Antarctic Treaty Inspections Programme Report 2014-15

Report of the Antarctic Treaty Inspections undertaken jointly by the United Kingdom and the Czech Republic in accordance with Article VII of the Antarctic Treaty and Article 14 of the Environmental Protocol

United Kingdom, Foreign & Commonwealth Office
Czech Republic, Ministry of Foreign Affairs

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Introduction

Antarctic Treaty Inspections were conducted jointly between 31 December 2014 and 12 January 2015 by the United Kingdom and the Czech Republic in the Antarctic Peninsula region.

The inspections were undertaken by Observers designated by their respective governments in accordance with the notification procedures under Article VII (1) of the Antarctic Treaty. In accordance with Decision 7 (2013) of the Antarctic Treaty Consultative Meeting, notifications were also provided to the Antarctic Treaty Secretariat, who issued Circulars 22/2014 and 23/2014 confirming the appointment of the Observers.

Lead Observers so designated were:

For the Czech Republic:

> Dr Pavel Sladký, Adviser to the Deputy Minister, Ministry of Foreign Affairs of the Czech Republic, Prague

For the United Kingdom:

> Mr Henry Burgess, Deputy Head, Polar Regions Department, Foreign and Commonwealth Office, London
> Dr John Shears, Head of Operational Support and Engineering, British Antarctic Survey, Cambridge

The logistic platform for the inspection programme was provided by the United Kingdom's Royal Navy ice patrol vessel HMS *Protector.*

The core inspection team consisted of Pavel Sladký, Henry Burgess and John Shears. This team was augmented as necessary by the following officers and specialists from HMS *Protector* who were also designated as United Kingdom Observers in accordance with the notification procedures of Article VII (1) of the Treaty:

> Captain Rory Bryan OBE – Royal Navy (logistics and communications, German linguist)
> Lieutenant Commander Adam Ballard – Royal Navy (logistics and communications)
> Surgeon Lieutenant Commander Martin Scutt – Royal Navy (medical)

- Lieutenant Commander David Cutler – Royal Navy (engineering)
- Lieutenant Commander Rebecca Burghall – Royal Navy (logistics and communications)
- Lieutenant Chris Cozens – Royal Navy (engineering)
- Captain Daniel Bull – Army (Spanish and Portuguese linguist)

The Observers were assisted by photographer Petty Officer Simon Ethell – Royal Navy

The inspections were undertaken between 31 December 2014 and 12 January 2015 and inspections were made of six permanent research stations; six summer-only research stations; one non-governmental facility; one refuge; six cruise ships and five yachts.

All inspections were undertaken in accordance with Article VII of the Antarctic Treaty and Article 14 of the Environmental Protocol.

The aim of the inspection programme was to visit a range of research stations, cruise vessels and yachts, and refuges to ascertain compliance with the provisions of the Antarctic Treaty and its Environmental Protocol. The focus of the inspection was to visit those stations and vessels which had either not been inspected recently, or at all, or where there had been major recent changes. Given the flexible nature of their voyage programmes, the inspection of cruise vessels and yachts was on an opportunistic basis, as and when vessels were embarking or disembarking passengers in the Antarctic Treaty area.

Wherever possible, at least 24 hours notice was provided, although for logistical reasons, as well as the difficulty of accessing the correct contact details from the Antarctic Telecommunications and Operations Manual (ATOM), this was not always achievable.

In line with Article 14(4) of the Environmental Protocol, reports of all inspections were forwarded to the relevant Treaty Parties for comment. Where responses from Parties were of a minor drafting nature or a technical correction, the proposed changes have been incorporated into the relevant inspection report. Responses of a more general or substantive nature are included within this report in the Annex. The reports of the inspections of cruise vessels and yachts were also sent to the relevant operators or owners for comment.

The majority of inspections were undertaken in English. But the Observers were able to draw on fluent Spanish, Portuguese, Russian, German and French language skills, in addition to English and Czech, during the course of their inspection programme.

On leaving from and arriving to HMS *Protector* the Observers and their supporting boat crew washed and disinfected their boots and other equipment. Wherever provided the Observers and assistants also used the disinfection facilities at research stations and vessels.

Acknowledgements

The inspection team was afforded unrestricted access to all the facilities of each station and vessel. The team would like to record its sincere gratitude to all the station leaders and staff, vessel masters and their officers and crew, and expedition leaders and guides, for their assistance and active engagement with the inspection process.

The team was particularly grateful to the personnel at those stations which had only recently opened for the season.

All the photographs in this report were taken by Petty Officer Simon Ethell, except for the photograph of SY *Australis*, provided by Ocean Expeditions Ltd.

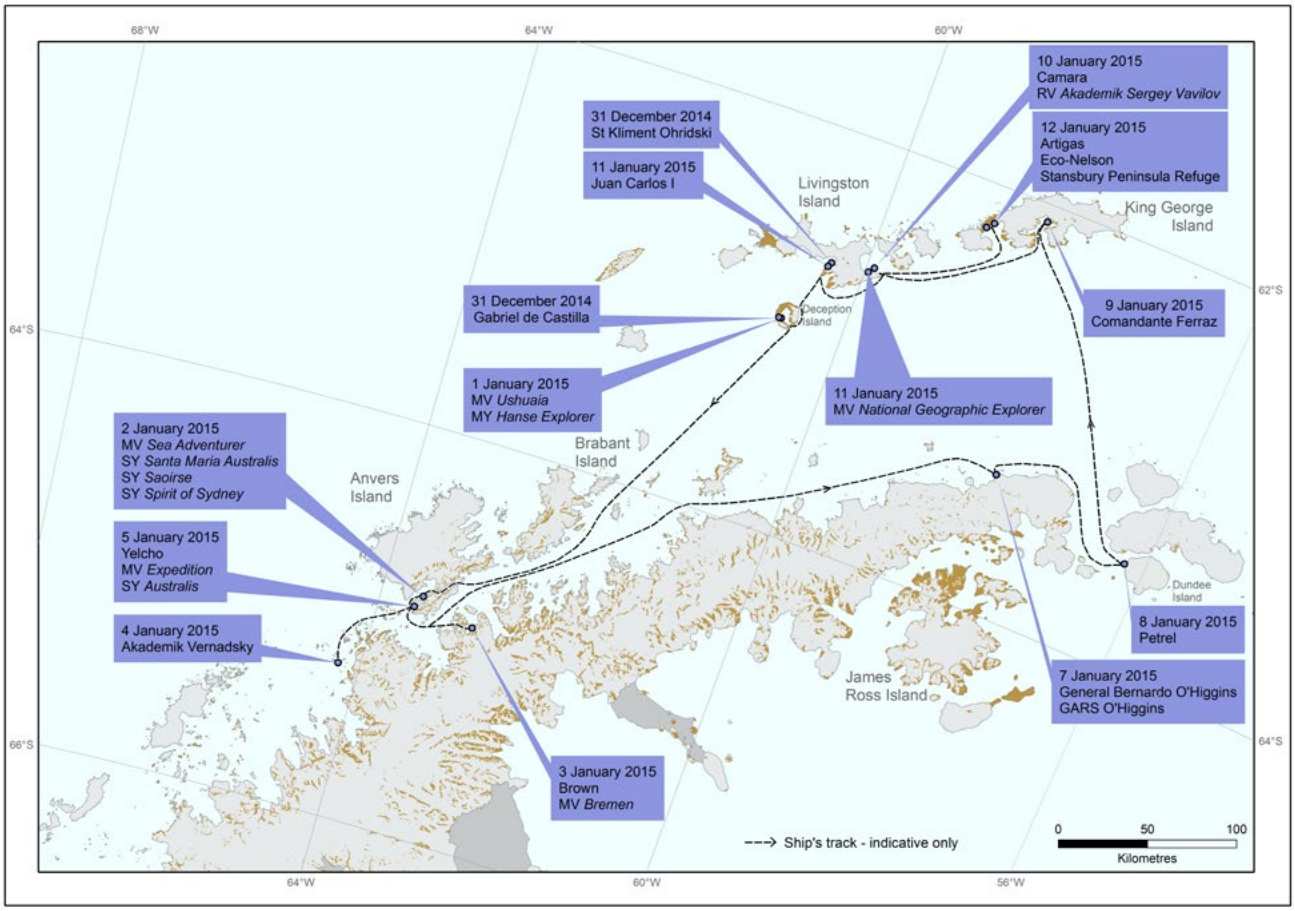
The inspection team would also like to thank the officers and crew of HMS *Protector*, under the command of Captain Rory Bryan OBE, for providing such effective logistical and technical support to the team, including extensive small boat operations.

Itinerary

The dates of the inspections were:

31 December	St Kliment Ohridski (Bulgaria)
	Gabriel de Castilla (Spain)
1 January	MV *Ushuaia* (Comoros)
	MV *Hanse Explorer* (Antigua and Barbuda)
2 January	SY *Spirit of Sydney* (Australia)
	SY *Saoirse* (New Zealand)
	SY *Santa Maria Australis* (Germany)
	MV *Sea Adventurer* (Bahamas)
3 January	MV *Bremen* (Bahamas)
	Brown (Argentina)
4 January	Akademik Vernadsky (Ukraine)
5 January	Yelcho (Chile)
	SY *Australis* (Australia)
	MV *Expedition* (Liberia)
7 January	General Bernardo O'Higgins (Chile)
	German Antarctic Receiving Station (GARS) O'Higgins (Germany)
8 January	Petrel (Argentina)
9 January	Comandante Ferraz (Brazil)
10 January	RV *Akademik Sergey Vavilov* (Russian Federation)
	Camara (Argentina)
11 January	Juan Carlos I (Spain)
	MV *National Geographic Explorer* (Bahamas)
12 January	Artigas (Uruguay)
	Eco-Nelson (non-governmental Czech facility)
	Stansbury Peninsula Refuge (China)

Map of the inspected research stations, other facilities, unoccupied refuges, and vessels



General conclusions and recommendations

Inspections

Each of the research stations and vessels inspected by the British and Czech inspection team were welcoming and fully co-operative. They all made considerable efforts to enable the inspectors to carry out their duties as effectively as possible.

However, the Observers often found it very difficult to make initial contact with some stations, particularly by e-mail, but also by telephone. The contact details for many of the stations given in the Antarctic Telecommunications Operation Manual (ATOM) were incorrect and for some of the smaller facilities no e-mail contact was given at all. This meant that it was not always possible to give 24 hour notice of each inspection. More seriously, in emergency situations it also risks adding considerable difficulty and delay in facilities' abilities to contact potential sources of assistance. Given the degree to which the whole of the Antarctic community relies on mutual assistance in the event of an incident, the Observers believe that this continues to be a serious issue.

The Observers noted that the errors and incomplete nature of some of the station information was in marked contrast to the correct contact details for cruise vessels and yachts produced by the International Association of Antarctica Tour Operators (IAATO).

That three of the research stations had completed the Revised Antarctic Inspection Checklist A (Resolution 3, 2010) was noted by the inspection team and this aided the inspection process significantly. They were provided to the team at the start of the inspection and it enabled them to make the best use of their limited time and to focus attention on key areas of interest.

The inspection team visited two stations that had been inspected during the British, Dutch and Spanish inspection in 2012. It was encouraging to see the progress which had been made since these inspections. But the inspection team were concerned to note that in a number of other cases, particularly in relation to those research stations which had not been inspected for many years, the recommendations made in previous inspection reports had not been followed through.

The inspection team recommend:

- All Antarctic stations and vessels should be encouraged to complete the relevant Antarctic Treaty Inspection Checklists and make these widely available.
- The Antarctic Treaty Secretariat should be requested to further develop the list of inspections on its website, to show the full list of COMNAP registered Antarctic stations and facilities, together with relevant inspection reports.
- Station contact details, including full telephone and e-mail, which are made available through the COMNAP system, should be checked and updated by National Antarctic Programmes at the start of the season.
- Parties should be actively encouraged to report station developments relevant to inspection recommendations to the ATCM and CEP.

Personnel and training

The inspection team found that most, but not all, of the research stations inspected were properly staffed and safely operated. The Observers were struck by the very wide range of approaches taken to staffing and training, ranging from stations which were entirely operated by the military, to those which were completely civilian. Given the variation in standards the Observers considered that a programme of exchanging station support personnel would be positive in sharing best practice.

The inspection team noted that all the stations inspected reported that staff had received mandatory practical training programmes prior to

arrival in Antarctica. In a number of cases this training was supplemented by on-site training in Antarctica. Some stations had advanced and comprehensive programmes of safety and training exercises. But the Observers also noted that other stations, given the potential risks associated with the age or location of the station and/or the experience of staff, would benefit from undertaking such on-site exercises.

The inspection team noted that several vessel operators required their expedition staff to complete and pass the IAATO field staff online assessment and certification programme. This seemed a promising approach and one that the team would recommend be more widely adopted by other operators.

The inspection team recommend:

> The training that all personnel and visitors, including temporary staff, receive before arriving in Antarctica should include, in addition to safety and environmental protection, clear information on the provisions of the Treaty, with particular reference to its Article IV.
> National Antarctic Programmes should actively promote and enable access to their stations from a wide variety of domestic and international scientists. Parties should also consider informal exchange programmes for station support personnel, to facilitate the sharing of best practice.

Scientific research

Although a few of the stations inspected were undertaking high quality research, the inspection team found that a larger number appeared to undertake very little science and only had very basic science facilities. At the time of the inspection many stations had very small numbers of scientists compared to logistics support staff. With several notable exceptions, it appeared to the inspection team that a number of the stations operated by military personnel appeared to undertake only routine scientific data collection, such as meteorological observations.

The inspection team also noted that the scientific facilities and laboratories at some stations appeared not to have had much current use. It was also not always clear how science projects had been chosen and evaluated by National Antarctic Programmes. Some stations appeared to have a good track record of human impact monitoring at their facilities, but this was not widespread.

The inspection team found that several summer stations which had previously been thought to have been abandoned, or only used sporadically, were now undergoing major refurbishment programmes, including the building of new purpose-built science laboratories. The Observers commend the National Antarctic Programmes involved in these developments.

The inspection team noted that several of the vessels supported active and impressive on-board science programmes, in collaboration with relevant research institutes. The team considered that the potential to extend the provision of such programmes should be explored.

The inspection team recommend:

> National Antarctic Programmes should ensure they use an appropriate system of expert peer review to ensure the science undertaken in Antarctica is of the highest quality and importance, and that its impact can be established.
> Forward plans for the future scientific use of stations should be developed to ensure that physical presence in Antarctica delivers rigorous scientific activity and outputs.
> Vessel operators, IAATO and others, including SCAR, should be encouraged to consider the opportunities to maximise the scientific activity

which is possible on tourist vessels in the region. In the meantime, existing activities and opportunities should be well publicised.
> Human impact monitoring studies should be undertaken on stations wherever practical.

Logistics and infrastructure

The inspection team noted some good examples of research stations, including some of the smaller stations, which were using renewable energy from solar and wind sources. A few other stations clearly had plans to invest in this technology or had undertaken some preliminary assessments. But no stations were self-sufficient in renewable energy and the majority relied on conventional diesel generators to produce electricity. Not least because of the age of some of the infrastructure on some of the stations, there was little evidence of advanced heat recovery systems from generators. The inspection team were concerned that the storage of fuel drums at some stations did not seem to be carried out in ways which minimised the likely impact of a spill.

The inspection team visited a number of stations with facilities which had been constructed around 50 years ago. It was clear that such structures will pose specific and increasing challenges in terms of ongoing maintenance and ensuring their safe operation.

The inspection team saw environmental changes taking place as a result of climate change. Long-term meteorological records from several of the stations inspected have shown that mean annual temperatures on the Antarctic Peninsula have risen rapidly. As a likely result of the increase in temperature, the inspection team observed a wide range of environmental change at the stations inspected, including higher snowfall, glacier and permafrost melting, and increasing numbers of nesting Gentoo penguins. Some stations were already adapting to the environmental changes and adopting new ways of working. For example, wire gabion baskets were being used to protect building foundations and service facilities from permafrost melting and melt water erosion.

The inspection team recommend:

> National Antarctic Programmes should consider how best to ensure that renewable energy (such as solar and wind) provision can feature more prominently in the future energy provision plans for stations.
> Stations with aerial masts and other non-habitable structures should consider appropriate and regular safety assessments of their structural integrity, to enable remedial or removal action to be undertaken as appropriate.
> COMNAP and SCAR should be encouraged to consider assessing the impact of climatic and environmental changes on stations and facilities, particularly those in the Antarctic Peninsula, and to develop advice on how best to adapt infrastructure such as buildings, pipe-work and bulk storage systems to cope with such impacts. Parties are encouraged to conduct appropriate risk assessments in the light of predicted climate change.
> The location of small scale fuel storage systems, such as drums, on Antarctic stations should be sited in ways to maximise safety, while minimising potential environmental impact. The provision of oil spill equipment and training should be the focus of renewed effort.

Transport and communications

The Observers were concerned to note potential risks, particularly at smaller summer stations, regarding vehicle transport, especially boat operations. Several summer stations were undertaking single boat operations, often travelling many kilometres to reach field sites or other research stations.

Snow and ice conditions did not always permit the inspection team to assess the impact of vehicles on the station surroundings. But it was evident on some of the larger stations that well-established tracks had been formed between the buildings where vehicles were used extensively.

The availability of communications on the stations varied considerably, from stations with wi-fi internet and mobile phone capability for personnel via advanced satellite systems, through to those reliant on VHF or HF communication. Understandably this partly reflected the age and size of the stations involved. The inspection team noted that the stations with the most up to date communication systems were able to deploy these for potentially important uses such as tele-medicine.

The inspection team had the opportunity to witness most of the tourist vessel operators' use of zodiacs and similar inflatable boats at first hand. All appeared to be well-maintained and well-handled, with good communication between expedition staff and with vessels.

The inspection team recommend:

> Consideration should be given to the best way of ensuring safe small boating operations around Antarctic stations, especially journeys using single open inflatable boats.

Safety, training and emergency procedures

The tragic and disastrous fire at Comandante Ferraz (Brazil) station in February 2012 showed how important fire safety and emergency procedures remain in Antarctica. The inspection team were therefore concerned to find several instances of poor practice in fire safety systems at several stations. Examples included having no fire or smoke detection or alarm systems in accommodation areas; the lack of working or regularly checked fire extinguishers or up to date fire fighting equipment; or irregular emergency training. This provision contrasted sharply with the facilities and procedures in place at several other stations, who had invested heavily in fire protection.

The inspection team noted that some stations would rely heavily on neighbouring stations in the event of a serious incident. Whilst this was understandable, the inspection team were concerned to ensure that this did not detract from the station's own emergency procedures.

Whilst the inspection team was onboard each vessel the Observers were informed that the vessels were fully compliant with all relevant international maritime requirements, such as SOLAS. However, the inspection team nevertheless noted that there were considerable differences in the specific levels of on-board safety and emergency equipment and procedures.

The inspection team recommend:

> All stations that have not done so should review, with expert assistance if necessary, their fire safety and detection equipment. Stations with no suitable detection systems, particularly in accommodation areas, should install them as a priority.

Environmental management

The Observers found high levels of awareness of the provisions of the Environmental Protocol at virtually all the stations and vessels inspected. There were numerous examples of good practice and these are noted in the individual reports.

The inspection team visited a number of small summer only stations, including those which had been temporarily unoccupied for some time, where there was considerable clean-up and waste removal activity taking place. However, it was not always clear what would happen at some stations

once clean-up activities had been completed and whether they would be refurbished and redeveloped, and if so what purpose they would be put to in the future. The inspection team were struck by the scale of the clean-up required at a small number of stations. It appeared that a significant upscale in removal activity would be required to make a serious impact, to avoid the growing risk of significant environmental contamination and to successfully implement the advice in the CEP Clean-up Manual (2014).

There were good examples Environmental Impact Assessments being completed for new activity in and around stations. But it this was not universal and the inspection team believed there is further work to do to ensure that appropriate assessments are completed, that station staff are engaged and that the appropriate documentation is available at the station.

Knowledge of nearby areas which were protected under the provisions of the Treaty, such as ASMAs, ASPAs or HSMs appeared to be generally good amongst station staff. Vessel operators were seen to be using and abiding by the Visitor Site Guidelines for the locations they were visiting at the time of the inspection. No significant issues in relation to the Environmental Protocol or the General Guidelines for Visitors to the Antarctic were observed.

The inspection team recommend:

> Stations should investigate opportunities to accelerate the clean-up and removal of historic waste from stations in Antarctica, including through innovative international collaborative efforts.
> Parties should ensure that all new construction and development in Antarctica is subject to an environmental impact assessment (EIA) before any activity is undertaken. Stations should be involved in this process, and the completed or draft EIA should be available on the station.
> Redundant infrastructure, such as fuel tanks and temporary buildings, should be removed from Antarctica to avoid the risk of inadvertent environmental contamination, wherever possible. Where there is a judgement that removal will create more impact than retention, this should be tested through the EIA process and regularly reviewed in the light of evolving techniques.
> Stations without appropriate sewage treatment and discharge facilities should investigate the opportunities to update their systems, drawing on the experience of other stations' successful use of such methods.
> Waste storage facilities on stations should be reviewed to ensure that waste cannot be dispersed by the wind or accessed by wildlife.

Medical

The inspection team found highly variable standards of medical facilities and personnel, both at stations and on those vessels inspected. A number of stations had full-time experienced doctors and well-stocked and provisioned treatment facilities. Other, usually smaller, stations were reliant on medical expertise provided by personnel with paramedic or nursing experience. It was notable that some of these stations were heavily reliant on support provided by other nearby stations operated by the same National Antarctic Programme. Other stations had an understanding with a neighbouring station belonging to another Party. The inspection team noted that such support was reliant on appropriate weather conditions and the availability of transportation.

As with the stations, the experience of medical personnel and the facilities available varied significantly on the inspected vessels, from some with basic but functional sickbay facilities to others with relatively sophisticated treatment options. A number of cruise vessels operated with two doctors, one provided by the vessel and one by the operator, often with additional medical supplies. The Observers also noted that some vessel doctors

had tele-medicine agreements with medical professionals back in their home countries, on which they could call for support and advice. Medical provision on the yachts was via crew members trained in emergency and wilderness medicine.

The inspection team recommend:

> National Antarctic Programmes and vessel operators should review the provision of medical facilities and advice, including providing for rapid access to expert back-up though tele-medicine services.
> COMNAP should be invited to ensure that the nature and location of specialist medical facilities (e.g. recompression chambers, X-ray facilities, automated external defibrillators), together with updated and accurate contact details, is better publicised and disseminated to both National Antarctic Programmes and vessel operators.

Tourism

Several of the stations welcomed tourists and it was clear from IAATO figures that such visits have involved several thousand visitors each season. Other stations were clear that they did not actively welcome tourists because of the size or nature of their facilities, the impact on scientific research or other station activity. The Observers found that most stations had their own internal procedures in place to deal with tourist visits and there were no discernible negative impacts from such visits.

The inspection team were encouraged to see the very widespread use by cruise vessels and yachts of the Antarctic Treaty Visitor Site Guidelines. The Observers considered that publicly available guidelines such as these could also help manage the increasing numbers of tourists visiting some stations.

The inspection team were generally impressed by the professional way in which cruise vessels and yachts were being operated and shore landings were conducted. The cruise vessels' focus on practical bio-security arrangements was especially prominent. The Observers noted that nearly all the operators of the cruise vessels and yachts inspected were members of IAATO, and that the organisation plays an important role in setting standards and developing best practice on environmental and safety guidelines for their members.

The inspection team recommend:

> Stations which receive tourist visitors should be encouraged to develop publicly available guidelines for the management of such visits including, where appropriate, Antarctic Treaty Visitor Site Guidelines.
> IAATO should be encouraged to develop industry peer and expert reviewed guidelines for the range of activities undertaken by cruise passengers (such as kayaking, snorkelling and diving), to provide appropriate common standards, whilst recognising that individual operators must retain full responsibility for the safe conduct of such activities.
> IAATO and COMNAP should be encouraged to identify and disseminate best practice for the effective implementation of the CEP Non-native Species Manual.

Good practice

Examples of good practice seen at research stations during the course of the Antarctic Treaty inspection programme

Issue	Station	Comments
Antarctic Treaty documentation	Artigas Petrel Camara	Comprehensive completion of the Revised Antarctic Inspection Checklist A (Resolution 3, 2010)
Clean-up	Comandante Ferraz	Major demolition and removal of buildings undertaken after the fire in 2012. Also biological remediation of contaminated ground
Fire safety and detection	Comandante Ferraz Gabriel de Castilla German Antarctic Receiving Station (GARS) O'Higgins	Excellent system of smoke detectors, fire alarms and evacuation procedures
Renewable energy	Juan Carlos I St Kliment Ohridski	A good proportion of station power supplied by wind turbines and solar panels
Fuel management and storage	Artigas	New double skinned and bunded fuel tanks
	Gabriel de Castilla	Good fuel management procedures, and oil spill plan and clean-up materials
Logistics co-operation and sharing of infrastructure	General Bernardo O'Higgins German Antarctic Receiving Station (GARS) O'Higgins	Excellent collaboration between Chile and Germany to share logistics to transport German scientists and support staff
	Artigas	International co-operation to share logistics, vehicles and science facilities on King George Island
Science co-operation and sharing of facilities	Juan Carlos I	Major joint glaciological programme between Spain and Japan

Issue	Station	Comments
Science laboratories	German Antarctic Receiving Station (GARS) O'Higgins	Advanced computer laboratories and facilities to provide ground control and data reception for orbiting satellites
	Yelcho	Significant investment in new purpose built facility demonstrating capacity at a small seasonal station
	Comandante Ferraz	Successful preservation of science programmes during the clean-up and re-building process
Waste management and recycling	Juan Carlos I	Comprehensive systems and processes
	General Bernardo O'Higgins	
Sewage treatment	Comandante Ferraz	New sewage treatment plant, including drying of sewage sludge to assist removal
Medical facilities	Gabriel de Castilla	Excellent surgery facility, including tele-medicine facilities
Wildlife conservation and protection	Brown	Comprehensive guidelines in place to protect breeding penguins
	General Bernardo O'Higgins	
	German Antarctic Receiving Station (GARS) O'Higgins	
Visitor management	Brown	Active management of visitors and provision of station information
	Akademik Vernadsky	

The inspection team also noted what they believed to be a range of examples of good practice during cruise vessel and yacht inspections. These are included within the individual reports on the vessels.

Research stations

St Kliment Ohridski (Bulgaria)

Inspected 31 December 2014, 0930–1145

Date of previous inspection

21 February 2005 (United Kingdom, Australia and Peru).

Introduction

St Kliment Ohridski station is located in South Bay on Livingston Island at 68° 38'S; 60° 21'W. It is a medium-sized summer only (November – February/ March) station operated by the Bulgarian Antarctic Institute (BAI). Initially established in 1988 the facilities were later refurbished and inaugurated on 11 December 1993, and it has been open every season since then. Science supported at the station includes glaciology, geomorphology, permafrost studies, cartography, life sciences (zoology, botany, ecology), seismology, meteorology, microbiology and geology.

Physical Description

The station was situated approximately 100m from a boulder and rock beach and comprised three main buildings: a main living accommodation and operations hut and two smaller A-frame accommodation buildings. There was also a small chapel, a fuel dump and an automatic weather station (AWS) at the site. Two shipping containers which were part of the original station were now under several metres of snow, and the Observers were told that attempts will be made to dig these out using a snowblower later in the 2014-15 season. The Observers were also told that the old station is a site of historical interest under Bulgarian law, and the containers are likely to remain in situ. Plans were being made to add another building to house the station fuel supply in 2015.

Personnel

At the time of the inspection there were 14 personnel on the station. These included the core station team, as well as three climbers and a two person film crew who were making a documentary for Bulgarian national television on environmental protection issues. The theoretical maximum capacity of the station was 22 people, but this would severely stretch logistical capabilities and a capacity of 18 was more realistic. All personnel in the camp, with the exception of the film crew, were volunteers and were working unpaid. Their time in Antarctica was mostly taken from their holiday allowance.

Scientific Research

Three cartographers and climbers were implementing a project related to measuring the precise altitude of peaks in the surrounding mountains A geologist from Sofia University had undertaken geological mapping of Livingstone Island earlier in the season and a Mongolian glaciologist from Ulaanbaatar University had studied glaciers. The Observers were told that two geologists from Sofia University were expected by the end of January.

A team of three Portuguese scientists from the University of Lisbon would arrive at the station in the middle of January for a month. The team would be studying permafrost as part of a long-term research project – AntECC- on Livingstone Island. The research involved the use of a range of automatic instruments and loggers at a number of sites on the island, including temperature measurements in boreholes, photographs of snow cover taken by automatic digital cameras and meteorological measurements taken by an AWS located 300m to the south east of the main station building.

The station had no dedicated science laboratories and samples are returned to Bulgaria, or the countries of visiting scientists, for detailed analysis.

One of the A-frame wooden buildings had basic workshop space for scientific work and, at the time of the inspection, contained the scientific cargo boxes sent in by the University of Lisbon team. The ground floors of the two A-frame wooden buildings, erected between 2006 and 2008, could serve as a working area, depending on the station's needs. The Observers were told that the loss of covered space due to the lack of access to snow-buried buildings required flexible use of these rooms.

The station leader explained that during past summer seasons the station had hosted scientists from a number of countries: Chile, Germany, Japan, Poland, Portugal, Republic of Korea, Spain, United Kingdom and the United States, partnering with Bulgarian research staff. The Observers were told that the first access to Antarctica for both Mongolian and Turkish scientists had happened at the station. It was unclear to the Observers whether BAI had core funding for its own national scientific research, or whether it was mainly reliant on hosting visiting scientists at the station.

Logistics and Infrastructure

Fuel was supplied at the start of the season from Argentina, Chile or Brazil and was held in 205lt drums, or tanks and cylinders for diesel, petrol and propane respectively. Only small quantities, enough for one summer season, tended to be held, with diesel storage being no more than 5m^3 for an annual usage of approx 3.5m^3. The bulk of the diesel was stored in drums on the beach, where there are plans to use a shipping container as a storage facility plus workshop in 2015. The remainder of the diesel, together with petrol, was stored directly adjacent to the main hut. Propane was stored separately, but also adjacent to the main hut.

Water for the station was provided directly from a nearby glacier melt lake via a pipeline to the main hut and accommodation. Ohridski was able to store 4m^3 in one large tank, additional small containers of 0.5m^3 were also stored in bathrooms.

Electrical power to the station was provided predominantly from four wind turbines, which double as water heaters, and two sets of solar panels. The station also had an A50KB Daca Blue generator providing 50kw (62kva) of power which tended to be run daily for two hours to augment the solar and wind turbines. A further 7kw, 11amp portable generator was situated in the church. Ohridski needs 20kva to maintain operations.

Transport and Communications

The station was equipped with two skidoos which allowed easy movement in the heavy snow around the station and also provided the opportunity for the scientists to travel further inland. During the inspection, the station personnel were seen using the skidoos to support an expedition climbing Needle Peak, approximately 14km away. Two zodiac inflatable boats with 50hp outboard engines were also available, which were used to reach the nearby – approximately 30 minutes – Spanish research station, Juan Carlos I. This link was critical as Ohridski relied heavily on their Spanish neighbours for storage and for medical and logistics support.

Supply lines to the station appeared to be sporadic, with shipping provided by a variety of Argentinean, Spanish and Chilean vessels which bring fuel, cargo and provisions when required. The main access to Ohridski was by sea via a rocky beach. This beach shelved gently and can only take small, shallow drafted craft and is often inaccessible due to prevailing westerly winds. The Observers were told that on one occasion supplies had to be left on the beach for several days before they could be recovered. The input or removal of heavy cargo is therefore only realistically feasible using helicopters. The main helicopter landing area is approximately 150m south west of the main station buildings, but this was rarely used, and almost never more than once a season. Complex

medical emergencies may therefore not be treated in a timely fashion, and the building of a small boat jetty or wharf which can improve access would considerably ease resupply.

Communications were mainly achieved by satellite (Began and Inmarsat), with two Iridium phones also available. There were also VHF sets for use in the station, but the HF capability bought in 1988 had been removed.

One of the station staff had built a small unmanned airborne vehicle which he was using to film the site from the air. The Observers were told that its use had been approved by BAI.

Arms and Military Support

The Observers recorded no explosives or guns and ammunition on the station, and there were no military personnel working at the station at the time of the inspection.

Safety, Training and Emergency Procedures

The station team was briefed on safety and emergency procedures on arrival at Ohridski. This included a lecture on fire safety, highlighting it as one of the main risks. The fire drill was outlined in the station manual. The procedure was to raise the alarm, move away from the fire, close the doors and then attempt to fight the fire. There were smoke detectors in the main hut and reportedly powder extinguishers throughout the station, although these were not prominently displayed. Areas that must be kept clear are marked around heat sources that may present a fire hazard, but there was evidence that this was not always achieved. The Observers believe that the station would benefit from regularly participating in fire drills and that fire fighting equipment should be more clearly displayed.

The Spanish station Juan Carlos I is situated a short distance from Ohridski and, if reachable by zodiac or skidoo, would be able to provide support or act as a point of evacuation if required.

Environmental Management

Small numbers of non-breeding penguins and skuas were present around the station and the beach, but there were no significant concentrations of wildlife nearby. There was no specific plan or training in place for managing wildlife interactions, but personnel received a short brief on arrival about respecting local wildlife. No problems were reported with station personnel or visitors not observing the provisions of Annex II to the Environmental Protocol. Research involving wildlife interference had taken place in previous years under permit from the BAI, but no such activity was planned this season. The Observers were told that there were some areas of moss to the south of the station, which were off-limits to the station team and visitors.

Waste material was separated, with glass and metal put in empty fuel drums and stored on a rocky area above the beach ready for collection and removal from Antarctica. The drums and gas canisters in this area were strapped together to secure against wind damage or dispersal. There were plans to erect a temporary storage facility at this location in which waste material could be stored in the future, and which would be dismantled at the end of each season.

The station had a medium size two-chamber/ phase incinerator situated in a workshop linked to the main living accommodation, and approximately two metres from the fuel storage area and the main generator. It was used to burn paper, cardboard and food waste. The ash from the incinerator was stored in empty fuel drums ready for collection near the beach. The area was also used as a general workshop and storage facility, including a large quantity of packet and tinned

foodstuffs, some of which appeared to be in poor condition. Basic shower and toilet facilities were linked to this workshop/incinerator area.

There was evidence of small scale contamination of the ground around the fuel storage area next to the generator, probably from occasional fuel spills or seepage. The team was informed that a barrel of absorbent dry material was available to cope with small scale fuel spills. There was no evidence of other spill prevention or containment material being present.

Waste (grey) water and kitchen water and sewage was treated separately. Kitchen water and sewage was piped to a single-stage anaerobic digester on the slope below the main living accommodation. Solid residue was held in the form of dry pellets and removed at the end of each season; liquid waste was pumped directly to sea using a chemical filter system with a capacity of $3m^3$.

Grey water was diverted through a separate pipe down a snow-filled gulley to the beach and the sea. All waste, including human waste, generated during off-station activities was returned to the station. There was however no evidence of environmental monitoring of human impact, including monitoring of sewage and waste water, at the station.

There were no Antarctic Treaty protected areas such as ASPAs, ASMAs or HSMs in the immediate vicinity.

Environmental procedures and requirements were summarised in a short Bulgarian-language handbook which was available on the station. All the non-scientific staff received a short training programme. All activities on the station, logistical and scientific, were authorised by BAI, including scientists from outside Bulgaria who worked at the station.

The Observers were informed that the proposed new storage building to be erected on the level ground above the beach has received appropriate permission from BAI , but it was not obvious to the Observers whether an Environmental Impact Assessment (EIA) had been completed or not.

Medical

The sickbay was staffed by a volunteer doctor who was a trained surgeon, specialising in abdominal surgery. The sickbay was basic, but had patient monitoring equipment and a defibrillator. It also had an oxygen concentrator. The doctor had established a good relationship with the doctor at the nearby Juan Carlos I station and would call on them should a medical evacuation be required. All clinical waste was disposed of by incineration.

Tourism

The Observers were told that there were very few tourist visits to the station. During the 2013-14 summer season there had been only one such visit, when 73 passengers landed from a cruise vessel, having first contacted the station. There were no apparent negative consequences as a result of the visit, either on the local wildlife or the activity of the station.

Summary

Ohridski is a small scientific research station operated by volunteers. The Observers were impressed by the use of renewable energy systems, including wind generators, PV panels and solar water heater on the station. They noted that major improvements had been made to disposal of sewage and grey water, with the installation of a small anaerobic sewage plant, since the last inspection in 2005.

However, the Inspection team considered that safety issues should be addressed as a priority at Ohridski: fire extinguishers were not prominently displayed, there was poor storage of flammable chemicals, irregular maintenance of the incinerator, and fuel handling and storage was not in line with current best practice, with evidence of numerous historic minor oil spills in the fuel storage area near the main building.

Station personnel have to deal with significant snow accumulation around the station, with the problem being much more significant since the last inspection in 2005. The snow has buried an arch-frame Parcol-type shelter, the original station main buildings and the original station generator building, including the generator. Considerable work will be required to remove the accumulated snow and to assess the need and feasibility of removing abandoned material and waste.

Recommendations

> Fuel drums should be stored away from the main living accommodation and the incinerator. Comprehensive oil spill equipment should be available and an oil spill response plan introduced.
> Consideration should be given to starting a monitoring programme of human impacts, specifically the efficacy of the sewage treatment facility and drinking water quality.
> An EIA should be undertaken prior to any work commencing on building the new temporary storage facility if not already underway.
> A forward coherent science plan should be developed for the station.

Gabriel de Castilla (Spain)

Inspected 31 December 2014, 1430–1845

Date of last inspection

20 February 2005 (United Kingdom, Australia and Peru).

Introduction

Gabriel de Castilla station is located on the south side of Deception Island at 62° 58'S; 50° 40W. It is a medium sized, summer only (December – March) station. Established in 1989 by the Spanish Army it has been in continual use ever since. The station was well-maintained and had impressive scientific facilities and a clear scientific primary purpose.

Physical Description

The station is located on volcanic ash substrate and set back 15-30m from the shoreline. It consists of approximately 30 buildings some of which are permanent structures, and the remaining are shipping containers. The buildings and shipping containers are centred around the main living block which houses the living space, station leader's office, communications office, showers, toilets and bedrooms.

Personnel

The station staff had arrived at Deception Island on 1 December 2014 onboard the Spanish Navy vessel RV *Hesperides* and spent their first four days removing snow and opening up the station's facilities. At the time of the inspection there were 18 personnel at the station, 12 from the Spanish Army and six scientists. The station leader was an army major who personally selected the military team from a pool of approximately 250 volunteers. The military personnel provided the support to operate the station and deployment of field teams in order to allow the scientists to focus on their research projects. The military team included the

station leader, boat officer, doctor, environmental science officer, two engineers, communications manager and two cooks. The station had a maximum capacity of 36 people.

The Observers were advised that the army personnel change every year, apart from one army engineer who was on his second of two seasons. This post was typically a two year assignment to allow continuity for the maintenance of equipment.

Scientific Research

Gabriel de Castilla had a very strong focus on Earth system science. At the time of the inspection, there were six Spanish scientists at the station studying seismology, vulcanology, permafrost and geology.

The station was supporting three major Spanish research projects on the day of the inspection visit. All of the studies involved long-term survey and monitoring of Deception Island and each had collected over twenty years of data. The projects were:

- SISDECVOL – This project was operated by the University of Granada and was undertaking the seismic monitoring of the volcanic activity at Deception Island and trying to predict when eruptions might take place. It used a range of automatic sensors and instruments, including seismometers, at a number of sites on the island.
- GEOTINANT – The University of Cadiz was responsible for this project which was monitoring the movement of magma within the volcano using a comprehensive network of Global Positioning System (GPS) sensors. The GPS allowed the team to detect very small changes (mm) of the ground surface.
- PERMATHERMAC – This project was being run by the University of de Alcala in Madrid. It was measuring temperature changes in permafrost on the island using a network of sensors in several borehole sites to assess the impact of climate change and regional warming.

The senior scientist told the Observers that all the Spanish scientific projects being supported at the station had undergone rigorous international peer-review organised by the Spanish Polar Commission. This ensured that only the highest quality research was undertaken.

Later in the season the station would be supporting two international research projects. A geological science team from Argentina and Portugal would be investigating permafrost, and a biological science team from Belgium and the Czech Republic would be studying diatoms.

The station had a large dedicated science laboratory building, which had been created by the redevelopment of the old station main building and had been opened in 2001. As well as basic office and laboratory bench space, the laboratory had a fume cupboard, scientific freezers (-80° C), and a drying oven. A shipping container next to the laboratory building was used to store science cargo boxes and spare equipment, but had also been used in the past as a wet laboratory for marine biology research.

In front of the science laboratory building there was an Automatic Weather Station (AWS) which was operated and maintained by the Agencia Estatal de Meteorología (Spanish Meteorological Agency). Gabriel de Castilla sent the AWS data to a meteorologist based at the Spanish Juan Carlos I station on Livingstone Island, who provided daily weather forecasts for Deception Island.

The Observers were impressed by the excellent scientific research being undertaken at Gabriel de Castilla, particularly in seismology, vulcanology and geology, and by the professional way the station was being operated by the Spanish Army. The station was an excellent working example of how military support can greatly assist scientific research within the Antarctic Treaty area. The station also provided an important volcano hazard warning service to the wider Antarctic community visiting Deception Island.

Logistics and Infrastructure

Stores, equipment, food, fuel (diesel and petrol) were supplied periodically by RV *Hesperides* during the summer season. Diesel was stored in four doubled-skinned diesel tanks behind the station (total capacity 25m^3) with an endurance of approximately 83 days (300lt/day). Petrol was stored separately inside a shipping container in a bunded double skin 1m^3 tank. The container also housed the outboard motor fuel tanks. A good supply of oil spill response equipment was stored around all fuel storage areas; any soiled absorbents were bagged and sent by ship for disposal.

Water was supplied by pipeline to the station from a glacial lake about 1km from the station, and stored in a 15m^3 storage tank. This water was not used for drinking, but was used for all other requirements (showers, toilets, cleaning etc). Bottled water supplied by support ships was used for drinking. A reverse osmosis system could be used in an emergency if required.

Electrical power was generated by two Gesan–Volvo 6 cylinder Penta diesel generators, supplying 150kva, 230v at 60hz, which was more than adequate provision for the station's needs. Most impressively, the generators can be monitored by a wi-fi application on a tablet computer and also accessed remotely in Spain in case further technical assistance is required. All machinery and vehicles were sampled regularly for fuel quality, noise emissions and exhaust emissions and repaired if out of limits. Energy saving was a priority for the station staff and motion sensitive lighting was evident in the main accommodation area.

Transport and Communications

There were a wide variety of vehicles and boats to allow the science teams access to different parts of Deception Island. The station had two quad bikes (one of which was tracked), two John Deere buggies (one tracked), one telescopic boom tractor, and four Mk 4 and two Mk 5 zodiac inflatable boats with 60hp outboard motors.

Two SATCOM dishes, and HF, VHF and UHF communications were available. The internet connectivity speeds (1.5Mb upload and 8Mb download) were particularly impressive, and facilitated a wide range of tele-conference, tele-medicine and tele-engineering. Further wireless communications were available with a variety of remote scientific sensors positioned around the island feeding data back to the station continuously.

Arms and Military Support

The Observers recorded no weapons or ammunition at the station. Gabriel de Castilla was run and maintained by the Spanish Army with funding from the Finance Ministry.

Safety, Training and Emergency Procedures

The Spanish Army provided a minimum of three weeks training for their personnel. This included a week long specialist training course for individual posts, a small boat handling course, and a mountain survival and cold weather training course conducted in the Pyrenees. Evacuation and fire drills were regularly carried out and coordinated by the station leader. A zoned smoke detection system was in place around the accommodation, office and laboratory areas with further sensors being installed in the generator room, petrol and workshop containers. Fire extinguishers were visible, but the condition of the carbon dioxide extinguishers was starting to deteriorate.

Environmental Management

It was clear that environmental management was a priority for the station leader and the whole of the station team, and the activity was well resourced. There was a dedicated station Environment Manager from the Army who was a senior member of the team. This position benefited from the use of a well-equipped environmental monitoring laboratory. The station achieved the ISO14001 Environment Management System standard in 2010 and has retained it each year since. The station receives an annual inspection from the Spanish Environment Agency via video link and a detailed on-site station assessment every third year. The Observers were impressed by the commitment of the personnel to excellent environmental management.

There was very good awareness at all levels of station management of the requirement to conduct an EIA for all new activities, demonstrated by the planned bank stabilisation works which had been subject to an EIA, a copy of which was held on station. There was a thorough training process in environmental management for all personnel on the station, achieved partly through pre-deployment training and by dedicated hands-on training on arrival. The Observers were impressed that pre-deployment training assessed the existing strengths and weaknesses of personnel in terms of their future training requirements in Antarctica and weighted subsequent training accordingly. There were excellent and detailed records of the completion of this training, which occurred as soon as staff arrived on station. In addition to strong technical background and training in the Spanish Army, the station environment manager also received a short dedicated training package prior to deployment.

There was a good system of environmental monitoring in place on the station, focusing on potential micro-biological and chemical contamination in relation to sewage treatment and hydrocarbon storage; monitoring of carbon monoxide, sulphur dioxide and particulate emissions from vehicles, generators, the incinerator and any other emission source; monitoring of the station's water source; and noise measurements of vehicles and generators. All monitoring systems were subject to an annual calibration.

The environmental monitoring of the sewage process was thorough and well-recorded, with regular samples taken throughout the treatment and dispersal process, and solid suspension tests were undertaken, with a particular focus on potential nitrogen and phosphorous contamination. The station's locally occurring water source was also regularly tested for any microbiological contamination. Whilst the local water supply was not expected to present any danger to health, for safety and taste reasons bottled water was used for human consumption, with the local water used for cooking, washing and toilets.

There was a good system for assessing ground contamination, including three sample sites for ammonia (sewage treatment) and two sites for hydrocarbons (fuel storage and use sites). These

tests were conducted at a depth of 500mm. In the absence of agreed international standards for acceptable levels of contamination in the Antarctic Treaty area, the station used European Union levels. All recorded levels were below the EU limits. The Observers encourage the station team to continue their comprehensive environmental monitoring programme.

Conservation of flora and fauna was clearly taken seriously and the relevant requirements of the Environmental Protocol were a key part of the pre-deployment and on-site training for all members of the team.

There were no obvious large penguin colonies in the vicinity of the station, although there was an occasional visitor on the beach area in front of the station. Two juvenile elephant seals were seen in the beginnings of moult and were hauled out on the beach beside the entrance to the station.

In previous seasons research by Spanish scientists from the Spanish Research Council had been undertaken on the effects of climate change on penguin parasites for which the appropriate permits were obtained from the Spanish authorities. There were no such studies planned this season.

The risk of accidental introduction of non-native species or transfer of seeds and micro-organisms within Antarctica was recognised as a potential threat. The Observers were pleased to see good evidence of control systems, including liquid and aerosol disinfectants, full body suits and a strong training and awareness programme and biosecurity protocol on the station. There was no evidence of the presence of non-native species and no biosecurity incidents had been recorded in the current season.

The station sits within the Deception Island ASMA, although there are no ASPAs or HSMs in the immediate vicinity. Entry to the ASPAs in Deception Island is only permitted in support of science personnel and programmes, and is conducted under specific authorisation by the Spanish authorities.

The station had a strong system of waste management, with clear protocols for the separation and treatment of wastes. Only paper, cardboard, food waste and untreated wood was burnt in the two chamber (400°C and 800-1000°C) incinerator. Glass, cans, plastics, incinerator ash and hazardous material were separated at source and appropriately stored in marked containers secured against wind dispersal. Hazardous waste material was stored in a dedicated storage facility. Such material, as well as batteries, lightbulbs, complex or mixed waste was returned to Spain at the end of the season on RV *Hesperides*. Due to a shortened season in 2013-14 (20 days) it had not been possible to return such waste last year, but it would all be returned this season. Other separated waste, and used oil spill absorbents, was taken out of the Treaty area to local ports in South America. Such material was handled by vessels from other national Antarctic programmes as opportunities arose in the season, with the ultimate disposal documentation received back at the station. A small and a medium size general waste compactor were in operation.

The station used a three phase sewage system (filtration, sludge separation and aeration/bacterial digestion) before discharging to the sea via a pipe. The sludge was collected into plastic drums and removed from the island by the support ship.

Medical

Station personnel were looked after by an army doctor who was a general surgeon. She worked in a dedicated sickbay, which had accommodation for two patients. There was a variety of medical equipment including defibrillator, ventilator, and a desktop blood laboratory for simple biochemistry and haematology. The doctor was supported by a

telemedicine facility at the station, which links via InMarSat to the military hospital unit in Madrid. This facility can send and receive ultrasound images. All medication was brought to the station by ship at the start of the season, and all clinical and pharmaceutical waste was removed by ship at the end of the season. The evacuation plan involved aeromedical evacuation using other military assets in the area (helicopter and aircraft) to transfer serious casualties to the hospital in Punta Arenas, Chile. This system had been used in the past and worked well. In addition to the general pre-deployment training the station team received, the doctor received additional training on cold weather injuries.

Tourism

Deception Island and the sites at Whalers Bay, Pendulum Cove and Telefon Bay are heavily visited by cruise ships and yachts. There was no prohibition on tourists visiting the station and this had occurred in the past, without any significant quantifiable impact on the activity of the station or local wildlife.

Summary

Gabriel de Castilla is an impressive summer station undertaking excellent science. The Spanish Army clearly provide strong support (station operation, field and boat support, vehicles, tele-communications) to the science being undertaken.

The volcano monitoring at the station has benefits that are much wider than just valuable scientific research, and is important for hazard and eruption warning not only for the station, but also for the Argentine Decepcion station nearby, and the many visiting cruise ships and yachts.

The station is now being seriously impacted by the effects of rapid climate change. The senior scientist on the station told the Observers that regional warming of the Antarctic Peninsula is causing heavier snowfall on Deception Island. At the same time the permafrost is thawing and melting because of the higher temperatures. Snow and ice melt in summer is now rapidly eroding gullies and channels in the loose volcanic ash around the station threatening to undercut the foundations of the main accommodation and living building. As a result, the station is undertaking a major bank stabilisation project this season to stop and prevent the erosion.

Recommendations

> The Spanish Polar Commission should consider how to spread best practice, perhaps within COMNAP, on ways to deal with the effects of permafrost melting and ground erosion by increased snow melt, on station facilities in the Antarctic Peninsula.
> The shipping containers at the station were beginning to deteriorate from the harsh environment and will require replacement or repainting. A rolling programme to replace the containers should be instigated within the next five years.
> The condition of all fire extinguishers on the station should be inspected monthly and units replaced as necessary.

Brown (Argentina)

Inspected 3 January 2015, 1315–1700

Date of last inspection

28 February 2005 (United Kingdom, Australia and Peru) – helicopter overflight only. The last inspection visit to the station itself was 29 January 1987 (Chile).

Introduction

Brown station is situated in Paradise Bay, in position 64° 54'S; 62° 52'W. The bay is not only spectacularly beautiful, but also very sheltered, and according to the personnel at the station seems to have a microclimate which is more temperate than much of the surrounding area. Originally established in 1951 the station had been predominantly occupied year round apart from four years from 1960 when it had been temporarily closed. But following a serious fire in 1984 there had been a reduction in the number of personnel and occupation of the station had become seasonal. This year the team had arrived at the end of December, and would be departing at the end of February.

Physical Description

The station consists of two main areas. The first area includes the main living and cooking accommodation, with beds for eight people. Previously this building had been the refuge for the main station before the fire. A small generator is located nearby. The larger second area 300m to the east consists of six buildings remaining from the original station: an old generator shed, a workshop and storage area, historic laboratory with two beds, a small generator building and a building which now operates as a small visitor office. The Observers were informed that the particular use of each building depends on the needs and objectives of each season and these

buildings could be used as laboratories as required. Approximately 30m above the larger second area is a small hut previously used for melting ice to provide fresh water but which the Observers were told was now empty.

The Observers were told by the station leader that the focus of the work at the station in the current and previous season was to clean-up the historic wastes at the site and prepare the way for modernisation and redevelopment of the station as a science and visitor facility.

There were no refuges or emergency shelters in the immediate vicinity. The station leader confirmed that there were no detailed plans for new buildings. As and when such plans came into being, the appropriate environmental impact assessments would be completed prior to commencing work. The historic laboratories were not currently operational, but would be used by visiting scientists later in the season.

The main living, cooking and eating accommodation was warm, well-maintained and comfortable, although relatively basic. A number of the other buildings clearly showed their age and understandably it had not been easy to maintain them to a sufficiently high standard in recent years, not least with the reduced number of personnel at the station.

Personnel

There were 10 personnel on the station. This included the station leader and her assistant from the Argentine national Antarctic programme (DNA) who were tasked with supervising the fulfilment of the Environmental Measures of the Madrid Protocol, including those related to the management of tourist activities. There were also two scientists (one biologist and one geologist) and six personnel from the Argentine Coastguard covering a range of tasks such as boating and diving, medical support, electrical maintenance and emergency response. The station had a similar number of people last year, but these numbers were roughly double those of the previous years. It was expected that the number of people would continue to grow. All the personnel on station were Argentine and no international collaboration was foreseen in the near future. The Observers thought that the station was currently at its maximum capacity until further accommodation and services were installed.

Scientific Research

Brown is a small summer only station, with only basic science facilities available. At the time of the inspection, there were two Argentine scientists at the station, studying coastal geomorphology and oceanography. Both of the scientists were from the University of Mar del Plata in Buenos Aires.

The station leader informed the Observers that the Instituto Antarctico Argentino (IAA) had recently developed a new long-term science plan for Brown station, and it would be used as a base to study Paradise Harbour and nearby areas. The project was in its early stages, but subject to further approval by the IAA, it was hoped to increase science activity at the station in future years, and the project widened to involve international partners. During the 2014-15 season the station would be supporting two projects. One was a geomorphological study of beach formation in Paradise Harbour involving topographic survey and sediment analysis, the other was an oceanographic study which was measuring current speeds and direction at different depths. Both projects made considerable use of the two inflatable zodiacs operated by the Argentine Coastguard to transport the scientists to their study sites and as platforms for oceanographic measurements.

The senior scientist on the station said that the two research projects had been submitted by the University of Mar del Plata to the IAA for review and were required to fit within the science plan for the station. As part of the project submission process, an Environmental Impact Assessment (EIA) was also submitted to the IAA.

The station had a small and very basic science laboratory building, which was also being used as a dormitory for the two scientists. At the time of the inspection, the two scientists had only just arrived on the station and had not yet unpacked their instruments and equipment.

As well as developing and expanding the science undertaken at Brown, the IAA was undertaking a preliminary tourist impact study which involved the assessment of several key environmental indicators, including monitoring any potential damage to vegetation by trampling and visitor disturbance to the nesting colonies of Gentoo penguins.

Logistics and Infrastructure

Fuel was supplied at the start of the season in 200lt drums from Argentina and again in late February, with any fuel not used remaining on site ready for the start of the following season. No surplus fuel was returned. Petrol for boats and propane for cooking was also stored with the diesel fuel in an open air fuel storage area until required for use. Fuel for the generators and boats was transferred to small 25lt tanks using a hand pump contained in a building directly adjacent to the fuel storage area; a drip tray for containing small fuel spillages and a supply of oil spill response equipment was also readily available. Brown station had five redundant fuel storage tanks positioned at the eastern edge of the station approximately 5m above the beach, all of which were empty and in a poor state of general repair, although there was no evidence of leaks as far as could be ascertained by external inspection by the Observers. The intention was to remove these tanks when the station redevelopment began in earnest. There were no records of a fuel spillage having taken place at this facility in the last three years.

Water for the station was provided directly from a nearby glacier and was held in two 1000lt tanks adjacent to the main accommodation hut. No chemicals were used to treat sewage and grey water, which was discharged directly into the sea via a pipe to the shoreline. The station leader stated there was a plan to improve sewage and grey water disposal by installing a treatment processing plant as part of the future site development.

Power was provided from four portable generators located across the two sites, each rated at 4.5kw. There were no wind turbines, solar panels or evidence of any other source of renewable energy.

Transport and Communications

Although there was only approximately 300m between the two areas, moving between them by foot was difficult because of heavy snow. The station had two zodiac inflatables (one with a 40hp engine, the other with 25hp), which could easily move between the two sites and there were two deep water areas in which relatively large boats could be easily brought alongside. The zodiacs were also used to support the scientific studies which took place on the adjacent beaches.

The station team were landed on 30 December by the Argentine Navy ship *Suboficial Castillo*, and would be picked up by a chartered Russian Federation vessel *Vasily Golovin* at the end of the season. The vessel would provide helicopter support to recover some of their equipment, although there was no designated landing area.

The station had two Iridium satellite phones and six VHF sets, of which one was fixed. There was also an HF transmitter and receiver which was operational on a pre-fixed schedule.

Arms and Military Support

There were no members of the military on the station, although six of the team were from the civilian Argentine Coastguard. There were no explosives or weapons on the station.

Safety, Training and Emergency Procedures

The station leader told the Observers that all personnel took part in a week long training programme in Argentina prior to arrival on the station, focusing on practical issues such as first aid and on the principles and requirements of the Antarctic Treaty and the Environmental Protocol. The station leader and those in charge of environmental issues at Brown received specific additional training.

There were no automatic fire detection systems in place, although the installation of such equipment was planned as part of the future redevelopment of the station. The Observers were informed that there were sufficient hand held fire extinguishers for each building.

The station leader showed the Observers an extremely detailed information pack listing all the station procedures and containing all the appropriate permits and permissions. This pack was for the previous season (2013-14) and was in the process of being updated, given that the station had only recently opened for the season.

Environmental Management

A comprehensive station Waste Management Plan was in operation and all waste was separated and retained for removal in February on closing down of the facility for winter. There was no incinerator or rubbish compactor and, other than for general cleaning, no chemicals were evident. Station waste was separated into four categories: plastic, hazardous, metal and glass and bio-degradable waste. There were separate bins for the different categories of waste in each of the main occupied buildings. Waste was packed into empty fuel drums for collection at the end of the season.

A significant clean-up operation was underway at Brown, with the concrete platform left after the fire in 1984 now used as a flat storage area for the waste material from previously damaged buildings and general station waste, alongside the station's current fuel storage area. The old building waste has been generally separated – wood, metal and firewood – and would be removed from the station over the coming seasons.

The station leader reported that the numbers of Gentoo penguins at the station had increased in recent years and there were now approximately 500 adult individuals in three colonies around the station. These were often in close proximity to the buildings, particularly the waste storage area, workshop and old generator building. The team had flagged and roped off the most significant colonies to ensure an appropriate separation between station staff and visitors and the penguins. There were some interesting examples of moss colonisation at the landing steps below the workshop and on the cliffs behind the five disused fuel tanks, as well as some examples of Antarctic hair grass (*Deschampsia antarctica)* in the nearby area. There were no protected areas in the vicinity.

Medical

Medical support to the station was provided by an experienced Coastguard nurse. This was his second tour at Brown. He had access to an appropriately wide selection of medications including various antibiotics and analgesics. He did not have access to morphine or adrenaline, and did not have a defibrillator. However, all personnel were given a thorough medical examination prior to coming to Brown. Supply, resupply, and waste disposal were all via the support ships used. The clinical and pharmaceutical waste was kept segregated appropriately.

Tourism

Paradise Bay is a highly visited area by cruise ships and yachts and offers a valued opportunity to make a landing on the Antarctic continent. The Observers were told that visitors were welcome. Figures from IAATO indicate that 8839 people visited during the whole of the 2013-14 season. In line with the General Guidelines for Visitors, numbers ashore were limited to 100 at any one time, but 60-70 was a more common size.

A station manual on handling visitors to the station had been drawn up and would be tested this season. Visitors were not able to access the station itself, but there were a number of marked areas to guide their visit to the area and to ensure that the penguin colonies were not disturbed. Most tourists walked on a marked footpath through the old buildings up to a viewpoint on the ridge above the station (84m). The station leader said that a preliminary tourist impact study was being undertaken during the current season for future assessment by the IAA/DNA authorities.

A short leaflet in both Spanish and English was available to visitors to describe the history of the station and the science being undertaken, as well as guidelines to protect the wildlife and environment. The Observers noted that this leaflet mentioned ATCM Resolution 3, 2011 'General Guidelines for Visitors in the Antarctic'. Inked 'stamps' were also available for visitors to record their visit to the station.

Summary

Brown is a small summer station with only very basic science laboratory facilities. Nevertheless, an Argentine scientific programme is in place to study the local area, involving scientists from the University of Mar del Plata and the Instituto Antarctico Argentino (IAA).

The Observers were impressed at how the IAA have in recent seasons cleaned up and removed the debris and waste from the major fire in 1984 which destroyed several of the buildings. However, there is still much to do, with most of the remaining buildings unused and in need of repair.

The Observers noted that the IAA plans to redevelop Brown as a scientific station, increasing the number of science projects developed while maintaining the capacity to receive tourists. Paradise Harbour is already a major visitor site because of its beautiful mountain and glacier scenery. The results of the tourist impact study being undertaken this season will be important in deciding the future strategy for the station, including the maximum carrying capacity (visitor numbers). The Observers would suggest a Visitor Site Guideline be developed for this location, in line with other heavily visited sites.

Recommendations

> Modern fire detection, alarm and control systems should be installed at the earliest possible opportunity.
> An assessment, including environmental impact assessment, be made to consider the removal of the five redundant fuel tanks.
> That the long-term strategic science plan for the station should include the monitoring of visitor impacts on the local environment.

Akademik Vernadsky (Ukraine)

Inspected 4 January 2015, 1230–1700

Date of last inspection

1 March 2005 (United Kingdom, Australia and Peru).

Introduction

Akademik Vernadsky is located in the Argentine Islands, south of the Lemaire Channel at 65° 15'S; 64° 16'W on rocky ground on the north west corner of Galindez Island. It is operated by the National Antarctic Scientific Centre of Ukraine (NASC).

Physical Description

The infrastructure and systems of the station are much the same as they were when it was transferred from the United Kingdom to Ukraine in 1995 and as described in the 2005 inspection report. The buildings are clearly ageing, particularly internally, but are generally well-maintained, warm and weather proof.

A small single storey Ukrainian Orthodox chapel, with wooden walls and floor and a sheet metal roof with an approximate area of 4m^2 had been constructed three years ago, immediately in front of the main accommodation building.

The outlying buildings, mostly housing scientific equipment, appeared to be in relatively good order and weather tight. The wooden slated terrace area in front of the main accommodation building had been damaged during the filling and testing of a free-standing tank and had subsided heavily in one particular area. The large antenna and aerial systems around the station were being well maintained and were in relatively good order. The station leader was not aware of any significant plans to update or alter the buildings or facilities in the near future.

Personnel

The station leader was very experienced having spent ten seasons at Akademik Vernadsky, including four full years. There were currently 12 people on the station and the maximum capacity was 14. For this current 19th Antarctic 'campaign' the station personnel included: a diesel mechanic, electrician, mechanical engineer, systems administrator, doctor, cook, seven scientists including two meteorologists and the station leader. The operating languages of the station were Ukrainian and Russian. All personnel were Ukrainian and employed under contract by the NASC.

Scientific Research

The primary purpose of the station was scientific research, with a very strong focus on Earth system science. The station supported a wide range of science including geophysics, ionospherics, seismology, ozone monitoring, oceanography, marine biology, meteorology, and medical research.

At the time of the inspection, there were seven Ukrainian scientists at the station all of whom were working for the NASC. One of the meteorologists also served as the station leader. There was a high ratio of scientists to logistics support staff on the station.

Several of the physical sciences projects were continuing important long-term monitoring studies, which had previously been undertaken by the British Antarctic Survey (BAS) up until 1995 when the station had been transferred from the United Kingdom. The senior scientist told the Observers that there continued to be very close co-operation between the NASC and BAS, with meteorological, ozone, and geophysical measurements and data being passed to BAS on a daily basis. Data was also sent to relevant international organisations. For example, meteorological data was sent from the station to the NASC and then to the World Meteorological Organisation (WMO). The station also operated a tide gauge on behalf of the UK National Oceanography Centre.

As well as the long-term monitoring studies started by BAS, the station also supported marine biology projects developed by the NASC. One of the scientists was investigating parasites and their transfer within the marine food chain, and another was studying marine phytoplankton and zooplankton distribution around the Argentine Islands. The marine scientists used the station's inflatable boats to also undertake a range of long-term marine survey and monitoring studies, including hydrography.

The station leader told the Observers that it was a high priority for the NASC to continue the long-term studies handed over by BAS, as required under the station transfer agreement between the UK and Ukraine. The selection of Ukrainian national science projects undertaken at Akademik Vernadsky were chosen by the State Special Purpose Research Programme in Antarctica for 2011-2020.

The station has separate and well found biological, geophysical, meteorological and ozone monitoring laboratories, with various instruments and computers, all of which are in the main station

building. Ozone monitoring was undertaken using a Dobson spectrophotometer in the loft, along with a UV-B light sensor. Near to the main building were two small huts for the magnetometers and the seismograph, and also the Very Low Frequency (VLF) ionosounder building and aerial arrays. The seismograph was able to detect earthquakes in the Southern Ocean and data was sent by satellite to the INTERMAGNET world data centre.

To the east of the main station building there was a Global Positioning System (GPS) base station operated by the US National Science Foundation as part of the Larsen Ice Shelf system, Antarctica (LARISSA) project.

The Observers noted that although still fully functional, the scientific laboratories had not been significantly upgraded since the transfer from the United Kingdom. To ensure that the station can maintain its strong focus on effective science the authorities should now develop a plan to ensure the station is effectively equipped to support its scientific aims.

The station doctor undertook human medical research for the NASC, in which all members of the station team participate. The aim of the research was to determine the physiological and mental changes to station members during the expedition and evaluate how they adapted to the isolation and environmental conditions of Antarctica, particularly during winter. The doctor carried out monthly tests on each station member, including electro-cardiograms, during the year that they spent at the station.

Logistics and Infrastructure

Fresh water was produced by reverse osmosis system which took suction from the sea via a bath to maintain system priming. It was capable of generating $3m^3$ per day which the Observers were told was more than adequate for the station's needs. The water was treated by UV light and chlorinated.

Diesel was stored in a double-skinned $200m^3$ tank which supplied one ready use tank in the generator room. The station used around $130\text{-}140m^3$ per year and was resupplied yearly. Petrol and engine oil was stored in 205 litre drums and placed to the side of the generator room and workshop. Two large disused fuel tanks ($145m^3$ and $33m^3$ capacity) remained on the site. The Observers understand that one of these tanks had been cleaned and was now storage facility for dry materials. It was intended that the same would be done with the other tank.

Three Volvo Penta diesel generators provided 415v, three-phase at 50hz with a total capacity of 80kw. Only one of the three generators was used at any one time, with the other two engines as standby or undergoing maintenance. The generators supplied electricity to the station via a switch board also situated in the generator room. The building housing the generators was wooden in construction and vented via glass windows. The building did not have a fixed fire fighting system but was protected by smoke detectors.

The generators were well maintained with sufficient spares and tools to cover most issues. An engine telemetry system had been installed in the past three months to enable the engineers to monitor engine performance from the main building. The generators did not have any emission control and air suction was via the space through a particulate filter. No renewable energy sources were in use.

The station had hoped to operate an unmanned aerial vehicle this year for practical aerial survey of local ice conditions and general awareness purposes, but the system had been blocked on departure from Ukraine by customs officials.

The main station resupply during the last year was done by the MV *Polar Pioneer* in March-April, but other in-season resupply took place on an ad hoc basis. Where embarked on the vessels, helicopters took part in this resupply.

Transport and Communications

The station had HF, VHF and Iridium communications, but internet bandwidth was limited and mostly used for scientific support. The email and telephone access, and satellite bandwidth, had been improved since the last inspection in 2005, enabling the staff to e-mail home much more regularly.

There were six inflatable boats with 5, 6, 40, 55 and 60hp outboard motors; two skidoos (one currently defective); and three plastic rowing boats. There was also a fixed HIAB crane beside the boat landing area, which was used for stores and boat operations, with a lift capacity ranging from 2000kg to 250kg depending on boom length.

Arms and Military Support

The Observers recorded no firearms or other weapons were on the station and there was no military support.

Safety, Training and Emergency Procedures

There was a monthly emergency training cycle which concentrated primarily on fire safety and evacuation drills which was controlled by the station leader and engineer. The accommodation and office spaces were separated into seven zones for fire detection and there was a control panel in the main entrance. Four breathing apparatus sets and fire suits were located near the main entrance. The fire fighting equipment was aging and apparently not regularly maintained (e.g. labels on some extinguishers suggested they had not been recharged or checked for up to ten years). There was no fixed fire suppression system fitted to any high risk areas, such as the generator room. General fire detection across the station was by smoke and heat alarms. The Observers were told that extinguishers were checked annually.

All personnel joining the station attended a week-long training programme at the NASC prior to deployment. Station personnel were a deliberate mixture of those with previous experience and new staff. This training programme included learning about the provisions of the Antarctic Treaty and the Environmental Protocol.

Environmental Management

A station Waste Management Plan existed and all waste was separated into three categories: metal, glass and general waste, which included plastic, paper and food. Cans were flattened and then stored in empty fuel drums prior to removal. General waste was compacted using a small compacting machine and then wrapped in grey plastic sheeting and tied together with plastic bands, prior to removal during re-supply or at the end of the season.

All the waste was stored outside on a decked area. The Observers saw evidence of wildlife interference with this waste, including a brown skua which had become habituated to human contact at the station and which appeared to be feeding or attempting to feed at this location.

Refrigerated food storage was in two large self-contained stores inside one of the buildings. One of these was a freezer unit and the other maintained at 4°C. The Observers felt that these storage conditions, as well as the labelling and the general condition of the contents could be significantly improved.

The station did not have a sewage treatment plant and discharged sewage directly to the sea. The sewage outfall was separated from the sea intake for drinking water generation.

There were basic oil spill kits available at the station for use during generator maintenance or boat re-fuelling. Inflatable booms were kept at the station for the control of oil spills in the sea, along with some absorbent material. But it was not clear to the Observers whether regular oil spill prevention and clean-up training was undertaken. Petrol drums were stored directly on a raised wooden area between the main accommodation building and the boat shed. There were no spill prevention or containment facilities in evidence.

The Observers were informed that the total quantity of petrol provided for the current season was 1400lt and that at the time of the inspection about two drums were left. The empty drums were filled with waste oil but were not used for longer than two seasons. The Observers were told that their condition was checked by station technical staff and also included in the twice-daily station inspection duties.

There were a large number of Gentoo penguins nesting around the station buildings, and according to the senior scientist on the station there were approximately ten times the number of penguins seen now compared to a decade or so earlier. Adélie and Chinstrap penguins were also present in small, non-breeding numbers. It was reported that small numbers of Fur seals (*Arctocephalus gazella*) were also present later in the season.

It was clear to the Observers that the planning and construction of the Ukrainian Orthodox chapel had occurred without the direct input of those operating and managing the station. There was no documentary evidence available to the Observers at the time that any environmental impact assessment had been carried out. Although the Observers were subsequently informed that the permit was available on the station and that details of the proposed construction were presented to ATCM XXXIV. It was the inspection team's opinion that the actual environmental impact was likely to be minimal, as the location was on the site of already impacted ground.

The only protected area within the immediate vicinity was Wordie House (HSM No. 62). Under the provisions of the Visitor Site Guidelines, the key for the hut was held at the station. Where the personnel at the station know the operator or visitors well, they would allow them to access the hut without being accompanied, otherwise a member of station staff would supervise the visit.

Green Island (ASPA No. 108) is located approximately 10km to the south east. Previously scientists from Akademik Vernadsky had travelled to this location having received appropriate permission from the Ukrainian authorities. But there were no plans to access the site in the current season. The pre-deployment training included details on protected areas in the local area.

Medical

Medical support to the station was provided by an experienced consultant trauma surgeon. He was resident for the whole year. He monitored the health of the station staff at least monthly and also conducted research. Monitoring facilities for ECG and EEG were available. There was a portable X-Ray unit, but this had been broken for some time, possibly up to six years. The Observers were assured that the X-Ray source itself remained intact and safe. The pharmacy had a wide range of medication, including adrenaline and morphine, as well as a defibrillator. Pharmaceutical supply was provided by ship at the time of the change of station crew. Segregated pharmaceutical and clinical waste was removed from the station at the same time.

Tourism

The station is a popular destination for cruise vessels and yachts, and the station leader informed the Observers that visitors are usually made welcome. Five cruise vessels and four yachts had visited so far this season. A small natural harbour and sheltered area behind the station provided good shelter for visiting yachts and two were anchored here during the inspection. IAATO figures show 4989 people visited the station in 2013-14. The station staff would occasionally decline a visit if it was likely to interfere with the station's activities. The Observers were informed that visits to the station were managed in line with a 'guidelines for visitors' document which was available at the station. No adverse impacts on the local wildlife or the work of the station were reported by station staff or noted by the Observers. In addition to a small shop selling Antarctic souvenirs the station offered an 'Antarctic Passport' in which visitors can collect inked 'stamps' from Akademik Vernadsky and other locations.

The Observers visited nearby Wordie House (HSM No. 62), a historic British hut managed for the United Kingdom by the UK Antarctic Heritage Trust and for which there is a Visitor Site Guideline. The Observers did not undertake a formal inspection, but noted that the hut was in generally good condition.

Summary

Akademik Vernadsky is a permanent research station undertaking a very wide range of Earth system science and long-term monitoring. The Observers were pleased to see the continuing and successful collaboration between the National Antarctic Scientific Centre of Ukraine and the British Antarctic Survey, which benefited both parties in maintaining the collection of important long-term data sets.

The Observers noted the rapid colonisation by several hundred pairs of Gentoo penguins nesting around the station since the last inspection in 2005. This may well be a clear example of the impact of rapid climate change on the environment in the Antarctic Peninsula.

Recommendations

> Improvements to pollution control management are required, with more comprehensive oil spill equipment and improved storage for the free standing fuel drums to stop any potential leaks from entering the sea or the surrounding ground area.
> Ukraine should consider installing a sewage and grey water treatment plant at the station to prevent potential marine pollution. In the interim, monitoring should be undertaken to establish any impact on the local environment.
> Wastes, particularly general waste including food waste, should be stored in a covered area where it cannot be accessed by birds or other wildlife. Alternatively, the station should consider installing a small incinerator for waste food products.
> All building works, even those on previously impacted areas, should be subject to an environmental impact assessment and the documentation held on the station for inspection. Protocols should be put in place to ensure that no construction takes place at the station without the clear and documented approval of the National Antarctic Scientific Centre and other appropriate authorities.

Comments received by Ukraine on this inspection report are noted in the Annex.

Yelcho (Chile)

Inspected 5 January 2015, 0915–1145

Date of last inspection

28 February 2005 (United Kingdom, Australia and Peru) – overflight only.

Introduction

Yelcho is a summer-only station located at South Bay, Doumer Island at 64° 54'S; 63° 35'W. It is a small facility of six buildings on a rocky outcrop around 5m above the shore. The station was established in 1962 by the Chilean Navy and had undertaken scientific investigations up to 1998, when it had been closed. The Instituto Antarctico Chileno (INACH) has now taken over the running of the station and this was the second season of its renewed operation.

Physical Description

All of the existing wooden buildings from the station were undergoing refurbishment or conversion. A new science laboratory and accommodation building was being constructed, which will have wet and dry laboratories on the ground floor with accommodation above. Construction of the new building had been started in January 2014 by INACH and it was hoped to complete this facility in the current season.

Personnel

There were six people at the station at the time of the inspection: the station leader, a cook, electrician, two general builders and a carpenter. There were no scientists on the station. The Observers were informed that it was expected that the team would be joined at the start of February

by two Portuguese scientists and five Chilean scientists. All the Chilean nationals on the station were employed under contract by INACH. The current maximum capacity of the station was 13, with three sleeping on the upper floor of the recreation and kitchen building and the remainder in the new building.

Scientific Research

Yelcho was currently undergoing major restoration and redevelopment by INACH as a science facility. Over the past two seasons INACH had been constructing a new two-storey building consisting of a laboratory downstairs and accommodation and bathroom facilities for a maximum of ten people upstairs. The new laboratory would be fitted with microscopes, computers, centrifuge, and a large freezer for storing biological samples. At the time of the inspection, an extension was being built onto this new scientific building, which would comprise a marine laboratory and aquarium on the ground floor and storage space above. The station leader told the Observers that the INACH Science Support Department had undertaken an Environmental Impact Assessment (EIA) of the new building and this had been presented to the Ministry of Environment Committee overseeing EIAs in Antarctica and approved.

There were three main scientific research projects during the 2014-15 season. The first was a terrestrial biology project led by researchers from the University of Magallanes, who would be collecting moss samples. The second was a marine biological project led by the University of Santiago involving sub-aqua diving to collect molluscs and algae. The third project was led by Portuguese scientists and was an oceanographic study of the local area. All of the scientists would be transported to Yelcho by the Chilean Navy and would stay on the station for about a month. Equipment for the Portuguese scientists had been delivered to the US research station at Palmer and would be collected by zodiac inflatable from Yelcho.

Chilean scientists wanting to undertake research work at the station were required to present their projects to the annual INACH science conference. INACH would then choose which project to give funding and logistic support in Antarctica. Each research project was expected to last between three and four years.

Logistics and Infrastructure

Water was generated by filling a 3000lt tank set about 300m behind the station with snow which was then melted by an electric heater and piped to a 5000lt tank at the station. The water was not treated. The station used about 1200lt per week. Another 5000lt tank will be installed to cope with the extra demand when the scientists arrive. This water was used for showering, cooking and flushing toilets. Bottled drinking water was supplied by regular ship visits every two months.

Diesel was stored in 205lt drums which were delivered by helicopter from the Chilean Navy re-supply ship. The station was provided with 4000lt at the beginning of the season and it was expected that this would be sufficient to last for

the whole summer season. Petrol was also stored in 205lt drums (1200lt in total) and was used for outboard motors and small portable generators. Both types of fuel were transferred by hand pump to ready use fuel drums for filling the generators and outboard motors.

The station currently had three generators (one diesel and two petrol) which were temporary units until a new Cummins 33kva diesel generator was installed when delivered by a re-supply ship at the end of January 2015. The old laboratory had been converted to house the new generator, including the installation of new fire-resistant and noise-reducing materials.

Transport and Communications

The station had VHF and Iridium communications. Internet was limited and currently on trial from a Chilean communications company. If the trial was successful and cost-effective then the bandwidth would be increased from 256kbs to support the scientific work.

There was one inflatable boat with two 50hp outboard motors. This boat was primarily used to support scientific research. The Observers were concerned about the safety and risk of single boat operations being undertaken at the station, especially the long boat journeys planned this season to Palmer station (United States) to collect scientific equipment.

There was a small concrete helicopter landing pad at the station, but this had been colonised by Gentoo penguins. Helicopter resupply now takes place with under-slung loads so there was no need for the aircraft to land in normal operation.

Arms and Military Support

The station had no military personnel and the Observers recorded no weapons or ammunition.

Safety, Training and Emergency Procedures

The station leader had received specialised training for cold weather and mountain survival. All station members had undergone a five day course on basic fire fighting, first aid and emergency training as well as environmental and wider Antarctic Treaty awareness in Chile. No emergency exercises were currently carried out, but a training programme would be instigated once the station was fully operational.

A zoned smoke detector system covering the accommodation, laboratories and machinery compartments was being installed. A small number of fire extinguishers were spread around the station, but did not appear to be regularly inspected for condition. The Observers felt that carbon monoxide detectors should be installed in areas where portable gas fires were installed.

Environmental Management

There was a significant focus on cleaning-up the station after a number of years of neglect. A large amount of old waste building material had been collected from around the site in preparation for helicopter uplift to the resupply vessel later in the season. There was still a considerable amount of snow covering the site and it was expected that further wastes would be uncovered before the end of the season. The Observers were concerned to see that much of the waste was stored in a metal cage which was open to the elements. A large green plastic tank had already been recovered from the sea after it had blown down the slope. In addition to historic waste there was also new waste produced by the building projects.

There was minimal oil spill kit or absorbents available at the station for use during generator maintenance or boat re-fuelling.

The new laboratory and accommodation building, including the wet and dry labs, had been the subject of an appropriate environmental impact assessment, which had been approved by the Chilean authorities.

Whilst the new building did not appear to have a significant impact on the surrounding area, it was evident that there was some environmental practice not in line with current best practice, with paint or other liquid treatments being allowed to drip onto the surrounding rocks. It appeared that old red paint on many of the buildings had either flaked off and collected on the ground, or had been scraped off without an appropriate means of collection.

There were considerable numbers of Gentoo penguins nesting in the area, particularly the area between the station and the rocky foreshore. The Observers were told by the station leader that he thought the numbers had been increasing gradually. Chinstrap and Adélie penguins were occasional visitors, but did not appear to be breeding.

The station leader was not aware of any deliberate or accidental introduction of non-native species. All the cargo due to arrive at the station underwent an extensive process to clean and check it prior to departure from Punta Arenas.

Medical

The station had a modest supply of medication, including pain relief and the station leader had a good awareness of general first aid. In the event of a more serious problem, support or evacuation would be requested from larger Chilean stations or vessels in the area.

Tourism

Yelcho is a small station with a limited amount of snow or ice free ground and it would be unable to support significant numbers of tourists. The station leader confirmed that there was no intention to cater for tourism and that the only recent visitors had been very occasional calls from National Antarctic Programme vessels and a passing yacht.

Summary

Yelcho is a small summer station with basic facilities undergoing significant building and redevelopment work. The Observers were impressed by the way in which INACH had taken responsibility for the station and the construction of a new science laboratory building.

There were a large number of Gentoo penguins nesting very close to the station buildings, as well as a few sheathbill nests. It is thought that the numbers of Gentoo penguins have increased over the past few years as a consequence of regional climate change.

The Observers were concerned at the waste management procedures on site. Waste and rubbish had not been bagged or drummed properly and was in danger of being blown away. Safety management could also be improved, especially given the apparent risks of single boat operations over a large area.

Recommendations

> INACH should review the safety of small boat operations at Yelcho, particularly those involving long boat journeys with one boat.
> Diesel and other fuels should be stored in a dedicated area rather than placed on snow without any form of spill protection. A robust oil spill management plan should be put in place when the new diesel generator is installed.
> That all waste material should be stored in a secure facility awaiting collection, to avoid accidental wind dispersal over the surrounding area. Improvements should be made to building methods and processes to avoid inadvertent and avoidable contamination of the site by paint and litter.

Comments received from Chile in relation to this report are noted in the Annex.

General Bernardo O'Higgins (Chile)

Inspected 7 January 2015, 0845–1300

Date of last inspection

23 November 2006 (United States).

Introduction

General Bernardo O'Higgins station was established in 1948 and is a large year-round facility operated by the Chilean Army. It is located at 63° 19'S; 57° 54'W, in the north west of the Antarctic Peninsula. The station also provides support to the German Antarctic Receiving Station (GARS) O'Higgins which was also visited. The station leader stated to the Observers that the station had four aims; to assert Chilean sovereignty; to provide administrative and logistical support to the scientific research programmes coordinated by INACH; to support expeditionary operations in Antarctica; and to provide a search and rescue capability.

Physical Description

The station was dominated by a large two storey main building constructed in 1999 which provided the main living, cooking, dining, recreational (there was a large basketball court and gym) and scientific facilities. Generators, water treatment, general storage and other facilities were housed in the basement of the main building. Attached to this was the original 1948 single storey station structure, which was occupied until 2003 but which was now empty and provided storage. The last inspection report (United States, 2006) noted that this old building was scheduled to be demolished, but the Observers were informed by the station leader that it was now protected as a historic site by Chilean domestic legislation and would remain.

In addition to the main facility, there were a small number of other buildings which acted as garages, workshops and other stores. In front of the main building and overlooking the jetty was a bust of General Bernardo O'Higgins, along with three other plaques and busts nearby (HSM no. 37). There were no plans for any new facilities or major construction. The station was separated from the mainland at high tide, and at these times access to the skiway on a glacier above the station was via a short wire foot bridge.

Personnel

The core permanent team of 21 was provided by the Chilean Army, all of whom wore a special non-military uniform whilst in Antarctica. This complement included a member of the Navy who undertook what was described as Coastguard

duties. At the time of the inspection, an additional renovation and maintenance team of 18 people from the army was at the station carrying out maintenance in anticipation of the visit from the head of the Chilean Army which was expected in the next few days. The Observers were informed that the week after the inspection visit a team of 16 scientists from INACH was due to arrive and stay for approximately three months. The maximum capacity of the station was 76. The station leader told the Observers that, apart from any temporary scientific teams, only men from the Chilean Army were allowed to serve at the station.

Scientific Research

The Observers were shown a small, but well-equipped, multi-purpose science laboratory in the main building. The laboratory was built in 2007 and was owned and operated by INACH. It contained a wide range of scientific instruments and equipment, including microscopes, weighing balances, autoclave and a fume cupboard. The laboratory enabled scientists to process their samples before sending to Chile for further analysis.

The station leader confirmed that O'Higgins would be supporting six major INACH projects during the 2014-15 season. These were:

> The production of metabolites and photosynthetic activity in Antarctic snow microalgae (Chilean Austral University)
> The atmospheric monitoring of aerosols and black carbon at the La Paloma observatory, and the collection of snow surface and soil samples for chemical analysis (University of Magallanes, Chilean Centre for Environmental Technologies, Technical University Federico Santa Maria)
> Monitoring of marine pollution, including, sewage and waste water around O'Higgins station, including the sampling and analysis of sea water and waste water (University of Magallanes)
> The study of antifreeze proteins of microorganisms (Chilean Bioscience Foundation)
> The study of the biodiversity around the station and local area
> The microbiology of Campylobacter in Antarctica, which would include the collection of guano from penguins, gulls, skuas and sheathbills from the Kopaitic refuge (University of Andres Bello, University of Kalmar, and the University of Concepcion).

The scientists would work at the station for about three months during the austral summer, with no scientists overwintering. The Chilean Army personnel provided logistical support to the scientists, such as small boats for diving and field safety assistance on the nearby glaciers. The station leader explained that the scientists brought their own scientific instruments and equipment with them to the station, including their own diving gear.

There was a meteorological office, operated by a Chilean Army observer, which was supplemented by an Automatic Weather Station (AWS) on the roof of the tower on the main building. Climate data was recorded and sent to Eduardo Frei station (Chile) on King George Island, where it was combined with data provided by the other Chilean Antarctic stations, and then sent to the mainland to the Chilean Meteorological Office and used to help compile weather forecasts.

Next to the station was a 20m high atmospheric instrument mast, also with an AWS. The Observers were told that the mast was built as part of a joint project between the University of Magallanes and a Chilean electricity company to investigate the potential of wind power at O'Higgins. The results of the project showed that wind power was not feasible. However, the mast and AWS have remained as they have proved to be very useful for climate change research being undertaken by the university.

Immediately in front of the Chilean station was the German Antarctic Receiving Station (GARS), O'Higgins. There was an agreement between Chile and Germany for the operation of the GARS, and it was evident to the Observers that there was excellent logistical collaboration between the two nations. In addition, scientists from the Czech Republic were working with colleagues from Chile at O'Higgins to investigate the impact of increased UV-B radiation as a result of the ozone hole over Antarctica. No radioisotopes were used in scientific research on the station.

About 6km away from the station there was a small field laboratory 'La Paloma' which supported a range of atmospheric research instruments, including the automatic monitoring of chemicals and aerosol emissions and the UV-B radiation monitoring.

Logistics and Infrastructure

The station was occupied all year round with the main crew rotation and resupply taking place in December via ship. Additional supplies and personnel were brought in by the Chilean Air Force using a ski-equipped Twin Otter and helicopters.

Diesel fuel (MGO) was kept in a number of old and new storage tanks with a total capacity of 2100m^3 and a daily consumption in the region of 5m^3. Petrol for the two zodiac inflatables was also readily available, but the exact quantity held was difficult to determine, although it was likely to be in the region of 2300lt contained in 100lt barrels and 25lt ready use tanks.

Diesel for the two 250kw Deutz generators was pumped directly from the storage tanks, and petrol for boats transferred using a hand pump. There were also a large number of 1000lt plastic

containers located adjacent to the main fuel storage facility which were partly filled with old fuel and sludge. Although there were no records of a fuel spillage having taken place at this facility in the last three years available for inspection, fuel management and spill response did not appear to conform with the best practice available, with only a very basic and minimal amount of spill response equipment on site. The Observers were told that the main oil spill kit would arrive with the resupply ship, which used floating hoses to resupply the tanks.

Water for the station was provided directly from the sea using two reverse osmosis plants able to produce 5m^3 per day. One was a recently new addition and it was understood that the other was also due to be replaced next season. The total amount of water that can be stored was 20m^3.

In addition to the two 250kw Deutz generators, power could be provided from a number of portable 4.5kw generators or one emergency generator believed to be rated at 125kw. There were no wind turbines or solar panels at the station.

Transport and Communications

There were a large number of vehicles at the station, including 11 skidoos, one snow cat, two snow diggers and one 20 tonne mobile crane stored in outbuildings. One of the snow diggers was believed to be unserviceable, and the mobile crane was restricted to seven tonne lifts.

The station had significant communications capabilities, with numerous satellite feeds providing VOIP access. There was also an HF set and several VHF sets, one of which was used to support the Vessel Traffic Service which the station used to monitor shipping across the Antarctic Peninsula.

No UAVs were in operation at the station. The Observers were told that the usually very strong winds prohibited their practical use. The station leader said that a UAV operated by a foreign national at the station had been lost the previous season.

The station provided a facility to stamp visitors' documentation and it was also possible to send postcards and other mail, using Chilean stamps.

The Observers were informed by the station leader that the naval member of the station team had the specific responsibility for contacting shipping in the local area and establishing vessel information, movements, intentions and the number of passengers and crew on board. The Observers were shown a map by the station leader which he said showed the Chilean territorial waters and their Exclusive Economic Zone in the Antarctic Treaty area. The Observers had witnessed the contact from the Chilean Navy in action the previous evening when their vessel was contacted by O'Higgins station to request vessel details and other information. On departure from the station the vessel was similarly asked again for these details. The Antarctic Treaty (including Article IV) was not referenced during this request.

Arms and Military Support

The Observers recorded no weapons or explosives held on the station.

Safety, Training and Emergency Procedures

All personnel on the station received a one week training course run by INACH and the Chilean Ministry of Foreign Affairs covering the Antarctic Treaty and Environmental Protocol and related issues. Additional job-specific training was available for those with individual responsibilities, such meteorology. All personnel were volunteers and were required to pass a written test prior to arrival. There was no specific additional training for the station leader, who drew on the expertise gained in his military career to date.

The station was well maintained, secure and appeared to be safe, with good fire protection, detection and containment systems. There was an eight-screen CCTV system in the main communications centre, which allowed good visibility of the various parts of the station.

The station had a well-developed medical evacuation plan which occurred in two stages. The first stage was evacuation by helicopter to Eduardo Frei station (Chile), where there was a doctor. Following assessment by the doctor, then the patient would be sent to the hospital at Punta Arenas, Chile by aeroplane.

Environmental Management

A comprehensive station Waste Management Plan existed and all waste was separated and retained in out buildings for removal via ship. The station also had one incinerator which was used fortnightly. Although functional, it appeared to the Observers to be in a poor state of repair and the station staff confirmed that it was due to be replaced shortly. There was also a small waste compactor for metal cans next to the waste bins.

Sewage and grey water was disposed of through a sewage treatment plant using aerobic action to break down waste and a final UV filter to kill any bacteria prior to discharging directly to the sea. The Observers were told that the station engineer tests the effluent discharge monthly to ensure no bacteria was present, with additional samples returned to the University of Magallanes for laboratory testing.

The station was surrounded by a large Gentoo penguin colony. The Observers were told that a monthly penguin count was undertaken and that the numbers appeared to be stable, or even increasingly slightly. It was remarked on by several people that the construction of the German satellite antenna had provided a windbreak and which now made this area more attractive for breeding penguins.

The station leader was not aware that the bust of General Bernardo O'Higgins had official protection under the Antarctic Treaty as Historic Site and Monument No. 37. He told the Observers that he understood that all the plaques, busts and historic buildings on the site had protection under Chilean domestic legislation.

In the original 1948 section of the station the Observers were shown a presentation box which contained soils from the different regions of Chile. Whilst the soil was self-contained within the box and presented little practical risk of contamination, the Observers wondered whether it was appropriate to retain the item in Antarctica in light of Annex II of the Environmental Protocol.

Medical

The medical facilities were modern and well equipped. The medical staff comprised two military nurses, who received some specific training prior to deployment. They were supported by a tele-medicine link to the military hospital in Santiago de Chile. There was a single patient bed which would be used for isolation of infectious disease. Otherwise patients were managed in their own accommodation. There was a wide selection of antibiotics and analgesics amongst other medications. The sickbay did not hold either adrenaline or morphine, but did have ECG monitoring equipment, a defibrillator and bottled oxygen. There was also a functioning digital X-Ray suite which could transmit images via the telemedicine suite.

Some diving occurred at the station but the Observers were told it was of short duration and limited to a maximum of five metres. As it was considered that this would preclude decompression sickness arising from evolved

nitrogen, there was no specific medical plan for diving injuries. The Observers considered that having awareness of the nearest recompression facility in Antarctica would be useful in the event of an arterial gas embolism which can occur, though rarely, on shallow dives.

Tourism

The station leader reported that tourism was not a significant issue. One cruise ship had visited last season and disembarked passengers to visit the historic station, send postcards and have their passports stamped with commemorative inked stamps. It was not expected that visitor numbers would increase significantly, which the station leader believed was probably appropriate given their facilities.

Summary

A well-managed large station operated by the Chilean Army. The small science programme both underway or scheduled by INACH did not appear to the Observers to be proportionate with the size of the support facilities.

Recommendations

> Consider expanding further the scientific research carried out at O'Higgins. For example, whether it would be appropriate to use the scientific laboratory facilities all year rather than for a short period in the summer.
> Improve the knowledge and awareness of the Antarctic Treaty, particularly Article IV, on the station. Suggest that the requests made by the Chilean Navy to passing vessels for information include reference to the Antarctic Treaty and confirm that the information is sought on a purely voluntary basis.
> Improve the knowledge and awareness of the provisions of the Environmental Protocol in relation to protected areas, to ensure that the bust of General Bernardo O'Higgins and related structures (HSM No. 37) continue to receive appropriate protection; and clarify the status of the 1948 station and other busts and plaques on the station.
> Increase awareness of diving related injuries, and establish and disseminate the location of the nearest recompression facilities.

Comments received from Chile in relation to this report are noted in the Annex.

German Antarctic Receiving Station (GARS) O'Higgins (Germany)

Inspected 7 January 2015, 1145–1400

Date of last inspection

23 November 2006 (United States).

Introduction

The German Antarctic Receiving Station (GARS) O'Higgins is operated as a unit of the German Remote Sensing Data Centre (DFD), which is in turn part of the German Aerospace Centre (DLR). The main purpose of the station is to serve as the international ground segment for remote sensing satellites; providing a downlink for satellite data and an uplink for satellite control, and enabling geodetic research. The station operates in conjunction with other satellite receiving stations at Troll (Norway), Syowa (Japan) and McMurdo (United States) in Antarctica.

The GARS was established in 1988 and the satellite antenna which it supports became operational in 1991. During its first 19 years, the station usually only operated in the austral summer season, but since 2010 it has been staffed all year round. Although a separate facility, it is heavily dependent on the neighbouring General Bernardo O'Higgins station for logistic support. The station is situated within the overall footprint of the Chilean station.

The scientific activities of the station were permitted by the German authorities and the station's logistical resupply and transport arrangements by the Chilean authorities through INACH. The appropriate German Antarctic Treaty and Environmental Protocol documentation was held on the station and seen by the Observers.

Physical Description

The station consisted of three main facilities: a set of single storey shipping containers providing office, living and sleeping accommodation; a separate set of containers containing power generation and related activity; and the large satellite antenna. The buildings appeared to the Observers to be well maintained, secure and safe. There were no immediate plans to alter the footprint of the buildings, but it was thought that should the European Galileo satellite project bid become successful, there might be a need for one or two more shipping containers.

Personnel

The normal complement of the station was between four and eight, depending on the time of year and the requirement for maintenance work. During the inspection there were four people on the station: two technicians/scientists and two maintenance staff. The Observers were told that the maximum capacity of the station was 12 people.

Scientific Research

The station currently provided a ground segment service to the following satellite missions: TanDEM-X, TerraSAR-X, GRACE, TET, NEOSSat and Cassiope. Services provided included receiving satellite remote sensing imagery and data, and also the command and control of satellites operated by DLR and other international mission operators.

The main mission run at GARS was the DLR's TanDEM-X mission, which uses two X-band Synthetic Aperture Radar (SAR) satellites, TSX-1 and TDX-1. The two satellites fly in close formation in orbit around the earth and to do this safely they require ground control and support from GARS. The high resolution SAR images acquired by these satellites, which are received at GARS, are used for a wide range of purposes, including rapid warning and assessment of natural hazards. The imagery and data are provided to a variety of public and commercial users. One of the primary aims of TanDEM-X is to produce accurate global elevation maps with a 12m spatial resolution and a relative vertical accuracy better than two metres, including Antarctica. GARS is one of the three core ground stations around the world used to downlink the huge amount of SAR data being acquired by the TanDEM-X mission.

GARS operated a large nine metre diameter antenna to receive satellite data and to send control instructions from the control centre at the German Space Operations Center (GSOC) in Germany, and from Canadian control centres. The antenna was constructed especially to withstand the extreme environmental conditions in Antarctica, with its high wind speeds and low temperatures.

GARS also supported geodetic research, including Very Long Baseline Interferometry (VLBI) using the 9m antenna as a radio telescope and taking permanent Global Navigation Satellite System (GNSS) measurements for the German Federal Agency for Cartography and Geodesy (BKG). The data is used to measure the tectonic movement of the Antarctic Peninsula, to realize the International Celestial Reference System (ICRS) and the International Terrestrial Reference System (ITRS), to derive Earth Rotation Parameters (ERP), and to support radio astronomy research like the TANAMI project (Tracking Active Galactic Nuclei with Austral Milliarcsecond Interferometry). As part of this support for the BKG, the station also operated an Automatic Weather Station (AWS) collecting air temperature, pressure, humidity and wind direction and velocity.

There were no foreign scientists at GARS at the time of the inspection. The Observers were told that the station was seldom used in this way, although Canadian scientists had used the station in the past as a testing site for the production of sea ice charts using satellite radar imagery.

The Observers noted that the GARS staff did not necessarily know who the end clients were for satellite data being received, which could be government, commercial or military. Thus it was a grey area as to whether the station was primarily there to support the peaceful scientific use of remote sensing data, or whether it was also supporting commercial or even military uses as well.

Logistics and Infrastructure

Antarctic Diesel was supplied by vessel through the same facility as the adjacent Bernardo O'Higgins station and current capacity was 64m^3 retained in storage tanks. However, these tanks were to be partially replaced with three new tanks which were already on site each with a capacity of 24m^3. The station engineer was unable to provide data on general fuel consumption, though this was estimated to be in the region of 330lt per day to power one of the two Elbe Strom 104kw generators (the two generators were operated alternately). The station had a fuel separator to maintain fuel quality and ample oil spill equipment and materials to limit the impact of fuel spillage. In addition to the two Elbe Strom 104kw generators, power could also be provided from a 60kw emergency generator.

Water for the station was provided from the sea using two reverse osmosis plants (100lt/hr and 50lt/hr capacities). However, this was not used for drinking. Water for personal consumption was provided from 1.5lt plastic bottles delivered via ship at the start of the season, along with all other provisions. The total amount of water that can be stored was 2.6m^3 in two separate fresh water tanks with a capacity of 2m^3 and 0.6m^3.

The Observers were told that there was an understanding between the German and Chilean authorities concerning logistical support by Chilean Antarctic operators where the basic costs for the transport of personnel, cargo and fuel would be met by the German authorities, but the cost of the on-site movement and the subsequent return of waste was covered by mutual support.

Transport and Communications

The team had an Iridium phone and VHF communications. Other communications were available through the Bernardo O'Higgins station, which was a two minute walk from the GARS. Given the work of the station there was very good satellite communications link with 1mb download and 2mb upload speeds.

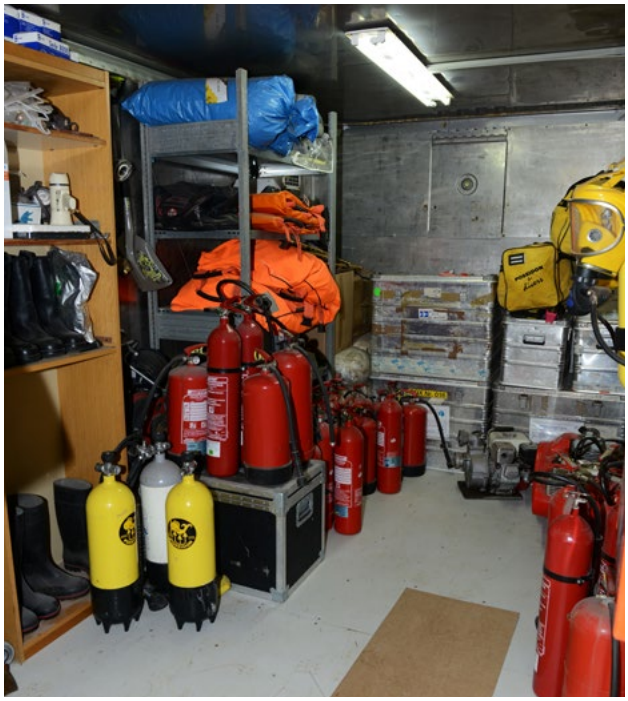
Arms and Military Support

There were no military personnel on the station and no weapons or explosives were held.

Safety, Training and Emergency Procedures

Pre-deployment training to staff at GARS was provided by DLR and AWI in Germany and includes medical tests, safety training and advice, as well as guidance on the provisions of the Antarctic Treaty and the Environmental Protocol.

Station staff did not leave the locality of the GARS station and the surrounding General Bernardo O'Higgins facility. The only time that they used the short wire bridge to access the mainland was when they arrived and left on the Chilean Air Force Twin Otter aircraft.



Environmental Management

A comprehensive station Waste Management Plan existed and all waste was separated and sent to the nearby General Bernardo O'Higgins station for either incineration, compacting or storage for subsequent return with the Chilean waste.

Sewage and grey water was managed with one Martin Systems BMA 12 sewage treatment plant (STP) which was fully functional using aerobic action to break down waste and ultra-filtration to purify the remaining liquid waste. Monthly monitoring of the treated wastewater from GARS O'Higgins was carried out in collaboration with the Universidad de Magallanes (UMAG), the Instituto Antártico Chileno (INACH) and the Departamento Antártico del Ejército (DAE). Solid waste (300lt annually) was removed at the end of the season, along with sewage waste from the Chilean station, with the purified liquid waste from the STP being discharged directly to the sea.

The station was surrounded by a Gentoo penguin colony. The Observers were told that whilst there was some change from year to year, the numbers were broadly stable. Other penguins such Adélie and Chinstrap were occasionally seen, but did not appear to breed. A German penguin webcam provided images of the colony every few hours on the Internet.

Medical

The station had a good range of basic medical facilities and all staff were required to complete a first aid course prior to departure from Germany. In the event of more serious problems, the station staff would use the neighbouring Chilean station's facilities.

Tourism

There were no records of tourist visits to the station and little expectation of visits in the future, particularly given the small size and highly operational focus of the station.

Summary

GARS is a well operated and maintained small research station. GARS is different to the other stations visited by the Observers as it only supports satellite remote sensing, VLBI and GNSS measurements, rather than a variety of science disciplines. Satellite missions supported by GARS provide important new information to scientists around the world working in many different disciplines. The missions are also of direct benefit to the study of Antarctica through, for example, provision of SAR imagery for high resolution 3D mapping of the continent.

Recommendations

> The German Remote Sensing Data Centre (DFD) and German Aerospace Centre (DLR) should consider clarifying whether the station processes data for military purposes.

Comments received from Germany on this inspection report are noted in the Annex.

Petrel (Argentina)

Inspected 8 January 2015, 1415–1830

Date of last inspection

25 February 2005 (United Kingdom, Australia and Peru)

Introduction

Petrel station was established in 1967 and is located at 63° 28'S; 56° 13'W on the western shore of Dundee Island. It comprises two distinct sets of buildings on a low and generally flat area parallel to a narrow beach and shallow bay. For the first time the station was under the joint command of the Argentine Navy, Air Force and Army, supported by a representative from the Dirección Nacional del Antártico (DNA).

The station was being reactivated and cleaned-up in order to prepare for future science and research activities. The station team had arrived the previous day by helicopter from Marambio station (Argentina) to start the season. The Observers noted and appreciated the fact that the team had completed Checklist A (Resolution 3, 2010) ahead of the Observers' arrival.

Physical Description

The station had been permanently occupied from 1967-1978 but following a very serious fire which had destroyed all the living accommodation in the southern section of the station, it had only been occupied sporadically since then during the summer seasons.

The only useable living accommodation was now at the northern end of the site, in the former emergency refuge. This comprised comfortable but basic bedrooms, cooking and dining spaces. Two other buildings completed this group, housing the storage facilities and the generator. This group of buildings were situated on ice-cored moraine which showed significant signs of melting and

subsidence. Rock-filled gabions had been placed on the slopes beside and below the buildings to combat this movement, with partial success.

The southern set of buildings had not yet been opened after being closed for the winter and the Observers were grateful to the station team for opening up the buildings as part of the inspection. These buildings included the concrete base of the former main living accommodation; a disused freezer store; another concrete base; a basic but sound emergency refuge with bunk beds for around 10-12 people and a small supply of emergency food and water; one smaller shed being used to store waste material, including over a 100 empty wooden crates; a medium-sized shed with at least 50 drums (contents unknown); as well as a large corrugated iron aircraft hangar where there were several hundred stored fuel drums, and large quantities of waste metal, corrugated iron, wood, other waste materials. The wastes had been sorted into specific groups over previous years, and were a mixture of historic waste from the remains of the fire and newer seasonal waste and surplus fuels. There appeared to be at least 200-300 fuel drums stored in the southern set of buildings.

The Observers' view was that the only significant change in this area since the previous inspection report in 2005 was the clearance of the remains of the burnt out buildings, with the material apparently being now stored in the large hangar. It did not appear that any significant removal of wastes or fuels from the site out of Antarctica had yet occurred.

Whilst there was a considerable amount of snow and ice in the entrance way to the main hangar and some other areas, the building itself was generally sound. It was apparent that in some of the buildings, especially the medium-sized garage/ warehouse, that plastic-framed windows had been installed relatively recently. However, most buildings were in a seriously dilapidated condition.

A set of historic fuel tanks was located to the east of the southern set of buildings. These appeared to be empty, and were intact and with no visible signs of leakage of fuel sludge either on the tanks or the ground beneath.

There was a very large and long flat area between the two groups of buildings and the narrow beach, which has been used in the past as an aircraft runway. The ground was mostly obscured by snow, but the Observers were told that the area, approximately 1400m long, was now criss-crossed by meltwater streams.

Personnel

There were 18 people at the station during the inspection. This included the core team of three sets of four people from the Navy, Air Force and Army, together with an additional five people from the Navy to provide dedicated clean-up support. An environmental specialist from the DNA was also present and was expected to stay for around 20 days.

Scientific Research

At the time of the inspection, there were no scientists working at Petrel. The civilian environmental specialist, with a science background, from the DNA working with the joint forces team was advising on the clean-up and removal of old fuel drums, scrap metal and building wastes. The adviser was also undertaking

baseline environmental surveys of the local wildlife and vegetation to assist with the future planning of the station.

In the past, geological, soil and glaciological studies had been undertaken. There were no dedicated permanent science facilities on the station. However, the Argentine National Meteorological service planned to install an AWS at the site later in the season.

The Observers were told that the DNA was producing a plan for the future development of Petrel. The long-term aim was to provide new facilities for scientific research and logistical support. In the meantime, the joint Argentine forces team were concentrating their efforts on completing the clean-up.

Logistics and Infrastructure

The team were landed on 7 January 2015 by helicopter via Marambio station. Stores, equipment, food and fuel were supplied at the same time. The 17 team members were due to leave the same way at the end of February. The chartered Russian Federation vessel *Vasily Golovnin* was due to call with additional stores at the end of January and was expected to take away some of the waste by helicopter lift. It was not clear to the Observers, or apparently to the station team, how much historic waste would be removed at the end of the season, or how much had been removed in previous seasons.

Bottled fresh water was used for drinking and all other water was currently being provided by melting glacier ice in the galley. An electric snow melter was in the process of being re-commissioned to be used to support this season's team.

The station was supplied by one Dietz 6 cylinder diesel generator producing 380v, 50hz with a capacity of 31kva which was fitted in 2012. A 200lt ready use tank housed in the generator compartment was refilled by 205lt drums kept beside the compartment and regularly re-supplied by ship. A small but effective spill kit was kept alongside the generator.

Transport and Communications

The station had limited communications using VHF and Iridium telephone. The Observers were told that once the station becomes more established, satellite internet services would be provided to support the scientific work. The station did not have any vehicles or boats. There were many large, old aerials in the vicinity of the station, which were a legacy from when the station was fully operational.

Arms and Military Support

The majority of the personnel on the station were military. This was the first occasion that the Argentinean military had provided a tri-service contingent to operate an Antarctic station. There were no weapons, ammunition or explosives on the station.

Safety, Training and Emergency Procedures

There was a three-stage training programme for all the station staff. The first was provided by the DNA and covers the Antarctic Treaty and Environmental Protocol and related environmental

issues. The second was emergency training, such as fire fighting and first aid. Finally, there was a nine month cold weather and mountain training course held in southern Argentina.

The fire fighting equipment on the station was old but appeared to be in good condition. The generator compartment was fitted with a CO_2 gas drench system which would be upgraded during the following season. There was no automatic fire, smoke or heat detection in the main cooking and living accommodation.

Environmental Management

A comprehensive station Waste Management Plan existed and all waste was separated and collected by support vessels and landed at the vessel's destination in Argentina. Sewage and grey water was processed using the same septic tank system as in 2005. Solid waste and liquid was removed in drums for disposal outside Antarctica at the end of the season.

The key elements of the Antarctic Treaty and Environmental Protocol were on prominent display on notice boards in the main living accommodation.

There were small numbers of penguins and seals on the narrow beach below the station, as well as skuas around the main buildings. There were no significant bird colonies or Antarctic Treaty protected areas in the nearby area.

Medical

There was a small medical store, which was in the process of being itemised. Medical support was provided by an experienced medical assistant who also had training and some experience of dentistry. He did not have access to morphine or adrenaline or a defibrillator. Supply, resupply, and waste disposal were all via the support ship, with clinical waste kept appropriately segregated. In the event of a medical emergency advice could be sought from Marambio station (Argentina) via VHF and a helicopter evacuation arranged followed by aircraft medevac to Argentina as necessary.

Tourism

There were no records of tourist visits to the station itself or the wider vicinity. But the station leader indicated that he would be open to such visits, if contacted in advance.

Summary

Petrel is a small station, run by a new joint unit of the Argentine Antarctic Command. No science was being carried out at the time of the inspection. Many of the buildings were unused and abandoned, or contained very large quantities of partially sorted waste and fuel drums destined for removal from Antarctica. The primary purpose of those at the station appeared, at the time of the inspection, to continue the long-term clean-up operations which have been going on at least since 2005, when the last inspection reported a similar situation.

The Observers noted that, despite the good intentions of the current team at the station, the key recommendations from the 2005 report for: smoke detectors to be installed in buildings; and a decision on whether to invest in the clean-up and removal of the station or to invest in new science facilities had not been acted on.

Recommendations

> The clean-up of Petrel should be completed as soon as practical, especially the removal of the very substantial quantity of waste fuel, empty fuel drums, scrap metal and general waste stored in the old hangar and other locations around the site.
> A forward science strategy be developed for the future use of Petrel.
> Old fire detection equipment should be replaced and modernised and an annual condition inspection programme instigated. In particular a fire alarm system should be installed in the accommodation area at the earliest opportunity.

Comandante Ferraz (Brazil)

Inspected 9 January 2015, 0830–1215

Date of last inspection

1 December 2012 (United Kingdom, Netherlands and Spain).

Introduction

Comandante Ferraz station is located on the eastern shore of the Keller Peninsula in Admiralty Bay, King George Island at 62° 05'S; 58° 23'W. It was established in 1984 as a permanent research facility and is operated by PROANTAR, the Brazilian Antarctic Programme. A fire, in which two people were killed, devastated the main building in February 2012.

Since 2012, the Brazilian Government has been engaged on a highly ambitious station clean-up and re-building programme under the direction of the Navy. Over the past three seasons, over 800 tonnes of debris and waste from the fire has been shipped back to Brazil. A new temporary station facility was completed on 20 February 2013 and has been established on top of what was the large helicopter landing pad. Nearly all the burnt out ruins of the previous building have already been removed, with only a few loads of scrap metal remaining to be taken from the site. The Observers were impressed with what was clearly a very substantial clean-up and recovery by PROANTAR from the devastating fire.

Physical Description

The temporary station facility was composed of modular Weather Haven units linked together on the site of the former helicopter landing pad. Underneath the new facility was the waste separation and storage area, and further to the south a series of small buildings and converted shipping containers with the incinerator and

scientific laboratories. Around 100m behind the station, up a short slope, were a small number of meteorological instruments and communications installations surrounding a small hut. To the north of the new building was the area where the previous station stood, which was now a partial storage and parking area and a site for further ground remediation.

Further to the north were the garages and vehicle stores and the fuel tanks. Beyond this was a slightly raised area on which was located the old British station 'Base G', which was demolished by the Brazilian Navy in 1995 in agreement with the United Kingdom. Only the concrete foundations now remain. Approximately 100m above the station is a small hill with the graves and crosses of both Brazilian and British men who have died on Keller Peninsula. In addition to the main buildings there were a number of small refuges situated in the local area.

The station leader told the Observers that PROANTAR hoped to start the construction of the new station in the 2015-16 season and it would take two seasons to complete at a cost of $US110m. The new station would be built on the same footprint as the old station and would have a suite of state-of-the-art science laboratories.

Personnel

At the time of the inspection there were 33 people on the station, including 15 from the Brazilian Navy, including the station leader. The maximum number of people at any one time on the station since the fire in 2012 was 54, but the maximum capacity of the temporary station facilities as currently configured was 66. Around 15 people over-winter from the Brazilian Navy, with the numbers occasionally increased with a small number of researchers.

The new station personnel for the 2015-16 season would arrive on 4 November 2015 and the outgoing crew would depart on 25 November 2015, allowing a handover period. Around 10-20 per cent of incoming personnel would already have experience of having worked at Ferraz.

Scientific Research

The primary purpose of the station was scientific research, and it supported a wide-ranging science programme with a focus currently on marine biology. The station also supported several other science disciplines, including micro-biology, oceanography, meteorology, ozone measurements, ionospherics, and environmental monitoring.

At the time of the inspection there were 12 scientists working at the station, all from Brazilian universities. The ratio of scientists to logistics support staff was very high, at almost 40 per cent of the station complement. There was one foreign scientist, from Columbia, working on a Brazilian university project monitoring phytoplankton and zooplankton in Martel Inlet and wider Admiralty Bay. The senior scientist on the station explained that they worked closely with Polish scientists working at the nearby Arctowski station (Poland).

Most of the scientists at Ferraz were working from cramped temporary laboratories housed in specially modified shipping containers, which had been set up in the 2013-14 season after the

catastrophic fire. There were three temporary biological laboratories. One was a wet lab and housed a marine aquarium containing live specimens of Antarctic *notothenioid* fish, another was a larger microbiological laboratory, and the third was a general purpose dry lab. There were two further laboratories for physical sciences on the hill above the station. One supported meteorological research, including ozone monitoring, and the other housed the VLF space physics computers. However, no ozone measurements were being made this season whilst the station was under re-construction and had limited facilities and accommodation.

The marine projects made considerable use of the zodiac inflatable boats for local area work. If scientists needed to go further away from the station, and into the more remote areas of Maxwell Bay, or if the weather was poor, they would use a steel launch called *Skua.* The launch was about 6m in length and was kept ashore on the beach.

No radioisotopes were being used on the station for scientific research, although they had been used in the past. The senior scientist told the Observers that it was not possible for radioisotopes to be used whilst they were using the temporary facilities.

As part of the science programme, an environmental impact monitoring study was being undertaken by the Oceanographic Institute of the University of Sao Paulo in association with experts from the Brazilian Ministry of Environment. The scientists were taking samples of sediments, soils, moss and plants to analyse them for persistent organic pollutants, such as PCBs, and also organo-chlorines and heavy metals. The project had been running for eight years and this had enabled the scientists to compare the baseline chemical results from before the fire with those now, and hence assess the impact of the fire on the local environment.

There were three different micro-biology studies taking place. One was being led by the University of Sao Paulo, called MICROPOLAR, and was studying extremophile bacteria and the effects of UV radiation. The scientists involved were undertaking a number of simulation experiments in the laboratory and exposing bacteria to different levels of UV-B radiation, and comparing this to natural conditions in the field. They were also examining how extremophile bacteria survive under different UV-C radiation levels, as a model for conditions on the surface of Mars.

The selection of scientific projects to be carried out Ferraz was rigorous and undertaken annually. University researchers in Brazil had to develop a written proposal which was then submitted to the National Council on Scientific and Technological Development (CNPq) for assessment. The CNPq selected the best projects and provided funding. Each of the chosen projects must also carry out an Environmental Impact Assessment (EIA) before they go ahead in Antarctica. Permission for each project was provided by the Brazilian authorities, including for those scientists from other countries.

Logistics and Infrastructure

The initial building work for the current temporary facility involved a total of 140 personnel and five ships for transport and logistics. That the Brazilian government invested on such a scale, in a relatively short time period after the 2012 fire, was considered by the Observers to indicate Brazil's strong commitment to future scientific operations on the Antarctic Peninsula.

Diesel fuel storage was in double skinned tanks. Fuel was moved through storage, to settling, and to ready use in order to remove water prior to filtration and use. Fuel lines were inspected daily and were also double skinned for insulation and atomisation avoidance. The main storage tanks (10 x 30m^3 capacity) remain unchanged since the fire. The station was re-supplied yearly by ship

transferring fuel ashore via a fuel barge. Petrol for outboard motors was stored in a separate tank near the main diesel storage tanks. Oil spill response equipment and material was provided for any accidental spills by all of the fuel areas, and a solid boom is placed around the barge when transferring fuel from ship to the barge and then from barge to shore.

The station received occasional air supply, using parachutes, from a Brazilian Air Force C-130 Hercules aircraft during the winter. These supplies were collected by a 4x4 tracked Ford pickup with HIAB.

Two Caterpillar diesel generators supplied 0.41mw each to the station at 480v three phase which was transformed to 230v and 110v for domestic use and machinery. The diesel generator modules were temperature controlled to maintain lubrication oil temperature. There was a gas fire suppression in each module, directed from the machinery control centre situated between the modules.

Water was obtained from two glacial lakes above the station and supplied by four electrical pumps (two at each lake). It was chlorinated and treated with UV prior to consumption.

Transport and Communications

The new facility continued to use the previous communications station, which was undamaged by the fire. It used HF and VHF radios and two satellite dishes to provide communications. Station staff reported that they have good wi-fi internet connectivity of up to 2mb/s allowing support to scientific work and regular use of video links such as Skype.

The following transport was noted; two snowmobiles, a tracked crane, a 4x4 tracked Ford pickup with HIAB, three tracked earth movers, two JCB diggers, a rigid hulled boat, a fuel barge and two barges for transport of shipping containers or large vehicles. There were also several zodiac inflatables with various sized outboard motors. The Observers noted that the steel-hulled launch used for marine sampling was nearing the end of its design life and will require replacement in the near future.

No UAVs were in operation or held on the station. The station leader believed that a special licence would be required from the Brazilian authorities should one be needed.

Arms and Military Support

All the logistical support staff were provided by the Brazilian Navy. No weapons or explosives were on station. The chassis of an old M100-13 battle tank had been brought to the station and after extensive cutting and welding the tracks would be used as the launching vehicle for the station's small steel-hulled boat.

Safety, Training and Emergency Procedures

The accommodation and office spaces were separated into 17 zones for fire detection and controlled in the centre passageway. Portable 90kg compressed water extinguishers were situated along the passageway and north and south exits. Also, smoke curtains were used to break up the large accommodation spaces. Automatic fire suppression systems were in operation in the kitchen.

There were two fire emergency muster points in the facility with 20 breathing apparatus systems and fire suit sets. Fire extinguishers were returned to Brazil at the end of each season and recharged units brought in. Whole-station fire training took place every week.

The station leader confirmed that everyone received a two week training course in Brazil prior to deployment, covering the provisions of the Antarctic Treaty and the Environmental Protocol.

This station was the only one where the Observers were shown an in/out board for personnel leaving the station for further afield. There was a good system of coloured safety zones on a prominently displayed map near the boot room (green – yellow – red) which indicated the land and sea areas and the precautions and permissions required.

Environmental Management

Five different types of recycling bins were observed inside the accommodation and working areas along with larger holding bins outside. Wastes were sent out on re-supply ships and returned to Brazil. In addition, the station had a modern and clean diesel fuelled incinerator for the disposal of non-recyclable rubbish such as hand tissues, toilet paper and food waste.

An aeration sewage treatment plant (STP) was in operation. Grey water was mixed into the third stage of the STP and discharged to the sea. The station was operating both chemical (chloride) and biological STPs. Sludge was dried, with the 'soil' sent to Brazil at the end of the season.

There were a number of Gentoo, Chinstrap and Adélie penguins around the station, but there were no breeding colonies nearby. The nearest large penguin colony was situated on the hills and other ice-free areas near Copacabana station (United States). In the past permits had been granted for taking samples from penguins and other animals, but there was no such activity this season.

There were extensive patches of moss and Antarctic pearlwort (*Colobanthus quitensis)* alongside a shore side track marked with rocks either side, approximately 200m long, to the north of the site of the old British Base 'G'. The Observers were informed that the nearby whale skeleton had been assembled several decades ago from separate bones found on the beach by the French underwater explorer and marine biologist Jacques Cousteau. The Observers saw wheel tracks in the moss at the end of this track, where a small vehicle had driven over the area at some point in the past. The Observers considered that the tracks could have been created when a vehicle was driven on overlying snow.

The station leader and his team were not aware of any non-native species around the station. All checking for such non-native species was undertaken by the scientists involved as and when they packed and unpacked their own stores, or in Punta Arenas when food stores were embarked.

The station leader confirmed that PROANTAR was undertaking an experimental soil biodegradation programme to help clean-up and restore ground which had been heavily contaminated by hydrocarbons during the fire, as detailed in ATCM XXXVII/IP007 *Remediation Plan for the Brazilian Antarctic Station area*. Further soil decontamination work would be conducted this season. The Observers were subsequently informed that this year however, an ex situ bioremediation technique was undertaken with the construction of a conventional biopile. Contaminated soil was removed from an area between the area treated in the first phase and the shoreline and deposited in another impacted area previously prepared for this purpose. Then fertilisers were added and the biopile was covered with a geomembrane. This

intervention included 450m3 of oil-contaminated soil. Four technicians from the Ministry of the Environment would supervise this work.

Medical

The station had a modern and well equipped medical facility in a temporary site awaiting completion of the new station. There was also a smaller secondary facility. The Observers were told that the doctor kept an emergency bag of equipment to take to the secondary facility should it ever need to be used.

The medical cover was provided by a pre-specialist Brazilian Army doctor who is four years post-graduation. He was conducting a one year tour after which he will enter specialist training. He had received extensive training in remote and wilderness medicine prior to deploying to Ferraz.

The medical centre had a good range of medications including adrenaline and opiate analgesia. The equipment included patient monitoring equipment, portable defibrillation, and blood analysis equipment which can measure troponins and simple biochemistry. Although there was no formal tele-medicine set-up, the doctor had support from the military hospital in Rio de Janeiro via Skype. Although there was no imaging equipment at the current station, digital X-Ray had already been purchased for the new station and will be fitted at a later date. The sickbay also had a portable warming device for helping hypothermia patients prior to their return to the station. In case of emergency, patients would be evacuated by air following liaison with Eduardo Frei station (Chile). Pharmaceutical supply was via a regular ship visit. Pharmaceutical and clinical waste was segregated and leaves via the same ship.

Tourism

The station leader understood that the area had been an attraction for tourists in the past, before the fire and before the British Base 'G' had been demolished (1995-96), and it was thought that the new station might attract visitors in the future. But for the moment, all tourist activity at the station was discouraged and was limited to vessels cruising in the bay.

Summary

Comandante Ferraz is a well-run station with very strong attention given to safety and fire prevention. The Observers were impressed to see Brazil maintaining its strong science focus in Antarctica, despite the considerable challenges presented by the fire, the temporary accommodation and the plans for the redevelopment. There was high quality science being undertaken with senior professors from well-respected Brazilian universities working on the station with their post-doctoral and research students.

Recommendations

> PROANTAR should continue to consult widely with the Antarctic science community in Brazil to ensure the plans for the facilities, infrastructure and laboratories in the new station meet modern research requirements.

Camara (Argentina)

Inspected 10 January 2015, 1315–1600

Date of last inspection

None.

Introduction

The station is situated at 62° 35'S; 59° 55'W in the central section of Half Moon Island, about 30m above a broad gravel and rock beach. The summer-only station is run by the Argentine Navy and is usually open for 70-80 days a year. The station was established in 1953 and for three seasons was a year-round facility. All the buildings date from this time and are of considerable historical interest. Slightly above the main building is a memorial cross to men who died in an aircraft crash. The Observers noted and appreciated the fact that the team had completed Checklist A (Resolution 3, 2010) ahead of their arrival.

Physical Description

The main building housed the living accommodation, bedrooms, cooking and dining facilities, with large quantities of dried and tinned goods and other stores in the loft. There were numerous large water tanks, as well as a workshop in the basement below. This main building dated from 1953 and was aging, but was warm and dry, and well-maintained and conserved.

A smaller nearby hut contained a fresh food store. A little to the north were the generator sheds and a separate emergency shelter with basic provisions. A hangar, originally thought to house a helicopter, was now used for waste and for the storage of

fuel in 205lt drums. All these buildings were similarly aging, but were in an overall sound state of repair.

The station was notable for its unique wire winch system used to haul light general supplies (less than 150kg) on a sledge from the beach up to the top of the snow slope level with the main living and storage accommodation. The Observers saw the winch, in which the weight is distributed by a pulley system that lightened the tension over the pole anchoring, in action. It was also used to send down waste at the end of the season. The Observers were informed that heavy cargo was moved by helicopter.

Behind the main building there was a small pumping shed at the edge of a meltwater lake, accessed along a short wooden boardwalk. There was also a small boat shed and a refuge. There were six substantial free-standing aerial masts in the vicinity of the station, estimated to be about 20m tall. They were no longer in use and dated back to the 1950s. The station leader said that the stability of each mast was assessed each season, but it was not clear to the Observers what form this assessment took. They were concerned to see one of the old aerial masts used as the anchor point for the top end of the winch system.

The station leader told the Observers that there were no plans for significant changes to the station. The focus was on conserving the historic buildings, assisting visitors, and maintaining a presence on the island.

Personnel

There were 17 personnel at the station, all from the Argentine Navy. The team would normally only consist of 12-14, but additional personnel were brought this year to effect repairs to some of the buildings. The maximum capacity of the station was said to be 22, but it was clear to the Observers that this would have stretched the station's available facilities considerably. The team had arrived five days before the inspection and were still heavily engaged in bringing up supplies from the beach and in getting the station operational again for the summer.

Scientific Research

At the time of the visit there were no scientists working at Camara. The Observers were told by the station leader that, according to the Argentina's Antarctic Annual Plan 2015, he expected between two to four scientists from the DNA would visit in February or March and that they were currently at Primavera or Carlini station (Argentina). The scientists would be carrying out a botanical survey, and making sample collections, of the native Antarctic grass (*Deschampsia antarctica)* for genetic analysis and morphological studies. The fieldwork at Camara was part of a wider survey of the grass, and the DNA scientists would visit five other Argentine stations in the northern Antarctic Peninsula during the 2014-15 summer season.

There were no permanent scientific facilities or major scientific equipment at the station. Scientists used the station as a temporary facility when undertaking fieldwork in the local area. The station leader said that four Brazilian scientists would be working at the station this summer. The plans for

the future use of the station included its continued use to support scientific and technical research in the local area.

Logistics and Infrastructure

The station leader informed the Observers that the station was usually occupied from around December to March each season, with replenishment taking place in January via ship. Diesel (MGO) (13.5m^3) was stored in 100lt drums and was transferred to the generators using a hand pump. Kerosene (2.8m^3) was used for general heating and propane (1.5m^3) held in 45kg cylinders for cooking purposes. All these were stored in the hangar away from the main building. Annual consumption of diesel was estimated to be 7m^3 with the station leader stating the fuel resupply took place every three years or as required. There was an ample supply of oil spill response equipment and absorbents on site situated in prominent areas adjacent to fuel facilities plus a small but useful store in the loft of the main building.

Water for the station was provided directly from a glacial lake using a 600lt/hr diesel-driven pump which transferred the water into nine tanks capable of storing around 27m^3 in the basement of the main building. One of the tanks was seen to be leaking a significant amount of water from a failed seal at the bottom of the tank. Glacial water was used for showers and toilets only, with all drinking water supplied in bottles at the start of the season. In an emergency, the glacial water could be treated and consumed.

In addition to the two 45kw and 31kw Equidiesel generators, power could be provided from one small 7kw portable emergency generator. There were no wind turbines, solar panels or any other source of renewable energy at the station.

Transport and Communications

Given the purpose of the station and the small size of the island on which it was situated, the team had no vehicles or boats available to them. Sufficient communications were available, with one Iridium phone, one HF set and three VHF sets available. There was no internet access.

There was no helipad, but there was sufficient space on the flat area near the hangar for a helicopter to land. No UAVs were in use and there were no plans for their use in the future.

Arms and Military Support

All personnel on the station were from the Argentine Navy. The Observers recorded no explosives or weapons on the station. The team had been landed by the Argentine Navy vessel *Canal Beagle* just a few days before.

Safety, Training and Emergency Procedures

The Observers were advised that all personnel who were new to the station undertook three courses of 15 days in Argentina which provided information on the Antarctic Treaty, the Environmental Protocol, the operation of the station and handling dangerous materials. Fire exercises were undertaken once a week.

Environmental Management

A comprehensive station Waste Management Plan existed and all waste, including food waste, was separated and retained in the basement of the main building for removal at the end of the season via ship or earlier if the opportunity occurred. Although there was no incinerator, the Observers understand that that a manual waste compactor will be installed for the next season.

Sewage and grey water was treated using a very old bacteriological separation system made up of three tanks in the basement of the main building. Once settled the liquid was pumped directly to sea, with the solids removed at the end of the season.

There were no colonies of breeding animals in the immediate vicinity of the station, but skuas, Gentoo penguins, Leopard seals and Chinstrap penguins were all regular visitors to the area. There were significant quantities of moss and lichen on the rocks and cliffs above the main station building.

The Observers were told that sampling of the lake water took place each year, but the station leader did not have the results to hand. It had been thought that the level of the lake was decreasing slightly each year, but on inspection the Observers noted that the level of the lake water was at least 60cm above the floor of the small building which acted as the pumping station.

There were several copies of the Antarctic Treaty and Environmental Protocol on display in the main living area.

Medical

There was a small basic sickbay in the main building. This was run by two navy nurses who received specialist cold weather injury training prior to deployment. The sickbay had a wide selection of antibiotics and analgesics, but did not have opiate analgesia or adrenaline. There was no defibrillator on the station. Medical evacuation would occur initially by helicopter and then by aeroplane to the Argentine mainland, coordinated by Marambio station (Argentina). Medical resupply occurred by ship. Clinical and pharmaceutical waste was segregated and removed by ship back to Argentina.

Tourism

Half Moon Bay is a popular tourist location with a Visitor Site Guideline in place. Figures from IAATO suggested 13,069 people landed ashore in the 2013-14 season. A much smaller number, thought to be around 600 people last season, visited Camara. The station staff noted that visitors followed the general guidelines of no more than three ships in one day and no more than 100 people ashore at any one time. There was no evidence of problems presented by visitors to the station.

Summary

Camara is a basic, but well-run and conserved summer station, though without any significant scientific research underway. It is clear that the age and nature of the facilities require a larger number of support staff than would otherwise be needed by a station hosting occasional visiting scientists.

Recommendations

> The six very tall aerial masts should be surveyed by a suitably qualified mast engineer for safety, and if at risk of collapsing should be demolished and removed from Antarctica.
> That the DNA develop a future science plan for Camara and consider whether the facilities available at Camara were able to support such plans.

Comments received from Argentina on this inspection report are noted in the Annex.

Juan Carlos I (Spain)

Inspected 11 January 2015, 0830–1100

Date of last inspection

21 February 2005 (United Kingdom, Australia and Peru).

Introduction

Juan Carlos I was established in 1988 as a summer-only station on Livingstone Island at 62° 39'S; 60° 23'W. It is operated as a civilian-run station by the Spanish National Research Council, through its Marine Technology Unit. The Observers found a well-run station with an obvious focus on scientific work. Juan Carlos I is the largest station on Livingston Island, and provides seasonal logistical and medical support to St Kliment Ohridski station (Bulgaria), which is approximately 30 minutes away by either boat or skidoo.

The station team had arrived on 30 November and would leave at the end of February, spending approximately 90 days at the station. Science being undertaken was international, with German, Bulgarian, Japanese, Portuguese and Russian scientists working there. There was evidence of expeditionary capability, with the station facilitating science in the mountains and beaches nearby, including a field camp on Byers Peninsula, which was approximately two hours away by boat.

Physical Description

The station was dominated by several new, large red glass fibre panel buildings raised on stilts. The largest of these had three accommodation 'spokes' which were linked through a central yellow hub and were designed to be the main living, dining and sleeping accommodation. Other new buildings

for generators, storage, workshops and a boat shed and laboratories had also been constructed. There were nine new buildings in total.

The new station was due to be operational in 2013. However, the Observers were advised that, due to severe financial constraints in Spain and a long-running dispute with the main building contractor, all construction work on the site had been stopped and would not continue this season. As such only the new boat shed was in active use. The other buildings had no insulation, heating or fixtures and fittings and were not in use apart from occasional storage.

It was expected that the building work would take approximately two seasons to complete and the intention was to occupy all the new buildings on the site by 2018 at which point all the other buildings would be demolished. The new station would be able to accommodate 50 people and have six new science laboratories.

But for the moment, the station personnel were living and working in an assortment of single person 'melon' huts, modified shipping containers and a variety of other temporary buildings, which together with the empty shell facilities, numbered around 49 structures in total, with two small refuges up on the glacier behind the station.

The station leader noted how snowfall was increasing and glaciers accelerating in this area of Livingstone Island, a problem also seen by the Observers at the nearby Bulgarian station.

Personnel

During the course of the season it was expected that around 17 technical staff and 27 scientists would stay at the station. The expected maximum number of people on the station during the course of the season was expected to be 29, but the technical maximum capacity was 46.

Scientific Research

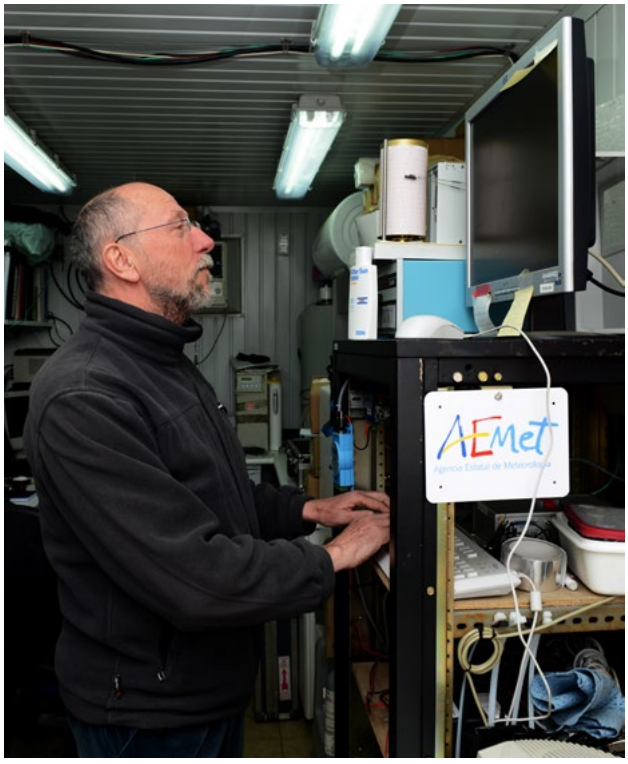
Juan Carlos I is a summer-only research station operated by the Marine Technology Unit (UTM) of the Spanish National Research Council (CSIC). The primary purpose of the station was scientific research, and it was supporting a very diverse and comprehensive international science programme. During the 2014-15 season the station would support research in glaciology, atmospheric chemistry, meteorology, geomagnetics, geology, and biology.

At the time of the inspection there were 11 scientists working at the station, including a group of four Japanese glaciologists. The ratio of scientists to logistics support staff was very high, at over 65 per cent of the station complement. Of particular note was the large number of international scientific collaborations being undertaken, and scientists from Germany, Portugal and the Russian Federation, as well as Japan, would be working at the station during the 2014-15 season. In total, 27 scientists would be supported during the summer. In addition, the station worked closely with Bulgarian scientists at the nearby St Kliment Ohridski station 1.7 km away to the north-east.

The scientists were working in three temporary laboratories housed in specially modified shipping containers. One of the laboratories was being used by the glaciologists, one by the atmospheric scientists and the other by the meteorologists and a geophysicist. The research facilities available were basic, but adequate. However, they were cramped and there was very little space for instruments. This meant that some scientists had to work outside. For example, the Observers saw a team of two CSIC scientists melting and filtering snow samples in the open near to the laboratories.

The station leader told the Observers that the station would support eight major science projects during the season. At the time of the inspection, four were taking place:

- Meteorological monitoring (AEMET) (Agencia Estatal de Meteorología, Spain)
- Glaciological research (DINGLAC) (Technical University of Madrid in collaboration with Hikado University and the National Institute of Polar Research in Japan)
- Geomagnetic monitoring (Observatori de l'EBRE, Spain)
- Atmospheric monitoring of persistent organic pollutants (REMARCA) (CSIC, Spain)



The Observers were told that the station was an excellent location for glaciological studies because of its proximity to Johnsons Glacier and Hurd Ice Cap on Nelson Island. This had enabled the Spanish scientists working on the DINGLAC project, and their international collaborators, to set up a suite of instruments on the glaciers, including GPS and AWS, to measure mass balance and ice dynamics. The data produced were being used to constrain and test glacier computer models. Glacier measurements from the DINGLAC project were also sent to the World Glacier Monitoring Service. The Japanese scientists were undertaking hot water drilling to depths of 120–150m on the glaciers and taking samples of basal water for microbiological studies and also inserting instrument chains to measure the temperature of the glaciers at different depths. During the previous season, the DINGLAC project had used a UAV to undertake an aerial survey of the glaciers, which in some places were unsafe to reach on foot because of the danger from crevasses.

The station supported a major research programme in meteorology co-ordinated by the Agencia Estatal de Meteorología. There was usually a team of three people working at the station during the summer season, comprising two scientists and a weather forecaster. The weather forecaster provided predictions not just for Juan Carlos I, but also for the Spanish summer station Gabriel de Castilla on Deception Island and for field camps. The station operated two AWS, and a range of other instruments measuring a wide range of environmental variables, including UV radiation and soil temperatures. Meteorological observations have been made at Juan Carlos I since the station was established in 1988 making the data important for long-term climate studies. Meteorological data were provided to the World Meteorological Organisation (WMO) and Juan Carlos I had WMO Observing Station status.

The station leader told the Observers that Juan Carlos I was supporting a major international Spanish-led field camp on Byers Peninsula during January 2015. There were seven scientists at the camp studying microbiology and permafrost, supported by two technical assistants.

Logistics and Infrastructure

The station was undergoing a major upgrade with ongoing transition between temporary buildings and new purpose built buildings and associated infrastructure. The new generator building was complete including the installation of three diesel generators which have a generation capacity of 92kva, but it was not yet operational. The waste heat from the generators would be recovered for accommodation heating and general hot water consumption. The new fuel bunkering and distribution building which was on the shore line was complete and required connection to the generators. The new waste handling facilities, including sewage treatment, were yet to be installed.

The station currently used three 6000lt and one 4000lt (22m^3 total capacity) single skin diesel tanks for the generators and vehicles. The station's total fuel consumption was about 1500lt/week and fuel was regularly re-supplied by Spanish and Argentine ships. A total of 2000lt of petrol was stored in 205lt drums for outboard motors, skidoos and vehicles. There was an ample supply of oil spill response equipment on this site situated in prominent areas adjacent to fuel and generator facilities. The waste pads and old engine oil were bagged and drummed and sent back by ship for disposal in port.

Fresh water was provided to the station from a glacial lake via a stream and then pumped and stored in a 5000lt tank. A separate 1000lt emergency tank was used if water could not be supplied from the lake for any reason. Sewage and grey water flowed by gravity to a two stage septic plant where bacteria created sludge and water, and this water was mixed with the grey water and discharged to sea.

Power was currently generated by three small diesel generators, with two running at any one time, producing a total of 37kva. They worked independently and supplied different areas of the station. The engines were 20 years old, but the Observers were informed that they were reliable and they confirmed that they appeared to be in adequate condition. Alternative energy was provided by three wind generators (two conventional blade generators and one vertical vane generator). An array of 100m^2 of solar panels was in the process of being installed and they were expected to provide nearly all the electrical power required by the new station. Existing wind power provided around five to ten per cent of the total electrical generation for the existing station.

Transport and Communications

The station had extensive communications facilities. A V-SAT capability had been recently installed which provided significant bandwidth for e-mail and internet access. There were also numerous VHF sets, which were used when scientists deployed either to the mountains or the adjacent islands.

The array of transport available was extensive and included: three zodiac Mk5 inflatable boats; five skidoos, one of which was unserviceable; a quad bike; a Terry caterpillar-style vehicle used to move the zodiacs, and a John Deere tractor. The skidoos were petrol driven. All the other vehicles were diesel.

There was a marked vehicle track across the stone and gravel beach on which the station was built and which linked the various buildings. It had clearly developed through regular use over time, not least during the recent construction phase. Several concrete pads had been placed in the roadway over trenches carrying services, and these were marked with red poles to indicate where they were when the track was covered in deep snow.

Arms and Military Support

There were no military personnel at the station. The Observers recorded no weapons or explosives, apart from emergency distress flares for the zodiacs.

Safety, Training and Emergency Procedures

The incoming team were a mixture of new personnel and those with prior, often very considerable, experience of the station. All new personnel received a short focused course prior to arrival in Antarctica.

All station support staff underwent a fire safety course and regular exercises were carried out for all members of the station. A comprehensive training plan would be implemented when the new station was fully operational. All scientists who were required to work outside the station had to be accompanied by a mountain guide who specialised in cold weather survival and mountain skills.

Environmental Management

A comprehensive station Waste Management Plan existed and all waste, including food waste, was separated. Paper and organic material was burnt in a 750°C and 1200°C twin-chamber incinerator. The remainder, including the ash, was stored for removal from Antarctica by the re-supply vessel.

The Observers noted that the station staff had collected fishing debris, buoys and other flotsam and jetsam from the nearby beaches for removal from Antarctica.

The engineering staff had a ten day test and sampling routine for sewage discharge water, generator and vehicle emissions, fuel quality and fresh water. All readings were reported as normal and there had not been any recorded out of tolerance readings in the past season.

There were no major concentrations of wildlife in the vicinity of the station. The hills to the north side of the station were heavily colonised by extremely large lichens. There were some areas of lichens around the station buildings and these were marked to ensure they were not trampled by station staff or visitors. There were no formally protected areas in the vicinity of the station, the nearest sites being Cape Shirreff (ASPA 149) and Byers Peninsula (ASPA 126), both some distance away.

Medical

Medical support was provided in a small but well-equipped temporary sickbay. The sickbay would move into the new buildings as they neared completion. Medical cover was provided by a doctor. The doctor conducted shorter tours than other technical personnel, and two were present at the time of the inspection as a handover was in place. The first was a General Practitioner and the second an ENT consultant. Both doctors had completed a three year Masters Degree in

mountain and wilderness medicine. In addition to providing medical cover to the station, they also formed part of the mountain rescue team.

There was a wide selection of antibiotics and analgesics, including opiates. Adrenaline was also available. The sickbay had a ventilator, two defibrillators, and equipment for measuring troponin and biochemistry. The doctors reported the hardest part of using the blood analysis equipment was getting reagents as these were very expensive; however, this had not caused any medical problems. The doctors were able to use video-conferencing with the military hospital in Madrid, and could email ECGs for analysis. They hoped to eventually secure a full tele-medicine suite like that seen by the Observers at Gabriel de Castilla station (Spain). The doctors were compiling a list of other additional equipment with which they hope to stock the new build sickbay, including FAST ultrasonography equipment.

Pharmaceutical supplies were brought by ship, but additional drugs could be requested and flown to nearby stations. Pharmaceutical waste was taken by ship to Spain. Clinical waste was incinerated. The medical evacuation plan involved helicopter evacuation to King George Island for aeroplane transfer to the mainland.

Tourism

The station leader told the Observers that the station was hardly ever visited by tour ships, and there were no records of significant numbers of tourists ever visiting the station. The decision on whether to accept a tourist visit rested with the station leader and whilst there was no prohibition on visits, the focus of the station was clearly on science.

Summary

Juan Carlos I is an impressive summer-only research station. It supports a wide variety of high quality research, with a large number of international collaborators. The ratio of scientists to logistical staff was the highest seen on any of the stations inspected.

The station is also important for logistics support and acts as the hub to co-ordinate the science and logistics at Gabriel de Castilla and the camp on Byers Peninsula, as well as substantial fieldwork on the glaciers found on Nelson Island.

The further potential for the station was considerable. But the current output is constrained by the condition of the temporary laboratories, which although functional, are small and without all the suitable scientific equipment.

Recommendations

> Completion of the new station should be a priority for Spain's Antarctic research programme to enable the strong scientific output to continue to flourish.

> The commendable beach clear-up activity undertaken by the station staff should involve the recording of all collected debris and, where the debris relates to relates potentially to fishing activities, the information should be submitted to CCAMLR.

Artigas (Uruguay)

Inspected 12 January 2015, 0830–1215

Date of last inspection

5 December 2012 (United Kingdom, Netherlands and Spain).

Introduction

Artigas is a small year round station widely spread over a mainly flat area above Collins Harbour towards the east of Maxwell Bay. Located at 62° 11'S; 58° 51'W the station was established in 1984 and is operated by the Instituto Antarctico Uruguayo (IAU), which is part of the Ministry of National Defence. The Observers were interested to see if there had been any changes to the station following the previous inspection report in 2012. The Observers noted and appreciated that the station staff had completed Checklist A (Resolution 3, 2010) ahead of the Observers' arrival.

Physical Description

The station's 13 buildings and installations were widely dispersed over the site. Nearly all the buildings had been long established and whilst secure and watertight, were beginning to now show their age. The exterior paintwork on the large two storey science and accommodation block, built in 2006 and painted in the colours of the Uruguayan flag, was beginning to flake away in places.

The Observers were pleased to see that new double skinned and bunded fuel tanks had been installed since the last inspection.

The Observers were told that no major redevelopment at the station was planned, although it was hoped to replace the old single storey building that now housed the basic gym and other storage, with a two-storey building

housing a larger dining room and a new gym. The Observers were informed that the Environmental Impact Assessment for this facility was underway, but no decision had yet been taken on the location of this new building. Demolition of the old facility was expected once the new building was up and running.

Personnel

There were 10 personnel from Uruguay on the station at the time of the inspection, as well as two scientists from Argentina and Germany. A further station member, the doctor, was due to arrive shortly. The station leader was from the Uruguayan Army, with all but one of the others, a civilian meteorologist, from other parts of the Uruguayan armed forces. All personnel would stay on the station for a full year, usually starting in December, apart from the doctor who would change after six months. Approximately half the incoming team had previous experience of working at the station. All those working at the station applied for the positions which, the station leader told the Observers, were highly sought after. The Observers were told that the maximum number of people that could be accommodated at the station was 50.

Scientific Research

At the time of the Inspection, there were three scientists working at Artigas, the Uruguayan meteorologist, and two glaciologists from Argentina and Germany. The station leader told the Observers that 12 scientists from a range of different Uruguayan universities and research institutes would be arriving at the station in the next week. He was also expecting three Brazilian scientists. Science supported at the station included biology, geosciences, meteorology, and psychology.

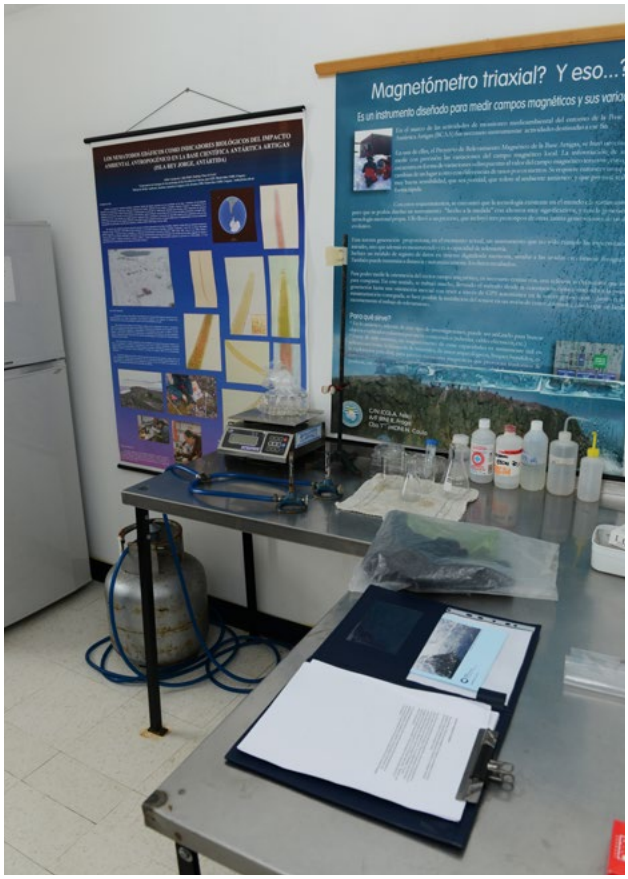
The inspection team were shown a large science and accommodation block, which was built in 2006, and used only in the summer season. This building housed two basic general purpose laboratories containing bench and cupboard space. One of the laboratories was for biological research and contained a fume cupboard and freezer. The station leader explained that scientists were expected to bring their scientific instruments and specialised sampling equipment with them to the station. One of the laboratories was occupied by the two glaciologists, who were part of an Argentine Antarctic programme undertaking fieldwork on nearby glaciers.

The station was well-equipped for meteorological research operating both a conventional weather station and an AWS. Measurements were made every six hours by the meteorologist who was from the Direccion National de Meteorologica in Uruguay. Adjacent to the weather station, was an ozone monitoring instrument, which was being operated as a joint project with the Agencie Estadal de Meteorologica in Spain.

The station leader provided the Observers with a list of the research projects that would be undertaken by Uruguayan scientists at Artigas during the summer season. The projects were:

Biology

- Analysis of diazatroph microbial communities
- The Antarctic – Magellan connection: diversity and biogeography in Turbellaria in the Scotia Arc
- Characterization of microbial communities in the soils of King George Island
- Biogeochemical study of the glacial melt ponds in Collins Harbour
- Environmental characterisation of the lake near to Artigas station, from which the station drew a water supply
- Determination of the prevalence of Shiga toxin producing E. Coli bacteria in Antarctica fauna. Isolation, molecular characterisation and study of the sensitivity and resistance of the strain to antibiotics



Geosciences
> Programme of Geodesic Infrastructure in Antarctica (GIANT) and satellite observations (EPOCH) in the International Terrestrial Reference Frame (ITRF)
> Tidal observations in Maxwell Bay

Environmental sciences
> Detection of marine debris in CCAMLR sampling areas and identification of marine mammal populations in the local area
> Biological monitoring of the Uruguayan Antarctic Institute activities linked to fuel management

Meteorology
> Meteorological and climatological observations

Psychology
> Study of the psychological characteristics needed by people working in the Antarctic environment

Several of these projects were long running monitoring studies. For example, the Observers were told that meteorological data had been collected at Artigas for over 30 years.

Science projects carried out at Artigas were chosen by the Scientific Department of the Uruguayan Antarctic Institute from proposals submitted by researchers from universities across Uruguay.

The station was making considerable effort to communicate its scientific work. The Uruguayan Antarctic Institute organised an annual 'Antarctic School' for about 30 university students who would visit Artigas for a few days during the summer season to learn about Antarctic science and undertake their own projects. Station personnel also used video-conferencing on a regular basis to secondary schools in Uruguay to tell them about Antarctica and their work.

Logistics and Infrastructure

Further to the description of the station in the 2012 Inspection Report, a significant addition and improvement to the station was the installation in 2013 of eight new 33m^3 double skin fuel tanks. The replacement of the existing corroded tanks was a recommendation from the previous inspection visit in 2012. The new tanks were empty at the time of the inspection and awaiting the first fuel supply by ship in February 2015.

Fuel to the station was previously supplied from the nearby Bellingshausen station (Russian Federation) by lorry and then transferred to holding tanks. This supply method was considered too hazardous and the UAI commissioned a new fuelling solution, which was built by the Administracion National de Combustibles, Alcoholes y Portland (ANCAP). The fuel would be transferred from the resupply ship to the new shore tanks using floating fuel hoses. The new tanks were built into a concrete 'saveall' with

integrated drains, the fuel system will be serviced by ANCAP twice yearly and fuel samples taken back to Uruguay for testing.

Three diesel generators supplied 220v and 50hz to the station. One engine was much older than the others and dated from when the station was first constructed in 1984. Two newer engines have been fitted in the past 10 years as the station's energy consumption had increased. The generators were mounted on a concrete 'saveall' which was similar to the fuel tanks, and the generators could also be monitored remotely via wi-fi.

Fresh water was provided by a nearby glacial lake and piped to a 12m^3 tank. Water was then distributed to a 6m^3 tank which was used for the laundry, showers and toilets and the kitchens via an activated coal filter for drinking water.

Transport and Communications

The station had VHF, HF, Iridium and internet which provided wi-fi to all of the station buildings. The internet bandwidth was enough to provide video conference calling and tele-engineering.

There was a wide variety of vehicles, including two skidoos, three zodiac inflatable boats with outboard motors (40 and 60hp), two BV tracked vehicles (one awaiting replacement tracks), a large new truck – Russian made, and a tractor. Only one of the boats (the smaller Mk2 zodiac) was operational as the others required the tracked vehicle to be launched.

Arms and Military Support

The Observers recorded that no weapons or ammunition were kept at the station. The station received personnel and logistics support from the Uruguayan armed forces.

Safety, Training and Emergency Procedures

There was a well-developed emergency evacuation plan, including guidance on the triaging of casualties. The station had comprehensive written fire, casualty and oil spill emergency plans which the Observers were informed were read and understood by everybody working at the station. The plans were tested regularly, including during staff pre-deployment training, and once a month at the station.

The core station staff underwent a three month pre-Antarctic training course which included awareness of the provisions of the Antarctic Treaty and the Environmental Protocol, fire fighting, evacuation and cold weather survival. Psychological analysis was carried out for all team members to ensure suitability.

Environmental Management

Sewage and grey water was discharged via a septic tank, where enzymes processed the sewage and created sludge and water. The water was discharged to the sea and the sludge returned to Uruguay for disposal. Sewage discharge and fresh water samples were taken twice yearly and returned to Uruguay for laboratory analysis.

There was currently no provision of alternative electrical generation. The Observers were informed that a study had been carried out into the viability of wind turbines, but that it had not proceeded due to concerns about the potential impact on birds.

The Observers were pleased to see that a full environmental impact assessment had been completed for the installation of the new fuel tanks and that a copy was held on the station.

A station waste management plan was in operation and waste was separated effectively for removal from Antarctica. Paper, food waste and occasionally cardboard was burnt in a two chamber incinerator. The resulting ash was put into empty fuel drums and taken back to Uruguay. The building housing the incinerator was equipped with a smoke alarm. However the Observers felt that the practice of storing so much cardboard near to the incinerator created an unnecessary fire risk.

The Observers were impressed with the oil spill kit available for use on the station, including a skimmer, booms and absorbent material. A good oil spill response plan was in place and the station held regular oil spill response exercises.

There were no significant concentrations of wildlife in the local area. Personnel were made aware on arrival and through the use of maps about the protected areas such as Ardley Island (ASPA 150).

The Observes noted with interest that the station leader was also aware of areas around the Maxwell Bay area which station staff should avoid, or at least contact the 'managing' country if they wanted to visit or work there. In relation to the Ardley Island ASPA, the station leader told the Observers that Chile had assumed day to day management of this location and that all intentions to visit or work in this location were subject to Chilean verification of appropriate national authorisation, via Eduardo Frei station.

Medical

The doctor was not present at the time of the inspection owing to attendance at a compulsory pre-deployment trauma course. Interim cover was provided by several nearby stations, and all current staff were first aid trained. The Observers were subsequently informed that the doctor arrived in mid-January and that there would then be medical doctor coverage for the whole of the year. Usually an Army doctor provided medical coverage on the station. The doctors were changed after six months, and both doctors for a particular deployment year would train together with the rest of the year-long station crew.

The sickbay was small, but emergency equipment around the examination couch was well organised. At the time of the inspection the new medical stores for the season had not been unpacked and were awaiting the doctor's arrival. The sickbay had a defibrillator and oxygen. There were a range of medications, but it was not possible for the Observers to verify the extent of the medication available. The station had opiate analgesia, which were locked in the station leader's safe. An automated external defibrillator was available in the main hut dining and recreation room.

Pharmaceutical supply was usually at the start of the season, but there were various options to call for additional supplies as required. Pharmaceutical and clinical waste was returned to the mainland as segregated hazardous waste.

A diver was employed to run boats and to collect samples for scientists as well as do some underwater maintenance. Where possible, diving was restricted to periods when the logistics vessel was present. This vessel had a hyperbaric chamber and a team of divers who would work with the station's own diver.

Tourism

There was no record of any tourist visits to the station or the immediate vicinity. Whilst there was no prohibition on visits, it was not expected that there were likely to be requests in the future.

Summary

Artigas is a small and well-run station which appears to be safe and with a relatively minimal environmental impact on the local area. However, there was little science activity occurring during the inspection visit, except for meteorology. The Observers were subsequently informed that the main body of scientists arrived several days after the inspection. Many of the research projects listed in the Inspection report in 2012 still continue today, providing long term monitoring, but there was little evidence of new science initiatives.

There have been major infrastructure improvements at the station since 2012, especially the replacement of the bulk fuel tanks, although the old tanks have yet to be dismantled and removed. The Observers noted the presence of the logos of the major State-owned Uruguayan utility companies that manage the power generation, the new fuel tanks and satellite communications on the station.

Recommendations

> The open rubbish dump behind the generator and storage shed marked as 'waste to be returned' should be emptied as soon as possible and all future similar waste stored inside to avoid accidental dispersal by the wind and weather.
> The diesel generators should be enclosed for noise and fire safety and fitted with an appropriate fixed fire suppression system
> The scientific research and educational activities at Artigas should make more consistent use of the laboratory and other facilities.

Comments received from Uruguay on this inspection report are noted in the Annex.

Other facilities and unoccupied refuges

Eco-Nelson (non-governmental Czech facility)

Inspected 12 January 2015, 1430–1545

Date of last inspection

5 December 2012 (United Kingdom, Netherlands and Spain). The facility was unoccupied and due to considerable snow drifts it was not possible to assess the site in detail.

Introduction

Eco-Nelson is located at 62° 15'S; 58° 59'W on the Stansbury Peninsula, Nelson Island. It consists of four small wooden huts and was established by a private Czech citizen in 1988 as a practical study in sustainable living, minimal environmental impact and survival skills. It has been used intermittently over the subsequent years, although no significant changes to the buildings appear to have been made. It is located about 30m above a small bay with a gravel and rock beach. The occupier had arrived on 9 December and intended to stay until the end of January.

Physical Description

The facility consisted of a main hut with a workshop and general area, a tiny through-kitchen and a small room with a desk and bed, heater and several book shelves. Linked to this building, but with separate access, was the battery compartment room which had been used in the past to store electricity generated by a small wind generator and a small storeroom, as well as a small vestibule used as a toilet. A nearby single room hut acted as the main bedroom.

Halfway down the slope to the beach was a small wooden store containing several fuel drums and other general supplies. Just above the beach was a small A-framed hut which appeared to act as another general store. A deflated and apparently unusable black zodiac-type craft lay on the snow and rocks outside this building. A collection of

marine debris, such as buoys and fishing nets, had been gathered together on the rocks near this location.

The huts at Eco-Nelson had always been minimalistic and rudimentary, although judging by pictures shown to the Observers by the occupier, the facility was clearly once in much better order. The huts were now in an extremely poor state and there was no evidence of any significant recent repairs or ongoing maintenance. The largest room in the main hut had at least 30cm of solid ice on the floor, indicating a lengthy period of neglect. It was the strong opinion of the Observers that the facility posed a significant safety risk, not least fire but also of collapse.

The occupier said that he had provisional plans to construct a new building to replace the aging facilities. No information was provided about the timing, process of approval, or logistical support for such a plan.

Personnel

The original builder and occupier of the station was present at the time of the inspection. The Observers were told that two Chinese researchers were also staying at Eco-Nelson, but had temporarily left to go camping. However, the Observers could find no evidence to substantiate this claim. The facility had clearly housed visitors in the past, but it did not look as though it had done so in several years.

The Observers were told by the occupier that Eco-Nelson had been occupied year-round in the past, and that he was hoping to secure another winter resident this season. It was the opinion of the Observers that such a solo over-wintering would be not only very dangerous, but also impossible in the living conditions they found.

Scientific Research

The Observers were told that the facility was designed to test sustainable low-impact living and survival skills, in addition to the ongoing collection of marine debris. Whilst there was evidence that these activities had taken place in the past, the Observers were doubtful that there had been any significant activity in recent years.

The occupier told the Observers about a series of experiments that he had established around 10 years ago to test the psychological and practical survival skills of two sets of children who had arrived with their parents at the station. Given the ages of the children involved, one as young as seven, the Observers were very concerned that such amateur, and in their opinion potentially unsafe and unethical, experiments had been carried out.

Logistics and Infrastructure

Diesel fuel was supplied approximately every three seasons in four 100lt drums via the occupier's contacts with visiting yachts, with any fuel not used remaining on site ready for the start of the following season. No surplus fuel was returned. 50lt of petrol for the likely unusable inflatable and cooking purposes was also stored with the diesel in the same small hut midway between the beach and main living hut.

There were no generators at this facility so all fuel was used for general heating purposes and was decanted into smaller containers using a hand pump. A drip tray for containing small fuel spillages was situated directly under the 100lt drums of diesel. There was no evidence of any oil spill response equipment held, but also no records of a fuel spillage having taken place at this facility in the last three years.

Water for the facility was provided directly from a glacier lake and stored in small plastic containers. There was no sewage treatment control other than decanting solid waste directly into a 100lt drum for removal at the end of the season. All liquid waste was disposed of directly into the sea.

Although the external inspection of the facility in 2012 found a wind turbine on the roof of the main hut, what remained was broken and clearly non-operational. There was a bank of very badly corroded nickel cadmium batteries, but it was clear that they held no charge. The occupier said he intended to fit solar panels, but was unable to provide any detail.

Transport and Communications

The only communication was via a single VHF radio, which appeared to be powered by small disposable batteries. Access to and from the facility was via a single kayak to a nearby location from which the occupier then walks to the facility. A deflated and apparently unusable zodiac-type craft was situated just above the beach.

Arms and Military Support

There were no weapons at the facility, and no military personnel present. A small number of signal rockets were kept for signal purposes in the same shed as the fuel.

Safety, Training and Emergency Procedures

The occupier told the Observers that he had an emergency arrangement with the nearby station Eduardo Frei (Chile) in the event of a communications failure. If the Chilean Air Force flew over the facility and a Chilean flag was flying, it meant that there were problems and they should come to help. The Observers also noted that the signal rockets would presumably also be used as a rudimentary method of emergency contact.

The Observers considered that in the event of the lone occupier of Eco-Nelson being seriously ill or incapacitated, together with a failure in the VHF communications, the outcome would likely be extremely serious.

Environmental Management

No Waste Management Plan existed and all waste that could be burnt was used for general heating inside the huts. Plastics were retained until the end of the season and food waste, though minimal, was believed to be thrown directly into the sea. There was no incinerator or waste compactor at the facility and no chemicals, including those for general or personal cleaning, were used.

Medical

The medical support to the facility was almost non-existent. The occupier held a supply of medications of various types in a small cardboard box in the main hut. This was not temperature controlled. A random sampling of the medications in the box showed that all were past their expiry date, with 2004 as the most recent expiry date. The facility held a very small cylinder of oxygen, but the Observers were not shown either a regulator or mask which would be required to administer it. There was no heart monitoring capability and no defibrillator.

There was photographic evidence that children had lived at the facility in the past. There was no evidence of any paediatric medical support. Given the occupier's stated intention for someone to over-winter at the facility, the lack of regular radio or satellite communications would be likely to result in a casualty being unable to call for medical evacuation should a significant injury occur.

Tourism

It was clear to the Observers that this facility had been able to operate, at least in the past, by visitors paying the occupier to use the facilities or at least by an informal contribution in kind. Given the extremely dilapidated condition of the huts, it was impossible to believe that this kind of activity would now continue.

Summary

Eco-Nelson appears poorly operated and maintained, and the huts are now extremely dilapidated and dangerous. The facility poses a significant risk to human health and potentially to the local environment. Whatever the earlier rationale for the facility, the Observers were not convinced that such a justification existed for it now. In the view of the Observers it should be closed down and the huts cleaned up and removed from Antarctica.

Recommendations

> Without a complete overhaul of the purpose and state of Eco-Nelson, the facility should be removed as soon as possible and the surrounding area cleaned-up and remediated.

Stansbury Peninsula Refuge (China)

Inspected 12 January 2015, 1545–1615

Summary

Whilst approaching Eco-Nelson (a non-governmental Czech facility) the Observers identified a small refuge approximately 1km to the east of that facility, around a small headland and situated approximately 20m above a gravel and rock beach.

Located at 62° 15'S; 58° 59'W the refuge consisted of a shipping container, flanked by two smaller containers. The main building contained several bunk-beds, a large amount of assorted bedding and blankets and a small store of water bottles, fruit juice and medicine.

It was apparent from flags in the main building and writing in the refuge's visitor's book that this refuge was linked to, or had been used by staff from, the Great Wall station (China). The shipping container was in poor condition with extensive rusting and exterior deterioration. A large, apparently empty, rusting gas cylinder was being used to hold the door closed.

A smaller container adjacent to the main building held a collection of waste material. The door to this structure had rusted away completely leaving the contents open to the snow and wind.

A third small container lay approximately 10m to the east and was partially filled with snow. This contained a half-full 200lt blue plastic fuel barrel, apparently containing a heating and cooking fuel such as white spirit.

The visitors' book in the shipping container indicated that this refuge was occasionally visited by those living in the nearby vicinity, including from the Eco-Nelson facility, and it contained relatively recent entries. However, it was the Observers'

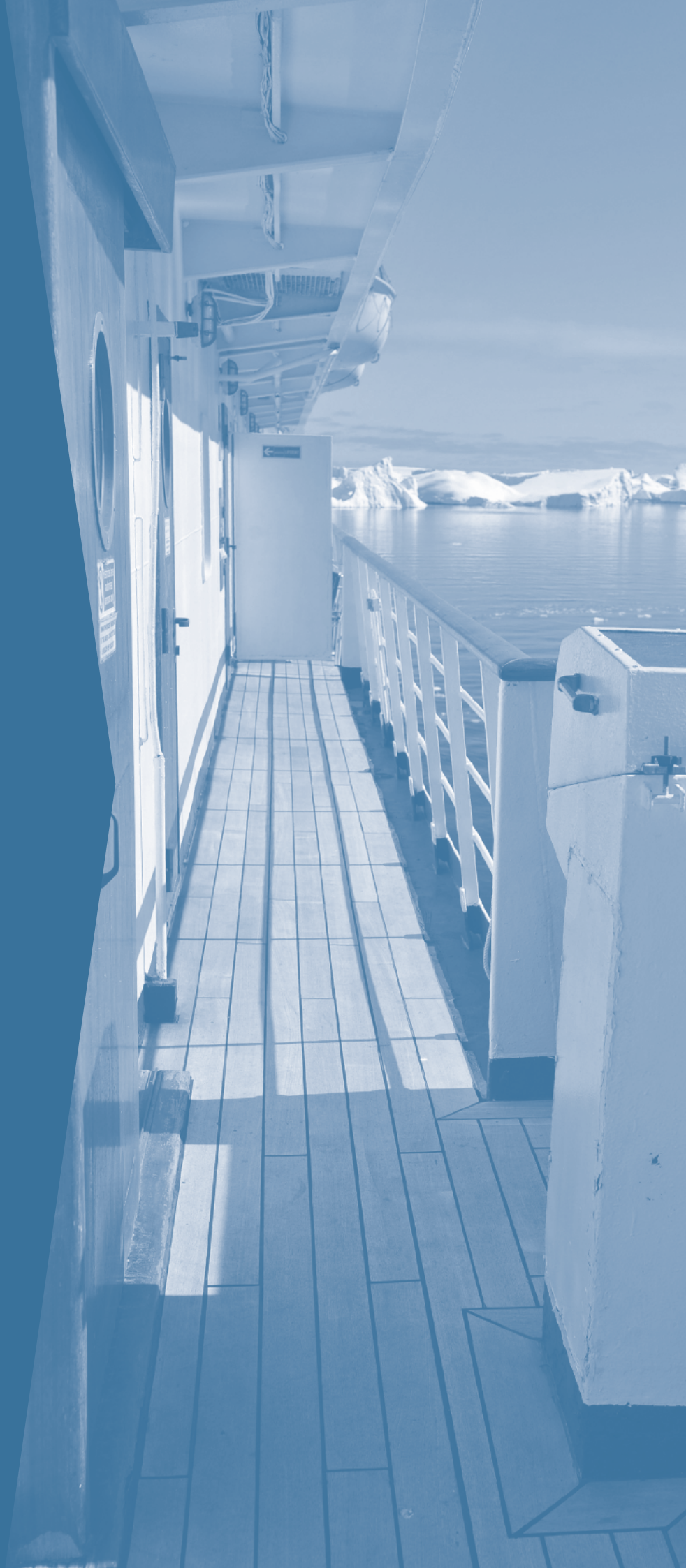
strong opinion that the refuge was now in very poor condition, and without adequate supplies, was not in a suitable state to act as a genuine refuge in case of a serious emergency or accident nearby.

Recommendations

> That the future use of this refuge should be reviewed and it be cleaned-up, reconditioned or removed as appropriate.

Comments received from China on this inspection report are noted in the Annex.

Vessels



MV Ushuaia (Comoros)

Inspected 1 January 2015, 0915–1215

Date of previous inspection

None.

Introduction

MV *Ushuaia* entered through Neptune's Bellows, Deception Island and anchored in Whalers Bay at 0815. Approximately 80 passengers were landed ashore to visit the former whaling station. Although the Comoros is not an Antarctic Treaty Party, the operator of the vessel on this occasion, 'Students on Ice' was authorised by Canada and is a member of the International Association of Antarctic Tour Operators (IAATO) and the Master and expedition leader welcomed the Observers on board.

Vessel Details

At the time of the inspection, MV *Ushuaia* had been charted by 'Students on Ice', a Canadian charity which provides international polar education expeditions to students, generally in the 14–18 age range. The vessel is an older, but well maintained, small cruise vessel, ice class 7. She was captained by an Argentinean Master with a crew of 35 mainly Argentinean personnel. There were 90 passengers onboard the vessel, the majority of whom were young students from a wide variety of different nationalities.

External Inspection

MV *Ushuaia* was built in 1970, but it was clear that considerable effort had been made to maintain her. Her external appearance was good, with little evidence of rust, and there were no overboard discharges or environmental concerns noted.

Antarctic Treaty, Documentation and Compliance

For this cruise, both the vessel and the expedition had the appropriate authorisations from the Canadian authorities. The permit holder was the expedition leader who also ran 'Students on Ice', an organisation registered in Canada. For expeditions not chartered by 'Students on Ice' it is the Argentine Government who normally provides the Antarctic authorisation for the vessel's activities in Antarctica.

The Observers noted strong awareness of the principles of requirements and responsibilities laid down in the Antarctic Treaty and the Environmental Protocol by both the vessel's officers and crew and the expedition team. The vessel's usual operator Antarpply and 'Students on Ice' are IAATO members and follow all relevant IAATO guidelines. The Observers did not observe any significant issues in relation to compliance.

Environmental Management

There were two reverse osmosis (RO) plants on the vessel each with a capacity of 36m^3 per day. Exhaust gasses from the main engines were used to pre-heat the sea water entering the RO plants to improve efficiency.

Sewage and grey water was managed using two International Maritime Organisation (IMO) approved sewage treatment plants. They were old style plants using aerobic action to break down waste and, as such, required no chemicals to operate.

MV *Ushuaia* did not have an incinerator so all waste was separated into different colour bins throughout the ship and then transferred into separate plastic and domestic cages on the aft deck for offloading at the next port visit. Food waste was retained in large bins again on the aft deck and removed along with all other waste. A brief on waste management was given to all visitors shortly after embarkation. There was no evidence of toxic waste onboard.

The ship had the capacity to hold 12m^3 of bilge water, which was then separated using centrifuges with the oil transferring to a sludge tank (maximum capacity of 4m^3) and the water being discharged overboard.

The passengers received a full briefing on the Antarctic Treaty, Environmental Protocol and IAATO Guidelines within the first few days of joining the vessel, and well before they entered the Antarctic Treaty area. Information was progressive, starting with the fundamental requirements, such as no littering, within the first hour or so of departure, followed by subsequent information on wildlife awareness and behaviour in Antarctica, particularly onshore. Preventing the inadvertent introduction of non-native species was taken seriously with checking of clothes, rucksacks and other equipment, with cleaning and vacuuming as appropriate during the voyage south. Lectures and briefings were provided in the bar area of the vessel where there was sufficient capacity for all the passengers and a number of television screens.

Passengers were briefed before every landing and copies of the relevant Visitor Site Guidelines were usually available wherever appropriate. Translations of the Guidelines were made available to passengers where necessary. Passengers received a re-cap and de-brief on completion of landings.

Passengers and expedition staff moving off the ship and returning from onshore were directed to a straightforward boot washing and scrubbing facility, using appropriate disinfectant.

Pollution and MARPOL Plan

A comprehensive MARPOL Plan existed with notices promulgated throughout the vessel. Fuel spillage exercises were conducted regularly under the direction of the Chief Engineer. There were

two fuelling stations (port and starboard amidships) with an adjacent upper deck locker containing MARPOL spill equipment. MV *Ushuaia* was also fitted with deck overboard valves which were shut in the event of a spillage and this too was controlled by the Chief Engineer. The ship was single skinned with both bottom and wing tanks containing diesel fuel (MGO). There were no records of a fuel spillage having taken place in the last three years.

Emergency Procedures

The ship's Master and Chief Officer discussed emergency procedures with the inspection team. Robust arrangements seemed to be in place for accounting for, mustering and if necessary looking for missing passengers. All safety equipment was in date for mandatory inspections, appeared well maintained and was sensibly dispersed throughout the ship. The designated Muster areas appeared to be of appropriate size and the Observers were informed that emergency drills were conducted at the first opportunity after the embarkation of a new set of passengers. The Observers were also advised that the lifeboats and life-rafts were sufficient for more than 150 per cent of those onboard.

Medical

The ship had two doctors present during the inspection. One was part of the vessel crew and the other was part of the 'Students on Ice' expedition team. The crew doctor was a specialist in emergency medicine. She worked in Santiago, Chile when not on the ship. There was a small and functional, but aging, sickbay. The sickbay contained two defibrillators, one of which was portable in a carry case with an associated bag of emergency drugs. There was bottled oxygen in the sickbay. A wide variety of medication was present. The ship updated her stocks when in port, and disposed of clinical and pharmaceutical waste appropriately. Should evacuation of patients be required the doctor would liaise with the ship's Master to arrange this.

The expedition doctor was carried for insurance purposes owing to the age group of the 'Student on Ice' expedition, where some students were as young as 14. She was a generalist doctor, present on a volunteer basis, who normally worked in a hospital in northern Canada. The 'Students on Ice' team had also brought their own medical equipment to supplement the ship's sickbay equipment. This included an additional portable defibrillator.

Small Boat Operations

Passenger transfers to and from the shore were conducted using the eight zodiac boats onboard. Each was equipped with outboard motors and operated by the vessel crew. All zodiac drivers were accredited to STCW95 for basic safety training, and received further appropriate training on the vessel. The Observers were informed that IAATO guidelines for the use of small boats in ice covered waters were followed. Boats appeared well controlled and handled with safe procedures for the passengers, and lifejackets were available for and worn by all passengers onboard. Immersion suits were not provided given the proximity of the vessel to the shore. Emergency equipment was landed with the passengers, but only once the majority of passengers were ashore. Control of passengers to and from the shore was well run, with a single point of exit from the vessel and a crew member accounting for each person.

Expedition and Tourist Management

The activities ashore were concentrated in Whalers Bay within the area described in the relevant Visitor Site Guidelines, including exploration of the site. Swimming from the shore was offered as an activity and although not directly observed by the inspection team, it was reported that nearly all passengers took part in this activity. Swimming

was under the direct on-site control of the expedition leader and guides and the accompanying doctor, with towels to hand and at least two zodiacs available at all times, one in the water and one on the beach.

The landings began with the arrival of the expedition leader and guides, shortly followed by the passengers, who received a short and effective briefing on landing. Guides were stationed at key points around the site, including the old aircraft hangar, but passengers were left to explore the site within the limits of the Site Guidelines. The guides provided briefings on the history, geology and wildlife of Whalers Bay. The expedition leader remained around the landing site and proactively and effectively kept in contact with all the guides using handheld VHF radio. Two zodiacs remained on the beach, accompanied by drivers to return passengers to the ship whenever they wished.

Passengers wore their own clothes. There were sufficient expedition guides, supported by a number of other 'Students on Ice' staff volunteers who accompanied the students. Supervision was effective and no infringements of the Visitor Site Guidelines or environmental regulations were observed.

The only activities being undertaken during this voyage were shore landings, zodiac cruises and swimming. There was no scientific research taking place on board or being supported by the ship ashore. No UAVs were onboard, either for use by the ship and crew or passengers. The inspection team were told there was no intention to carry UAVs onboard *Ushuaia* in the future.

Summary

MV *Ushuaia* has a capable and professional crew and a highly experienced expedition team from 'Students on Ice', with a clear focus on educational learning and understanding Antarctica and the site being visited. There were no significant issues observed, other than one concerning the timing of the landing of emergency equipment.

Recommendations

> The emergency equipment, including shelter, medical supplies, warm clothes, food should be brought to shore at the start of the passenger landing, and before large numbers of passengers arrive from the vessel.

> The vessel operator should investigate the opportunities to access tele-medicine services or similar support, in order to provide additional back-up in the event of a medical emergency.

MV Hanse Explorer (Antigua and Barbuda)

Inspected 1 January 2015, 1430–1645

Date of last inspection

None.

Introduction

MV *Hanse Explorer* entered through Neptunes Bellows and anchored in Whalers Bay, Deception Island. Five passengers went ashore to the whaling station along with the expedition leader. The vessel was conducting four voyages in and around the Antarctic Peninsula, collecting and depositing passengers from Marsh airfield on King George Island, with each trip in the Antarctic Treaty area lasting around 10-14 days. No refuelling took place in Antarctica. Although Antigua and Barbuda is not an Antarctic Treaty Party, the operator was authorised by Germany and is an IAATO member and the Master and expedition leader welcomed the Observers onboard.

Vessel Details

MV *Hanse Explorer* is a small polar vessel used for private expedition charters for up to twelve passengers. The vessel was visited whilst at anchor in Whalers Bay, Deception Island and landing procedures were observed. Ice classed to E3 and in classification with Germanischer Lloyd (GL), she is very well maintained and has a multi-national crew of 14. In this instance, a Canadian family of five had charted the vessel for a 10 day period. The vessel was not undertaking any scientific research.

External Inspection

Launched in 2006, the Observers considered the vessel to be modern and very well maintained; managed by her parent company Harren and Partner. Her external appearance was good and there were no overboard discharges or environmental concerns noted.

Antarctic Treaty, Documentation and Compliance

The vessel's operator Harren and Partner received a permit from the German competent authority and the Observers confirmed that all the appropriate documentation was held on the vessel. The permit allowed the vessel to operate in the general area of the Antarctic Peninsula and in conditions of up to 8/10ths ice concentration. Harren and Partner is a full IAATO member. It was evident from the inspection that appropriate guidelines and procedures were being followed correctly.

Environmental Management

The reverse osmosis (RO) plant can provide 20m^3 of fresh water daily. Water was also treated with ultraviolet light. Hot water was produced by a calorifier, which included a second stage for general heating of the accommodation areas, upper decks and fuel tanks.

Sewage and grey water was treated by aeration in an IMO approved sewage treatment system, where grey water was fed into the third stage to assist filtration and dilution. Bilge, oily water and sludge were held onboard and removed during each port visit, and the vessel had tank capacity of one month in normal charter running. All equipment was well maintained and managed by a 'Sertica' Platform Management System (PMS).

All waste was segregated and stored onboard and discharged ashore during port visits, and it was managed by the crew under the responsibility of the Chief Officer. No waste was discharged to sea except by IMO approved equipment.

It was clear that compliance with the environmental provisions of the Antarctic Treaty and the Environmental Protocol were taken seriously by the vessel and the operator, with IAATO Guidelines prominently on display in the disembarkation area. There was a dedicated bootwashing and disinfecting station for both leaving and returning to the vessel. The expedition leader, from EYOS Expeditions, provided onboard dedicated training for both passengers and vessel crew.

Pollution and MARPOL Plan

A ship's Oil and Pollution Plan was held on the Bridge and well understood by all staff. The Observers were subsequently informed that according to the company's International Safety Management practice a MARPOL drill is conducted monthly which is put on record in the logbook and the training matrix. Leak stopping equipment was held on the quarter deck for boat operations and in the bunkering station midships on the port side. Any used absorbents were bagged and kept for disposal in port. All emergencies were coordinated by the Bridge supported by the Chief Engineer in the Engine Control Room. There were no records of fuel spills in the past three years.

Emergency Procedures

Emergency procedures were discussed with the Master, Chief Officer and two Deck Officers and all seemed well versed with the vessel's emergency procedures. Primary and alternate muster stations had been provided and emergency roles were designated for all crew. Emergency drills were carried out regularly including the recovery of man overboard markers to ensure all crew were fully trained. A rescue boat and life raft space for 100 people were carried along with survival suits for all personnel. All life saving equipment appeared to be in very good condition.

Medical

The sickbay was a small self-contained compartment, containing an examination couch, medication store and defibrillator. The medication included adrenaline, injectable morphine, and a variety of antibiotics and analgesics. The ship had a contract for telephone medical support with a German telemedicine assistance service. Pharmaceutical supply was through the parent

company's logistics division. Pharmaceutical and clinical waste were segregated and landed as hazardous waste.

Small Boat Operations

Passenger transfers to and from the shore were conducted using a well maintained zodiac boat equipped with an outboard motor and crewed by the expedition leader. The boat appeared well controlled and handled with safe procedures for the passengers, and lifejackets were available for all passengers onboard. Immersion suits were not provided given the proximity of the vessel to the shore.

Expedition and Tourist Management

Given the small numbers of passengers ashore at Whalers Bay supervision and assistance was provided directly by the expedition leader who accompanied the party of five visitors ashore. The vessel had a copy of the short introductory film about Whalers Bay produced by the UK Antarctic Heritage Trust and this had been shown to passengers prior to arrival. No issues, infringements or unmanaged risks were observed during the landing or the visit ashore.

Summary

MY *Hanse Explorer* is a very well equipped and managed polar vessel, and is clearly provided with full support from its parent company in Germany. Professional procedures were evident in all aspects of work, with a well-motivated and friendly and knowledgeable crew and expedition leader. MY *Hanse Explorer* operates in Antarctica every year, conducting expedition cruising for very small numbers of passengers. No infringements or issues were observed either with the operation of the vessel, the landing or the overall conduct of the expedition.

Recommendations

> None.

SY Spirit of Sydney (Australia)

Inspected 2 January 2015, 0900–1015

Date of last inspection

None.

Introduction

SY *Spirit of Sydney* was visited whilst at anchor at Port Lockroy. She had seven passengers and two crew, including the master. The operator is Spirit of Sydney Expeditions Pty Ltd.

Vessel Details

SV *Spirit of Sydney* is a modified Open 60 sailing yacht, launched in 1986, with an aluminium hull and rigging, a displacement of 18 tonnes and capable of 8kts under power. The vessel is operated by two Ocean Yacht Master crew members, with a maximum of nine guests with 16 life raft spaces.

External Inspection

The Observers considered that the vessel was in good order and well capable of the sea conditions found in Antarctica. The rigging had been renewed in the past two years and had been fully overhauled four months before the inspection. All repairs and maintenance were completed by the two experienced crew members.

Antarctic Treaty, Documentation and Compliance

The vessel was flagged to Australia and the operator was Australian. The operator had a five year authorisation from the Australian Government to operate in Antarctica. The Observers had the opportunity to see paper copies of the up to date

authorisation document, which demonstrated that the vessel was in the third year of its five year authorisation. The operator is a member of IAATO.

Environmental Management

A small reverse osmosis plant was fitted but not generally used due to the adequate 500lt tank capacity. Sewage and grey water was discharged overboard, with the two day holding tank used when close into land or anchorages. The vessel had the capacity to generate electricity via a small wind turbine.

Waste was managed onboard by separation and stored on the stern for removal in port. Passengers were thoroughly briefed on environmental and waste management procedures on joining the vessel. The crew were fully conversant with the IMO regulations for discharge into the sea and did not discharge any products, except sewage and grey water in the Antarctic Treaty area.

Pollution and MARPOL Plan

There was no formal oil pollution plan held onboard, however, spill kits were held and the vessel operated a dry bilge routine (no oily products discharged by the bilge pump). All used absorbent materials were bagged and landed in port. The diesel fuel tanks (1400lt capacity) were double skinned; petrol (140lt) and gas (four bottles) were stored on the stern away from the main accommodation area. Emergency fuel spill exercises were not regularly carried out, but the routine appeared to be well understood by the crew.

Emergency Procedures

A man overboard exercise was carried out on each expedition voyage, and safety briefings and familiarisation were conducted soon after the passengers embarked. There were six water tight compartments (WTCs) in the vessel and all separated by a water tight door, when on transit these were kept closed at sea. It was noted by the operator himself that one of the water tight seals required replacing, although the Observers were told it still functioned well. All sea and fire safety equipment was in date for mandatory SOLAS inspections and stored pressure fire extinguishers were arranged around the ship and in each WTC. The Observers were informed that the operator's second yacht was only one day behind the *Spirit of Sydney* and that they would normally shadow each other during their time in the Peninsula. The operator also had good awareness of other vessels in the vicinity, not least other IAATO vessels.

Medical

Both the master and crew had appropriate wilderness and first-aid training and experience and had suitable medical supplies on board to deal with relatively straightforward conditions. In the event of a more significant medical issue, the response would be to contact the wider IAATO network.

Small Boat Operations

The vessel had two inflatable boats with a 15hp outboard motors (Bombard C3 Commando and Achilles 3.2) launched using a davit on the stern. There were also four kayaks stored on the forward deck.

Expedition and Tourist Management

The Master also acted as expedition leader. Although the vessel was in the vicinity of Port Lockroy, no landings or small boat operations were observed there. The seven passengers on board were intending to conduct a range of climbing and mountaineering activities, including skiing and snowboarding around the local area and at other locations in the Antarctic Peninsula. Environmental and bio-security procedures were in place, including training for passengers once they had joined the yacht. An up to date set of Visitor Site Guidelines was held on the vessel. No scientific research was being undertaken by the vessel.

Summary

Spirit of Sydney is a well set-up vessel with a master who has significant experience of operating in ice-covered waters.

Recommendations

> That the water tight door seal is renewed.

SY Saoirse (New Zealand)

Inspected 2 January 2015, 1030–1200

Date of last inspection

None.

Introduction

SY *Saoirse* was visited and inspected whilst at anchor in Port Lockroy. She had a group of nine passengers on board, plus three crew members. She was on a 21 day voyage, expecting to spend 11 days in the Antarctic Treaty area. The main activities planned included photography and shore landings. Previous trips over a period of 24 years with another vessel had included activities such as kayaking, climbing and filming. The operator is Ocyan Logistics Ltd, based in New Zealand.

Vessel Details

Launched in 1997, SY *Saoirse* is a custom built Langedrag steel hull 17.8m sailing yacht, with a displacement of 30 tonnes and capable of 8kts under power with a 250hp engine. The vessel is managed by three Ocean Yacht Master crew members with a maximum of nine guests, with numbers limited by IMO sewage and grey water discharge rules.

External Inspection

The Observers considered that the vessel was in good order and capable of the sea conditions of Antarctica. The vessel was purchased by the current owners 18 months ago and had been fully serviced to be made ready for the voyage. All

repairs and maintenance were completed either by the experienced crew members or by hired professionals.

Antarctic Treaty, Documentation and Compliance

The operator received authorisation from the New Zealand authorities to enter Antarctica. A copy of the permit was held onboard the vessel and the details verified by the Observers. The operator had been a member of IAATO, but was not currently.

Environmental Management

A small reverse osmosis plant was fitted but not generally used due to the adequate 1000lt tank capacity onboard. Any further water required was taken from nearby glacial run off. Sewage and grey water was discharged overboard, after passing through a 20mm filter. There were currently no holding tanks fitted, but it was intended to fit a sewage tank during the next maintenance period.

Waste was managed onboard by separation and stored on the stern for removal in port. The passengers were thoroughly briefed on joining the vessel. The crew were fully conversant with the IMO regulations for discharge into the sea and did not discharge any products, except sewage and grey water in the Antarctic Treaty area. Food waste was collected and discharged in accordance with MARPOL regulations.

No renewable electrical generation was currently fitted to the vessel. It was intended to fit both solar and wind generators in the next maintenance period.

Pollution and MARPOL Plan

There was no formal oil pollution plan held on-board. However, spill kits were held and the vessel operated a dry bilge routine (no oily products discharged by the bilge pump). All used absorbents were bagged and landed in port. The diesel fuel tanks ($8m^3$ capacity) were single skinned due to the age of the vessel. Petrol (100lt) and gas (four bottles) were stored on the stern away from the main accommodation area. Fuel spill exercises were not regularly carried out, but the routine appeared to be well understood by the crew.

Emergency Procedures

A man overboard exercise was carried out on each expedition voyage, and safety briefings and familiarisation were carried out as soon as passengers have embarked. There were five water tight compartments (WTCs) in the vessel and all were separated by a water tight door. When on transit the engine room compartment and sail locker compartment were kept closed at sea. All sea and fire safety equipment was in date for mandatory SOLAS inspections. Stored pressure extinguishers (water, powder and CO_2) were in good condition and arranged around the yacht and in each WTC. The Observers were impressed by a fixed fresh water fog system which was fitted to the engine space for fire suppression. The Observers were told that the vessel is inspected before relaunch from the boat yard by the Chilean National Maritime Authority and all equipment (the 12 person life raft, flares etc) are serviced by a certified inspection service for SOLAS compliance.

The vessel was operating in Antarctica in co-operation with the yachts SY *Santa Maria Australis* and SY *Paradise*, providing mutual support and assistance in the event of an incident. The Observers were informed that the vessel also checked-in every day with the regional MRCC authorities and with their expedition base manager in Canada.

The Observers were told that the yacht had two firearms on-board, a 12 gauge shotgun and .470 rifle which were required as part of the vessel's permissions in Canada to operate in the Arctic, due to the threat posed by polar bears. Both firearms were registered in Greenland. The

firearms were disassembled and parts stored separately in a private area which was locked whenever the owners were not onboard the yacht whilst in the Antarctic Treaty area.

Medical

The crew had good medical experience and training, including wilderness and first responder qualifications. On this voyage one of the passengers was also a qualified medical doctor. The medical equipment carried was sufficient to deal with the range of routine injuries that could be expected. The Observers were impressed that the vessel also had Iridium telephone access to a 24 hour on-call doctor in Canada via a paid-for system.

Small Boat Operations

The vessel had two inflatable boats, one Polaris inflatable 12.5' with 25hp outboard motor and one Zodiac classic with 15hp outboard motor and a spare 20hp outboard motor, launched using a halyard from the main mast.

Expedition and Tourist Management

The vessel had a good system of ensuring compliance with the wildlife protection and other provisions of the Environmental Protocol and ready access to documents such as the Visitor Site Guidelines. Paper copies of the Guidelines were held on the vessel and access to the most recent versions was available electronically.

It was a requirement of the contract signed by all passengers that they must abide by the provisions of the Antarctic Treaty and the Environmental Protocol. Similarly, drinking alcohol was prohibited while the vessel was underway and limited in anchorage. No science activities were being carried out by the vessel, but there was an interest in a future programme to support marine sediment sampling.

Summary

The vessel was in good order with an extremely experienced crew. No significant operational, environmental or safety issues were identified.

Recommendations

> The operator should consider the use of a locked cabinet to store firearms, or consider whether there are alternative storage locations whilst the vessel is in the Antarctic Treaty area.

SY Santa Maria Australis (Germany)

Inspected 2 January 2015, 1300–1430

Date of last inspection

None.

Introduction

The SY *Santa Maria Australis* was visited whilst at anchor in Port Lockroy. The vessel had arrived the previous day and the passengers were ashore visiting 'Base A' Port Lockroy (HSM No. 61).

Vessel Details

SY *Santa Maria Australis* is a 66ft ketch rigged aluminium hulled (8mm thick) sailing yacht built in Gdansk, Poland in 1998. Flagged in Germany and owned by Ritz Consultants she is classed by Germanischer Lloyd. *Santa Maria Australis* is operated by SIM Expeditions, who are a member of IAATO, and was skippered by a German Master who was also the expedition leader. Capable of accommodating a maximum of 12 people, the vessel was carrying eight passengers in addition to the three crew members.

The yacht had two Deutz 106hp main engines with two shafts in addition to an independent diesel generator. Heating was provided by a main boiler which provided central heating throughout the boat. The three diesel fuel tanks (total 5000lt capacity) provided an endurance of approximately 4000nm and which gave a significant safety margin in case the vessel were to be beset in ice.

External Inspection

The Observers considered the vessel to be in good order and capable for the sea conditions found in Antarctica. The crew members were experienced yachtsmen, especially the Master who had over twenty years of experience of sailing in Antarctica. The crew were capable of carrying out running repairs and routine maintenance as required.

Antarctic Treaty, Documentation and Compliance

The inspection team were shown the expeditions permit from the Federal Environment Agency in Germany and the Master told the team he would be providing the agency with an end of season report which would also go to IAATO. The Master showed the Observers the IAATO Field Operations Manual and told the Observers he briefed his clients every time they went ashore, using the Visitor Site Guidelines wherever applicable.

The Observers were subsequently informed that the yacht also has a Ship Security Certificate, issued by the German Seamen's Accident Prevention and Insurance Association and was therefore authorised to take aboard paying sailors worldwide.

Environmental Management

Waste was managed onboard by separation and stored on the stern, in watertight barrels, for removal in port. The passengers were thoroughly briefed on environmental and waste management on joining. The crew were fully conversant with the IMO regulations for discharge into the sea and did not discharge any non-permitted products below 60°S.

Pollution and MARPOL Plan

The Observers were told that there were 12lt of oil in the drive motors, in addition to five litres of replacement oil in the engine room. There was no formal oil pollution plan held onboard, but in case of a spillage, absorbent material was available. The Observers were told that any spills on the vessel were cleaned out and all absorbents used bagged and landed in port.

Emergency Procedures

All passengers were provided with a full safety brief prior to sailing, which included actions in the event of a fire, man overboard and other emergencies .The engine space had a CO_2 drench fixed fire fighting system, and adequate supplies of fire extinguishers were evident throughout the vessel. Two eight person life raft, as well as emergency survival suits to augment yacht foul weather clothing, were available. When underway the Master had an all-personnel policy of no drinking of alcohol in order to safeguard passengers.

SY *Santa Maria Australis* had a comprehensive outfit of up to date charts and publications. An EPIRB and emergency communications were available in addition to the vessel's Iridium SATCOM and IMM VHF. The vessel was operating in Antarctica in co-operation with the yachts SY *Saoirse* and SY *Paradise*, providing mutual support and assistance in the event of an incident.

Medical

The Master and crew were first aid trained and a comprehensive first aid box was held. All passengers are required to complete a medical questionnaire prior to acceptance of a booking. In the event of a serious incident, plans were in place to contact an on-call doctor in Germany for further advice.

Small Boat Operations

Boat operations to and from the shore were conducted using two small inflatable tenders with an outboard motor.

Expedition and Tourist Management

The expedition focused on sailing and short visits to notable sites around the northern Antarctic Peninsula. The expedition leader accompanied and supervised all visits ashore with his clients.

Summary

Santa Maria Australis is well prepared for the location and conditions in which she operates. She is run by a well-qualified team, with many years of Antarctic experience.

Recommendations

> None.

MV Sea Adventurer (Bahamas)

Inspected 2 January 2015, 1430–1700

Date of last inspection

None.

Introduction

The MV *Sea Adventurer* was visited during the landing of passengers ashore at Dorian Bay, Wienke Island. The vessel was on a 21 day expedition cruise with a mixture of shore landings, zodiac cruising, camping ashore and kayaking. Although the Bahamas is not an Antarctic Treaty Party, the operator of the vessel, Quark Expeditions met the requirements of the United States, and is a member of IAATO. The Master and expedition leader welcomed the Observers on board.

Vessel Details

Sea Adventurer is a Class A1 ice strengthened vessel built in 1976 with subsequent extensive refits and improvements in 1999 and 2002. The ship is registered in the Bahamas. There are berths for 120 passengers and 70 crew members, of these 12 are deck or engineering crew and the remainder are hospitality staff. The Master has 17 seasons experience in the Antarctic region and, along with the Chief Officer, was Russian. Most of the rest of the crew were from the Philippines.

External Inspection

The Observers considered that the vessel appeared well maintained with little rust or corrosion visible externally. It was the Observers' view that most recent refits had focused primarily on the passenger accommodation areas.

Antarctic Treaty, Documentation and Compliance

The operator was notified that their environmental documentation met the requirements of Article 8 and Annex I of the Protocol and the provisions of the US EIA regulations. The appropriate documentation was seen by the Observers on board.

The vessel reported that it regularly supported small scientific research projects in Antarctica. A British bird biologist from the non-governmental organisation 'Penguin Lifelines' had been on a previous cruise and the vessel had helped him visit a number of penguin colonies where he monitored the birds using automatic camera recording equipment. Expedition staff took part in Orca and Humpback whale photographic identification studies co-ordinated by NOAA. Such activities were authorised separately to the passenger expedition by the United States. The Observers were also informed that the vessel undertook occasional logistical support to research stations.

Environmental Management

The two reverse osmosis (RO) plants, though functional, were operating at decreased efficiency. The capacity for fresh water production was 15m^3 per day per RO plant with the ship tending to use 40m^3. On longer voyages water conservation measures were put in place in the galley and laundry, and in advice to passengers.

Sewage and grey water was managed using one IMO approved sewage treatment plant, using aerobic action to break down waste and a final chlorination tank to kill any bacteria prior to discharging overboard. The Observers were told that all MARPOL requirements were met.

A comprehensive Waste Management Plan existed with notices promulgated throughout the vessel. All waste was separated and retained onboard for removal ashore; food waste was retained in bags within a dedicated cool room, while a rubbish compactor was used to compact all plastics, cans and cardboard which were also retained in a dedicated stowage for discharge ashore. There was no evidence of toxic waste onboard.

The ship had a capacity to hold 8m^3 of bilge water which was then separated using centrifuges with the oil transferring to a sludge tank (max capacity of 7m^3) and the water being discharged overboard 12 nautical miles from land. Exhaust from the main engines was used to pre-heat the sea water used in a flash evaporator for the production of technical feed water.

All passengers received a detailed briefing onboard the vessel on environmental protection and on wildlife awareness and minimising human impact in the Antarctic Treaty area. Passengers were issued with yellow jackets on arrival and invited to use the operator's rubber boots during their cruise. The vast majority of passengers choose to use this equipment. The sea-days were used for briefings and presentations on environmental protection and other issues, including visitor guidelines. All passengers also signed a declaration during the first days of the cruise to say that they had read and understood the environmental guidelines. IAATO Guidelines and the Visitor Site Guidelines were central elements of the briefings given to passengers.

Disinfecting and cleaning facilities were prominent, comprehensive and seen in active use in both embarking and disembarking from the vessel. Briefings prior to landings were carried out in communal areas, with a comprehensive PA system in operation. Re-cap sessions followed each landing, which also included a briefing for the following day. IAATO posters and Guidelines were on prominent display throughout the vessel.

Guides on the vessel included ornithologists, marine biologists, historians and geologists, in addition to numerous other guides with wildlife skills. All those in expedition leadership positions on the vessel, including all guides, were required by the operator to take and pass the IAATO field staff online assessment and certification programme.

Pollution and MARPOL Plan

MARPOL Regulations offered for inspection were Lloyds regulations dated February 2011 and responsibility for MARPOL incidents fell to the seamanship hands supported by the Chief Engineer. There were fuelling stations (port and starboard aft) with an adjacent upper deck locker containing ample MARPOL spill response equipment. The Chief Engineer stated that the ship had double bottom tanks and wing tanks containing up to 342m^3 of diesel (MGO). Petrol was held in 5lt plastic cans in dedicated stowages on the upperdeck aft, adjacent to the zodiac inflatables. These stowages were fitted with a manually operated fire suppression system. There were no records of a fuel spillage having taken place in the last three years.

Emergency Procedures

The vessel's emergency procedures were clearly understood by the Deck Officer, and the evacuation routes were well marked throughout the ship. Muster stations were briefed to the passengers on arrival onboard, and the correct way to don a lifejacket was explained and demonstrated at the earliest opportunity.

There were four enclosed lifeboats on board with a capacity of 50 each with additional life rafts located around the upperdeck. It was the Observers' opinion that some of the operating mechanisms for these appeared to be a little rusty, but there was no indication that they were defective. The Observers considered that the temporary positions of moveable tables and other furniture on the upper deck could hamper access to lifeboats and other emergency equipment.

The Observers were informed that no firearms or other explosives were held on the vessel.

Medical

The sickbay was small, but reasonably well-equipped. It held a portable defibrillator and portable oxygen. There was a second portable defibrillator in the forward part of the ship. There was a wide selection of medications, including adrenaline and injectable pain relief. There was a limited amount of storage space in the sickbay, which had resulted in boxes being stacked in the shower tray and over the toilet, placing these facilities out of use. The ship's doctor had three years of emergency medicine experience.

Medical supplies are topped up at the start of the season, with the doctor conducting an inventory towards the end of the season. Clinical and pharmaceutical waste was kept separated and landed appropriately. The doctor also conducted water testing for coliforms weekly on a random selection of water sources throughout the ship.

In addition to the ship's doctor, there was also an expedition doctor who was onshore at the time of the inspection. The Observers were informed that this doctor had considerable emergency experience.

Small Boat Operations

There were 11 zodiac inflatable boats onboard which were used to transfer passengers to and from shore. A small fleet of kayaks was also held onboard. All the small boats appeared to be in good repair. The Observers were informed that all zodiac drivers were required to complete a small boat accreditation module with both written and practical training, which included environmental and safety aspects. Control of passenger movements was good, with two experienced crew at the embarkation/disembarkation points to assist passengers. Passengers notified their movements using a tick-sheet on leaving and arriving from the vessel.

Expedition and Tourist Management

The operator offered camping ashore in a number of locations, including Dorian Bay, Paradise Bay, Ronge Island and Portal Point. However due to the deteriorating weather conditions during the visit the expedition leader confirmed that this activity was unlikely to proceed on this occasion at Dorian Bay. The maximum number of people camping ashore at any one time was 30, accompanied by a minimum of two guides and emergency food, water and other supplies. Any rubbish and human waste was returned to the vessel the following morning.

Kayaking was due to be offered at Dorian Bay but again, due to the deteriorating weather conditions, it did not take place. The maximum number of people kayaking at any one time would be 16. Guidelines for kayaking were those developed by the operator, Quark Expeditions. There were procedures in place for managing potentially conflicting interactions with Leopard seals which included observation, rafting-up and abandoning or postponing the activity. The expedition leader told the Observers that he did not perceive any significant risk in kayaking in the presence of Orcas.

No drones or unmanned aerial vehicles (UAVs) were held or operated on the vessel or as part of shore landings. While this activity was considered and assessed in the IEE that met the requirements of the United States, the requirement of the draft IAATO Guidelines for the use of Unmanned Aerial Vehicles for 20 hours of pilot training was seen to be prohibitive.

The Observers met the expedition leader and his team ashore at Damoy Point, Dorian Bay. The expedition leader highlighted immediately the fact that the number of visitors landed ashore by the vessel had slightly and temporarily exceeded the maximum number allowed ashore under the Visitor Site Guidelines for the area: 109 versus the limit of 100. The Observers were told that this was because the original plan was for kayakers to visit and depart the site prior to the rest of the passengers coming ashore. This plan was delayed for approximately 20 minutes due to increasing wind. After which time the kayakers departed and the passenger count remained under the limit. The Observers did not consider that this created any significant wildlife impact.

The Observers noted that the expedition leader acknowledged that due to tide and wave conditions it had been necessary to choose a landing site in close proximity to a small Gentoo penguin colony on nearby rocks. Expedition staff were on hand to monitor the landing site and the penguin colony.

A route from the landing site approximately 1km long was marked with flags from the landing point to Damoy Hut (HSM No. 84), and then to the top of the ridge to the east of the hut. A guide was positioned on the top of the ridge to meet those passengers who wished to walk to the top. The Observers were told that passengers had been warned about the risk of crevasses when walking to the top of the ridge and that the guide here had appropriate search and rescue experience. The expedition leader said that he felt that lower Damoy Point area was a site with relatively few significant safety risks and passengers were given free rein to explore this area without the need for dedicated guiding. There were four guides ashore, in addition to the zodiac crews. Emergency kit had been landed with the first guides ashore, who had also conducted an initial risk assessment for the landing to proceed.

It was noticeable to the Observers that around 50 passengers had walked along the route from the landing site towards the ridge before a second guide appeared. The operator subsequently confirmed that staff members were being used to assist at the disembarkation point given the

slippery nature of the rocks. A number of the passengers appeared to be in doubt as to whether they were allowed to visit Damoy Hut, for which there are Visitor Site Guidelines. Some passengers did enter the hut, but were asked to leave by the guide when she arrived due to a temporary miscommunication because of difficult radio communications between the landing site and the hut. It was subsequently confirmed to the Observers that the hut was open for visitation and that monitored and interpreted visits were undertaken before the end of the landing.

Two guides were stationed at a point above the landing area between small Gentoo penguin colonies. The Observers felt that several passengers were within the suggested 5m minimum distance from wildlife at this point. However the Observers did not record any significant visible disturbance to the nesting penguins.

Summary

It was clear that the expedition leader and operator were strongly committed to environmental protection and maximising the passengers' experiences both on the vessel and ashore. That the expedition leader self-reported that the number of landed passengers had accidentally exceeded that permitted was a strong indication of this commitment and was appreciated and understood by the Observers.

Recommendations

> There should be an assessment by the operator of the positioning of guides ashore: to ensure that there is a good guide to passenger ratio at all times, to prevent inadvertent contravention of the 5m minimum wildlife avoidance guideline, and to ensure that at locations such as HSMs, the rules of entry are made clear.
> That the operator should review its landing procedures to ensure that no more than the maximum number of passengers (100) are ashore at any one time.
> Contribute to the development of industry-wide guidelines for kayaking activities, including in relation to potential interaction with marine mammals.

MV Bremen (Bahamas)

Inspected 3 January 2015, 0900–1045

Date of last inspection

None.

Introduction

MV *Bremen* entered Paradise Harbour and was discharging passengers for zodiac cruising when the Observers visited the ship. The vessel was on a 17 day cruise. The vessel intended to undertake six cruises in total in the 2014-15 season. The *Bremen* sailed under the flag of the Bahamas, but the operator is based in Germany and the cruises were organised in Germany. Therefore, the operator was authorised by the German Federal Environment Agency. The operator is an IAATO member. The Observers were well received throughout and made to feel welcome by the Master and expedition leader.

Vessel Details

MV *Bremen* was launched in 1990 and appeared well maintained by her owner and operator Hapag Lloyd. Classed by Germanischer Lloyd (GL) she is ice class E4. *Bremen* was commanded by a German Master, and most of the senior crew members were also German. There were beds for a maximum of 188 passengers and 94 crew. 141 passengers were onboard at the time of inspection and 103 crew members, including eight guides.

External Inspection

The Observers considered that the vessel was in a very good material state with no environmental or pollution concerns noted.

Antarctic Treaty, Documentation and Compliance

The operator and vessel were both authorised by the German authorities. The permit document was held on board and verified by the Observers. The permit covered the operations of the vessel for the 2014-15 season for all six cruises of MV *Bremen* to the Antarctic Treaty area, finishing with the end of the last one.

Environmental Management

The *Bremen* was fitted with a reverse osmosis plant which was capable of producing water at 100m^3/day, with the ship's demand was about 55m^3/day. The vessel was also fitted with a flash

evaporator from which waste heat could be recuperated from the main engines should the RO plant become defective. The water was dosed by chlorination and could be treated by UV if required.

A three stage IMO-approved sewage system was fitted to treat sewage and grey water, where grey water was mixed into the third stage and discharged overboard. Grey water could also be contained onboard and the vessel had a tank with about a six day endurance before discharge. Oily water could be stored in various tanks (approx 10m^3 total capacity) and processed using an oily water separator when above 60°S. The Observers were informed that the endurance for the oily water containment was more than enough to last a cruise period. All equipment was clean and in a good state of repair.

Waste was separated onboard and managed with various space saving solutions; a shredder was used for tin and glass, a rubbish compactor for tin, plastic and cardboard, and an incinerator was used for the majority of general waste and sludge, except for food which was dehydrated and stored for removal in port.

The vessel usually catered for German-speaking passengers with occasionally passengers from other nationalities. The language generally used onboard was German. Briefings were provided in English for international groups and for crew instruction and training. The vessel had not taken full charters with other single nationality groups.

The Observers considered that environmental protection and passenger training was taken seriously onboard the vessel. The Observers were informed that the first full day of a cruise was focused on ensuring there was no inadvertent introduction of non-native species with vacuum cleaning of rucksacks, and pockets and zips for all those intending to use their own outer clothes. Vacuums continued to be available in the changing area throughout the voyage. Most passengers preferred to use the yellow jackets and rubber boots provided by the operator.

The observers were impressed with the automatic boot washing facility onboard the vessel, known as the 'Guanomatic', with a hand sanitising facility nearby, and with the automatic in/out card swiping facility for those leaving and arriving. The Observers were signed on to and off the vessel and wore visitor passes provided by the vessel.

The passengers and Observers when they came onboard had to complete a self-declaration form for Ebola in order to assess whether they had been to the affected regions or had been in contact with someone who had the virus.

IAATO posters and wildlife guidelines were on prominent display in the public areas of the vessel, particularly around the disembarkation point. Passengers signed a self-declaration form about wildlife and environmental protection in the Antarctic and that they had taken appropriate bio-security measures. The Observers were told that pre-landing briefing and re-caps after landing and other activities were provided in the main passenger lounge and bar area.

Pollution and MARPOL Plan

A robust Ship's Oil Pollution Emergency Plan (SOPEP) was managed by the Chief Officer and kept on the bridge. A plentiful supply of oil spill response equipment was kept in a locker on the upper deck and further equipment was in the main store, exercises were carried out biannually as directed by GL. There were two bunkering stations (port and starboard sides) which were enclosed providing adequate protection should a leak occur, this compartment also contained oil spill equipment and drip trays.

Emergency Procedures

The Ship's Chief Officer discussed safety and emergency procedures at length with the Observers and provided a full tour of all muster areas, lifeboats and other emergency equipment. *Bremen* had clearly thought out emergency plans. Passengers were briefed immediately prior to the vessel sailing on emergency procedures. There were two partially enclosed lifeboats for 73 people each and two smaller partially enclosed lifeboats for 32 people each. In addition there were six life rafts with a capacity of 25 people in each.

Medical

The sickbay was extensive and modern. It comprised three sections, a one bed ward, a main room including examination/operating couch, and a bathroom accessible from either of the other two sections. There was a defibrillator with external pacing capacity as well as two portable defibrillators, one of which was usually taken ashore when landings were made. The sickbay was equipped with an ultrasound machine and laboratory equipment with which it was possible to conduct basic chemistry and haematology, as well as more advanced analysis.

The doctor was a consultant physician (internal medicine specialist) with a great deal of cold weather experience. He was assisted by an experienced nurse. Pharmaceutical supply was arranged through the parent company's logistics chain. Clinical and pharmaceutical waste was kept separated and disposed of in port through appropriate contracts. There was an existing evacuation plan, and the ship had a contract for telephone medical advice. All expedition guides carried a first aid kit whilst ashore.

Small Boat Operations

Boat operations were conducted using zodiac inflatables with outboard motors with around seven or eight passengers in each boat, accompanied by a guide. Boats appeared well-controlled and handled with safe procedures for passengers embarking and disembarking. Control of personnel to and from the vessel was clearly well run with capable bio-hazard controls in place and a swipe card system to ensure all passengers were accounted for.

In addition to the 12 conventionally powered zodiacs, the ship was trialling two electric powered versions. The Observers were informed that these boats would minimise the impact of tourism on the area by removing almost all underwater noise and any risks of fuel pollution. The Observers noted the potential for their development and that further use of electric boats in the Antarctic Treaty area should be encouraged.

Expedition and Tourist Management

The expedition leader confirmed that the only activities being undertaken on the cruise were zodiac cruises, shore landings and extended walks. No camping or kayaking activities were undertaken. The Observers were subsequently informed that these activities would require an additional permit as they were not included in the permit that was issued by the Federal Environment Agency for this season. The operator was aware of this fact and would include camping and kayaking activities in the application if those activities were to be offered in an upcoming season.

No UAVs were in use, either by the crew of the vessel or passengers. It was the operator's policy not to allow passengers to operate UAVs. The Observers were subsequently informed that the operator itself did not consider it necessary to use UAVs for ice-navigation or other ship/company-related purposes and therefore had not yet applied for a permit to use them.

Whilst there were no shore landings being undertaken at Paradise Harbour during the inspection, the expedition leader confirmed that the usual policy involved sending a scout boat

ahead with the expedition leader and Chief Mate to assess the conditions. Emergency equipment (blankets, food, communication equipment and emergency shelters) were landed in large boxes. The expedition leader said that in 20 years of Antarctic operations these emergency supplies had never yet been used by the *Bremen*. If the location and conditions were suitable for a landing, then the lecturers and guides were landed first. Passengers would then be landed and given a short briefing on shore, with no more than 100 people ashore at any one time, with around eight guides to assist. The standard approach was to flag a suggested route and have guides positioned along the route to support passengers and enhance their experience.

All expedition staff were expected to complete the IAATO field staff online assessment and certification programme, as part of the operator's own internal policy.

Science

There was no science being undertaken on the vessel and the vessel was not supporting any external science projects. However, when requested by national Antarctic programs the vessel did take small numbers of scientists as passengers to research stations. For example, in previous seasons German scientists had been transported on behalf of the Alfred Wegener Institute.

Summary

The MV *Bremen* is a very well operated and maintained vessel, with excellent safety and environmental management systems. The expedition and tourist management of the vessel is also extremely well-focused and well organised. The use of electric zodiacs by the vessel is notable and novel, and their use should be encouraged where appropriate and safe to do so in Antarctica.

Recommendations

> None.

SY Australis (Australia)

Inspected 5 January 2015, 1400–1530

Date of last inspection

None.

Introduction

SY *Australis* was visited at anchor in Port Lockroy.

Vessel Details

Completed in 1994, the vessel is a 22.1m Masthead Cutter with a hull made of steel, with an ice strengthened belt and a displacement of 46.2 tonnes. The yacht is managed by an Australian Master Class 5 skipper, an Offshore Yacht Master First Mate and one other crew member. The yacht can take a maximum of 12 passengers as restricted by SOLAS lifesaving equipment (2 x 16 person life raft). The skipper has sailed in Antarctica and the Southern Ocean for 19 years and usually acts as the expedition leader. The operator, Ocean Expeditions, is a full member of IAATO.

External Inspection

The Observers considered that vessel was in good order and capable for the sea conditions found in Antarctica. All repairs and maintenance were completed by the two experienced crew members.

Antarctic Treaty, Documentation and Compliance

The yacht was authorised to enter the Antarctic Treaty area by the Australian Government. As part of the authorisation process, the Master was required to make an environmental impact assessment for the season on the basis of which an authorisation was issued by the Australian Antarctic Division. The Master also had good knowledge of the Antarctic Treaty and the Environmental Protocol.

Environmental Management

Fresh water was produced by using a reverse osmosis plant which had a maximum capacity of 4m^3 per day and filled a 1000lt tank, which generally lasted for about three days before more water was required. The vessel started each expedition with all fuel and water tanks filled. Sewage and grey water was discharged directly to sea. However, when in an anchorage, waste water was stored in an 80lt tank which would last for about two days before emptying.

Waste was managed onboard by separation and stored on the stern in plastic barrels for removal in port. The Observers were told that passengers were thoroughly briefed on waste management on joining the vessel. Some food scraps were dumped to sea when north of 60°S, but it was mostly retained for disposal in port.

Pollution and MARPOL Plan

There was an oil pollution plan in force on the yacht and spill kits were available for outboard motor fuelling operations. All used absorbents and pads were kept in a plastic tub which was held on the stern and landed when in port.

The diesel fuel tanks were 12m^3 capacity and single skinned. Petrol (200lt) was stored on the stern away from the main accommodation area in a single tank which had a 'saveall' spillway to stop any leaks when re-fuelling. The Observers were advised that occasional exercises were carried out and the routine was well thought about and understood by the crew.

Emergency Procedures

The Observers were advised that at the beginning of each expedition charter the passengers received a safety brief and were asked to sign a declaration to record that they had read and understood the safety information provided. The vessel had an impressive, self-generated training manual which detailed the initial safety brief which was given to the passengers before sailing. This included: what to do in the event of a man overboard, fire, abandon ship, evacuation and oil spills.

There were three water tight compartments (WTCs) in the vessel and all were separated by a water tight doors, which when on transit were kept closed at sea. All sea and fire safety equipment was in date for mandatory SOLAS inspections, stored pressure extinguishers and smoke detectors were arranged around the vessel and in each WTC and inspected yearly by contracted Chilean maritime inspectors. There was a manual fixed carbon dioxide extinguishing system for the engine space, which was controlled by an operating panel outside the engine room.

Medical

The yacht was well prepared and provisioned for medical emergencies, with three levels of medical kit. In the event of major medical emergencies, the Master explained that he could call two doctors in Australia for consultations. All of the crew members were Level 2 first aiders. The Master also asked the passengers if anyone else was first aid trained, and if any were radio operators who could assist in an emergency should they be asked.

Small Boat Operations

The vessel had two Bombard inflatable boats with 15hp outboard motors which were launched using two davits on the stern.

Expedition and Tourist Management

The Master explained that the yacht was under charter for an expedition cruise and the charterer had brought their own guide to supervise the landings ashore. However, the Master had ensured that as part of the vessel briefing, the passengers were briefed on how to behave ashore, including conservation of flora and fauna. The Master had also shown the passengers the IAATO presentation, and along with this the vessel also

had a copy of the IAATO Field Operations Manual and he made the passengers aware of the relevant Visitor Site Guidelines.

Science

A feature of the activities undertaken by the yacht was its strong support for scientific research programmes. Ocean Expeditions operated a science fellowship program, where every second season they offered the yacht, free of charge, to one scientist to conduct marine research. The Master explained that in the past they had supported a scientist from the University of New South Wales undertaking acoustic research on Leopard seals and another from INACH who had undertaken photo identification and obtained skin samples from Humpback whales. This season the yacht would support six scientists from the Malaysian Antarctic Programme, however at the time of the visit it was not yet known what science they would undertake. The operator subsequently confirmed that their research included chemical biology, physics, oceanography, and geo-spatial, environmental and human science.

Summary

Australis is a very well prepared and organised expedition yacht with a highly experienced and professional crew. The Observers were impressed with the novel science fellowship programme operated by the yacht.

Recommendations

> A man overboard exercise should be carried out on every expedition.
> The replacement smoke detectors and carbon monoxide detectors should be fitted as soon as possible.

MV Expedition (Liberia)

Inspected 5 January 2015, 1600–1830

Date of last inspection

None.

Introduction

MV *Expedition* arrived in the vicinity of Port Lockroy to disembark passengers by zodiac inflatable to Port Lockroy and Jougla Point. The vessel was visited and inspected whilst at anchor in the Peltier Channel. Small boat operations, landing procedures and onshore passenger briefings were also observed. Whilst Liberia is not an Antarctic Treaty Party, the expedition was authorised by Canada. The Observers were welcomed by the Master and expedition leader and no difficulties were encountered. The operator of the vessel is G Adventures, an IAATO member.

Vessel Details

An older, but well maintained, mid-size cruise vessel built in 1972 the MV *Expedition* is ice classed 1B by Lloyds Register. The Captain, Staff Captain and Master all had significant Antarctic experience and in the opinion of the Observers clearly ran the ship to high professional standards.

At the time of inspection there were 130 passengers and a mixed nationality crew of 71.

External Inspection

The vessel had recently been surveyed by Lloyds and appeared in good material state for her age with no overboard discharges or environmental and pollution concerns noted.

Antarctic Treaty, Documentation and Compliance

The vessel, and the operator, had both received Antarctic authorisation from Canada. The documentation was inspected and up to date. The Observers did not find any breaches of the Antarctic Treaty or Environmental Protocol during the inspection.

Environmental Management

The vessel, though ageing, was well maintained throughout. The reverse osmosis plant appeared to be in good working order and had a capacity for

fresh water production of 60m^3 per day with the ship tending to only use 35m^3. No methods of fresh water conservation were in place.

Sewage and grey water was managed using one IMO-approved sewage treatment plant (STP); it was an old style functional plant using aerobic action to break down waste with a final chlorination tank to kill any bacteria prior to discharge. There was also a holding tank of 40m^3 capacity, and this was in use at the time of the inspection as the STP discharge overboard was shut.

A comprehensive Waste Management Plan existed with notices throughout the vessel. All waste was separated and retained onboard for removal ashore. Food waste was retained in bags within a dedicated cool room. A rubbish compactor was used to compact all plastics, cans and cardboard, which were also retained in a dedicated stowage aft in the old cargo deck area for discharge ashore. There was no evidence of toxic waste onboard. All chemicals were held in a designated chemical store.

The ship had the capacity to hold bilge water in designated tanks which was then separated using centrifuges with the oil transferring to a sludge tank and the water being discharged overboard 12 nautical miles from land. Exhaust from the main engines was used to pre-heat the sea water used in a flash evaporator for the production of technical (feed) water.

Pollution and MARPOL Plan

The vessel's oil pollution emergency plan was offered for inspection. The responsibility for MARPOL incidents fell to the Chief Engineer. There was a fuelling station in the cargo hold and adjacent to this a good supply of oil spill response material held in two designated stowage areas. The ship had double bottom tanks and wing tanks containing up to 320m^3 of diesel (MGO). There were no records of a fuel spillage having taken place in the last three years. The Chief Engineer had been onboard for two years and there was clear evidence of a pride of ownership and high standards throughout.

Emergency Procedures

The Ship's Chief Officer provided a detailed brief to the Observers on safety procedures. The standard brief provided to all passengers was shown to the Observers. This brief was shown to all passengers on arrival followed by a demonstration of the correct donning procedures for life jackets and survival suits. Passengers were then taken to the lifeboats and invited to board. It was clear to the Observers that robust arrangements were in place for mustering personnel with consideration also given to passengers who might require additional assistance in the event of an emergency.

The vessel carried four 51 person lifeboats and six 25 person life rafts. Passengers had life jackets in their cabins and an additional 100 per cent of life jackets were available on the upper deck. Survival suits for all personnel onboard were also carried.

Medical

Medical cover was provided by a contracted volunteer doctor. The current doctor was a trauma surgeon who shared the role with her husband, a general practitioner. The doctor was on a one-month contract while taking a holiday from her hospital in Svalbard. She had worked for the company before both in the Arctic and Antarctic. As a Svalbard resident, she was familiar with cold weather medicine. The sickbay had a good range of drugs, including adrenaline and injectable morphine, with opiates stored in the Captain's safe. The sickbay also had two defibrillators. Pharmaceutical supply and waste disposal was organised through pharmacies at ports. Clinical waste was kept segregated and passed to the ship's company as hazardous waste. The doctor described a positive culture of development where

she had made several suggestions for improvements onboard, most of which were promptly acted on.

Small Boat Operations

Boat operations to and from the shore were conducted using up to 14 zodiac inflatable boats with outboard motors. The boats generally appeared well controlled with safe procedures for embarked passengers. Immersion suits were not used, but all passengers wore life jackets. The ship was in relative proximity to the shore and the zodiacs proceeded at relatively low speeds.

Expedition and Tourist Management

Passengers were landed in two separate groups at Port Lockroy and nearby Jougla Point, having left the MV *Expedition* anchored in the nearby Peltier Channel. They then had the opportunity to move by zodiac between the two sites, before returning to the vessel. All passengers received a short and focused briefing on landing at both locations. There were appropriate numbers of guides, with flags and other markers for protected areas and to mark walking routes.

There was extensive IAATO documentation and posters in the common areas of the vessel, particularly around the disembarkation points. The Observers were told that passengers received a full briefing prior to each landing, as well as undergoing extensive bio-security measures and receiving advice on the environmental guidelines on embarking on the vessel.

Boot washing and disinfecting was clearly in operation and use by the passengers. The majority of passengers wore red jackets and rubber boots provided by the operator. Guides were clearly identifiable.

The weather during the shore landing at Port Lockroy was particularly windy and cold. Understandably, this meant that passengers were keen to enter the historic hut 'Base A' at Port Lockroy (HSM No. 61) sooner rather than later. It appeared to the Observers that for some periods of time during the landing there were probably significantly more than the recommended 35 people inside the hut as specified by the Visitor Site Guideline.

Summary

The MV *Expedition* is well operated. It is an older vessel, but one which is thoroughly maintained with all appropriate safety features and a strong focus on standards, correct procedures and drills.

Recommendations

> The operator may wish to review how best to ensure that, even in low temperatures and bad weather, no more that the recommended 35 people enter the historic hut 'Base A' (HSM No. 61) to ensure compliance with the Visitor Site Guidelines, minimise overcrowding and to ensure the best possible visitor experience.

RV Akademik Sergey Vavilov (Russian Federation)

Inspected 10 January 2015, 0830–1100

Date of last inspection

4 February 1993 (United Kingdom, Italy and the Republic of Korea).

Introduction

The RV *Akademik Sergey Vavilov* was landing passengers at Half Moon Island when the Observers arrived. Passengers and guides were observed during the landings and during walks around the visitor site. The *Akademik Sergey Vavilov* is a polar research vessel owned and operated by the P.P. Shirshov Institute of Oceanography, within the Russian Academy of Sciences (IO RAS). The vessel is under long term annual charter by One Ocean Expeditions. It was expected that the vessel would make ten trips to Antarctica this season. The operator was authorised by Canada and is an IAATO member.

Vessel Details

The vessel was built in 1988 and was in class with Lloyds Registry as 1A ice strengthened. The crew and tour operator have long Antarctic experience and the Observers considered that they ran the ship to high professional standards. There were 93 passengers on board, 19 expedition staff, 43 crew, one scientist and one science observer.

External Inspection

Akademik Sergey Vavilov is inspected yearly to remain in Class. During the inspection the Observers considered the vessel to be in a good material condition for her age with no overboard discharges or environmental and pollution concerns noted.

Antarctic Treaty, Documentation and Compliance

The operator was authorised by the Canadian authorities. The documentation was seen by the Observers and was all in order. No breaches of the Antarctic Treaty or the Environmental Protocol were observed.

Environmental Management

Good bio-security provisions were in place, with passengers being seen cleaning and disinfecting their boots on return to the vessel following the

landing. The Observers were informed that all passengers received full briefings on the provisions of the Antarctic Treaty, Environmental Protocol and the various IAATO guidelines prior to arrival in Antarctica. The Observers were told that there was a thorough vacuuming and decontamination process and that passengers were required to sign a declaration confirming their compliance with the environmental provisions. Briefings were provided in English, with specific separate crew briefings in Russian. Where non-English speaking passengers were present, it was an operator requirement that they bring a translator with them.

Fresh water was embarked prior to leaving port where 340m^3 would last approximately 10 days until a flash evaporator was then required to generate 24m^3 per day until the ship returned alongside, although the evaporator was not often required. No methods of fresh water conservation were in place or perceived by the operator to be needed.

Sewage and grey water was processed using one IMO-approved sewage treatment plant. It was an old style functional plant using aerobic action to break down waste and a final chlorination tank to kill any bacteria, where grey water was mixed prior to discharging overboard.

The ship had a good ballast water management plan under the control of the Chief Officer and abided by the international IMO regulations. All waste was separated and paper, cardboard and used oil absorbents were incinerated and the ash landed ashore in the next port of call.

Pollution and MARPOL Plan

There was a basic Ship's Oil and Emergency Plan with a small spill kit held near the bunkering position and further equipment held in the forward locker.

Emergency Procedures

An impressive array of emergency equipment was landed ahead of passengers arriving on shore. This equipment included a defibrillator, stretcher, food, water, shelter and blankets/sleeping bags.

The ship was classed to carry 170 passengers. There were two 66 person covered lifeboats and four 50 person life rafts. Survival suits were available for 10 per cent of persons on board. The Observers were informed during the inspection that whilst there would most likely be sufficient life rafts for all personnel, there could be insufficient survival suits or covered lifeboat space for all onboard. The Observers were told during the visit that the vessel's owners have been requested to provide additional equipment. However, it was subsequently confirmed to the Observers by both the operator and the Canadian authorities that the vessel is already in full compliance with all appropriate SOLAS standards.

Medical

The ship carried two doctors. One was the ship's doctor, a Russian general practitioner, who looked after the crew. The other was the expedition doctor, an American general and trauma surgeon, who looked after the passengers. Both were experienced in both Arctic and Antarctic conditions.

Ashore the doctor had a good supply of emergency drugs and medical equipment and a rescue sled. The facilities on board were extensive including an operating table and dental suite as well as a separate two bed ward. There was a defibrillator, adrenaline and a wide range of primary care medications, but no imaging facility.

The medical evacuation plan depended on the current location of the ship, and all such evacuations were coordinated through the ship's master. Pharmaceutical supplies were topped up at each port call where possible. Pharmaceutical and

clinical waste was segregated and landed to the South American mainland. The Observers were informed that passengers were questioned about their possible exposure to the Ebola virus prior to departure.

Small Boat Operations

Small boat operations to and from the shore were conducted using zodiac inflatables with outboard motors. The boats appeared well controlled and handled safely.

Expedition and Tourist Management

On this trip the operator was offering shore landings, kayaking, swimming and camping. The Observers did not see kayaking in operation at Half Moon Island but were told that the standard procedure was a maximum of 16 passengers in single or double kayaks, two guides in kayaks and an accompanying zodiac as safety cover.

Approximately 90 passengers were landed ashore, accompanied by eight guides, including the expedition leader. The expedition doctor was also ashore. Passengers were given a short and focused briefing prior to leaving the zodiac and then followed the flagged route through the site to the other side of the island. Whilst no specific 'crossing guards' had been posted in the locations where the footpath in the snow crossed the penguin highways, as suggested in the Visitor Site Guideline, there were guides at other 'pinch points' to ensure that penguins had the right of way to and from the sea.

Nearly all the passengers wore red waterproof jackets and trousers provided by the operator. Approximately half-way through the passengers' time on shore a mist descended which temporarily obscured the vessel. The position was actively monitored by the expedition leader and all passengers were informed about what signals from the ship would be given to return to the shore.

The shore landing was well-managed and no contraventions of the Visitor Site Guideline or the Environmental Protocol were observed. No UAVs were in use on the vessel or onshore, either by passengers or crew.

Science

Under charter to the operator, scientific survey work was made possible during mobilisation, demobilisation and often throughout the passenger season. The vessel undertook a wide range of underway marine scientific observations for the IO RAS when it was working on tour charters in the Antarctic each austral summer season. The Observers were informed that the operator has also supported a small number of other independent scientific projects in Antarctica.

The purpose of the IO RAS underway observation programme, which began in 2010, was to study the Antarctic Circumpolar Current. The speed and direction of the currents in the upper 30–1000m layer of the ocean were measured using an Acoustic Doppler Current Profiler. Measurements were made during vessel passenger transits to and from the Antarctic Peninsula and were taken in the Drake Passage, the Bransfield Strait and in some parts of the Scotia Sea. In addition, measurements of sea surface temperature and the conductivity of the seawater were taken within a thermosalinograph. The vessel also had an automatic meteorological station. The programme was supported by the operator and run by a scientific technician from the IO RAS who worked onboard the *Akademik Sergey Vavilov* throughout the austral summer. Data was sent back to the IO RAS at the end of each season, and then presented to the national federal Russian science programme, "One Ocean Expeditions" and also to the international "Climate and Ocean Variability, Predictability and Change" (CLIVAR) programme co-ordinated by the World Climate Research Programme.

The Observers were told by the Russian scientific technician that an Argentine scientific observer was onboard the *Akademik Sergey Vavilov* to monitor the underway marine observation programme. The technician said that the observer was required by the Argentinean government as part of the permission given to IO RAS to collect marine data whilst transiting Argentine waters.

The operator was also supporting a two person science team from the US non-governmental environmental organisation Oceanites. They were seen by the Observers making counts of the breeding penguins, terns, kelp gulls and skuas at the Half Moon Bay tourist landing site. They wore different colour jackets to differentiate themselves from the passengers.

Summary

The *Akademik Sergey Vavilov* is well maintained and operated, and the shore landing at Half Moon Island was well-managed by an experienced expedition leader with over 15 seasons experience in Antarctica. There was clear guidance and monitoring of passengers, who received a refresher briefing on arrival on shore. No contraventions of the Visitor Site Guideline for this location, or the provisions of the Environmental Protocol, were observed.

The Observers were interested to see the productive use of the research vessel, whilst on commercial charter, to deliver a major underway programme of science observations. Multiple passenger crossings of the Drake Passage during the season allowed for more frequent observations of the ACC, at no cost to the IO RAS. The results of the programme have been published in high quality international research journals. The Observers noted that other marine science could be supported in this way, at very little cost if supported by the tour operator, either onboard the *Akademik Sergey Vavilov* or other Antarctic tourist vessels.

Whilst the operator and Canadian authorities have confirmed that the vessel is in full compliance with all appropriate SOLAS standards, the Observers were still concerned to note that they had been informed by members of the crew that additional equipment had been requested from the vessel's owners. The Observers believe that this issue should be considered further by the operator and the appropriate authorities.

Recommendations

> IO RAS and One Ocean Expeditions could provide further information about the underway science observation programme to tour passengers onboard the vessel.

> Given the apparent success of the underway science observation programme, that One Ocean Expeditions consider if the scientific capacity of the *Akademik Sergey Vavilov* could be shared more broadly with the wider Antarctic community.

MV National Geographic Explorer (Bahamas)

Inspected 11 January 2015, 1415–1715

Date of last inspection

None.

Introduction

The MV *National Geographic Explorer* anchored at Half Moon Island around 1400 and had started to land passengers as the Observers arrived. This was the passengers' first landing in Antarctica on this trip. Over the course of the season the vessel was expected to complete ten trips to Antarctica, and where ice and weather conditions permitted she expected to reach down to below the Antarctic Circle.

Although the vessel was flagged to the Bahamas, a country which is not an Antarctic Treaty Party, the operator of the vessel met the requirements of the United States. The Observers were made welcome and no difficulties were encountered. The vessel is owned and operated by Lindblad Expeditions who are a member of IAATO.

Vessel Details

Launched in 1982, the MV *National Geographic Explorer* was purchased by the current owners in 2007 and extensively refitted to provide accommodation for 148 guests and 80 staff (approximately 20 deck crew and 60 hospitality and expedition staff). Her hull is ice-strengthened. The operator has also installed forward scanning sonar.

External Inspection

The Observers considered that the vessel appeared to be in good repair both externally and internally with no evidence of overboard discharges and no environmental or pollution issues were noted.

Antarctic Treaty, Documentation and Compliance

The Observers were shown a comprehensive suite of documentation covering the vessel and the expedition's EIA and management processes,

including the initial environmental evaluation that met the requirements of the United States' authorities. The Observers were satisfied that the Master, senior officers and expedition staff were aware of their responsibilities. The Observers also saw the IAATO Field Operations Manual, and the vessel's draft Polar Waters Operations Manual which was in development, in accordance with the ongoing work on the International Code for ships operating in Polar Waters being developed by the International Maritime Organization.

Environmental Management

In the Observers' opinion the vessel had a strong system of training and briefing in place to ensure that passengers and crew were aware of the provisions of the Antarctic Treaty and the Environmental Protocol. Passengers received a full briefing on departure, with those unable to attend briefings in person having access to the same material via television screens in their cabins. All passengers were required to sign a declaration that confirmed they understood the guidelines and had decontaminated their own clothes and belongings, such as rucksacks, if they intended to use them ashore. Most passengers chose to use the orange jackets provided by the operator.

The vessel, though ageing, was refitted in 2008 and was well maintained throughout. There were two reverse osmosis (RO) plants, both in good working order with a capacity for fresh water production of 200m^3 per day with the ship tending to only use 60m^3. No methods of conservation were in place with regards to fresh water management.

Sewage and grey water was managed using what the Master described as a simple IMO, MARPOL and Class-approved sewage treatment plant (STP) which had been installed when the vessel was remodelled in 2008. It used aerobic action to break down waste and a final chlorination tank to kill any bacteria prior to discharging. There was also a holding tank of 31m^3 capacity and this was in use with the STP discharge overboard shut at the time of the inspection. Grey water was held in two tanks each with a capacity of 23m^3. This again was retained and discharged once at sea and in open water.

A comprehensive Waste Management Plan existed with notices throughout the vessel. All waste was separated and retained onboard for removal ashore; food waste was stored in a small holding tank via a garbage disposal unit in the galley for discharge in open water. The food waste holding tank was located in a dedicated cool room, which also contained a rubbish compactor used to compact all plastics, cans and cardboard, for discharge onshore. There was no evidence of toxic waste onboard.

The Observers were informed that the ship had the capacity to hold bilge water in designated tanks which was then separated using a Marinfloc system, capable of filtering bilge water to standards exceeding those required by MARPOL. Filtered bilge water was not discharged within the Antarctic Treaty area.

Pollution and MARPOL Plan

The ship's oil pollution emergency plan was offered for inspection and the responsibility for MARPOL incidents fell to the Chief Engineer. There were two fuelling stations amidships port and starboard and adjacent to these was an abundance of oil spill response equipment held in two designated stowage spaces. The ship had double bottom tanks and wing tanks containing up to 348m^3 of diesel fuel (MGO). There were no records of a fuel spillage having taken place in the last three years. Petrol was held in 31 x 25lt tanks for use in the zodiac inflatables. Although there was a designated jettison stowage on the upper deck the majority of the fuel tanks were held in the zodiacs.

Emergency Procedures

The Safety Officer provided details of the ship's evacuation plans, including the briefings the guests receive when they arrive onboard. There were four enclosed lifeboats each with a capacity of 60 people, as well as five life rafts located on either side of the vessel. Lifebelts were sighted at intervals around the upper deck. Each passenger was provided with a lifejacket and the number of lifejackets was used to double check the number of people ashore. Fire drills were regularly carried out for the crew, approximately one per week, and breathing apparatus appeared to be in good condition and easily accessible.

The vessel was well supplied with communications equipment, both satellite and VHF were available, including four mobile Iridium phones that could be taken off the ship for use in the lifeboats if required. All passengers were required to have medical evacuation insurance and to provide proof to the operator, prior to embarkation.

Medical

Medical cover was provided by contracted volunteer doctors. The current doctor was an American consultant internal physician, who undertook the role as a job-share with her husband who was a general and cardio-thoracic surgeon. They had done several Arctic and Antarctic trips over a 16 year period. The Observers were told that with *National Geographic Explorer*, the preference was for a minimum of a month commitment. The doctors provided care to both the crew and the passengers.

The sickbay had a wide selection of medications, including opiate analgesia and a variety of antibiotics. Defibrillators and emergency drugs were present in the sickbay and with the shore party. Pharmaceutical supply and disposal of pharmaceutical and clinical waste, as segregated hazardous waste, was arranged through the shipping company's logistics chain. Pharmaceuticals were usually sourced from the US, though if necessary they would be locally purchased.

Emergency evacuation occurred via the Ship's Captain and his command team who would liaise to evacuate personnel as quickly as possible. This was laid out in detail in the ship's evacuation plan.

Some of the expedition team took part in diving, often to capture video footage to be shown to passengers onboard. The Observers noted that the diving team did not know the locations of all the hyperbaric chambers in the vicinity and these details were passed on during the course of the visit. In accordance with international cruise ship guidelines, all passengers had completed an Ebola-risk questionnaire prior to arrival in South America.

Small Boat Operations

The vessel carried a number of zodiacs to transport people ashore and as safety boats when guests were kayaking. The zodiacs appeared to be in good repair and well handled by the crew, with additional expedition staff or deck crew on hand to assist guests in and out of the boats at the shoreline and onboard. There was also a floating platform that could be towed behind a zodiac, which could be used to enable guests to get in and out of the kayaks easily.

Expedition and Tourist Management

Around 70 passengers were landed on the small beach to the south of Half Moon Island for which there is a Visitor Site Guideline. Another 70 passengers were landed on the wide gravel beach in front of Camara station (Argentina) and they trekked in separate guided groups to the top of the nearby hill. A doctor accompanied these groups.

Due to the time available for the visit, the Observers concentrated on the Visitor Site Guideline site and observed zodiac landings, briefings and the behaviour of passengers and guides ashore. All passengers received a short briefing immediately on arrival on the beach. There were five guides and the shore-based expedition leader covering this site. Routes were marked with small orange plastic cones and guides stationed at the end of the routes. The Observers noted that this site was used in a different way to that during the earlier RV *Akademik Sergey Vavilov* landing, with the expedition guides flagging the point beyond where the snow track was crossed by the penguin tracks to the south-east as 'out of bounds'. Both approaches were compliant with the Visitor Site Guidelines agreed by the ATCM in 2013.

The Observers were informed that *National Geographic Explorer* also offered kayaking, zodiac cruising and short walks on fast ice, when appropriate. No kayaking was seen, but the Observers were told that there were 36 double kayaks on board, with a maximum of 30 kayaks in use at any one time. Each person in a kayak had an EPIRB system with both manual and automatic activation on contact with sea water. On activation, the location and direction would be sent to both the accompanying zodiac and the bridge of the *National Geographic Explorer*.

The expedition leader confirmed that no UAVs were being used on the vessel, either by passengers or by the crew for ice navigation purposes. The Observers were told that all requests by guests for UAV use would be declined and this policy was clearly stated in the company's promotional material.

The expedition leaders confirmed that passengers were usually a mixture of United States and Australian citizens. Single country charters were not currently considered. Where there were non-English speaking passengers it was an absolute condition of acceptance that they bring their own translator with them. The Observers were informed that all members of the expedition team were required by the operator to take and pass the IAATO field staff online assessment and certification programme.

Science

The Observers were informed that the operating company had a policy of supporting a wide range of scientific research as part of its cruises to Antarctica. An experienced underwater specialist was employed as part of the cruise expedition team. The specialist told the Observers that she was an experienced sub-aqua diver, and would make shallow dives (between 12–22m depth), with a buddy partner, at most landing sites in Antarctica. The specialist would take video footage of the undersea life to show passengers back onboard. Any interesting or unusual footage was passed to marine scientists at the US Antarctic Program (USAP) or the British Antarctic Survey (BAS). No marine samples were collected during the dives. Passengers were not allowed to dive.

In deeper water, up to around 300m, a Remotely Operated Vehicle (ROV) was used to make underwater videos to show the passengers. The pilot of the ROV was the underwater specialist. Any interesting or unusual video footage was also sent to USAP and BAS, and the Observers were told that footage supplied had identified new marine species and helped scientists in their research.

During the 2014-15 season the *National Geographic Explorer* was also supporting a US non-governmental organisation, Earth Vision Trust, in their 'Extreme Ice Survey', a project to monitor a number of glaciers in the Antarctic Peninsula region using automatic time lapse cameras. This activity, under the Lindblad Expeditions' Initial Environmental Evaluation, met the requirements of

the US Environmental Protection Agency's environmental impact assessment process and was authorised separately by the National Science Foundation under the Antarctic Conservation Act. The ship would deploy two camera systems during the season to support this project.

The vessel also supported several marine mammal identification schemes for different science organisations and institutes, including photographic identification of Orcas, Humpback whales and Leopard seals in the Antarctic. The Orca study, which involved scientists from the National Oceanic and Atmospheric Administration (NOAA), also included the collection of biopsy samples for DNA identification and satellite tracking of individual animals.

On request, the *National Geographic Explorer* would also assist with the transportation of scientists to and from research stations, and had done so last season for the US National Science Foundation and had transported five scientists from Palmer research station (United States) to South America.

The vessel intended to visit a small number of research stations during the 2014-15 season, including Rothera research station (United Kingdom) later in January.

Summary

The Observers considered that the *National Geographic Explorer* has a strong expedition team who have a good knowledge and understanding of the requirements of the Antarctic Treaty and the Environmental Protocol. The vessel appears to be well-equipped and maintained and with good training for operations in Antarctica, particularly further south where ice conditions were likely to be more testing. The Master has over 20 years of experience in navigating in Antarctic waters. The science programme offered by the vessel has real deliverables and the Observers felt it could be considered as best practice in the field. The Observers did not observe any contraventions of the Environmental Protocol and related guidelines.

Recommendations

> The operator could consider establishing an independent scientific committee to choose the best research projects to support on its Antarctic cruises, if future requests outweigh their capacity.

Annex

Responses received of a substantial nature to the Inspection Report and hereby included in accordance with Article 14(4) of the Environmental Protocol

Party	Inspection Report	
Argentina	Camara	136
Chile	Yelcho and General Bernardo O'Higgins	137
Ukraine	Akademik Vernadsky	139
Germany	GARS O'Higgins	144
Uruguay	Artigas	145
China	Stansbury Peninsula Refuge	146

Comments made by Argentina concerning the inspection of Camara station

This season a civilian technician (architect) from the Argentine Navy checked the stability of the aerial masts in order to determine their general condition and if any maintenance might be required.

The station leader confirmed that by the end of the summer campaign the leak on the water tank was sealed.

Comments from Chile on the Antarctic Treaty Inspection Report

Dirección de Antártica

Santiago, 21 April 2015

Ms. Jane Rumble
Head of Polar Regions Department
Foreign & Commonwealth Office
United Kingdom

Dear Jane,

I would like to refer to the draft report on the Joint Antarctic Treaty Inspection Programme carried out by the United Kingdom and the Czech Republic during December 2014-January 2015, which cover the Chilean Antarctic Stations of Yelcho and General Bernardo O'Higgins.

In this regard we very much appreciate the efforts made by the UK and the Czech Republic in conducting an inspection programme during this last Antarctic summer. In particular, we take very seriously recommendations from the inspection teams. In this regard, I would like to make the following observations regarding both reports:

Concerning the inspection of the Chilean Station Yelcho:

- The Instituto Antártico Chileno (INACH) is already considering all the report recommendations to improve on safety and environmental management next summer season.

Concerning the inspection of the Chilean Station General Bernardo O'Higgins:

- We agree that O'Higgins Station has the capacity to accommodate an expansion of the scientific activities carried out there by INACH, though these activities are subject to available financing and interest on the part of scientific teams.

- With regards to raising awareness of the Antarctic Treaty provisions, including the Environmental Protocol, the Ministry of Foreign Affairs of Chile initiated a special course aimed at all non INACH personnel last year. This three day course, which is in addition to regular instruction given to personnel which will be travelling and conducting activities in Antarctica, is aimed at giving an in-depth knowledge of the Antarctic Treaty System. The recommendations made will be addressed in this year's course.

- Regarding the necessity to increase awareness of diving related injuries, and establish and disseminate the location of the nearest recompression facilities, diving activities carried out during scientific activities do not exceed a depth of 5 meters. They are conducted for very

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Ministerio de Relaciones Exteriores
Gobierno de Chile

Dirección de Antártica

short periods of time and always under expert supervision. Nonetheless the recommendation remains pertinent.

I would like to thank you once again for allowing us to review the inspection reports and having the opportunity to address some of the recommendations made by the inspection team.

With best wishes,

Francisco J. Berguño
Director of Antarctic Affairs
Ministry of Foreign Affairs of Chile

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Comments from Ukraine on the Antarctic Treaty Inspection Report

UKRAINE

MINISTRY OF EDUCATION SCIENCE OF UKRAINE

NATIONAL ANTARCTIC SCIENTIFIC CENTER

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31 March 2015 № 93

Foreign & Commonwealth Office
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Old Admiralty Building
London SW1A 2PA

Jane Rumble
Head of UK Delegation to ATCM

Dear Jane,

Many thanks for the draft report of inspection at Vernadsky Station of January 4, 2015. We send you back the report with our factual corrections as well as provide bellow detailed comments in response to remarks and recommendations stated in the inspection report.

1. National Antarctic Scientific Center depending on financial resources constantly takes steps to modernize the station. To carry out loading operations in 2005 there was installed a hydraulic crane Palfinger PK 10000 (M) with maximum capacity 5, 7 tones. In 2006 there was constructed a new double-skinned fuel tank with capacity of 200m³ (see below). In 2010 an automated meteorological complex "Troposphere" was delivered to the station allowing automatically recording the weather data, which are subsequently transferred to the World Meteorological Organization. In 2012 two storage tanks for water desalination with capacity 2m³ each were welded from a cold-rolled stainless steel and placed in the boiler-room. These new tanks were installed to replace the old ones made of black metal, which have already worked out their technological lifespan and do not ensure quality of fresh water. Internal computer network was moderni zed i n 2013. In particular, a new powerful server, routers, and Wi-Fi access points were installed, providing connection to a distance of up to 3 km from the station. An engine telemetry system had been installed in 2014 to enable the monitoring of engine performance from the main building.

National Antarctic Scientific Centre developed (and submitted for approval at the moment) Vernadsky station modernization plan, repair of existing and creation of new station infrastructure. The Plan will be carried out till 2020 in compliance with the requirements of the State Special-Purpose Scientific and Technical Program of Research in Antarctica for 2011-2020 years. Within the framework of the Plan a technical improvement of both the engineering systems and communications, and scientific equipment is planned. In particular, installation of automated early warning system for fuel spills is planned and in 2016 it is planned to purchase and install a compact incinerator for solid waste.

Taking into account remarks of the inspection, maintenance check, test weighing and maintenance of fire extinguishers (June 2015), recharging of a set of fire extinguishers in Ushuaia; construction of covered wooden storage fo r b ags with compacted food waste where they cannot be accessed by local fauna (April-May 2015); building of metal pallets for barrels of gasoline and diesel fuel waste are introduced to the requirements specification for performance of engineering and logistic works at Vernadsky station during the wintering season of XX Ukrainian Antarctic Expedition (2015-2016).

During rotation of XIX – XX UAE a portable pulsed diagnostic X-Ray unit will be removed from the station, delivered to Ukraine, written off and duly utilized.

2. According to the Memorandum of Understanding between BAS and Ukrainian Antarctic Program (1995) the fuel storage facility present at that time should be replaced by a new tank. In addition, the Inspection Reports (2005) had recommended the replacement of this facility as soon as possible. This commitment has now been achieved.

On November 9, 2006, the draft CEE was sent to CEP consideration and further circulation among Treaty Parties through the ATS website. At the 30th Consultative Meeting in New Delhi Ukraine introduced IP-030 *The Replacement of Fuel Tanks at Vernadsky Station* (with a non-technical summary), and provided a presentation on the construction of the new fuel tank during the 2006/2007 season.

Some Members suggested that Ukraine might present an update of this activity, including activity regarding the old fuel tanks, at the next CEP meeting (CEP X Report, items 73-80).

In response to this Ukraine informed in Kyiv (2008) that the old fuel tanks with capacity 145 m^3 and 33 m^3 are put in dead storage. In the previous years one tank was cleaned of oil product deposits which have been taken out from the Antarctic Treaty Area in a special container and then utilized in a proper manner. In accordance with requirements of the Environmental Protocol it is planned to finish clearing of another tank and to use them both as a storage facility for dry solid materials (ATCM XXXI Information Paper IP-102).

It was agreed by Representatives of the National Antarctic Scientific Centre and British Antarctic Survey, who met at Boryspil Hotel, Kiev, 27 November, 2007 in

order to review a new ten year MOU agreement of cooperation between NASC and BAS and discuss a number of specific issues relating to science and environmental activities of the two organisations. At that meeting Dr Lytvynov, the NASC's director, reported, inter alia, that after due consideration it was decided that it was too expensive and technically difficult to remove old fu el tanks and that instead of removal the tanks will be drained, cleaned and a door will be fitted in a side wall to allow the structure to be used as a storage facility for dry solid materials. BAS applauded this NASC innovative solution to change the purpose of use of old tanks (the Meeting's Minutes of December 27, 2007).

The results of this Meeting were fixed in the current Agreement for Bilateral Cooperation in Antarctica between the National Antarctic Scientific Center of Ukraine and the British Antarctic Survey (April 11, 2008). In accordance with the Article VIII "... both parties agree it appropriate that the old fuel storage tank be cleaned, the waste fuel and sludge be carefully removed without causing pollution, and the empty tank to be modified to change its use to a dry solid materials store as soon as possible".

3. In 2010 there was developed and delivered to the station "Vernadsky Station Technical Passport", which allows learning in details about all facilities and life support systems available at the station. In 2014 "Station Commanders Handbook" was developed and put into operation. This document describes in detail all the features of staff life at the station (following the example of "Base Commanders Handbook"). In addition, there is a complete set of safety instructions and field operations at the station.

In 2014 in accordance with COMNAP Fuel Manual - V1.0 (April 01, 2008) the National Antarctic Scientific Center has developed "Vernadsky Station Oil Spill Contingency Plan", which in April 2015 will be delivered to the station. Paragraph 1.4 of this document provides for regular contingency exercises, both theoretical and practical, to test oil spill contingency planning and response at least twice a year – in winter and summer.

Pursuant to the 33th ATCM recommendations (ATCM XXXIII Final Report, points 242-148) Ukraine presented its policy (the Guidelines) regarding visits by tourists and nongovernmental expeditions to Vernadsky station. These Guidelines were revised in March 2011 and now the document clearly states the level of availability of infrastructure and personnel open for tourism activities. The Guidelines for visitors were developed and approved in accordance with national standards of records management. The extract from the Guidelines was presented for Parties' consideration in a format of the Visitor Site Guidelines, facilitating tourist vessel expedition crew comprehension and use (ATCM XXXIII Information Paper IP-110 with the attachment). A copy of these Guidelines is available at Vernadsky station.

4. In accordance with point 1, Article 5 of Annex III "Waste disposal and waste management" to the Environmental Protocol "sewage and domestic liquid wastes may be discharged directly into the sea, taking into account the assimilative capacity of the receiving marine environment". Also, in accordance with paragraph (b) of this point, such wastes, generated in a station where the average weekly occupancy over the austral summer is approximately no more than 30 individuals, shall not be treated by maceration.

As soon as the average occupancy at Vernadsky station over the austral summer is approximately no more than 20-25 individuals (excluding tourists) Ukraine meets the commitments of the Environmental Protocol concerning disposal of waste in the sea. In addition, a marine biologist from the station personnel is responsible for underwater environmental monitoring around the discharge point of sewage waters yearly during the austral summers.

Nevertheless, taking into consideration general commitment to reduce as far as practicable the amount of wastes produced or disposed of in the Antarctic Treaty area to minimise impact on the Antarctic environment (Article 2 of the Annex III to the Environmental Protocol), Ukrainian Antarctic Program's leadership considers a possibility to purchase (or develop) and install an additional equipment for sewage treatment within the technical improvement plan for Vernadsky station.

5. During the 2010-2011 austral summer a small Ukrainian Orthodox chapel was installed at Vernadsky station, sponsored by several private charitable foundations. Before the beginning of constructing works Ukrainian Antarctic Program, after procedure of a Preliminary Environmental Evaluation, issued the relevant permit AP No 035-10.

In March 2011 wooden modular constructions of the chapel (12 panel-gluing constructions of 6,5 cubic meters and total weight about 950 kg) were delivered to Vernadsky station by the Ukrainian Antarctic Program supply ship.

On March 25, a ceremony of consecration of the erected orthodox chapel took place. In order to provide this ceremony, an Archbishop of the Ukrainian Orthodox Church and a representative of the project sponsors (one is a citizen of Russian Federation) have arrived at Vernadsky station with a short-term visit together with the 15th Ukrainian Antarctic Expedition members. The chapel was named the Grand Prince St. Vladimir, Equal-to-the-Apls.

This humanitarian project has received the ministrations of Vladimir, the Metropolitan of Kiev and the whole Ukraine. In addition, the Icon of the Saint Nicholas was painted specially for this chapel by the icon painters from the School of icon painting manner, in compliance with considerations given in Resolution 2 (1996) on Educational and Cultural Activities.

All details concerning the construction of an Orthodox chapel at Vernadsky Station were presented in the ATCM XXXIV Information Paper IP-127 and IP-93. A copy of the relevant permit is available at Vernadsky station.

We hope our corrections and comments stated above will be taken into consideration or will be appended to the final inspection report, which will be prepared for submission to the Antarctic Treaty Consultative Meeting in Sofia in June.

With kind regards,

Director Valery Lytvynov

National Antarctic Scientific Centre,
Ministry of Education and Science of Ukraine

Comments from Germany on the Antarctic Treaty Inspection Report

The German Aerospace Centre (DLR) has provided the following clarification that the station does not process data for military purposes:

> The Earth Observation (EO) satellite missions TerraSAR-X and TanDEM-X are purely civil satellite missions, i.e. there is no dual use character of these missions. The missions are organized in a Public Private Partnership, whereby the German Aerospace Center DLR is responsible for the scientific exploitation of the missions and the industry performs the commercial exploitation.
> The data of these missions received at GARS O'Higgins are not processed at the station. Only metadata are extracted at the station and forwarded online to the German processing and archiving center.
> The SAR (Synthetic Aperture Radar) mass data, however, are not transferred online, but are written on tape and shipped to Germany. This procedure takes time – from a minimum of one week to a maximum of about 8 or 12 weeks (depending on logistics within Antarctica). This procedure is cost effective and has been chosen because no time critical usage of the data is performed.
> The TerraSAR-X data received at the station mainly belong to the so called background mission and have a clear focus on scientific purposes. The TanDEM-X data received serve for the worldwide digital elevation model processing, including Antarctica, as mentioned in the report.

Comments from Uruguay concerning the Antarctic Treaty Inspection Report

JOSÉ ARTIGAS
UNIÓN DE LOS PUEBLOS LIBRES
BICENTENARIO.UY

Jane Rumble
Head of UK Delegation to ATCM
Head of Polar Region Unit
Foreign and Commonwealth Office
King Charles Street
London, SW1A 2AH
UNITED KINGDOM

14th April, 2015
by email: Jane.Rumble@fco.gov.uk

Dear Ms. *Rumble,*

We are pleased to contact you, responding with our comments to your gentle note to us dated 10th March 2015 regarding the Antarctic Treaty Inspections to our Scientific Stations Artigas undertaken on January 12th 2015.

Uruguay wishes to add comments to the Report at the Recommendations section as follows:

Referring to the *¨waste to be returned':*

We inform that the mentioned rubbish was removed in February, as yearly done by the Uruguayan vessel during the annual summer resupply.

Referring to *¨the use of laboratory:*

We add that the extensive use of the laboratories and facilities is done during the stay of the scientists who, in this case, arrived after the visit of the inspectors, when they also bring their sensors and instruments specialized for each research activity.

As we stated during the past ATCM´s final reports, we appreciate those useful recommendations, from party to party.

We kindly request if these comments are appended to the final report of the inspection for the submission to the next ATCM XXXVIII.

With our best regards,

INSTITUTO ANTARTICO URUGUAYO
Ministerio Defensa Nacional

The President of the Uruguayan Antarctic Program

General

Claudio Romano

CC: Embajador Alberto Fajardo, MRREE
Direcciones IAU

CR/ALI/HB/nc

Comments from China concerning the Antarctic Treaty Inspection Report

The refuge on the Stansbury Peninsula was built by China in 1987 for emergency situations for Chinese scientists carrying out field work in glaciology and geology. It has been not used for many years. China has been planning to remove the refuge whilst considering the transport capacity. It expects it will be done in two years. China will be fully aware of the impact on the local environment when it removes the refuge and will do its best to minimise any impact.