



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

ALASKA FISHERIES SCIENCE CENTER
MARINE MAMMAL LABORATORY
7600 Sand Point Way NE, Bin C15700
Seattle, Washington 98115-0070

FINAL Project Instructions

Date Submitted: March 2, 2016

Platform: NOAA Ship *Oscar Dyson R-224*

Project Number: DY-16-05 (OMAO)

Project Title: Ecology of Ice-associated Seals in the Bering Sea

Project Dates: April 2, 2016 to April 29, 2016

Prepared by: Michael Cameron Dated: March 2, 2016

Michael Cameron
Chief Scientist
Polar Ecosystems Program, MML

Approved by: Peter Boveng Dated: March 2, 2016

Peter Boveng
Leader
Polar Ecosystems Program, MML

Approved by: Doug Demaster Dated: March 2, 2016

Doug Demaster
Science Director
Alaska Fisheries Science Center

Approved by: _____ Dated: March 11, 2016

Commander Brian W. Parker,
NOAA Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. Brief Summary and Project Period

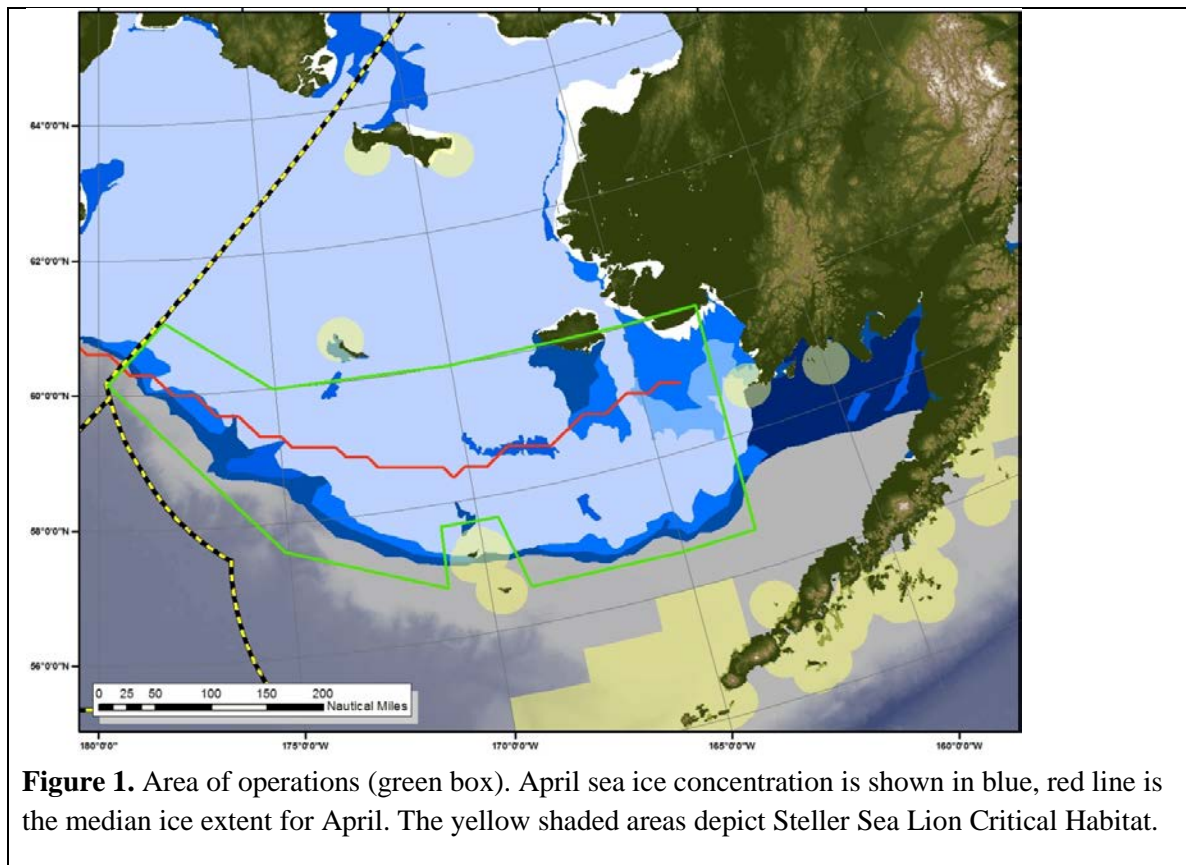
This project is a study of the habitat requirements and ecological relationships with sea ice, of ribbon and spotted seals in the core of their Bering Sea breeding area. The seals' movements, haul-out behavior, diet, genetic population structure, health will be investigated and monitored. A particular focus of the work in 2016 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 2 and end on April 29, 2016.

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.



D. Summary of Objectives

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

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Brady, Gavin	Mr. (Biologist)	2-Apr-16	29-Apr-16	M	NMFS	USA
Cameron, Michael	Dr. (ChiefSci)	2-Apr-16	29-Apr-16	M	NMFS	USA
Dahle, Shawn	Mr. (Biologist)	2-Apr-16	29-Apr-16	M	NMFS	USA
Fauquier, Deborah	Dr. (D.M.V.)	2-Apr-16	29-Apr-16	F	NMFS	USA
Horning, Markus	Dr. (Biologist)	2-Apr-16	29-Apr-16	M	U of AK, Fairbanks	USA
Littnan, Charles	Dr. (Biologist)	2-Apr-16	29-Apr-16	M	NMFS	USA
London, Josh	Dr. (Biologist)	2-Apr-16	29-Apr-16	M	NMFS	USA
Withrow, Dave	Mr. (Biologist)	2-Apr-16	29-Apr-16	M	NMFS	USA
Ziel, Heather	Ms. (Biologist)	2-Apr-16	29-Apr-16	F	NMFS	USA

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 (19309) issued by the Office of Protected Resources, National Marine Fisheries Service on March, 2016 and expiring March, 2021 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:

March 30: Scientists arrive, Kodiak
March 31: Prep/Load
April 1: Prep/Load
April 2: Depart Kodiak
April 4–27: Conduct Ops at ice edge
April 29: Arrive Dutch Harbor
April 30: Offload and ship gear
May 1: Scientists depart Dutch Harbor

B. Staging and Destaging:

We intend to send all equipment and supplies north with *Oscar Dyson* (see Appendix A) and/or ship them to a storage facility in Kodiak, AK prior to scientists' arrival on March 30. Based on past experience, everything can be loaded onto *Oscar Dyson* in one day, May 31, with April 1 being a buffer day. All personnel will embark *Oscar Dyson* in Kodiak and disembark Dutch Harbor, AK after the completion of the project. We intend to unload *Oscar Dyson* on April 29 or 30, having made prior arrangements to ship all equipment and supplies back to Seattle.

C. Operations to be Conducted:

Primary research: Research operations are expected to be very similar to those conducted from *Oscar Dyson* in 2014. 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)

Sea-Ice Imagery: 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 (<http://www.ndc.noaa.gov/dr.html>) and require the approval of the ship's Commanding Officer. (This statement must remain in all project instructions)

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 250-300 gallons unleaded gasoline for outboard engines (see Appendix C)
5. We also request that *Oscar Dyson* activate its AIS receivers as our small boats come equipped with individual AIS transponders.
6. Some of our VHF radios can transmit/receive GPS locations to each other at regular intervals. As such, we request that *Oscar Dyson* provide access to a BNC-cable/pigtail

on the bridge with connection to an external antenna to improve functionality of project provided VHF/GPS.

7. SCS display in the Electronics Lab and main Oceanographic Lab
8. 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
9. We request that before reaching the ice edge, all ships clocks be tuned back 2 hours (UTC-11). We will likely work near the western edge of the EEZ and our operations should coincide with the seal's hauling-out behavior which is influenced by the sun.
10. 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. Additional, supplementary safety equipment to compliment *Oscar Dyson* capabilities (if available). Specifically, AIS transponders on small boats and VHF radios that broadcast GPS coordinates on regular basis.
10. 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 Project 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 past projects aboard *Oscar Dyson*.

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
Fluorometer-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 that 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 previous projects aboard *Oscar Dyson* 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. Pre-Project Meeting: 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. Vessel Familiarization Meeting: 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. Post-Project Meeting: 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 <http://www.oma.noaa.gov/fleeteval.html> 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 MML 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. MML 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, NF 57-10-01 (3-14)) 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 NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (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 Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide 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 accellionAlerts@doc.gov 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 MOP.Health-Services@noaa.gov

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 email 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 through the ship's Commanding Officer 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 for this project.

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 *Oscar Dyson*

Container	Description	No.	Vol. (ft ³)	Weight (lbs)	Contents
Clamshell	Small, white (#13, 17)	2	13	120	Empty fuel cans, EtOH, acetone
Engine Box	Tall, wood box (#1; 30 hp)	1	43	170	Honda 4 stroke, 30 hp
Engine Box	Tall, wood box (#5; 25 hp)	1	43	160	Honda 4 stroke, 25 hp
Engine Box	Short wood box (#4,6,7,8)	4	41	640	Honda 4 stroke, 25 hp
ActionPacker	Green plastic	1	5	10	Glue, fire extinguishers, flares
Pelican	Medium, Black	1	5	50	PFDs
Total		10	150	1150	

Shipped North to USCG Base, Kodiak

Container	Description	No.	Vol. (ft ³)	Weight (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
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		14	235	2505	

Carried north by 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 *Oscar Dyson*. MML 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 port side of *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 MML 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 MML 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 MML 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 MML researchers will, in consultation with the Chief Scientist, decide whether to request that *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 MML 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, *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 (we have found that launching off of the port side is safest). Using a ladder hung over the side of *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 MML 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, MML 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 *Oscar Dyson*, the field party will immediately return together to the ship. After the field party has boarded the ship via the ladder, *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 MML 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. MML 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 (MML) for research project aboard the NOAA Ship *Oscar Dyson*. MSDS information for each item follows.

Cruise participants do not have Hazwoper training. As on past research cruises, Oscar Dyson's ECO Officer will be responsible for addressing gasoline spills.

Common Name of Material	Qty	Notes	Trained / Responsible Individual
Ethyl Alcohol (EtOH)	1 gallon	Hazwoper training not required if quantity < 5 L.	Michael Cameron
Acetone	6 quarts		
CO2 Cartridges for PFDs	30 (14 installed in PFDs)	Included on list for shipping purposes.	n/a
Gasoline for outboards*	250-300 gal.	In jettisonable tank	ECO Officer
Empty gas cans for 4-stroke engines*	Gasoline residue / fumes		

* *Unleaded Gasoline for Outboard Motors*. We will require 250-300 gallons of unleaded gasoline for use in outboard motors on the inflatable boats. The gasoline should be stored in a jettisonable tank(s) 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)

1-800-368-0050

IN CASE OF EMERGENCY CALL:

(24 Hours/Day, 7 Days/Week)

1-800-707-4555 or Chemtrec 1-800-424-9300

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

Burdick & Jackson

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 NAME	NTP STATUS	IARC STATUS	OSHA LIST
Isopropyl Alcohol	Group 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:	59°F (15°C)
FLASH POINT METHOD:	Closed Cup
AUTOIGNITION TEMPERATURE:	Not determined
UPPER FLAME LIMIT (volume % in air):	Not determined
LOWER FLAME LIMIT (volume % in air):	Not determined
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	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	ACGIH TLV	OSHA PEL	OTHER LIMIT
Ethyl Alcohol	1000 ppm	1000 ppm	none
Methyl Alcohol	200 ppm	200 ppm	250 ppm (STEL)
Isopropyl Alcohol	400 ppm (skin)	400 ppm	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
% VOLATILES:	100%
FLASH POINT:	59°F (15°C)

COMPARED TO: Butyl Acetate = 1

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

Burdick & Jackson

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

LC50 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

RCRA

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 (lb) SARA EHS TPQ (lb)

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

---- PPM ----

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 40 CFR 372. NONE 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: % by weight

infinite in water Specific Gravity: .785

- .788 Vapor Pressure: 186 mm Hg @ 20°C 100

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 carbon dioxide and carbon monoxide. residue) can ignite explosively.

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 alkalis, strong mineral acids.

Hazardous Decomposition of By-products: May 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 or prove fatal.

Skin: May cause 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 effects.

Chronic Overexposure: Repeated or prolonged solvent overexposure may cause permanent brain/nervous system damage. This material (or a component) shortens the time

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 effects. 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 Contact: Thoroughly wash exposed area with soap and water. If symptoms persist, seek medical attention. Remove contaminated clothing. Launder before reuse. Eye Contact: Flush with large amounts of water, lifting upper and lower lids occasionally, get medical attention. 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 waste disposal container for disposal.

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 filled.

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 & TLV. Wear resistant gloves such as natural rubber, neoprene, nitrile 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).

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. Hygiene: 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.

Proper Shipping Description	Pints	Hazard Class	ID#	Pkg Group	Label Req.
Consumer Commodity		ORM D	none	p none	none
Quarts Consumer Commodity		ORM D	none	none	none
Gallons Acetone		3	UN109 0	II	Flammable
5 Gallon Pails Acetone		3	UN109 0	II	Flammable
55 Gallon Drums Acetone		3	UN109 0	II	Flammable

10 Regulatory 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 made.

Print MSDS Sheet

MGIO4260 Page 001 of 008 SECTION 1 CHEMICAL

PRODUCT AND COMPANY IDENTIFICATION

MG INDUSTRIES
3 GREAT VALLEY PARKWAY
MALVERN, PENNSYLVANIA 19355
PHONE: 610-695-7400
FAX: 610-695-7596

EMERGENCY CONTACT:
CHEMTREC:
1-800-424-9300

SUBSTANCE: CARBON DIOXIDE, GAS
~~TRADE NAMES/SYNONYMS:~~
CARBONIC ACID GAS; CARBONIC ANHYDRIDE; CARBON DIOXIDE;
CARBON OXIDE; STCC 4904535; UN 1013; CO2; MGIO4260; 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~~ 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 MGIO4260 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.

MG104260 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 Liquefied 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

MGIO4260 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,

~~CARBON DIOXIDE~~ 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 inhalation-mouse 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:

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 INSTRUCTIONS: NON-

BULK PACKAGING: 49 CFR 173.302, 304

BULK PACKAGING: 49 CFR 173.302, 314,

QUANTITY LIMITATIONS:

PASSENGER AIRCRAFT OR

RAIL CAR: 75 kg CARGO AIRCRAFT

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification

ONLY: 150 kg

Assigned 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

ADR/RID CLASS: 2.2 LABEL:

Nonflammable gas

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):

MG104260 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

NATIONAL INVENTORY

STATUS: INVENTORY (TSCA): Listed on

inventory. TSCA 12(b) EXPORT

NOTIFICATION: Not listed

SECTION 16 OTHER INFORMATION

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IS SUPPLIED PURSUANT TO OSHA REGULATIONS. OTHER GOVERNMENT

REGULATIONS MUST BE REVIEWED FOR APPLICABILITY TO THIS

PRODUCT. WE BELIEVE THE INFORMATION SOURCE IS RELIABLE AND

THE INFORMATION IS ACCURATE AS OF THE DATE HEREOF, HOWEVER,

ACCURACY OR COMPLETENESS IS NOT GUARANTEED AND NO

WARRANTY OF ANY TYPE IS GRANTED. THE INFORMATION RELATES

ONLY TO THIS SPECIFIC PRODUCT. IF COMBINED WITH OTHER

MATERIALS, ALL COMPONENT PROPERTIES MUST BE CONSIDERED.

Print MSDS Sheet



MATERIAL SAFETY DATA SHEET

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHS Inc.
P.O. Box 64089
St. Paul, MN 55164-0089
Mail station 923

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 Gasoline **MSDS:** 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)	100 < 20 < 20	300 ppm TWA 500	300 ppm TWA 500	8006-61-9 108-
Ingredients Toluene		ppm STEL 200 ppm	ppm STEL 50 ppm	88-3 1330-20-7
Xylene Isomers		TWA 100 ppm TWA	TWA 100 ppm TWA	
		150 ppm STEL	150 ppm STEL	
Benzene	< 5	1 ppm TWA 5	0.5 ppm TWA 2.5	71-43-2
		ppm STEL	ppm STEL	
1,2,4-Trimethylbenzene	< 5	25 ppm TWA	25 ppm TWA	95-63-6
Ethyl Benzene	< 5	100 ppm TWA 125	100 ppm TWA 125	100-41-4
		ppm STEL	ppm STEL	
n-Hexane Naphthalene	< 4 < 0.5	500 ppm TWA 10	50 ppm TWA	110-54-3 91-20-3
		ppm TWA	Skin 10 ppm	
			TWA	

(TWA) - Time Weighted Average is the employee's average airborne exposure in any 8-hour work shift of
(STEL) - Short Term Exposure Limit is the employee's 15-minute time weighted average exposure which shall not
a 40-hour work week which shall not be exceeded.
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.

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 mice.

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: No IARC: No OSHA: No

Benzene - NTP: Yes IARC: Yes OSHA: Yes

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

EXTINGUISHING MEDIA: Dry Chemical, Foam, Carbon Dioxide (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 is applied.

HAZARD RATINGS: NFPA 704: Health- 1 Fire-3 Reactivity- 0 HMIS: Health- 2 Fire-4 Reactivity- 0

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 spaces 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 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 alkalis.

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 Up to 4.8%

100-41-4 Ethylbenzene Up to 2.6%

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

91-20-3 Naphthalene Up to 1% **SARA SECTION 311-312 HAZARD****CATEGORIES (40 CFR 370.2):****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: Periodic review and update

THE INFORMATION CONTAINED IN THIS MSDS RELATES ONLY 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 OF THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATION.



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