr.					
London, Josh	(Biologist)	4-Apr-14	1-May-14	М	NMFS	USA
	Dr.					
McClintock,	(Statisticia					
Brett	n)	4-Apr-14	1-May-14	М	NMFS	USA
	Mr.					
Ziel, Heather	(Biologist)	4-Apr-14	1-May-14	F	NMFS	USA

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

G. Administrative

1. Points of Contact:

P.I.: Peter Boveng, Peter.Boveng@noaa.gov, 206-526-4244

Chief Sci.: Michael Cameron, Michael.cameron@noaa.gov, 206-526-6396

Chief Sci. Alternate: Josh London, Joshua.London@noaa.gov, 205-526-4296

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

This project will be conducted under the Marine Mammal Protection Act Scientific Research Permit (15126) issued by the Office of Protected Resources, National Marine Fisheries Service on May 6, 2010 and expiring May 30, 2015 issued to the National Marine Mammal Laboratory

II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

April 1	Scientists arrive in Kodiak, AK
April 4	Depart Kodiak, AK no later than 1200
April 6 – 29 April	Conduct operations within the Bering Sea marginal sea ice zone
May 1	Arrive Dutch Harbor, AK

B. Staging and Destaging:

We intend to send all equipment and supplies north with the Dyson (see Appendix A) and/or ship them to a storage facility in Kodiak, AK prior to scientists' arrival on April 1. Based on past experience, everything can be loaded onto the *Oscar Dyson* in one day, April 2, with April 3 being a buffer day. All personnel will embark the *Oscar Dyson* in Kodiak and disembark Dutch Harbor, AK after the completion of the project. We intend to unload the *Oscar Dyson* on May 1 or 2, having made prior arrangements to ship all equipment and supplies back to Seattle.

C. Operations to be Conducted:

<u>Primary research</u>: Research operations are expected to be very similar to those conducted from the *Oscar Dyson* in 2007-2008 and the *McArthur II* in 2009 and 2010, although the operations in 2014 will not involve unmanned aircraft activities. The first operation upon leaving Kodiak will be to proceed as quickly as possible to the Bering Sea seasonal ice front, i.e., the nearest point of the ice front as indicated by the analysis of the National Ice Center and other available ice imagery. Some marine mammal observations will be conducted during daylight hours on the transit to the ice front, but most of the transit will be spent unpacking gear and staging for capture

and research activities. Once the vessel has reached the ice front, time will be taken as necessary to evaluate the conditions in and near the ice margins. A safety briefing will be conducted each morning prior to any small boat launch and will be attended by all associated personnel. Once the safe operating capabilities have been determined, daily operations will commence, consisting of moving gradually west along the ice front, conducting transect surveys for seals, and stopping to capture seals when conditions (weather, daylight, and entering the ice only where ice density and thickness are no heavier than the ABS ice classification of the vessel will permit).

Small Boat and off-ship operations: (see Appendix B)

<u>Sea-Ice Imagery:</u> The Chief Scientist will provide the ship command with updated satellite imagery as frequently as possible. These satellite products will include Radarsat, AVHRR, MODIS and other products obtained from the National Ice Center. The Chief Scientist and Commanding Officer will use the images in conjunction with on-site observations to plan the ship movements.

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (<u>http://www.ndc.noaa.gov/dr.html</u>) and require the approval of the ship's Commanding Officer.

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations:

Poor weather conditions, poor ice conditions, equipment failure, safety concerns, unforeseen circumstances.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized)

Sufficient consumables, backup units, and on-site spares and technical support must be in place to assure that operational interruptions are minimal. The following systems and their associated support services are essential to the project:

- 1. Global Positioning System via the Scientific Computer System (also see Section VI.A.)
- 2. Surface seawater thermo-salinograph (in bow) calibrated to 0.05°C and 0.01 ppt with calibration records
- 3. Deck machinery for launching and recovering inflatable boats (1000 lbs max). These will not be hoisted while containing personnel.

- 4. Appropriate bulk storage for at least 100 gallons unleaded gasoline for outboard engines (see Appendix C)
- 5. SCS display in the Electronics Lab and main Oceanographic Lab
- 6. Approximately 2.5 cu ft of -20°C and 2.5 cu ft of -80°C freezer space for scientific samples, including seal tissues, blood, and feces
- 7. The ship is requested to provide technical expertise and assistance if unexpected problems arise
- B. Equipment and Capabilities provided by the scientists (itemized)

The scientific party will provide the following items and will be responsible for their maintenance support:

- 1. Five inflatable boats (Mark II or Mark III), including one or two spares that will remain packed unless needed
- 2. Five 4-stroke outboard motors
- 3. Spare parts for boats and motors
- 4. Nets and sampling gear for seal captures and handling
- 5. Satellite-linked dive recorders for seals
- 6. Binoculars, inclinometers, and rangefinders for bridge-based transect surveys of seals and other marine mammals
- 7. Protective clothing, including dry suits or Mustang suits for small boat operations
- 8. Safety and survival supplies for small boat operations (e.g., VHF radios, GPSs, EPIRBs)
- 9. All vials, instruments, chemicals, and other supplies required for onboard processing and curation of biological samples.

IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

B. Inventory

See attached Appendix C

C. Chemical safety and spill response procedures

See attached Appendix C

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information*. To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their data.

A. Data Classifications:

The Chief Scientist, with permission of the ship's command, will contact the senior survey technician prior to the project to determine the final parameters to be logged by the SCS system. These parameters should maintain some level of consistency between years and ships in order to maximize the application of these data to multi-year studies. The senior survey technician should provide the Chief Scientist with a final list of parameters recorded during the project and describe those parameters such that future research efforts can be consistent.

The ship's SCS system should log the following parameters. These variables are developed from the systems present on the *Oscar Dyson (DY0805 project):*

MX420-Date MX420-Time MX420-Lat MX420-Lon MX420-Quality MX420-COG MX420-SOG **GYRO** SOG-ms-Value Seabird-Temp Seabird-Conductivity Seabird-Salinity Seabird-External-Temp **Baro-Press Rel-Humidity** Air-Temp Flurorometer-Val TWind-Spd-ms-Value **YOUNG-TWIND-Direction** Rel-Wind-Spd

Rel-Wind-Dir ES60-50hz-Depth ES60-200hz-Depth

The following data products will be produced by the ship and, if requested, will be given to the Chief Scientist at the end of the project:

- 1. Navigational log sheets (MOAs);
- 2. TSG data written to SCS as ASCII data and preferably as raw Seasave .hex files;
- 3. SCS tapes

In addition, we require that the SCS system broadcast the ships basic GPS data via TCP/IP so that any computer plugged into the network could tap into that for data logging or mapping purposes Scientists will provide software than can create a virtual port on their computers from a TCP/IP broadcast.

The ship will make all efforts to provide network access for shared file storage and provide access to at least one printer for all scientific personnel and their laptop computers. The majority of the science party laptops are joined to the AFSC domain and cannot be removed from this domain. Guest scientists in the party will not be joined to the NMFS domain, and cannot be joined to the ship's domain. Visiting scientists must be able to share via network, files on their computers to those on the AFSC domain. Visiting scientists must also be able to print via network to a ship's lab printer. Program scientists will coordinate with the ship's network administrator to ensure a solution has been implemented prior to the ship's departure. Note: The ETs on the *Oscar Dyson* in 2008 were able to accomplish this by registering the MAC addresses of the laptops and authorizing them to access network resources.

B. Responsibilities:

The Chief Scientist will be responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist will also be responsible for the dissemination of copies of these data to participants in the project and to any other requesters.

The Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the project's principal investigators or their designees. Copies of ancillary project data will be provided to the Chief Scientist when requested. The ship may assist in copying data and reports insofar as facilities allow.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. <u>Pre-Project Meeting</u>: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all

concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

- B. <u>Vessel Familiarization Meeting</u>: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.
- C. <u>Post-Project Meeting</u>: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.
- D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at <u>http://www.omao.noaa.gov/fleeteval.html</u> and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non NOAA or non Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

Excerpted from Appendix B: The NMML research team will typically be away from ship for several hours each day, and likely to miss scheduled meals. During previous research projects onboard NOAA Vessels, the Chief Steward purchased additional snacks (e.g., pop-tarts, granola bars, chips) and sandwich fixings along with portable coolers. NMML researchers would prepare the coolers with sandwiches and snacks prior to departure. The Chief Steward left meals (especially dinner) on the warmer and available for us upon our return. These accommodations by the Chief Steward and First Cook were much appreciated and were a significant contribution to the success of previous seal research projects. We would very much appreciate it if these accommodations could be continued on this project.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, Revised: 02 JAN 2012) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/~noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014 must be accompanied by <u>NOAA Form (NF) 57-10-02</u> - Tuberculosis Screening Document in compliance with <u>OMAO Policy 1008</u> (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the

participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is <u>Accellion Secure File Transfer</u> which requires the sender to setup an account. <u>Accellion's Web Users Guide</u> is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to <u>accellionAlerts@doc.gov</u> requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services Marine Operations Center – Pacific 2002 SE Marine Science Dr. Newport, OR 97365 Telephone 541-867-8822 Fax 541-867-8856 Email <u>MOP.Health-Services@noaa.gov</u>

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.

- (2) Installation of the latest critical operating system security patches.
- (3) No external public Internet Service Provider (ISP) connections.

Completion of the above requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

Foreign National access to the NOAA ship or Federal Facilities is not required because no foreign nationals will be included in the science party.

VIII. Appendices

- A. Load Weights and volumes
- B. Small Boat Operations
- C. Hazardous Materials and spill procedures

APPENDIX A - LOAD WEIGHTS AND VOLUMES

Volume and Weights of Scientific Equipment

Sent North with Dyson

			Vol.	Weight	
Container	Description	No.	(ft ³)	(lbs)	Contents
Clamshell	Tall, grey (#1, 2)	2	34	300	Field gear
Clamshell	Large, grey (#3, 4)	2	26	350	Boating supplies
Clamshell	Small, grey (#5, 7, 8)	3	12	525	Field gear
Clamshell	Small, white (#12)	1	13	115	Field gear and clothing
Clamshell	Small, white (#13, 15)	2	13	120	Empty fuel cans, EtOH, acetone
Engine	Tall, wood box (#1; 30 hp)	1	43	170	Honda 4 stroke, 30 hp
Engine	Tall, wood box (#5; 25 hp)	1	43	160	Honda 4 stroke, 25 hp
Engine	Short wood box (#4,6,7,8)	4	41	640	Honda 4 stroke, 25 hp
Brailer	Brailer bag of drybags	1	55	300	Field clothing
Pallet	Three deflated Zodiacs	1	50	400	Mark II Zodiacs and floorboards
Pallet	Two deflated Zodiacs	1	40	500	Mark III Zodiacs and floorboards
Cylinders	Two bipods and 12 poles,	3	5	15	Weighing bipods, capture poles
Total		22	375	3595	

Sent North with scientists

Container	Description	No.	Vol. (ft ³)	Weight (lbs)	Contents
ActionPacker	Black plastic	2	5	60	Field gear
Clamshell	Small, grey (#6)	1	37	200	Field gear
Clamshell	Small, white (#17, 19)	2	26	350	Field gear
Pelican	Large, black	1	11	100	Lab gear
Total		6	79	710	

APPENDIX B – Small Boat Operations

Equipment, safety supplies, and preparation

Three or four inflatable boats are used in each seal capture attempt. Usually, this will include two Zodiac Mark II Grand Raids, and one Mark III Grand Raid. These are professional/military-grade inflatable boats designed specifically for use in remote and hazardous sea conditions. They are time tested and renowned for their stability, safety and speed, and have lifting bridles for rapid launch and recovery by crane from the *Oscar Dyson*. NMML researchers have successfully used these types of boats for seal capture operations in both Arctic and Antarctic pack-ice for over 30 years with an excellent safety record. Each boat will be equipped with a Honda 25 hp or 30hp 4-stroke outboard motor.

Each boat launched from the Oscar Dyson for marine mammal studies will be equipped with:

- 1) 1 or more handheld VHF radios with fully-charged batteries,
- 2) 1 handheld GPS with fresh batteries, and a compass,
- 3) 1 EPiRB,
- 4) Anchor and spare line,
- 5) A repair kit including an inflatable boat patch kit, inflation valves, foot pump, bilge pump, a basic tool kit and spare parts (e.g., spark plugs, fuel line, etc.),
- 6) A safety kit containing a field first aid kit, food, water, flares, signal mirror, radar reflector, air horn, whistle, rescue throwing line, fire extinguisher, knife, flashlight, etc
- 7) Copies of all permits required to be in possession during seal research.

The NMML will provide the operators for the inflatable boats. Each boat will carry at least two people (the Mark III, in particular, may carry additional persons). The members of the NMML research team have received NOAA approved, certified training in small boat operations and safety, as well as in CPR and First Aid. The team includes experts in each of three areas: 1) seal handling, 2) small boat operation and 3) working on and around sea ice.

All NMML personnel embarking small boats for seal studies will wear Mustang MSD575 dry suits with thermal liners and a MD3183 inflatable PFD, or full Mustang-style float suits (we prefer the "standard" MS-185 or the MS2195). We have found that this clothing system offers an excellent combination of cold water protection and flotation, without sacrificing the maneuverability and speed required to capture a seal before it escapes off of an ice floe and into the water. Personnel will also wear bunny boots (or other appropriate footwear), waterproof gloves, sunglasses, and warm headwear at all times.

Seal capture and handling operations

Whenever a seal is seen hauled out onto the ice during daylight hours NMML researchers will, in consultation with the Chief Scientist, decide whether to request that the *Oscar Dyson* be stopped to launch the Zodiacs for seal capture operations. Many factors are considered in this decision including the

weather and the ice conditions. Attempting a capture event in rough seas and high winds (e.g. greater than Beaufort scale 3 or 4) is futile as seals are much less likely to stay on the ice when approached by boat. Similarly, the ice floe with the seal must be judged to be reasonably strong enough to support the seal, four people and their equipment. The NMML researchers, in consultation with the Chief Scientist and the ship's command, may also decide to launch the Zodiacs on reconnaissance activities when there are no immediate seals identified for capture, but the likelihood of encountering a seal is high.

If the decision is made to attempt to capture the seal or deploy the Zodiacs for reconnaissance, the Oscar *Dyson* will move to within 2 miles of the seal, or determined location safe for deployment of the Zodiacs, and come to a full stop. Oscar Dyson's deck crew and crane operators will lower our Zodiacs into the water. Using a ladder hung over the side of the Oscar Dyson, members of the capture party will climb down into the boats (at least two people for each boat). After the operators of each vessel have established radio communications with: 1) the bridge, 2) the spotter stationed on the bridge, and 3) the other Zodiacs, the capture team will motor towards the target seal's ice floe (if necessary directed by a spotter on the bridge). The three boats will then split up and take positions to surround the floe at a distance of about 1/3 mile. Coordinated via radio, they will then close in on the target seal. Often the seal becomes confused by the approaching boats and hesitates while deciding if it should escape into the water or stay on the ice floe. As the researchers approach the ice floe, they will make a final determination about the safety/stability of the ice, and, if the ice is determined to be safe, researchers on each of the three boats will jump onto the floe with hoop nets to capture the seal. Once the seal is captured and restrained, the necessary handling equipment will be unloaded from the Zodiacs onto the ice and researchers will proceed to measure, weigh, take biological samples from the seal and instrument it with a satellite-linked location transmitter. The two Mark II Zodiacs will be tied/anchored close to the floe with their outboards shut off. The operator of the Mark III and one additional person will remain in the larger Zodiac with the outboard running to render immediate assistance if it becomes necessary and to serve as spotters for unsafe changes in the weather, ice conditions and the presence of polar bears. After releasing the seal, the NMML researchers will climb back into their original boats, start their outboards, and cast off from the floe.

The entire operation takes approximately 1 hour or less per seal captured, handled, and released. With the permission of the bridge, NMML researchers may choose to remain in the pack ice to continue to hunt for additional seals to capture. This often includes frequent radio calls to the spotter positioned on the bridge. If the bridge determines that conditions are unsafe, or for any other reason requires that researchers return to the *Oscar Dyson*, the field party will immediately return together to the ship. After the field party has boarded the ship via the ladder, the *Oscar Dyson*'s crew and crane operators will raise the three inflatable boats back onto the deck. Once all equipment and team members are aboard, the team leader will notify the bridge that the pinniped capture and handling operations are complete and that the ship may again get underway.

The NMML research team may be away from ship for several hours each day, and are likely to miss scheduled meals. During previous research projects onboard NOAA Vessels, the Chief Steward purchased additional snacks (e.g., pop-tarts, granola bars, chips) and sandwich fixings along with portable coolers. NMML researchers would prepare the coolers with sandwiches and snacks prior to departure. The Chief Steward left meals (especially dinner) on the warmer and available for us upon our return.

These accommodations by the galley staff were much appreciated and made a significant contribution to the success of previous, similar projects.

APPENDIX C - Hazardous Materials and spill procedures

Inventory of HAZMAT material in the Polar Ecosystems Program (NMML) for research project aboard the NOAA Ship *Oscar Dyson*. MSDS information for each item follows.

Common Name of	Qty	Notes	Trained
Material			Individual
Ethyl Alcohol (EtOH)	1 gallon		TBA
Acetone	6 quarts		TBA
CO2 Cartridges for	30 (14 pre-	Only included list for	n/a
PDFs	installed in PFDs)	shipping purposes	
Gasoline for	100 gallons	2x55 gallon tanks	TBA
outboards*		jettisonable	
Empty gas cans for 4-	Residual gas in 8		TBA
stroke engines*	cans		

* Unleaded Gasoline for Outboard Motors. We will require up to 100 gallons of unleaded gasoline for use in outboard motors on the inflatable boats. The Chief Scientist will provide the ship details on when and how much gasoline will be delivered to the ship. The gasoline should be stored in a jettisonable tank on the aft deck. Gasoline will be transferred by the ship's crew to the 6-gallon tanks in each boat. The Chief Scientist will provide a spill containment pan and all tanks will be filled within that pan by authorized ships personnel. The 6-gallon tanks will be stored in the boats on the aft deck and a 'no smoking' area will be designated.

Spill Procedures

- Wear appropriate protective equipment and clothing during clean-up. Keep upwind.
- Ventilate closed spaces before entering them.
- Eliminate ignition sources.
- Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.
- Never return spills in original containers for re-use.
- **Large Spills**: Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal.
- **Small Spills**: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Transfer to vent hood or closed container

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals useful for	Amount it can clean up
Spill containment Pan	2	Gasoline	Spill prevention, holds
			~15 gallons
Absorbent Spill Pads	20	All listed	~10 gallons each
			depending on location

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Material Safety Data Sheet

Ethyl Alcohol, Reagent, Anhydrous

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Ethyl Alcohol, Reagent, Anhydrous

OTHER/GENERIC NAMES: Ethyl alcohol, Denatured alcohol

PRODUCT USE: Solvent

:

MANUFACTURER Honeywell, Burdick & Jackson

1953 South Harvey Street Muskegon, MI 49442

FOR MORE INFORMATION CALL:

(Monday-Friday, 8:00am-5:00pm)

IN CASE OF EMERGENCY CALL:

(24 Hours/Day, 7 Days/Week)

1-800-368-0050 2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Ethyl Alcohol	64-17-5	~90%
Methanol	67-56-1	~5%
Isopropyl Alcohol	67-63-0	~5%

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Extremely flammable liquid and vapor. Clear colorless liquid. Mildly toxic by inhalation, ingestion and skin contact. Cannot be made nonpoisonous.

POTENTIAL HEALTH HAZARDS SKIN: Irritant. May cause dermatitis through defatting of the skin. EYES: Irritant. Redness and

itching may result from exposure to vapors or liquid. INHALATION: Can cause headache, drowsiness, intoxication, visual impairment,

blindness, coma and death. INGESTION: Can cause gastrointestinal disorder, central nervous system depression, headache, drowsiness,

intoxication, visual impairment, blindness, coma and death

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MATERIAL SAFETY DATA SHEET

Ethyl Alcohol, Reagent, Anhydrous

DELAYED EFFECTS: Prolonged or repeated exposure can result in alcoholism, cyanosis, respiratory failure and liver damage.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAMENTP STATUS IARC STATUS OSHA LISTIsopropyl AlcoholGroup 3, Unclassifiable

Ethanol is classified by ACGIH as A4, not classifiable as a Human Carcinogen

4. FIRST AID MEASURES

SKIN: Rinse affected area thoroughly with water until no evidence of chemical remains. EYES: Rinse with plenty of water

for at least 15 minutes. Get professional medical assistance. INHALATION: Remove from exposure area to fresh air. If

victim is not breathing administer artificial respiration according to your level of training and obtain professional medical assistance immediately. **INGESTION:** If

patient is conscious, rinse mouth with water. Do not induce vomiting unless instructed to do so by a physician. Get

immediate medical attention. ADVICE TO PHYSICIAN: No specific instructions. Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:

FLASH POINT METHOD: AUTOIGNITION TEMPERATURE: UPPER FLAME LIMIT (volume % in air): LOWER FLAME LIMIT (volume % in air): FLAME PROPAGATION RATE (solids): OSHA FLAMMABILITY CLASS: 59}F (15}C) Closed Cup Not determined Not determined Not determined Not applicable IB

EXTINGUISHING MEDIA:

Alcohol foam, carbon dioxide, or dry chemical.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May burn with an invisible flame. Fire hazard when exposed to heat, flame or oxidizers. Vapors are heavier than air and may travel a considerable distance to an ignition source and flash back. Vapor mixtures are explosive.

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MATERIAL SAFETY DATA SHEET

Ethyl Alcohol, Reagent, Anhydrous

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS: Wear self-contained breathing apparatus. Do not release runoff from fire control methods to sewers or waterways. Keep fire exposed containers cool and reduce vapors with water spray.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.) Eliminate sources of ignition. Isolate the spill area. Stop leak in a safe and practical manner. (If leak cannot be stopped easily and safely, advise trained emergency response personnel of the situation.) Using inert material (such as ground corncobs) dike the spilled solvent to prevent it from running into drains or waterways.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.) Keep away from heat, open flame or other high temperature sources. Avoid contact with skin, eyes and clothing; avoid breathing vapor or mist. Use good personal hygiene and housekeeping practices.

STORAGE RECOMMENDATIONS:

Store in an area designed for storage of flammable liquids. (OSHA 29 CFR 1910.106) Protect from physical damage. Store in a cool, dry, well-ventilated area away from ignition sources and other fire hazards.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general or local exhaust ventilation systems to maintain airborne concentrations below permissible TLV levels. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: Where liquid contact is possible impervious coveralls are recommended. To minimize the possibility in other handling and storage operations, wear appropriate PPE to include chemical resistant gloves, boots and apron.

EYE PROTECTION:

Safety glasses are considered minimum protection. Goggles or face shield may be necessary depending on quantity of material and conditions of use.

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MATERIAL SAFETY DATA SHEET

Ethyl Alcohol, Reagent, Anhydrous

RESPIRATORY PROTECTION:

Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For emergency or non-routine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. Warning! Air-purifying respirators do not

protect workers in oxygen-deficient atmospheres.

ADDITIONAL RECOMMENDATIONS:

This material should be used in close proximity to eyewash station and safety shower. Use appropriate personal hygiene after handling this material. Do not smoke in the vicinity of flammable materials.

EXPOSURE GUIDELINES

INGREDIENT NAME Ethyl Alcohol Methyl Alcohol Isopropyl Alcohol ACGIH TLV 1000 ppm 200 ppm (skin) 400 ppm **OSHA PEL** 1000 ppm 200 ppm 400 ppm OTHER LIMIT none 250 ppm (STEL) 500 ppm (STEL)

* = Limit established by Honeywell International, Inc. ** = Workplace Environmental Exposure Level (AIHA). *** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS: None

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, Colorless
PHYSICAL STATE:	Liquid
MOLECULAR WEIGHT:	(mixture)
CHEMICAL FORMULA:	Mixture
ODOR:	Fragrant mild odor of alcohol. Threshold not determined.
SPECIFIC GRAVITY (water = 1.0):	0.78 (Ethanol)
SOLUBILITY IN WATER (weight %):	Miscible in all proportions
pH:	Not Applicable
BOILING POINT:	78.32 C (Ethanol)
MELTING POINT:	-114.1 C (Ethanol)
VAPOR PRESSURE:	44.6 mm Hg @ 20 C (Ethanol)
VAPOR DENSITY (air = 1.0):	1.6 (Ethanol)
EVAPORATION RATE:	~3 COMPARED TO: Butyl Acetate = 1
% VOLATILES:	100%
ELASH POINT:	50 E(15 C)

(Flash point method and additional flammability data are found in Section 5.)

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MATERIAL SAFETY DATA SHEET

Ethyl Alcohol, Reagent, Anhydrous

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Stable at room temperature in closed containers under normal storage and handling conditions.

INCOMPATIBILITIES:

Strong oxidizing agents.

CONDITIONS TO AVOID:

Avoid heat, ignition sources and incompatible materials.

HAZARDOUS DECOMPOSITION PRODUCTS:

Incomplete combustion can produce toxic fumes of carbon monoxide.

HAZARDOUS POLYMERIZATION:

Not expected to occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Oral-Rat LD50:7060 mg/kg Oral-Mouse LD50:3450 mg/kg Inhalation-Rat LC50:20,000 ppm/10H Inhalation-Mouse LC50:39 g/m3/4H Intraperitoneal-Rat LD50:3750 mg/kg Intraperitoneal-Mouse LD50:933 mg/kg Intravenous-Rat LD50:1440 mg/kg Intravenous-Mouse LD50:1973 mg/kg

Subcutaneous-Mouse LD50:8285 mg/kg

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Exposure to concentrations over 1000 ppm may cause headache, irritation of the eyes, nose, and throat, and, if continued, drowsiness and lassitude, loss of appetite, and inability to concentrate. There is no concrete evidence that repeated exposure to vapor results in cirrhosis of the liver. Ingestion of large doses can cause alcohol poisoning. Repeated ingestions can lead to alcoholism.

OTHER DATA: None

12. ECOLOGICAL INFORMATION

Data reported is for methanol

 LC_{50} Pimephales promelas (fathead minnows) 29.4 g/L/96 hr, (28-29 days old), confidence limit = 28.5-30.4; test conditions: water temp = 25°C, dissolved oxygen = 7.3 mg/L, water hardness = 43.5 mg/L calcium carbonate, alkalinity = 46.6 calcium carbonate, tank volume = 6.3 l, additions = 5.71 V/D, pH = 7.66 (0.03) (conditions of bioassay not specified)

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MATERIAL SAFETY DATA SHEET

Ethyl Alcohol, Reagent, Anhydrous

13. DISPOSAL CONSIDERATIONS

<u>RCRA</u>

Is the unused product a RCRA hazardous waste if discarded? Yes If yes, the RCRA ID number is: D001

OTHER DISPOSAL CONSIDERATIONS:

Dispose of material in accordance with all applicable local, state, and federal regulations.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT PROPER SHIPPING NAME:	Alcohols, flammable,toxic, n.o.s.
US DOT HAZARD CLASS:	3, 6.1, Flammable liquid, Poison
US DOT ID NUMBER:	UN1986
US DOT PACKING GROUP:	II
NA EMERGENCY RESPONSE GUIDE:	131

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA) TSCA INVENTORY STATUS:

All ingredients listed on TSCA inventory **OTHER TSCA ISSUES:** May be subject

to Export Notification.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME SARA/CERCLA RQ (1b) SARA EHS TPQ (1b)

Methanol 5000 lbs.

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Acute, Fire

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MATERIAL SAFETY DATA SHEET

Ethyl Alcohol, Reagent, Anhydrous

SARA 313 TOXIC CHEMICALS: The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME COMMENT

Methyl Alcohol Isopropyl Alcohol Reporting is required only for those manufacturers using the Strong Acid Process

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME WEIGHT % COMMENT No ingredients listed in this section.

ADDITIONAL REGULATORY INFORMATION: None

WHMIS CLASSIFICATION (CANADA): Class B, Division 2 & Class D, Division 2a

FOREIGN INVENTORY STATUS: Not Determined

16. OTHER INFORMATION

CURRENT ISSUE DATE: June, 2000 PREVIOUS ISSUE DATE: November, 1996, January, 1998, October, 1998

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING: October, 1998 Update DOT info in section 14. New header and footer information.

Update to ANSI Standard. (Former, Jan, 1998)

OTHER INFORMATION:

NFPA Classification	
Health:	0
Flammability:	3
Reactivity:	0

Material Safety Data Sheet Series 76400

1 Company and Product Identification

Manufacturer.s Name: STAR BRONZE COMPANY, INC. PO Box 2206 Alliance, Ohio 44601-0206

Emergency Telephone: 330-823-1550 Information Telephone: 330-823-1550 Identity: 76400 Acetone Date Prepared: April 5, 2001 (revised)

2 Ingredient Composition Information

		PP	PPM	
Ingredient CAS No.	% by weight	OSHA PEL	ACGIH TLV	
Acetone				
Acetone				

67-64-1 100 750 500 Section 313: Supplier Notification. This product contains the following toxic chemicals, subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986, and of 40 CfR 372. MMS Information must be included in all Material Safety Data Sheets that are copied and distributed for this material.

3 Physical and Chemical Properties

Boiling Range: 133°F Evaporation Rate: (n-Butyl Acetate = 1) 14.40 Percent Volatile: 100% Appearance and Odor: clear liquid, ketone odor VOC: 790 grams/liter VOS: 6.59 lbs./gal. Vapor Density: (Air = 1) 2.0 Weight per Gallon: 6.59 lbs. Solubility in Water: infinitely soluble in water Specific Gravity: .785 - .788 Vapor Pressure: 186 mm Hg @ 20°C Solvent Density: .788

4 Fire and Explosion Hazard Data

Flash Point: - 4°F Flammable Limits:

LEL: 2.6% UEL: 12.8

Extinguishing Media: Alcohol foam, carbon dioxide or dry chemical.

Special Fire Fighting Procedures: Water may be ineffective, water may be used to keep fire exposed containers cool until fire is out. Wear self-contained breathing apparatus with a full face piece operated in the positive pressure demand mode with appropriate turn out gear and chemical resistant personal protective equipment.

Unusual Fire and Explosion Hazards: Material is highly volatile and readily gives off vapor which may travel along the ground or may be moved by ventilation and ignited by heat, pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge or other ignition sources at locations distant from material handling point. Keep away from heat, sparks, pilot lights and other sources of ignition. Closed containers may explode when exposed to extreme heat. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite Fight Welly Products of Combustion: May form carbon dioxide and carbon monoxide.

HMIS Codes: Health 1, Flammability 3, Reactivity 0 NFPA Codes: Health 1, Flammability 3, Reactivity 0

5 Reactivity Data

Stability: Stable Conditions to Avoid: N/A

Incompatibility: Avoid contact with strong oxidizing agents, strong alkalies, strong mineral acids. Hazardous Decomposition of By-products: May form carbon dioxide, carbon monoxide.

Hazardous Polymerization: Cannot occur

6 Health Hazard Data

Routes of Entry: Inhalation - Yes, Skin - Yes, Ingestion - Yes

Health Hazard Acute and Chronic:

Inhalation: Excessive inhalation of vapors can cause nasal and respiratory irritation, central nervous system effects including dizziness, weakness, fatigue, nausea and headache and possible unconsciousness or in extreme cases, death. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful **9kiPf:Wayfatal**se mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms may include redness, burning, drying and cracking of skin, and skin burns. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling

and use Eyes: Can cause irritation, redness, tearing, stinging and swelling of eyes.

Ingestion: Can cause gastrointestinal irritation, nausea, vomiting and diarrhea. This material can get into the lungs during swallowing or vomiting. This results in lung inflammation and other lung injury.

Chronic Overexposure: Repeated or prolonged solvent overexposure may cause permanent brain/nervous system damage. This material (or a component) shortens the time Page **26** of **38** of onset or worsens the liver and kidney damage induced by other chemicals. Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals: mild, reversible liver effects; mild, reversible kidney

Medical Conditions Aggravated by Exposure: unknown

Carcinogenicity: IARC - not listed; NTP - not listed; OSHA - not listed.

Emergency First Aid Procedures:

Inhalation: If affected, remove individual to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet and get medical attention.

Skin: Thoroughly wash exposed area with soap and water. If symptoms persist, seek medical attention. Remove contaminated clothing. Launder before reuse.

Eyes: Flush with large amounts of water, lifting upper and lower lids occasionally, get medical attention.

Ingestion: This material is an aspiration hazard. If swallowed, do not induce vomiting. Call physician immediately.

7 Precautions for Safe Handling & Use

Steps to be taken in case material is released or spilled

Small Spill: Absorb liquid on paper, vermiculite, floor absorbent or other absorbent material and transfer to vent hood or closed container.

Large Spill: Eliminate ignition sources (flares, flames, pilot lights, electrical sparks). Contain liquid, stop spill at source and prevent run off to sewers. Ventilate area, avoid breathing vapors. Clean up with absorbent material and place in closed container for disposal.

Waste Disposal Method:

Small Spill: Dispose of in accordance with local, state and federal regulations.

Large Spill: Dispose of in accordance with local, state and federal regulations.

Precautions to be taken in handling and storing: Store in cool, dry area. Avoid flames and high temperatures. Store upright to prevent leaks. Keep container tightly closed. All 5 gallon pails and larger containers should be grounded and bonded when material is transfered.

Other precautions: None

8 Control Measures

Respiratory Protection: If work place exposure limits of product or any component are exceeded, 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 or administrative controls should be implemented to reduce exposure. Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below PEL

Protective Gloves: Wear resistant gloves such as natural rubber, neoprene, nitrite rubber.

Eye Protection: Chemical splash goggles in compliance with OSHA regulations are advised. However, OSHA regulations also permit other types of safety glasses (consult your safety equipment supplier).

Other Protective Clothing or Equipment: Where prolonged or frequently repeated contact could occur use protective clothing impervious to this material. Selection of specific items, such as gloves, boots or aprons will depend upon

Work^{ji} Hygienic Practices: Avoid contact with eyes, skin and clothing. Avoid breathing vapors or spray mist. Wash thoroughly after handling and before eating, drinking or smoking. Remove any contaminated clothing promptly and clean before reuse.

9 Transportation Data

Proper Shipping Description Pints Consumer Commodity	Hazar d Class ORM D	ID# none	Pkg Grou p none	Label Req. none
Quarts Consumer Commodity	ORM D	none	none	none
Gallons Acetone	3	UN109 0	II	Flamma ble
5 Gallon Pails Acetone	3	UN109 0	II	Flamma ble
55 Gallon Drums		UN109		Flamma

10Regulatory Information

Reportable quantity (Rq)

Acetone 5,000 lbs

Toxic Substances Control Act: The intentional ingredients of this product are listed.

SARA 311/312 Hazard Categories: Health - Immediate Health, Delayed health, Fire

SARA 313 Components: None

California Proposition 65 Warning: This product contains chemicals known to the State of California to cause cancer (acetaldehyde, formaldehyde (gas) and Benzene) This product contains chemicals known to the State of California to cause reproductive harm (benzene). Warning: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

The information and recommendations contained herein have been compiled from sources believed to be accurate and reliable. The information herein is given in good faith, but no warranty, expressed or implied, is page 27 of 38

Print MSDS Sheet

MGI04260 Page 001 of 008 SECTION 1 CHEMICAL PRODUCT

AND COMPANY IDENTIFICATION

MG INDUSTRIES 3 GREAT VALLEY PARKWAY MALVERN, PENNSYLVANIA 19355 PHONE: 610-695-7400 EMERGENCY CONTACT: CHEMTREC: 1-800-424-9300

FAX: 610-695-7596

SUBSTANCE: CARBON DIOXIDE, GAS CARBONIC ACID GAS: CARBONIC ANHYDRIDE; CARBON DIOXIDE; CARBON OXIDE; STCC TRADE: NAMES/ SYNONYMS: 4904535; UN 1013; CO2; MGI04260; RTECS FF6400000 CHEMICAL FAMILY: oxides of carbon CREATION DATE: May 04 1990 REVISION DATE: Mar 22 2001

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CARBON DIOXIDE, GAS CAS NUMBER: 124-38-9 EC NUMBER (EINECS): 204-696-9 PERCENTAGE: 100

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0 EMERGENCY OVERVIEW: PHYSICAL DESCRIPTION: Colorless, odorless gas, with a slight acidic taste. MAJOR HEALTH HAZARDS: difficulty breathing PHYSICAL HAZARDS: Containers may rupture or explode if exposed to heat. POTENTIAL HEALTH EFFECTS: INHALATION:

SHORT TERM EXPOSURE: ringing in the ears, nausea, irregular heartbeat, headache, drowsiness, dizziness, tingling sensation, visual disturbances, suffocation, convulsions, coma LONG TERM EXPOSURE: no information on significant adverse effects

SKIN CONTACT: SHORT TERM EXPOSURE: blisters, frostbite LONG TERM EXPOSURE: no information on significant adverse effects

EYE CONTACT: SHORT TERM EXPOSURE: irritation, blurred vision LONG TERM EXPOSURE: no information on significant adverse effects

INGESTION: SHORT TERM EXPOSURE: frostbite MGI04260 Page 002 of 008

LONG TERM EXPOSURE: no information is available CARCINOGEN STATUS: OSHA: No NTP: No IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is

not available, gently wrap affected parts in blankets. Get immediate medical attention. EYE CONTACT: Flush eyes with plenty of water. INGESTION: If a large amount is swallowed, get medical attention. NOTE TO PHYSICIAN: For inhalation, consider oxygen.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard. EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. FIRE FIGHTING: Move container from fire area if it can be done without risk.

Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile). Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Do not get water directly on material. Reduce vapors with water spray. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Consider downwind evacuation if material is leaking.

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE: Do not touch spilled material. Stop leak if possible without personal risk. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.

MGI04260 Page 003 of 008

SECTION 7 HANDLING AND STORAGE

STORAGE: Cylinder temperature should not exceed 125 F (52 C). 29 CFR Subpart "H"-Hazardous Materials. National Fire Protection Association publication #55, "Standard for the Storage, Use and Handling of Compressed and Liquified Gases in Portable Cylinders". Compressed Gas Association publication P-1, "Safe Handling of Compressed Gases in Containers". Store and handle in accordance with current regulations and standards: OSHA 29 CFR 1910.101

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

CARBON DIOXIDE, GAS:

CARBON DIOXIDE: 5000 ppm (9000 mg/m3) OSHA TWA 10000 ppm (18000 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 30000 ppm (54000 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 5000 ppm ACGIH TWA 30000 ppm ACGIH STEL 5000 ppm (9000 mg/m3) NIOSH recommended TWA 10 hour(s) 30000 ppm (54000 mg/m3) NIOSH recommended STEL 9100 mg/m3 (5000 ml/m3) DFG MAK (peak limitation category-IV) 9000 mg/m3 (5000 ml/m3) EC MAK 5000 ppm (9150 mg/m3) UK OES TWA 15000 ppm (27400 mg/m3) UK OES STEL MEASUREMENT METHOD: Gas collection bag; Gas chromatography with thermal conductivity detection; NIOSH IV # 6603

VENTILATION: Based on available information, additional ventilation is not required. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Eye protection not required, but recommended. CLOTHING: For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing. GLOVES: Protective gloves are not required, but recommended. RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. 40,000 ppm Any supplied-air respirator. Any self-contained

breathing apparatus with a full facepiece.

Escape Any appropriate escape-type, self-contained breathing apparatus. For Unknown Concentrations or Immediately Dangerous to Life or Health -Any supplied-air respirator with full facepiece and operated in a

MGI04260 Page 004 of 008 pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION: Colorless, odorless gas, with a slight acidic taste. MOLECULAR WEIGHT: 44.01 MOLECULAR FORMULA: C-O2 BOILING POINT: Not available FREEZING POINT: -71 F (-57 C) @ 4000 mmHg SUBLIMATION POINT: -110 F (-79 C) VAPOR PRESSURE: 43700 mmHg @ 21 C VAPOR DENSITY (air=1): 1.5 SPECIFIC GRAVITY (water=1): 1.522 @ 21 C WATER SOLUBILITY: soluble PH: acidic in solution VOLATILITY: Not applicable ODOR THRESHOLD: Not available EVAPORATION RATE: Not applicable COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable SOLVENT SOLUBILITY:

Soluble: alcohol, acetone, hydrocarbons, organic solvents

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure. CONDITIONS TO AVOID: Protect from physical damage and heat. Containers may rupture or explode if exposed to heat. Avoid contact with water or moisture. INCOMPATIBILITIES: combustible materials, oxidizing materials, metal salts, reducing agents, metal carbide, metals, bases

CARBON DIOXIDE: ACRYLALDEHYDE: Exothermic polymerization. BARIUM PEROXIDE: Incandescent reaction. CESIUM OXIDE: Ignition. DIETHYL MAGNESIUM: Ignition. ETHYLENEIMINE: Explosive polymerization. HYDRAZINE: Decomposition. METAL ACETYLIDES: Ignition or incandescence. METAL HYDRIDES: Reduction reaction. METALS: Dusts of many metals suspended in carbon dioxide atmospheres are ignitable and explosive; some bulk metals will burn in the gas at elevated temperatures. POTASSIUM: Mixtures of the solids are impact-sensitive. POTASSIUM-SODIUM ALLOY: Mixtures of the solids are impact-sensitive. SODIUM: Mixtures of the solids are impact-sensitive. SODIUM PEROXIDE: Highly exothermic reaction; may be explosive in the presence of metals. MGI04260 Page 005 of 008 POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

CARBON DIOXIDE, GAS:

TOXICITY DATA: 9 pph/5 minute(s) inhalation-human LCLo; 90000 ppm/5 minute(s) inhalation-mammal LCLo; 10000 ppm/24 hour(s)-30 day(s) continuous inhalation-rat TCLo; 27000 ppm/24 hour(s)-30 day(s) continuous inhalation-rabbit TCLo

ACUTE TOXICITY LEVEL: Insufficient Data. MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: heart or cardiovascular disorders, respiratory disorders

REPRODUCTIVE EFFECTS DATA: 6 pph inhalation-rat TCLo/24 hour(s) 10 day(s) pregnant female continuous; 6 pph inhalation-rat TCLo/24 hour(s) 10 day(s) pregnant female continuous; 55 pph inhalation-mouse TCLo/2 hour(s) 3 day(s) male; 55 pph inhalationmouse TCLo/4 hour(s) 6 day(s) male; 2 pph inhalation-mouse TCLo/8 hour(s) 10 day(s) pregnant female continuous; 13 pph inhalation-rabbit TCLo/4 hour(s) 9-12 day(s) pregnant female continuous

HEALTH EFFECTS:

INHALATION:

ACUTE EXPOSURE: CARBON DIOXIDE: In the solid or liquid form carbon dioxide is very volatile, readily releasing the gas. At concentrations from 2-10% it may cause acidic taste, dyspnea, headache, vertigo, nausea, labored breathing, weakness, drowsiness, mental confusion, and increase in blood pressure, pulse, and respiratory rate. Exposure to 10% for a few minutes has been reported to cause visual disturbances, tinnitus, tremors, profuse perspiration, restlessness, paresthesias, general feeling of discomfort, loss of consciousness, and coma. Concentrations of 25-30% may cause coma and convulsions within one minute. Tachycardia and arrhythmias are possible. Concentrations of 50% may cause symptoms of hypocalcemia including carpopedal spasms. Excessive carbon dioxide for a time period of not more than 5 minutes was reported to cause effects on vision with constriction of visual fields, enlargement of blind spots, photophobia, loss of convergence and accommodation, and deficient dark adaptation as well as headache, insomnia, and personality changes, largely depression and irritability. Even when there is sufficient oxygen present to prevent simple asphyxiation by carbon dioxide, high concentrations may cause adverse effects by interfering with its normal elimination from the body. Initially, exposure to increased carbon dioxide concentrations results in a compensatory increase in both rate and depth of ventilation. Beyond a certain point, however, this may reverse to hypoventilation resulting in respiratory acidosis. Death from asphyxia may occur if the concentration and duration of exposure are sufficient. Reproductive effects have been reported in animals.

CHRONIC EXPOSURE: CARBON DIOXIDE: It has been reported that persons may tolerate 1.5% in inhaled air for prolonged periods without adverse effects, but calcium/

MGI04260 Page 006 of 008 phosphorus metabolism may be affected with serum levels of calcium and urinary phosphorus progressively falling. At 2% concentration, deepened respiration may occur. At 3% impairment of performance has been noted. It has, however, been demonstrated that the development of tolerance may occur during prolonged exposure to low levels. Reproductive effects have been reported in animals.

SKIN CONTACT: ACUTE EXPOSURE: CARBON DIOXIDE: No adverse effects have been reported from exposure to the gas. Due to rapid evaporation, the liquid or solid may cause frostbite with redness, tingling and pain or numbness. In more severe cases, the skin may become hard and white and develop blisters. CHRONIC EXPOSURE: CARBON DIOXIDE: No adverse effects are expected from

exposure at low levels.

EYE CONTACT:

ACUTE EXPOSURE: CARBON DIOXIDE: At high concentrations in air, carbon dioxide may cause a stinging sensation of the eyes. 200,000 ppm of the gas may cause irritation. Due to rapid evaporation, the liquid or solid may cause frostbite with redness, pain, and blurred vision.

CHRONIC EXPOSURE: CARBON DIOXIDE: No adverse effects are expected from exposure to low levels.

INGESTION:

ACUTE EXPOSURE: CARBON DIOXIDE: Ingestion of a gas is unlikely. If the liquid or solid is swallowed, frostbite damage to the lips, mouth and mucous membranes may occur.

CHRONIC EXPOSURE: CARBON DIOXIDE: No data available.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA: FISH TOXICITY: 150000 ug/L 48 day(s) (Mortality) Brown trout (Salmo trutta)

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. MGI04260 Page 007 of 008

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101: PROPER SHIPPING NAME: Carbon dioxide ID NUMBER: UN1013 HAZARD CLASS OR DIVISION: 2.2 LABELING REQUIREMENTS: Nonflammable gas PACKAGING AUTHORIZATIONS:

EXCEPTIONS: 49 CFR 173.306 NON-BULK PACKAGING: 49 CFR 173.302, 304 BULK PACKAGING: 49 CFR 173.302, 314, 315 QUANTITY LIMITATIONS: PASSENGER AIRCRAFT OR RAILCAR: 75 kg CARGO AIRCRAFT ONLY: 150 kg CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned. LAND TRANSPORT ADR/RID: SUBSTANCE NAME: Carbon dioxide UN NUMBER: UN1013 ADR/RID CLASS: 2 ITEM NUMBER: 5(a)/2A WARNING SIGN/LABEL: 2/2; 13 HAZARD ID NUMBER: 20

AIR TRANSPORT IATA/ICAO: PROPER SHIPPING NAME: Carbon dioxide UN/ID NUMBER: UN1013 IATA/ICAO CLASS: 2.2 LABEL: Nonflammable gas MARITIME TRANSPORT IMDG: CORRECT TECHNICAL NAME: Carbon dioxide UN/ID NUMBER: UN1013 IMDG CLASS: 2(2.2) EmS No.: 2-09 MFAG Table No.: 615 IMDG CODE PAGE: 2111

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS: CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated. SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated. SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated. SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

MGI04260 Page 008 of 008 ACUTE: Yes CHRONIC: No FIRE: No REACTIVE: No SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated. OSHA PROCESS SAFETY (29CFR1910.119): Not regulated. STATE REGULATIONS: California Proposition 65: Not regulated. CANADIAN REGULATIONS: WHMIS CLASSIFICATION: Not determined. EUROPEAN REGULATIONS: EC CLASSIFICATION (CALCULATED): Not determined. GERMAN REGULATIONS:

WATER HAZARD CLASS (WGK): STATE OF CLASSIFICATION: VwVwS CLASSIFICATION UNDER HAZARD TO WATER: 0 NATIONAL INVENTORY STATUS: U.S. INVENTORY (TSCA): Listed on inventory. TSCA 12(b) EXPORT NOTIFICATION: Not listed.

SECTION 16 OTHER INFORMATION

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Print MSDS Sheet

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MATERIAL SAFETY DATA SHEET

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHS Inc. P.O. Box 64089 SMBଲଧ୍ୟ ଥିଲି ଜଣ୍ଡ ଅଟ-0089

Transportation Emergency (CHEMTREC): 1-800-424-9300 Technical Information: 1-651-355-8443 MSDS Information: 1-651-355-8438

PRODUCT NAME: Regular, Midgrade & Premium Unleaded GasolineMSDS: 0147- M6A0 - Rev. G (01/03/07)COMMON NAME: Unleaded Gasoline, Premium Unleaded Gasoline CHEMICAL FORMULA: Mixture CHEMICAL NAME:Light Petroleum Distillate CHEMICAL FAMILY: Mixed Petroleum Hydrocarbon

Section 2 - COMPOSITION AND INFORMATION ON INGREDIENTS

INGREDIENTS Product	PERCENTAGES (by weight)	PEL (OSHA)	TLV (ACGIH)	CAS #
Gasoline (Mixture) Ingredients Toluene Xylene Isomers	100 < 20 < 20	300 ppm TWA 500 ppm STEL 200 ppm TWA 100 ppm TWA 150 ppm STEL	300 ppm TWA 500 ppm STEL 50 ppm TWA 100 ppm TWA 150 ppm STEL	8006-61-9 108- 88-3 1330-20-7
Benzene	< 5	1 ppm TWA 5 ppm STEL	0.5 ppm TWA 2.5 ppm STEL	71-43-2
1,2,4-Trimethylbenzene	< 5	25 ppm TWA	25 ppm TWA	95-63-6
Ethyl Benzene	< 5	100 ppm TWA 125 ppm STEL	100 ppm TWA 125 ppm STEL	100-41-4
n-Hexane Naphthalene	< 4 < 0.5	500 ppm TWA 10 ppm TWA	50 ppm TWA Skin 10 ppm TWA	110-54-3 91-20-3

(TWA) - Time Weighted Average is the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be **EXCEPT** and the employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a work day unless another time limit is specified.

Section 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Reddish golden brown liquid with gasoline odor - HIGHLY FLAMMABLE LIQUID. DANGER! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders.

OSHA HAZARD CLASS

Based on OSHA definitions, the following ingredients in this product are hazardous. The OSHA physical and health hazard categories are shown below. Note: CHS has not conducted specific toxicity tests on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience

Gasoline - Flammable, toxic, irritant, target organ (CNS) Toluene -Flammable, toxic, irritant, target organ (CNS) Xylene - Flammable, toxic, irritant Benzene - Flammable, irritant, carcinogen, target organ (kidney, liver, blood) 1,2,4-Trimethylbenzene - Flammable, toxic, irritant, target organ (CNS, blood) Ethylbenzene - Flammable, toxic, irritant

POTENTIAL HEALTH EFFECTS ROUTES OF

ENTRY: Inhalation, Dermal, Ingestion.

mice.

ACUTE EFFECTS OF OVER EXPOSURE:

Eyes - Slight to moderate eye irritation.

Skin - Moderately irritating; causes redness, drying of skin.

Inhalation - Irritating to mucous membranes and respiratory tract. Causes dizziness, irritation of eyes, nose and throat, signs of intoxications. Can act as a simple asphyxiant.

Ingestion -Burning of the throat and stomach, loss of consciousness, convulsions, cyanosis, congestion and capillary hemorrhaging of the lungs and internal organs. Possible pneumonia (if vomited), loss of consciousness, and death.

CHRONIC EFFECTS OF OVER EXPOSURE: Suspect carcinogen from long term exposure studies on laboratory animals. Recent studies with laboratory animals have shown that gasoline vapors caused kidney damage and kidney cancer in rats and liver cancer in

Mouse skin painting studies have shown that petroleum middle distillates (boiling range of 100-700°F) can cause skin cancer when repeatedly applied and never washed from the animal's skin. The relative significance of this to the skin and the resulting skin effects (irritation, cell damage, etc.) may play a role in the tumorigenic response. Studies have shown that washing the animal's skin with soap and water between treatments greatly reduces the carcinogenic effect of some petroleum

oils. A few studies have indicated that workers exposed many years to high concentrations of benzene have a slightly higher incidence of leukemia. Benzene can also be toxic to the blood and blood-forming tissues. For additional information on employee monitoring, information and training, medical surveillance, methods of compliance, etc., refer to the OSHA benzene standard, CFR 1910.1028.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing dermatitis, respiratory illness, or other conditions which have the same symptoms or effects as stated above.

CARCINOGENICITY: Unleaded Gasoline - NTP: <u>No</u> IARC: <u>No</u> OSHA: <u>No</u> Benzene - NTP: <u>Yes</u> IARC: <u>Yes</u> OSHA: <u>Yes</u>

Section 4 - FIRST AID MEASURES

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact - If material comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids until medical attention can be obtained.

Skin Contact - Remove contaminated clothing. Wash affected areas with soap and water. If irritation or redness develops, seek medical attention.

Inhalation - Move person away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. Apply artificial respiration or cardiopulmonary resuscitation if not breathing. Get medical attention.

Ingestion -Never give anything by mouth to an unconscious person. Do **not** induce vomiting. Aspiration of material into the lungs due to vomiting can cause chemical pneumonitis which can be fatal. If spontaneous vomiting occurs, keep head below hips to prevent aspiration of liquid into lungs and monitor for breathing difficulty. Seek medical attention immediately. Keep victim warm and quiet.

Section 5 - FIRE - FIGHTING MEASURES

FLASH POINT: -40°F (TCC)AUTO IGNITION TEMP: 495-850°F

FLAMMABLE LIMITS IN AIR LOWER

UPPER

EXTENCIONSHIMEG MEDIA: Dry Chemical, Foram, Carbon Bioxide (CO2), Water (fog pattern).

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective on flames, but should be used to keep fire-exposed containers cool. Large fires, such as tank fires, should be fought with caution. If possible, pump the contents from the tank and keep adjoining structures cool and protect personnel. Avoid spreading burning liquid with water used for cooling purposes. Do not flush down public sewers. The use of a self-contained breathing apparatus and protective clothing is recommended for fire fighters. Avoid inhalation of vapors.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Highly volatile material. Flowing gasoline can be ignited by self-generated static electricity; containers should be bonded and grounded. Vapors may travel along the ground to a source of ignition (pilot light, heater, electric motor) some distance away. Containers, drums (even empty) can explode when heat (welding, cutting, etc.) is applied.

HAZARD RATINGS: NFPA 704: Health- <u>1</u> Fire-<u>3</u> Reactivity- <u>0</u> HMIS: Health- <u>2</u> Fire-<u>4</u> Reactivity- <u>0</u>

Section 6 - ACCIDENTAL RELEASE MEASURES

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED: Notify emergency response personnel as appropriate. If facility or operation has an "Oil or Hazardous Substance Contingency Plan", "Spill Prevention Control & Countermeasures (SPCC) Plan" or equivalent, activate its procedures. REMOVE ALL SOURCES OF IGNITION. Keep unnecessary people away; isolate hazard area and deny entry. Contain spill if possible. Small spills can be removed with inert absorbent. Dike area of large spill to prevent run-off to sewers, streams, etc. Ventilate area. Avoid breathing vapors. Use appropriate personal protective equipment during clean up. Contact fire authorities and notify appropriate Federal, State, and Local agencies.

Section 7 - HANDLING AND STORAGE

HANDLING AND STORING: Transport, handle and store in accordance with OSHA Regulation 29 CFR 1910.106, and applicable D.O.T. Regulations. Store in tightly closed containers in a dry cool place, away from sources of heat or ignition. Ground and bond all transfer and storage equipment and equip with self-closing valves, pressure vacuum bungs and flame arrestors. **Caution:** Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting, welding or other of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame, heat, sparks or other sources of ignition. Do not siphon gasoline by mouth.

WARNING: Danger! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders. **Other:** Do not siphon gasoline by mouth. May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Flammable Liquid. Vapors may explode.

Section 8 - EXPOSURE CONTROL - PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate ventilation to keep vapors below permissible concentrations.

RESPIRATORY EQUIPMENT: Use appropriate NIOSH-approved respiratory protection where atmospheric concentrations may exceed acceptable exposure limits. Self-contained breathing apparatus or supplied air respiratory protection required for entry into tanks, vessels, or other confined spaced containing gasoline.

EYE PROTECTION: Chemical type goggles or face shield where contact with liquid or mist may occur.

PROTECTIVE CLOTHING: Wear impervious clothing and gloves when contact with skin may occur.**OTHER** (SAFETY SHOWERS, EYE WASH STATIONS, ETC.): Emergency eye wash station and safety shower where operations and exposure warrant. Loading, unloading, tank gauging, etc., remain upwind.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Reddish golden brown liquid ODOR: Gasoline odor (odor threshold approximately 10 ppm). BOILING POINT: 760 mmHg @ 80°F SPECIFIC GRAVITY (water=1): .72 VAPOR PRESSURE: 400 mmHg @ 68°F VAPOR DENSITY (air=1): 4 SOLUBLE IN WATER: Negligible EVAPORATION RATE (ether=1): Slower pH: N/D

Section 10 - STABILITY AND REACTIVITY

STABILITY STABLE \underline{X} (At room temperature and pressure. See handling and storage section) **UNSTABLE** _____

INCOMPATIBILITY -CONDITIONS TO AVOID: Heat, sparks, flame, build-up of static electricity, and other sources of ignition should be avoided.

MATERIALS TO AVOID: Strong oxidizing agents, halogens, strong acids, and alkalies.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, and hydrocarbons.

HAZARDOUS POLYMERIZATION: Has not been reported to occur under normal temperatures and pressures.

Section 11 - TOXICOLOGY INFORMATION

Note: CHS has not conducted specific toxicity tests on this product. Section 12 -

ECOLOGICAL INFORMATION

Note: CHS has not conducted specific ecological tests on this product. Section 13 -

DISPOSAL CONSIDERATION

WASTE DISPOSAL PROCEDURES: Recycle as much of the recoverable product as possible. Do not flush to drain or storm sewer or otherwise release to the environment. Dispose of non-recyclable material as a RCRA hazardous waste, complying with federal, state and local regulations. Note: Re-evaluation of this product may be required by the user at the time of disposal, since the product uses, transformations, mixtures and processes may change classification to non-hazardous or hazardous for reasons other than, or in addition to ignitable.

Section 14 - TRANSPORTATION

DOT PROPER SHIPPING NAME: Gasoline* DOT HAZARD CLASS: Flammable Liquid* DOT IDENTIFICATION NUMBER: UN 1203 DOT EMER. RESPONSE GUIDE NO.: 128

*EFFECTIVE 10/1/93 DOT's HM-181 changes how materials are classified. Proper Shipping Name-Gasoline; Hazard Class-3; UN/NA Identification #- UN 1203; Packing Group II; Placard-FLAMMABLE

Section 15 - REGULATORY INFORMATION

This product contains the following toxic chemicals subject to the reporting requirements of SARA Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372:

CAS Number Chemical Name Percent by Weight

108-88-3
Toluene
Up to 18.1%

1330-20-7
Xylene
Up to 15.3%

71-43-2
Benzene
Up to 5.3%

95-63-6
1,2,4
Trimethylbenzene

100-41-4
Ethylbenzene
Up to 2.6%

110-54-3
n-Hexane
Up to 4%

91-20-3
Naphthalene
Up to 1%
SARA

SARE
SECTION
311-312
HAZARD

CATEGORIES
(40 CFR 370.2):
CFR 370.2
Context and the second sec

FIRE: Yes SUDDEN RELEASE OF PRESSURE: No REACTIVE: No ACUTE: Yes CHRONIC: Yes

Section 16 - OTHER INFORMATION

Updated By:	Hue Lam	Date:	January 03, 2007
Title:	EHS Compliance Specialist	Supersedes:	December 24, 2003

Reason for

Issue: Deriodic review and update. THE INFORMATION CONTAINED IN THIS MSDS RELATES UNLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS MSDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS MSDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.



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