National Oceanography Centre, Southampton

Internal Document No. 9

SNOMS: SWIRE NOCS Ocean Monitoring System Maintenance and underway sampling protocols and safety information for the MV *Pacific Celebes* system fitted June 2007

D J Hydes & J M Campbell

2007

The Swire Group and the National Oceanography Centre, University of Southampton working together to examine the role of the oceans in limiting the build up of carbon dioxide in the atmosphere

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TITLE

Report on the SNOMS Swire NOCS Ocean Monitoring System. Maintenance and underway sampling protocols and safety information for the MV *Pacific Celebes* system fitted June 2007.

REFERENCE

Southampton, UK: National Oceanography Centre, Southampton, 27pp.
(National Oceanography Centre Southampton Internal Document, No. 9)
(Unpublished manuscript)

ABSTRACT

The SNOMS project brings together the resources of the United Kingdom's National Oceanographic Centre, Southampton (one of the world's leading centres for marine research) and The Swire Group (a major multinational corporation) to make a significant contribution towards improving our understanding of the role of the oceans in controlling concentration of carbon dioxide in the atmosphere and hence the worlds climate.

The Swire Group Charitable Trust funded the design, assembly and installation of a scientific data collection system on their ship the MV *Pacific Celebes*. The system is now providing data from areas where no or little data exists particularly in the Indian Ocean, Red Sea and Mediterranean. It links with and connects on-going observations in the Atlantic. Data from the system supports projects both at NOC and elsewhere including the IOCPP (International Ocean Carbon Coordination Project).

In Singapore and Jakarta, in June 2007, NOC installed the first system on the Swire ship the MV *Pacific Celebes*. This report details the job required to be carried out by NOC personnel and the ship's crew in order to main the system and to provide water samples to be analysed on shore. These water samples will allow the quality of the autonomous measurements to be assessed. This report should be used in conjunction with, NOC Internal Document No. 8 [Hydes, D J, (2007) Report on the SNOMS Swire NOCS Ocean Monitoring System: System Description and Inventory for the MV *Pacific Celebes* system fitted June 2007] which provides a detailed description of the equipment installed on the ship. Two videos of the cleaning and sampling procedures were made during the fitting out of the system ["070604 tank movie v2" and "070604 sampling movie v2"]. Copies of the videos have been supplied to both the Master and Chief Engineer of the MV *Pacific Celebes* along with this document on a CD.

The report also contains the "risk assessments" for the work needed on the MV *Pacific Celebes* as part of SNOMS activities and the necessary chemical safety data.

KEYWORDS

air water exchanges, carbon dioxide, chemical safety, dissolved oxygen, equipment, installation, measurement, long term observation, monitoring, MV *Pacific Celebes,* risk assessment, Ships of Opportunity, SNOMS

ISSUING ORGANISATION

National Oceanography Centre, Southampton
University of Southampton, Waterfront Campus
European Way
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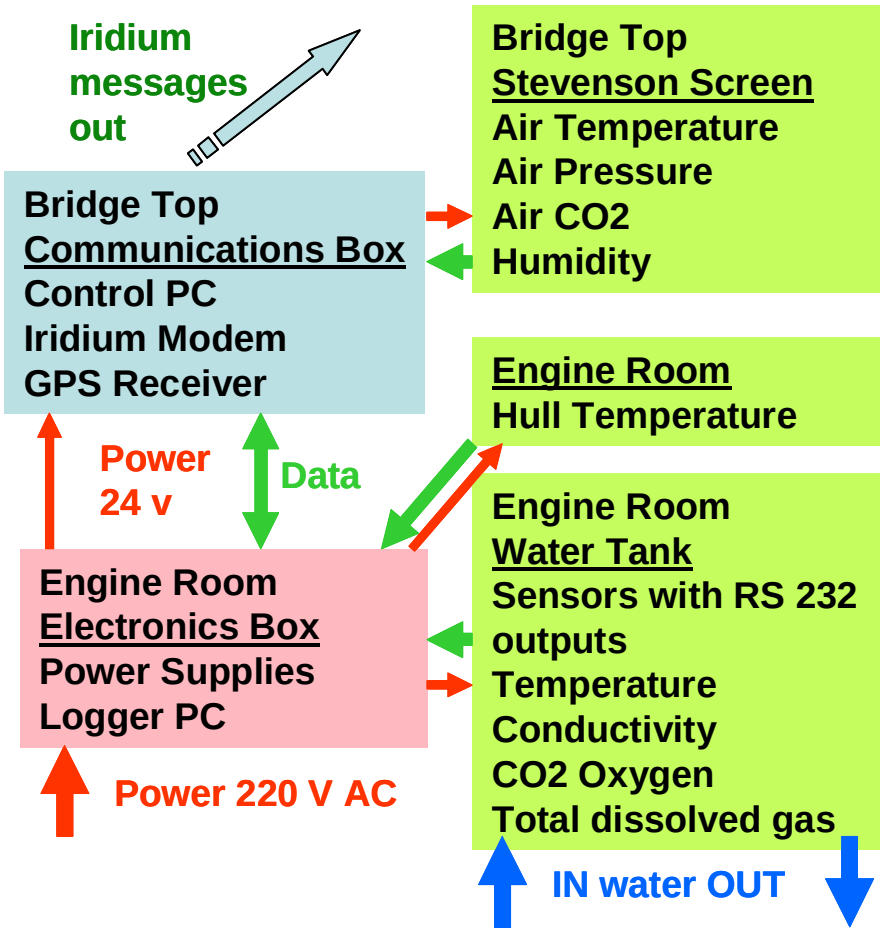
Contents

Schematic of system



The 4 main scientific instrument packages and control units aboard the Pacific Celebes are :-

1. In the engine room a stainless steel tank connected to ships pumped seawater supply containing measuring devices for dissolved carbon dioxide and oxygen, total dissolved gas pressure, temperature and conductivity
2. In the engine room an electronics cabinet containing the main data logging, control computer and DC power supplies.
3. On the Monkey Island a Stevenson screen box containing sensors measuring humidity, air temperature and atmospheric carbon dioxide content.
4. On the Monkey Island an electronics cabinet containing an Iridium satellite modem, GPS receiver and data logger.

Measurements are made of CO2 dissolved in seawater and in the atmosphere. These and other measurements are logged on the computer in the engine room. The full data set is sub-sampled at 5 minute intervals and this data is transmitted to NOC Southampton at 4 hourly intervals. This data is then passed to public access web page.

Why calibration samples are needed

To establish a traceable record of the accuracy of the directly measuring sensors, samples of seawater needed to be collected and returned to shore for analysis. This practical to do in the case the measurement of salinity and alkalinity-total CO2 (alkalinity and total CO2 are measured on the same sample. These water samples should be collected daily when the ship is at sea and the SNOMS equipment is running.

Job Descriptions

Introduction

Watch Checks

On each change of the engine room watch the equipment in the machine space should be visited, to check for (1) leaks (2) flow (3) loss of electrical power.

Daily samples

Two water samples need to be collected each day that the ship is at sea. These are to check that the calibration of the seawater sensors is not drifting, and to provide extra information on the carbonate system. The sample for carbonate chemistry measurements has to be preserved by the addition of a small quantity of mercuric chloride solution. Mercuric chloride is toxic chemical, which has to be handled carefully. The second sample is required for the salinity (total salt content) of the water. This is simply collected in a tightly stoppered bottle.

Cleaning and checking instruments in SNOMS tank

Each time the ejector pump is turned off the tank containing the sensors needs to be opened and the sensors wiped down or sprayed down with fresh water. This is to stop their surfaces becoming fouled.
This should be done within one hour of the pump being turned off.
There is danger that if the flow through the tank is turned off and the tank remains sealed the stagnant will become anoxic. This will damage the gas exchange membrane of the CO2 detector.

Job: Watch Checks

Person responsible for equipment

Chief Engineer Pacific Celebes

Equipment.

None –

Procedure

On each change of the engine room watch (*4 hourly)*the equipment in the machine space should be visited.

(1) A visual inspection should for leaks in the system. These should be stopped as soon as is appropriate.

(2) The flow meter should be checked. If the injector pump is running the flow should be greater than **30 litres per minute**. If flow is less than this first check that all stop cocks are fully open.

(3) Turn on display screen to check that system is running. If system is not running contact ship's electrician and ask for the power to be restored. When the power is turned on again the system **software will reboot automatically**. (Note – system is DOS based so is robust).

POWER ON/OFF BUTTON

IF POWER ON DOES NOT RESTORE SYSTEM PLEASE INFORM JON CAMPBELL FOR FURTHER INSTRUCTIONS e-mail joc@noc.soton..ac.uk

Job: Cleaning and checking instruments in SNOMS tank.

Person responsible for equipment

Chief Engineer Pacific Celebes

Equipment.

Camera

Adjustable wrench

Hozelock water spay.

Paper towel

Bucket

Fresh water

Washing up liquid

Sponge

Silicon Grease (In with sampling kit)

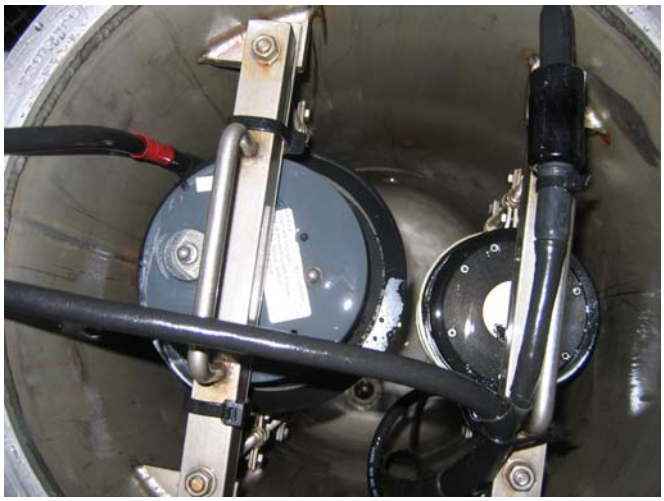
Procedure

As soon as possible after ejector pump is turned off prior to entering port

1. Turn off taps (ball valves) at (A) Ejector pump discharge (B) On top of tanks
2. Open large 1” ball valve at base of tank and direct drain hose into bilges.
3. Open air vent ball valve on top of tank.
4. Allow bottom hose to drain in to bilge

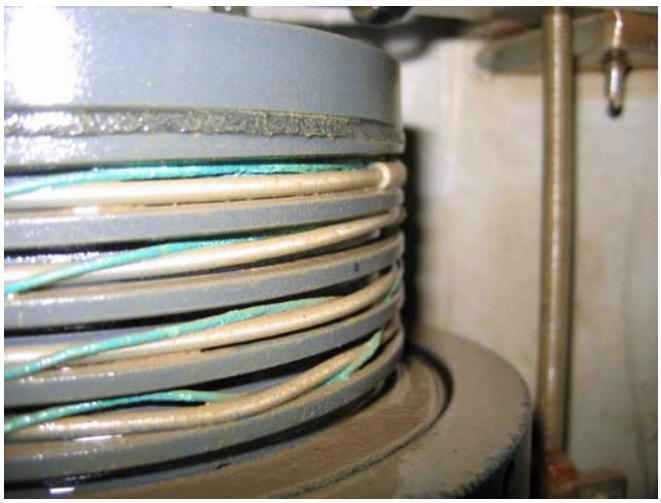
As soon as is convenient after ejector pump has been turned off

5. Undo fastenings round tank lid.
6. Open lid (THERE IS NO NEED TO DISCONNECT ANY CABLES AT ANY STAGE)
7. Before (and after) cleaning take PHOTOGRAPHS of inside tank and lid. Please photograph all stages of cleaning operation



8. Photograph top view into tank

9. Photograph condition of Aanderaa sensors around tank lid



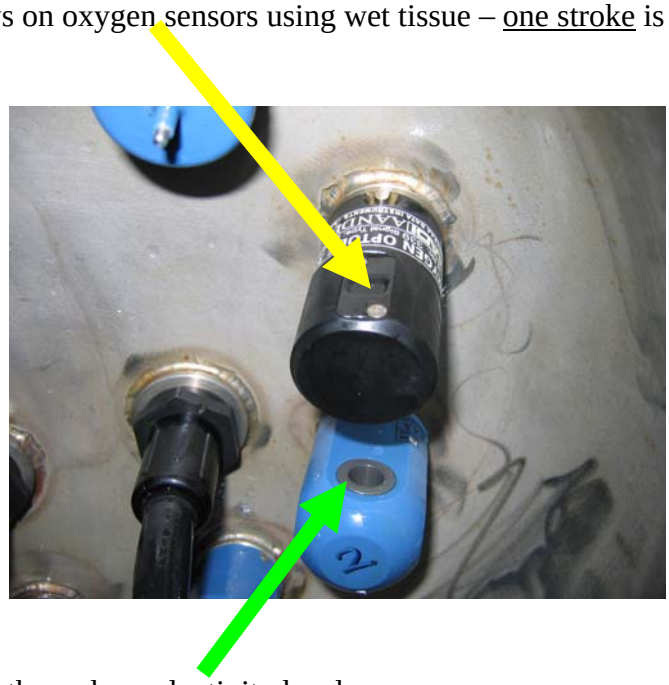
11 Place camera in tank to photograph ProCO2 sensor coil head. (One from Pride of Bilbao - A much lower level of fouling is expected on the Pacific Celebes. If you see anything like this please let us know)

Cleaning

TAKE CARE NOT PUT ANY PRESSUE ON THE CO2 SENSOR COIL OR ABRADE IT IN ANY WAY IT IS VERY DELICATE

1. Wipe down all lid surfaces and all Anderaa sensor surfaces with sponge and washing up liquid. (One wipe per surface is enough)

Gently wipe windows on oxygen sensors using wet tissue – one stroke is enough



Run wet paper towel through conductivity heads

2. Fill Hozelock spray with fresh water. Pressurise it by pumping up. Rinse off all lid surfaces using spray

3. Photograph clean heads

4. Use fresh water spray to clean down tank wall and ProCO2 sensor coil .

Take care not to touch or put any pressure on ProCO2 manifold tubing it is very delicate

5. Photograph clean head

6. Continue spray cleaning with the GTD. To clean detector surface of GTD spray horizontally across the recessed detector surface. **DO not touch it is very delicate.**

7. Inspect and photograph condition sensor face.

9. Photograph after cleaning.

Cleaning is now nearly finished

Replace in reverse order

1. Close bottom drain tap.
2. Close lid of tank checking cable tie holds data cables so cannot contact ProCO2 manifold.
3. Tighten down lid
4. Leave water supply taps off and air vent open until **ejector pump is running again.**
5. **AS SOON AS EJECTOR PUMP IS RUNNING**
6. Open water supply leaving air vent open to prevent airlock.
7. Water flow into tank will be about 54 litres a minute.
8. Standby air vent tap the tank will take about 50-70 second to fill. As soon as water spurts from air vent close it.
9. Open outlet cock on other side of T.
10. **Check flow on flow meter** it should be about 34 litres a minute
11. Dry off top of tank.
12. Wipe down sides
13. Use fresh water from bucket to swill plate under tank.
14. Replace all the equipment

Job
Collection and preservation of samples of sea water prior to being stored before analysis to determine alkalinity content of sample.

Person responsible for equipment
Chief Engineer Pacific Celebes

Description of equipment
Plastic bottle containing 40ml of saturated solution of Mercuric Chloride (7g /100ml)
Finpipette automatic pipette 50 micro litres (0.050 ml)
5 ml volume plastic syringe
Glass bottles containing seawater sample (250 ml)
Silicon grease
PVC tape
Marker pen
Log sheet
Bucket for transport of sample bottle
Pencil

Procedure
Collect equipment.
Take next sample bottle from red and grey plastic transport box
Check ground glass stopper has been lightly smeared with silicon grease.

In Engine room

1. Remove stopper from glass bottle
2. Use silicon grease to light grease ground glass neck of bottle
3. Record date and time on **log sheet and on bottle label**.
4. Flush tap by quarter filling bucket
5. Rinse bottle by half filling bottle and shaking vigorously
6. Empty
7. Repeat rinse
8. Insert plastic tube on sampling tap to base of bottle.
9. Slowly fill bottle and first inverting it then turn upright. Slowly rotate bottle as it fills and making sure no bubbles collect in side the bottle.
10. Allow the bottle to over flow by the volume of the bottle
11. Slowly remove the tube from the bottle.
12. Insert the stopper
13. Remove stopper from the glass bottle.
14. Using 5ml syringe withdraw **2.5 ml** of seawater from the bottle
15. Replace stopper

In stable engine control room

1. WORK WITH CLEAN HANDS
2. Lay out bits needed for adding mercuric chloride to sample
3. Pipette, pipette tips, mercuric chloride bottle, PVC tape
4. In case of spill have ready rubber gloves, paper towel and plastic bag
5. Put a tip on the microlitre pipette.
6. Pipette 50 microlitre of mercuric chloride solution in the seawater sample. Place tip of pipette about half the length of the pipette tip below the surface of the seawater to do this.

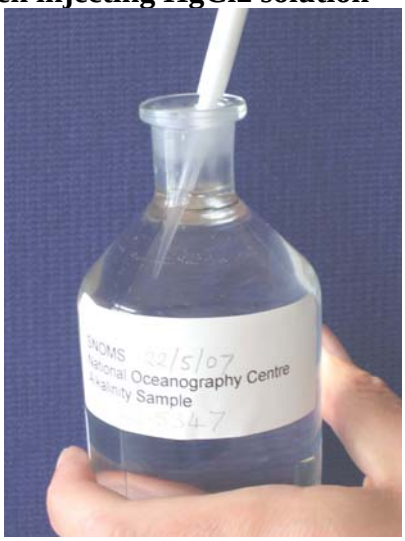
7. Rinse pipette by taking up and immediately ejecting back into the bottle some seawater from the top of the bottle.
8. Put down pipette
9. Reseal the bottle of mercuric chloride securely.
10. Eject the tip of the pipette into a plastic bag.
11. Replace the stopper in the glass bottle.
12. Bind the stopper in to the bottle using 3 loops of tightly stretched PVC tape round the bottle.
13. Replace the bottle in the storage crate.
14. Check the log sheet.
15. Replace all the sampling equipment in the SNOMS Aluminium storage case in the engine control room

Note on use of Mercuric Chloride
Mercuric Chloride is toxic. At the concentration used it might cause skin irritation or burns if prolonged contact with the skin occurs.
Best practice is to work with CLEAN HANDS and to wash them immediately a splash should occur FIRST having closed the bottle securely.
The mostly likely problem is that the bottle might fall over when open and spill on the floor. If the injection is done in the control room working on the floor as in the video this will minimise the spread of any splash as the impact of the bottle falling over will be small. Also the floor of the control room is well sealed so can be easily decontaminated.
If spill occurs: (1) if hands are contaminated wash them first (2) put on the rubber gloves provided (2) dry up the spill with dry towel paper (3) place contaminated towel in a plastic bag (4) wipe the splashed area with damp water towel (5) add this damp towel to the plastic bag. (6) remove the rubber gloves and add them to the bag (7) seal the bag (8) estimate the amount spilt – the bottle started with about 40 of a solution of 7g in 100ml. (9) label the bottle with the **amount** (**??mls of 7%HgCl2 solution**) and **MERCURIC CHLORIDE Hazchem 2X, UN 1624.** (10) Store in a safe place for disposal on shore.

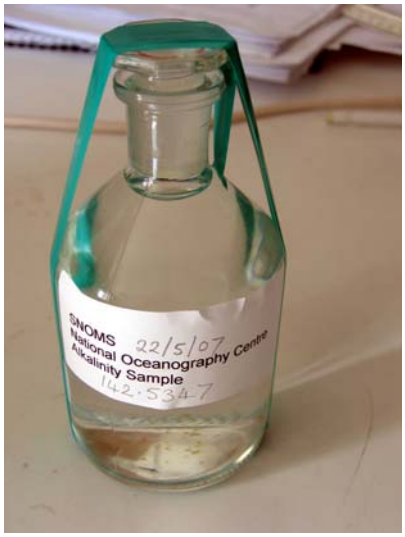
Note on use of microlitre pipettes
Microlitre pipettes are high precision pieces of scientific equipment when used correctly. They are used with disposable tips that are the only part of them that contacts the solution being pipetted.
A new tip should be used each time the pipette is used.
It should be pushed firmly on the pipette and discarded directly into a plastic disposal bag after use.
The button in the end of pipetted is used for filling and discharging the pipette. The button can be pushed in two distances. To fill the pipette the first stop is used. To empty the pipette the button is pushed in further to the second stop.
When filling the pipette the button should be pushed in and then the tip of the pipette placed about 5mm below the surface of the liquid being collected. The button should then be released slowly.
To dispense the solution the tip of pipette should be about half the length of the pipette tip below the surface of the seawater. The button should then be pushed on all the way. The tip should then be removed from the seawater **before** the button is released. The tip should then be ejected in a plastic waste bag.

Picture of pipette being used correctly

Close up of position of tip when injecting HgCl2 solution



Picture of correctly filled and labelled bottle



Job
Collection of samples of sea water prior to being stored before analysis of salinity

Person responsible for equipment
Chief Engineer Pacific Celebes

Description of equipment
One 250ml flat glass bottle with black screw cap
Bag of plastic bottle stoppers
Bucket
Pencil

Procedure

1. Remove cap and stopper from glass bottle
2. Flush tap by quarter filling bucket
3. Rinse bottle by half filling bottle and shaking vigorously
4. Empty
5. Repeat rinse twice
5. Fill bottle to base of shoulder (do not over fill).
6. Record time from system display screen
7. Dry neck of bottle, cap and stopper (Kleenex tissue).
8. Replace stopper and cap return bottle to rack
9. Record date and time (use decimal date-time to 4 places) on **log sheet and on bottle label**.

Picture of correctly filled and labelled bottle

Example: Sampling Log Sheet sampling

Date is GMT date from Display screen

Sample time is decimal date read from display screen

Comment should be to note things like for example “sampling just after sailing” or delay occurred in adding mercuric chloride.

Date	**Salinity Time**	**Alkalinity Time**	**Comment**
21/5/07	**142.5123**	**142.5132**	**First sample Soton**
22/5/07	**143.5231**	**143.5234**	**No problems**
23/5/07	**144.5000**	**144.5004**	**Problem Hg added hour after sample taken**

Example: Cleaning Log Sheet

Date GMT date from Display screen

All times are GMT times from display screen

Ejector off. Time ejector pump was turned off

Tank open Time tank was opened difference between the ejector going off and tank being a opened will allow us to know how long the water was stagnant in the tank

Tank closed Keeps a track on how long the cleaning process is taking

Comment e.g. Comment on state of system or any delays or problems in the cleaning process etc.

Date	Ejector off	Tank open	Tank closed	Comment
22/5707	02:04	03:30	04:45	All surfaces look clean

Risk Assessments

- **General Risk Assessment**
- **Collection of seawater samples**
  - **Alkalinity**
  - **Salinity**

Risk Assessment: Overview assessment for fitting out related work

Reference No. Pacific Celebes Risk PC1
Date of assessment 21/5/07

Name of Assessor David Hydes
National Oceanography Centre
Southampton UK
e-mail djh@noc.soton.ac.uk
phone + 44 23 8059 65347

1a.Name of Organisation carrying out work
Swire Shipping
Hong Kong
University of Southampton
Southampton
SO14 3ZH

1b.Work location Address
MV Pacific Celebes

2 Subject of Assessment
Overview assessment of fitting out related work

3. Person responsible for equipment
David Hydes and Jon Campbell

4. Description of equipment
All SNOMS equipment listed in Appendix of SNOMS safety report

5. What are the main tasks involved in this work activity?
Lifting and moving heavy items.
Mechanical operations involving turning and twisting.
Working with ladders to access high points
Making electrical connections

6. Are any COSHH regulated substances involved?
None

8. What environmental constraints are there, if any?
Noise heat and high humidity in engine room spaces.
Surfaces and floors contaminated with oil.
ENGINE ROOM IS SEALED BY MECHANICAL DOORS WHEN AT SEA
ALARM BELLS AND SIRENS SOUND VARIOUS WARNINGS
ESCAPE ROUTES REQUIRE CLIMBING STEEP LADDERS

9. What can go wrong?
Bottles and boxes are heavy. Lifting should be avoided where possible and trolley used for moving where possible.
Connections to ships power supply should only be made after completing setting up and by the ships electrician.
When working on ladders assistance should be obtained to support ladder.

10. Are there any other aspects you should consider?
Keeping hands clean when working in areas contaminated by old oil.
Ear defenders should be warn to reduce tiring effects of high noise levels when in port and must been warn when noise levels increase when the ship is at sea

Signed

Risk Assessment: Collection and preservation of samples of sea water prior to being stored before analysis to determine alkalinity content of sample.

Reference No.	Pacific Celebes Risk PC2
Date of assessment	21/5/07
Name of Assessor	David Hydes National Oceanography Centre Southampton UK e-mail djh@noc.soton.ac.uk phone + 44 23 8059 65347

1a.Name of Organisation carrying out work	**1b.Work location Address**
Swire Shipping Hong Kong University of Southampton Southampton SO14 3ZH	MV Pacific Celebes

2 Subject of Assessment
Collection and preservation of samples of sea water prior to being stored before analysis to determine alkalinity content of sample.

3. Person responsible for equipment
Chief Engineer Pacific Celebes

4. Description of equipment
Plastic bottle containing 40ml of saturated solution of Mercuric Chloride (7g /100ml)
Finpipette automatic pipette 50 micro litres (0.050 cc)
Glass bottles containing seawater sample (250 cc)
Silicon grease
PVC tape
Marker pen
Log sheet
Bucket for transport of sample bottle

5. What are the main tasks involved in this work activity?
In engine room collection of water sample.
In stable clean area pipetting 50 microlitres of mercuric chloride into each sample bottle.
Sealing sand storage of bottle

6. What machinery, equipment and personnel are involved?
The person doing the work

7. Are any COSHH regulated substances involved?
Mercuric Chloride (Hazchem 2X). Data sheet attached

8. What environmental constraints are there, if any?
Work should be done in stable environment. All bottles should be secure against being

dislodged by ship movement

9. What can go wrong?
Chemical can be spilt. Glass bottles can break.

10. Are there any other aspects you should consider?
Clean hands should be handling the mercuric chloride bottle. Hands should be washed as soon a practical if splashed using soap and plenty of water. Rubber gloves should be worn when wiping up any spillage. Boiler suit should also be worn. If the saturated Mercuric Chloride is split it should be wiped up with paper towel. The wet towel should be stored in a labelled plastic bag and disposed of ashore.

Signed

Risk Assessment: Collection of samples of sea water prior to being stored before analysis of salinity.

Reference No.	Pacific Celebes Risk PC3
Date of assessment	21/5/07
Name of Assessor	David Hydes National Oceanography Centre Southampton UK e-mail djh@noc.soton.ac.uk phone + 44 23 8059 65347

1a.Name of Organisation carrying out work	**1b.Work location Address**
Swire Shipping Hong Kong University of Southampton Southampton SO14 3ZH	MV Pacific Celebes

2 Subject of Assessment
Collection of samples of sea water prior to being stored before analysis of salinity.

3. Person responsible for equipment
Chief Engineer Pacific Celebes

4. Description of equipment
Crate 24 250cc glass bottles

5. What are the main tasks involved in this work activity?
In engine room collection of water sample.

6. What machinery, equipment and personnel are involved?
The person doing the work

7. Are any COSHH regulated substances involved?
None

8. What environmental constraints are there, if any?
All bottles should be secure against being dislodged by ship movement

9. What can go wrong?
Glass bottles can break.

10. Are there any other aspects you should consider?
Hands should be clean when handling bottles. The glass bottles that are used are soft glass and will break easily if dropped giving very sharp glass splinters.
Bottles can also break if they are over filled with cold sea water.

Signed

Chemicals used on board Pacific Celebes

COSHH forms. Mercuric Chloride Solution

Mercuric Chloride

Saturated Solution

(7g / 100ml)

Hazchem 2X(1)

UN 1624

Material Safety Data Sheet Mercury(II) chloride
MSDS Name:

Mercury(II) chloride

Source Company Identification:Fisher Scientific UK Bishop Meadow Road, Loughborough Leics. LE11 5RG For information in Europe, call:(01509) 231166 Emergency Number, Europe: 01509 231166
Composition, Information on Ingredients
CAS#: 7487-94-7 Chemical Name: Mercury(II) chloride %: >99.5
EMERGENCY OVERVIEW Very toxic if swallowed. Causes burns. Toxic : danger of serious damage to health by prolonged exposure in contact with skin and if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Light sensitive. Spills/Leaks:
Clean up spills immediately, observing precautions in the Protective Equipment section.
Handling and Storage Handling:
Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Extreme care should always be taken to prevent skin and gastrointestinal absorption because these routes of entry can greatly increase the total body burden.
Storage:
Store in a tightly closed container. Keep away from food and drinking water. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light.
Potential Health Effects Eye:
Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes severe eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
Skin:
May be fatal if absorbed through the skin. Causes severe skin irritation and possible burns. May cause allergic contact dermatitis.
Ingestion:
May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and

diarrhea. Causes gastrointestinal tract burns. May cause muscle tremor and impaired motor function. May cause cardiac disturbances.

Inhalation:

May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause gastrointestinal effects including gum and mouth inflammation, jaw necrosis, and loosening of the teeth. May cause burns to the respiratory tract. Acute exposure to high concentrations of mercury vapors may cause severe respiratory tract irritation.

Chronic:

Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion. May cause reproductive and fetal effects. Chronic ingestion may cause accumulation of mercury in body tissues. Laboratory experiments have resulted in mutagenic effects. May be rapidly transferred across the placenta and cause adverse fetal effects.

First Aid Measures Eyes:

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: POISON material. If swallowed, get medical aid immediately. Only induce vomiting if directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.

Antidote:

The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel.

Exposure Controls, Personal Protection

Exposure Limits CAS# 7487-94-7: United States OSHA: 0.1 mg/m3 Ceiling (Mercury, aryl and inorganic compounds). Malaysia: (mercury, aryl and inorganic compounds): 0.1 mg/m3 TWA (as Hg)

Personal Protective Equipment Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Section 9 - Physical and Chemical Properties

Physical State:	Crystals
Color:	white
Odor:	odorless
pH:	4.7
Vapor Pressure:	slightly volatile @RT
Viscosity:	Not applicable.
Boiling Point:	300 deg C (572.00F)

Freezing/Melting Point: 277 deg C (530.60F) Autoignition Temperature: Not available. Flash Point: Not applicable. Explosion Limits: Lower:Not available Explosion Limits: Upper:Not available Decomposition Temperature: Not available Solubility in water: Soluble Specific Gravity/Density: 5.44 at 25C Molecular Formula: HgCl2 Molecular Weight: 271.50

Stability and Reactivity

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.
Incompatibilities with Other Materials

Disposal Considerations

Products considered hazardous for supply are classified as Special Waste and the disposal of such chemicals is covered by regulations which may vary according to location. Contact a specialist disposal company or the local authority or advice. Empty containers must be decontaminated before returning for recycling.

Section 14 - Transport Information

IATA

Shipping Name:	MERCURIC CHLORIDE
Hazard Class:	6.1
UN Number:	1624
Packing Group:	II

IMO

Shipping Name:	MERCURIC CHLORIDE
Hazard Class:	6.1
UN Number:	1624
Packing Group:	II

RID/ADR

Shipping Name:	MERCURIC CHLORIDE
Hazard Class:	6.1
UN Number:	1624
Packing Group:	II

Section 15 - Regulatory Information

European/International Regulations

European Labelling in Accordance with EC Directives Hazard Symbols: T+ C N Risk Phrases:

R 28 Very toxic if swallowed.
R 34 Causes burns.
R 48/24/25 Toxic : danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases: S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection. S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S 60 This material and its container must be disposed of as hazardous waste. S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.