UNITED STATES DEPARTMENT OF STATE

UNITED STATES ANTARCTIC INSPECTION TEAM 2006

Report of Inspections under Article VII of the Antarctic Treaty and Article 14 of the Protocol on Environmental Protection

NOVEMBER 12 – DECEMBER 1, 2006

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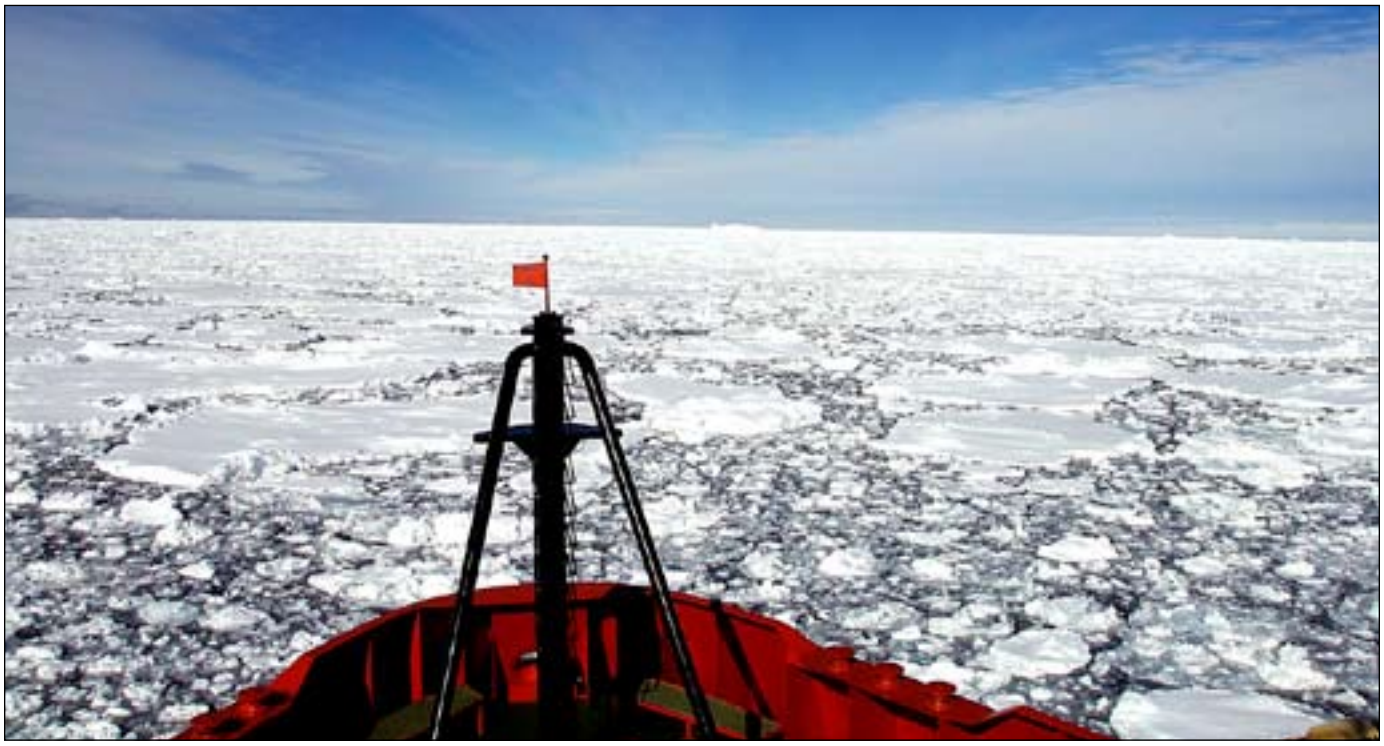
Table of Contents

U.S. Inspection Team



Bow of the *Laurence M. Gould* off Adelaide Island

Part I – Introduction

The United States conducted an inspection under the Antarctic Treaty from November 12 to December 1, 2006, the twelfth U.S. inspection since the Antarctic Treaty entered into force in 1961. This report describes the observations and conclusions of the 2006 U.S. Antarctic Treaty Inspection Team.

The United States carries out a long-term program of inspections in order to promote peace and security in Antarctica and to determine whether parties to the Antarctic Treaty are meeting their obligations under the Treaty and related instruments. The United States' program of inspections helps emphasize that the Antarctic continent is open to access by all countries. The last U.S. inspection was conducted in 2001.

As part of this inspection, the United States inspected a number of tour vessels operating in Antarctica. This was the first time that the United States had inspected tour vessels. A review of tour operations was undertaken because of the considerable attention that has recently been devoted by Treaty parties to issues related to tourism and the increasing number of tourists visiting Antarctica. Observations made in this report will help the United States and other Antarctic Treaty Consultative Parties assess and weigh policies related to tourism in Antarctica at future Antarctic Treaty Consultative Meetings.

The inspection is an interagency effort led by the U.S. Department of State, the agency that coordinates Antarctic policy within the U.S. Government. It does so in close cooperation with the National Science Foundation, which operates the U.S. Antarctic Program, including three year-round stations in Antarctica. The Inspection Team included officials from the State Department's Bureau of Oceans and International Environmental and Scientific Affairs, Bureau of Verification, Compliance and Implementation, and Office of the Legal Adviser, and

from the U.S. Environmental Protection Agency and the National Science Foundation.

The inspection was conducted under rights established in the Antarctic Treaty itself.[1] Article VII of the Treaty and its provision for the right to inspect was precedent-setting in international diplomacy and has been a cornerstone of the Treaty. It established the right of all parties to conduct on-site unannounced inspections of all installations and facilities in Antarctica, in order to monitor compliance and ensure observance of all of the Treaty's provisions.

The Protocol on Environmental Protection to the Antarctic Treaty, adopted in Madrid in 1991 (Environmental Protocol), also provides for inspection rights.[2] This was the second U.S. inspection since the entry into force of the Madrid Protocol in 1998.

The 2006 U.S. Inspection Team consisted of six U.S. officials designated by the U.S. Under Secretary of State for Democracy and Global Affairs in accordance with Article VII of the Treaty. The members of the Team, whose names were communicated to all parties to the Treaty by diplomatic note of October 27, 2006, were:

Mr. Evan T. Bloom
Department of State
Team Leader

LCDR Robert N. H. Duong, USN
Department of State
Deputy Team Leader

Ms. Aimee Hessert
Environmental Protection Agency

Mr. David Lopez
Environmental Protection Agency

Mr. Mark A. Simonoff
Department of State

Mr. Al Sutherland
National Science Foundation

The Inspection Team arrived in the Antarctic Treaty Area on November 14, having departed Punta Arenas, Chile, on November 12, 2006 on the National Science Foundation's ice-strengthened vessel *M/V Laurence M. Gould*. The Inspection Team inspected the following stations: Rothera (United Kingdom), O'Higgins (Chile), German Receiving Station at O'Higgins (Germany), Esperanza (Argentina), Bellingshausen (Russian Federation) and Great Wall (People's Republic of China). The Team intended to inspect two other stations but could not do so: San Martin (Argentina; heavy ice conditions) and Gabriella de Castilla (Spain; had not yet opened for the

[1] Article VII of the Treaty provides in relevant part:

1. In order to promote the objectives and ensure the observance of the provisions of the present Treaty, each Contracting Party whose representatives are entitled to participate in the meetings referred to in Article XI of the Treaty shall have the right to designate observers to carry out any inspection provided for by the present Article. . . .

2. Each observer designated in accordance with the provisions of paragraph 1 of this Article shall have complete freedom of access at any time to any and all areas of Antarctica.

3. All areas of Antarctica, including all stations, and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargoes or personnel in Antarctica, shall be open at all times to inspection by any observers designated in accordance with paragraph 1 of this Article.

[2] Article 14 of the Environmental Protocol to the Antarctic Treaty provides that:

1. In order to promote the protection of the Antarctic environment and dependent and associated ecosystems, and to ensure compliance with this Protocol, the Antarctic Treaty Consultative Parties shall arrange, individually or collectively, for inspections by observers to be made in accordance with Article VII of the Antarctic Treaty.

2. Observers are:

(a) observers designated by any Antarctic Treaty Consultative Party who shall be nationals of that Party; and
(b) any observers designated at Antarctic Treaty Consultative Meetings to carry out inspections under procedures to be established by an Antarctic Treaty Consultative Meeting.

3. Parties shall co-operate fully with observers undertaking inspections, and shall ensure that during inspections, observers are given access to all parts of stations, installations, equipment, ships and aircraft open to inspection under Article VII (3) of the Antarctic Treaty, as well as to all records maintained thereon which are called for pursuant to this Protocol.

4. Reports of inspections shall be sent to the Parties whose stations, installations, equipment, ships or aircraft are covered by the reports. After those Parties have been given the opportunity to comment, the reports and any comments thereon shall be circulated to all the Parties and to the Committee, considered at the next Antarctic Treaty Consultative Meeting, and thereafter made publicly available.

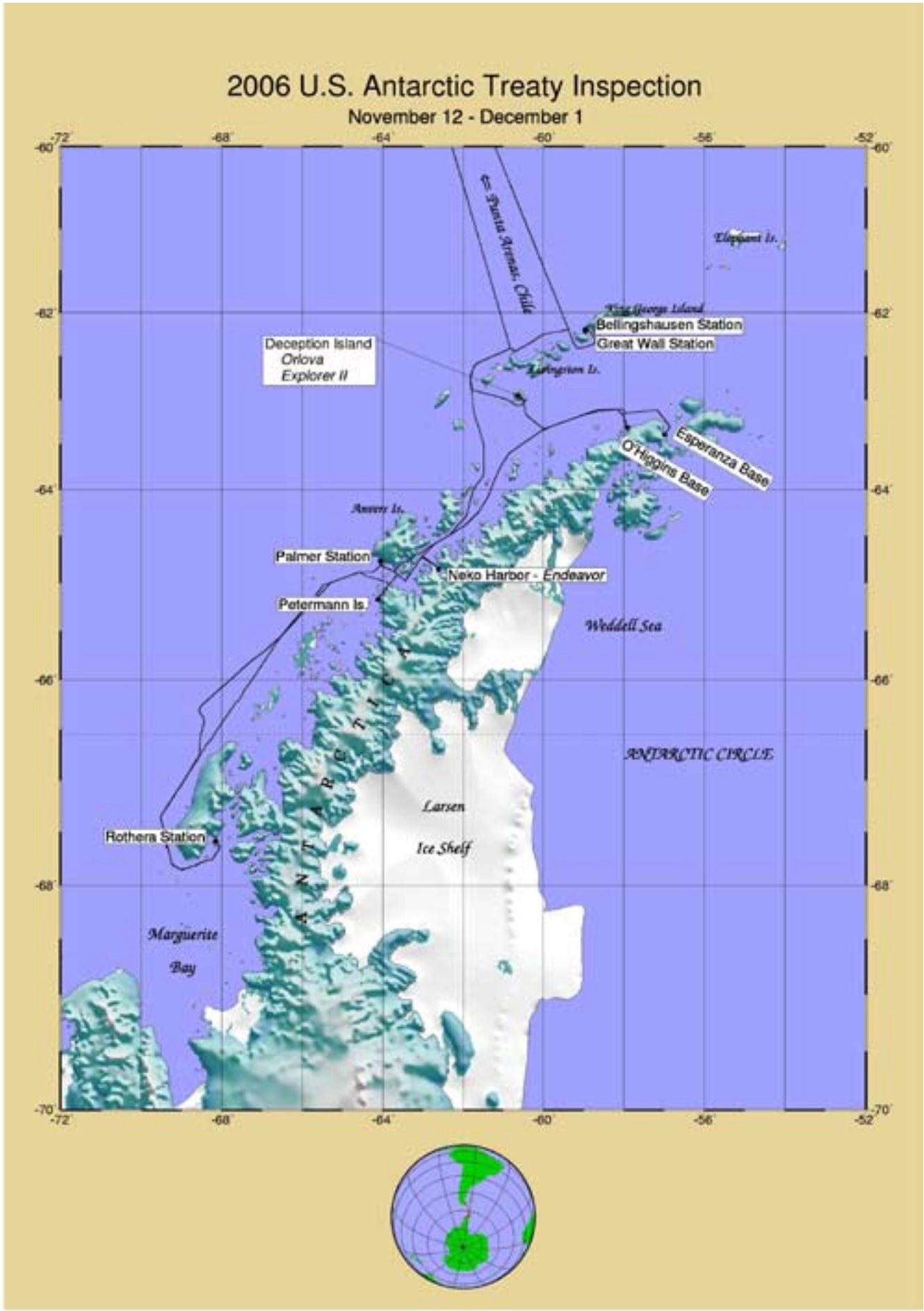
summer). The Team inspected the following vessels, with the permission of the masters of each: *M/S National Geographic Endeavour*, *M/S Lyubov Orlova*, and *M/S Explorer II*. The Team also visited the U.S. science field camp at Petermann Island in order to review how tour operations are conducted at the site, and U.S. Palmer Station.

The Inspection Team returned to Punta Arenas on December 1, 2006. The itinerary and route of the inspection are shown on the map (see following page).

The United States is a founding member of the Antarctic Treaty, which was signed at Washington on December 1, 1959. The United States plans to host the thirty-second Antarctic Treaty Consultative Meeting (ATCM) in Washington in 2009, the fiftieth anniversary of the Treaty's signing. The Treaty reserves Antarctica as an area exclusively for peaceful purposes. Moreover, it places science at the heart of international cooperation on the continent by guaranteeing freedom of scientific research, including the sharing of research and scientific information. It prohibits all military activities, including the testing of weapons, the explosion of nuclear materials, and the storage or disposal of radioactive waste. The Antarctic Treaty has been signed by 46 countries, 28 of which are conducting research on the continent, thus entitling them to the status of Consultative Party with the right to name inspectors.

ACKNOWLEDGEMENTS

A number of individuals and organizations contributed to the success of this inspection and their efforts are greatly appreciated. The inspection would not have been possible without the logistical and administrative support of the Office of Polar Programs of the National Science Foundation, under the leadership of its Director, Dr. Karl Erb. Captain Martin Galster, Mr. Herb Baker and the rest of the crew of the *Laurence M. Gould* provided the best possible support for all inspection operations. The map of the cruise and information technology support was ably supplied by Dan Elsberg and other members of the information technology team on the *Gould*. Agencias Universales S.A. (AGUNSA) handled logistic concerns while the Team was ashore in Chile. The Team thanks Palmer Station Manager Bob Farrell and his staff for their hospitality during the Team's short visit to Palmer, and Regina Cross of the State Department's Multi-Media Services office for designing the Team logo.


2006 U.S. Antarctic Treaty Inspection
November 12 - December 1
Punta Arenas, Chile
Elephant Is.
King George Island
Bellingshausen Station
Great Wall Station
Deception Island
Orlova
Explorer II
Esperanza Base
O'Higgins Base
Palmer Station
Neko Harbor - Endeavor
Petermann Is.
Weddell Sea
ANTARCTIC CIRCLE
Larsen
Ice Shelf
Rothera Station
Marguerite
Bay
ANTARCTICA
-72
-68
-64
-60
-56
-52
-60
-62
-64
-66
-68
-70

Neumayer Channel

Part II – General Conclusions

Although only a small proportion of the stations and tourist vessels in Antarctica were inspected, the Inspection Team hopes that the general conclusions below, as well as the more detailed observations related to individual stations, may lead to further improvement of efforts to safeguard the environment while conducting beneficial activities in Antarctica.

Conclusions, including recommendations, related to individual stations are contained at the end of the chapters covering those stations.

A. ANTARCTIC STATION OPERATIONS

The inspectors found a high degree of knowledge of, and respect for, the Antarctic Treaty and the Environmental Protocol, in addition to applicable measures, guidelines, and domestic laws implementing those instruments. There was also a good understanding at stations of the role and importance of inspections, as shown by the universal cooperation and assistance provided to the Team by all stations visited.

All station leaders expressed support for scientific research at Antarctic facilities, which is the cornerstone of cooperation among parties to the Antarctic Treaty. In addition, all station personnel spoke of significant cooperation with other stations and Antarctic programs with respect to science, safety, logistics and equipment. It is clear that the stations form part of a community, and this attitude among station managers fosters international cooperation within Antarctica and beyond.

The Inspection Team found no arms violations, storage or disposal of hazardous or radioactive materials, or activities with military implications. All stations appeared to be in compliance with the provisions of the Treaty reserving Antarctica exclusively for peaceful purposes.

The Inspection Team found that several stations did not seem to be fully aware of the Environmental Impact Assessment (EIA) process and pointed to decisions made by the responsible agency in their home countries -- decisions that were apparently not shared with the station manager. Given that the activities that might have an impact on the environment take place at the station itself, and that implementation of EIA's, including monitoring of environmental impacts, will be performed by personnel at the station, it is important that stations be more directly involved in the EIA process. The Inspection Team recommends that governments involve stations in all aspects of the EIA process, including the determination of whether an Initial Environmental Evaluation (IEE) should be prepared, the preparation of an IEE, the preparation of a Comprehensive Environmental Evaluation (CEE), and the monitoring of the environmental impacts of station activities.

Several stations had barrels of waste oil sitting exposed to the environment, without any secondary containment. In one case, the Inspection Team found a barrel of waste oil leaking its contents into the ground. The Inspection Team recommends that stations store such waste oil, prior to its removal from the Antarctic Treaty Area, in containers that will prevent leakage into the environment. In addition to waste fuel containment, the Inspection Team noted at several stations that clean, operational fuel for station, vehicle and aircraft use was either stored in permanent tanks or temporary drums that did not have secondary containment. Some permanent tanks were in need of sandblasting, ultrasonic or other testing, and recoating. The Team recommends that all fuel storage containers, whether permanent or temporary, have secondary containment and that all permanent fuel storage tanks be subject to a regular testing and coating maintenance program. In addition, all stations should have a ready supply of absorbent pads, booms and other clean-up material to be used in the event of both small and large oil spills.

In two instances, the Inspection Team found large piles of paint and chemical cans, twisted scrap metal and other assorted solid waste stored in a haphazard manner. Annex III of the Environmental Protocol requires the removal of such waste from the Antarctic Treaty Area. The Inspection Team recommends that all stations review whether such waste exists on their premises, and that they expeditiously arrange safe and prompt removal of such waste from the Antarctic Treaty Area.

The Inspection Team experienced considerable difficulty in communicating with stations to give advance notice of its intended arrival, despite having access to relevant Council of Managers of National Antarctic Programs (COMNAP) materials (such as the Antarctic Telecommunication Operators Manual (ATOM)) and state-of-the-art communications equipment on board the *Laurence M. Gould*. Although this can in part be explained by errors that were discovered in the materials, and weather and other conditions that always make Antarctic communications uncertain, there was cause for concern. For example, in the event of distress, tour vessels and others may not be able to reach stations that might be able to assist with search and rescue activities if communications are not adequate. Moreover, stations may have difficulty seeking support from other stations in the event of medical emergencies, oils spills and other situations requiring immediate action.

The Inspection Team recommends that COMNAP and the ATCM consider means to improve communications as a matter of urgency. A potential solution, for at least those stations capable of supporting a more sophisticated communications suite, may be at hand. All vessels operating in the Antarctic are now required to carry an A4 GMDSS (Global Marine Distress & Safety System) communications suite, and some types of MF-HF transceivers incorporated into these packaged equipment suites are designed to transmit only on International Telecommunications Union (ITU) channels. It would facilitate communication between ships and Antarctic stations if shore establishments selected stand-by frequencies that were on the ITU channel lists, whether simplex or duplex.

It would further enhance communication between ships and stations, and between stations themselves, if stations included a standard marine MF/HF DSC (Digital Selective Calling) Controller in their MF/HF gear, and if stations were issued an MMSI number from the ITU. This would allow stations to be made aware of an attempt to contact them via MF/HF, with call-back information, in the event their communications equipment could not be continuously monitored.

There are also likely to be alternative means to accomplish this objective outside the realm of marine radio equipment. One simple but very important alternative that should apply to all stations would be for COMNAP to verify, on an annual basis, the entries made into the

U.S. Team with O'Higgins officer

ATOM – particularly for the commonly available communications systems: e-mail, Inmarsat and Iridium. COMNAP could verify this information by annually attempting to call or e-mail each of the listed numbers. If no confirming reply is received, the respective COMNAP member should be notified with a request for an ATOM update. The COMNAP website, where the ATOM is posted, has now moved to a system of individually-named, password-protected entry. While the Team appreciates that information technology security is important, the result of this change is likely to be that myriad telecommunications operators at the various stations may not now be able to access the manual that was designed for them. The Team suggests that COMNAP consider a means of annually sending the ATOM, via e-mail, to each station that lists its e-mail address. Where a station does not list any e-mail, then COMNAP should send the ATOM to the respective member with a request to forward to the appropriate station. Finally, all stations should consider having Iridium, which is simple to operate.

B. TOURIST VESSELS

The Inspection Team was impressed by the dedication of the tour companies to ensure that the impacts of their operations on the Antarctic environment are no more than minor or transitory. The Inspection Team observed organized and well-managed landing and activities ashore conducted by three companies at two sites on the Antarctic Peninsula. The expedition staff implemented appropriate plans and guidelines at these sites and worked to ensure that passengers avoided restricted and sensitive areas. The activities observed were designed both to give tour passengers an enjoyable Antarctic experience and to avoid impacts on the Antarctic environment.

The Inspection Team also reviewed the operations of the tour ships and took note of two maritime incidents that had occurred in the past two years. While navigating through brash ice, one ship struck a growler (small iceberg) which caused minor damage to its hull. Another ship was caught on a sand bank for a number of hours and had to be pulled free by another ship. While the incidents are not necessarily representative of the Antarctic tour industry as a whole, and we understand that the number of such incidents overall is small, governments at the ATCM may wish to give further consideration to addressing the safety and environmental risks of tour ships in Antarctica.

The Team did not have the opportunity to inspect large vessels carrying over 500 passengers, which by and large do not land their passengers in Antarctica. Such vessels have been a major source of publicity and attention, and whether such vessels (as well as smaller vessels) pose particular safety and environmental risks is a matter that the ATCM may wish to consider.

C. OTHER OBSERVATIONS

The Team observed a number of dilapidated huts and refuges in several locations. Examples were the huts at Petermann Island and Neko Harbor. In the view of the Inspection Team, an effort should be made by those responsible for such huts to either repair them fully for some reasonable use (such as support for science) or remove them. There is no basis for old structures without historic designation to be left in such places simply on the basis that they might at some point provide a bit of safety to someone; if that were an appropriate basis for building and retaining huts, they would dot the landscape in contravention of basic environmental principles, if not the Environmental Protocol itself.

In addition to the aforementioned refuges, the Team passed by (but did not inspect closely) the following facilities that were unoccupied at the time: 1) A hut near Esperanza of uncertain ownership (the hut was referred to by Esperanza personnel as belonging to the UK but it had a Uruguayan flag painted on it), 2) Almirante Brown Station (Argentine, Paradise Bay) and 3) Deception Station (Argentine, Deception Island). If these facilities, and other similar ones reported, but not observed, are expected to remain unoccupied, consideration should be given to their removal.

The Inspection Team found value in visits by tourist ships to stations, especially to increase knowledge of scientific pursuits in Antarctica. Nevertheless, in light of the central role of science in Antarctica, the Team found it curious that some stations (including ones not visited by the Team) seemed to be going out of their way to attract tourist vessels. While there is nothing wrong with focusing attention on the historic aspects of stations and their locales, and visits by tourists can increase general understanding of the role of stations in Antarctica, the Team felt that resources might be better focused on expanding science programs than attracting tourists.

Petermann Island

Part III – Antarctic Station Inspection Reports

UNITED KINGDOM - ROTHERA RESEARCH STATION
67°34'17"S, 68°07'20"W
November 20, 2006

Rothera Research Station, operated by the British Antarctic Survey (BAS), is one of two year-round United Kingdom stations in Antarctica, and it is one of the largest stations on the continent in terms of personnel. Significant science is conducted at the station. Rothera also functions as a logistics center for UK scientific activities throughout the Antarctic. The station was established in 1975. Among all-year stations on the Peninsula, only Argentina's San Martin Station is farther south.

The Inspection Team arrived at Rothera's Biscoe Wharf on the evening of Sunday, November 19, 2006, and began its inspection at 8:30 a.m. local time the following morning. The Team was welcomed by Steve Hinde, Rothera's Station Manager, who led the briefings provided to the Team and also provided a comprehensive tour of Rothera's facilities. Advance notice of approximately three days had been given to the station, one day more than usual because heavy ice conditions made it advisable to coordinate earlier. The inspection lasted approximately seven hours.

Physical Description

Rothera Station is located on a promontory at the southern end of Wormald Ice Piedmont, Adelaide Island, on the east side of Ryder Bay, which is located within Marguerite Bay. The station covers 31,538 m^2, including 7450 m^2 occupied by buildings. There are currently 16 buildings, although the station is beginning a 15-year, 8-phase program under which many of the older structures will be removed and replaced in roughly the same locations with buildings using more modern materials and insulation. A 17th building, New Bransfield House, is under construction. This build-

ing will provide "modern messing facilities" and will replace the existing Bransfield House structure, which will be demolished.

The first buildings were erected in 1976, including the main accommodation buildings, power house and tractor shed. The station's main building for scientific research, the Bonner Laboratory, was completed in 1996-97. The Bonner Laboratory was destroyed by fire in winter 2001 as a result of an electrical wiring malfunction. The Laboratory was entirely rebuilt during 2002-03 and 2003-04, incorporating sprinkler systems and other anti-fire improvements. It reopened in 2004.

Other key buildings include Fuchs House, which contains workshops for repairing field equipment, travel stores and a coldroom; Admirals House and Giants House for accommodations; a generator building, a garage, a hangar and a boatshed.

A major feature of the station is its 900 m crushed rock gravel runway that is normally used by Dash 7 (DHC-7) and Twin Otter (DHC-6) aircraft. The runway became operational during the 1991-92 season. The station also has a secondary snow runway on a nearby glacier to the west.

Rothera Point includes, adjacent to its North Cove and abutting the station, an Antarctic Specially Protected Area (ASPA No. 129). The ASPA is used by scientists as a control area for reviewing impacts on the environment made by the station.

The station supports a number of field huts and facilities, especially by air, as well as field camps that vary according to the needs of scientists. Rothera manages over 15 fuel and food depots throughout the Peninsula. The fuel depots, totaling some 300 barrels, are inspected and refurbished at least once every two years. Depots consist of anywhere from 4 to 100 fuel drums. Major depots are located at Fossil Bluff and Sky Blue (both manned in the summer). This depot network provides an impressive reach throughout the Antarctic.

Personnel

At the time of the Inspection Team's arrival, the station had 37 persons in place, pending arrival of the remainder of the summer complement that would raise the total in mid-summer to 110 persons. The station has sleeping accommodations for 136 personnel, and over the summer approximately 230 persons will transit the station and stay at least one night. Twenty-one persons wintered over this year.

Of the 110 persons on station for the summer, 33 are scientists or scientific technicians. The remaining personnel provide logistics and support functions, including 23 construction workers building the New Bransfield House. One doctor is assigned to the station in the winter and two are assigned to the station during the summer. Personnel who winter over are usually hired on contracts of between 18 and 30 months.

Scientific Research

Rothera traditionally supports a wide range of scientific disciplines – marine biology, glaciology, geoscience, meteorology, terrestrial biology and upper atmospheric physics. For the 2006-07 season, the following science programs were reported: Two glaciologists working at Pine Island Glacier in collaboration with the U.S. Antarctic Program (USAP); an aerial radar survey was conducted of Rutford Ice Stream; two biologists worked at Ellsworth Mountains; two geologists at James Ross Island; biology and geology programs were conducted involving the drilling of fresh water lakes in the Peninsula. Although no preliminary International Polar Year (IPY) work was planned at this stage, BAS indicated after the inspection that Rothera will have a prominent IPY role and that BAS is involved in 25 percent of all IPY programs. The Inspection Team noted that Pine Island glaciology has strong IPY potential for collaboration with USAP.

The station supports the Bonner Laboratory, a substantially sized, stand-alone, multi-disciplinary scientific laboratory with scientific offices, conference space, general purpose labs, radioactivity lab (although no radioactive work is planned this year), chemistry/biology labs, an environmental lab, an aquarium lab, a dive locker, and a recompression chamber.

Physical sciences such as meteorology and Mid Frequency (atmospheric) Radar science are supported in Bransfield House.

Ships and aircraft support Rothera science. Ships include the civilian Royal Research Ship (RRS) *James Clark Ross* built specifically for BAS research and re-supply; *HMS Endurance,* a Royal Navy ship that supports BAS science and provides local helicopter support to Rothera; and the civilian *RRS Ernest Shackleton,* a sister ship to *Endurance* dedicated to BAS research and re-supply. There are four Twin Otters (DHC-6) at Rothera that provide logistical support to science throughout the BAS operating area.

International collaboration in the 2006-07 season includes local terrestrial biology with Dutch and Belgian scientists as well as the annual collaboration with the USAP in a long-term ecological research (LTER) program. For the LTER program, the *Laurence M. Gould* will visit Rothera in January 2007 as part of a regular, annual collaboration that has been active over the past decade.

Transportation, Communications and Facilities

Transportation. Rothera has two minor gravel roads: A 500 m track running northeast/southwest through the station as well as a 250 m track running east/west from the main station to the aircraft hangar. The station has a variety of ground vehicles, including five gators, 24 snowmobiles, one telehandler, and one small forklift. Additionally, at the time of the inspection, the station had one container lifter, one forklift, and one 360-degree excavator belonging to Morrison Construction. These vehicles were being used for the construction of new facilities. They will be removed from the station upon the completion of the project.

Rothera has one 60 m long wharf. The depth at the wharf was approximately 19 m allowing the *Laurence M. Gould* to dock pier-side without difficulty. The wharf is also used for the station's maritime operations. Rothera uses two 4.9 m outboard inflatable dinghies and four rigid-hull outboard-powered inflatable dinghies for local water operations.

Rothera has a 900 m long and 45 m wide crushed rock gravel runway. Additionally, Rothera also has available to it a secondary runway on a nearby glacier. The snow runway is used for ski-equipped aircraft operations if the primary runway is out of service. Rothera operates one Dash 7 (DHC-7) and 4 Twin Otters (DHC-6). The aircraft are used to transport personnel and supplies to and from Rothera, and to conduct airborne science. The aircraft are also used to supply and support work at various sites in Antarctica. Rothera has no rotary wing aircraft. Air operations occur only in

Rothera Station, Bransfield House

the summer months. During the season, the Dash 7 aircraft flies approximately 21 intercontinental flights while the Twin Otters operated numerous Antarctic continental flights. Rothera's runway had also been used in recent seasons by aircraft from Germany, Italy, Canada, Russia and the United States. As a safety measure, Rothera takes care to ensure that all personnel are aware of incoming flights and avoid crossing the runway when flights are arriving or departing.

Twice a year, Rothera receives supplies from the *James Clark Ross* or the *Ernest Shackleton*. In addition to fresh and dry goods, both vessels also deliver fuel for aircraft and station operations. Normally, supplies are transported to the station in December and March. During the 2006-07 season, the *James Clark Ross* will visit Rothera four times in order to provide equipment and personnel support for ongoing building projects and scientific work. Additionally, the DHC-7 aircraft is used to bring in small loads of essential cargo as necessary.

Communications. The station relies on several methods of communication, including VHF, UHF, Iridium, Sat B (Inmarsat), Mini M and a 24-hour VSAT satellite link hosting "BASnet." BASnet, which provides access to the Internet, became operational in 2004. BASnet has vastly improved communications for the base by providing 24-hour e-mail and inexpensive Internet-based telephone services, in addition to the vast range of information available on the internet. BASnet is very reliable, aside from the rare occasion when thick, wet snow interferes with the signal.

Facilities. Water is provided by a reverse osmosis unit with a reported capacity of 110 l per person per day. There is a limited snow-melting capability as an emergency back-up. Toilets are salt water flush.

Power is provided by three Cummins 680HP diesel generators. Typically one is operating, one is in back-up and one is in maintenance. A fourth emergency generator was reported to be in a container mounted on skids. Waste heat from the primary generators is used to heat the power plant. The station was starting to reach peak power capability and has had to reduce power demand by conservation efforts. Annual fuel consumption for power, boilers and vehicles was reported to be 600,000 l.

A concerted conservation and alternative energy program was reported to be in its preliminary phase. As an initial input to this effort, monitoring gauges for water consumption at various locations were installed last year. Electric gauges will be installed during the 2006-07 season. The goal is to understand the specifics of the consumption of water and power so that conservation and alternatives can be best applied. BAS has created a new position, that of Sustainable Energy Engineer. This individual will deploy to Rothera in the 2006-07 season to develop conservation, co-generative and alternative energy plans. Currently there is no solar or wind power system, but the new building, New Bransfield House, will have solar power for water heating. Emissions are not monitored at the source, but lichens are monitored for heavy metal uptake.

Hazardous chemicals are stored in a separate facility next to the Bonner Laboratory. The facility has secondary containment. The chemicals are segregated. Flammables are located separately from other chemicals.

Bulk fuel storage consists of six 240,000 l tanks. The tanks are located next to the aircraft hangar. Three tanks store marine gas oil (MGO) and the other three store aviation fuel. The tanks are bermed for secondary containment. A number of secondary day tanks, located throughout the station, are used to fire boilers in various buildings. All were observed to have secondary containment. All tanks have a layer of insulating material between them and the ground. No differential settlement was observed. Piping is heated and is primarily above ground but goes under the runway to the main storage tanks.

A significant amount of fuel is also stored in drums. There were 20-30 drums of gasoline for generators and vehicles, 20 drums of light kerosene for heaters, and approximately 270 drums of aviation fuel for depot maintenance. It was reported that there can be 400 to 500 depot fuel drums after a ship off-load. Currently, the drums are stored in standard 20-foot shipping containers in order to reduce exposure to corrosion. Since this is a standard fuel storage method, the Inspection Team recommends that secondary contain-

ment of these drums both on station and in the field be considered.

Fuel resupply is done from the *James Clark Ross* and/or the *Shackleton*. Approximately 50 m of flexible hose is run from the ship to the permanent above ground pipeline. When fueling, "slam-shut" valves are used on piping to isolate any leaks. Drip trays (1/2 drums) are placed at joints. During fueling operations, "line walkers" patrol the piping to report and take action on any leakage. Fueling is conducted twice per year. Fuel volume in tanks is monitored by manual sounding. In the summer, fuel management is conducted by the facility engineer. In the winter, it is conducted by the power plant mechanic. It was reported that all fuel management operations are guided by written procedure.

Arms and Military Support

The Rothera station manager informed the Inspection Team that there were no firearms kept at the station and none were noted. However, he indicated that a variety of explosives were kept for use in scientific seismic work. Explosives and detonators were stored in separate locked compartments. The compartments were situated a safe distance from occupied station facilities. The station manager and seismic scientists were the only personnel with access to the explosives. The station is considering moving explosive compartments further away from the New Bransfield House, which is under construction.

There is no military involvement in the management of Rothera or the running of the station. However, Rothera receives logistical and other support through the Royal Navy-operated *HMS Endurance* and from personnel of the Royal Navy and the Royal Air Force. *HMS Endurance* provides helicopter support for BAS field parties during each season. Two Royal Navy personnel assist Rothera with radio communications in the summer. Additionally, two Royal Air Force personnel set up and maintain communication infrastructure at the station. According to station personnel, no military equipment is kept at Rothera and the station does not engage in military activities.

Safety and Training

In the summer season there are two doctors in residence and in winter there is one. A two-bed clinic is on station. Minor surgery (*e.g.*, stitches, setting of bones) can be performed on station.

Evacuation of personnel for major medical treatment would normally involve using the BAS Dash 7 aircraft to fly to Stanley, Falkland Islands. Plymouth Hospital in the UK provides telemedicine support. For winter evacuation, a Twin Otter might deploy from the UK or Canada. Alternatively, the UK has Chilean Air force contacts for Twin Otter support.

Emergency medical support can be provided to nearby stations if requested. Air evacuation would be dependent upon availability of a Twin Otter landing site. Rothera has provided airfield and meteorology support to USAP-contracted Twin Otters performing winter medevacs at South Pole Station on two occasions.

A recompression chamber is available for diving-related incidents.

After a fire destroyed the original Bonner Laboratory in 2001, there was a concerted effort to determine the cause of the fire and to benefit from lessons learned. As a result, the rebuilt laboratory has a sprinkler system. Sprinklers will be installed in all new buildings, unless a review indicates that this is not necessary.

Fire emergency plans are posted throughout the station. Muster points and a personnel location tagging board are located at the Bonner Laboratory and Bransfield House. Fire extinguishers are the primary fire fighting equipment. They are regularly inspected and changed. There is a portable foam fire fighting system for aircraft fires. The vehicle mechanics and an air unit assistant are specially trained in aircraft fire fighting by attending a three-day aircraft fire fighting course in the UK. A test of the fire fighting systems is conducted every week. There is a muster fire drill approximately monthly. Once per summer season there is a mass casualty drill. Smaller exercises are held in the winter.

Environment

Pollution (Oil and Chemical Spills). The station made available its oil spill contingency plan. The station facilities engineer, and during winter the power plant mechanic, are responsible for implementing the plan, which is maintained and updated annually by the BAS Environment Office in Cambridge. The station manager provided copies of the "Station's Risk Assessment for Oil Spill Response," the "Station Procedures for Vehicle Refueling," and the "Method Statement on Refueling, Ship to Shore." The station is equipped with approximately 100 m of Vikoma inflatable boom, absorbent boom and pads. The station also has available a Vikoma floating skimmer that, in the event of an oil spill into the marine environment, could be used to contain and collect oil and oily water. The station uses collapsible holding tanks to contain the collected oil and oily water. Training in oil spill response is given to station personnel before deployment by BAS with support of Oil Spill Ltd, an international oil spill response organization. Station personnel receive additional oil spill response training and orientation at the station once they arrive. Pollution control training exercises are carried out at least twice per year. The station's ability to provide assistance, such as personnel or equipment, in the event of a pollution incident beyond the immediate local vicinity is limited and dependent on the availability of vessels.

Rothera Point ASPA sign

The Team was informed that most of the station's oil spill incidents have involved the refueling of Skidoos. These are small spills and the station is taking steps to minimize and stop these incidents. The steps include improved dispensing nozzles and more training of personnel. The station's policy is to report all spills of 100 l or more to BAS Headquarters in Cambridge. Records of all spills, including those less than 100 l, are maintained at the station and periodically sent to BAS Headquarters.

The station has coordinated two international oil spill exercises with visiting vessels. One was with USAP's *Laurence M. Gould* in 2003, and a few years earlier there was an exercise with the German vessel, *Polarstern.*

Waste Management. The station has a well-organized and detailed Waste Management Handbook (Rev. 1 (2005)). The Station Support manager has responsibility for implementing the procedures in the Handbook. The Handbook is maintained by BAS and is reviewed and updated annually. Station personnel receive training in waste management before deployment to the Antarctic Treaty Area. The training is provided by BAS through a conference held in the UK. Once at Rothera, personnel receive additional training on the station's requirements for waste management. The Rothera Station does not use products made from polyvinyl chloride (PVC) or that contain polychlorinated biphenyls (PCBs). Notices concerning waste management are displayed throughout the station facilities. These notices instruct personnel on types of waste such as recyclable materials (paper, glass, plastics, and metals) and other wastes such as spent batteries, biological and chemical wastes, as well as food wastes. The wastes are separated by category and baled and packaged for shipment to the UK. Office paper and cardboard are separately compressed; aluminum, metal cans and smaller steel objects are shredded and put into drums. All glass products are crushed and placed in drums. Plastics are similarly processed. The drums into which these materials are placed are color-coded and made ready for shipment out of the Antarctic Treaty Area.

Radioactive materials used for scientific purposes are separately handled, processed and marked for transport to the UK for disposal. Treated lumber is specifically color-coded blue and are also shipped to the UK for disposal. The Station has a fully functioning sewage treatment plant. The produced sludge is pressed, dewatered and bagged for shipment to UK for disposal. The effluent water is treated under ultraviolet light and discharged into the bay. No other waste is discharged into the marine environment. The station does not put waste in landfills or ice pits, or discharge waste into the sea. Most empty fuel and lubricant drums are removed from the Antarctic Treaty Area. Some are steam-cleaned and the wash water is captured and placed in an onsite container to allow the oil and water to separate. The oil is skimmed off and the water is pumped into the treatment plant. Drums in good condition are used to transport the wastes off the station bound for either the Falkland Islands or the UK.

The station has an old incinerator located outdoors near the construction for New Bransfield House. A new general waste incinerator will be brought on line during the 2006-07 season. Once the incinerator is fully functional, sewage sludge and food and clinical wastes will be incinerated at the station. The incinerator ash is bagged and shipped to the UK for disposal. The Inspection Team supported the station's need to bring a new more efficient incinerator on line as soon as possible. The current incinerator is in a poor state of repair and is fueled by scrap wood, which is not likely to produce the sufficiently high temperatures needed to properly burn wastes such as from avian products. The incomplete burning of this type of waste can produce emissions that could release the contaminants into the air that were meant to be destroyed by incineration.

There is no landfilling of wastes by the station. Wastes produced by field parties is bagged and brought back to the station where it is processed and packaged for shipment to the UK. Although the station only allows imports of boneless meat (chicken, beef, etc.), other animal products/waste such as egg shells are incinerated. Laboratory cultures are sterilized through the use of autoclaves.

Overall, the Inspection Team found the station's pollution and waste management well-organized and managed.

Conservation. Prior to arrival at Rothera Station, all new personnel are required to attend a BAS conference where they receive lectures and reference material on the rules regarding the conservation of flora and fauna in Antarctica. Pilots carry charts indicating the location of sensitive areas. While the Ryder Bay is not known for a high concentration of wildlife, South Polar Skuas return to the area each summer to breed. A five-month permit was issued pursuant to Annex II for four individuals to make biometric measurements of these birds at Rothera Point and Anchorage Island in Marguerite Bay. Krill in Ryder Bay can attract fur seals and Adelie penguins to the station later in the season. In addition, Weddell seals, Crab Eater seals, Leopard seals, and terns can be found in the area.

In 2004, fruit flies inadvertently brought to the station on fresh fruits and vegetables were found and eradicated. Since then, preventative measures and a monthly monitoring program have been instituted in food storage areas on the station.

Protected Areas. Adjacent to Rothera Station is Protected Area 129, Rothera Point, Adelaide Island. This site has been in existence and managed by BAS since the station was established in 1975. There is nothing unique or rare within the site. It was specifically designed as a control area for the study of human effects on Rothera Point.

Rothera personnel provided the observers with a copy of a permit authorizing entry to the ASPA by a Rothera Terrestrial Field Research Assistant for the purposes of biological sampling of soil, flora and invertebrates and monitoring of the breeding success of South Polar Skuas and Dominican Gulls. The permit appropriately included relevant provisions of the Management Plan.

Rothera informs all personnel and visitors at their orientation about the location and prohibition on entering the ASPA. Maps of Rothera Station clearly indicate where the ASPA is located.

Rothera Station, construction of New Bransfield House and incinerator

Rothera reported one accidental incursion into the ASPA during the summer of 2005-06, which was duly reported through BAS channels. Another marker was added after this accidental incursion.

The Inspection Team viewed the boundary of the ASPA and considered it to be well marked. A prominent sign at the point closest to the station clearly identifies the ASPA and announces the prohibition on entry. The sign also illustrates with a map the permissible walking path along the coastline. Rothera personnel indicated that the UK would release a proposed amended management plan in April 2007, more clearly showing the footpath and correcting the current management plan to state that the ASPA postings are marked by green signs rather than pink fuel barrels.

Environmental Impact Assessment. Rothera Station personnel coordinate with BAS in Cambridge on environmental aspects of projects on a regular basis, including the potential environmental impact of station projects and activities. It is unclear based on discussions during the inspection whether the UK prepared written documentation of determinations that it is not necessary to prepare an Initial Environmental Evaluation (IEE) in particular cases, *i.e.*, that "an activity is determined as having less than a minor or transitory impact," within the terms of Article 1.2 of Annex I of the Environmental Protocol. After the inspection, BAS Cambridge commented that Project Leaders must complete a Preliminary Assessment (PA) before their project can proceed. The completed PA form is assessed by the BAS Cambridge Environment Office as to whether the activity is likely to have less than a minor or transitory impact on the environment. If the determination by the Environment Office is that the impact is likely to be minor or transitory, then an IEE is carried out. If impacts are considered to be more than minor or transitory, then a Comprehensive Environmental Evaluation (CEE) is undertaken.

Several field activities were described that might have environmental implications. For example, BAS maintains approximately 300 fuel drums at approximately 10 fuel depots throughout the Antarctic Peninsula and in other parts of Antarctica. It is not clear how BAS has evaluated the possible environmental impact of these fuel drums. In the future, BAS may wish to consider documenting in writing the factors and analysis that led to a determination that an IEE is not necessary in connection with this fuel depot activity and other similar activities that may have environmental implications, if it does not already do so.

After the inspection, BAS commented that all field projects, including the establishment of drum depots, were evaluated for their possible environmental impact through the EIA process before they were allowed to go

ahead. The PA form used by BAS documents in writing the factors and analysis that lead to a determination that an IEE is, or is not, necessary. Copies of all PA forms are held by the BAS Environment Office.

Rothera reported the following Environmental Impact Assessments (EIA's) that have been prepared for activities currently being undertaken: a CEE for Rothera Point Airstrip; an IEE for expansion of Bonner Laboratory; an IEE for MF Radar; an IEE for the proposed construction of an accommodation building and operations at Rothera; and an IEE related to the 15-year planned redevelopment of the station. Rothera reported that a PA was prepared on the Sky Blue runway and field depot in October 2006.

The UK Foreign and Commonwealth Office Polar Regions Unit requires pre-season and post-season reviews of EIA's. This entails review of whether the activities stated in the EIA's are indeed being carried out. This is distinct from environmental monitoring of the EIA's (see below).

The station provided the Inspection Team with an IEE on the "Proposed Redevelopment of Rothera Research Station, Rothera Point, Adelaide Island, Antarctica," dated November 2005. BAS is planning to redevelop Rothera over a period of at least 15 seasons to provide new or refurbished facilities for accommodation, messing, science, recreation, storage, vehicle and boat maintenance, waste management and power generation. Several buildings are slated for demolition, and several new buildings are to be constructed. The construction and demolition will be undertaken within areas of previously leveled ground that have been subject to considerable station activity since 1975. Roughly the same number of square meters will be constructed as will be demolished. The IEE lists a series of mitigation measures that would be taken during the course of the project. The IEE concludes that "the proposed new buildings at Rothera Research Station are likely to have no more than a minor impact on the Antarctic environment, provided the recommended mitigation measures are carried out." The Inspection Team was shown the building site and confirmed that new construction will all take place within the "footprint" of the existing station.

Rothera monitors four principal areas for possible environmental impacts: The concentrations of heavy metals in lichens around the BAS research station; the distribution, numbers and breeding success of nesting birds at Rothera Point, Adelaide Island and Anchorage Island; the environmental fate and effects of fuel leaks and spills at BAS research stations; and the near-shore marine biology and sewage pollution at Rothera Point, Adelaide Island.

Tourism

Two International Association of Antarctica Tour Operators (IAATO) member tour ships are permitted at Rothera Station each summer season. IAATO tour ships coordinate with BAS in advance, and the station provides them with site guidelines for their visit. Ships either dock at the wharf or bring passengers ashore by Zodiac. Visits normally last about half a day, and visitors are given a guided tour ashore in small groups by station personnel. According to the station manager, visits to date by tour ships have been well planned, and have not caused any operational problems for the station. The station has a small store that sells souvenirs.

Conclusions

The Inspection Team was impressed with the overall operation of the station. Very considerable resources are expended at Rothera to ensure a high quality of support for scientific research conducted throughout a wide geographic area. Great care is taken to comply with environmental rules and to follow best practices.

The Team recommends that Rothera managers not store steel drums containing waste out in the open, as was observed next to the Generator Shed. Outside storage in recycled containers can lead to accidental seepage or spills. In addition, the Team recommends that the UK implement secondary containment of fuel drums at the station and in the field to protect against spills.

The Inspection Team supports the station's decision to replace in the very near future the current rusted incinerator with a newer more efficient model.

Chile's O'Higgins Base and German Antarctic Research Station from the sea

CHILE – GENERAL BERNARDO O'HIGGINS BASE
63°19'25"S, 57°54'02"W
November 23, 2006

O'Higgins Base is located in the northwestern part of the Antarctic Peninsula at Cape Legoupil. The base was established in 1948 and was built in the midst of an existing Gentoo penguin rookery. The logistic support of the base is managed by the Chilean Army (Ejército de Chile). At the time of the visit, the winter-over personnel manning the base were all military. Turnover to summer personnel was expected in one week.

The Inspection Team arrived at O'Higgins via Zodiac from the *Laurence M. Gould* on Thursday, November 23, 2006 at 1:00 p.m. The Team was greeted at the landing site by Base Commander Lt. Colonel Jorge Fuenzilida; Deputy Commander Major Pedro Sepulveda; and Science Officer Major Jorge Mell. These officers fully answered the Inspection Team's questions and provided a thorough tour of the base facilities. Two-day advance notice of the intended inspection date was attempted by telephone and e-mail directly to the base, but there were difficulties in communication as described in the communications section of this report. The Inspection Team also sought the aid of the Instituto Antártico Chileno (INACH), which was successful in alerting O'Higgins in advance to the Team's intended arrival. The inspection lasted approximately five hours.

Physical Description

O'Higgins Base consists of 1200 m² of combined floor area. One large, modern three-story building comprises the vast bulk of the base functions and houses all living, office, water and wastewater facilities. There are plans to move the power generators into the ground (basement) floor along with the other support facilities. There are a few additional unheated warehouses and garages on the base site. The initial building, built in phases and used from 1948 to 2000, stands adjacent to the new building built in 1999-2000. The old building is unoccupied and only serves to house minor storage and an incinerator. The old building is scheduled to be demolished and related material returned to Punta Arenas over the next few years.

The base supports a refuge 47 km away near Esperanza Base (Argentina).

The base commander indicated that the primary aim of the base is scientific research and establishing Chilean presence in Antarctica. Exploration away from the base has been curtailed due to three fatalities caused when a Snowcat fell into a crevasse.

Personnel

At the time of the Inspection Team's visit, O'Higgins had 17 persons at the station. One more person had recently left due to illness. All of these were Chilean

Army personnel, assigned for a year. During the summer, there will be 53 persons at the station, comprised of the 18 military personnel, an additional complement of 15 military logistics and support specialists, and the remainder will be scientists. The station can handle a maximum of 60 persons, but the Chileans indicated that up to 50 is ideal.

The station has two paramedics during the summer, but no doctor.

According to the base commander, all personnel receive extensive training in Antarctic Treaty regulations from INACH before deployment, as well as training in safety, first aid, fire prevention and Antarctic maritime matters. The commander also receives special training related to his responsibilities. The 18 Army designees are chosen from among many applicants and are required to pass an examination on Treaty and other matters. All personnel must undergo medical and psychological screening, and appendectomies are mandatory.

The base officers showed the Inspection Team copies of extensive materials related to the Antarctic Treaty, including treaty documents and regulations. They indicated that Chilean laws implement the requirements of the Environmental Protocol, and that staff at the station are trained in and required to follow these rules.

Scientific Research

O'Higgins was reported to support scientific research into ultraviolet (UV) measurements, magnetics (serving as a node in an international magnetics program headed by E. Zesta, UCLA), hydrology, oceanography and human physiology.

At the time of the inspection the base was manned by the winter-over crew. There were no scientists in residence, thus the science activities being conducted primarily involved monitoring of continuous measurement instruments, namely a magnetometer for the SAMBA program (E. Zesta, Principal Investigator) and the operation of a UV Dobson meter. Weather data was recorded and transmitted to Frei Base. In addition, there was a human physiology study sponsored by Italy in which personnel were assigned exercise regimens on a variety of gym equipment (tread mills, weights and various workout machines) to see if there were changing physiological effects on humans caused by periods of darkness and light. A program of retinal physiology affected by periods of darkness and light was also performed.

There is no separate laboratory, but one was reported to be planned. There are no radioisotopes used in scientific investigations.

Transportation, Communications and Facilities

Transportation. O'Higgins is located on an island that is separated by about 50 m from the Antarctic continent during high tide. There were minor access trails on the facility. A wire bridge connected the main base with the base garage on the continent. O'Higgins maintains a 47 km snow/ice trail from the station to the Chilean Refugio General Jorge Boonen Rivera. The station uses a variety of ground vehicles including a forklift tractor, a Rigo container transporter, a Snowcat and eight Ski-doo snowmobiles. The vehicles provide logistical support for the base as well as transportation for scientific work on the continent.

O'Higgins had a small permanent concrete dock that allows a small boat to deliver containers from a supply ship to the station. O'Higgins also has a temporary small craft dock that is used for Zodiac operations. The dock is assembled in November and disassembled in March. The station operates one Zodiac.

O'Higgins operates an ice runway on the nearby glacier. The runway is used by Twin Otters (DHC-6) flying from the Chilean Frei Base. Twin Otter flights average about one per month. Air operations are used to bring in essential supplies as well as personnel, and for emergency situations. Helicopters from Chilean naval vessels and Frei Base have also used the glacier landing area, but generally for only emergency situations.

O'Higgins receives supplies approximately four times a year. In August, the base receives the majority of its supplies including fresh food and dry goods as well as fuel (diesel, oil, gas) for the year. In December, January and March, the base is re-supplied with fresh food as well as other essential material. O'Higgins is supplied

by the Chilean Navy vessels *Oscar Viel, Lautoro,* and *Leucoton*. Additionally, supplies are also brought to the base via the Twin Otter.

O'Higgins Chilean Station, old main building

Communications. The Inspection Team had difficulty making contact with O'Higgins when trying to give advance notice of arrival. For example, the telephone number listed in the COMNAP ATOM directory turned out to be a private residence in Chile not connected with the base. Station personnel provided the following numbers for the base: Commercial Telephone: (56) (02) 4411245 or 4411525; Iridium Satellite: 881641417732. Station personnel confirmed that the email address is: baseohiggins@entelchile.net . INACH provided assistance in ultimately advising the base of the Team's intended arrival. Station personnel noted that its VHF radio is VHF 156.8 MHz (16) and not VHF 155.4 and 156.2 MHz as stated in the COMNAP Communications Directory. Its HF is 3100 KHz.

Facilities. Potable water is supplied by a reverse osmosis system capable of generating 500 l per day. A backup snow melter is also on site.

Power is supplied by three generators. Two produce 290 kw each and one produces 304 kw. The latter was to be shipped back to Chile for repair. No alternative energy sources are used.

No hazardous chemicals were reported to be in use. Industrial chemicals (cleaning supplies) were stored in a location separate from the main station.

Diesel fuel is stored in twelve outdoor storage tanks. There were three newer tanks containing 16,800 l each, eight older tanks containing 20,000 l each, and one older tank containing 21,000 l, for a total of 231,400 l. The newer tanks were well coated with paint but had no secondary containment. The paint on the older tanks was in need of re-coating. The older tanks did have secondary containment. It was reported that the older tanks were to be replaced and all tanks were to get secondary containment.

Piping to and from storage tanks is over-ground. Refueling is from ship and a flexible hose is run from the ship to the permanent piping. Approximately six drums of helicopter fuel were stored outside without secondary containment. A 5000 l bladder of petrol (gasoline) for light vehicles was reported but not observed.

Arms and Military Support

The deputy commander of the base indicated that there were no firearms at the station and none were noted. However, the station had on hand 20 flare guns and various flare rounds to be utilized in emergency situations. Additionally, O'Higgins also possessed smoke grenades for signaling purposes during air operations. For safety purposes, the flare guns and flare rounds are kept in separate storage areas.

O'Higgins is operated by the Chilean Army. Military personnel maintain the infrastructure as well as assist in the scientific work at the station. The Chilean Navy provides logistical support to O'Higgins on a routine basis. Additionally, a Chilean naval vessel is assigned to support and provide whatever assistance is required by all Chilean stations on the Antarctic continent.

Safety and Training

There are two paramedics on station. There is a small clinic for minor medical and dental care.

Emergency medical evacuation can be facilitated by Twin Otters landing on the glacier behind the station. Evacuation would be first to Frei Base, where there is a larger clinic, and then on to Punta Arenas for more serious problems. Twin Otters can land at the base in summer or winter.

A fire emergency plan with risk assessment was shown to the Inspection Team. There are fire hose locations throughout the station. All military personnel receive thorough fire training. Fire drills are conducted monthly – announced and unannounced. There is a survival station with survival food and equipment located in the basement of the gymnasium, a building separate from the main station. Day-long survival training is provided.

Environment

Pollution (Oil and Chemical Spills). The base has an oil and chemical spill contingency plan. The plan is updated annually. The plan will be updated shortly after the new commander arrives at the end of November. Pumps and approximately 140 l of dispersants are the only equipment available on base in the event of an oil spill. The base does not have booms or absorbent materials. Should there be the need to respond to an oil spill, the dispersants would be applied with the use of hand pump sprayers. The Inspection Team recommends that the base obtain absorbent pads and absorbent booms for oil and other chemical spills.

The base has 12 separate fuel storage tanks. Eight of these hold 20,000 l of fuel (diesel) each and are within an open-air metal containment structure with sufficient capacity to hold the single largest fuel container. These tanks appear to be the older tanks on the base and appear to be in poor condition. As the base expanded, the need for additional fuel was addressed by adding another four tanks: one holding 21,000 l and three 16,880 l tanks. These tanks do not have secondary containment, whereas the older tanks do have secondary containment. Base personnel indicated that the older tanks were soon to be replaced. The Inspection Team endorses this planned replacement and recommends that secondary containment be installed on all tanks. If the older tanks will not be immediately replaced, the Team recommends that they be sandblasted, tested ultrasonically and re-coated.

The base's fuel is delivered once per year and off-loaded to the tanks through hoses and surface pipe. Fuel (benzene (gasoline)) for the snow machines (Skidoos) is contained in a collapsible 5,000 l bladder. The base commander did not have any information or history of

O'Higgins Chilean Station, new main building

recent spills at the base; however he indicated that he is required to report all environmental spills/incidents to the Antarctic Department in Punta Arenas, Chile and to INACH. The base personnel receive pollution control training through INACH seminars in Punta Arenas, Chile. Once deployed to the base, the personnel receive base orientation on oil and chemical spill prevention and response.

O'Higgins could possibly provide personnel but not equipment to assist in the event of a pollution incident nearby. The base commander recalled that there has not been a need to take a response action pursuant to Article 15 or the Environmental Protocol due to any environmental emergency.

Waste Management. The base has a written waste management plan. The base's waste management plan is updated annually. A new waste management plan will be in place soon after the change of command. The station separates its waste by category. All paper, cardboard, glass, metal, wood, iron (old machinery), medical waste and batteries are separated and stored until shipped out of the Antarctic Treaty Area. The storage/holding area for these wastes is located in O'Higgins Base buildings. Several of these old buildings are scheduled for dismantling and the debris from these buildings will also be shipped out of the Treaty Area. Before being deployed, personnel receive specific training in Punta Arenas on the requirements for waste management in the Antarctic Area. Receptacles are marked for the separation of wastes. Electrical batteries are specially separated and packaged for shipment out of the Treaty Area to Punta Arenas for disposal.

Waste oil is stored in drums that are kept in the open. The Inspection Team was concerned that the drums are beginning to rust and could leak as the metal oxidizes over a long period of time. Chilean personnel reported that there are no wastes containing harmful levels of heavy metals or acutely toxic or harmful persistent compounds on site. The base does not utilize PVC or polyurethane foams or polystyrene foam. All wood, including any treated wood, is removed from the Treaty Area to Punta Arenas. Some older fuel drums are located at the base. The base maintains a cache of fuel for helicopters from Frei Base should the fuel be needed. Secondary containment of all drums (whether for waste or fuel) is recommended. All other solid, non-combustible wastes are separated and stored until removed from the Treaty Area.

Residues of carcasses of imported animals and all food wastes are incinerated; the ash is collected and stored until removed to Punta Areas. The incinerator is located in the older part of the station that is being dismantled. The incinerator appears to be part of the original construction of the base that was put in place in 1948. Although it is reported that the incinerator receives regular maintenance on a yearly basis, the Inspection Team noticed a distinct smoky odor coming from the incinerator that permeated throughout the older section of the station. The Inspection Team recommends that the incinerator and flue be inspected for leaks and repaired. It further recommends that consideration be given to replacing the incinerator with a modern high temperature system.

The base employs a state-of-the-art sewage treatment system and treats all sewage and grey water with the effluent being discharged into the marine environment. Any waste generated by field parties is brought back to the station for separation and storage until removed from the Treaty Area. There is no landfill, ice pit disposal or open burning taking place at the station. An inventory of the volumes of wastes removed from the Treaty Area was not available to the observers during this visit. The station does not have fuel depots at this time.

Conservation. Prior to arrival at O'Higgins, all personnel attend an INACH meeting in Chile where they receive a lecture on the rules regarding the conservation of flora and fauna in Antarctica. It was reported that there are no biological studies conducted at the base, and no permits have been issued pursuant to implementation of Annex II of the Environmental Protocol. The base was constructed in 1948 in the midst of an existing Gentoo penguin rookery. Monitoring by base personnel shows that many of the Gentoo penguin nests are in the same location as in 1948. While base personnel said they attempt to maintain a distance from the nesting penguins to prevent any disturbance, many of the nests are on or near base facilities where people must pass during daily activities, and thus close human contact with these animals is unavoidable.

It is unclear whether penguin nests were taken during the construction of the new part of the Chilean facilities in 1999 and 2000, and if so, whether any permit was obtained for the taking of these nests.

Protected Areas. There are no protected areas in the vicinity of the base.

Environmental Impact Assessment. Most of the old part of the base is slated for demolition, while a few buildings dating back to 1948 will be preserved and probably restored. Construction of the new part of the station was completed in 2000.

The base commander believed that both an IEE and a CEE had been performed prior to the construction of the new base and in relation to the upcoming demolition of the old part of the station. However, no copies of the IEE or CEE were available for review. It was suggested that INACH would have these materials.

An IEE is in the process of being prepared in relation to the removal of existing fuel tanks and the installation of new fuel tanks.

The commander stated that INACH is very diligent in ensuring that all activities receive appropriate environmental evaluation as required by the Environmental Protocol and Chilean law. INACH reviews the activities of the base with base personnel on a regular basis to determine whether an IEE or CEE is necessary, and it reportedly documents decisions not to conduct an IEE.

Observers reviewed a document providing guidelines and questions to determine whether an IEE or CEE is needed.

The base has a log book documenting environmental impacts on a weekly basis. For example, penguin nests, eggs and chicks are monitored, as well as other birds in the vicinity of the base. All monitoring is visual; there is no tagging and no touching of the birds.

Tourism

O'Higgins was visited by two tour ships in the past year. The *Alexander Von Humboldt* (the same vessel as the *Explorer II* inspected by the Team) visited the base in March of 2006, and the *Ushuaia* visited the base the day prior to the inspection. Both tour ships gave sufficient advanced notice to personnel at the base. Visitors were given a guided tour of the facilities by base personnel, and they did not cause any operational problems for the base.

Conclusions

The station is well-maintained and the new, modern buildings are exemplary.

The Inspection Team is in full accord with the stated plans to remove all or most of the existing old and unused portion of the base. As noted above, the remains of the old base should be removed from the Treaty Area.

Secondary containment should be used with all fuel tanks, bladders and drums. The Inspection Team is in full agreement with the reported plans to replace all old fuel tanks and to build secondary containment. If there is a delay in replacing the old tanks, the Team recommends that they be sand blasted, tested ultrasonically and re-coated.

Absorbent pads and booms should be stored on site for use in any oil or chemical spill.

The incinerator leaks should be sealed. The incinerator appears quite old and replacement with a new one should be considered.

The base should have on hand copies of relevant IEE's and CEE's, particularly with regard to the demolition of the old base buildings and construction of the new buildings. The base should be more integrally involved in the environmental impact assessment process, including evaluation, preparation, implementation and monitoring of IEE's and CEE's.

The Inspection Team is fully in accord with the intention of Chile to build a laboratory at the base. Science could be enhanced at the base and the fact that the base is within the boundaries of a Gentoo rookery would seem to afford a unique opportunity to study the wildlife and ecology of the region.

German Antarctic Receiving Station satellite dish

GERMANY – GERMAN ANTARCTIC RECEIVING STATION
63°19'25"S, 57°54'02"W
November 23, 2006

A German scientific station is located next to, indeed within a few meters from, Chile's O'Higgins Base, and the Inspection Team took the opportunity at the time of its visit to O'Higgins Base to conduct a brief inspection of the German facilities.

The Inspection Team was given a tour by the leader of the German station, Dr. Alfons Zimmer, and several of his colleagues. The facility is called the German Antarctic Receiving Station at O'Higgins. It is physically distinct from the Chilean station, and although the two entities cooperate closely pursuant to an agreement between Chile and Germany and share some resources, the two operate independently.

The station at the time of our visit had six persons in residence (four Germans, one Brazilian and one Chilean). During the summer, this number rises to 12. The station is occupied four to five months per year, and the rest of the time O'Higgins personnel provide basic caretaking services. Personnel are medically screened prior to deployment.

The German station consists of a series of modern prefabricated structures, brought in by ship in 1990, and occupies approximately 350 m^2. It also includes a prominent satellite dish located next to the bay. The station is funded entirely by the Federal Republic of Germany, and is affiliated with the German Aerospace Center (DLR).

A principal function of the station is to serve as an international ground segment of the German remote sensing data center. The station receives satellite data and imagery, including data related to measurement of the ozone hole over Antarctica, and Terra and Aqua MODIS Satellite images.

Work is also performed by the German Federal Agency for Cartography and Geodesy, which measures terres-

trial baselines between receiving stations in other parts of the world. The work is part of the Very Long Baseline Interferometer (VLBI) project.

The Germans do not have their own vehicles and boats and must rely on Chile and others in this regard. Personnel come to the station via air from Frei Station. A German support vessel visits occasionally.

The German Government requires that station personnel be trained in Antarctic Treaty-related regulations. Station personnel were not aware of any environmental assessment having been performed at the station, despite the fact that a power supply was added to the station two or three years ago.

After the inspection, the German Federal Foreign Office commented that the installation of a backup power supply had been planned for several years but the installation took longer than originally planned. In the early stages of the planning process, the environmental impacts related to the installation had been examined and found to be less than minor or transitory. The installation of the power supply was subsequently approved by Germany's Federal Environment Agency on January 7, 2004. The related logistic operations (*e.g.*, transport of the container) were not part of the environmental assessment because they were undertaken in accordance with a German-Chilean agreement that places such actions within the area of responsibility of the Chilean station operator. According to the documentation of the applicant, neither animals nor plants were directly or indirectly affected by the project.

It appeared that the large satellite dish and much of the station itself, which was built in approximately 1990, had been constructed on the site of a penguin rookery. It was unclear to the Team whether penguin nests were taken during the construction of the German facility, and, if so, whether permits were obtained for the taking of penguin nests, consistent with the 1964 Agreed Measures for Flora and Fauna, which were in effect at the time of the construction of the station.

After the inspection, the German Federal Foreign Office commented that, with respect to the location of the antenna in the immediate vicinity of a group of penguins, the construction created a wind-free area immediately adjacent to the concrete base on which the antenna had been built. Until recently, this area had hardly been used by penguins, since it was not ice-free for long enough periods of time required for breeding. The main penguin colony is found on the opposite side of the adjacent Chilean O'Higgins station. The area around the German station is experiencing high wind velocities which would normally prevent penguins from breeding there. By creating a less windy area, the installation of the antenna prompted the penguins to come to this spot. The researchers at GARS, who are physicists and technicians, report an increase in the overall number of penguins nearby the station in recent years. They do not interfere with the penguins but monitor them using webcams.

The Inspection Team was shown a very impressive array of equipment supporting the station's operation, including generators, a waste water treatment facility, and reverse osmosis equipment for production of drinking water. The station appeared to be following carefully necessary protocols for disposal and separation of wastes. Firefighting and safety equipment appeared to be up to date. Overall, the Team left with the impression that the German station was well-run and organized.

The Team appreciated the good will shown by the German station personnel, who had no advance notice from the U.S. Team, but nevertheless welcomed the Team warmly and cooperated in all respects.

Team walking at Esperanza Base

ARGENTINA – ESPERANZA BASE
63°23'70"S, 56°59'77"W
November 24, 2006

Esperanza Base is a year-round Argentine base located at the northern tip of the Antarctic Peninsula, on Hope Bay. It is operated by the Argentine Army, in coordination with Argentina's Dirección Nacional del Antártico (DNA). According to the base commander, it functions primarily as a scientific and logistical base, and also to establish a significant Argentine presence in Antarctica.

A naval post was first established on the site in 1930. The base was established in 1952. In 1978, Argentina first brought families to the base, a practice which has continued.

The Inspection Team arrived at the base at 10:00 a.m. on November 24. The Team was welcomed by the commander of the base, Major Alejandro Berto, who led the briefings and provided a full tour of the base's facilities. The Inspection Team gave Esperanza advance notice of approximately two days. The inspection lasted approximately seven hours.

Physical Description

The base, which occupies almost four square kilometers, has the appearance of a small town spread out on a hillside above Hope Bay, at the base of Mt. Flora, near Buenos Aires Glacier. The base consists of 37 buildings, variously constructed out of corrugated metal, concrete, and fiberglass. Many of these buildings were constructed after 1978. Among the buildings that the Inspection Team visited were the power station, the communication center, the hangar, the "casino" housing the kitchen and dining hall, the mechanics shop, a residence, the infirmary, two small laboratory buildings, the solid waste storehouse and the schoolhouse. Overhead electricity wires provide electricity throughout the complex. The terrain is loose rock, and a few gravel roads form the major arteries of the base.

Near the base's dock is a kind of outdoor museum, featuring an old sledge, a recreation of an original Swedish stone hut, and a building with placards naming Argentine personnel who worked at the base affixed to the side. The Inspection Team was informed that there are plans to convert this building into a museum for visiting tourists.

The base supports several refuges in the vicinity of the upper Antarctic Peninsula: Refugio Independencia, Refugio Cristo Redentor, Refugio Güemes, Refugio Abrazo Maipú and Refugio Malvinas. These refuges were reported to be used regularly for scientific and logistical purposes, as well as for search and rescue training.

The base is adjacent to thriving Adelie and Gentoo penguin rookeries. A specially protected area, ASPA number 148, is approximately 3 km from the base, consisting of the upper portion of Mt. Flora.

Personnel

There were 57 persons at Esperanza at the time the Inspection Team visited, consisting of about 30 members of the Argentine Army, their family members (total of 7 families) and 4 scientists. All of them wintered over. In summer, the base has about 90 persons. Among the 90, 30 to 35 would be the military officers who wintered-over, 30 more military personnel working on logistics, a dozen additional scientists, plus family members of the officers. There are sometimes several non-Argentines among the scientists. This summer, additional personnel will arrive to work on finishing a museum housed in an existing building. Others may come for a few weeks at a time. The capacity of the base is about 100.

There were reported to be twenty children living at the base at the time of the inspection, although the Inspection Team did not see any children. There are three teachers at the base, including a husband-and-wife team. Primary school students receive training from these teachers, while secondary students use distance learning for their education.

Military officers assigned to the base must, prior to deployment, complete an eight-month course on matters relevant to their duties, including study of the Antarctic Treaty, related regulations and environmental protection. Scientists also have their own courses, as do wives of the officers. Courses are provided by DNA as well as the military.

All persons on the base are subject to medical and psychological screening.

Base personnel showed the Inspection Team detailed documents published by the Argentine authorities related to the Antarctic Treaty and its various underlying rules and regulations, including the Environmental Protocol. Relevant documents are maintained at the base's main office. In addition to training in Argentina, new arrivals receive orientation training at the base on its procedures, protection of flora and fauna, and other matters. Every two months, there is additional training on various subjects.

Scientific Research

Scientific studies at Esperanza were reported to be in the fields of biology, marine biology, limnography, seismic studies (in conjunction with Italy), tide measurements, avian and mammal studies, glaciology and oceanography. There were four scientists on station at the time and approximately 12 were expected throughout the season.

The base houses two laboratories which consist of two 20-foot storage containers converted to office/lab space. Permanent instrumentation consists of a tide gauge, and a seismometer. Scientists are typically expected to bring their own equipment and supplies. A new laboratory that will concentrate on wind power is under construction. This project will be conducted in conjunction with Canada. Typically, two to three foreign national scientists were reported to participate in scientific studies every year. Scientists normally are Ph.D. or Masters level depending upon the type of projects. There was a reported 50/50 split between Instituto Antártico Argentino (IAA) staff scientists and University based scientists. Typical international collaborations with Japan, Spain and Italy were reported.

No radioisotope work is done on the base.

Transportation, Communications and Facilities

Transportation. Esperanza has approximately 1.5 km of unfinished access roads throughout the base. The road surface consisted of gravel and crushed rocks. The base used a variety of ground vehicles, including nine tracked-type vehicles, one all-terrain vehicle, three wheeled-type heavy duty trucks, and 16 snowmobiles. The vehicles allow for personnel and supply transportation throughout the area of the base.

Esperanza receives supplies three times a year. The supplies are transported to the base by the Argentine Navy ship *Almirante Irizar* in December, February, and March. Goods are either transported in by Zodiacs or flown to the base via helicopter from the ship.

Esperanza Station, base commander's office

Additionally, supplies are also brought to Esperanza via Twin Otters (DHC-6) operating at the glacier airfield nearby.

Esperanza has two small wooden and metal docks from which small boats operate. The base has three semi-rigid inflatable boats. At the time of the inspection, only one boat was operational. The boats are mainly utilized to support scientific work.

Esperanza operates an ice runway on the nearby Buenos Aires Glacier. Twin Otters (DHC-6) operating from the Argentine Station Marambio land at the base 15 to 20 times a year. Additionally, the base also maintains a helicopter pad. Helicopters from Marambio and the Argentine Navy use the pad for logistics operations and for emergency transportation.

Communications. Communication facilities include basic and cellular telephone, VHF, UHF and HF radio, e-mail and internet.

Facilities. Water is provided from a nearby snow melt lagoon, which is located near a penguin rookery. The water is filtered and chlorinated.

Power is provided by three 180 kw Caterpillar diesel generators. Only one generator operates at any one time. Annual fuel consumption was reported to be 200,000 – 220,000 l. Currently, there is no alternative energy used.

Hazardous chemicals such as paint are stored in a loft in the sewage treatment plant. No hazardous scientific chemicals were reported.

The primary fuel used is diesel. It is stored in thirty-two 10,000 l tanks plus three 15,000 l tanks. These tanks are all co-located away from the main base and manifolded together. They stand on cement platforms but have no secondary containment. There is sufficient spare volume in tank capacity that if one were to leak, its contents could be pumped into other tanks. There are float alarms in each tank that indicate any leakage. This data is transmitted to a central control room. The tanks appear to be well maintained and well coated. There are 2000 l of JP-1 and 500 l of gasoline stored in drums in a warehouse. They are used for Twin Otter and Skidoo fueling. Piping is above ground.

Fuel is brought to the base by ship and helicopters based off the ship. Helicopters ferry 2000 l tanks from the ship to shore where the contents are pumped into the storage tanks. This annual fueling process takes approximately two days. A senior mechanic is responsible for fuel management.

For the transferring of fuel, a ship-based helicopter lifts a fuel bladder to a staging area where it is connected to the land fuel pump system to be transferred to the base's tanks. A container more rigid than a bladder is used to transfer the fuel from the ship to shore. The transfer process takes about two days to complete. The availability of some absorbents at the base is generally helpful in the event of a spill, but there are no spill containment booms available in the event of a discharge of oil while the transfers are under way.

Arms and Military Support

The base commander indicated that there were no firearms or explosives at the base and none were noted by the inspectors.

Esperanza Base is operated by the Argentine Army, in conjunction with DNA. The Argentine Navy provides logistical support to Esperanza on a routine basis.

Safety and Training

There are typically one doctor and two nurses at the base during winter and summer. At the time of the inspection, there were two doctors. The second doctor was the spouse of the primary doctor. The base has a small clinic, a pharmacy and a dental office. Emergency evacuation for medical situations beyond the capability of the base can be done by Twin Otters operating out of Marambio Station. This can be done in summer or winter. In the summer there is also the possibility of helicopter transport through Marambio and ship support.

The base has a fire emergency plan and showed a copy of the plan to the Inspection Team. There is a water hydrant system throughout the base and fire extinguishers are in each building. Each home was reported to have a smoke detector and a carbon dioxide (CO_2) detector. All personnel are trained in fire fighting. A training emphasis is on fire prevention. There are two fire muster stations. Fire drills are practiced typically every two months and are typically desktop (paper) drills.

The base engages in search and rescue exercises, at times coordinating with Chile's O'Higgins Base, which is the closest base to Esperanza.

Environment

Pollution (Oil and Chemical Spills). The base has an oil and chemical spill contingency plan that is updated annually. Revisions and updates to the plan coincide with the change in personnel and command. Revisions to the plan are based on need. The base stores a supply of oil absorbent material but does not have containment booms. Base personnel receive training in oil and chemical spill response as part of their overall training prior to deployment to the Antarctic Treaty Area. Personnel arriving at the base receive additional training and orientation of base operations. This additional training is given by the outgoing base commander and other officers. Bimonthly training seminars are held throughout the year. The training strongly stresses care and prevention of spills at their facilities. In the event of a pollution incident nearby, the base's ability to provide assistance is limited by the number of personnel available and the distance from the base where the incident may have occurred. The primary method of assistance for such an incident may be limited to assistance with communications.

The base commander did not have any records or recollection of pollution that may have damaged the facilities or had an impact on the environment. By Argentine law, the base personnel are required to report all fires or spills of greater than 20 l to the IAA-Environmental Division and internally to the Argentine Army Command.

Waste Management. The base has a written waste management plan that is updated annually. Revisions and updates to the plan coincide with the change in personnel and command. Personnel receive training on the requirements of waste management and the need to minimize the impact of waste on the environment in the Antarctic Treaty Area. The training stresses the need to separate wastes by category, regulations

governing the storage of waste, and the need for the safe removal of the wastes from the Antarctic Treaty Area. The wastes are separated in the categories for, *inter alia*, glass, paper, plastic, cardboard, metal, waste oil/lubricants and wood. The commander showed the Inspection Team a framed color coded chart explaining the waste categories and stated that they are located throughout the base, including in all residences. Used lead-acid and dry cell batteries are stored separately. The liquid from the batteries is drained and stored separately from the other wastes. The dry cell batteries are also kept separated from the rest of the wastes. The number of dry cell batteries is very small. The wastes removed from the base out of the Antarctic Treaty Area are taken to Buenos Aires for final disposal by the contractor hired through IAA. The base produces monthly waste reports.

The base neither uses nor stores radioactive materials, and does not have any materials that contain heavy metals or acutely toxic or harmful compounds. The base does use PVC piping at its facility. The observers notified the base commander of the need to specifically track any waste PVC materials and to ensure that these are removed from the Antarctic Treaty Area. The observers noticed the presence of small amounts of polystyrene packing material and advised the base commander of the Protocol's prohibition on the introduction of such material under Annex III, Article 7. The base does not use treated wood products. Fuel drums on base are recycled as containers for waste storage and removed from the Antarctic Treaty Area. Some of these drums are used to store waste oil, waste lubricants and sludge from the fuel oil storage tanks. The drums containing these waste oil materials are held outside to await removal from the base. The Inspection Team counted approximately 30 of these drums, some of which were rusted. The Team expresses concern that the waste oil drums may start to leak and spill their contents into the environment.

Food wastes including carcasses of imported animals, avian products and kitchen food waste is incinerated and the ash is collected and stored in crates to await removal from the Antarctic Treaty Area. Emissions from the incinerator are not monitored. Waste produced by field parties is collected and brought back to the base for separation and processing.

The base operates a biological based sewage treatment plant. The plant is in operation on Mondays, Wednesday, Friday and Saturdays. The effluent water is treated with chlorine before being discharged into the marine environment. Every three months, the sewage sludge is removed and placed in drums for storage until it is removed from the Antarctic Treaty Area. On average, three drums of sludge are produced every three months.

The base does not have any trash/waste landfill operations. An old landfill that was once used by the base was closed many years ago, and was reported to have been cleaned up. It was reported that there is no open burning, sea ice discharge or ice pit disposal at that base.

Conservation. Esperanza base personnel and their families all take a mandatory course in Argentina which includes rules on the conservation of flora and fauna in Antarctica. The base also has reference guides that include instructions on how to prevent harmful interference with flora and fauna in Antarctica. There is a large Adelie penguin rookery in close proximity to the base reported to have an estimated 120,000 breeding pairs, as well as a smaller Gentoo penguin rookery. Base personnel are restricted from entering areas where penguins are nesting. Also, it was reported that the base closed a helicopter pad to avoid any disturbance to penguins nesting in a nearby rookery, and constructed a new pad in an area distant from nesting penguins. There are ongoing biological studies of the penguins, and a permit was issued pursuant to Annex II for three researchers to study the reproductive parameters of the Adelie and Gentoo penguins through their diets. The timeframe of the permit is from October 2006 to February 2007. There was another permit issued in December 2004 to two individuals to recover dead penguins, skuas, and cormorants for taxidermy.

All equipment is cleaned and fumigated before entering Antarctica. Fresh fruits are brought to the base in minimal quantities. No alien species have been reported at the base.

Protected Areas. ASPA no. 148, formerly Site of Special Scientific Interest no. 31, Mt. Flora, is located approximately 3 km from the base, beginning about a third of

the way up the mountain. Its purpose is to preserve the fossils contained in the rocks of the mountain. The site was one of the first fossil floras discovered in Antarctica and has played a significant role in deducing the geological history of the Antarctic Peninsula.

The base does not depict the boundaries of the ASPA on maps of the area, but the Inspection Team was informed that there are plans to prepare a map showing the ASPA boundaries. The ASPA boundary is not marked, and there are no signs at the entrance to the ASPA. Base personnel are briefed on the location of the ASPA, and are told that they are prohibited from entering it. The ASPA is located outside of the perimeter of the base, and base personnel are prohibited from leaving the perimeter of the base. On the tour of the base, the commander pointed out the general area on the mountain where the protected area began. The commander provided the Inspection Team with a copy of a one-week permit authorizing two army personnel and one DNA employee to enter the ASPA for the purpose of taking GPS positions to be used for the creation of a topographical map of Mt. Flora. Base personnel did not have a copy of the management plan, and appeared to be unaware of its existence. The Inspection Team provided the base with a copy of its English language version of the management plan.

The management plan states that the site's "long history as an easily accessible site and the large amount of fossiliferous debris occurring in scree has made it vulnerable to souvenir collectors, and the amount of material available for serious research has been considerably depleted." The Team recommends that the base create a map of the ASPA clearly showing its boundaries, and that the base post signs at markers at the base of Mt. Flora which show the boundaries of the ASPA and inform visitors of the prohibition on entry. The Inspection Team recommends that Esperanza implement these recommendations, especially in light of the considerable presence of tourists at the base.

Environmental Impact Assessment. The base provided an environmental manual and a "practical guide" on environmental protection, which contain sections on EIA's, including discussion of the procedure for preparing CEE's and IEE's. Base personnel stated that DNA required authorization prior to any new construction, and that DNA was diligent about environmental review. However, it did not appear that base personnel were familiar with the EIA requirements. For example, base personnel were not aware whether a CEE or IEE had been prepared prior to the construction of the sewage treatment plant in 2000. In addition, base personnel did not know whether an IEE had been prepared

Esperanza Station, base commander and U.S. team leader

with respect to a new project with Canada on wind energy which will include the conversion of a residence into a laboratory and the construction of more than one wind tower. In addition, while the commander reported that the base performs no monitoring of the environmental impact of the activities of the base, a document provided by the base suggested that the base does regularly monitor water quality and the penguins living nearby.

The Inspection Team recommends that DNA more closely involve base personnel in the Environmental Impact Assessment process, including the review of whether an IEE is necessary in the first instance, the preparation of IEE's and CEE's, and the implementation of IEE's, including monitoring of environmental impacts of base activities.

Tourism

Esperanza Base is frequently visited by tourists in the Antarctic Peninsula, and may be one of the Antarctic sites most frequently visited by tourists. Indeed, it appeared that Esperanza actively seeks tourist vessel visits. Statistics collected by the base show that each year they receive visits from approximately 25 tour ships carrying between 45 and 200 passengers, as well as approximately two or three yachts, and flights from Twin Otter planes and helicopters. In total, the base is visited by approximately 2,300 tourists per year. The base has developed procedures to manage tourist visits and provides guided tours of the base. Small groups of 20 to 25 people are guided on an hour-and-a-half tour of the base, and no more than three groups are on-site simultaneously. The base is converting one of its buildings into a museum, and there is a gift shop and a number of historic artifacts on-site. Tourist operators give sufficient advance notice to base personnel. On a few occasions, the base has notified a tourist operator of conflicts that have prevented a visit.

Conclusions

Esperanza Base appeared to be very well managed and maintained. Personnel at the base appear to take great pride in their work and to have deep appreciation of the importance of preserving the Antarctic environment and the wildlife adjacent to the base.

The Inspection Team recommends that the base create a map of ASPA no.148 clearly showing its boundaries, and that the base post signs and markers at the base of Mt. Flora which show the boundaries of the ASPA and inform visitors of the prohibition on entry. It also recommends that DNA more closely involve base personnel in the Environmental Impact Assessment process, including the review of whether an IEE is necessary in the first instance, the preparation of IEE's and CEE's, and implementation of IEE's and CEE's, including monitoring of environmental impacts. The Inspection Team believes that the base should install secondary containment for fuel drums containing waste oil to ensure that oil leaks do not affect the environment.

The Adelie penguin rookery adjacent to Esperanza Base is thought to be the most northern large colony of Adelies. It has been estimated to number up to 120,000 pairs. It would appear that the convenient location of such a large colony could lead to an expansion of census and scientific study of the animals and the local ecology. The Inspection Team encourages such an expansion of biological, ecological studies and that the results of such studies be made readily available.

U.S. Team with Bellingshausen base commander

RUSSIA – BELLINGSHAUSEN STATION
62°11'78"S, 58°57'65"W
November 27, 2006

Bellingshausen Station is a year-round station located in Maxwell Bay on King George Island. Bellingshausen is operated by the Russian Antarctic Expedition (RAE). It functions primarily as a scientific station.

Bellingshausen Station was established in February 1968 and has been in continuous operation since that time. It is the most recent Antarctic station built by the RAE. The station is adjacent to Chile's Frei Station.

The Inspection Team arrived at the station at 9:30 a.m. on November 27. The Team was welcomed by the station manager, Mr. Oleg Sakharov. Mr. Sakharov and Mr. Sasha Orup provided all the responses on behalf of the station. Since another U.S. team had visited the station in 2001, the Inspection Team was seeking only an update to information previously provided. As a result, the inspection lasted only three hours. The Inspection Team attempted to give Bellingshausen two days advance notification. However, due to communication difficulties, Bellingshausen had only one day of advance notice. After the inspection, Mr. Sakharov transported the Inspection Team to the nearby Chinese Great Wall Station for the Team's next inspection appointment.

Physical Description

Bellingshausen occupies an area of one square kilometer. It is situated on loose rock with a few gravel roads throughout the facility. The station consists of 15 buildings. The station's buildings include a meeting building, communication center, computer lab, administrative office, living quarters, kitchen and dining hall, power plant, garage, warehouse, and church.

The initial buildings were erected in 1968. The most recent structure is a Russian Orthodox Church built in 2004. The church was built in Siberia. It was disassembled and shipped to Bellingshausen where it was reassembled. It is located on the ground of an abandoned "hut."

The station manager indicated that there is no plan for expansion of the facility in the near future.

Bellingshausen is in the vicinity of the Antarctic Specially Protected Area Ardley Island (ASPA No. 150). The site is protected because of its penguin and petrel population.

Personnel

At the time of the visit, the station had 18 persons, including 6 scientists, 4 mechanics, a doctor, a priest and his assistant. Three more personnel were expected shortly. There is a resident doctor who is at the station all year. The normal winter complement is 13. In winter, the station's maximum capacity is 28, and 40 persons could be housed at the station in an emergency. Most personnel stay for a year, although the station manager and some others have one and a half year terms.

Personnel were given initial training courses in Russia prior to departure and supplemental training while at the station on issues such as safety, environmental rules and related matters, including implementation of the Antarctic Treaty and Environmental Protocol.

All personnel are subject to advance medical clearance in St. Petersburg. This clearance has been made stricter than in the past. At the station, each person is subject to a heart diagnostic each month, and the data is sent to Russia for analysis.

Inspectors were informed that the Antarctic Treaty and other relevant documents were available at the station. The station manager instructs the staff with respect to what they must do to ensure compliance.

Scientific Research

The station manager reported that studies were being conducted in marine biology, ecology, flora (lichen studies), hydrology, and ornithology. (RAE later noted that the station was conducting studies on sea ice and coastal monitoring and meteorology.) A continuing cooperative program with Germany has resulted in a winter ecology and ornithology program with emphasis on skuas and sheathbills. One German scientist who had wintered over was on station at the time of the Team's visit.

The station manager reported that a collaborative program with the Korean Antarctic Program has been initiated. As part of the collaborative efforts, the Koreans will populate and outfit a laboratory in one building at Bellingshausen. The Russians will provide logistic support including housing, food, power and water for the program. At the time of the visit, an existing building was in the process of being cleared out for future use as a laboratory. Interior construction of the lab was scheduled to commence in January 2007. The station manager indicated that the collaborative nature of the project was patterned after successful cooperation between Argentina and Germany in the Dallman Laboratory at Argentina's Jubany Base. The cooperation between Korea and Russia was reported to start in the 2007-08 season.

No radioisotopes were reported to be used in scientific experiments.

Transportation, Communications and Facilities

Transportation: Bellingshausen is connected by a system of unimproved gravel roads to Frei Base, Great Wall Station and Artigas Station. The roads are used for transportation between the four stations. Bellingshausen's ground vehicles included three trucks, one car, one bulldozer, and one tractor.

Bellingshausen does not have a small craft pier. However, the station operates two small craft: a small inflatable boat and a landing craft for cargo transport.

Bellingshausen has no aircraft or helicopter at the station. The station does not operate a helicopter pad.

Bellingshausen receives supplies three times per season from Chile through an agent working in Punta Arenas. Supplies are transported to the station by merchant vessels contracted by the agent working for other national Antarctic programs supporting the Korean, Chinese, and Chilean stations in the vicinity of Bellingshausen. The station receives food and dry goods in November, January and March. Additionally, the station is re-supplied with fuel every two-to-three years by the Russian ship *R/V Akademik Federov*. The next visit will be in February 2008.

Communications: The station manager reviewed the COMNAP Antarctic Communications Directory and noted several erroneous entries. The accurate information is as follows:

Inmarsat: *Phone:* 762-284-325
Fax: 762-284-327
Cell: 56-9-959-241-92
Email: lukin@aari.nw.ru

The station uses VHF and HF radio. At the time of the inspection, the station had Internet access on a trial basis, including WIFI. The station manager was hopeful that Internet would remain at the station on a long-term basis.

Facilities: Potable water for Bellingshausen is provided by a glacial melt stream and lake that flows freely all summer. In winter, the lake does not freeze, allowing a constant source for the station's two water tanks. It was reported that there was no need for water filtering or chemical treatment.

Three new generators (60 kw, 75 kw, and 100 kw) had been installed since the previous inspection. Only one generator is needed to power the station and the lowest output generator is selected to accommodate the need. The annual consumption of fuel was reported to be less than the 100 tons noted in the previous inspection, but actual annual consumption was not available. No solar, wind or co-generative energy conservation measures were reported. After the inspection, RAE commented that there is a plan to turn one of the existing older buildings into a greenhouse equipped with solar batteries and a wind generator. The work will be done in cooperation with Mission Antarctica, a UK non-governmental organization.

There are three 1000 ton, and six 200-300 ton fuel tanks located about 2 km from the Station. It was reported that only two of those tanks were in use. These tanks are rusted and pitted with no secondary containment. The condition in which all large oil tanks are maintained at the station was a matter of concern to the Inspection Team.

The fuel from these large tanks is transported to the station by a truck with a tank to fill four large day tanks located near the power station. The day tanks had recently been cleaned, visually inspected and recoated. A new secondary containment concrete berm had been installed since the last inspection. This berm, however, was only about 6-8 inches high around the perimeter of the tanks and appears to be insufficient to contain a spill from one tank if it were to empty fully. In addition, an open 1-1/2 inch pipe was installed in the base of the berm as a water drain. This would also drain any fuel leak until plugged.

Arms and Military Support

The station manager reported that there were no firearms or explosives at the station and none were noted by the inspectors. Additionally, the manager also indicated that the station had 4 "flare rockets" for use by small craft crew during an emergency.

The station manager indicated that Bellingshausen Station does not receive support from, or provide assistance to, the Russian military.

Safety and Training

There is a small one-bed medical clinic and a one-chair dental clinic staffed by a doctor who is on station both winter and summer. There is cooperation with doctors and medical facilities at nearby stations. Emergency evacuation, if necessary, could be done with Chilean air assets at Frei Station.

The station is equipped with fire extinguishers. No sprinklers and no fire detectors are installed on station.

Environment

Pollution (Oil and Chemical Spills). The Team was shown a Russian language copy of the oil and chemical spill contingency plan. Bellingshausen has a limited supply of oil spill containment materials such as absorbent pads and booms. Station personnel receive seminars on oil and chemical spill prevention and response prior to departing for the Antarctic Treaty Area. The Inspection Team was informed that the station carries out pollution training exercises on a regular basis. Station personnel are not equipped to provide assistance

Bellingshausen Station, fuel tank

with equipment but would be willing to assist in any other way should a pollution incident occur nearby. The Inspection Team was informed that there have not been any accidents in the last three years resulting in damage to station facilities or the environment. Any incidents would be reported to RAE in St. Petersburg and to Roshydromet in Moscow.

Waste Management. The station manager provided a Russian language copy of the station's waste management plan. Bellingshausen's personnel receive training on waste management at the station and on the need to minimize the environmental impact of waste. Waste management notices are displayed near waste receptacles in the various buildings at the station. Batteries are separated from the rest of the station wastes.

Bellingshausen collects used oil in metal drums and stores them until removed from the station. Plastics, paper, food scraps and avian products are incinerated and the ash is collected and stored. PVC pipe material is collected and stored at the station's waste deposit. Fuel drums are reused as waste storage containers for glass, metal cans, and waste/used oil. Scrap metal from old equipment is also stored until it is removed from the Treaty Area.

Bellingshausen operates an incinerator for paper, food scraps and avian products. The incinerator ash is collected and stored at the deposit. Waste produced by field parties is brought back to the station for processing.

Bellingshausen had a septic system to treat sewage and grey water, but the system is no longer working. The station's sewage and grey water is discharged untreated into the nearby stream. After the inspection, RAE commented that Bellingshausen had discharged untreated sewage in compliance with the requirements of Annex III, Article 5 of the Protocol. RAE also noted that installation of treatment facilities is planned during the 2007-08 season.

During the February 2001 inspection, the U.S. Inspection Team found that waste, including large metal items such as cabling, pipes and building scrap, were being collected in an approximately one-quarter acre holding area on the beach near the station. The station indicated that a non-governmental organization, "Mission Antarctica," was providing planning assistance for station clean-up and developing a plan for removal of all the station's waste in the beach collection area and other drummed waste stored in buildings. On this visit, the Inspection Team found that the waste on the beach had in fact been removed. The station manager stated that Mission Antarctica had removed the metal waste to Uruguay and the waste oil to the United Kingdom.

Bellingshausen Station, fuel tank used for waste storage

Although the Team was informed that no landfill disposal techniques are currently employed at the station, the Inspection Team observed the use of abandoned bulk oil storage tanks as a deposit for a very significant amount of many different types of waste all mixed together. The tanks are located approximately 2 km from the main facility. In the same area, barrels containing oily substances were leaking into the snow. There were also discarded vehicles in the area. The station manager had indicated that some waste materials were being housed in this area that would be taken out of the Treaty Area this year. However, the material observed had not been packaged for shipment, and instead was in a disorganized state.

The Inspection Team was concerned by what it saw in the tanks because the disorganized arrangement seemed to indicate that the materials were not being prepared for removal from the Antarctic Treaty Area soon. The Team recommends that the materials be separated and removed as soon as possible.

After the inspection, RAE commented that this type of waste had previously been sorted on the beach before removal, but as this raised aesthetic concerns, the waste was now being collected in old fuel tanks. RAE indicated that these materials would be removed by the *Akademik Federov* during the next season, and would be separated and sorted at that time.

Conservation of Fauna and Flora: All personnel at Bellingshausen are required to take a course that includes review of rules on the conservation of flora and fauna prior to arriving to the station. The station manager reported that he also educates personnel on the conservation of flora and fauna during an orientation session when they arrive at the station. A German ornithologist wintered over at the station and is conducting a biological study of the skuas and sheathbills on Ardley Island. The station manager also reported that no Russian permits had been issued pursuant to the implementation of Annex II of the Environmental Protocol.

The Inspection Team observed, as it had during its last inspection in 2001, non-indigenous decorative plants at the station, including a particularly large plant in the station's main conference room, apparently with non-sterile soil. The station manager indicated that they had been there for years, and that no permit had been issued relating to these plants. The Inspection Team expressed its concern that these plants might not be consistent with Protocol requirements.

Protected Areas. Across from the station lies ASPA No. 150, Ardley Island. The site is protected because of its penguin and petrel population.

The station briefs all new personnel that Ardley Island is a protected area, and that entry beyond the small tourist area by the landing area is prohibited without a permit. The station manager reported that no Russian personnel had visited the areas. A map in the station noted the protected area status of the island.

The station manager reported that Chile has management responsibilities for the ASPA.

Environmental Impact Assessment. The station manager did not appear to be familiar with the environmental impact assessment requirements of Annex I of the Environmental Protocol. In 2004, the station constructed a Russian Orthodox Church on a hill above the site of the station. The church was built on the site of a much smaller hut. The station manager showed the Inspection Team a permit for the construction of the church, but said that no environmental impact assessment of any kind was performed. It did not appear that there were any plans to perform an environmental impact assessment for any of the future construction activity planned for the station.

After the inspection, RAE commented that issuance of a permit for activity in Antarctica includes the requirement of having an EIA. According to RAE, Permit No. 114 related to the construction of the church involved prior review by the Ministry of Natural Resources.

The Team understood from discussion with the station manager that the station conducts no environmental monitoring of the station's activities. However, after the inspection, RAE stated that monitoring of environmental impacts of activities of the Russian program is carried out in the area of the Fildes Peninsula on a seasonal basis. In addition, according to RAE, RAE jointly monitors impacts on flora and fauna in the area with German scientists.

Tourism

Bellingshausen receives visits from tour ships and planes each year. The station does not record the number of ships, planes, and passengers visiting the station. However, the station manager reported that the number of visits per year was between five and ten. Most tour operators give at least 24 hours advance notice and spend about two hours at the station. Bellingshausen does not have any written procedures to manage tourist visits, but the station manager reported that visits by tourists have not caused any operational problems for the station.

Conclusions

The Inspection Team is very concerned about the wastes being stored at the old fuel tank site. The Inspection Team strongly recommends that the area be thoroughly cleaned and the waste material be organized properly and removed as soon as possible, as required by Annex 3 of the Environmental Protocol. Additionally, the Team urges Bellingshausen to bring the fuel tanks up to proper condition for the Antarctic environment or to remove them entirely. All fuel tanks currently in use should be periodically surveyed ultrasonically for damage, cleaned, and have a protective coating applied on the inside.

The Inspection Team also recommends that Bellingshausen consider expanding the day tanks to accommodate all the necessary fuel for the station. Piping for these tanks could be arranged to have fuel pumped directly from the supply ship. Additionally, secondary containment, capable of holding the fuel contained in the largest tank of the group with allowance for snow displacement, should be installed.

The Inspection Team strongly recommends that the station conduct initial environmental evaluations and comprehensive environmental evaluations, whichever is appropriate, for all future activities, as required by the Environmental Protocol. The Inspection Team also recommends that the station conduct monitoring of the environmental impact of the station's activities.

Although there have been some improvements at Bellingshausen since the U.S. inspection in 2001, there are still many areas related to waste and fuel management as well as environmental impact that need further attention. The Inspection Team urges the station to review the Team's recommendation and to seek from its authorities the resources needed to take necessary actions.

Great Wall Station, building and fuel tanks

CHINA - GREAT WALL STATION
62°12'98"S, 58°57'73"W
November 27, 2006

Great Wall Station is operated by China's State Oceanic Administration, which has its headquarters in Beijing. The China Polar Research Center in Shanghai also provides support to Great Wall. The Inspection Team arrived at the Great Wall Station on Monday, November 27, 2006 at 1:30 p.m. after having completed an inspection of the Bellingshausen Station nearby. The Team conducted the inspection in about four hours. The Inspection Team was hosted by Station Manager Chen Yong Xiang. Interpretation was provided by the station's meteorologist, Mr. Yang Qinghua. Advance notice of approximately one day was given before the inspection. The United States also inspected Great Wall in 2001.

Physical Description

The station has 11 buildings. Construction of Great Wall Station began in 1984 and was completed in 1985. The most recent construction was in 2001 when a new power house was built on the site of an existing building. The station personnel believed that an environmental impact assessment was done prior to construction of the power house, but they did not have any documentation or know the details. They indicated that each year someone comes from China to review environmental conditions at the station. The station maintains a field hut at Nelson Island, which also has a small dock. Biologists from the station do field work there. Station personnel indicated that there was some thinking that new buildings would be built in the future, but there were no immediate plans and no construction would be undertaken this season.

There is a clear distinction between newer and older buildings at Great Wall. The older buildings have little or no use and are deteriorating badly while the new ones appear well maintained and in active use. The Team inspected three of these old buildings -- a berthing building, a communications building, and a garage. The exterior of the berthing building was metal and exhibited severe corrosion with large portions of the exterior wall panels corroded through to the interior layers. Large flakes of rust surrounded the perimeter of the building. The building itself seemed to be used for storage of some items but was mostly empty. The roof

of the communications building had collapsed and was loosely covered with a tarp. The old garage building was partially collapsed and was used to store old, corroded drums of paint and other chemicals. The Inspection Team strongly recommends that these unused and deteriorating buildings and their waste contents be dismantled, packed and removed from the Treaty Area consistent with the requirements of Annex III of the Environmental Protocol.

After the inspection, the Chinese Arctic and Antarctic Administration (CAA) commented that Great Wall is planning to maintain some older buildings and alter the use of others in order to respect and protect their historic value. CAA further indicated that the old garage building will be dismantled and removed from the Treaty Area together with the articles stored inside.

Personnel

At the time of our visit, the winter complement of 12 persons was at the station; they would depart in about ten days. During the summer, the number of people at the station increases to 20 to 30. During the winter there are two scientists, and during the summer there are ten. A doctor is at the station all year. Most of the station personnel who over-winter also stay at the station for a year; others for perhaps two to three months.

Personnel are given training in Beijing or Shanghai on matters related to the Antarctic Treaty, related regulations, and other matters relevant to their service at the station. They are also sent to a location in Northern China for two weeks to learn about working and living in cold climates. All personnel are subject to medical examinations prior to assignment to Great Wall.

Station personnel indicated that Antarctic Treaty-related materials are maintained in Chinese at the station. Managers provide training to the staff upon their arrival and regularly over the winter. We were told that China has guidelines related to compliance with Treaty rules, but that these were not available at the station in published versions although some materials were maintained on station computers.

Scientific Research

Scientific research in the fields of geology, biology, meteorology and oceanography was reported although no specific examples of science during the current season were described. GPS technology was reported to be in use, but specific application of this technology was not explained. The Inspection Team was shown the station's meteorology lab which has two computers and is semi-automated.

At the time of the inspection, the station was hosting a team of UK biologists who were working on the ASPA Ardley Island nearby. The biologists were conducting limnography studies of the lakes on the island. The station does not use radioactive isotopes.

Transportation, Communications and Facilities

Transportation. Great Wall is connected by a system of unimproved gravel roads to Frei, Bellingshausen, and Artigas Stations on King George Island. The roads are used for transportation between the four stations. Great Wall had a total of eight ground vehicles including two sport utility vehicles, one truck, three bulldozers, one snow track-type vehicle, and one crane vehicle. Great Wall has a concrete pier for small craft operations. The station has two Zodiacs.

Great Wall has no aircraft or helicopter at the station, but it does have a concrete helicopter pad. The station manager reported that the pad is used infrequently. Most recently, the British Antarctic Survey had utilized the pad to bring in supplies and personnel for their work near Great Wall.

Communications. The station uses VHF and satellite telephones. It also uses IStar and has limited email connectivity. It does not have Internet access.

Facilities. Fresh water is supplied winter and summer from a nearby glacially fed lake. The station reported that no water treatment was necessary.

A new power plant was constructed in 2001. There are three generators, each supplying 120 kw. One generator is sufficient to supply power for the station. No alternative energy sources are used. Waste heat from the

generators is not captured. Emissions were reported to be filtered, but are not monitored.

Fuel is contained in eight, 50-ton cylindrical tanks that are on elevated support pedestals. The tanks are located about one-half mile away from the station wharf on a slight rise. The exterior of the tanks was well coated with paint, although some blisters were noted on the tanks and paint flakes were noted below the tanks indicating a possible need for a thorough exterior sandblasting and painting. There was no secondary containment of the tanks and the concrete drip pans below tank valves were observed to be cracked and deteriorated and not serviceable unless temporarily lined with some sort of impermeable membrane (*e.g.*, a plastic sheet). The Inspection Team recommends construction of secondary containment as well as an assessment of the need to sandblast and re-coat the tank exteriors, as well as periodic ultrasonic testing.

The fuel tanks use a flexible hose for both supply and feed to the station. This hose is laid on the ground surface from the wharf to the tanks and was noted to go over two large boulders. The hose runs over what appears to be a road and tire tracks were noted to have run over the hose. While the tire tracks were explained by station management to have possibly been due to the four-wheel-drive vehicle of visiting scientists, what the Team observed nevertheless indicates the need to at least mark the hose with flags and to move it away from the existing roadway. Fuel was in the hose under pressure due to the uphill location of the tanks. A home-made crimping device that was corroded and unusable was noted to be partially crimping the hose, and its purpose was not explained. The crimping device creates a region where wear can occur and should be removed.

A re-supply vessel, the *Xue Long*, comes every three years to provide fuel. It was reported to the previous U.S. Inspection Team that fuel is brought from the ship to the wharf by barge and then pumped into the tanks. Station management indicated that the fuel was then delivered to the station by truck and the tanks were filled from the gravity-fed fuel hose at the wharf. It is recommended that the station consider a permanent, solid, raised piping system.

The CAA commented, after the inspection, that the tire tracks on the hose were made by a vehicle operated by foreign visitors, and that the crimping device is out of use and will be dismantled and removed from the Treaty Area in the period 2007-09. Certain fuel tanks will be replaced in 2007-09. In the view of CAA, sandblasting and repainting now would cause a greater environmental impact than waiting to replace the tanks.

Arms and Military Support

The station manager indicated that there were no firearms or explosives at the station and none were noted by the inspectors. He indicated that Great Wall Station does not receive assistance from, or provide support to, the Chinese military.

Safety and Training

One doctor is present at the station throughout the year. Communication is maintained with the other doctors on King George Island. In the event of an emergency, nearby doctors would be available for assistance.

Fire fighting capabilities were also the same as reported to the previous U.S. Inspection Team. Namely, there are fire detectors in the berthing areas. Fire extinguishers throughout the station are checked and replaced regularly. A staff member in each building is specially trained for fire fighting.

Environment

Pollution (Oil and Chemical Spills). The Inspection Team was shown an Oil Spill Contingency Plan in Chinese. The station manager is the person responsible for maintaining an up-to-date plan. It was not clear if the station maintains any type of oil absorbent materials or oil spill containment equipment, such as booms. That is a matter of concern because there is the potential of an oil spill during the transfer of fuel from the re-supply vessel to the onshore facility, and from the fuel storage tanks to the station. Oil spill response equipment should be readily available at the station when these transfers occur. The need for spill response equipment also applies to the situation regarding the fuel transfer hose mentioned above. The station manager was made aware of this situation and he assured the Team

he would take care of this immediately so that it would not occur again. After the inspection, CAA stated that in fact the station does have some absorbent materials and oil spill containment equipment.

Waste Management. The Team was shown a Chinese language Waste Management Plan. The Team was informed that the station manager is the person responsible for waste management and for maintaining an up to date waste management plan. Station personnel receive training before leaving China on the requirements of the Protocol and the requirements for waste management in the Antarctic Treaty Area. The Inspection Team observed several waste collection stations with individual waste receptacles identified (in Chinese) by waste type. Dry cell batteries also are collected separately. They are packed, removed from the Treaty Area and sent back to China.

Waste is separated by category such as glass, paper, metal cans, plastics, and food waste. Fluorescent light tubes are also separated. The Team was informed that all waste is processed, placed in wooden crates and stored in a shipping container. This shipping container is used to transport the waste out of the Antarctic Treaty Area, for return to China. The station has two working incinerators. Only one is used at a time. The processing of wastes involves the crushing of glass and metal cans, incineration of food wastes, paper, cardboard and some plastics. Avian products from food scraps and egg shells also are incinerated. The ash from the incinerator is collected, bagged, and placed into the shipping container to be removed from the Treaty Area. The Inspection Team was informed that all processed wastes are removed to Shanghai approximately every two years. The station's sewage and grey water are processed through the sewage treatment plant. Sludge from the treatment plant is incinerated and the water is discharged untreated into the tidal basin. The station does not recycle waste oil. The waste oil is placed in metal drums and stored until it is removed from the Treaty area.

As mentioned above, the Inspection Team observed an older building described as the old vehicle garage, in a state of disrepair. This building is used to store haphazardly many large containers (approximately 4 to 5 gallons in size) of paints, degreasers, and oil. At the back of building, there is a pile of waste material, including broken pieces of PVC pipe, scrap metal and old concrete building supports. Many of the liquid containers are in poor condition and there was evidence of leaks and spills. The Team was informed by the station manager that these wastes would be removed out of the Treaty Area by December 2007. The Inspection Team recommends that waste material of this sort be better organized, separated by category and processed for shipment out of the Treaty Area, and that the Sta-

Great Wall Station, building

Great Wall Station, waste near building

tion should ensure that the waste is removed promptly in accordance with Annex III of the Environmental Protocol.

The Inspection Team, while conducting its walk through of the station facility, also observed polystyrene foam beads in the snowmelt runoff coming from the facility and entering the tidal area. The Team reminded the station manager that use of polystyrene foam is prohibited under the Environmental Protocol. After the inspection, CAA indicated that polystyrene foam was used at the time the station was built, and that older buildings with this material will gradually be removed.

Conservation. The rules on the conservation of flora and fauna are reinforced in an orientation session when personnel arrive at the station. The session includes instruction on the rules relating to the conservation of flora and fauna. The station is near Ardley Island where there are penguins, skuas, and Southern Giant Petrels. Station managers reported that there are no biological studies conducted by Great Wall that would require a permit pursuant to the implementation of Annex II. Station managers reported that there were no alien species at the station.

Protected Areas. Across from the station lies ASPA No. 150, Ardley Island. The site is protected because of its penguin and petrel populations. Station personnel receive a briefing on the protected status of the island, and the prohibition on entry beyond the landing area without a permit. The principal station map of the vicinity of the station, including Ardley Island, does not mention its ASPA status.

The Inspection Team recommends that the station prepare and display materials that clearly indicate the existence of the ASPA, and that the station emphasize rules related to the ASPA to its personnel and to visitors.

Environmental Impact Assessment. The station manager reported that China performs an environmental impact assessment as required by Annex I of the Environmental Protocol prior to any construction. However, he did not have any specific knowledge about

any past IEE or any CEE, including with regard to the construction of the new powerhouse, which was built in 2001 and 2002. The station manager said that an official from the environmental protection office in Beijjing spends two months at the station every year performing environmental monitoring and determining whether any assessment needs to be performed. However, he said that he has not received any monitoring reports prepared by that official.

The Inspection Team recommends that the Chinese government include the station – and particularly the station manager -- in the environmental impact assessment process and in the monitoring process and its results.

After the inspection, CAA commented that, in accordance with the Protocol, CAA conducts an advance assessment of all projects and decides if an IEE or CEE should be prepared. Every summer, an official is sent to Antarctica by CAA to carry out an on-site inspection and report back to CAA. In addition, an official is appointed for every expedition whose responsibility is to deal with all kinds of environmental matters. CAA is in charge of environmental impact assessment. Some station managers are members of environmental impact assessment teams, but not all the station managers are.

Tourism

Station managers reported that Great Wall does receive visits from tour ships, and it has a gift shop at the station for tourist visits. The Inspection Team was told that some of the tour ships have not given sufficient advance notice to the station. When possible, the station personnel like to give a guided tour of the station, but at other times personnel are too busy and groups of tourists and their guides walk through the station unaccompanied.

Conclusions

The Inspection Team was impressed with the manner in which waste paper, cardboard, smaller metal containers, plastics, used batteries, glass, food wastes and even the sewage sludge is separated, crushed/compacted, packaged and stored until these wastes are shipped out of the Antarctic area. Great Wall is encouraged to continue this practice. However, with regard to larger metal containers (approximately 5 gallons in size and larger), waste metal such as broken tools, machine vehicle parts, and building materials, the Team is very concerned about these wastes are being stored in the older dilapidated garage/storage building. The Inspection Team strongly recommends that the area be thoroughly cleaned and the waste material be organized properly and removed as soon as possible as required by Annex III of the Environmental Protocol.

The Inspection Team recommends that all fuel tanks currently in use should be periodically surveyed. Additionally, the Team urges Great Wall to bring the fuel tanks and the spill containment structures (berm/dike/wall) up to proper condition for the Antarctic environment. The Team also recommends that all waste resulting from maintenance of these tanks (such as paint chips) be collected with the other wastes for removal from the Antarctic Treaty Area.

The Team recommends removal of unused, deteriorating buildings from the Treaty Area.

The Inspection Team is very concerned with the flexible fuel transfer line (hose) method used by Great Wall. The Team recommends that, at a minimum, the location of the hose should be marked in such a way as to determine its location at all times, such as when the hose may be covered by snow or during the night time. Marking the hose location would help to minimize the possibility of accidentally running over the hose with a vehicle. The Team also recommends that Great Wall establish a schedule for periodic inspections of the entire length of the fuel line. Additionally, the fuel storage tank's secondary containment should be maintained, at a minimum, in a condition capable of holding the volume of the largest tank of the group, with allowance for snow displacement.

The Inspection Team recommends that the station be integrally involved in all aspects of initial environmental evaluations and comprehensive environmental evaluations, whichever is appropriate for all future activities. The Inspection Team also recommends that the station conduct monitoring of the environmental impact of the station's activities.

Petermann Island

Part IV – Tour Vessel Operations

***M/S National Geographic Endeavour* –**
LINDBLAD EXPEDITIONS
Neko Harbor¸ Advord Bay
November 23, 2006

The *M/S National Geographic Endeavor (Endeavour)* was inspected on November 23, 2006 while it was at Neko Harbor in Advord Bay on the western side of the Peninsula. The inspection began at 1:30 p.m. and ended at 5:00 p.m. The Inspection Team had the prior approval of the vessel's master, Captain Leif Skog. The *Endeavour* is a Bahamian flagged vessel operated by Lindblad Expeditions, a U.S. tour operator with headquarters in New York. Lindblad Expeditions is a full member of IAATO. The ship is owned by SPEX CAL STAR Ltd. of New York, and manned by Columbia Ship Management Ltd. of Cypress.

Lindblad Expeditions planned to operate a total of eight voyages to the Antarctic Peninsula region between November 16, 2006 and March 4, 2007. The expeditions are scheduled between 12 and 23 days in length. The expedition activities include scenic cruising, excursions in Zodiac landing craft, and landings at wildlife sites, scientific research stations, and historic suites and huts. In general, shore visits last between two and three hours, but can range from one to six hours depending on the location and weather conditions.

The ship was carrying 110 passengers, close to its capacity of 114 passengers, although it averages 100. In addition, it carried 68 crew members and approximately 12 additional staff (naturalists, scientists from Oceanites, and a representative from the National Geographic Society).

Vessel Particulars

The ship was formerly the *M/S Endeavour* and the *M/S Caledonian Star*. It was built in Bremerhaven Germany in 1966 as an ocean-going trawler operating near Greenland. It was converted to an expedition-style passenger vessel in 1983 in Gothenburg, Sweden, and rebuilt in Vancouver, Canada, in 1987 and Southampton in 1998. The ship is registered at 3,132 gross tons. It has an ice-strengthened hull and an ice classification rating of DNV + 1A1 Passenger Ship ICE-C.

Personnel

Captain Leif Skog, who is also a qualified ice pilot, has been working in Antarctica since the 1970's, as had three other officers. The crew had considerable Antarctic experience. The deck foreman had even longer Antarctic service. The chief mate and navigation officer has Antarctic experience amounting to more than 50 Antarctic cruises. The engineer had been with the ship since 1998. Two officers who lacked Antarctic experience had served in the Arctic. The expedition leader had been on numerous Antarctic cruises, including with another tour company.

Expedition staff consists of between 10 and 11 individuals. Tim Soper, the expedition leader, also has extensive Antarctic experience. There is also an assistant expedition leader, and 8-9 naturalists and lecturers. The Inspection Team noted with satisfaction that many of the *Endeavor* staff it spoke with had been with the company for many years, and many had very significant Antarctic experience. Expedition staff and guides were reported to typically have at least a Masters Degree in a biological science or wildlife management. One of the tour guides was a Professor of Biological Oceanography at the University of California, Santa Barbara.

Training and Education

The captain indicated that all crew and staff receive extensive training on board related to Antarctic Treaty rules and safety matters as part of their duties. Crew are trained according to Lindblad Expeditions' company safety management systems, which are designed to follow SOLAS requirements. IAATO rules are also presented to the crew.

Antarctic legal materials, among many other documents and maps, were available in carefully organized binders on the bridge. The officers indicated that all relevant materials related to any area the ship would visit, such as site guidelines and protected area management plans, were gathered and available prominently on the bridge for each visit.

According to the captain, there is always extensive discussion with passengers related to Treaty requirements and protection of wildlife. The captain indicated that discussion of Treaty matters is a theme for every cruise, and that this leads to interesting and enthusiastic discussions among passengers about territorial matters, global warming, conservation and other current topics.

On the bridge of the vessel, the captain had manuals that included the IAATO programmatic EIA submitted to the U.S. Environmental Protection Agency on behalf of Lindblad Expeditions, and the Advance Notification submitted by Lindblad Expeditions to the U.S. Department of State. The Team was told that Lindblad Expeditions has incorporated IAATO guidelines into the Safety Management System along with components of the IAATO bylaws that are relevant to Antarctic operational issues. This System was well documented on the bridge of the vessel.

Vessel Emergency Response and Medical Facilities

The *Endeavour* has a limited medical facility onboard. The facility consisted of an examination office with an examination bed. The vessel has one doctor onboard to care for the passengers. In addition to the doctor, the ship also has personnel trained to administer first aid. There is no "hospital bedding" capacity. Passengers who are sick will be cared for in their stateroom. The *Endeavour* does not have any dental care capability onboard.

If a passenger is seriously ill requiring major medical care or evacuation, the *Endeavour* utilizes the IAATO Vessel Medical Emergency Contingency Plan to assess the situation and take the appropriate actions. According to the captain, the *Endeavour* has the ability to support helicopter medivac. The captain stated that using the airfield at the Chilean Frei Base to evacuate the passenger would also be an option.

Due to the *Endeavour's* small medical facility, it can provide only limited assistance to others in distress. The captain did indicate that the ship would provide whatever assistance it could to assist others in need.

The following life saving equipment is aboard the *Endeavour*: four open motor life boats, including lifeboats for 220 people, seven life rafts for a total of 129 persons, 12 life buoys, 250 adult life jackets, 16 chil-

dren life jackets, 12 immersion suits, and 216 thermal protective aids.

The crew conducts a full evacuation drill prior to departure. The crew is required to conduct three drills every week, including evacuation, fire and damage control. The day prior to the inspection, the crew conducted a man overboard drill involving a flipped Zodiac boat.

The vessel is equipped with a wide range of firefighting equipment, including fire extinguishers of various sizes and types, hoses and hydrants, breathing apparatus and a high-fog sprinkler system. There are two fire teams and fire drills are practiced weekly. Officers and members of the Fire Team receive Advanced or Extended Fire Fighting training from an approved Standards of Training, Certification, and Watchkeeping (STCW) training facility. Advanced Fire Fighting is a two-week training course. Extended Fire Fighting is a one-week course. All other crew members receive basic fire fighting as part of their STCW Basic Safety Training from an approved training facility. This course is generally two days. In addition, on-board training is supplemented by drills and videos.

There is a Shipboard Oil Pollution Emergency Plan on board the ship. The vessel includes spill response materials and equipment on board. The crew receive monthly training on response to oil and chemical spills. The ship has only limited capacity to respond to an oil spill by another vessel.

Unplanned Incidents and Search and Rescue

The Inspection Team was told that there have not been any unplanned incidents related to the *Endeavour* in the past year.

The *Endeavour* has no dedicated search-and-rescue capacity beyond its inherent capabilities as a motor vessel. The *Endeavour's* 12 Zodiacs could play a role in any type of search-and-rescue operations, though this is not the Zodiac's primary function. The captain indicated that the *Endeavour* monitored standard communications circuits, in particular maritime channel 16. If a distress call is received, the *Endeavour* will do what it can to help those in distress, and to assist in the search and rescue efforts.

Logistics and Communications

Lindblad Expeditions' planned itinerary for its expeditions was coordinated through the IAATO ship scheduler database in advance. There had not been any changes to the itinerary at the time of the inspection, and the ship has not made any opportunistic landings.

The *Endeavour* has an up-to-date, modern navigation suite. A dual frequency graphic fathometer feeds depth information directly into the ship's Electronic Chart Display Information System (ECDIS). The ECDIS then permanently records depths along selected routes for future reference. In uncharted waters, which are common in the Antarctic, this serves as an excellent recording of the routes and depths of previous cruise tracks and enables safe future navigation. The ship has a new Westmar 360° sonar. This system can scan in any direction away from the ship to locate shoals or submerged hazards along the intended direction of travel. When entering new and uncharted anchorages, the *Endeavour* can send a Zodiac ahead. In the Zodiac are GPS and depth sounding equipment that transmit their data back to the *Endeavour* where it is displayed on the bridge. Thus, new anchorages can be readily entered in a safe manner. The ship has new X and S band radars. The displays are very clear and sharp with excellent daylight visibility.

The vessel had several methods to communicate, including INMARSAT-B, INMARSAT-C, Iridium, and VHF. E-mail is available on the vessel, and is sent out several times, daily.

The ship regularly communicates with other ships in the area. The captain showed the Team a chart which contained the schedules of all vessels in the Antarctic Treaty Area during the month of November. In coordination with IAATO, the tour companies and their vessels all regularly communicate with one another on schedules and locations, and have a standing meeting every evening at 7:30 pm on 6220 frequency in order to avoid more than one vessel being at the same place at the same time.

The *Endeavour* reported that they planned to visit U.S. Palmer Station the day following the inspection. This is the only station they planned to visit this season. They

had coordinated the visit in advance, and received approval for the time and date. They also provided advance notice, and continued to coordinate the visit, as requested by the station

Waste Management

The ship has an updated waste management plan and a copy was made available to the Inspection Team. The person responsible for all records and updates to the plan is the Chief Officer. The crew, staff and passengers were given a training lecture by the expedition leader and expedition staff after boarding the ship at Ushuaia. An IAATO slide show includes IAATO requirements for waste management. The crew is trained and informed of the waste management protocol and other requirements related to the discharge of waste and sewage. The ship has publicly displayed notices concerning the required waste management practices.

The ship does not have an incinerator on board. All non-food wastes are separated into categories. The categories for separation of the waste include: glass, metal, paper, cardboard, plastic, medical waste, florescent bulbs, and electrical wire. Paper and cardboard are compacted, baled and stored to be brought to port for disposal. All metal, glass, plastic and medical waste is brought out of the Treaty Area for disposal. The ship's agent in Ushuaia makes arrangements for the disposal of these wastes.

Electrical batteries and spent smoke detectors are handled as a special category of waste and collected and stored separately from all other waste. The electrical batteries are collected and stored on board and taken out of the Antarctic Treaty Area to Ushuaia.

The ship does not carry any acutely toxic or harmful persistent compounds. The closest to this category is medical waste which is clearly marked and stored until it is brought back to Ushuaia. Medical waste from the ship may include syringes, spent medications, bandages, and human hair (from the hair salon). The ship's agent arranges for disposal of these types of waste.

The ship does not have or allow any polyvinyl chloride or polyurethane foam on board. The Inspection Team was informed that many of the supplies for the ship may be packed in polyurethane foam but that the products are unpacked and the foam packing material is returned to the supplier of the products before being loaded onto the ship.

National Geographic Endeavor, Neko Harbor

Plastics are separated in two categories: food packaging (water bottles) and non-food packaging. The plastics are taken out of the Treaty Area for disposal in Argentina. The ship does not carry any treated wood other than marine plywood.

The fuel for the Zodiacs arrives in port in barrels. This fuel is then transferred to a primary tank on board located outboard of the ship off the transom. The tank is fitted with a quick release so that it can be safely discharged in the event of a fire. The barrels are normally sent immediately back to shore following fuel transfer to the primary tank. However, in some instances the ship is unable to return them before departure and the empty barrels are stowed on board until return to port.

Oily waste from bilges and other sources is separated, stored and once the ship returns to port this waste oil is delivered to users in the Falkland Islands where it is used as a fuel extender for a greenhouse. This is done in exchange for fresh vegetables from that greenhouse.

Food wastes (organic wastes) are shredded, dewatered and stored in plastic bags until the ship is out at least 12 miles from the coast or ice shelves outside of the Antarctic Treaty Area. The produced water is sent to the sewage and grey water storage tanks. Avian products that may be part of the food wastes are also mixed in with the other food wastes, shredded, dewatered and stored. The crew member informed the Inspection Team that the food waste is disinfected as it is being shredded.

During the inspection, the Team was told that sewage and grey water are not treated. After the inspection, Lindblad Expeditions reported that Sewage (Black Water) is treated using an IMO certified treatment system. Gray water is not treated but rather stored in the ship's holding tanks until out beyond the 12 mile limit, before it is released. The ship has sufficient storage space for the number of passengers and the length of time for the cruise.

During this part of the observation and tour of the ship's waste management operations, the Inspection Team noticed that the personnel who should have known which tanks are used to store the sewage and grey water could not readily identify which tanks were for that purpose. The ship's crewman had to call at least two other crew members to ascertain which tanks were for that purpose.

Small Boat Transportation

The *Endeavour* has a total of 12 Zodiacs onboard. During the inspection, 11 Zodiacs were operational. According to the officer in charge of small craft operations, the Zodiac operators, during this particular cruise, were seasoned Antarctic boat drivers with long experience. Operators are trained in boat handling and safety as well as in the proper procedures when operating near wildlife. A normal complement on the Zodiacs is 8 passengers with the operator.

The *Endeavour* utilized the "Crew Finder" system to track its Zodiacs. With "Crew Finder," the ship is able to locate, track, and determine the status of each Zodiac. The captain informed the inspectors that before and after each use, the Zodiacs are washed and cleaned in order to prevent cross-contamination of the Antarctic environment.

During the short visit, inspectors observed that the Zodiac operators were aware of the requirements of the Antarctic Treaty System related to the stand-off distance to wildlife as well as the proper location to land their craft once ashore. Inspectors were impressed with operators' familiarity with operations in Neko Harbor.

Non-Indigenous Species

Staff inform passengers prior to departure that they may not bring any animals, plants or seeds with them on the vessel. While in the Antarctic Treaty Area, passengers wash the soles of their boots at a boot-washing station with Virkon S disinfectant prior to departing the vessel and upon returning to the vessel to prevent cross-contamination. In addition, the Zodiacs are cleaned after every use.

The Inspection Team was informed that the vessel maintains a ballast management system in which no ballast water from outside the Antarctic Treaty Area is released into the Antarctic Treaty Area's waters.

Conservation of Flora and Fauna

As an IAATO member, Lindblad Expeditions follows the IAATO Marine Wildlife Watching Guidelines. The officers demonstrated knowledge of the guidelines that the vessel should stay at least 300 feet from all marine mammals, as well as 15 feet from penguins ashore. Lindblad Expeditions has a policy of never disturbing wildlife. The wildlife should not react to human presence.

The *Endeavor* reported that there were no incidents where an animal was harmed.

Protected Areas

The *Endeavor's* crew maintains a list of all Antarctic Specially Protected Areas, including marine protected areas. It keeps maps of ASPAs in the vicinity out on the bridge. The crew ensure that the vessel never enters a marine ASPA. Staff also ensure that none of the passengers or staff enter any land-based ASPAs.

Landings and Activities Ashore

The Inspection Team observed a landing at Neko Harbor. The small bay has a cobble beach extending approximately 500 m at the southwestern end. Behind the beach a rocky outcrop leads up the foot of a permanent snowslope. The glaciers around the site are highly crevassed and those that surround the bay regularly calve. Gentoo penguins and skuas can be found at the site, as well as moss species, the green alga *Pasiola crispa* and snow algae. Neko Harbor is subject to Site Guidelines for Visitors (Resolution 2, 2006).

The ship had previously visited Cuverville Island and, thus, many of the approximate 108 passengers had just been ashore to visit a penguin rookery and elected to take Zodiac trips around the harbor area rather than land at the Neko Gentoo rookery. Twelve passengers elected to visit the Neko rookery.

The Inspection Team observed well-managed landings and operations ashore. The expedition leader, Tim Soper, was aware of the Neko Harbor Site Guidelines for Visitors (Resolution 2, 2006), and managed the landing according to the guidelines. The expedition leader and two expedition staff went ashore before the passengers to check the condition of the site. The landing was preceded by a checkout by the expedition leader and two expedition staff. In addition to the expedition staff, there were two wildlife observers from Oceanites who were conducting penguin hatching censuses and who also helped guide the tourists.

The expedition staff and guides established a safe landing spot to the side of the rookery and set up two small, portable bins ashore for passengers to store temporarily items such as life vests. Flags were brought in the event that there was a need to establish walking routes, but, in fact, this was not necessary, since the routes were clearly defined by a small strip of sand beach at water level and a path in the snow above the beach that a previous tourist visit had made.

Passengers were briefed on the beach regarding safety (*e.g.*, calving of the nearby Rudolph Glacier could cause sufficient waves to swamp the beach and passengers should take to high ground if calving was noticed). Passengers were also briefed about the local area management plan and where there were established penguin pathways to avoid. Passengers were advised to stay in a group and not stray off, not to cause disturbance to the wildlife and to stay at least 5 m away from all penguins. Passengers were observed to comply with these rules. There was an organized walk along the beach, stopping for wildlife lectures at points of interest (*e.g.*, a basking Weddell Seal). The group was then led up a gently sloping snow covered hill that was well away from the rookery to a high point for observation and photography.

The entire time of the landing was about two hours. No disturbance of wildlife was observed and all behavior by passengers was exemplary.

Lyubov Orlova, Deception Island

***M/S Lyubov Orlova* – QUARK EXPEDITIONS**
Deception Island Caldera (Port Foster), Whalers Bay and Pendulum Cove
November 25, 2006

The *M/S Lyubov Orlova* is operated by Quark Expeditions (Quark), a U.S. tour company with offices in Connecticut. The ship is flagged in Malta with a Russian crew. The ship carries a current classification certificate with the Russian Registry. The inspection was carried out at Whalers Bay, Deception Island, with the advance approval of the ship's master, Captain Igor Karavaev. Quark Expeditions is a member of IAATO.

Prior to arrival of the *Lyubov Orlova,* the Inspection Team was ashore on Whalers Bay to observe management of the landing of passengers. At 3:30 p.m. an advance party of the expedition staff arrived ashore. The Team was met by Ms. Kara Weller, Expedition Leader, who organized the landings. The inspection was completed at approximately 6:30 p.m.

After viewing the landing and shore side organization, the Team was transported via Quark Zodiac to the *Lyubov Orlova* and met with Ms. Weller, Captain Karavaev, the First Officer and the Chief Engineer to discuss relevant issues regarding ship and tourist management. After the meeting, the Team was given a tour of the vessel.

The ship carried 96 passengers, well below the carrying capacity of the vessel. There were 53 Russian crew on board, and the catering staff consisted of 10. With 11 staff members, there were 74 personnel in all.

The Team had some difficulty obtaining accurate information because all ships officers with whom the Team interacted spoke limited English and the Inspection Team did not bring with it an interpreter. As a result, it was not possible to delve in detail into some aspects of the ship's operations.

Vessel Particulars

The *Lyubov Orlova* was built in Yugoslavia in 1976 and is a sister ship of the *M/S Clipper Adventurer*. The ship is 100 m in length and 4,160 tons in displacement. Maximum allowable personnel capacity is 280 although Quark does not exceed approximately 170. Propulsion is via two 2,640 HP diesel engines with two propellers and rudders and a bow thruster. The *Lyubov Orlova* was built as an ice-strengthened tourship and saw previous use in the Arctic, notably in the Hudson Bay Region.

Personnel

Captain Karavaev indicated that he had worked in the Antarctic for five seasons. His Chief Officer and Chief Engineer had spent seven seasons in Antarctica, and one of his second officers had two years experience there.

This was Ms. Weller's eighth year in Antarctica, working not only for Quark but also for Clipper Cruise Lines, and was her third year as expedition leader. All of her 11 staff members (including the ship's doctor) had Antarctic tour experience. Two had worked for the Australian Antarctic Division.

Training and Education

Ms. Weller received training from Quark on expedition and Antarctic matters. She said that the standard half-hour IAATO briefing on Antarctic policies and procedures was given to all crew members, and translated into Russian for the Russian crew. Antarctic and U.S. regulatory materials were available on the bridge and available to the staff. Passengers were given an IAATO slide show at the start of the voyage, and were provided translated summary materials in relevant languages. Some lectures on Antarctic history were provided by staff.

Vessel Emergency Response and Medical Facilities

The ship has six uncovered lifeboats capable of holding a total of 300 people and four life rafts capable of holding 80 people. Life boat drills are practiced once per week by the crew. Passengers must do one lifeboat drill which is conducted early in the cruise prior to entering the Drake Passage.

The ship has a fire emergency plan. A current certificate of classification from the Russian Registry testifies to proper fire fighting equipment on board.

Maritime crew is trained in spill response. Absorbents are kept aboard for spill clean up. Spill exercises are carried out on an approximate monthly basis. A current Shipboard Oil Pollution Emergency Plan registration is carried aboard.

Lyubov Orlova has a small medical facility onboard. The sickbay has two beds. The vessel has two doctors to care for the passengers and crew. In addition to the doctors, the ship also has a Medical Emergency Response Team made up of five personnel trained to administer first aid and provide emergency treatment. A doctor accompanies the tourists when they travel ashore. *Lyubov Orlova* does not have any dental care capability onboard.

If a passenger is seriously ill requiring major medical care or evacuation, *Lyubov Orlova* uses the IAATO Vessel Medical Emergency Contingency Plan to assess the situation and take the appropriate actions. According to the captain, *Lyubov Orlova* had to evacuate one of its passengers to the Chilean Frei Base in 2005 because of a serious medical condition.

Due to *Lyubov Orlova*'s small medical facility, it can provide only limited assistance to others in need of medical help. However, the expedition leader reported that in 2005 the *Lyubov Orlova* assisted the medical evacuation of a passenger from a different tour ship to Ushuaia, Argentina. The transfer of the passenger was conducted by Zodiac.

Unplanned Incidents and Search and Rescue

According to the captain and expedition leader, earlier this season the *Lyubov Orlova* ran into a sand bank in Whalers Bay at Deception Island (the same place the U.S. inspection was being conducted) and was stuck for 16 hours. It was freed with the help of a Spanish Government tug boat that was fortunately nearby. The *Lyubov Orlova* was later inspected at Ushuaia and, according to the captain and expedition leader, no damage was found to the hull. This incident was reported to IAATO. No other unplanned incidents were reported to the Team.

The captain reported that *Lyubov Orlova* has a search and rescue contingency plan in place. *Lyubov Orlova* monitors all international emergency communications circuits in the various frequency ranges. If a distress call is received, the captain stated that he would do what he could to help those in distress and to assist in search and rescue efforts.

Logistics and Communication

The *Lyubov Orlova* carries the standard suite of navigational equipment – GPS, fathometer, and weather fax. The ship also has a modern radar with a high definition color display. A junior mate was observed keeping continuous watch of the bridge fathometer while the ship navigated in Port Foster.

The *Lyubov Orlova* carries the communication equipment such as HF, VHF and INMARSAT-C. There are also two Iridium units and a Mini-M. An e-mail network is aboard that uses the INMARSAT and Mini-M for transmission. The ship does not have Internet connectivity.

The ship participates in daily communications with other tour ships in the area at 7:30 p.m. on 6220 frequency.

The expedition leader reported that they had made only small changes to their itinerary during their time in Antarctica. The itinerary was coordinated through the IAATO scheduler prior to the summer season. Opportunistic landings to sites they had not visited before were rare; the last opportunistic landing occurred two years ago.

Waste Management

The vessel has a waste management plan that calls for the separation, reduction, collection storage and disposal of wastes. The plan is dated 1999, and the Team reviewed a copy of the plan during this inspection. The plan is available in both Russian and English. The chief mate is the crew member responsible for the maintenance and updating of the plan. The ship's waste management report also was made available for review and is up to date. The reports are retained for a period of two years.

As stated elsewhere in this report, the crew, staff and passengers are informed of the importance and need to minimize the impact of their activities on the environment. Training and orientation is given to the crew, staff and passengers upon embarkation by the chief mate and the expedition leader before arriving in the Antarctic Treaty Area. The training of the new crew and staff also includes special courses, drills and waste management specific training on the requirements under the Treaty and the Protocol. Under the waste management plan, the vessel is sectioned off and individual personnel are assigned specific areas of responsibility for waste management. For example, the passenger accommodations area is assigned to the passenger mate; the decks and hold to the boatswain; sanitary, medical waste, medications to the ship's doctor; galley and restaurants to the chief cook; and the engine room to the chief engineer.

Publicly displayed notices on waste management practices are posted throughout the vessel. Spent batteries are collected at frequently visited areas of the vessel such as at the gift shop and the passenger information desk. Waste oil is collected from the oil-water separator and reused as boiler fuel. All oily waste is retained on board while the ship is in the Antarctic Treaty Area. All plastics, wood, metal and metal cans are collected, separated and stored on the vessel. These wastes are brought out of the Treaty Area and off-loaded at port where arrangements have been made for proper disposal through the agent's contractor in Ushuaia. The use of a compactor was not observed during this inspection. Food wastes are collected, separated and stored on board until disposed outside the Treaty Area in the sea. Empty drums of lubricants are stored and disposed of at port. All paper and cardboard is incinerated. The ash is collected and stored for disposal at port. The vessel employs a vacuum flush system for its on board toilets. This type of system reduces the volume of water needed for each flush.

The vessel has a 10 m^3 storage capacity for its sewage and grey water. Sewage and grey water are held in the storage tanks until outside the Antarctic Treaty Area where they are discharged untreated into the marine environment. The crew of the vessel is aware of Protocol and MARPOL requirements. The Team reviewed the ship's copy of these documents which are part of the training and orientation given to the crew prior to entering the Treaty Area.

Small Boat Transportation

Lyubov Orlova has six Zodiacs on board. According to the expedition leader, *Lyubov Orlova* has nine Zodiac operators who are seasoned operators with considerable Antarctic experience. Operators are trained in boat handling and safety as well as in the proper procedures when operating near wildlife. Additionally, the Inspection Team was informed that passengers are also provided with a short course on Zodiac safety. A normal complement on the Zodiacs is ten passengers with the operator.

During the short visit, inspectors observed several Zodiac operators transporting passengers ashore in Whalers Bay, Deception Island. The Inspection Team was impressed with the boat handling skills of the operators under windy and choppy sea conditions.

Non-Indigenous Species

Passengers are informed prior to the expedition that they are not permitted to bring on board animals or plants.

The *Lyubov Orlova* maintains boot washing stations on the vessel, and requires passengers to clean their boots and walking sticks prior to disembarking and immediately upon returning to the vessel. Virkon S is used as a boot washing agent. The used Virkon S solution is deposited into the sea.

Conservation of Flora and Fauna

The vessel follows IAATO's Marine Wildlife Watching Guidelines. Crew and Zodiac drivers are briefed on the distances to be kept from marine wildlife and the need to keep a safe distance, reduce speed, and not disturb marine mammals.

Expedition staff implement the IAATO Marine Wildlife Watching Guidelines for small boat operations as well as operations ashore to avoid harmful interference or any impacts on flora, fauna, and geologic features. Passengers are educated on the conservation of flora and fauna during the IAATO slideshow at the beginning of the cruise. They are taught to stay 5 m from wildlife and are given a visual demonstration of that distance. Expedition staff monitor the distance of passengers from wildlife ashore. The expedition leader reported that there have not been any major infractions or misconduct by passengers ashore. Occasionally expedition staff may need to remind an overeager passenger who gets too close to wildlife.

Protected Areas

The vessel maintains a copy of all management plans of Antarctic Specially Protected Areas on board. At annual training, expedition leaders are briefed on the areas that are off limits, and staff is briefed on these areas by the expedition leaders during the expedition. Passengers are briefed on areas where entry is prohibited prior to leaving the vessel. At each landing site, passengers are shown exactly where entry is prohibited, and expedition staff members are posted near protected areas to prevent passengers from entering them. During the landing at Whalers Bay, the Inspection Team observed staff informing passengers where they were permitted to go. Passengers, in individual informal conversations with Inspection Team members, confirmed that they were well-briefed on where they could and could not go.

Vessel crew is informed of the location of marine protected areas, and the vessel stays out of these areas.

Landings and Activities Ashore

The Inspection Team observed a landing in Whalers Bay, one of four tourist landing sites on Deception Island. While ashore, the Inspection Team observed a well- planned and executed landing on behalf of the expedition staff of the *Lyubov Orlova*. Prior to arrival of any passengers ashore, nine expedition staff came ashore to survey the site and set up operations to manage the passengers' visit. The expedition staff included the doctor who also brought emergency supplies. The expedition staff were knowledgeable about the site, and were aware of the Management Plan for the Deception Island ASMA and the ASPAs in the vicinity of Whalers Bay. Expedition staff were stationed in key positions at the landing site to protect historic resources and ensure passenger safety. A biologist was stationed at Neptune's Window on one end of the site to educate the passengers on the nesting Cape Petrels in the distance and

to ensure that no one was injured climbing the steep incline to the lookout point. A historian was stationed at the airplane hangar at the other end of the site to ensure that passengers did not walk beyond the designated area into the ASPA, and to provide the history of the site to passengers. Passengers were brought to shore aboard Zodiacs, and were given a briefing by the expedition leader as they disembarked. They were told the extent of the area open to them, and were asked to stay off fragile terraces. They were made aware of the historic resources and proper conduct in the area in accordance with the ASMA. The Inspection Team felt that the expedition leader did an excellent job of briefing passengers about the site and the rules they had to follow as each Zodiac landed, and she was clearly fully familiar with IAATO guidelines.

While Whalers Bay is not one of the sites covered by Site Guidelines for Visitors (Resolution 2, 2006) (Site Guidelines), the expedition leader reported that she was aware of the Site Guidelines, and had copies aboard the ship as a reference for all of her staff. The expedition leader reported that there was extensive discussion of the site guidelines at the annual meeting for Quark's expedition leaders, and, in turn, she educated her staff on the site guidelines in briefings at the beginning of the cruise, and before each landing. She also reported that they often brought the site guidelines ashore for reference at the landing sites.

The *Lyubov Orlova* does not put more than 100 passengers ashore at any one time in any one place. Off-duty crew members receive permission to come ashore as passengers from time to time when space is available. For this cruise, the ratio of staff to passengers ashore is 1:9 or better. While the duration of a visit ashore varies with each site and weather conditions, on average a shore visit is two-and-a-half to three hours.

Explorer II, Deception Island

***M/S Explorer II* – ABERCROMBIE & KENT**
Deception Island, Whalers Bay and Pendulum Cove
November 25, 2006

The *M/S Explorer II* is operated by Abercrombie & Kent, Inc. Permission for the inspection was given in advance by the master of the ship, Captain John Moulds.

The Inspection Team boarded the *Explorer II* in Whalers Bay at Deception Island at 5:15 a.m. The Team was met by Victoria Wheatley of Abercrombie & Kent. Ms. Wheatley, together with Captain Moulds and Staff Captain Giovanni Biasutti, met with the Team and began discussing the vessel's operations shortly after the Team's arrival. At 7:15 a.m., members of the Inspection Team accompanied staff and passengers on a landing at Whalers Bay. The Team was also given a tour of the bridge, engine room, sewage treatment plant, public, and other non-public areas of the vessel. After the passengers, staff and Inspection Team returned to the vessel, discussions continued with staff and crew while the vessel relocated to Pendulum Cove. The inspection ended at approximately 11:30 a.m.

The total number of personnel on board was 174, including 22 officers and managers, 14 cruise department and expedition staff, and 32 crew. On this trip, there were 199 passengers, including 75 from the United Kingdom, 38 from Germany and 37 from the United States.

This vessel had not been inspected previously under the Antarctic Treaty or the Environmental Protocol.

Vessel Particulars

The hull and machinery space of the *Explorer II* were built in 1989 in Ukraine by the Russian Navy. The vessel was originally planned to be an underwater reconnaissance vessel. It was at dry dock in Ukraine until it was converted into a passenger ship in 1996 at the Mariotti Yard in Genoa, Italy. The maximum capacity of the ship is 421 passengers. The weight of the ship is 12,449 gross tons. The vessel was built to USSR Register of Shipping ice class L2 (corresponding to the Baltic ice class 1B). The bulbous bow has been reinforced to a higher ice class (1B). The stern and its vicinity have also been reinforced to a higher ice class (also 1B). In addition, in April 2004 new stainless steel propellers (ice class 1A) were installed.

The *Explorer II* is a Bahamian flagged vessel. The ship is owned by Atholl Shipping Corporation of Southampton, United Kingdom. It was scheduled to make eleven trips to the Antarctic Treaty Area between November 8, 2006 and March 7, 2007. Each year, the ship is officially named the *M/S Explorer II* (this season for nine cruises) and renamed *M/S Alexander von Humboldt* (for two cruises – one at the start of the season and the other at the end) when chartered by Phoenix Reisen, which serves a different market than the *Explorer II*. Abercrombie & Kent remains the operator of the vessel when it is chartered by Phoenix Reisen.

Personnel

Captain John Moulds is a British master with three years of Antarctic experience with the *Explorer II* (and 20 voyages to the Antarctic Peninsula). Captain Giovanni Biasutti, serving as captain on the voyage, is an Italian master with 10 years of Antarctic experience aboard this vessel and other Antarctic experience amounting to 65 trips to the Antarctic Peninsula and the Ross Sea.

Abercrombie & Kent Antarctic Environmental Officer Victoria Wheatley has over 20 years of Antarctic experience. (She has also been a member of the U.S. delegation to Antarctic Treaty Consultative Meetings.) Larry Hobbs, the expedition leader, has been involved in marine mammal research, teaching natural history courses at the university level and leading natural history tours for over 25 years. He has been leading Antarctic cruises for the past 23 years. Cruise Director Jannie Cloete has worked at sea for over twenty-five years, including three years of Antarctic experience. Assistant Cruise Directors Sally Millns and Assistant Expedition Leader Marco Favero have 9 and 21 years of Antarctic experience, respectively. The naturalists and other lecturers have long polar tenures. All of the expedition staff have previous Antarctic experience.

The Inspection Team was impressed by the breadth of knowledge and experience of the 14 historians and naturalists who functioned as lecturers. This group included Bob Rutford, a glaciologist and former President of the Scientific Committee on Antarctic Research (SCAR).

Training and Education

All officers, staff and crew are briefed on Antarctic regulatory matters prior to the commencement of the season, and as part of the induction process for new employees. The captain indicated that he met each day with the expedition leader and others to discuss matters affecting the ship related to landings, including avoidance of marine protected areas and choice of Zodiac landing areas.

Passengers receive briefings before entering the Antarctic Treaty Area, and are given IAATO handouts in relevant languages. Passengers are shown IAATO's standard slideshow as supplemented by ship's staff. Passengers (and crew) are also provided with a hard copy of "Guidance for Visitors to the Antarctic," ATCM Recommendation XVIII-1 provided, as appropriate, in one of the four ATCM languages (English, French, Russian, and Spanish) or other languages (Chinese, German, Italian, or Japanese) which the Guidelines have been translated into by IAATO. The expedition leader gives a briefing in the main lounge to passengers the prior evening on the next day's activities, and includes relevant site information. These are for all passengers, and are also relayed on the ship's closed circuit TV system. The Inspection Team heard relevant shore information provided to passengers by announcements throughout the ship as passengers waited to board Zodiacs, and the expedition leader gave final guidance to each Zodiac's passengers as they disembarked at Whalers Bay. This cruise had a large number of Spanish-speaking and German passengers. The Inspection Team observed briefings in German by *Explorer II* staff at landings, and was informed that separate briefings and lectures in Spanish, German and English were a part of the ship's regular practice.

Lectures by the ship's dozen historians and naturalists throughout the journey complement the work of the expedition leader and his staff.

The Inspection Team was shown a very substantial collection of Antarctic Treaty regulatory materials on board, including on the bridge and staff office. The Team also received a copy of the "Table of Contents" from the Expedition Leader's Manual which provides

extensive reference materials for the expedition leader, ship's command and expedition staff.

Vessel Emergency Response and Medical Facilities

There are four covered lifeboats capable of holding a total of 696 people. Passengers are required to participate in one lifeboat drill which is conducted alongside the pier in Ushuaia. There is one drill per day in lifeboat and other emergency situations for selected portions of the crew. There is a full crew drill every two weeks.

The ship has a fire emergency plan. A current certificate of classification from the Italian Registry (RINA) indicated that necessary fire fighting equipment is on board. In addition, the vessel carries a current U.S. Coast Guard Certificate of Inspection.

There is a current Shipboard Oil Pollution Emergency Plan carried on board. Pollution handling materials are stored in two locations, one forward and one aft. A small boom and absorbent pads are also available on the vessel. Maritime crew are trained in spill response and they occasionally tow a mooring rope with Zodiacs to simulate a boom deployment.

Explorer II has a small medical facility on board. The sickbay has two beds with an examination room and waiting area. The vessel has one doctor and one nurse to care for the passengers and crew. All members of the staff are trained to administer first aid. A doctor or nurse, with a medical kit, accompanies the passengers when they travel ashore. *Explorer II* does not have dental care capability.

If a passenger is seriously ill requiring a medical evacuation, *Explorer II* will use the IAATO Vessel Medical Emergency Contingency Plan to assess the situation and take appropriate action. According to the Antarctic Environmental Officer, if *Explorer II* had to evacuate one of its passengers by air, it would likely use the commercial air carrier, DAP.

Unplanned Incidents and Search and Rescue

The captain informed the Inspection Team that during his tenure on the ship there had been no incidents related to impact by the ship except that a seam in the forepeak had been opened by a big growler strike during last season's passage through the Lemaire Channel. The damage, while causing a leak from a ballast tank, did not endanger the ship and was repaired in Ushuaia without further incident.

Explorer II's bridge watch stander showed an Inspection Team member the ship's search and rescue contingency plan. The plan includes the initial communications steps to be taken in order to request assistance. *Explorer II* monitors all the emergency communications circuits in the various frequency ranges and has the capability to transmit and received distress signals in VHF, UHF, MF, text message and voice via INMARSAT. The watch officer stated that if a distress call is received, the captain would do what he could to assist if the request for help is in *Explorer II*'s vicinity or if *Explorer II* is closest to the scene. During the past year, *Explorer II* did not have to render any assistance to another vessel.

Logistics and Communications

Explorer II carries the standard suite of navigational equipment, such as GPS, bridge fathometer and weather fax. The ship has a modern radar with a high definition color display. Depths and cruise tracks are entered by hand into a computer data base with corrected chart coordinates. This serves as an excellent recording of the routes and depths of previous cruise tracks and enables safe future navigation.

Explorer II carries communication equipment such as HF, VHF and INMARSAT-C. An e-mail network is aboard that uses INMARSAT for transmission. Internet access is to be installed in the near future.

The ship participates in daily communications with other tour ships in the area, including a daily radio call at 7:30 p.m. to discuss changes to schedules for the upcoming days and other relevant matters.

The vessel provides 72 hours advance notification prior to any visits to Antarctic research stations.

For this cruise, there had not been changes to Abercrombie & Kent's itinerary which had been coordinated through the IAATO scheduler database in advance.

All the sites on the itinerary are familiar to the ship, and the vessel did not make, and generally does not make, opportunistic landings. In the past, when the vessel has made an opportunistic landing at a new site, it followed IAATO guidelines for new sites.

Waste Management

The Inspection Team reviewed the vessel's waste management plan which was last revised in September 2004 by Staff Captain Biasutti. The staff captain is responsible for waste management and the maintenance of waste management reports. The Team reviewed the vessel's waste management reports and observed that the latest report entry was for November 16, 2006 and the earliest entry was dated in 2003.

The vessel's crew receives training and orientation prior to embarkation with periodic refresher drills while at sea. The Team observed that the waste management plan calls for the vessel to meet the United State's Resource Conservation and Recovery Act (RCRA) provisions for waste handling, recycling and disposal. The Team observed that notices concerning waste management were displayed in areas where the passengers tend to gather such as around open areas on the deck and other common areas.

Electrical batteries are handled separately from other waste and are stored on board until the vessel makes port outside the Antarctic Treaty Area. The vessel's waste management plan calls for the separation of all wastes into specific categories. Waste oils and lubricants are stored on board the vessel and disposed of at port. The vessel does not have any waste that has heavy metals or acutely toxic or persistent compounds. All plastic, PVC, foam or rubber is separated and stored on board until disposed of at port outside of the Antarctic Treaty Area. The vessel does not carry or use treated wood. Fuel drums are cleaned out and reused as waste storage containers. The empty drums are stowed on drum racks located on deck.

Waste cleaning fluids, and other cleaning materials are handled as combustible waste and stored on board until these can be off-loaded at port. Fluorescent light tubes are collected separately and stored. All glass and glass containers are crushed and placed in storage until ready for disposal at port. Paper and cardboard is compacted, baled and stored. The Team observed the storage areas. The vessel appears to have adequate storage capacity to store its waste. Organic wastes such as food wastes are sent through a grinder, dewatered, and stored until ready for incineration in its diesel fired incinerator. The vessel does not operate the incinerator while at anchor.

Avian products are separated from other food and organic wastes. These are ground and sent through the incinerator. The incinerator ash is stored on board until disposal is arranged at port. The liquid pressed out of the ground food waste is sent to the sewage holding tank for treatment through the sewage treatment plant. The sewage plant is regularly cleaned of sludge. The sludge that is removed is dewatered and incinerated. The staff and crew are aware of and receive refresher training on the Environmental Protocol and MARPOL regulations that cover the discharge of food wastes and sewage.

The vessel retains all oily water on board while in the Antarctic Treaty Area and until arrangements for disposal are made after arriving at port. The staff captain informed the Team that special wastes such as hazardous wastes and batteries are retained on board and very likely kept until the vessel arrives in Northern Europe, depending on the port, before making arrangement for disposal.

Overall, the Inspection Team was impressed with *Explorer II*'s handling of waste management.

Small Boat Transportation

Explorer II has 12 Zodiacs on board. According to the expedition leader, *Explorer II* has 13 Zodiac operators with various levels of Antarctic experience. During the inspection, the ship was operating five Zodiacs to transport passengers to and from the ship. A safety Zodiac was rigged at the ship, ready to be launched if necessary; another was anchored just off the landing site. The staff director reported that boat operators are trained in boat handling and safety as well as in the proper procedures when operating near wildlife. Additionally, the Inspection Team observed that passengers are briefed on Zodiac safety procedures prior to board-

ing the small craft. The captain reported that a normal complement on the Zodiacs is ten passengers with the operator.

During the shore visit, inspectors observed several Zodiac operators transporting passenger ashore in Whalers Bay, Deception Island. Inspectors were impressed with the boat handling skills of the operators.

Non-Indigenous Species

The vessel does not release ballast water from outside the Antarctic Treaty Area into the sea in the Antarctic Treaty Area. Prior to landing and after returning to the vessel, passengers and staff wash their boots with Virkon S, a disinfectant, and clothing and shore gear are inspected.

Prior to departure at the start of the cruise, passengers are informed that they may not bring non-native species aboard the vessel.

Conservation of Flora and Fauna

Explorer II staff and crew report that they observe the IAATO Marine Wildlife Watching Guidelines. The captain stated that the vessel will keep an appropriate distance from whales, but that sometimes whales actually approach the vessel. Crew and staff reported that there have been no collisions with whales.

Zodiac drivers are trained not to disturb marine wildlife. When operating near seals, Zodiac drivers avoid actions that will cause the animals to change their behavior. Sometimes they will get close to seals sleeping on ice floes, turning off the engine and drifting by without disturbing them.

Expedition staff are trained in how to manage passengers on shore to prevent any harmful interference with wildlife. Passengers are given instructions in an IAATO slideshow on how to maintain an appropriate distance from penguins and other wildlife. They also receive briefings the night before a landing, and when disembarking from the Zodiacs before walking ashore. Expedition staff arrive at the landing site in advance, and post flags and position staff to keep passengers clear of areas where wildlife is sensitive to disturbance, such as seals hulled out on the beach, or nesting birds.

According to ship personnel, there have not been any incidents with this ship where any wildlife – either on land or at sea – has been killed, injured, captured, handled, molested, or disturbed.

Protected Areas

Explorer II has on board notebook binders with management plans of all of the protected areas in the Antarctic Treaty Region. It also has created a map of the Antarctic Peninsula, in a format which can easily be updated, identifying any protected areas (including all ASPA's, ASMA's, HSM's, CCAS Seal Reserves, CCAMLR CEMP Sites) and the twelve Site Guidelines for Visitors (Resolution 2, 2006). This was seen as a useful innovation which might be considered for adoption by other tour operators and by Antarctic programs.

Expedition leaders and staff are briefed on any protected area. The night before visiting a site adjacent to an ASPA, passengers receive a lecture explaining areas where entry is prohibited. In addition, at the landing site itself, expedition staff point out the location of the ASPA and remind passengers that entry is prohibited. Staff also, at appropriate sites, post flags designating any areas where passengers may walk, and monitor passengers to ensure they do not enter ASPA's. Staff indicated that passengers who have wandered off receive a stern lecture, and will be prohibited landing if they repeatedly fail to abide by staff instructions.

Crew are knowledgeable of marine protected areas, and report that they do not enter marine protected areas.

Landings and Activities Ashore

With 199 people on board, Abercrombie & Kent divides passengers into two groups to ensure that there are never more than 100 passengers on shore at any one time. Each passenger and crew member is given an identification card as a pass, and this card is swiped each time a passenger boards or disembarks the ship, including for landings. The electronic system lists the names of those on shore as well as the total number of passengers or crew on shore at any one time. Crew

are permitted ashore when they are off duty, but are counted towards the 100-passenger limit.

The environmental officer explained how the expedition staff and passengers were informed about the twelve Site Guidelines for Visitors (Resolution 2, 2006). A map of the Peninsula Area used by the ship shows the location of the twelve site guidelines. Also, the text of the site guidelines is posted on the bulletin board for passengers to view on days when they were scheduled to visit one of the sites.

Abercrombie & Kent sends fourteen expedition staff and one to four crew members ashore to manage the activities of passengers ashore. The ratio of staff to passengers does not exceed 1:10. While the duration of a visit varies depending on the location and weather conditions, an average landing is about one-and-a-half hours per group.

Before bringing passengers ashore, the expedition leader and staff captain go ashore to assess the site for safety and sensitive areas to avoid. The second Zodiac brings in the expedition staff, including a doctor or nurse with medical supplies (to assist with any medical emergencies while ashore) and emergency supplies and rations (should a group be stranded on shore).

The Inspection Team observed a landing in Whalers Bay, one of four tourist sites on Deception Island. While ashore the Inspection Team observed a well managed landing of the second group of Abercrombie & Kent passengers. Two staff were posted at Neptune's Window to point out the nesting birds, and to ensure the safety of the guests on the steep incline. Another staff member was posted further down the beach to mark the extent of the open area. On the other side of the site, a historian was posted by the airplane hangar to ensure that passengers did not continue on into the ASPA on site. Other staff members were posted at the landing site along the beach and walking path, and staff planted small red flags, where necessary, to indicate walking areas and prohibited areas.

All staff members appeared knowledgeable about the site and aware of the Management Plan for the Deception Island ASMA and the ASPAs in the vicinity of Whalers Bay. After each Zodiac reached the landing site, passengers were again briefed on the landing site before walking ashore. Passengers were divided into English-speakers, German-speakers, and Spanish-speakers to ensure everyone understood the code of conduct for the site, distance to maintain from wildlife, historic artifacts on the beach, and the extent of area open to them. ◆

U.S. Team members observing passenger landing by *Lyubov Orlova*, Deception Island