User guide for working in the Dirck Gerritsz Laboratory

Season 2015-2016

Table of Content

Season 2015-2016

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Contacting the Dirck Gerritsz Laboratory

Dirck Gerritsz main lab: ext. 4065

Dry lab Annunciation: ext. 4066

Wet lab Faith : ext. 4067

Dry lab Hope: ext 4068

Ultra-clean lab Love: ext. 4069

Coordinator for the Dirck Gerritsz Laboratory

1. Jacqueline Stefels from 18 November 2015 until 25 January 2016

2. Libby Jones from 31 January 2016 until 24 March 2016

The coordinator is the main person through whom communication lines between BAS and Dirck Gerritsz laboratory users will be conducted. This person is also aware of all work that is carried out in the Dirck Gerritsz laboratory and he/she is aware of all possible risks and hazards.

The Dirck Gerritsz laboratory will not have its own laboratory manager. Therefore the coordinator will carry out induction training to all users of the Dirck Gerritsz laboratory. This induction training is additional to the induction training for the Bonner Lab.

Please see the separate instructions for the coordinator that can be find in the Dirck Gerritsz laboratory, on a shelf to the right of the main entrance.

When this document refers to the laboratory manager, then the laboratory manager of the Bonner laboratory is intended. This is Ali Massey.

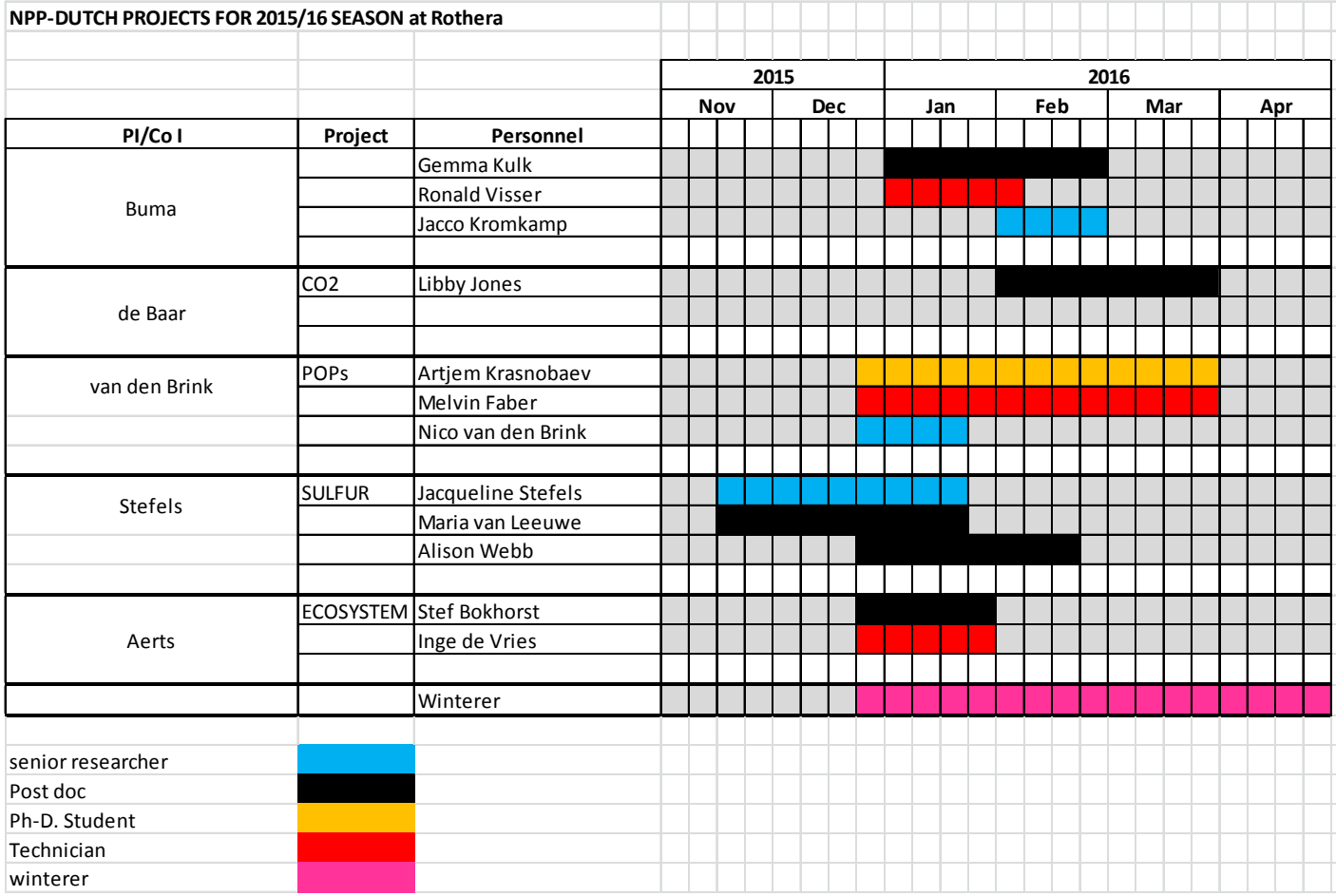
Contact in case of emergency

In case of any personal emergency all communications will go through BAS' Operations department that can be reached 24/7. You can reach BAS by telephone on: **+44 (0)1223 221400**
You can give this number to your relatives/ colleagues at home in case they need to make contact with you.
Alternative contact: Liesbeth Noor **+31 6 23501671**

Presence of Dutch researchers at Rothera Research Station

NPP-DUTCH PROJECTS FOR 2015/16 SEASON at Rothera

PI/Co I	Project	Personnel	Nights	In		Out	
Buma		Gemma Kulk	52	5-jan-16	D7	26-feb-16	D7
		Ronald Visser	30	5-jan-16	D7	4-feb-16	D7
		Jacco Kromkamp	26	31-jan-16	D7	26-feb-16	D7
de Baar	CO2	Libby Jones	59	31-jan-16	D7	30-mrt-16	ES
van den Brink	POPs	Artjem Krasnobaev	68	26-dec-15	JCR	30-mrt-16	ES
		Melvin Faber	68	26-dec-15	JCR	30-mrt-16	ES
		Nico van den Brink	35	21-dec-15	D7	25-jan-16	D7
Stefels	SULFUR	Jacqueline Stefels	68	18-nov-15	D7	25-jan-16	D7
		Maria van Leeuwe	68	18-nov-15	D7	25-jan-16	D7
		Alison Webb	54	26-dec-15	JCR	18-feb-16	D7
Aerts	ECOSYSTEM	Stef Bokhorst	35	26-dec-15	JCR	30-jan-16	D7
		Inge de Vries	35	26-dec-15	JCR	30-jan-16	D7
		Winterer		26-dec-15	JCR		
			598				



Liesbeth Noor (l.noor@nwo.nl)
October 2015

How to work in the Dirck Gerritsz Laboratory

- In case of an emergency:

  - Alarm: there is a fire alarm panel in the building to the left of the entrance
  - The fire emergency plan is exhibited in several locations on station.
  - Muster point is located next to the tagging board in the Bonner Lab

- All users have to conform to NERC/BAS Health & Safety standards. These include good laboratory practice, induction training and safe working practices, such as COSHH, risk assessments and standard operating procedures;

- The Bonner lab manager will monitor conformance to these regulations. In case of any non-conformities, she will contact the coordinator for the Dirck Gerritsz laboratory (see page 3);

- All manuals and procedures are placed on a shelf on the right side of the entrance to the Dirck Gerritsz Laboratory. Lab users are supposed to know where to find them and to consult these when necessary.

- When the temperature within the docking station is getting too high for good operation of the mini lab's climate system, the floor- and roof shutters need to be opened. Please refer to the "Mini manual for handling the Dirck Gerritsz lab" for the optimum temperature. Make sure to discuss this with the other Dirck Gerritsz lab users. All manuals are located in the Dirck Gerritsz laboratory, on a shelf to the right of the main entrance. Both inside and outside temperature are displayed on the control panel of each lab container.

- Weekly "scrub-out" is done every Friday from 17:00 – 18:00 hrs. A scrub-out list is put up each Friday by the Winter BC or admin assistant. Some personnel will be allocated to lab cleaning others will assist elsewhere on station. So always check the list.

- All hazardous waste from the Dirck Gerritsz Laboratory is managed and supervised by the Bonner lab manager. All hazardous waste has to be suitably identified and labelled for onward export from Rothera. For questions about this, please contact the Bonner lab manager;

- All incoming and outgoing cargo and biological specimens are supervised by the Bonner lab manager;

- Before starting your work in the Dirck Gerritsz and Bonner laboratory you will receive induction training for the Bonner lab from the Bonner lab manager and for the Dirck Gerritsz lab from the current lab coordinator (see page 3).

Maintenance and servicing

BAS Estates will work to maintain the facility on a "best endeavor" basis and can provide spares/ replacements from the existing - general purpose - BAS materials on the station. The station's facility manager will check the Dirck Gerritsz lab monthly to keep sight on available spare parts If you need any of this, please contact the Dirck Gerritsz Lab point of contact.

Log files about incidents and issues concerning all 4 lab containers will be provided by the facility manager. The facility manager will always have the latest version.

NWO provided specific spare parts for each of the small labs. In annex I you will find a list with each spare item named. They are stored at the loft of the Bonner laboratory, except for:

- Compressor oil (5 L). This is stored in the HazChem store of the Bonner laboratory;
- The 3 items on the last page of the spare parts list (that says "container 10 spare parts". These are stored in the Dirck Gerritsz laboratory, in a white wooden box underneath one of the windows.

The four mobile labs turn in winter mode to minimize the energy consumption. This winter mode is programmed automatically and switches on after 72 hours of not using the light and/ or the fume hood in the lab container. It is impossible to manually take the mobile labs out of winter mode. If it is necessary for your research to keep (one of) the labs out of winter mode for a longer period, please consult the Dirck Gerritsz lab coordinator. (S)He can contact JM Services. This company is 24/7 available, although you should keep in mind that the internet connection at Rothera research station might slow down the implementation of your request.

After a power down on station the container labs will restart themselves, but will take between 30 minutes and 1 hour to get into full operation mode. A manual for good operation practice can be found in the Dirck Gerritsz Lab.

Introduction

This guide provides an introduction to the use of the Dirck Gerritsz laboratory at Rothera. It includes information on health and safety, forward planning, laboratory procedures, storage and handling of chemicals and samples, waste disposal and the use of equipment. Additional useful information may be contained in the British Antarctic Survey (BAS) Code of Practice for Safety in UK Laboratories.

This guide is intended for all Dirck Gerritsz laboratory users.

1.1 Abbreviations

AINME	Accident, Incident, Near Miss and Environment	FOM	Field Operations Manager
BAS	British Antarctic Survey	GMO	Genetically Modified Organisms
BOL	Bill of Lading	MSDS	Material Safety Data Sheet
CAR	Chemical Approval Register	RA	Risk Assessment
COP	Code of Practice	RPS	Radiological Protection Supervisor
COSHH	Control of Substances Hazardous to Health	SOP	Standard Operating Procedure
DO	Dive Officer		

1.2 The Dirck Gerritsz Laboratory

(See map on next page)

The Dirck Gerritsz laboratory comprises:

- a dry lab (called Annunciation) with a constant temperature between 15 °C and 20 °C

- a wet lab (called Faith) with an incubator with an operating temperature of 4°C

- a dry lab (called Hope) with a mass spectrometer and a growth cabinet

- an ultra-clean lab (called Love) with special filters to provide clean air constantly. This lab is a restricted area and can only be entered by authorized personnel.

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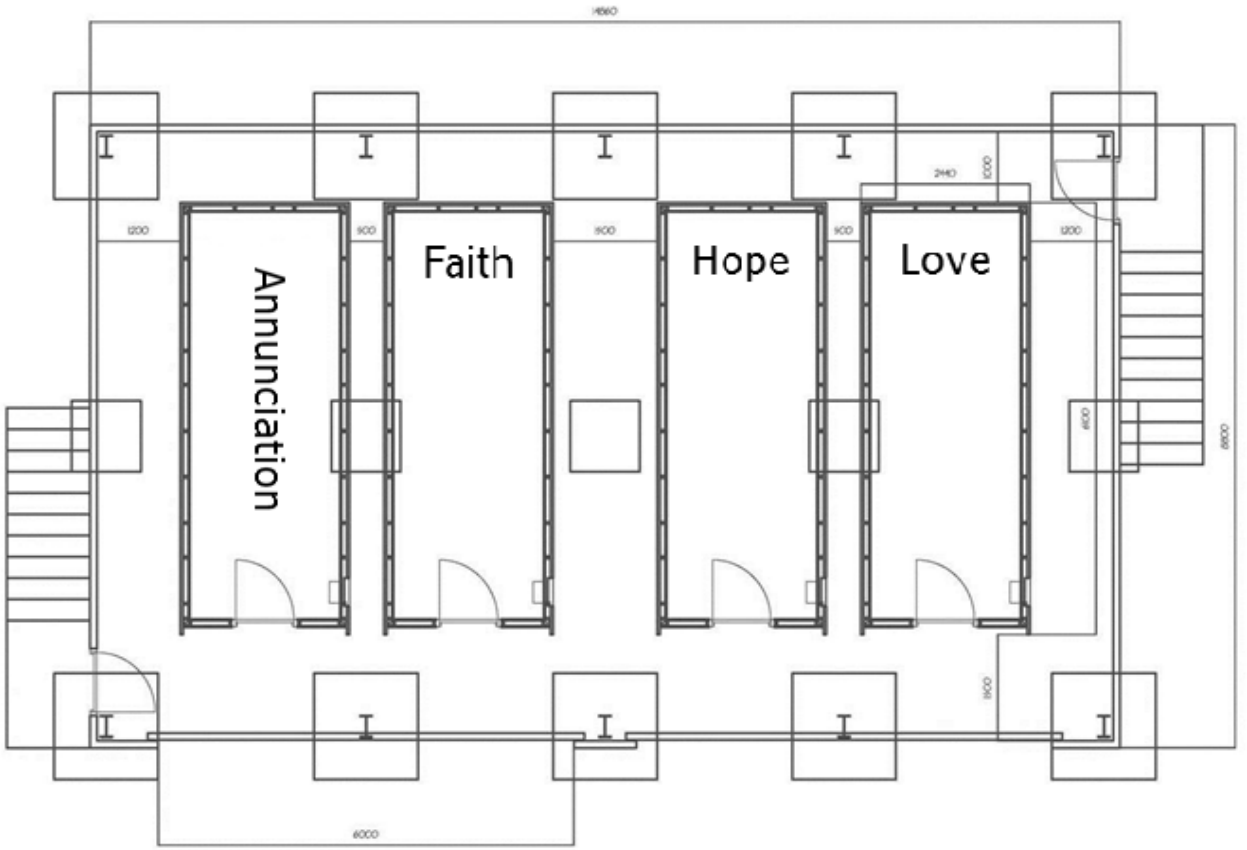
Floor plan Dirck Gerritsz laboratory



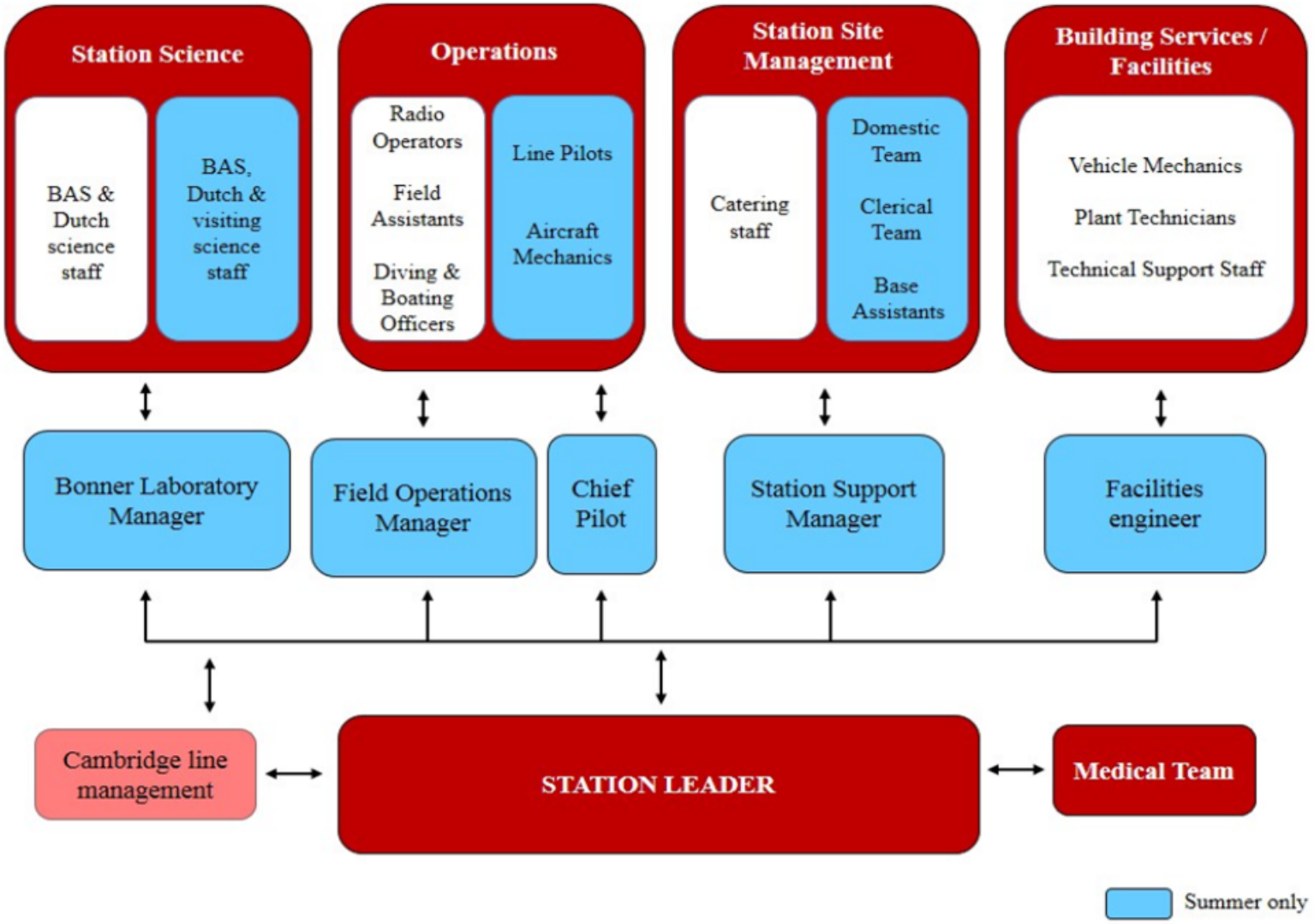
Liesbeth Noor (l.noor@nwo.nl)
O c t o ber 2015

1.3 Laboratory Management Structure

The diagram on the following page outlines the management structure at Rothera Research Station during the summer period. Wherever possible, all work related communications use the pathways indicated to ensure that work requests are allocated correctly and correct procedures followed. You will be introduced to the key management personnel upon arrival on station.

The Rothera management team are extremely busy during the summer period. Scientists should in the first instance liaise through the laboratory manager or the Dirck Gerritsz lab coordinator who will convey requests to the Rothera management team. This will ensure a coordinated approach to field activities so resources are utilised for the mutual benefit of all personnel. Communications and computing support may be sought directly from the communications manager.

Organisational Chart for Rothera Research Station



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Dirck Gerritsz Laboratory Facilities

2.1 Power

The main power supply in the docking station is 230Vac 50Hz. Power outlets are of the standard British 3 square pin type. The main power supply inside the 4 laboratory units is 230Vac 50Hz. Power outlets are of the standard Dutch 2 round pin type.

The supply is generally very reliable but occasional power outages do occur. The Facilities Engineer may be able to arrange a portable generator to cover critical equipment only during planned power outages. Power demand during the summer can approach the capacity of the main generators. Please switch off and unplug equipment that is not in use, this also applies to computers. All equipment **MUST** be PAT tested prior to use.

2.2 Water

The Dirck Gerritsz Laboratory is supplied with potable water via the Bonner Laboratory. In general, there should be no shortage of water in the Dirck Gerritsz laboratory and the quality of the tap water is usually very high. Water is produced by a reverse osmosis plant. The Bonner laboratory has a water purification system to provide deionised and ultra-pure water (18 MΩ, 5 litres per hour, 30 l tank). This water takes time to produce in large quantities. Plan in advance, keep bottles full and give consideration to other users.

Should the station RO plant break down, water may be extremely limited. Should this occur the station manager or facilities engineer will issue specific instructions. A temporary or permanent impact on scientific programmes is possible.

2.3 Gas

Note that there is no natural gas supply available in the Dirck Gerritsz laboratory. BAS recommends the use of spirit burners or laboratory butane burners with safety cut-out. However, these must not be used inside re-circulating cabinets where they may cause excessive build up of heat. Several portable butane burners are available in the microbiology laboratory of the Bonner laboratory, if you wish to avail of these please inform the laboratory manager to ensure availability.

2.4 Storage

2.4.1 Biostore & laboratory consumables

There is no storage space available in the Dirck Gerritsz laboratory. All scientists are advised to treat Rothera as a field camp, and bring all equipment and consumables required for their projects and to remove it when they leave, or when the project is finished. Some equipment can stay inside the Dirck Gerritsz Laboratory.

There is a limited stock of general laboratory consumables, health and safety and hygiene supplies and basic laboratory equipment and glassware in the Biostore in the Bonner laboratory. However, Dirck Gerritsz lab users should take their own consumables with them. Only in case of unprepared running out of specific consumables they can appeal to the Biostore. The laboratory manager MUST be informed of all items removed from the Biostore prior to use.

2.4.2 Fridges and freezers

There are no freezers in the Dirck Gerritsz laboratory. In the Bonner laboratory freezers are available at -20°C and -80°C and fridges at 4°C. The fridge and freezer capacity for scientific samples at Rothera is limited. Pressure on space is especially high at the end of the season when many samples are being collected for return to the UK. In addition, there is limited space on the ships and at BAS headquarters in Cambridge. Please consult the laboratory manager if large amounts of freezer space are required for projects.

Stock solutions of chemicals should be made up in sensible quantities, such that they do not take up too much fridge space and only stored in spark free fridges/freezers. These must be disposed of when analyses are finished. All items stored in fridges and freezers must be properly sealed to prevent leakage and labeled with date, contents, hazard labels and owner's name.

Please see the document "Introduction to working at the Bonner Laboratory" for details.

2.5 Laboratory Equipment

The Dirck Gerritsz laboratory at Rothera is NOT available to other scientists than the Dutch teams conducting research inside it. These teams must maintain the Dirck Gerritsz laboratory equipment. If you are interested in using this equipment, please consult the lab coordinator.

2.5.1 Personal Research Equipment

Scientists are expected to remove all of their cargo from BAS stations at the end of their stay. Surplus equipment, chemicals, gases or consumables may stay in the Dirck Gerritsz laboratory or HazChem store **ONLY** with express permission of the laboratory manager.

Uncontaminated equipment that is broken beyond economic repair may be disposed of through the station waste and recycling systems, as directed by the lab manager. Contaminated equipment must be consigned as hazardous waste to the UK.

2.6 Boating and Diving

Boating and diving at Rothera is at the discretion of the field operations manager (FOM), the Boatman and the Dive Officer (DO). Full season Scientific Boating and Diving requirements should be submitted to the boatman and/or DO as soon as possible.

Please discuss requests for diving (dive store) and boating to allow the boatman and DO to prioritize requirements. On the day you wish to go boating or diving you must attend the 8.30am boating brief in the dive store (unless other agreements are made). At the end of each day all Dutch team members will discuss the boating requirements for the Dirck Gerritsz laboratory for the following day. Island access should be discussed with the laboratory manager so individual project requirements can be amalgamated where possible ensuring the best use of resources.

Follow BAS biosecurity protocols to clean clothing, footwear and sample equipment before travelling between Rothera and the Islands (this is to prevent the spread of invasive species). Treat all Antarctic habitats with respect and keep sample collection to the minimum. Only specimens listed on the project requirements should be collected. Opportunistic sampling is discouraged however additional sample requirements, if any, should be discussed with the laboratory manager PRIOR to sampling. All samples are subject to license for import to the UK and will need approval by the BAS environment office and/or BAS license holder prior to collection and consignment to the UK. Importing samples from the UK to the Netherlands is the responsibility of the owner of the samples. The relevant

authority in the Netherlands is the Netherlands Food and Consumer Product Safety Authority (or in Dutch de Nederlandse Voedsel- en Warenautoriteit- NVWA).

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Working in the Laboratory

3.1 General guidelines for good laboratory practice

The following guidelines set the ***minimum*** standards for good laboratory practice. All procedures will require a RA or COSHH assessment that may require additional safety and control measures. If in doubt, ask the laboratory manager for advice. All Health and Safety documentation should be filed within the dossier in the Dirck Gerritsz laboratory PRIOR to commencement of work activities. All documentation is stored in folders on a shelf to the right of the main entrance. Work must not commence until personnel have been inducted to the Dirck Gerritsz laboratory, please consult the lab coordinator (see page 3).

1. No food or drink is to be taken into any laboratory or scientific store.

2. Smoking is not allowed anywhere in the laboratory building.

3. Lab coats and safety spectacles must be worn in areas indicated by door signs.

4. Additional PPE (disposable gloves, aprons and respirators/face masks) must be worn as appropriate for all hazardous procedures or when indicated by COPs or RAs. Be aware of work undertaken by other laboratory users which may require the use of additional PPE.

5. Laboratory PPE, including lab coats, must NOT be worn in offices or the kitchen area of the Bonner facility.

6. Appropriate footwear must be worn at all times which enclose the foot to protect from spillages (no flip-flops, sandals or crocs with holes). Steel toe-capped footwear should be worn when moving gas cylinders or heavy loads.

7. Use appropriate reagent containers with wide-necked screw tops (e.g. Duran), not stoppered tops. Close chemical containers immediately after use.

8. Replace chemicals in the correct storage location. Use appropriate bottle carriers for transporting Winchesters.

9. **Label all sample and reagent containers with user's name, contents, hazard labels, date made/opened and/or expires.** Attach appropriate hazard labels.

10. Use spill trays at work station.

11. **Clean up any spillages or breakages immediately** and inform the laboratory manager. Dispose of residues correctly.

12. Dispose of waste chemicals or solids in accordance with the hazardous waste disposal procedure. If in doubt, ask.

13. Wash up glassware immediately after use. Do not leave it in the sink or on draining board. Remove equipment from drying cabinets as soon as it is dry.

14. Do not interfere with or adjust equipment that you are not responsible for. Ask for a demonstration if you wish to use equipment that you are not familiar with. Equipment manuals are located in the Dirck Gerritsz laboratory, on a shelf to the right of the main entrance, and should not be removed.

15. Do not pour any chemicals or washings down the sink.

16. **Be as tidy as possible. Avoid spreading over large areas.**

ALL scientists are required to clear and wash up for themselves. There are no technicians or cleaning staff to do this on your behalf.

At Rothera there is a weekly clean or 'scrubout' of station communal areas, to which **ALL laboratory users**, visitors and BAS employees alike, are expected to contribute. It is the responsibility of laboratory users to keep their work space clean and tidy, if this is unsatisfactory the laboratory manager will arrange an additional work area scrubout.

3.2 Health and Safety

Health and safety documentation includes Control of substances hazardous to health (COSHH) forms, Biohazard assessment, Risk assessments (RA), Codes of practice (COP) and Standard operating procedures (SOP).

3.2.1 Control of Substances Hazardous to Health (COSHH) assessments

The Control of Substances Hazardous to Health (COSHH) Regulations (1999) require that a risk assessment be carried out prior to the use of any substance that is hazardous to health. This includes many common household or workshop substances. As a rough guide, if a substance includes an orange hazard warning label as part of its packaging it will require a COSHH form to be completed before use.

Blank copies of the BAS COSHH assessment form can be obtained from the laboratory manager. It is only necessary that this form be filled in once for each process; subsequent users of the same process, once they have read the assessment, may sign their name to the list of users. The assessment must be periodically reviewed.

Visitors to BAS may already have completed a COSHH form for a process within their own institution. If this contains sufficient detailed information, they need only supply a copy to the dossier in the Dirck Gerritsz laboratory and the laboratory manager to continue the process at the Bonner laboratory.

The information required for the completion of a COSHH form is contained in a Material Safety Data Sheet (MSDS). The manufacturer should include these with each product. A copy of the MSDS is kept at the Dirck Gerritsz laboratory and the Bonner laboratory, either as hard copies, on CD-ROM or on the computer network for each chemical. Copies of these sheets should be either appended to the COSHH form or otherwise be readily available. The hazard data sheets provide an important part of the COSHH form, and must be read and understood by all users.

Where hazards involved in a process are solely due to the chemical properties of the substances used, the COSHH form is a sufficient assessment of the associated risks and no further risk assessment for the procedure is required. However, where there are additional hazards involved a more wide ranging risk assessment may still be required.

3.2.2 Biohazard assessments

The COSHH regulations also apply to biological agents that may cause infection, allergy, toxicity or other hazard.

The hazards associated with biological agents are somewhat different to those associated with chemical agents. BAS has introduced a special form to cover this assessment. All personnel working with biological material must have completed a biohazard assessment form, blank copies of which can be obtained from the Bonner or Cambridge laboratory manager.

Biological agents are classified into four groups of increasing virulence. Group one organisms may be handled at BAS research stations; group two organisms require the use of a Class II Containment Cabinet, and groups three and four are prohibited throughout BAS laboratories. Inexperienced researchers must seek advice from appropriate personnel, such as the BAS Biological Safety Officer, before completing the form.

In contrast to the usual COSHH form, the biohazard form is person-specific rather than process-specific. It is an assessment and record of the work undertaken by each individual, and must be updated each time an individual carries out a new process. The form is transferable between sites, and should be carried by the individual concerned. An up-to-date copy should be provided for station records.

Special regulations apply to the use of genetically modified organisms (GMOs). If such agents are to be used at BAS research stations, advice and guidance must be sought from the BAS GMO Safety Committee.

3.2.3 General Risk Assessments (RAs)

If a procedure is not covered by COSHH or Biohazard assessments, a general risk assessment may be required to cover mechanical, manual and physical hazards (for example, dust, vapour, UV, heat, cold, electrical).

For most standard laboratory procedures, such as the use of the autoclaves, a generic risk assessment has already been produced and is available for consultation. The assessment is located in a folder next to the equipment. The user need only read, understand, sign and comply with the assessment before starting work; a copy may be taken for the individual's Health and Safety documentation file.

The BAS procedures and Risk Assessment database can be obtained from the Bonner lab manager or from the BAS intranet, which is only accessible from BAS computers:

https://ishare.apps.nerc.ac.uk/teams/bas_risk/Station%20Risk%20Assessment/Forms/AllItems.aspx

If a procedure is to be carried out for which there is no existing risk assessment, then a new assessment must be completed. The actual assessment should be completed by the operator and then approved by the laboratory manager. Prior to completing a risk assessment, a user must have received training in the assessment of risks, and is strongly advised to seek advice from an experienced person such as the station leader, laboratory manager or BAS Health and Safety Advisor.

3.2.4 Codes of Practice (COP) and Standard Operating Procedures (SOP)

Many other procedures are covered by COPs and SOPs. Copies of these are available on the BAS network or from the laboratory manager and are held in the Dirck Gerritsz laboratory. It is the responsibility of both line managers/supervisors and scientists to ensure compliance with these guidelines wherever possible.

3.2.5 Accident, Incident, Near-Miss and Environment (AINME) Reporting

All accidents (injuries to people), incidents (damage to property) and near-misses that occur must be reported. AINME forms are available on the station computer networks or from the laboratory manager. Forms may be filled in anonymously.

AINME reports are used to help assess and if necessary modify procedures and risk assessments to maximize safe working practice and work environments.

3.2.6 Personal Protection Equipment (PPE)

The wearing of PPE is a **mandatory** requirement in the Dirck Gerritsz laboratory. Laboratory coats (buttoned-up), safety spectacles and appropriate footwear should be routinely worn in laboratories. Other items such as gloves, aprons and face shields should be used as necessary or as directed by COPs and RAs.

Wearers of prescription glasses must bring their own prescription safety spectacles if required for laboratory work

Please note the use of Latex gloves is NOT permitted in BAS laboratories.

3.2.7 Lone working

Lone working is prohibited for specific fieldwork activities such as boating, diving and island access. Working in the laboratory out of normal working hours is permitted however individuals must comply with Rothera lone working procedure. Certain activities are not allowed such as accessing the HazChem store.

3.3 Chemicals

BAS does not stock chemicals for general use, all chemicals and laboratory cleaning products required for a project must therefore be brought in for the duration of the work.

The following substances are prohibited at BAS research stations:

Inorganic cyanides

Osmium tetroxide

Hydrofluoric acid

Ethidium bromide

Mercury (including thermometers)

The following may be used in limited quantities (less than 10ml or 10 grams) for extraction or preservation, but are prohibited from use in bulk reactions such as digestions:

Perchloric acid

Picric acid

3.3.1 Storage and use of chemicals

Chemicals must be returned to the hazardous chemicals store or other appropriate area at the end of each analysis. Small working stocks of chemicals may be stored in the Dirck Gerritsz laboratory, a flammable chemicals storage cabinet and a corrosive chemicals storage cabinet are provided for this purpose. Chemicals should be labelled with the scientists name, date prepared, chemical name and concentration and hazard label(s).

Working quantities and solutions must be labelled with the owner's name, content, preparation and expiry date and appropriate hazard label(s).

Hazardous chemicals must be dispensed in a fume cupboard using a plastic drip tray with disposable cover, any spillages must be immediately cleaned.

All chemicals, with the exception of working stocks, should be stored in the bunded hazchem store. When entering the hazchem store, the ventilation system must be activated for a minimum of 30 minutes PRIOR to entry. Chemicals in the hazchem store will be labelled with the scientists name or project number and the date received, only chemical consigned to your project should be removed and used. All unused chemicals must be removed and packed for consignment back to the UK at the end of the season. Storing chemicals at Rothera for use next season must first be discussed with the laboratory manager.

3.3.2 Removal of unused chemicals from Rothera

To avoid a build-up of chemicals in the HazChem store it is imperative that only those chemicals needed are brought to Rothera, and that all unused chemicals are either sent back to the UK or disposed of as hazardous waste in the correct manner at the end of the season or upon completion of your fieldtrip. Visiting scientists are responsible for the removal to UK of ALL chemicals that they bring.

3.3.3 Disposal of waste chemicals

Under the Antarctic Treaty Protocol, all chemical wastes must be disposed of outside Antarctica. **For BAS this means that *no chemical waste, including washings, may be poured down the sink*.** All waste must be returned to the UK for proper disposal. For more information please see guide A001 on disposal of waste from BAS Antarctic research stations (available from the laboratory manager).

All waste streams generated by your work should be discussed with the laboratory manager prior to commencement of work to ensure safe disposal. Waste must be safely disposed of as it is generated and NOT at the completion of your fieldtrip.

3.3.4 Chemical spillage

Chemical spillages should be prevented by the use of funnels and drip trays which should be used whenever possible. Plastic baskets, trays and Winchester carriers are provided for transporting chemicals to and from the HazChem store. You can find these items in the Biostore of the Bonner laboratory.

All chemical spillages, however trivial, must be dealt with immediately to prevent spreading and cross-contamination. A spill response kit is provided in each of the four laboratory units. If these are used, they will almost certainly require special disposal.

In the event of a spillage:

a) Inform other workers immediately and ensure that there is no danger to others;

b) Refer to the RA and MSDS;

c) Use additional PPE (masks, gloves, etc.) as necessary;

d) If the spill is relatively small and the chemical not toxic or harmful, wipe up immediately;

e) For larger spills: inform the laboratory manager and consult the BAS chemical spill procedures (in the Bonner laboratory). Clear up larger spills using appropriate levels of absorbents: tissues, dedicated spill kits, neutralizing substances, as outlined below;

f) Inform the laboratory manager and complete an AINME form.

Neutralizing powder (calcium carbonate) is available to deal with acid spills. This is localized at the far short end of the envelope, near the "coffee corner". In the event of a spill, excess powder should be added to the spill to both neutralize and soak up the acid. The residue should then be disposed of properly.

In some cases, specialized clear-up kits will be supplied with particular pieces of equipment or substances. Ensure that these are available and that you are familiar with their application before you start such work.

3.4 Compressed gases

The Dirck Gerritsz laboratory is equipped with external gas storage from which the gases are piped directly into the individual laboratory units. The use of gas cylinders in laboratories is restricted and discouraged. A guide to using compressed gases, R002, is available. **If you are using gasses inside the Dirck Gerritsz Laboratory make sure to install one of the available portable gas detection alarms. These are kept inside lab *Annunciation.*** Please see the separate Standard Operating Procedure for these gas monitors, available in the Dirck Gerritsz lab on a shelf to the right of the main entrance.

3.5 Radioisotopes

No radioisotope work may be carried out at BAS research stations until the approval of the BAS Radiation Protection Supervisor (RPS) has been sought. The Bonner laboratory manager is the RPS for Rothera. A copy of the full regulations governing the use of radioisotopes on BAS research stations will be supplied to anyone intending to use radioisotopes. The laboratory manager and station leader also hold copies.

3.6 End of fieldwork / season

All laboratory work and sampling will finish a week before scheduled departure date. A leaving checklist must be completed with the laboratory manager at the end of your field season. All work areas must be left clean and tidy and all cargo, including equipment, consumables, unused chemicals (if not used the next season) and waste must be packaged and consigned to the UK.

3.6.1 Consignment of samples to the UK

A biological bill of lading (bioBOL) must be completed for all samples before you leave Rothera. More information can be obtained from the guide A002–on the collection and consignment of biological samples/specimens from BAS research stations and vessels. The laboratory manager will advise you on successfully completing this form. It details the license the samples will be imported to the UK under in addition to storage conditions for transport. All samples must be packaged, labelled and stored prior to your departure from Rothera.

All cargo and samples must be collected from BAS Cambridge shortly after the ship docks and all cargo is offloaded to the Cambridge site. The project BAS Co-Investigator or Paul Geissler (page@bas.ac.uk; 01 223221568) can be contacted for collection of samples from Cambridge.

3.6.2 Last call

All field work and laboratory work will cease approximately two weeks prior to last call or as advised by the station management team. At the end of the summer season all Dirck Gerritsz laboratory users are expected to contribute to a final 'scrubout' to winterise both the Dirck Gerritsz and the Bonner laboratory and help as required by the laboratory manager.

All documentation, including bioBOLs must be completed several weeks in advance of last call to facilitate the organisation of last call by the station management team.

Annex I Additional guides/ manuals

BAS

(Available on BAS Intranet page when at Rothera: http://basweb/~page/guides/index-guides.html or from the Bonner laboratory manager)

A001	Disposal of waste from BAS Antarctic research stations
A002	Collection and consignment of biological samples / specimens from BAS research stations and vessels
A003	Use of glutaraldehydes at BAS Antarctic research stations
A004	Terrestrial fieldwork in Antarctica and sub Antarctic islands
A005	Hazard classification and labeling at BAS Antarctic research stations
A006	Notes on Biological Sample Storage
A007	Preparing for Scientific Projects at a BAS Antarctic Research Station
R001	A Guide to Working at the Bonner Laboratory, Rothera research station
R002	Use of compressed gases at the Bonner laboratory, Rothera research station
R003	Use of radio-isotopes at BAS Antarctic research stations

NWO

(Available on the NWO website: http://www.nwo.nl/onderzoek-en-resultaten/programmas/nederlands+polair+programma/publicaties and in the Dirck Gerritsz Laboratory)

- Standard Operating Procedure for gas detector
- 50104153-002 GasAlertClip Extreme, User manual, A4 web
- Role and responsibilities of coordinator of the Dirck Gerritsz Laboratory
- Mini manual for handling the Dirck Gerritsz lab
- Container manual Rothera 81_Annunciation
- Container manual Rothera 82_Love
- Container manual Rothera 83_Faith
- Container manual Rothera 84_Hope

ANNEX II List with spare parts for laboratory units

If you use anything from the list, please inform the station's facility manager

Electricity cabinet:				
Spare part number:	***Spare part:***	***Amount of enclosed reserve spareparts:***	*Indent Feb 2015*	***Used stock***
	Technische Unie		*Actual stock*	
2304848	*Find relais 40 2P8A 230AC*	*4*	*4*	*0*
273235	*Se autom 6KA C60N 6A-C 3P*	*1*	*1*	*0*
273268	*Se autom 6KA C60N 20A-C 3P*	*1*	*1*	*0*
322438	*Se 16A-B 19793 DPNA Vigi 30MA*	*2*	*2*	*0*
322420	*SE 10A-B 19791 DPNA VIGI 30MA #82 #83*	*1*	*1*	*0*
342311	*Se autom 4,5KA DPNA 6A-B 1P+N*	*2*	*2*	*0*
273896	*Se HLPcont of C60/1D wiss*	*2*	*2*	*0*
405720	*Se magnschak CT 2P 25A 230V*	*4*	*4*	*0*
1515881	*Tlux omschak+N M20EU4 32A4P*	*1*	*1*	*0*
2220671	*Se magnschak LC1D09P7 230V*	*4*	*4*	*0*
2304848	*Find relais 40 2P8A 230AC*			
Spare part number:	***Spare part:***	***Amount of enclosed reserve spareparts:***	*Indent Feb 2015*	***Used stock***
2906410	*Fins relvoet (40)+module 8pins*	*8*	*8*	*0*
2906907	*Find variaclip (tbv40,49)*	*2*	*2*	*0*
2303626	*FIND LEDMOD+VA (95) 110-230ADC*	*8*	*8*	*0*
3206836	*Legr trafo 230/24V 40VA*	*1*	*1*	*0*
7050735	*Se motbevschak GV2ME06 1,60A*			
7050792	*Se hlpcont GVAN11*	*4*	*4*	*0*
7345010	*Entr Fuse holder M4/8SF*	*4*	*4*	*0*
3431277	*ESKA Fuse glass 5X20 500MA T DS10 #81 #82 #83 #84*	*1*	*1*	*0*
3431368	*ESKA Fuse glass 5X20 2A T DS10 trafo/zuurkast #81 #82 #83 #84*	*1*	*1*	*0*
3498565	*ESKA Fuse glass 5X20 6,3A T DS10 laminaire flowkast #82*	*1*	*1*	*0*
3354792	*Abb push button 1W RD CP1*	*4*	*4*	*0*

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October 2015

	10R-11			
3357118	*Abb sign+led220VDC RD CL-523R*	*4*	*4*	*0*
3357126	*Abb sign+led220VDC RD CL-523G*	*4*	*4*	*0*
3357134	*Abb sign+led220VDC RD CL-523Y*	*4*	*4*	*0*
3505203	*Crou fasecon MWA 208/480vac*	*1*	*1*	*0*
4385290	*RITL Cabinet heating 3105340*	*1*	*1*	*0*
3803756	*SE THERMST 87561 NSYCCOTHC*	*1*	*1*	*0*
	Delta Technics			
	Intuitive plant controller TDB	*1*	*1*	*0*
	Intuitive plant stepper ex.mo	*1*	*1*	*0*
	Plant controller colour touch display	*1*	*1*	*0*
	PT1000 sensor art. PR0209 NOT found number PRO171	*20*	*18*	*2*
	PT1000 Pipe sensor	*10*	*10*	*0*
	Pressuresensor -1…12bar	*1*	*1*	*0*
	Pressure sensor -1…34bar	*1*	*1*	*0*
	Plug pressure sensor DSH	*2*	*2*	*0*
3498623	*ESKA Fuse glass 6X32mm Traag, kar traag (T regelaar 10A*	*1*	*1*	*0*
3388345	*ESKA Fuse glass 6,3X32 2A T DS10, regelaar*	*1*	*1*	*0*
Spare part number:	***Spare part:***	***Amount of enclosed reserve spareparts:***	*Indent Feb 2015*	***Used stock***
Ventilation and fluid components:				
	Vedotec			
42003720	*Premasgard 1141 Pa 0-10V Differential pressure measuring transducer*	*1*	*1*	*0*
42007495	*RCO2, CO2 sensor, air velocity*	*1*	*1*	*0*
42004291	*RFF-U, RH meter FRIJA II*	*1*	*1*	*0*
	Technische Unie			
834127	*Csar difference pressure reg.. Knel 22mm*	*1*	*1*	*0*
1800630	*Flam prescofiller 1/2*	*1*	*1*	*0*
4294633	*KSB RIO.c 25-60 pump*	*2*	*2*	*0*
1800036	*Flam expvat flexcon 12 0.5*	*1*	*1*	*0*

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October 2015

1800077	*Flam expvat flexcon 25 0.5*	*1*	*1*	*0*
3135951	*ROBOT PUMP BP/UPS 15-40*	*1*	*1*	*0*
2864106	*Danfoss Coil EV220B 12B 230V*	*1*	*1*	*0*
2952349	*Hon therm.servomotor 24V 280N*	*1*	*1*	*0*
1782952	*Purging key*	*1*	*1*	*0*
	Rucon			
2583	*K 250 EC centrifugal fan DN 250mm #81 #82 #83 #84*	*1*	*1*	*0*
1561	*EX 180-4 Atex centrifugal fan 400V/50Hz/3~ #81 #82 #83 #84*	*1*	*1*	*0*
304841	*R3G250-AK41-71 centrifugal fan EC #82*	*1*	*1*	*0*
	Centercon			*0*
680235	*P48 AAA-9120 penn pressostaat*	*1*	*1*	*0*
628900	*SKB3400037 CT frequentie reg. 1,3A-HD*	*1*	*1*	*0*
841205	*Antifrogen N - Hoechst glycol 35kg*	*1*	*1*	*0*
	Dehon			
	Climalife Neutragel glycol 20 liter	*3*	*1*	*2*
	Wasco			
8210219	*Siemens servomotor sqs65*	*2*	*1*	*1*
8216460	*Siemens air velocity QVM62.*	*1*	*1*	*0*
Spare part number:	***Spare part:***	***Amount of enclosed reserve spareparts:***	*Indent Feb 2015*	***Used stock***
	ACS filtertechniek B.V.			
	Aero panel afm. 289X289X45 mm. G4 81-82-83-84	*40*	*24*	*16*
	Filters bags 82	*30*	*18*	*12*
	Downflow filters	*25*	*10*	*15*
	White square filters for Container 4 (clean lab)	*13*	*8*	*5*
	KE fibertec			
	Air dispensing sock	*3*	*3*	*0*
	Centercon, nog niet meegeleverd:			
4153946	*Fill set glycolcircuit*	*1*	*1*	*0*
893147	*Connection for purging hose 17C*	*1*	*1*	*0*
891432	*Purging hose*	*1*	*1*	*0*

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October 2015

891663	*Fillpump glycol circuit*	*1*	*1*	*0*
Laboratory components:				
	Eszet lighting			
20956201	*3F Linda inox 2X18 watt*	*1*	*1*	*0*
91001873	*Ultimate longlife T8 18W/840 TL ø 26mm 4000K*	*4*	*4*	*0*
20956205	*3F Linda inox 2x18W HF EP - emergency lighting*	*1*	*1*	*0*
	Aura longlife 54W 840	*1*	*0*	*1*
Refrigerant components:				
	Centercon			
627223	*Danfoss coil 220V/ 50Hz*	*2*	*2*	*0*
145387	*Kriwan Thermistor SE-B1*	*1*	*1*	*0*
	Centercon			
891663	*Oliepump (hand) type 77940*	*1*	*1*	*0*
891431	*Hose for oilpump*	*1*	*1*	*0*
840012	*5 l compressor oil*	*1*	*1*	*0*
	JM Services			
	Jerrycan 20 liter	*1*	*1*	*0*
	Technische Unie			
3498557	*ESKA GLASZ 5X20 5A T DS10 #81 #82 #83 #84*	*1*	*1*	*0*
3498581	*ESKA GLASZ 5X20 10A T DS10 #81 #82 #83 #84*	*1*	*1*	*0*
3431335	*ESKA GLASZ 5X20 1,25A T DS10 #81 #82 #83 #84*	*1*	*1*	*0*
Spare part number:	***Spare part:***	***Amount of enclosed reserve spareparts:***	*Indent Feb 2015*	***Used stock***
310318	*Osram lumilux L15-840 plus*	*1*	*1*	*0*
2183663	*Osram T5 lumilux T524840 HD*	*1*	*0*	*1*
	Interflow			
	Lemmens ventilator DD9-7	*1*	*1*	*0*

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October 2015

ANNEX III Rothera Inspection Checklist

The following list contains questions to be answered during an inspection of Antarctic Stations by another party of the Antarctic Treaty. This list is the standard inspection checklist from the Antarctic Treaty Secretariat, completed with answers specifically regarding the Dirk Gerritsz Laboratory (right side of the page, in *Italic*). Not all questions do concern the Dirck Gerritsz Lab, so these are left open. The answers given at the left side of the page were given during an inspection of Rothera research station in 2005. This part of the checklist will be taken care of by the station management.

This information needs to be available to all users of the Dirck Gerritsz Laboratory in case of an inspection. Please keep in mind that you have to be aware of the Antarctic Treaty and Environmental Protocol, while working in the Dirck Gerritsz Laboratory.

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Season 2015-2016

Rothera Research Station | Dirck Gerritsz Laboratory

1. GENERAL INFORMATION

1.1 Name of station visited

Rothera

1.2 Operating nation

United Kingdom | *Netherlands*

1.3 Location

67^{0}S, 68^{0}W, Rothera Point, Ryder Bay, south-eastern Adelaide Island (16 m above sea level)

1.4 Date established

25 October, 1975 till present | *27 January 2013*

1.5 Primary aim of the station (scientific, logistic, etc.)

Scientific, and as a logistical station for aircraft | *Scientific operation*

1.6 Plans for future use of the station

To continue as at present | *To continue as at present*

1.7 International logistic cooperation

Logistical support to transient German, American and Canadian aircraft, and German and US research vessels.

1.8 Availability of the Antarctic Treaty Exchange of Information

Available on station

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October 2015

2. INSPECTION DETAILS

2.1 Date

2.2 Time of visit

2.3 Duration of visit

2.4 Last inspection (nation(s), date)

3. PERSONNEL

3.1 Name of person in charge

Spokesperson for Dirck Gerritsz lab

Jacqueline Stefels; Libby Jones

3.2 Total number of personnel on station

Total number of personnel working in the lab

13 (but not all in the same period)

3.3 Number of scientists on station

3.4 Number of over-wintering personnel

1, person works for BAS as well

3.5 Maximum capacity of station

136 bed spaces

3.6 Responsible agencies or ministries

British Antarctic Survey,(a component research institute of the UK Natural Environment Research Council).

Netherlands Organisation for Scientific Research (NWO)

3.7 Training (survival, first-aid, environmental protection, etc.)

First aid training, survival and field, environmental training held in the UK during BAS Introductory Conference in Cambridge. Further station and field training and local area familiarization is held once

Dirck Gerritsz lab users receive the same training

personnel arrive on Rothera. This may amount to 14 days in total.

4. SCIENTIFIC RESEARCH

4.1 Major scientific programs supported by the station

Environmental monitoring, marine biology, glaciology, geoscience, mapping, meteorology, terrestrial biology, human biology and medicine, tidal measurement, and upper atmospherics.

Oceanography, marine biology, terrestrial ecology, Persistant organic pollutants,

4.2 Dedicated permanent scientific facilities on the station

Bonner laboratory (terrestrial, microbial, marine). LIDAR building and Bransfield House laboratories (physical sciences); MF radar and met balloon launching facility.

Dirck Gerritsz Laboratory (1 wet lab, 2 dry labs and 1 ultra-clean lab)

4.3 Number and nationality of exchange scientists from other Antarctic programmes

none

4.4 Advance notice, use and control of radio-isotopes.

5. PHYSICAL DESCRIPTION OF STATION

5.1 Area covered by station

31,538 m^2 total station area, 7450 m^2 footprint, area of buildings, 1872 m^2 area of accommodation.

5.2 Approximate number and type of buildings

17 buildings, type described in 5.3.

One building, four mobile sea containers

5.3 Age and state of buildings

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Buildings *The station was initially planned and constructed in 3 phases to spread the costs. Phase I, a small accommodation block was erected on 1 Feb 1976. Phase II was erected in 1976/77. This included the main accommodation block, power house and tractor shed. An old storage shed from Adelaide (Station T) was erected close to Phase I and known as the Bingham building after Surgeon Commander EW Bingham, leader of FIDS 1945-47. Phase III was erected 1978/79. This building included the scientific offices, travel store and a coldroom. In 2001 it was named Fuchs House after Sir Vivian Fuchs, Director of FIDS/BAS 1958-73.*

Further building work has been undertaken when required. Phase IV, begun Nov 1985 and completed in the 1986/87 season was an extension to Phase II. It was named Bransfield House (after RRS Bransfield) in 2001. A wharf and gravel runway became operational in the 1991/92 season. The former was named Biscoe Wharf (after RRS John Biscoe). During the 1996/97 season a transit accommodation block was completed (named Giants House in 2001 after the Rothera sledge dog team "Giants") and the Bonner Laboratory became operational. The laboratory was named after W N Bonner, biologist 1953-86 and Deputy Director of BAS 1986-88. It houses the biology laboratories which were established at Rothera when the main biological station, Signy (Station H), was reduced to summer only operations. A new accommodation building was erected during the 1999/00 and 2000/01 seasons. It was named Admirals House after the Rothera dog team "Admirals".

Field huts *A hut was established on Lagoon Island 30 Nov 1989 as a shelter for those on recreational trips. Two field huts were established on Léonie Island in Dec 1996. Known as the Melon hut and the Apple hut, they were provided by the Netherlands AntArctic Programme (sic) during a collaborative study with BAS. A second Melon hut was erected at Two Step Cliffs, Alexander Island, in 1998/99.*

The Dirck Gerritsz Laboratory consists of 1 building, being the outside envelope. Four mobile laboratories are placed inside this envelope. The foundation for the envelope was constructed during the 2010/2011 season. The outer envelope itself was erected in 2011/ 2012. Three of the four mobile labs were placed inside the envelope in March 2012. The fourth lab was placed in December 2012.

The four mobile laboratories are standard 20 foot containers (l (6.06 m)x d (2.44 m)x h (2.89 m)). Lab 1 (Annunciation) is a dry lab, Labs 2 and 3 (Faith and Hope) are wet labs and lab 4 (Love) is an ultra-clean lab.

PV cells have been placed on top of the outer envelope and the four mobile laboratories are heated by a heat pump.

The Laboratory is named after a Dutch trades man, Dirck Gerritsz, who was part of a fleet that sailed the area at the end of the 16th century. The four mobile labs are named after the ships of this fleet.

The laboratory was commissioned by the Netherlands Organisation for Scientific Research. The building process was a collaboration of BAS and the Netherlands Institute for Sea Research (NIOZ).

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5.4 New or recent construction

5.5 Sketch or map of buildings

see map on page 9

5.6 Major aerial systems

HF Communications and MF radar

5.7 Landing or dock facilities

Biscoe Wharf, 80 m long Wharf

5.8 Roads

Minor access tracks around station.

5.9 Airstrips

Crushed rock gravel airstrip, 900 m in length

5.10 Helipads

None

5.11 Nearby facilities (refuges, field huts, etc)

Sledge caboose in the local travel area on the skiway

6. COMMUNICATIONS

6.1 Communication facilities

VHF, UHF, Iridium, Sat B, Mini M, Internet connection

7. TRANSPORT

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7.1 Number and type of ground vehicles

7.2 Number and type of small boats

7.3 Number and type of fixed and rotary wing aircraft

7.4 Number of aircraft movements per year

7.5 Cargo handling and earth moving equipment

7.6 Frequency and method of resupply

2 supply ships visit, one in December and the other in March

8. STATION FACILITIES – FUEL STORAGE/USAGE

8.1 Types, amount and use of fuel (diesel, petrol, aviation fuel, etc.)

8.2 Types and capacity of station storage containers

8.3 Monitoring of fuel pumping systems and storage tanks (method)

8.4 Background information on fuel pipe-work (material, above ground, gravity feed, valves, etc.)

8.5 Transfer of bulk fuel (include transfer method)

8.6 Methods of emptying fuel lines (gravity, compressed air, etc.)

8.7 Field fuel depots (quantity and type)

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8.8 Responsibility for fuel management

Facilities Engineer

8.9 Protection against leaks and spills

9. STATION FACILITIES – WATER SYSTEM

9.1 Type of water supply and storage facility
(RO, distillation, snow melt, chemical treatment, etc.):

Reverse Osmosis desalination plant

The Dirck Gerritsz lab is supplied with potable water from the Bonner lab.

9.2 Availability and quality of water supply

Continuous availability of good quality water supply

9.3 Consumption of water per person/day

10. STATION FACILITIES – POWER GENERATION

10.1 Number, type and capacity of generators

10.2 Annual fuel consumption for power generation
(tonnes)

10.3 Alternative energy sources

None

PV cells and heat pump technology

10.4 Filtering and monitoring of emissions

No

11. STATION FACILITIES – MEDICAL

11.1 Medical facilities and personnel

11.2 Number of patient beds

12. STATION FACILITIES – HAZARDOUS CHEMICALS

12.1 Types and quantities of chemicals

Various types of analytical and preserving chemicals: Phenol, Hydrochloric and Sulphuric acids, Gluteraldehyde, Formaldeyde, etc	*equal*

12.2 Storage and monitoring arrangements

Hazchem store adjacent to the Bonner lab	*The Dirck Gerritsz lab does not have its own Hazchem store and therefore uses the one of the Bonner lab*

12.3 Protection against leaks and spills

Hazchem store is bunded

13. FIREARMS/EXPLOSIVES

13.1 Number, type and purpose of firearms and ammunition

None

13.2 Amount, type and use of explosives

None

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13.3 Storage of explosives and method of disposal

14. MILITARY SUPPORT ACTIVITIES

14.1 Describe any military support to the station

None

14.2 Details of military equipment held at station

None

15. ANTARCTIC TREATY LEGISLATION

15.1 Understanding of the provisions of the Antarctic Treaty and related agreements

Station Leader and senior staff are well aware of the Antarctic Treaty and Environmental Protocol.	*senior staff are well aware of the Antarctic Treaty and Environmental Protocol*

15.2 Availability of Antarctic Treaty documentation on station

Antarctic Treaty and Environmental Protocol available on station.

16. EMERGENCY RESPONSE CAPABILITY

16.1 General

a) Search and rescue capability

All personnel receive field training at the Derbyshire field course before leaving the UK. Field Assistants generally have more technical knowledge of rescue techniques	*equal*

b) Incidents in the last year resulting in significant damage to station facilities or the environment

c) Method of reporting incidents

Accidents and incidents are reported and recorded using a special notification system.

16.2 Medical

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a) Mobile medical emergency response capability

Paramedic grab sacks are available in the Doctor's surgery and also in the Bonner Lab

b) Evacuation plan for medical emergencies

Medivac by Dash 7 aircraft to Stanley, Falklands or Punta Arenas, Chile

16.3 Fire

a) Fire emergency plan

The fire emergency plan is exhibited in several locations over the station. Muster points are located next to the tagging boards in Bransfield house and the Bonner Lab

Muster point is located next to the tagging board in the Bonner Lab

b) Fire fighting equipment

Fire suppression system installed in the Bonner Lab. Elsewhere minor fires may be dealt with fire extinguishers. The use of BA equipment may also be used in the rescue of personnel caught in a fire or overcome by smoke.

c) Training of personnel for fire fighting

A select number of personnel receive fire fighting training in the UK before leaving south from the UK. Those personnel wintering on station all receive training in fire fighting and rescue procedures

d) Fire fighting exercises (frequency)

16.4 Pollution (oil and chemical spills)

a) Risk assessment for spills

RA's for dealing with various types of oil spills are in place

b) Spill response plan

Oil spill contingency plan is in place. All minor and major oil spills are reported and recorded.

c) Training of personnel to deal with spills

Most personnel attending BAS Introductory Conference take part in a one day Oil Spill Response course. Senior staff attend a 2 day course in Southampton with an international company 'Oil Spill Response Ltd'.

d) Spill response exercises (frequency)

Spill exercises are carried out twice a year (once in summer, and once in winter).

e) Mobile spill response capability

See oil spill response plan

17. ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

17.1 Awareness of station management personnel of the requirement to conduct an EIA for all new activities

Personnel within the Environmental Office at BAS are tasked with carrying out any EIA's and will liaise with station management.

EIA's are carried out by the Environmental Office at BAS

17.2 EIAs prepared for activities currently being undertaken

Initial Environmental Evaluation for Expansion of Rothera Research Station (Bonner Laboratory)
Initial Environmental Evaluation for MF Radar
Initial Environmental Evaluation for the proposed construction of an accommodation building and operations tower at Rothera Research Station, Rothera Point, Adelaide Island, Antarctica.

Initial Environmental Evaluation for Dirck Gerritsz laboratory (see ANNEX V of this document)

17.3 Environmental monitoring of indicators of possible environmental impacts of the station or associated activities

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Existing Human Impacts Monitoring

1) The concentrations of heavy metals in lichens around the British Antarctic Survey (BAS) research stations

Monitor heavy metal concentrations (lead, zinc, cadmium, aluminium, manganese, copper, magnesium and iron) in Antarctic lichens (Usnea spp.) around Rothera research station, to establish the area of contamination and to verify whether any observed contamination is as a result of station activities.

2) The distribution, numbers and breeding success of nesting birds at Rothera Point, Adelaide Island

Monitor the distribution, numbers of breeding pairs and breeding success (eggs laid, chicks hatched and chicks fledged) of skuas (Catharacta spp.) and Dominican gulls (Larus dominicanus) nesting near to Rothera Research Station, Rothera Point, Adelaide Island, and to establish whether any observed changes related to station activities.

3) The environmental fate and effects of fuel leaks and spills at BAS research stations
Monitor petroleum hydrocarbon concentrations in soil, seawater, sediments and marine fauna around Rothera research station, particularly after major fuel spills, and to establish the environmental pathways and fate of petroleum hydrocarbons in local ecosystems.

4) The near-shore marine biology and sewage pollution at Rothera point, Adelaide Island
Identify and survey near-shore marine flora and fauna, habitats and communities around Rothera Point, using sub-aqua diving techniques, and also to investigate the local impact of sewage effluent from the research station on nearby sub-tidal marine communities.

18. CONSERVATION OF FLORA AND FAUNA

18.1 Methods of making station personnel aware of the rules relating to the conservation of Antarctic flora and fauna

All new personnel attend the BAS conference where these issues are covered, and are given a copy of the BAS Handbook which contains a section on the conservation of Antarctic flora and fauna.

All Dirck Gerritsz lab users attend the BAS conference and are given a copy of the BAS handbook

18.2 Details of any native mammals, birds or invertebrates that have been killed, injured, captured, handled, molested or disturbed during the past year; Methods used to kill, capture and or handle animals; Issue of permits and reasons for their issue

A permit has been issued for the Dirck Gerritsz lab for this type of work, during the past year and for the season 2015-2016

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October 2015

18.3 Harmful interference with animals and plants in the vicinity of the station; Issue of permits and reasons for their issue

A permit is requested to work have been issued for the Dirck Gerritsz

18.4 Non-indigenous animals or plant species present; Issue of permits and reasons for their issue

Non-indigenous animals present – flies in the bond store were discovered in 2004, eradication programme underway and flies exterminated. See attachment for report describing the occurrence of an alien Diptera surviving at Rothera Research Station and eradication methods utilised.

None

Permitted non-indigenous animals present – Antarctic Act (1994) Permit No. S8-3/2004: Issued to Dr Simon Morley of BAS, Cambridge, UK authorizing the introduction of Harpagifer Georgianus

None

18.5 Actions taken to avoid accidental introduction of non-indigenous species

BAS have currently formed a working group to deal with highlighting and developing measures to prevent the introduction of alien species to maritime and continental Antarctica. Current measures in place include the cleaning of soil and plant material from clothes and tents between stations and UK-Antarctica.

Dirck Gerritsz lab users follow BAS procedures

18.6 Nearby, important wildlife or plant sites

Leonie Island is rich in various forms of plant life.

18.7 Local guidelines controlling the use of aircraft and vehicles close to concentrations of wildlife

Not applicable, there are no high concentrations of wildlife nearby

19. WASTE MANAGEMENT

19.1 Waste management plan for the separation, reduction, collection, storage and disposal of wastes

Liesbeth Noor (l.noor@nwo.nl)

See the "BAS Waste Management Handbook" for full details

Dirck Gerritsz lab users follow BAS procedures. All waste from the Dirck Gerritsz lab is disposed of by BAS

19.2 Responsibility for waste management on the station

Station Support Manager

19.3 Production of an annual waste management report

Station Support Manager compiles a manifest of all outgoing waste to be shipped out of Rothera.

19.4 Training of personnel in waste management and the need to minimize the impact of wastes on the environment

Two Station General Assistants are employed full time to deal with waste management issues. All personnel are briefed at UK conference and on their initial arrival on station in waste management issues

Dirck Gerritsz users are briefed at UK conference and on their initial arrival on station in waste management issues

19.5 Publicly displayed notices concerning waste management

Widely distributed around station next to the recycling points, compactor, shredder

19.6 Current waste disposal methods:

a) Radioactive materials

Returned to UK for disposal by approved waste disposal contractors

b) Electrical batteries

Returned to UK for recycling by approved waste disposal contractors

c) Fuel (both liquid and solid) and lubricants

Stanley Services, Falklands dispose of waste oil and fuel, some of which may be burnt by Stanley Growers to heat their greenhouses

d) Wastes containing harmful levels of heavy metals or acutely toxic or harmfu1 persistent compounds

Returned to UK for disposal by approved waste

disposal contractors

e) Poly-vinyl chloride (PVC), polyurethane foam, polystyrene foam, rubber

Returned to UK for disposal by approved waste disposal contractors

f) Other plastics

Recycling of non-polythene materials, sent back to UK

g) Treated wood

Returned to UK for disposal by approved waste disposal contractors

h) Fuel drums

Empty fuel drums are collected by Stanley Services, Falklands for reuse.

i) Other solid, non-combustible wastes

Hazardous wastes - Returned to UK for disposal by approved waste disposal contractors.
Non hazardous waste – landfill, Falkland Islands

j) Organic wastes

- Residues of carcasses of imported animals

  Only boneless meat allowed on BAS stations, waste is incinerated

- Laboratory cultures of micro-organisms and plant pathogens

  Returned to UK for disposal by approved waste disposal contracters

- Introduced avian products

  Incineration (only boneless poultry permitted by BAS)

- Other organic wastes (e.g. large items of food waste)

  Incineration

Liesbeth Noor (l.noor@nwo.nl)

k) Sewage and domestic liquid wastes and food scraps

Treated by the Rothera sewage treatment plant

l) Waste produced by field parties

Solid waste (e.g. paper, plastics, tins, glass) returned to Rothera for processing

19.7 Production of waste per person/day

19.8 Use of open burning; Disposal of ash; Alternatives planned for by 1998/99

No open burning is permitted, Incinerator ash is disposed of in a 205 litre drum, landfill, Falklands.

19.9 Use of incineration; Disposal of ash; Control and monitoring of emissions

Incinerator moved to wharf to prevent impact on scientific activities. Incinerator burns only take place during a southerly wind.

19.10 Treatment of sewage and domestic liquid wastes; Monitoring of effluent

Treated by the Rothera sewage treatment plant. Effluent is monitored for microbial pathogens and survey of north beach water quality is also undertaken

19.11 Use of landfill or ice pit

No

19.12 Recycling of wastes

Yes, various recycling schemes have been introduced: aluminium cans, paper, glass, batteries, fluorescent tubes, photochemicals, printer toner catridges, 205 litre drums, plastics

19.13 Measures taken to prevent wastes which are to be removed from the Treaty area being dispersed by wind or accessed by scavengers

Loose rubbish banded together or covered with a

tarpaulin, waste also put into drums, boxes or skips.

19.14 Inventory of the locations of past activities (abandoned stations, old fuel depots, etc.)

Old fuel depots held by the Field Operation Manager. Locations of abandoned stations held by EID, BAS, UK

19.15 Clean-up of past activities and future plans

i) Removal of old rubbish dump at Fossil Bluff in February 2003.

ii) Abandoned stations at Danco Island and Prospect Point removed in April 2004

iii) Minor clean-up undertaken at Deception Island in April 2004

iv) Maintenance work carried out at Port Lockroy during 2003/04. Station operated by BAS with guidance from the UK Antarctic Heritage Trust and the UK Foreign and Commonwealth Office.

v) Minor restoration work and condition survey is planned for Wordie House in March 2005.

vi) The removal of the abandoned station at Detaille Island is planned for 2006/07.

20. MANAGEMENT OF PROTECTED AREAS

20.1 Protected area(s) in the vicinity of, or containing, the station (type, name, site number)

Local Antarctic Special Protected Area at Rothera Point, Adeliade Island, site number 129 Leonie Island, ASPA

20.2 Relevant management plans and maps of protected areas held on the station

Relevant plans held on station.

20.3 Entry by station personnel to protected areas within the past year; Issue of permits and reasons for their issue

20.4 Problems with station personnel or visitors not observing the restrictions of protected areas

None

20.5 Marking of the protected area(s) in the vicinity of, or containing, the station

Rothera Point ASPA is clearly marked by information signs and rock gabions

20.6 Monitoring or management of protected areas

Carried out by the Rothera Terrestrial Field Research Assistant

20.7 Information as to whether the protected areas continue to serve the purpose for which they were designated

Monitoring by BAS.

20.8 Additional steps that should be taken to protect the areas.

None, current measures are adequate

21. TOURIST AND NON-GOVERNMENTAL ACTIVITIES

21.1 Visits to the station by tourists or non-governmental expeditions during the past year:

- Total number of people
- Numbers ashore at any one time
- Number of cruise ships

  Maximum of two per season permitted
- Number of yachts
- Number of aircraft

21.2 Procedures developed to facilitate or control tourist and non-governmental activities

Except for two permitted tourist ships per season, all other tourist and non-governmental such activities are not allowed, except with authorization by the Director of BAS or in case of an emergency.

21.3 Advance permission required for visits to the station

Yes, request from BAS, UK

21.4 Operational problems for the station caused by visitors (unannounced visits, etc.)

Unannounced visits, particularly aircraft, may pose a hazard to flying operations and disrupt science activities

21.5 Environmental impact of visitors at the station or nearby

Disruption of scientific sites through inadvertent interaction by shore party visits

Liesbeth Noor (l.noor@nwo.nl)

ANNEX IV UK permit for Rothera Research Station

Liesbeth Noor (l.noor@nwo.nl)

Foreign &
Commonwealth
Office

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
ANTARCTIC ACT 1994 ANTARCTIC ACT 2013

ANTARCTIC REGULATIONS 1995/490 (as amended)

Permit for activities under Section 3, Section 4 and Section 10 of the Antarctic Act 1994

(No. 31/2015)

British Antarctic Survey

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
ANTARCTIC ACT 1994 & ANTARCTIC ACT 2013
ANTARCTIC REGULATIONS 1995/490 (as amended)

Permit for activities under Section 3, Section 4 and Section 10 of the Antarctic Act 1994.

This permit (**No. 31/2015**) granted under Section 3, Section 4 and Section 10 of the Antarctic Act 1994 to **Professor Jane Francis, the Director of the British Antarctic Survey (BAS)** (the 'permit holder'), located at High Cross, Madingley Road, Cambridge, CB3 0ET, authorises the persons specified by her and approved by the Secretary of State (the 'permitting authority') **in accordance with Specific Conditions a) iii, iv and b),** to enter and remain in Antarctica and to remain on any British station listed in Appendix II to this permit, to undertake the activities specified by her and approved by the permitting authority, **in accordance with Specific Conditions a) i and b).**

This permit is valid from **1 October 2015** to **30 September 2016** and is granted subject to the conditions listed overleaf.

Signed .....on behalf of the Secretary of State

Deputy Head, Polar Regions Department
Overseas Territories Directorate

Official stamp

Dated.....30 September 2015

Name and address of permitting authority:

Foreign and Commonwealth Office
London SW1A 2AH

General Conditions

1 This permit is not transferable.

2 This permit may be suspended or revoked at any time in accordance with Regulation 10 of the Antarctic Regulations 1995/490.

3 This permit (or a true photocopy of it) shall be carried by the permit holder whilst in Antarctica; and the permit holder shall ensure that any other persons specified in the permit do likewise. The permit holder and such persons shall produce this permit, or a true photocopy of it, to any authorised person (see Notes below) if so requested.

4 The permit holder must ensure that all activities undertaken under this permit are conducted in a manner that is consistent with the requirements of the Protocol on Environmental Protection to the Antarctic Treaty. The permit holder must ensure that all persons authorised under this permit familiarise themselves with and observe the requirements of the Antarctic Act 1994, Antarctic Act 2013 and the Antarctic Regulations 1995/490 (as amended).

5 The permit holder is ultimately responsible for ensuring that the terms of this permit are strictly adhered to. It is a condition of this permit that the contents and undertakings contained in the application (Appendix IV) must be complied with fully and at all times during the period that the expedition is in Antarctica.

6 The permitting authority, Foreign & Commonwealth Office (FCO), must be notified immediately of any significant changes to the final programme of activities.

Specific Conditions

a) The permit holder must submit Seasonal Documentation by 31 August of each year in order to apply for a permit for activities under s3, s4 and s10 of the Act. Information provided in the Seasonal Documentation will also be used by the Foreign and Commonwealth Office (FCO) to provide notice to other Contracting Parties as required under Article VII(5) of the Antarctic Treaty.

This Seasonal Documentation must include the following information with respect to the period 1 October of the year in which it is submitted to 30 September of the following year:

i) all activities planned by BAS in Antarctica, including the location of field project sites;

ii) proposed itineraries of BAS vessels and aircraft;

iii) the names and roles of BAS personnel planning to enter Antarctica and the names and roles of those planning to remain on British stations;

(iv) names and roles of all other persons travelling to Antarctica to undertake activities planned by BAS: under contract to BAS; or as non-salaried or otherwise voluntary staff; by means of BAS logistics; or under a formal exchange programme; specifying which persons plan to remain on British stations;

(v) the BAS Environmental Strategy, including the schedule for reporting on specific environmental requirements;

(vi) any other BAS information which should be included in the United Kingdom's notifications in accordance with Article VII(5) of the Antarctic Treaty and/or required as part of the Electronic Information Exchange Service (EIES); and

(vii) the permit holder will collate and input information arising from BAS activities into the Annual Report and Permanent Sections of the EIES by 1 October of each year.

b) The permit holder must notify the permitting authority immediately in writing of any significant proposed changes to any of the above information provided in the Season Documentation. Such changes, once approved by the permitting authority, will amend Appendix III to this permit.

c) The permit holder will ensure that all activity in the Treaty area with which BAS is engaged, either as the lead organisation or as the logistics provider, is subject to appropriate and proportionate Environmental Impact Assessments. The Environmental Impact Assessments must be agreed by the BAS Environment Office prior to the season starting. Compliance with the EIAs must be reviewed by the BAS Environment Office post season and findings shared with the permitting authority by the end of the September following the completion of the season.

d) The permit holder should provide IEEs (or an update to an existing IEE) for the FISS project, iBEAM, and any other science project deemed by the BAS Environment Office to have a minor or transitory impact by 30 September 2016.

e) All planning and activity in the Treaty area which is led by BAS or which involves significant numbers of BAS staff should be informed, guided and delivered in full accordance with the British Antarctic Survey's Environmental Strategy. BAS are to report annually to the permitting authority on the progress made in delivering this Strategy.

f) Unless agreed in advance with the FCO, this permit excludes all support for external/private expeditions of any form. Any such proposed activity will require a specific application which will be considered separately by the permitting authority.

g) The provisions in Appendix I to this permit must be strictly complied with. They do not apply in cases of emergency relating to the safety of human life or of ships or aircraft or equipment and facilities of high value or to the protection of the environment. Notice of activities undertaken in case of emergency must be communicated immediately to the permitting authority.

h) The permit holder must ensure that all fuel-spill response training procedures are reviewed and that adequate training of all relevant personnel is carried out on a regular basis. A record of the training carried out each season and the BAS contribution of information required under Article VII(5) of the Antarctic Treaty must be included in the BAS Seasonal Documentation every year for the duration of this permit. Each operational British station (as listed in Appendix II) must be covered by an appropriate oil spill contingency plan and that these plans are reviewed, updated and disseminated in line with the contents of the BAS Environmental Strategy.

i) Article 1 (5) of Annex III to the Environmental Protocol places an obligation on Contracting Parties to clean up abandoned work sites and waste disposal sites.
BAS will remain responsible for clean up and, where appropriate, removal of redundant facilities.

j) If any proposed clean-up is pursued, the permit holder must advise the permitting authority how the above will be achieved, with the appropriate Environmental Impact Assessment agreed with the permitting authority.

k) The permit holder must ensure that the following historic huts and sites are maintained to a standard appropriate to their international designation, and their status respected:

i) Port Lockroy;
ii) Horseshoe Island;
iii) Stonington Island;
iv) Wordie House;
iv) Deception Island;
vi) Detaille Island and;
vii) Damoy Point.

l) As operational accountability for some of these sites at k) above is governed by an MOU between BAS and the United Kingdom Antarctic Heritage Trust, the permit holder must liaise with the Trust to ensure that those sites are also preserved appropriately, and in agreement with the permitting authority. This permit provides authorisation for the permit holder to temporarily remove objects from a Historic Site and Monument for conservation or repair, under section 10 of the Antarctic Act 1994 as amended, once plans are agreed with the permitting authority. A short report should be submitted to the permitting authority providing basic details of any such activity by 31 August 2015.

m) Working with the permitting authority the permit holder will endeavour to carry out reviews of UK proponent ASPAs and ASMAs when required under the Environmental Protocol.

n) Working with the permitting authority, the permit holder will endeavour to provide;

i) the necessary support in preparation for Antarctic Treaty Consultative Meetings (ATCMs);
ii) key physical presence and appropriate expertise at annual ATCM meetings.

o) The permit holder must ensure that no flora and fauna are held at British bases in Antarctica that are not held under permits issued under Section 12 of the Antarctic Act 1994. Any other flora or fauna must be removed or destroyed by the appropriate means. Products containing non-native microorganisms for use in station sewage treatment plants or for degreasing/fat digestion purposes may be used under BAS' delegated authority and without a specific permit issued under Section 12 of the Antarctic Act 1994.

p) Any emergency in Antarctica (e.g. a spill involving over 1000 litres of fuel or vessel incident) and any breach of any condition in this permit must be reported by the permit holder to the permitting authority within 24 hours of the emergency or breach occurring. The permit holder must then submit a written report to the permitting authority not more than 10 days after the incident.

q) To reinforce the commitment to meeting the obligations of the Health and Safety at Work Act 1974 as amended, the permit holder must ensure that BAS continues to review all aspects of its Health and Safety Policy in Antarctica and wherever possible take appropriate action.

r) The permit holder must advise the permitting authority how it intends to continue its programme of redevelopment at Rothera, Signy and Halley and ensure that updated or new Environmental Impact Assessments are provided in accordance with the information required in Regulation 5 of the Antarctic Regulations 1995. This applies to both routine redevelopment, works associated with the new polar vessel, and the intended re-positioning of Halley. A short update on the overall position in relation to the three stations should be provided by 30 April 2016.

s) The permit holder must ensure that management manuals for Rothera, Halley and Signy stations are reviewed on an annual basis to ensure continuing best environmental protection standards are applied, as is practicable. The permit holder should confirm to the permitting authority that the management manuals have been reviewed by 31st December 2015.

t) The permit holder should ensure that fully completed and updated Antarctic Treaty Inspection Checklists are held centrally and locally in relation to all stations, planes and vessels.

u) The permit holder must report progress on penguin monitoring programmes at Port Lockroy to the permitting authority as required. This activity must conform to the CCAMLR CEMP and any related guidelines established by the Committee for Environmental Protection.

v) The permit holder must provide and ensure effective participation in, annual pre-deployment training for everyone that BAS transports to Antarctica, including all ship's crew and field personnel. This training must include waste management, wildlife awareness and conduct to minimise disturbance and information about relevant Management Plans and Visitor Site Guidelines requirements, as appropriate. For field personnel, the training must also cover additional safety training, including guidance on self-sufficiency and search and rescue arrangements. Sufficient opportunity will also be provided for the FCO to contribute an overview briefing.

w) A report on the recreational use by the permit holder of locations with Visitor Site Guidelines in place (name of Site, number of visitors, and dates) should be provided to the permitting authority by 31 March 2016.

x) In relation to Halley, the permit holder should submit a short report on the findings and recommendations on the consequences of the operational issues encountered in July 2014 following the release of the final conclusions of the Halley Assurance Board. This process should include assessing the utility of the environmental protection measures set out in the Comprehensive Environmental Evaluation; the types and success of interim remedial action; and timescale/next steps to re-establish best environmental outcomes.

y) The permit holder should ensure that to the maximum extent possible all solid human waste generated in the field continues to be collected for safe disposal at Rothera.

z) To the maximum extent possible, the permit holder should record the location of all deep field activities (by GPS or whatever means practicable) for inclusion into the Ops GIS.

Notes

1 Any entry to Antarctica, other than in accordance with the authorisation granted by this or any other permit granted under the Antarctic Act 1994 (or written authorisation of another State party to the 1991 Environmental Protocol to the Antarctic Treaty), or any breach of the conditions of this permit, may lead to suspension or revocation of the permit in accordance with the provisions of the Antarctic Regulations 1995/490, and is punishable as an offence under section 3(5), section 3(6), section 4(3), section 4(4), section 10(2) or section 13(2) of the Antarctic Act 1994, for which the maximum penalty is **two years imprisonment or an unlimited fine** or both.

2 Persons authorised to require production of this permit in Antarctica are listed in Regulation 9(5) of the Antarctic Regulations 1995/490, and include a magistrate, or public officer of the British Antarctic Territory, a station leader of the British Antarctic Survey, an Antarctic Treaty Observer, a British naval officer or the Master of a British Antarctic Survey vessel.

3 "Antarctica" means all land, sea and ice shelves and the airspace above them south of 60° South latitude.

APPENDIX I

WASTE DISPOSAL AND WASTE MANAGEMENT

Rule 1

Application

This Appendix applies to all activities for which advance notice is required under Article VII(5) of the Antarctic Treaty.

Rule 2

Waste Disposal by Removal from Antarctica

1 The following wastes must be removed from Antarctica if generated by the permit holder:

(a) radio-active materials;

(b) electrical batteries;

(c) fuel, both solid and liquid;

(d) wastes containing harmful levels of heavy metals or acutely toxic or harmful persistent compounds;

(e) poly-vinyl chloride (PVC), polyurethane foam, polystyrene foam, rubber and lubricating oils, treated timbers and other products which contain additives that could produce harmful emissions if incinerated;

(f) all other plastic wastes, except low density polyethylene containers (such as bags for storing wastes), provided that such containers are incinerated in accordance with Rule 3 below;

(g) fuel drums;

(h) other solid, non-combustible wastes.

2 Liquid wastes which are not covered by paragraph 1 above and sewage and domestic liquid wastes, must, to the maximum extent practicable, be removed from Antarctica.

3 The following wastes must also be removed from Antarctica unless incinerated, autoclaved or otherwise treated to be made sterile:

(a) residues of carcasses of imported animals;

(b) laboratory culture of micro-organisms and plant pathogens;

(c) introduced avian products.

Rule 3

Waste Disposal by Incineration

Combustible wastes, other than those referred to in Rule 2(1) which are not removed from Antarctica must be burnt in incinerators which to the maximum extent practicable reduce harmful emissions. The solid residue of such incinerations must be removed from Antarctica.

Rule 4

Other Waste Disposal on Land

1 Wastes not removed or disposed of in accordance with Rules 2 and 3 must not be disposed of onto ice-free areas or into fresh-water systems.

2 Sewage, domestic liquid wastes and other liquid wastes not removed in accordance with Rule 2, must to the maximum extent practicable, not be disposed of onto sea ice, ice shelves or the grounded ice-sheet, provided that such wastes which are generated by stations located inland on ice-shelves or on the grounded ice-sheet may be disposed of in deep ice pits where such disposal is the only practicable option. Such pits must not be located on known ice-flow lines which terminate at ice-free areas or in areas of high ablation.

3 Wastes generated at field camps must, to the maximum extent practicable, be removed to supporting stations or ships for disposal in accordance with this Appendix.

Rule 5

Disposal of Waste in the Sea

1 Sewage and domestic liquid wastes may be discharged directly into the sea, taking into account the assimilative capacity of the receiving marine environment and provided that:

(a) such discharge is located, whenever practicable, where conditions exist for initial dilution and rapid dispersal; and

(b) large quantities of such wastes (generated in a station where the average weekly occupancy over the austral summer is approximately 30 individuals or more) must be treated at least by maceration;

2 The product of sewage treatment by the rotary Biological Contracter process or similar processes may be disposed of into the sea provided that such disposal does not adversely affect the local environment, and provided that any such disposal at sea is in accordance with Annex IV to the Protocol.

Rule 6

Storage of Waste

All wastes to be removed from Antarctica, or otherwise disposed of, must be stored in such a way as to prevent their dispersal into the environment.

Rule 7

Prohibited Products

No polychlorinated biphenyls (PCBs), non-sterile soil, polystyrene beads, chips or similar forms of packaging, or pesticides (other than those required for scientific, medical or hygiene purposes) must be introduced onto land or ice shelves or into water in Antarctica.

Rule 8

Waste Management Planning

1 The permit holder must have in place a waste disposal classification system as a basis for recording wastes and to facilitate studies aimed at evaluating the environmental impacts of scientific activity and associated logistic support. Wastes produced must be classified as:

(a) sewage and domestic liquid wastes;

(b) other liquid wastes and chemicals, including fuel and lubricants;

(c) solids to be combusted;

(d) other solid wastes; and

(e) radio-active material.

2 Waste management plans (including waste reduction, storage and disposal) must be prepared specifying:

(a) current and planned waste management arrangements, including final disposal;

(b) current and planned arrangements for analysing the environmental effects of waste and waste management;

(c) other efforts to minimise any environmental effects of waste and waste management

3 An inventory must be prepared of locations of activities where waste management has taken place and submitted to the permitting authority along with any waste

management plans as an appendix to the report on activities required under this permit (specified earlier).

Rule 9

Management Practices

The permit holder must:

(a) where applicable designate a waste management official to develop and monitor waste management plans; in the field, this responsibility must be delegated to an appropriate person at each site;

(b) ensure that persons covered by this permit receive training designed to limit the impact of their operations on the Antarctic environment and to inform them of the requirements of this Appendix;

(c) discourage the use of poly-vinyl chloride (PVC) products and ensure that persons covered by this permit are advised of any PVC products they may introduce into Antarctica so that these products may be removed subsequently in accordance with this Appendix.

APPENDIX II

OPERATIONAL BRITISH STATIONS IN ANTARCTICA

Rothera, Ryder Bay, Adelaide Island

Halley, Brunt Ice Shelf, Coates Land

Signy, Signy Island, South Orkney Islands

Fossil Bluff, Alexander Island

Sky Blu, Eastern Ellsworth Land

FORMER BRITISH STATIONS NOW DESIGNATED AS HISTORICAL SITES AND MONUMENTS

As noted in Specific Condition k).

APPENDIX III

BAS Seasonal Documentation, as approved by the permitting authority

APPENDIX IV

Application Form

Season 2015-2016

ANNEX V EIA for Rothera Research Station

Liesbeth Noor (l.noor@nwo.nl)
October 2015

Update to the Initial Environmental Evaluation for the Proposed Redevelopment of Rothera Research Station, Rothera Point, Adelaide Island: Dutch –funded Science Laboratories

1.Introduction

In November 2005, the British Antarctic Survey (BAS) submitted an Initial Environmental Evaluation (IEE) for the proposed Redevelopment of Rothera Research Station. This redevelopment, which started in 2006, is taking place over eight phases lasting at least 15 austral summer seasons. Polar Regions Unit of FCO require BAS to provide an update to the 'rolling IEE' at each stage of the redevelopment.

This Update to the Rothera Redevelopment IEE covers the proposed Dutch-funded science facility, an additional phase of redevelopment at Rothera.

The original IEE included a comprehensive description of the environment at Rothera Point, the predicted impact of a major redevelopment, measures that are in place to minimise these impacts, and details of the Rothera long-term monitoring programme in place to asses and verify environmental impacts. These details remain extant.

2.Background

The Netherlands Polar Programme, operated by the Netherlands Organisation for Scientific Research (NWO) and BAS have an agreed Memorandum of Understanding outlining their scientific collaboration in Antarctica. To strengthen the links between Dutch and UK polar science, NWO is planning to make a capital investment in laboratory facilities at Rothera. Science at the new laboratories will focus on two over-arching themes which complement BAS science, namely i. *Ice, climate and rising sea level*, and ii. *Polar Oceanography*. The NWO science funding round is currently underway, and will determine which science projects are carried out in the new science laboratories.

3.Description of the proposed Dutch–funded science facilities at Rothera

The proposed facilities will comprise a 'docking station' located adjacent to the existing Bonner Laboratory with the capacity to house four simple modular containerised laboratories (initially, it will house just three). The docking system is designed so that individual laboratories can be removed and replaced as funded science priorities change.

The proposed docking station will be an east – west trending single storey shell sat on concrete plinths 1.5 m above ground level and 8.5 m in height. It will comprise a steel skeletal frame with an external envelope of insulated panels and roller shutter doors. A removable A-frame will be used to move the mobile laboratories in and out of the docking station.

Several alternative locations on Rothera Point were examined for the docking station. Proximity to the existing Bonner Laboratory with access to existing services including electricity, water and sewage/grey water was considered essential. A site at the north-eastern end of the Bonner Laboratory was chosen initially, however snow modelling recently undertaken by external consultants suggest that it would be better located to the south-east of the Bonner Laboratory, to reduce winter snow drift. This is currently under consideration by the Project Board.

Figure 1. Proposed location of Docking Station (to be confirmed by the Project Board)

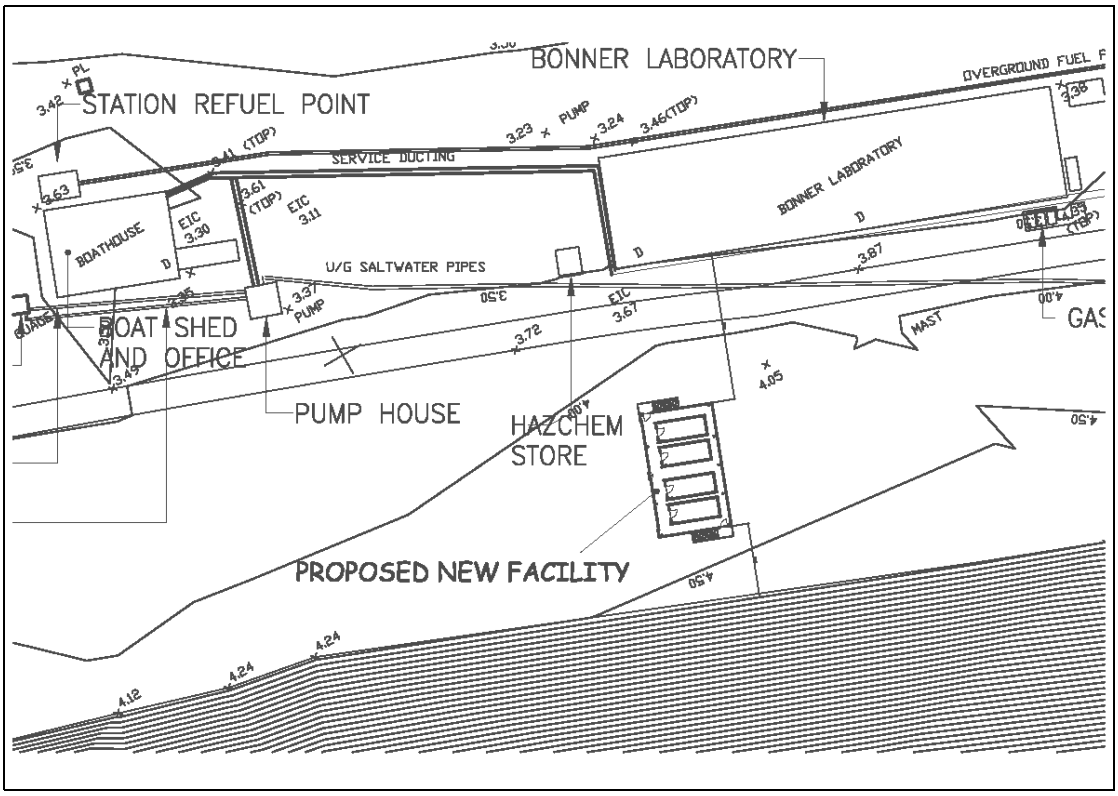


Figure 2. Floor plan of docking station

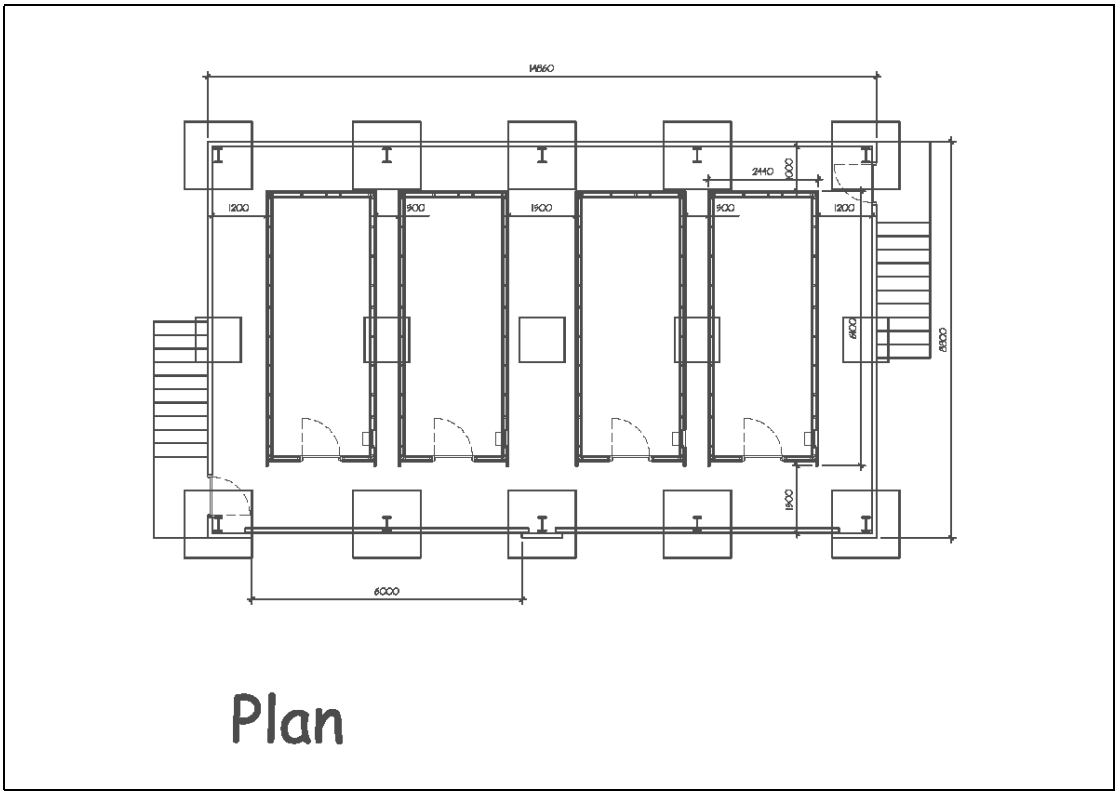


Figure 3. Front and side view of planned docking station

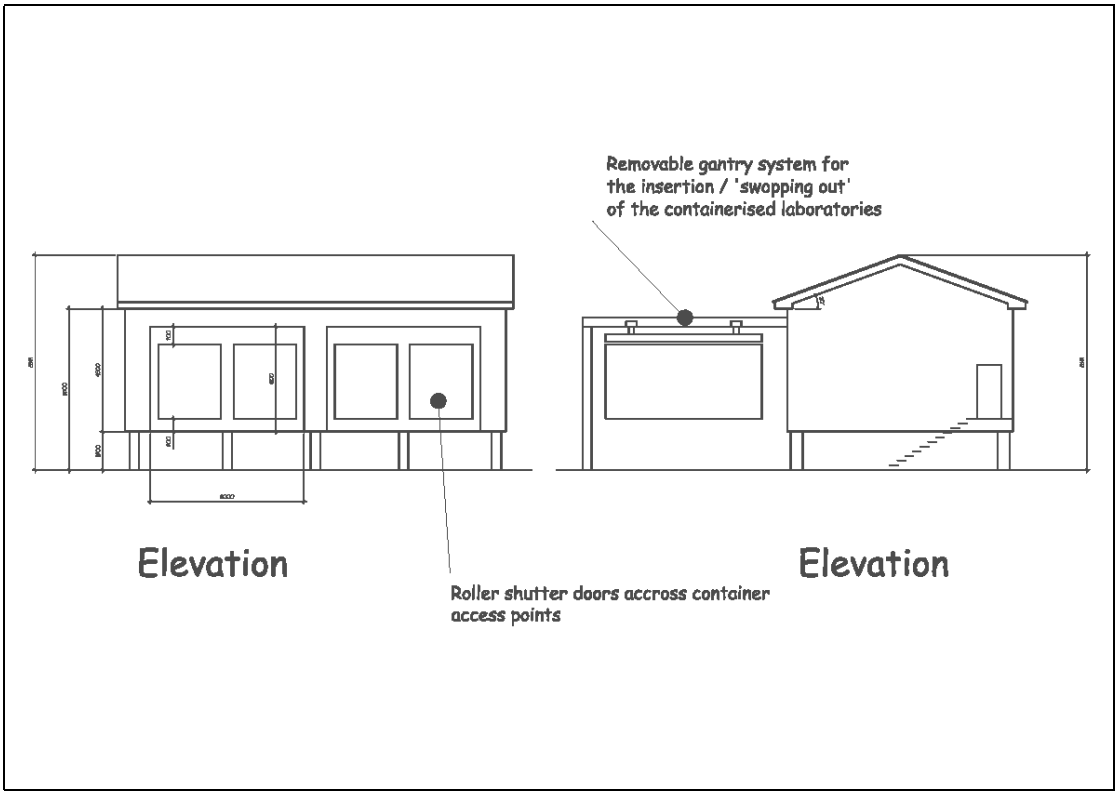
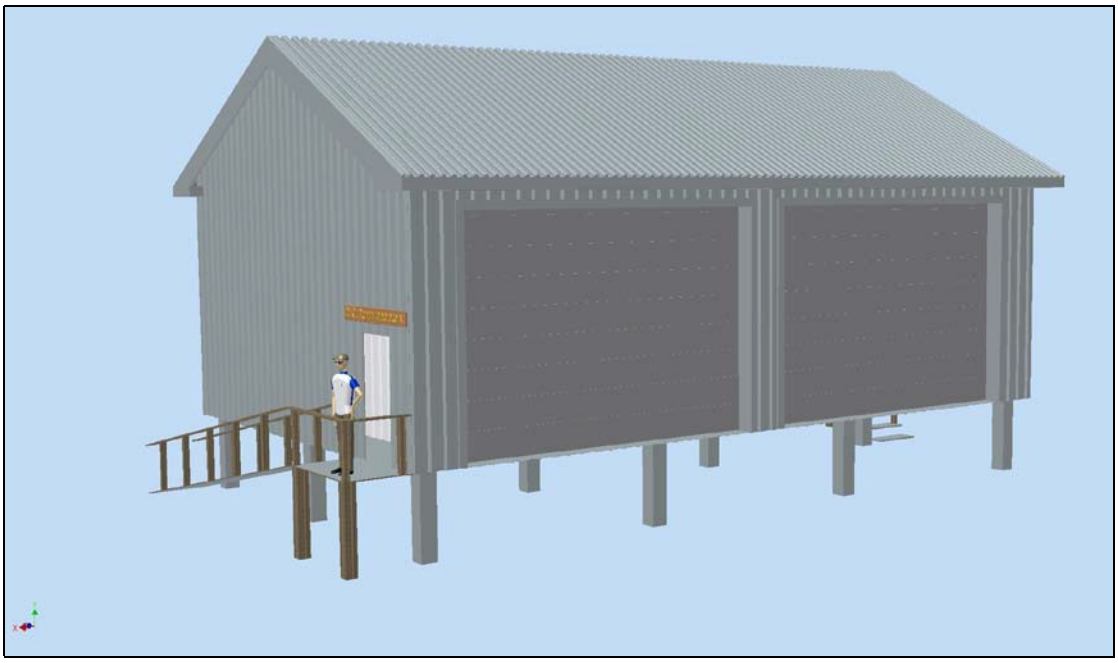


Figure 4. Artist's impression of the docking station



The laboratory units will be High Cube 20' ISO Shipping Containers (6.10m x 2.44m and 2.89m high). The choice of modular shipping containers will allow for flexible deployment by BAS ship.

The three containers in the docking station will comprise:

i. Dry laboratory

Standard 20 foot laboratory container including ventilation and heating. Internally it is equipped with 2 tables, a sink and cupboards. This laboratory will house analytical instrumentation. Utilities will include power and fresh water.

ii.Wet laboratory

Standard 20 foot laboratory container including ventilation and air-conditioning. Inside, the lab is equipped with 2 lab tables, a sink, a fume hood and cupboards. The floor will be equipped with a drain pipe leading to the sewage treatment plant. The laboratory will be used largely for cultivation and incubation, for example of algae, phytoplankton or marine viruses. Utilities will include power, fresh water and CO_2.

iii.Clean room laboratory

Standard 20 foot container including ventilation and heating. This ultra-clean laboratory will be equipped with special air-handling filters designed for continuous recycling and filtering of air inside the laboratory, creating a Clean Room classification of 10.000. Inside, the lab is equipped with 2 tables, 2 laminar flow benches, a sink and cupboards. Utilities will include power and fresh water.

Two further containerised units will be sited adjacent to the north end of the aircraft hangar, sat on concrete pads. This is the optimal location within the existing station footprint to avoid downwind exhaust fumes from the high temperature waste incinerator, which could interfere with planned atmospheric analysis. These units will comprise:

iv.Measuring/storage container

Standard 20 foot workshop container for installation and storage of scientific measurement equipment. This will be a temperature-stabilized laboratory suitable for atmospheric analyses instrumentation. Inside, the lab is equipped with 1 work bench. Utilities will include power and internet connection.

v.Workshop

Standard 20 foot workshop container for data recovery, and for storage, repair and maintenance of scientific instruments. Inside, the lab is equipped with 1 work bench and 1 storage rack. Utilities will include power and internet connection.

4.**Duration and Intensity**

It is proposed that the ground-work excavation and placement of concrete foundations will be undertaken by BAS at Rothera during January 2011. The remainder of the construction works will take place between December 2011 and March 2012.

These preparatory works will require approximately 130 person days, with an estimated 700 person days anticipated to complete the works in 2011/12.

The facility will have a planned lifespan of 25 years.

5.**Footprint of the proposed facilities**

The 'docking station' will have a footprint of 135m^2 and the two containers to the west of the hanger a further 30m^2. Both will be sited on rocky ground denuded of any vegetation and previously impacted by ground levelling works on Rothera Point.

6.**Impact Matrix**

Table 1 shows the predicted impacts of the construction and operation of the proposed Dutch-funded science facility at Rothera, and the measures that will be put in place to minimise those impacts.

Table 1. Impacts associated with the proposed construction and operation of the Dutch-funded Science Facility, and mitigating measures

Activity	Possible Output	Possible Impact	Probability of impact occurring[1]	Severity of impact[2]	Preventative or mitigating measures
Import of construction cargo, personnel and laboratories	Introduction of non-native species	Ecosystem alteration if species became established. Increased competition and introduction of disease-causing microorganisms. Operational shut-down of station facilities for eradication measures.	Medium	Very low (if 1 or small number of individuals) Medium to High (if species survival is synanthropic) High to very-high (if species becomes established independent of station)	All equipment to be thoroughly cleaned before packing. Visual inspection of cargo on arrival at Rothera. No additional vehicles brought on site. Existing vehicles will be steam –cleaned to remove soil and mud prior to transport to Rothera. All staff involved to be briefed on the risks and consequences of non-native species introductions. Laboratory units to be steam cleaned prior to shipment to Antarctica.
Site preparation, excavation and foundation laying	Rock dust and concrete dust dispersal	Alteration of pH values of soil. Physiological damage, bleaching or mortality of plants or invertebrates if present	Medium	Low	Chosen sites have no recorded flora or invertebrate communities Concrete batching not to be undertaken in strong winds.
Construction works	Generation of non hazardous waste, comprising timber	Possible harm to human health or danger to wildlife if scattered	Low	Low	All waste to be correctly packaged, labelled and removed from Rothera for reuse, recycling or safe and licensed disposal, in line with BAS Waste Management Handbook.

[1] (Very Low, Low, Medium, High, Very High)
[2] (Very Low, Low, Medium, High, Very High)

	packaging materials, cement bags, waste steel offcuts, and plastic wrapping, pipeworks, cable. Estimated quantity 50m3 to 75 m3	by wind.			Site to be cleared each day and checked for litter to prevent wind scatter.
	Minor and transitory disturbance to non-breeding penguins and seals	Increased energy expenditure. Possible injury to seals or penguins	Medium	Very low	Construction staff to minimise noise and other sources of disturbance, and where practicable to maintain a distance which does not cause behavioural changes to birds or seals.

Construction team - daily routines	Minor increase in waste sewage and grey water (including cleaning products)	Contamination of sea water by heavy metals and organic pollutants. Introduction of non-native organisms to North Cove	High	Very low	A sewage treatment plant is in operation at Rothera. The water at the sewage outfall location meets high standards. The dried, treated sludge will be incinerated, and the ash removed from Antarctica for disposal. The BAS uses mainly readily biodegradable citrus-based multi-purpose cleaning agents (Citraclean) at Rothera Research Station.
Use of vehicles and generators	Minor fuel spills and leaks	Soil/ gravel contamination Contamination or mortality of flora/fauna in immediate area.	Medium	Low	Careful attention to fuel handling and management. Absorbent pads to be used immediately to clean up any minor spills. Rothera Oil Spill Contingency Plan to be followed
	Atmospheric emissions resulting from the combustion of approximately 3 to 5m^3 of fuel during construction Annual fuel consumption to meet the power requirement during operation is estimated to be in the region of approximately 10-12,000 litres/ month. As detailed	Very minor but cumulative contribution to regional and global atmospheric pollution including greenhouse gas emissions. Heavy metal and particulate fallout	High	Very low	Daily checks of vehicles / generator emissions. Maintenance to be carried out as necessary. NIOZ/ BAS will investigate sustainable energy options for the new facilities, including solar water heating system and photovoltaic panels.

	plans of the laboratory design and instrumentation are further developed, it is anticipated by BAS that actual monthly fuel consumption will be considerably less.				
Scientific research	Generation of chemical waste	Possible harm to human health or danger to wildlife if scattered by wind.			Guidelines on waste minimisation are provided to staff prior to departure for Antarctica. All laboratory waste will be incorporated into the BAS waste stream and will be removed from Antarctica in UN approved packaging for safe disposal in UK.

7.**Assessment and Verification of Impacts, and Monitoring.**

The BAS on Site Construction Supervising Officer, the Rothera Logistics Co-ordinator and the Base Commander will be responsible for carrying out day-to-day inspections of the construction works, ensuring that the preventative and mitigating measures in this IEE are implemented, and that the activities of the construction team comply with the conditions of the permit issued to BAS under the Antarctic Act (1994) as well as the Protocol on Environmental Protection to the Antarctic Treaty, the tender specification and on-site procedures.

A photographic survey of the proposed redevelopment will be undertaken at all stages.

An environmental audit of Rothera Research Station will be undertaken by the BAS Environmental Office on completion of the project. The main objectives of the audit will be to examine whether:

i. the predictions contained in this Update to the Rothera IEE were accurate;
ii. the mitigation measures and monitoring studies recommended were effective.

8.**Conclusion**

This update to the Rothera IEE indicates that the additional cumulative impact of the proposed construction and operation of the Dutch-funded science facility at Rothera will be ‘minor or transitory’, provided that the recommended mitigation measures are carried out.