

# OMG

The OCC Knowledge Base

*NVP*

*2019-12-12*



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# Preface



The OMG is the online knowledge base of the OCC Team. It started as the OCC Mission Guide, a reference manual to help consolidate best practices for conducting OCC team operations at sea. As of 2020, it has evolved into an online living book, written in R Markdown and compiled into book with bookdown and published via GitHub Pages. The current live version of the book is [here](#) All OCC team members are encouraged to not only use it as a resource but help it grow by adding and editing content as OCC projects, methods and missions change and grow. Anyone may suggest edits to the contents of the OMG by forking the OMG repository from Noah via GitHub, pushing any changes back to GitHub, after which they may be approved for incorporation into the master copy of the OMG.

The HTML version of the OMG may be accessed from your local machine or a network drive



# Chapter 1

## Preparing for a Research Cruise

### 1.1 Determine Goals

Determine the team's goals in the region the research cruise is scheduled to visit. Identify all planned retrievals, deployments and specialty projects (such as the diel suite), and the number of days, staff, and boats needed to accomplish these goals.

### 1.2 Spatial Data Preparation

- Create a single .kml file that includes all planned instrument retrievals and any planned additional deployments and other necessary points (collectively all called "planning points". .kml files are more agile than ArcGIS files; they are easier to use in Google Earth for day to day planning.
- Create an ArcGIS map project that contains the locations of all planning points.

### 1.3 Garmin 78 Handheld GPS Preparation

- Ensure each handheld unit is setup properly
  - Time to UTC
  - LAT and LONG in decimal degrees
- Test each handheld GPS to be taken on the cruise prior to sailing: take it outside and ensure that it collects waypoints.
- Upload planning points to both the primary and secondary GPS units.

## 1.4 Datasheet Preparation

- Prepare Field Data Binders
  - Print enough data sheets for all activities, including mooring, CAU, CTD/H2O for the OCC team in addition to enough CTD/H2O data sheets for any other team on CTD/H2O Ops.
  - Attach sharp pencils to field binders

## 1.5 Software Needed at Sea

Software	Team Lead Only	Manufacturer	Needed For	Instrument	Download Location
ARCMAP	x	ESRI	planning operations and generating maps	NA	see Tomoko
Google Earth		Google	planning operations	NA	
Keyspan USA Software		Keyspan	serial to USB adapter cable	GPS	<a href="https://www.triplite.com/support/USA19HS">https://www.triplite.com/support/USA19HS</a>
Microsoft Access 2010		Microsoft	mooring and CTD databases	NA	request from ITS
Excel		Microsoft	spreadsheets	NA	you must have this already
DNR Garmin		Minnesota DNR	download of GPS Waypoints	GPS	<a href="http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html">http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html</a>
DNR GPS		Minnesota DNR	upload of GPS planning points from Google Earth	GPS	<a href="http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html">http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html</a>
Aquadopp Software - AquaPro v1.37.08		Nortek	instrument interface	Aquadopp ADCP	<a href="http://www.nortek-as.com/en/support/software">http://www.nortek-as.com/en/support/software</a>
SoundTrap Host Software Version 2.0.9.x	x	Ocean Instruments	instrument interface	Sound Trap	<a href="http://www.oceaninstruments.co.nz/downloads/">http://www.oceaninstruments.co.nz/downloads/</a>



Software	Team Lead Only	Manufacturer	Used For	Instrument	Download Location
Basic Stamp Editor		Parallax Inc.	instrument interface	PUC	<a href="https://www.parallax.com/downloads/basic-stamp-editor-software-windows">https://www.parallax.com/downloads/basic-stamp-editor-software-windows</a>
Python 2.51		Python	scripts that are part of mooring and CTD databases	NA	<a href="https://www.python.org/download/releases/2.5.1/">https://www.python.org/download/releases/2.5.1/</a>
SeaFETCOM 2		Satlantic	instrument interface	SeaFet	<a href="http://satlantic.com/seafetcom">http://satlantic.com/seafetcom</a>
Seaterm 1.59		SeaBird	instrument interface	SBE39, SBE19, SBE19+	<a href="http://www.seabird.com/software/software">http://www.seabird.com/software/software</a>
Seaterm V2		SeaBird	instrument interface	sbe19+ V2, SBE56	<a href="http://www.seabird.com/software/software">http://www.seabird.com/software/software</a>
SBE Data Processing R and R Studio for STR processing		SeaBird R Studio	CTD cast processing data processing	SBE CTDs all	<a href="https://www.seabird.com/software-updates">https://www.seabird.com/software-updates</a> <a href="https://www.rstudio.com/products/rstudio/download/">https://www.rstudio.com/products/rstudio/download/</a>
Ruskin		RBR	STR, PAR, DO	RBR Solo	<a href="https://rbr-global.com/products/software">https://rbr-global.com/products/software</a>



## Chapter 2

# CTD and DIC Water Sampling Field Guide

If available hands on deck and conditions allow, please conduct the CTD downcast and the water sample collection simultaneously.

### 2.1 Waypoint and metadata collection

Use the OCC provided GPS unit to collect a waypoint when the CTD downcast begins. Record all metadata on provided data sheet.

### 2.2 CTD CAST

1. Ensure that the CTD line is connected to the top of the CTD frame by 1 shackles.
2. Tie non-CTD end of the CTD line to the boat with a bowline or clip off with carabiner.
3. Flake CTD line on deck.
4. When the coxswain says the CTD can go over the side, raise the CTD switch to the "ON" position, and loudly say, "ON!" then lower it over the side until the top of the frame is 1 meter below the surface of the water to begin the 1 minute soaking period, either holding the line or cleating off the line to maintain the CTD at soaking depth.
5. After 1 minute soak, ask the coxswain for the current depth so you know how far you can lower the CTD without it hitting the bottom (5-10 feet less line than the bottom depth). Un-cleat the CTD line if it was cleated and begin the CTD cast by pulling the CTD frame up until the top ring of the frame emerges from the water, then begin gradually lowering at a consistent rate, hand over hand, until the CTD gets to the target depth (using the markings on the line to estimate depth). Once the target depth is reached, pull the CTD back on board.

6. Once the CTD is back on board, lower the switch to “OFF”, and loudly say “OFF!”

## 2.3 Water Sample Collection

1. Prime the Niskin Bottle, ensuring the petcock and the air bleed valve are closed.
2. Clip off the boat side of the niskin line to the boat.
3. Near the end of the the CTD soaking time, lower the weight and the open Niskin bottle over the side so the top of the Niskin is at 1m depth (surface of water at the BLACK mark drawn on Niskin line).
4. Clip the messenger on to the line
5. When the CTD begins its downcast, send the messenger to trigger the Niskin to close. Ensure no air bubbles are trapped inside the Niskin and bottle sits vertically in the water column before firing the messenger.

## 2.4 Water sample Processing

1. Designate roles: bottle filler, mercuric chloride ( $\text{HgCl}_2$ ) handler, data recorder. NOTE: Supersaturated mercuric chloride solution is extremely dangerous; use the utmost caution when dealing with the chemical. All personnel working with it are required to wear eye protection. The mercuric chloride handler is also required to wear disposable nitrile gloves. In the event of contact with any part of the body, wash the area profusely. If contact is made with eyes, abort operations, rinse continuously with fresh water (or salt if fresh has run out), alert the ship and return ASAP.
2. Remove a bottle and its stopper from the storage tote and insert the tygon tubing to the bottom of the bottle. With the tygon tubing attached to the Niskin bottle dispensing nipple, open the Niskin bottle valve and allow for three complete flushings of the bottle to occur before stopping the sample collection (i.e. start the collection and count how long it takes for the bottle to overflow and then allow that to occur for 2x the required fill time...ie. if the bottle fills in 20 seconds, allow the sample water flow to flush the bottle for 60 seconds). Attention must be given to how the sample water enters the bottle. Care should be given to ensure that smooth water flow into the bottle is maintained and that no bubbles are created during the dispensing of sample. Any bubbles introduced to the sample will alter the  $\text{pCO}_2$  within the sample water and produce inaccurate DIC results.
3. After the appropriate flushing time, shut off the Niskin valve to stop the water flow, while at the same time ensuring the tygon tubing doesn't come off the bottom of the sample bottle. Once the flow is shut off, pinch the tubing and in one motion remove it from the bottle. This “pinch and remove” action with the tubing should establish a consistent head-space in all the sample bottles. The meniscus

of the sample should be about 1 cm below the neck of the bottle (see picture.)



4.
  - a. Once the proper head space is established, pipette 200ul of  $\text{HgCl}_2$  saturated solution into the sample bottle
  - b. Use the syringe containing vacuum grease to make 3-5 vertical "stripes" of grease on a clean, dry stopper. Insert the greased stopper until fully seated in the bottle, then twist until the grease completely seals the bottle contents. The vertical stripes of grease allow for gases to escape the bottle neck while the stopper is being inserted. Having the stopper clean/dry ensures that other than sample water isn't introduced into the bottle. Twisting the stopper, once it has been fully seated into the neck of the bottle, ensures a smooth distribution of grease within the sample bottle's neck and an air tight seal.
  - c. Use the rubber band and plastic collar to lock down the stopper inside the bottle. Once secured, softly invert the bottle 1-2x to mix the  $\text{HgCl}_2$  with the water sample and secure the sample bottle in the field container.
  - d. Complete data sheet including REA Site name or OCC Site Name (if it exists), waypoint name (default), UTC date and time, lat and long, sample depth and

DIC bottle #.

## 2.5 Mercuric Chloride Emergency Procedures

- Eyes: Irrigate immediately with large quantity of water for at least 15 minutes.
- Skin: Immediately flush with plenty of water for at least 15 minutes. Remove any contaminated clothing.
- Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
- Ingestion: Only induce vomiting if directed to do so by medical personnel.
- The MSDS can be seen from any NOAA Google Account via this google drive link



## SECTION 4: First aid measures



## Mercuric Chloride, Saturated

### Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

#### SECTION 6: Accidental release measures

##### 6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate area. Absorb spillage to prevent material damage.

##### 6.1.1. For non-emergency personnel

Protective equipment : Safety glasses. Protective clothing. Gloves.  
Emergency procedures : Evacuate unnecessary personnel.

##### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.  
Emergency procedures : Ventilate area.

##### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters. Avoid release to the environment.

##### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

##### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

#### SECTION 7: Handling and storage

##### 7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid breathing mist.  
Hygiene measures : Do not eat, drink or smoke when using this product. Wash exposed skin thoroughly after handling.

##### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.  
Incompatible products : Strong bases. Strong acids. Strong oxidizers.  
Incompatible materials : Sources of ignition. Direct sunlight.

##### 7.3. Specific end use(s)

No additional information available

#### SECTION 8: Exposure controls/personal protection

##### 8.1. Control parameters

Mercuric Chloride, Saturated		
ACGIH	Not applicable	
OSHA	Not applicable	
Mercuric Chloride (7487-94-7)		
ACGIH	ACGIH TWA (mg/m³)	0.025 mg/m³
OSHA	OSHA PEL (TWA) (mg/m³)	0.1 mg/m³
Water (7732-18-5)		
ACGIH	Not applicable	
OSHA	Not applicable	

##### 8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation.

Personal protective equipment : Avoid all unnecessary exposure.

Hand protection : Wear protective gloves.

Eye protection : Chemical goggles or safety glasses.

Skin and body protection : Protective clothing.

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EN (English US)

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## Mercuric Chloride, Saturated

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Respiratory protection	: Wear appropriate mask.
Other information	: Do not eat, drink or smoke during use.

#### SECTION 9: Physical and chemical properties

##### 9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Color	: Colorless
Odor	: None.
Odor threshold	: No data available
pH	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: No data available
Flash point	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: No data available
Explosion limits	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
Vapor pressure	: No data available
Relative density	: No data available
Relative vapor density at 20 °C	: No data available
Solubility	: Soluble in water. Water: Solubility in water of component(s) of the mixture : • Mercuric Chloride: 6.9 g/100ml
Log Pow	: No data available
Log Kow	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available

##### 9.2. Other information

No additional information available

#### SECTION 10: Stability and reactivity

##### 10.1. Reactivity

No additional information available

##### 10.2. Chemical stability

Stable under normal conditions.

##### 10.3. Possibility of hazardous reactions

Not established.

##### 10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

##### 10.5. Incompatible materials

Strong acids. Strong bases. Strong oxidizers.

##### 10.6. Hazardous decomposition products

Hydrogen chloride, mercury.

#### SECTION 11: Toxicological information

##### 11.1. Information on toxicological effects

Likely routes of exposure	: Skin and eye contact
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03/30/2015

EN (English US)

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## Mercuric Chloride, Saturated

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according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Acute toxicity	: Oral: Fatal if swallowed. Dermal: Toxic in contact with skin.
<b>Mercuric Chloride, Saturated</b>	
LD50 oral rat	15.4 mg/kg
LD50 dermal rat	631 mg/kg
ATE US (oral)	15.400 mg/kg body weight
ATE US (dermal)	631.000 mg/kg body weight
<b>Mercuric Chloride (7487-94-7)</b>	
LD50 oral rat	1 mg/kg (Rat)
LD50 dermal rat	41 mg/kg (Rat)
ATE US (oral)	1.000 mg/kg body weight
ATE US (dermal)	41.000 mg/kg body weight
<b>Water (7732-18-5)</b>	
LD50 oral rat	≥ 90000 mg/kg
ATE US (oral)	90000.000 mg/kg body weight
Skin corrosion/irritation	: Not classified
Serious eye damage/irritation	: Not classified
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Suspected of causing cancer.
<b>Mercuric Chloride (7487-94-7)</b>	
IARC group	2B - Possibly carcinogenic to humans
Reproductive toxicity	: Suspected of damaging fertility or the unborn child.
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: May cause damage to organs (nervous system) through prolonged or repeated exposure.
Aspiration hazard	: Not classified
Potential Adverse human health effects and symptoms	: Based on available data, the classification criteria are not met. Toxic in contact with skin. Fatal if swallowed.
Symptoms/injuries after inhalation	: No data available.
Symptoms/injuries after skin contact	: Repeated exposure to this material can result in absorption through skin causing significant health hazard. Toxic in contact with skin.
Symptoms/injuries after eye contact	: No data available.
Symptoms/injuries after ingestion	: Fatal if swallowed.
Chronic symptoms	: Impairment of the nervous system.

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - water : Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

<b>Mercuric Chloride, Saturated</b>	
LC50 fish 1	0.46 mg/l 96 hr.
EC50 Daphnia 1	0.05 mg/l 48 hr.
<b>Mercuric Chloride (7487-94-7)</b>	
LC50 fish 1	0.03 mg/l (96 h; Poecilia reticulata)
EC50 Daphnia 1	0.0081 mg/l (24 h; Daphnia magna)
LC50 fish 2	0.04 mg/l (96 h; Cyprinus carpio)
EC50 Daphnia 2	0.003 mg/l (48 h; Daphnia magna)
TLM fish 1	0.82 mg/l (168 h; Carassius auratus)
Threshold limit algae 1	0.08 mg/l (Selenastrum capricornutum)
Threshold limit algae 2	0.07 mg/l (Scenedesmus quadricauda)

## Mercuric Chloride, Saturated

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#### 12.2. Persistence and degradability

<b>Mercuric Chloride, Saturated</b>	
Persistence and degradability	May cause long-term adverse effects in the environment.
<b>Mercuric Chloride (7487-94-7)</b>	
Persistence and degradability	Biodegradability: not applicable. No test data on mobility of the substance available.
Biochemical oxygen demand (BOD)	Not applicable
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable
<b>Water (7732-18-5)</b>	
Persistence and degradability	Not established.

#### 12.3. Bioaccumulative potential

<b>Mercuric Chloride, Saturated</b>	
Bioaccumulative potential	Not established.
<b>Mercuric Chloride (7487-94-7)</b>	
BCF fish 1	10000 (Pisces)
BCF fish 2	500 - 4620 (Cyprinus carpio; Test duration: 10 weeks)
BCF other aquatic organisms 1	10000 (Ostreidae)
Log Pow	0.1 - 0.22 (Calculated)
Bioaccumulative potential	Potential for bioaccumulation ( $500 \leq \text{BCF} \leq 5000$ ).
<b>Water (7732-18-5)</b>	
Bioaccumulative potential	Not established.

#### 12.4. Mobility in soil

No additional information available

#### 12.5. Other adverse effects

Effect on the global warming	: No known ecological damage caused by this product.
Other information	: Avoid release to the environment.

### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

Waste disposal recommendations	: Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to comply with local, state and federal regulations.
Ecology - waste materials	: Hazardous waste due to toxicity. Avoid release to the environment.

### SECTION 14: Transport information

#### Department of Transportation (DOT)

In accordance with DOT	
Transport document description	: UN2024 Mercury compounds, liquid, n.o.s. (Mercuric chloride), 6.1, II
UN-No.(DOT)	: UN2024
Proper Shipping Name (DOT)	: Mercury compounds, liquid, n.o.s.
Transport hazard class(es) (DOT)	: 6.1 - Class 6.1 - Poisonous materials 49 CFR 173.132
Hazard labels (DOT)	: 6.1 - Poison inhalation hazard



Packing group (DOT)	: II - Medium Danger
Dangerous for the environment	: Yes

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Marine pollutant : Yes



DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 243

DOT Symbols : G - Identifies PSN requiring a technical name

DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.

DOT Packaging Exceptions (49 CFR 173.xxx) : 153

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 5 L

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L

DOT Vessel Stowage Location : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.

DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"

**Additional information**

Other information : No supplementary information available.

**ADR**

No additional information available

**Transport by sea**

No additional information available

**Air transport**

No additional information available

**SECTION 15: Regulatory information****15.1. US Federal regulations**

Mercuric Chloride, Saturated		
SARA Section 311/312 Hazard Classes		Immediate (acute) health hazard Delayed (chronic) health hazard
All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory		
Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.		
Mercuric Chloride	CAS No 7487-94-7	6.5
Mercuric Chloride (7487-94-7)		
Listed on the United States SARA Section 302		
Listed on United States SARA Section 313		
RQ (Reportable quantity, section 304 of EPA's List of Lists)	500 lb	
SARA Section 302 Threshold Planning Quantity (TPQ)	500 lb	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard	

**15.2. International regulations****CANADA**

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Mercuric Chloride (7487-94-7)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class E - Corrosive Material
Water (7732-18-5)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

#### EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

No additional information available

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Not classified

#### National regulations

Mercuric Chloride (7487-94-7)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
Water (7732-18-5)	
Not listed on the Canadian IDL (Ingredient Disclosure List)	

#### 15.3. US State regulations

Mercuric Chloride (7487-94-7)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
No	Yes	No	No	

### SECTION 16: Other information

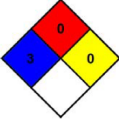
Other information : None.

Full text of H-phrases: see section 16:

Acute Tox. 1 (Dermal)	Acute toxicity (dermal) Category 1
Acute Tox. 1 (Oral)	Acute toxicity (oral) Category 1
Acute Tox. 2 (Oral)	Acute toxicity (oral) Category 2
Acute Tox. 3 (Dermal)	Acute toxicity (dermal) Category 3
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment - Chronic Hazard Category 1
Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Carc. 2	Carcinogenicity Category 2
Repr. 2	Reproductive toxicity Category 2
STOT RE 2	Specific target organ toxicity (repeated exposure) Category 2
H300	Fatal if swallowed
H310	Fatal in contact with skin
H311	Toxic in contact with skin
H351	Suspected of causing cancer
H361	Suspected of damaging fertility or the unborn child
H373	May cause damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects
H411	Toxic to aquatic life with long lasting effects

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NFPA health hazard	: 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.	
NFPA fire hazard	: 0 - Materials that will not burn.	
NFPA reactivity	: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.	
HMIS III Rating		
Health	: 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given * - Chronic (long-term) health effects may result from repeated overexposure	
Flammability	: 0 Minimal Hazard - Materials that will not burn	
Physical	: 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.	
Personal Protection	: D D - Face shield and eye protection, Gloves, Synthetic apron	

SDS US (GHS HazCom 2012)

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.



## Mercuric Chloride, Saturated

### Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations  
Date of issue: 03/30/2015 Version: 1.0

#### SECTION 1: Identification of the substance/mixture and of the company/undertaking

##### 1.1. Product identifier

Product form : Mixture  
Product name : Mercuric Chloride, Saturated  
Product code : LC16620

##### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : For laboratory and manufacturing use only.

##### 1.3. Details of the supplier of the safety data sheet

LabChem Inc.  
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court  
Zellienople, PA 15063 - USA  
T 412-826-5230 - F 724-473-0647  
[info@labchem.com](mailto:info@labchem.com) - [www.labchem.com](http://www.labchem.com)

##### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

#### SECTION 2: Hazards identification

##### 2.1. Classification of the substance or mixture

###### Classification (GHS-US)

Acute Tox. 2 (Oral) H300  
Acute Tox. 3 (Dermal) H311  
Carc. 2 H351  
Repr. 2 H361  
STOT RE 2 H373  
Aquatic Acute 1 H400  
Aquatic Chronic 2 H411

Full text of H-phrases: see section 16

##### 2.2. Label elements

###### GHS-US labeling

Hazard pictograms (GHS-US)



Signal word (GHS-US)

: Danger

Hazard statements (GHS-US)

: H300 - Fatal if swallowed  
H311 - Toxic in contact with skin  
H351 - Suspected of causing cancer  
H361 - Suspected of damaging fertility or the unborn child  
H373 - May cause damage to organs (nervous system) through prolonged or repeated exposure  
H410 - Very toxic to aquatic life with long lasting effects

Precautionary statements (GHS-US)

: P201 - Obtain special instructions before use  
P202 - Do not handle until all safety precautions have been read and understood  
P260 - Do not breathe mist  
P264 - Wash exposed skin thoroughly after handling  
P270 - Do not eat, drink or smoke when using this product  
P273 - Avoid release to the environment  
P280 - Wear protective gloves, protective clothing, eye protection, face protection  
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER/doctor  
P302+P352 - IF ON SKIN: Wash with plenty of soap and water  
P308+P313 - IF exposed or concerned: Get medical advice/attention  
P312 - Call a POISON CENTER/doctor if you feel unwell  
P330 - If swallowed, rinse mouth  
P361 - Remove/Take off immediately all contaminated clothing  
P363 - Wash contaminated clothing before reuse



## Chapter 3

# Data Processing and the Occ Package

The *occ* package is uploaded to GitHub and can be downloaded directly in R.

1. Open the *devtools* library.

```
library(devtools)
```

2. To download the *occ* package, use the `install_github` command. The repository name is in the form “username/repo”. For the *occ* package, the username is “hannahbarkley” and the repo is “occ”. This install only need to occur once; however, the *occ* package will need to be reinstalled if there are updates to the package (which is likely).

```
install_github("hannahbarkley/occ")
```

3. Once installed, load the *occ* package.

```
library(occ)
```



## Chapter 4

### Software Needed at Sea

Software	Team Lead Only	Manufacturer	Used For	Instrument	Download Location
ARCMAP	x	ESRI	planning operations and generating maps	NA	see Tomoko
Google Earth		Google	planning operations	NA	
Keyspan USA Software		Keyspan	serial to USB adapter cable	GPS	<a href="https://www.tripplite.com/support/USA19HS">https://www.tripplite.com/support/USA19HS</a>
Microsoft Access 2010		Microsoft	mooring and CTD databases	NA	request from ITS
Excel		Microsoft	spreadsheets	NA	you must have this already
DNR Garmin		Minnesota DNR	download of GPS Waypoints	GPS	<a href="http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html">http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html</a>
DNR GPS		Minnesota DNR	upload of GPS planning points from Google Earth	GPS	<a href="http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html">http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html</a>
Aquadopp Software - AquaPro v1.37.08		Nortek	instrument interface	Aquadopp ADCP	<a href="http://www.nortek-as.com/en/support/software">http://www.nortek-as.com/en/support/software</a>

Software	Team Lead Only	Manufacturer	Used For	Instrument	Download Location
SoundTrap Host Software Version 2.0.9.x	x	Ocean Instruments	instrument interface	Sound Trap	<a href="http://www.oceaninstruments.co.nz/downloads/">http://www.oceaninstruments.co.nz/downloads/</a>
Basic Stamp Editor		Parallax Inc.	instrument interface	PUC	<a href="https://www.parallax.com/downloads/basic-stamp-editor-software-windows">https://www.parallax.com/downloads/basic-stamp-editor-software-windows</a>
Python 2.51		Python	scripts that are part of mooring and CTD databases	NA	<a href="https://www.python.org/download/releases/2.5.1/">https://www.python.org/download/releases/2.5.1/</a>
SeaFETCOM 2		Satlantic	instrument interface	SeaFet	<a href="http://satlantic.com/seafetcom">http://satlantic.com/seafetcom</a>
Seaterm 1.59		SeaBird	instrument interface	SBE39, SBE19, SBE19+	<a href="http://www.seabird.com/software/software">http://www.seabird.com/software/software</a>
Seaterm V2		SeaBird	instrument interface	sbe19+ V2, SBE56	<a href="http://www.seabird.com/software/software">http://www.seabird.com/software/software</a>
SBE Data Processing R and R Studio for STR processing		SeaBird	CTD cast processing	SBE CTDs	<a href="https://www.seabird.com/software-updates">https://www.seabird.com/software-updates</a>
Ruskin		R Studio	data processing	all	<a href="https://www.rstudio.com/products/rstudio/download/">https://www.rstudio.com/products/rstudio/download/</a>
		RBR	STR, PAR, DO	RBR Solo	<a href="https://rbr-global.com/products/software">https://rbr-global.com/products/software</a>

## **Chapter 5**

# **Diel Suite**

### **5.1 Diel Suite Underwater Checklist**

#### **PUC**

1. Tubes cleared of air and water with swipe of pump
2. Tubes connected to valves
3. Valves opened one full turn

#### **ADCP**

1. Ensure ADCP has unobstructed view of the surface
2. Get compass bearing on ADCP head direction after final installation



## Chapter 6

# Instruments

Guidance on instrumentation in the OMG is not intended to replace the instruction manual

### 6.1 STRs

All STRs must be programmed prior to deployment and have fresh batteries and dessicant installed. See manual's for specific programming guidance.

#### **STR - RBR Solo V3 Temperature Sensor**

Find the user manual in "Reference" section of OCC files at sea.

#### **Physical Preparation for Deployment**

- Use brand new Tadiran Lithium Thionyl Chloride 3.6v batteries
- Wrap instrument housing with "PVC floor marking tape", leaving the serial number exposed

#### **Programming**

1. Open Ruskin
2. Connect to the instrument with the supplies USB C cable, it should appear in the "Navigator" view after a few seconds
3. Ensure that your computer is connected to the internet so that the program can get the correct time from your computer.
4. Click UTC to set the instrument's time to UTC
5. Click on the "Information" tab and confirm that the battery has 3.6v

6. After programming each instrument, disconnect the USB cable, install a fresh desiccant and close the instrument in a short period of time so that the desiccant does not absorb ambient moisture in the air
7. Parameters
  - a. Sampling Interval: 1 sample every 5 minutes
  - b. Sampling mode: Continuous
    - “Ruskin\_instrument.log” keeps a text file that includes the parameters of each instrument programmed
    - .rsk files are sqlight data files which are open source and non-proprietary

### Downloading Data from Solo 3

1. Connect to the instrument
2. Select the dataset and download it

### Processing RBR Solo 3 Data Files

see Data Processing with the OCC Package

### Factory Recalibration of the Solo 3

- Call RBR to arrange the re-calibration of each Solo 3, which will cost approx. \$120
- Instrument drift over 3 years should be less than .006 C, thus there is no need to re-calibrate the data set with post-cruise calibration coefficients
- In Ruskin, by default, the name of a data file is composed of the following information:
  - The first six digits represent the logger serial number.
  - The next eight digits represent the current year, month, and day.
  - The next four digits represent the current time to the minute.
  - The file extension indicates the file format and should not be changed. If you change it, the file extension that you specify becomes part of the name, and the required extension is appended. For example, the file named 911936\_20090522\_1613.rsk contains data for a logger with a serial number of 911936 whose data was downloaded in 2009 on May 22 at 4:13 pm.



## Chapter 7

# Field Checklists

### 7.1 Daily Tasks for the Team

Find Excel version here via Google Drive

#### STR

- Before Ops
  - assemble, program and stage needed STRs
  - confirm 10 36" cable ties for each STR planned
  - write serial numbers of planned STR deployments on tomorrow's data sheet
- After Ops
  - download strs
  - enter deployments and retrievals into mooring database
  - import waypoints into mooring database
  - clean STRs, put weights and brackets on fantail or in DD bath

#### CAU

- Before Ops
  - Pack supplies for planned CAU site swaps
  - write down deploy CAU SNs on tomorrow's data sheet
- After Ops
  - scrape/record CAU SN's, re-bag and freeze with cruise & site label
  - dispose of old clips and stakes
  - after CTD/H2O data is entered, give data sheets to data manager

**Water Sampling and CTD**

- Before Ops
  - DIC bottles and all supplies in each kit
  - Niskin, line, messenger, weight staged for each CTD
- After Ops
  - rinse and stage CTDs
  - Swap full bottles for empties, dispose of waste
  - restock all supplies
  - replace and label any worn ziplocs
  - enter CTD and water sample log into CTD/H2O Database (hopefully this is not a necessary step on MARAMP 2020!)

**GPS Units (for OCC and benthic/fish GPS)**

- Drop off GPS units with data manager for waypoint download

**Cameras**

- Before Ops
  - Ensure cameras are set to UTC time
  - Ensure cameras have memory cards
  - charge camera batteries
  - clean camera housings
  - bake desiccants and install them
- After Ops
  - download and sort photos
  - download and sort photoquad photos
  - charge cameras or swap charged batts for used batts
  - install new dessicants

**Stage all Gear**

- Action packer packed for day of ops
- Pam float and reel staged
- If deep STR: Marker Float and drop weight
- 1 full bag of large cable ties (keep on boat)
- CTDs and lines

**Other**

- gauge tanks

## **7.2 Where to Save Data**

Checkout this Excel file on Google Drive for details on where to save data