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Japanese Inspection Report 2010

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

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Introduction

This is the final report of the inspection of the Antarctic conducted by the Japanese inspection team in January/February 2010, under Article VII of the Antarctic Treaty and Article 14 of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol).

The inspection team wishes to express its gratitude and appreciation for cooperation and hospitality it received from Maitri, Princess Elisabeth, Neumayer III, SANAE IV, Troll and Novolazarevskaya, as well as the Governments of India, Belgium, Germany, South Africa, Norway and Russia.

I. Inspection Results and Recommendations

1. Overview

(1) Background of 2010 Antarctic Inspections

The Antarctic Treaty and the Madrid Protocol are among key instruments for the international framework concerning Antarctica, which is generally referred to as the "Antarctic Treaty System". Mutual inspection by Contracting Parties which is provided in Article VII of the Treaty and Article 14 of the Protocol, is designed to promote objectives and ensure compliance with their obligations, and plays an important role in safeguarding the Antarctic Treaty System.

Approximately 40 inspections have been conducted by Contracting Parties since the Antarctic Treaty entered into effect in 1961. Japan conducted the inspection of six stations stretched across Dronning Maud Land from January 29th to February 10th 2010. This is the first time for Japan to conduct an inspection in Antarctica.

(2) Overview of the Inspection

(i) The Inspection Team

The inspection team was comprised of five observers designated by the Government of Japan:

- Mr. Yo Osumi : Team Leader (Senior Coordinator, Ministry of Foreign Affairs)
- Mr. Meguru Akimoto (Official, Ministry of the Environment)
- Dr. Kazuyuki Shiraishi (Deputy Director, National Institute of Polar Research)
- Dr. Kentaro Watanabe (Professor, National Institute of Polar Research)
- Mr. Kazuya Inui (Consultant, Nord Institute for Society and Environment)

The names of the observers were communicated to all Contracting Parties

through diplomatic channels in November 2009, in accordance with the provisions of Article VII(1) of the Antarctic Treaty. Likewise, the notice of the termination of their assignment was also communicated to all Contracting Parties.

(ii) Preparation

This inspection had been prepared through collaboration among the Ministry of Foreign Affairs, the Ministry of the Environment, and the Ministry of Education, Culture, Sports, Science and Technology, with the support of the National Institute of Polar Research for logistic arrangements. A committee comprising these ministries and experts was established for that purpose.

(iii) Inspection Visit

The Japanese inspection team used the intercontinental air transport of DROMLAN (Dronning Maud Land Air Network) to fly to Novolazarevskaya runway from Cape Town on January 29th. A small aircraft of DROMLAN was used for subsequent intra-continental flights.

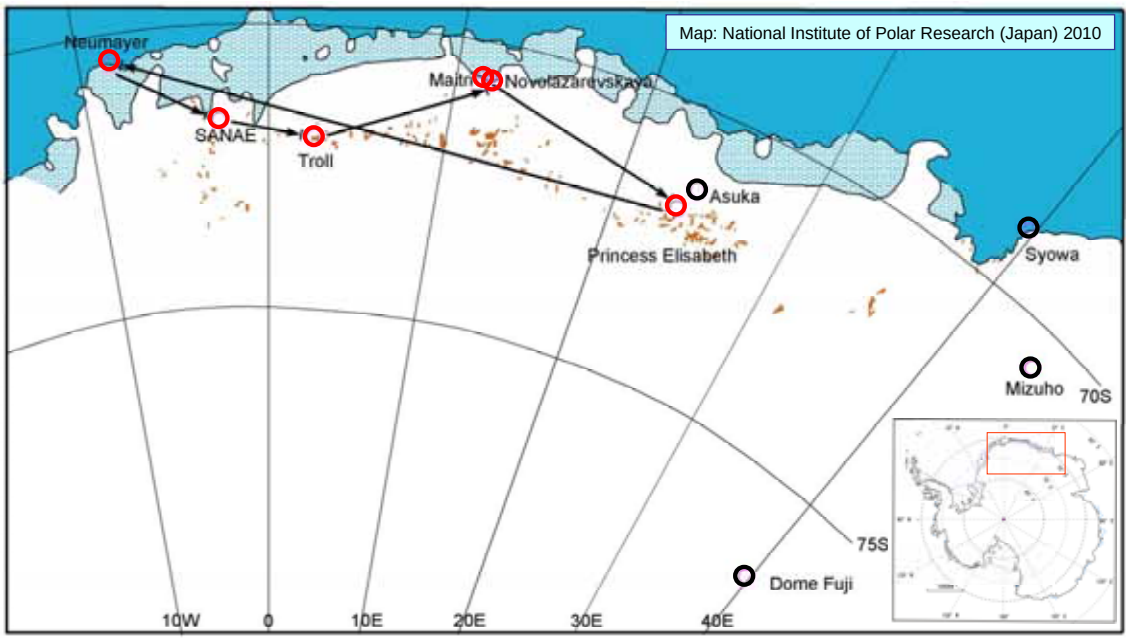
On the conclusion of inspections on six stations, the inspection team returned in the same manner, departing from Novolazarevskaya runway on February 10th, arriving in Cape Town on February 11th.

The following is the list of the six stations, their locations and the date of visit by the inspection team.

- Maitri station (70° 45' S, 11° 44' E) (India)
  January 29th - January 30th
- Princess Elisabeth station (71° 57' S, 23° 20' E) (Belgium)
  January 31st - February 2nd
- Neumayer station III (70° 40' S, 08° 16' E) (Germany)
  February 5th - February 6th
- SANAE IV base (71° 41' S, 02° 51' E) (South Africa)
  February 7th
- Troll station (72° 01' S, 02° 32' E) (Norway)
  February 7th - February 8th
- Novolazarevskaya station (70° 46' S, 11° 50' E) (Russia)
  February 9th - February 10th

In light of the changeable weather in the Antarctic, the outline of inspection schedule had been decided beforehand, while details were determined on the spot. The inspection team had initially planned to visit Antarctic Specially Protected Area (ASPA) No. 163 (Dakshin Gangotri Glacier), but it had to cancel the visit due to bad weather condition. However, the team managed to visit all six stations by changing its schedule in a flexible manner.

The locations of the inspected stations and the route of travel are indicated on the map below:



(iv) Other Recent and Preceding Inspections

The inspection of Maitri was the first one since the 2001 Norwegian inspection. Princess Elisabeth is a newly established station that began operations in the 2008 season, and inspected previously by Norway (February, 2009). Neumayer III is also a new station and this Japanese inspection was the first inspection it received (Neumayer II had been inspected by Finland in 2004.). The inspections of SANAE IV and Troll were the first ones since the 2001 Norwegian inspection and 2004 Finnish inspection. For Troll, it was the first inspection since being converted from

a seasonal station to a year-round station in 2005. Novolazarevskaya was inspected previously by Norway in 2001 and Russia itself in 2004.

(V) Reporting

The operators and Governments of the respective stations have been provided the opportunity to comment the draft version of the report in line with established practices and as stipulated in the Madrid Protocol. Comments received from the Ministry of Foreign Affiars of Norway, National Centre for Antarctic & Ocean Research (NCAOR) of India, Ministry of Foreign Affairs of Russia and Russian Antarctic Expedition (RFA), Alfred Wegener Institute (AWI) of Germany, Belgian Federal Science Policy Administration (BELSPO) have been incorporated into the text as appropriate. The Department of International Relations and Co-operation of the Republic of South Africa informed that they had no specific comments to the draft.

The inspection team is grateful for these responses and hopes that any mistakes and misunderstandings have been duly addressed.

2. Summary of Inspection Results

(1) Overview

The inspection was conducted to ascertain efforts and challenges at each of the stations for the promotion of and with regard to compliance with the Antarctic Treaty and the Madrid Protocol, and to share the findings to all Contracting Parties.

It focused on five main subjects: (a) station facilities and operations, (b) environmental conservation measures, (c) scientific research and international cooperation, (d) use of antarctica for peaceful purposes, and (e) tourism.

Questions were listed up using the "Antarctic Inspection Checklist A" (Resolution 5 (1995)) and collecting information from public sources. Some stations provided the inspection team with prepared documentation based on the "Checklist A", which was quite useful for the team.

The inspection team concludes that all stations were in compliance with the use of Antarctica for peaceful purposes, and were making efforts to

promote scientific investigation and international cooperation while minimizing environmental impacts. Disparities were found among the stations with regard to the level of environmental protection measures, reflecting different physical, financial and other circumstances of respective stations. In relation to pertinent points made by Norway in its inspection report to XXXIII Antarctic Consultative Meeting (XXXIII ATCM), new modes of activities such as the involvement of various actors in scientific observation and station operations are emerging, which raises concomitant challenges.

The Japanese inspection team hopes that all the Parties including those managing the inspected stations share an understanding regarding these matters and cooperate with each other to address them under the Antarctic Treaty System.

The followings are the description of the inspection team's main observations.

(2) Station Facilities and Operations

At all stations, it was found that managers and personnel were aware of the Antarctic Treaty and the Madrid Protocol as well as making efforts to promote their objectives and comply with them. However, wide variations as well as differences in their efforts were observed with regard to organizational arrangements and concrete measures for environmental conservation.

Wide variation was also observed between the newly built stations and older ones, with regard to the size of buildings, installations, devices, equipment and other infrastructure, as well as the level of introduction of cutting-edge technologies such as remote monitoring, renewable energy and cogeneration. The inspection team finds it interesting that some practices reflect distinctive policies of the respective stations and the governments. In particular, Princess Elisabeth and Neumayer III were actively using renewable energy, but had differences in, among others, ways of thinking, and actual level of introduction, due to the different size of the stations and technical challenges. For instance, solar power system was actively used at the former but was not used at the latter.

Internet connectivity, even with limitation of its use and access speed variation, seems to have a major positive impact on scientific activities of the station, as well as living conditions. This positive effect could not be overemphasized.

The increased involvement of various actors in the operation of the stations is also noteworthy. For example, the construction of Princess Elisabeth was coordinated by the International Polar Foundation (IPF), a non-governmental organization (NGO) that was mandated and co-funded by the Belgian Government. After the ownership was transferred to the Government in March 2010, IPF has been serving as the station operator under the responsibility of the Belgian Polar Secretariat, a department of BELSPO. There are also a number of cases in which non-governmental actors are participating in the usage of station's installations. For instance, Kongsberg Satellite Services AS (KSAT), a commercial Norwegian enterprise which is owned by the Norwegian Space Centre (NSC), under Norwegian Ministry of Trade and Industry, and Kongsberg Defense Systems on a 50/50 basis, has set up a large antenna installation (TrollSat) at Troll. It was briefed that, a commercial satellite ground station is maintained and managed by the company staff in the summertime. There are also small facilities managed or used by the private enterprise Antarctic Logistics Centre International (ALCI), based in Cape Town, inside Novolazarevskaya station. It may well be that activities by actors other than governmental ones in Antarctica will be more widespread in the future.

DROMLAN, in which Japan also participates, provides essential transportation infrastructure for scientific investigation and logisitic activities in the Dronning Maud Land. The operation of this air network is mainly managed by ALCI, and it frequently uses Novolazarevskaya runway owned by the Russian Government, while occasionally using Troll runway owned by the Norwegian Government. ALCI uses Novolazarevskaya runway and manages facilities including the operation center and the passenger accommodation nearby the runway. However, Russian expedition personnel were engaged in the maintenance of the runway. With the use of the runway by DROMLAN rising, the burden on the Novolazarevskaya station has become considerable.

(3) Environmental Protection

Implementation of measures for environmental protection varies depending on the size, location and time of construction of the station. New stations introduced cutting-edge installations, whereas the stations subject to the 2001 Norwegian and 2004 Finnish inspections generally have made improvements compared to then.

(i) Waste Management and Disposal

All inspected stations were equipped with manuals for their personnel about the sorting and collection of wastes. At Neumayer III, the inspection team observed efforts to reduce the supplies brought into Antarctica, for instance, by switching food packages from glass jars to paper containers, as well as consolidating containers.

The inspection team observed that the respective countries removed wastes from Antarctica to the maximum extent practicable in accordance with the Madrid Protocol. Neumayer III and Troll had each signed an MOU (Memorandum of Understanding) with South Africa to have some of their wastes, transported out by the vessels of DROMSHIP (Dronning Maud Land Shipping) consortium jointly chartered by Germany, Norway, South Africa, Belgium, etc., be unloaded and disposed of in Cape Town. At some stations, combustible wastes were incinerated, but not all incinerators had secondary combustion chambers. There were some uncertainties about the performance of those incinerators and their exhaust fumes.

The inspection team observed that nearly all stations had prepared manuals and conducted proper management of oil leaks and spills. However, some stations' oil storage tanks were placed on ice-free ground without oil weirs, and there seemed to be scope for further reduction of contamination.

The inspection team found that one station had oil contamination on the soil at multiple sites which was seemingly due to the leakage from generators or past activities (Novolazarevskaya).

(ii) Treatment of Sewage and Domestic Liquid Wastes

The inspection team observed that efforts were being made to reduce the

impact on the environment through such installations as suitable septic tanks and the treatment and reuse systems for sewage and domestic liquid waste. For instance, one station had installed a septic tank with very high performance so that treated sewage and domestic liquid waste could be used for showers and other domestic uses (Princess Elisabeth), whereas another station used a relatively old biotreatment plant which is to be replaced shortly(Maitri).

Furthermore, a number of stations discharged treated sewage onto ice-free ground or inland freshwater lakes, but the inspection team found differences as to if the discharged water was subject to advanced treatment.

The team was briefed that Novolazarevskaya station discharged some untreated sewage and domestic liquid waste into a crack in the ice.

The environmental impact of effluent was unclear at some stations as water quality of the lakes where water may well be streamed into was seemingly not monitored after the treatment of sewage and domestic liquid wastes (Maitri, Novolazarevskaya).

(iii) Conservation of Fauna and Flora

No insects or other exotic animal species were found in any of the stations and surroundings, even though supplies transported to stations were not fumigated.

Indoor potted plants, the presence of which had been pointed out previously, were not found this time (Maitri, SANAE IV). On the other hand, hydroponic plants, which were found at one station, had been brought in not necessarily with prior permission, though the station plans to follow relevant domestic procedures (Neumayer III).

With regard to protection of plant communities or nesting sites around the stations, each station was taking measures such as educating or informing its personnel about entry restrictions.

(4) Scientific Investigation and International Cooperation

As the campaigns of the International Polar Year (IPY) 2007-2008 had wound down, the stations seemed to be focusing on monitoring observations. At the same time, installation of satellite tracking and data reception systems such as the one by an enterprise owned by private sector and governmental agency (Troll) was steadily advancing as mentioned in (2)

above.

There were major differences in the level of research and observation facilities among the station. Conventionally, over-wintering observations had been carried out on a limited scale by small numbers of personnel. Recently, efforts have been made to avoid increasing the work load in the field by introducing remote monitoring and remote control, rather than increasing the number of over-wintering personnel. The trend which the inspection team observed is for experts to carry out intensive maintenance work of scientific installations during the summertime, while trained personnel maintain operation during the wintertime (Troll). For this reason, it was observed that securing adequate infrastructure, particularly electric power and space inside the stations for monitoring observation was an urgent issue at the relatively old stations.

The inspection team found the members of the research projects also quite international (SANAE IV). Field observations appear to be not so active though the inspection team did not have time to investigate this. Conclusion of the IPY is likely the main reason for this. It can be surmised that each country shifted its emphasis from field investigations and observations covering large geographic areas, to research and observations at the stations and their vicinities. It appeared that Princess Elisabeth, opening only in summer, tended to focus on field observations, taking advantage of convenient access to research sites in nearby mountainous areas as well as the monitoring station.

It is noteworthy that station installations and heavy machinery are shared and reused on the basis of bilateral agreements, as a part of international cooperation activities (Neumayer III).

(5) Use of Antarctica for Peaceful Purposes

The inspection team found that all stations complied with the use of Antarctica for peaceful purposes, one of the main principles of the Antarctic Treaty. In terms of involvement of the military in logistics, practice varied: at some stations, they engaged in logistics purpose such as vehicle maintenance, driving, and field training of expedition personnel, whereas little or no involvement was observed with other stations. Nevertheless, the inspection team found no activities contrary to the principle, and no weapons were found. The 2001 Norwegian inspection had reported the existence of

dynamite at Maitri. The inspection team was informed that it no longer existed.

(6) Tourism

Tourism is an issue that has been discussed frequently at ATCM in recent years. Dronning Maud Land, where the Japanese team carried out the inspection this time, still did not seem to be affected by large-scale tourism, in contrast to the Antarctic Peninsula which is often visited by large cruise ships. However, the inspection team encountered some evidence that small scale sightseeing via Novolazarevskaya runway was taking place. As for the sightseeing tours organised by White Desert, a travel company in the U.K., mentioned in the Norwegian inspection report, the inspection team observed their tent sites. The team also found that tourists had visited the guesthouse on the Novolazarevskaya station premises. Since the inspection team did not obtain a clear coherent explanation about the ownership and management of the facility, these matters may require further clarification.

It was apparent from interviews at all stations that tourist visits to the stations were extremely rare, and manuals on tourist visits were not being prepared, as tourism is still not common in the area. However, many stations had policies not to allow tourist visits except in emergencies, as they were regarded as burden to station operations and scientific activities. Meanwhile, there were some stations that did not refuse tourist visits.

It is possible that more tourists will visit Dronning Maud Land in the future with development of air routes. As pointed out in Norway's inspection report to XXXIII ATCM, sightseeing activities in Antarctica need to be carried out under proper management.

3. Recommendations on Inspection Results

i) Addressing New Modes of Activities in Antarctica: The inspection team observed the expansion of activities by actors other than governments, and the diversification of the activities. It may well be more widespread in the future that private funding will be used to promote scientific investigation and international cooperation to conduct efficient and effective management of stations in Antarctica. These are new modes of activities vis-à-vis conventional activities in Antarctic hitherto centered around

government activities. **ATCM may need to consider how to respond to these new trends.** In that case, deliberation should be on how to ensure the compliance of these new kinds of activities by various non-traditional actors with the Antarctic Treaty and the Madrid Protocol. The situation surrounding them is different from governmental activities, where states themselves are able to directly secure compliance. **In this regard, there may be a need to consider, in light of the prioritization of scientific investigation, to what extent it would be appropriate to make stations and various installations available for activities conducted by those other than governmental actors, and commercial activities in particular. It may be possible for ATCM to consider coming up with new guidelines regarding new modes of activities in Antarctica, as necessary, but at first, exchanging views on this matter at ATCM would be needed.**

ii) DROMLAN logistics: Concerned Contracting Parties including Japan that conduct activities in Dronning Maud Land would need to acknowledge that the maintenance of the Novolazarevskaya runway, transportation of aviation fuel, and other aspects of DROMLAN logistics have become burdensome to Russian station personnel.

iii) Waste Management and Disposal: There is a need for renovation of less efficient or aging facilities whose environmental impacts are of concern, such as incinerators without an adequate capacity of exhaust gas treatment.

There also seems to be a scope to reduce the risk of oil leaks and spills through preventive measures, such as installation of oil weirs around oil storage tanks in accordance with the guidelines of Council of Managers of National Antarctic Programs (COMNAP). Thus, preventive measures are of utmost importance. Furthermore, disposal of soil already contaminated with oil is an urgent task; **the station where such contamination has occurred should be proactive in removing the contaminated soil and related materials.**

iv) Treatment of Sewage and Domestic Liquid Wastes: The inspection team observed that the differences among stations with regard to how they treat sewage and domestic liquid wastes were not necessarily small. **The station that was discharging untreated liquid wastes informed the inspection team of a plan to introduce a treatment facility in future. An early introduction of**

the treatment is highly recommendable.

The inspection team observed that a few stations were found to discharge sewage and domestic liquid wastes onto ice-free ground or freshwater lakes after treatment. As Annex III to the Madrid Protocol prohibits disposal of sewage and domestic liquid wastes onto these areas, it can be surmised that these stations do not consider the said effluents to be sewage or domestic liquid wastes in Annex III to the Protocol. However, the actual quality of water from different stations was seemingly varied and there were some stations that were not monitoring water quality.

The stations that were not monitoring water quality at the time of the inspection are recommended to start doing so. It is also recommended that such issues as waste water quality, and treatment methods be discussed at ATCM in the future. An option could be for COMNAP to adopt practical guidelines on waste water quality as necessary, in light of what is "to the maximum extent practicable" (Article 2 (2) of Annex III to the Protocol) and "the only practicable option" (Article 4 (2) of Annex III to the Protocol).

v) Use of Renewable Energy: Some stations were actively using renewable energy, but had differences in, among others, ways of thinking. Generally speaking, introduction of renewable energy would be an attractive option, given the costs of transportation and use of petroleum and its environmental impacts. However, there are various technical and economic issues that need to be addressed in the future. **Exchanges of information on initiatives, achievements and challenges at each station and of best practices should be further promoted.**

vi) The Effective Use of Facilities and Equipment through Cooperation among Stations, and the Responsibility of Final Disposal: The inspection team observed that South Africa and Russia had been provided with some of the facilities and equipment of Neumayer II, which was decommissioned by Germany. **Such effective use of facilities based on international cooperation is desirable and should continue to be promoted.** In this regard, **it is important for the parties which enter into this kind of arrangement to share the understanding as to who is responsible for waste disposal so that obligations under the Madrid Protcol will be continuosly followed through.**

vii) Scientific Investigation and International Cooperation: Each country is making efforts to continue monitoring and station observations, but the inspection team observed that the condition of observation equipment and installations in the field were uneven. In particular, **equipment and installations need to be maintained and updated particularly in order to maintain the quality of scientific data in an international observation network.** Furthermore, the inspection team observed that some stations would need to improve the living condition and research environments of the personnel conducting observations in the summertime when population at stations is considerably larger. Differences also existed in terms of the level of engagement among the inspected stations in international joint research initiatives. While international science programs generally employ bottom-up approach starting from interactions among researchers at a personal level, **exchanges of information on science programs and operations should also be encouraged through Scientific Committee on Antarctic Research (SCAR) and COMNAP.**

II. Findings of the Inspection of Each Station

1. Maitri Station

(1) Overview

The inspection team arrived at the station in the late afternoon of January 29th. On January 30th, the inspection team was briefed on the overview of Antarctic science and logistic activities by India and introduction to Maitri after which the inspection of the facilities was conducted. The inspection team left the station on January 31st.

Due to weather conditions, the inspection team was unable to conduct the planned inspection of ASPA 163 (Dakshin Gangotri Glacier).

Director of National Center for Antarctic and Ocean Research (NCAOR), and Programme Director (logistics of the same institute), transmitted greetings to the Japanese inspection team via internet video-phone system.

The inspection team received station's answers to the questions prepared according to the Checklist, and also received a station personnel schedule, map of the surrounding areas and General Guidelines. These documents were prepared and compiled upon request from the inspection team. There seemed to be some members of the station who were not aware of the existence of the General Guidelines though it may not be ruled out that this observation could have been due to language and communication problems.

(2) Station Facilities and Operations

(i) Station Facilities

Maitri is a year-round station opened in 1989. The station consists of an 850 square-meter main building that includes sleeping quarters, a canteen, bathrooms and other living facilities, three heliports with a landing mat, an observation hut, power generator, vehicle workshop, incinerator, and sewage treatment facility which can accommodate 65 people. The station was being operated and managed by NCAOR.

The former Dakshin Gangotri Station was closed and currently lies about 20 meters below the surface of an ice shelf.

Exterior view of the front entrance to the Main Building

Welcome remarks by NCAOR Director to the inspection team via internet video-phone system from Goa, India

- Fuel

At the time of the inspection, two types of fuel were being used at Maitri:

- Jet A-1 (used for snow vehicles; this is also used in generators, incinerators and helicopters.)
- Gasoline (used for snowmobiles)

Vehicles were being refueled from a 10,000-liter vehicle fuel tank installed near the Vehicle Workshop.


Oil for servicing vehicles in the garage

- Water Supply

The station was using water pumped from a nearby lake (Lake Priyadarshini). The station was equipped with two water tanks with the capacity of 5,000 liters. Water usage was 40 liters per person per day.


Water intake

- Chemicals

The station was not using any chemical including photographic chemical. Any medical drugs past their expiry dates are shipped to India.

- Power Generator

The station was using an air-cooled power generator. The generator was being monitored 24 hours a day, with two persons working in 12-hour shifts.

Air-cooled power generator

The monitoring panel of the power generator

- Renewable Energy

The wind power generation facility installed in 2008 had been broken due to gale-force winds and was not in use.

Solar power is used at the Automatic Weather Station.

- Internet Environment

Three personal computers permanently connected to the internet had been installed in the living room area next to the canteen in the Main Building. internet video-phone system could be used and this enables station personnel to converse with their families. The staff at the station informed

the inspection team that the computers are very useful not only for observation and logistic purposes but also for their wellbeing.

(ii) Station Operations

The list of the personnel currently living in the station indicated 29 members including those of the winter team were participating in the 2009-2010 expedition. The members were selected by the organization where they had belonged respectively and dispatched to Antarctica via NCAOR.

- Training

Pre-expedition orientations for environment, emergency- and fire-response procedures are held in Goa, where the NCAOR is located, on the environmental emergency and fire-response procedures. Additional training is conducted in the Himalayan region so that the station personnel can acclimate themselves to the extremely cold climate.

- Understanding of the Antarctic Treaty System

Copies of the Antarctic Treaty and the Madrid Protocol were being kept at the station as reference and be browsed by station personnel at any time. The inspection team was briefed that information on the Antarctic Treaty and related resolutions was obtained from NCAOR and available any time.

(3) Environmental Protection Measures

During the 27th expedition in 2008, NCAOR organized a long-term environmental monitoring and environmental impact assessment of exhaust gas, water, soil and oil leakage from the station, in the surrounding areas of Maitri and the lakes in the Schirmacher Oasis. This activity is a part of a long term project and is being continued ever since.

(i) Waste Management and Disposal

- Waste Management

Although kitchen waste was sorted, combustibles and non-combustibles were observed to be collected in the same container, and sorted after being shipped to India.

- Disposal and Shipping of Wastes

The station was producing 600 grams of waste per person per day.

Combustible waste such as leftover foods and paper were being incinerated in a pressure-injector-type incinerator. The inspection team observed that the incinerator was not equipped with the capacity of exhaust gas treatment. It was subsequently informed that, a new incinerator having a secondary combustion chamber is to replace this old one in the future, proving the station and Indian Antarctic program's awareness of the need of upgrading this particular equipment.

The inspection team was briefed that 7 containers of wastes per year were shipped to India, and the content was: 2 tons of ashes, 5 tons of waste oils, and 6 tons of other types of wastes.

In terms of the storage of wastes in the containers, the inspection team was briefed on but could not confirm whether that rule was fully implemented.

Waste stored in one of the containers

Oil tanks

Oil tanks were found at two locations. The double-walled steel tanks were placed directly on ice-free ground and there were no measures such as the installation of oil retaining walls around the tanks to prevent leakage yet. It would be welcome if a concrete platform should be built in the coming Antarctic season, as there is already a plan to build it. The inspection team was briefed that the tank for the power generator had been moved closer to the oil tanks for refueling. The team was also briefed that a pipe extending to the power generator was used for refueling. The refueling pipe was composed of steel pipes that were connected with plastic hoses, which may entail risk of an oil leakage.

The tubes for fuel feed line were buried under the road, not very far from the surface (less than 30 cm deep on the appearance), and there seemed to be high risks of oil leakage. A pail was placed under the fueling spout of an old and seemingly unused fuel tank, in order to collect leaked oil in case.

(ii) Treatment of Sewage and Domestic Liquid Wastes

Urine and domestic liquid wastes were collected in a tank where it went through a biological treatment plant and then were held in the temporary reservoir beside the station. The treated sewage was pumped up 2 to 3 times per year and drained in the direction of a lake, the name of which was unknown to the team, on the west side of the station. The inspection team observed that, judging from the topology, the wastewater drained on the soil seemed to form a stream from the drain outlet to the lake on the west side of the station.

The Norwegian inspection in 2004 pointed out the permeation of the wastewater from the temporary reservoir. The station personnel explained that, in response to this finding, the station installed a shielding on the bottom of the temporary reservoir.

Next to the temporary reservoir, there seemed to be an artificially made pond that appeared to contain wastewater, but no one knew the exact purpose of the pond.

The station informed the inspection team that water quality was examined on an annual basis.

Pump at the temporary reservoir

Drain outlet

The station informed the inspection team that solid human waste was treated by incinerating toilets, and that, due to limitations in incineration speed, one toilet was assigned to only 2 to 3 people.

Incinerating toilet

(iii) Conservation of Fauna and Flora

There is a location about 3 kilometers from the station where penguins live, but it was explained that the station personnel seldom visited there.

The station informed the inspection team that there was another penguin habitat in the ice-shelf area.

The station personnel were instructed by NCAOR not to approach or feed animals, to comply with the relevant provisions of the Madrid Protocol.

- Dakshin Gangotri Glacier and the ASPA 163

The inspection team did not conduct a site visit but conducted a hearing. The team was informed that a signboard had been installed at the site to indicate that it was a protected area, and that the only activity undertaken in the protected area was the annual measurement of glacier movement.

In the past, biological observations had been undertaken as a project, but they were not being conducted at the time of the visit.

(4) Scientific Investigation and International Cooperation

The station conducts scientific research programs involving 12 organizations including GSI (Geographical Survey of India). Five research facilities have been installed in the station, including an Ionosonde observatory, as well as the permanent, meteorological, seismological, geomagnetic and GPS Obsevatory that are linked to international network.

The station was engaged in several programs during International Polar Year 2007-2008.

- Scientific Cooperation

WWLN, a joint research project of India and the University of Washington on thunderbolt and a joint project with Lancaster University in the field of upper atmospheric physics were being undertaken at the time of the visit. The main activity was to collect data from the observation facilities installed at the station and to exchange them.

There was no ongoing official joint project with Russia, even though researchers from the neighboring Russian Novolazarevskaya in seismology and lichenology had unofficially visited the station to obtain samples. In terms of mutual logistical cooperation, the station was providing vehicle service and exchange of supplies, and the station personnel suggested that it

was proving to be very useful.

Seismic Observation Room

- Exchange of Scientists

Notwithstanding achievement of international cooperations in the past, there was no scientist from other countries staying at the station in 2009 - 2010. However, an Estonian environmental expert stayed the years before to obtain samples from the lakes in the Schirmacher Oasis, and a microbiologist from NASA visited to obtain water and soil samples from the nearby lakes.

These scientists received the approval from NCAOR to visit the station and were engaged in their own research activities.

(5) Use of Antarctica for Peaceful Purposes

No activity was seen to be violating the use for peaceful purposes.

There were no weapons observed in the station and the inspection team was informed that the dynamite found by the Norwegian inspection team in 2001 was no longer there. In the interview, the inspection team was informed that the involvement of military personnel in support of the activities of the station was terminated two years before (from the 27th expedition). There were a few ex-military members who had come to the station from the military and retired subsequently, before being recruited by NCAOR as electrical/mechanical employees.

(6) Tourism

The inspection team was briefed that a camp of a UK tour operator named White Desert was located at about the mid point between the station and the Novolazarevskaya Runway. One (French) participant of the tour once visited the station. The station personnel informed the inspection team that 6 to 10 tourists took part in the tour at a time, but they did not have detailed information such as how many tours were operated per season, because there was no contact with the tour groups other than the said visitor.

(7) Summary and Findings

The inspection team observed improvements in addressing the comments made by previous inspections. Also, new activities were taking place. In this context, it is worth mentioning that international cooperation in science has been actively promoted by the station, such as: the implementation of monitoring and observation in the area of solid-earth physics as a part of an international observation network, and the recent commencement of collaboration with a British university in the field of upper atmosheric physics.

The station is struggling with the aging equipment and facilities. Measures related to installation of oil leakage prevention pursuant to relevant COMNAP guidelines should be taken to address such situations as installation of oil tanks directly on ice-free ground without oil retaining walls around, and as oil supply from oil tanks to the power generator by way of plastic hoses. Also, the incinerator requires upgrading. Furthermore, the inspection team believes that the treatment plant and the draining of treated sewage still have room for improvement.

This left the impression that more budget allocation was to be needed. It is thus only hoped that further upgrading and improvement of the facilities and operation of the station will materialize soon.

On the final note, the inspection team was very impressed by the high morale of personnel at this year-round station.

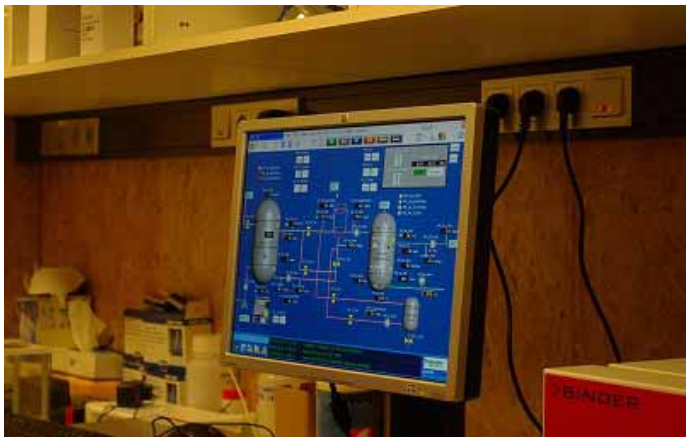
2. Princess Elisabeth Station

(1) Overview

The inspection of Princess Elisabeth took place over two days on January 31st and February 1st.

After arriving at the station in the afternoon on January 31st, the inspection team was given a presentation by station personnel of the International Polar Foundation (IPF) explaining the station's operation and the facilities. On February 1st, the team conducted their first interviews in the morning and inspected all of the station facilities, including the rooftops and surrounding areas. The second interviews were conducted that afternoon.

The new station was officially opened last year, and aimed to establish operation systems during the 2009 and 2010 season. When the inspection took place, installation work of observation facilities, solar panels, wind turbines and water treatment facilities was being carried out throughout the station.



Control system display for station facilities

(2) Station Facilities and Operations

(i) Station Facilities

The inspection team was briefed that the Princess Elisabeth aims to be the first zero emission station in Antarctica. Almost all the energy needed in the station is to be supplied by wind, photovoltaic power and solar heat. It aims for an advance system with, among other things, “smart grid” being

its core, by controlling energy use and reduce the amount of energy consumption to the level of one-tenth of an ordinary station. The station is designed to be manned only in summer, while observation continues in winter by maintaining a part of satellite communication functions powered by wind and sun. All personnel leave the station in the end of February because the station is in use only in summer. Sewage treatment and power generation are integrated into a centralized system, being remotely monitored from Belgium.

Station exterior

- Fuel

The station keeps following types of fuels.

1. Polar diesel
2. Petrol unleaded 95 oct.
3. JET A1
4. Benzene

As a large amount of fuel was shipped in with other equipment last year, no fuel has been delivered this season.

At the time of the inspection, fuel drums for generators were lined up on a sump, to prevent spillage.

Fuel for snow vehicles and snowmobiles were being stored outdoors on a platform on the north side of the station. They were being fueled directly on the spot. Because the drums are rarely moved, it seems unlikely that they will break or spill fuel.

Jet fuel was kept outdoors near the airfield. From the experience of other

stations, it is said that storing jet fuel drums outside has proven to be safe. Airplane crew refuels the aircrafts.

The inspection team found that the station personnel were well aware that fueling can cause accidents and that fueling vehicles is riskier than fueling generators. For this reason, measures against fuel and oil spill such as use of secondary containment (e.g.drip tray) and absorbent material were taken and there have been no fuel or oil spill incident so far.

Fuel is stored in drums on a platform outside

- Water Supply

According to the station, 70 liters of water per person per day are used (the average number of 16 to 18 personnel is supposed). 20 liters of water for drinking are newly made by melting snow, while remaining 50 liters are recycled water. Repeated recycling of water reduces the need of melting snow to make fresh water. (The team was briefed that 450 liters of water were produced on January 31st). Antifreeze fluid in two solar heating panels on the rooftop is warmed up to 60 degrees Celsius, and then the heated fluid was put in heat exchangers to melt snow. Water is also heated to 60 degrees Celsius (90 degrees at the maximum) in solar heating panels on the rooftop, and stored in two 300 liter tanks placed in the attic for shower and the kitchen.

Hot-water tank and pump for making water

Solar panel for water heating

The capacities of the water tanks located in the station building and the garage are 3,600 liters and 2,400 liters respectively. According to the station, up to 6,000 liters of water can be stored in the entire station. The operating system controls the amount of water produced and stored depending on the number of people in the station.

In winter, all tanks except for the one for melting snow water are vacated and kept clean, because the station is used only in summer. The melted snow water tank holds a small amount of water in winter to maintain the humidity level of about 30%, to protect electric equipment.

- Power Generators

The inspection team observed that two containers located in the north of the building had one generator each: (the main generator's specification is 50Hz 40kVA (32 kW), and the emergency one is 50Hz 44kVA (35.2 kW)).

The use of these generators is kept minimum. The main generator is used only when a large amount of power is needed, including charging the batteries at the beginning of the season as well as welding. The average annual consumption of fuel is about 1,000 liters, and fueling takes place once a year only.

- Renewable Energy

Almost all the electricity used at the station comes from solar photovoltaic and wind power. Four out of nine wind turbines were in operation and an additional four turbines will be installed during this expedition.

Electricity generated by wind and solar powers is stored in large amount of batteries, each of which is managed by respective control units. The battery's life cycle is ten years.

Battery room

Wind turbines

Solar panels

The “smart grid” optimizes the station with minimum electricity use and reduces power consumption to one-tenth of an ordinary station. Insulations are installed within wooden panels thicker than 50 centimeters, in order to enhance air heating efficiency.

According to the station, in most cases, the station does not need heating sources in summer, because it is designed to efficiently heat itself with 20% of calorific value of an ordinary station, and is utilizing the heat from station equipment.

Outlets controlled by the smart grid (When energy is available, the light turns on after pressing the outlet button)

In order to reduce the use of diesel-powered vehicles, the station is planning to introduce electric snow vehicles in the future, which will be used on a trial basis next season. The trial vehicles will be powered by rechargeable battery, which can be used repeatedly.

- Internet Environment

There was internet access in the base via satellite, but only a few LAN ports were available at the time of the inspection.

(ii) Station Operations

The construction of the Princess Elisabeth differs from other national program stations, in that it has been constructed by a non-governmental organization, the International Polar Foundation (IPF).

According to the briefing, most construction costs were borne by donations from the private sector. At the completion of the construction, the station was planned to be donated to the Government and this actually took place on 31st March 2010. The Belgium Government commented on this point, clarifying that the costs were borne equally by the Government and the private sector. They also noted that the overall management of the station will be assured by the Polar Secretariat, a Department of BELSPO. IPF will be appointed as the ‘Station's operator’. A strategic council composed of equal number of members from public and private sector will supervise all the activities of the Secretariat.

According to the interview, the station personnel were comprised of those from the Belgian federal government, IPF, and volunteers. One characteristic of the composition of station personnel working on the construction was that many are volunteers. There are two types of volunteers who come to work at the station. One is the individuals who applied for a position after hearing about the station's activities via newspaper or other media, and the other is the employees who volunteered in and sent by their companies. In the latter case, these companies have mainly worked on the construction of the station facilities as a part of their own projects. Recruitment is not publicly advertised.

Even on a voluntary basis, only experienced people have been recruited and sent to Antarctica. For example, a professional restaurant owner and chef volunteered to work in canteen but with only for the cost of transportation, accommodation, and food being paid by IPF.

45 staff members worked for 107 days during the 2009 - 2010 season.

- Training

According to the station, training is provided to the scientists in Belgium before leaving for Antarctica. Two former Belgian armed force members conducted drills as field guides, which include operating snow vehicles, walking in snowshoes, rescuing from crevasses, and unloading from the ship.

(3) Environmental Protection Measures

The current French edition of the field manual for environmental conservation will be revised into English before next season and provided to all personnel at the station to familiarize themselves with conservation measures.

(i) Waste Management and Disposal

The inspection team was briefed that waste was being sorted into human excrement, organic waste, oil, aluminum, and combustible waste including cardboards. Sorted wastes were stored in 20-feet containers. According to the station, all the wastes will be taken to Cape Town when station fully starts to operate.

Containers to keep waste

(ii) Treatment of Sewage and Domestic Liquid Wastes

A sewage treatment unit was being installed at the time of the inspection. After the treatment unit is equipped, bioreactors and filtration will treat sewage and liquid wastes from the shower room and the kitchen for station to recycle it for the shower and the toilet.

According to the station, the processed water is normally reused about five times. After that, the water is treated and released into an approximately 100 meter deep crack between the rocks and ice (Bergschrund). Membrane filters used to clean the water are replaced with new ones every three years. The amount of sludge is about one bucket per month. The drainpipe was being worked on and could not be inspected.

Sewage treatment tank

(iii) Conservation of Fauna and Flora

The area where the station is located provides habitats (or colonies) for liverworts, lichens, and mites. Upon the request from biologists, a part of the vicinity has been notified to station personnel and visitors as "off-limits" to preserve the habitats.

Field manuals for the conservation of fauna and flora are in the preparation process and will be used from the next season.

(4) Scientific Investigation and International Cooperation

At the time of the inspection, two research teams were staying at the station: a Japanese geosciences research team from the 51st Japanese Antarctic Research Expedition completed its mission and was waiting for DROMLAN transportation, and the joint Royal Metrological Institute and Royal Observatory of Belgium team had been setting up and testing meteorological observation instruments. A team of multi-national microbiologists of a Belgian project, BELVIDA, stayed at the station during the month of January.

(5) Use of Antarctica for Peaceful Purposes

Only activities for peaceful purposes were observed at the time of the inspection.

The Belgian Armed Forces support logistic operations by sending

personnel for mechanical and transportation assistance under an agreement with IPF.

(6) Tourism

According to the briefing, the station is not planning to accept tourists and basically rejects tourists coming for sight-seeing purposes unless it is absolutely necessary. A Belgian photographer requested a permission to visit the station last year for photography and was accepted.

(7) Summary and Findings

Intended as Antarctica's first -ever "zero emission" station, the construction of Princess Elisabeth is an ambitious project. While it is difficult to provide definite conclusion on the operation of the station as it was still under the final stage of construction at the time of the visit, planned equipment and facilities for energy generation, smart grid, and waste and water management systems were highly advanced and certainly impressive. It is hoped that the station will function smoothly and efficiently as envisaged.

The role of IPF in constructing this station is noteworthy. The IPF is a non-governmental organization with a lot of donations coming from corporate partners. It is yet clear if they represent a new breed of actors in Antarctica, but their innovative approach actually gives a "food for thought" to ATCM.

3. Neumayer Station III

(1) Overview

The inspection team arrived at Neumayer III after 7:00 p.m. on February 5th and conducted the inspection mainly on February 6th. On the day of arrival, the station was holding the award ceremony celebrating the completion of work by the wintering party. On February 6th, the inspection team was briefed on Neumayer III by the Coordinator of Construction and Logistics. The team then conducted the inspection of the facilities of the station, including the former Neumayer II site that was under the snow after many years and being dismantled.

(2) Station Facilities and Operations

(i) Station Facilities

Neumayer III, inaugurated last year, is a year-round station on an ice shelf near the coast. The station is moving towards the sea at a speed of about 150 meters a year. Due to the movement of the ice sheet, it is expected that the current station will reach the same position as the site of the former Neumayer II in about 25 years, and that it would be under the ground unless measures were to be implemented against the accumulation of snow. In order to address this problem, the station was designed to have its foundation on 16 supporting legs with a hydraulic pump and two hydraulic cylinders each to keep the structure horizontal and prevent it from being buried under snow. The facilities had mostly been completed at the time of the inspection, with some interior finishing work still underway.

The inspection team was briefed that the station can accommodate 40 people and it sits 6 meters above the snow surface. It measures 68 meters in length and 26 meters in width and has two stories. The temperature and humidity inside is kept at 20 to 22 degrees Celsius and 30% to 40%, respectively. A lengthways side of the building faces the (easterly) direction of katabatic winds (downhill winds). According to the station, this slows down the accumulation of snow around the building. However, the impact of the winds on the building is very strong, making it susceptible to swaying and shaking.

The inside of the building is composed of container modules. Most

functions of the station, including power generation, are concentrated in this building.

The station is located on an ice shelf close to the seashore where a vessel can berth.

Exterior view of the station

Supporting legs of the foundation of the station

- Fuel

According to the documentation, the station consumed 300,000 liters of diesel (Polar Diesel) for power generators and vehicles, 120,000 liters of Jet A1 fuel for Polar 5 aircraft and other air operations within DROMLAN, 8,000 liters of gasoline for snowmobiles and mobile generators, 1,000 liters of lubricants for vehicles and generators, and 900 liters of oils for the

supporting legs of the foundation and vehicles per year. At the interview, the inspection team was informed that usage of diesel fuel amounted to approximately 270,000 liters per year.

Oil tank for the hydraulic jacks in the foundation

- Transportation Equipment

With two berthing points 20 kilometers to the north and 10 kilometers to the northeast of the station, logistical planning for the sea shipment of materials seems to be relatively easy for this station. The team was briefed that the station extended support to DROMSHIP (The Dronning Maud Land Shipping Network) and had transferred some of the used containers (of Neumayer II) to South Africa and Russia.

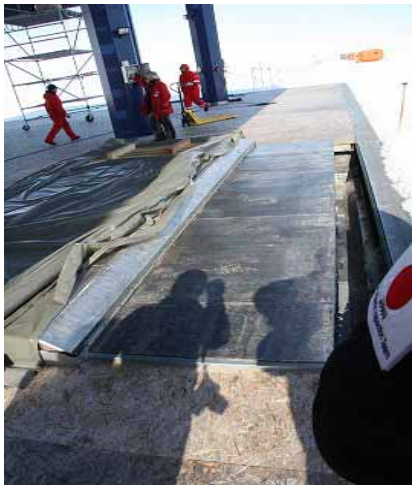
At the time of the inspection, POLAR 5 (Basler Turbo BT-67) was used for transportation and scientific research. The station also had 14 Pisten Bully snow vehicles, one mobile crane, one truck with crane attached, 17 snowmobiles, 100 sledges to transport containers, and 3 wooden sledges.

- Water Supply

At the time of the inspection, the station consumed 100 liters of melted snow water per person per day. A medical doctor examines potable water quality once a month.

The station also consumes approximately 3 tons of water per week to

maintain the indoor humidity level of 30 -40%.



Snow intake for water supply

- Internet Environment

The inspection team was briefed that wireless internet connection was available in the station, including in the sleeping quarters. The introduction of a new antenna was to improve the connection speed.

- Energy Use and Power Generators

It was observed that the station has 4 power generators, of which one was for emergency use only. The remaining 3 were used one at a time, in turns.

Each generator, as a cogeneration system, generated 150 kilowatts of electricity and 178 kilowatts of heat.

The electric power consumption of the station was 120 kilowatts, with the summer peak reaching 220 kilowatts. The peak heat demand was 212 kilowatts, including 40 kilowatts for melting snow, and 30 kilowatts for heating water.

The inspection team was briefed that the station was planning to self-supply all of its energy requirements by introducing 10 to 15 wind turbines and producing hydrogen. If the plan is implemented, the existing generators will be used as a backup system.

Power generators


Water heating pipes using the exhaust heat from the generators

An energy management system was being implemented to minimize energy consumption.

- Renewable Energy

The station is built on an ice shelf and faces various challenges. The team was informed that the wind power generators that would withstand the environment were being developed. The plan was to install 5 wind turbines first, and install additional 5 turbines at a later stage. The planning and

construction is based upon a concept of an optimized cogeneration plant which can be augmented by renewable energy (preferably windpower). The one windturbine in operation at present is an experimental setup to find an optimum energy mix between renewable and conventional energies at this location. When all wind turbines are installed, either wind power generation facility that produces hydrogen and converts it into energy or additional equipment for energy generation (such as flying wheel, synchronized machine, etc.) will be introduced as well. A research has found that winds are blowing around the station at the velocity of about 10 meters per second most of the time, and that the station is favorably located for the use of wind power.

Wind turbine

(ii) Station Operations

- Training

The inspection team was briefed that the station conducted the following safety training for the members of the wintering party after their arrival: monthly fire drill; training to assist a surgeon in an operating theater; first-aid training; crevasse rescue training; and, evacuation drill.

The inspection team was informed that outdoor activities during the winter would include visits to two locations 100 km and 150 km away from the station respectively, to maintain the observation facilities. The work would take one week to ten days. The participants in this work are trained to operate and repair vehicles, and vehicle engineers accompany them.

(3) Environmental Protection Measures

(i) Waste Management and Disposal

The inspection team was briefed that the station implemented its Waste Management Plan, and reported to the Federal Agency on Environment Affairs.

At the time of the inspection, organic wastes from the kitchen were sealed in white medical pails (capacity of 30 liters) and frozen for storage. According to the station, approximately 400 of such pails (which fill about three fourths of a container) were shipped to Germany per year. Other wastes were compacted and stored in containers. Recyclable glass wastes were disposed of in Cape Town, and other waste was being shipped to Germany.

It was informed that the station did not conduct any on site waste treatment such as incineration.

Inside a container where waste is stored

Waste bins that are color-coded for sorting

- Method of Waste Material Reduction

The team found that packaging materials (cardboard, plastic, etc.) of the supplies shipped to the station were removed and the contents were re-packed in aluminum containers in Germany to reduce the amount of wastes before being shipped to the station. The aluminum containers were shipped back to Germany.

At the time of the inspection, the station was also working to reduce the use of cans and increase the use of reusable paper containers. Glasses were being pulverized and cans being compacted to reduce the volume of waste. Used fuel drums are shipped out with waste oil inside.

Glass pulverizer

Waste oil

- Hazardous Wastes

It was noted that photographic chemical was used at the station for medical purposes. Although the introduction of a new machine has reduced the frequency of the use of X-ray photos, its use is unavoidable if a chest X-ray is required. The station informed the inspection team that it was planning to reduce the use of photographic chemicals for X-rays.

- Measures against Oil Leaks

According to the station personnel, the station was implementing the measures against oil leaks that had been issued during the operation of Neumayer II. Preparation of a revised version was being planned in conjunction with the opening of the new station.

It was informed that there was a snowmobile fire accident in 2010 (already reported to COMNAP). The cause of the fire was the heat generated from the brake disk, as the vehicle was running with the brake being locked.

- Exhaust Gas

It was informed that exhaust gas monitoring had been implemented at the former station, but it was not implemented at Neumayer III, as the station was still in the phase of checking the operational status of the generators.

(ii) Treatment of Sewage and Domestic Liquid Wastes

According to the interview, the examinations of the sewage after treatment

of biodegradation, sludge segregation using ultrafiltration, and sterilization by a UV filter were regularly provided by a medical doctor.

Sewage quality checks, including the pH level, conductivity, and *E. coli* tests, are conducted every month. Harmful bacteria have never been detected.

(iii) Conservation of Fauna and Flora

- Status of Education and Training on Conservation of Fauna and Flora

The inspection team was briefed that all Antarctic expedition team members received an eight-hour mandatory orientation on the conservation of fauna and flora before their departure.

- Issuing of Permits for Catching/Gathering Native Fauna and Flora

According to the station, a permit to research the ecology of seals was issued for 2008/2009 season. Measurement equipment was attached to the bodies of seals for observation. All equipment was removed after the observation.

- Introduction of Non-native Species

Although there is no treatment, such as fumigation on the incoming shipping containers, the inspection team was informed that there had been no insects such as cockroaches seen in the station (or in Neumayer II).

Hydroponic plants, which were found in the lounge of the station, had been brought in not necessarily with prior permission, though the station plans to follow relevant domestic procedures. The station had an intention to include information on these plants upon the completion of construction when they would have to report the station's equipment.

The station explained the inspection team that there was no environmental impact, as the station is located on an ice shelf and no soil was used for these foliage plants.

Foliage plants seen in the station

(4) Scientific Investigation and International Cooperation

- Scientific Research and Exchanges

Scientific activities and logistic operations at the station are as follows:

- Long-term scientific observatories ;
- Logistic support to operate Kohnen Station ;
- Logistic support for aircraft missions ;
- Vehicle fleet for field activities ;
- Contribution to DROMLAN by operational flight weather service.

The inspection team found the station well equipped with facilities to conduct scientific research, and more joint projects with other countries are planned. Due to the recruitment policy of station members, all of the members were wintering here for the first time. According to the station, many scientists from various countries, including the Netherlands, Norway, and Austria, had stayed at the station during summer. However, in the past few years, there was no such visitor due to the construction of the station.

Entrance to the geomagnetism observation facility

Inside the geomagnetism observation facility

- Joint Scientific Survey and Sharing of Facilities with Other Stations/Programs

It was briefed that the station had transferred some containers used in Neumayer II (currently being dismantled) to South Africa and Russia. Using these containers, South Africa set up a logistical/supply base for its SANAE IV, located some 100km away, near the former Neumayer II. They were also being used as emergency shelter for the German party, with emergency food being stored.

In addition, Neumayer III takes a role of an information center of weather forecast for DROMLAN. During the flight operation in summer, AWI deploys a professional forecaster to collect weather information from nearby stations extending to Syowa Station, providing weather information.

These are good examples of international cooperation taking place in this particular area of Antarctica.

E-Base: logistical base of the South African Sanae Station

Neumayer II site

Due to construction works in recent years, many scientists were working near Kottas Mountains, and the station was not accommodating any outside scientist at the time of the visit.

(5) Use of Antarctica for Peaceful Purposes

The inspection team was briefed that there had been no military involvement in the station since its opening.

(6) Tourism

It was explained that the basic stance of the German Government and the station management towards tourism was that Antarctica is a place of

scientific research and that tourists should refrain from visiting there. Based on this stance, the station does not normally allow tourist visits.

The inspection team was also briefed that since the station did not have the authority to control tourists visiting the ice shelf near the station, it was not possible to rule out tourists visiting there.

According to the interview, two tourism vessels had visited the seashore near the station to watch penguins in the past. The tourists then had requested to visit Neumayer station but the station had declined the request. They were the only visits of the kind since 1992, the team was informed.

It was also informed that a German-Austrian team of Antarctic explorers using skis and kites had visited the station two years before. The station allowed these explorers to camp near the station but did not permit them to visit or use station facilities. It asked them to arrange an emergency search and rescue operation on their own and to leave the site as soon as possible.

(7) Summary and Findings

The inspection team found the level of environmental conservation measures high, with energy supply and oil leak preventive measures being in place, the latest sewage treatment facility being adopted. Innovative design of the station as well as high consciousness of environment should be acclaimed. A few small issues were observed, such as the storage of waste oils on ordinary sledges respresenting possible danger of oil leakage and the omission of application for a permit to bring in foliage plants, as stipulated in Article 4, Annex II of the Madrid Protocol.

Neumayer II, which had been used until one year ago, was being dismantled. This mutually beneficial arrangement between Germany and South Africa represents a new form of international cooperation which can be well justified by its economic and environmental benefits. Overall, the inspection team was very impressed by the dedication and advanced approach throughout the operation of the station and looks forward to its further development. Finally, it is worth noting that the inspection team was greatly aided by the complete and thick reference material handed over to it ahead of the visit.

4. SANAE IV Base

(1) Overview

As inclement weather was forecast, the inspection of SANAE IV was conducted for only about 3 hours from shortly after 9:00 a.m. until noon on February 7th. Due to time limitations, the inspection team conducted in an on-site tour with two separate groups moving independently but did not have specific time for sit-in interviews.

(2) Station Facilities and Operations

(i) Station Facilities

The station was established in 1997 and is open throughout the year. It has large-scale installations that can accommodate 80 people. The inspection team observed that it was one of the stations most actively engaged in year-round observations among those which the team visited.

In addition to providing logistic support to other countries, the station shares a role for Search and Rescue (SAR) activities in Dronning Maud Land with its helicopters. The inspection team observed a helipad and helicopter hanger attached to the main building.

View of SANAE IV

- Fuel

According to the documentation, the following three types of fuel are used:

- ✧ Polar diesel, 450,000 liters are stored.
- ✧ JET A-1 helicopter fuel, about one hundred and fifty 200- liter drums

are stored.

- ✧ Chainsaw mix, about twenty five 200- liter drums which are used also for snowmobile are stored.

Inspection team observed six 100,000-liter rubber bladders for polar diesel kept in metal storage reservoirs, with the total storage capacity of 600,000 liters.

Oil storage tanks

Oil supply pipes

- Transportation Equipment

According to the briefing, in addition to ground transport such as snow vehicles and snowmobiles, the station has 2 helicopters always on site in summer to support field observations. Supplies are transported once a year

by ship between December and February.

Station personnel are also transported by ship and helicopter without using DROMLAN.

Helipad

Helicopter hangar

- Water Supply

An immersion heater is placed in a hole in the snow, and the melted snow is pumped up into a 42,000 liter tank for storage and use. Snow is melted on a daily basis. Per capita water use is 50 to 200 liters per day.

Water intake pipe

- Power Generators

The inspection team observed that three diesel engine generators (225 kVA) were being used simultaneously. The waste heat was used for air conditioning of the station.

It was briefed that approximately 280,000 liters of diesel fuel were annually used for the generators.

Diesel power generators

- Renewable Energy

At the time of inspection, three wind turbines (rated power output for the system is 20 kW with the wind speed of 12.5 m/s) installed in January 2010,

were under test operation. It is planned that by 2011 the three wind turbines will be linked with the electric power network currently in use.


A wind turbine

- Internet Environment

Although the inspection team did not have time to confirm, the station has internet facilities for all expedition personnel, according to the documentation. As work-related internet use is prioritized, web browsing, use of internet video-phone system, large downloads, etc., are prohibited during working hours. Private use is allowed after 6:00 p.m., but with restrictions on the number and data size of e-mails.

(ii) Station Operations

According to the documentation, 10 over-wintering personnel (3 of them are scientists) and 78 summer personnel (17 of them are scientists) are participating in the 2009-2010 South African National Antarctic Programme (SANAP).

- Training

Over-wintering personnel are given in-depth training on their respective duties in South Africa, after which they are given on-site training at SANAE IV. Training is also given on first-aid, fire drill, mountaineering, weather observation, etc.

- Understanding of the Antarctic Treaty System, etc.

The Antarctic Treaty and related documents such as resolutions were available for reference at the station.

(3) Environmental Protection Measures

(i) Waste Management and Disposal

- Waste Management

The inspection team observed that wastes were being collected and sorted in an organized manner.

Waste containers in the kitchen and rooms were all categorized with different colors for collection and sort of all waste.

According to the documentation, about 50 drums containing waste are transported out by ship every year.

The quantities disposed of are as follows:

- ✧ Sludge: 6,000 liters
- ✧ Glass: 3,000 liters
- ✧ Oil: 10,000 liters

Instructions on waste separation at SANAE IV

Color-coded waste storage drums

- Measures against Oil Leaks and Spills

The oil tanks were equipped with electric sensors to detect leakage, but they were not functional at the time of the inspection.

The oil storage tank used on a daily basis was being placed within the station. The station had double protection system for oil storage.

According to the station, there had been an oil spill accident near the station several years ago, and the contaminated snow was being collected this season as well. The inspection team observed that the collected oil was stored in empty drums in the waste storage site.

Oil tank (3,000 liters)

Drums stored with snow soaked with the past spilled oil

- Hazardous Wastes

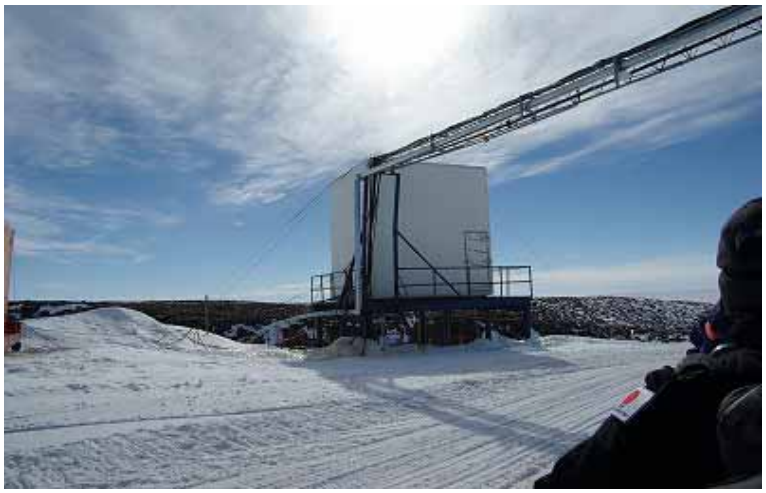
The inspection team observed that photographic chemicals and battery electrolyte were stored in plastic containers at the station and it was briefed that it had been monitored on a daily basis.

(ii) Treatment of Sewage and Domestic Liquid Wastes

The inspection team observed that sewage was biologically treated and sterilized with UV irradiation, after which it was stored in a sewage tank near the helipad outside the station, and subsequently discharged onto a rock ledge. The filter is exchanged once a year. Ammonia levels, pH and other properties of the treated water in the tanks are examined every month.

UV irradiation equipment

Sewage treatment tank



Tank for temporary storage of treated sewage

Drainage from sewage tank to the bottom of a cliff

(iii) Conservation of Fauna and Flora

The inspection team visited a protected area designated by the SANAP.

A signboard had been placed on a post in front of the area to indicate its boundary. Inspection team was briefed that only scientists and personnel concerned with environmental issues who have been given special permission are allowed to enter the area, and that they were considering to draft and file an application to make the area an ASPA under the Madrid Protocol .

Signboard of the protected area

Protected area enclosed with posts

(4)Scientific Investigation and International Cooperation

- Scientific Cooperation

The station provides Norway, Sweden, Germany and Finland with logistic support for transport of cargo and personnel, sharing a role for Search and Rescue operations in Dronning Maud Land, and, by those examples, actively contributes to international cooperation.

- Exchange of Scientists

In addition to a number of joint scientific projects with various countries, an absolute gravimetry measurement project led by Finland in collaboration

with the Alfred Wagner Institute (AWI) of Germany was taking place. A Swedish aeronomic physicist and a British biologist were present at the time of the inspection.

Aeronomic physics laboratory

(5) Use of Antarctica for Peaceful Purposes

During the summer, the South African military are dispatching more personnel for various job posts such as drivers, bulldozer operators, chaplains and healthcare professionals.

(6) Tourism

Inspection team was briefed that there were no tourist visits last year. It is the station's policy not to accept tourists.

(7) Summary and Findings

The inspection of SANAE IV was conducted in a much shorter time than the inspections of all other stations. With that note, the inspection team observed that the base was characterized by its extensive and yet well maintained installations and active engagement in scientific investigation and international cooperation. The base was housing a relatively large number of young personnel (summer personnel) compared to other stations. Though there were some signs of wear and tear in this year-round station opened in 1997 compared to the newest stations, the station was well organized, for instance, with thorough separate collection in color-coded

garbage cans placed throughout the station.

Likewise, sewage is cleaned with biological treatment and UV sterilization. The issue of the discharge of sewage and domestic liquid wastes is analysed in Part I.

It is also noteworthy that there is a helipad and indoor hanger at the base. The service provided by airlift and SAR activities in the region is a major contribution to the international cooperation in the region. With the full fledged operation of wind power generators, the station is to be geared up for more sustainable operation.

5. Troll station

(1) Overview

The inspection of Troll was conducted on the 7th and 8th of February. After arrival at the station in the afternoon of the 7th, a presentation on the Norwegian Polar Institute was given by the head of the summer expedition, after which the inside of the station and the surrounding installations were inspected. In the morning of the 8th, the inspection team conducted interviews in accordance with the checklists, after visiting outdoor drainage, satellite-related installations and atmospheric observatories were inspected. Prior to departure in the afternoon of the 8th, the inspection team was briefed on the activity by KSAT (Kongsberg Satellite Services AS), which engages in downlinking and transmission of satellite data at the station.

Exterior view of the main building of the station

(2) Station Facilities and Operations

(i) Station Facilities

Troll was opened in 1990, first as a summer station. It was renovated and inaugurated as an over-wintering station in 2005, and has been generally used year-round ever since. The area covered by the station is approximately 50,000 ㎡, plus the air field and outlying cargo lines. There

are 10 beds inside the main building, 8 beds in the emergency station. Two living containers with beds and a tent camp are used during the summer season to house a larger number of people if necessary. Around 60 people are present at Troll at the same time, but the station can only sustain this number of people over a few days.

- Transportation Equipment

The inspection team observed that four Everest snow vehicles manufactured by Prinoth of Italy were the main means of ground transportation. A Toyota four wheel drive vehicle of polar specification was also in use.

Last year, 750 tons of fuel and equipment were transported for 270 km, from the ship berth on the ice edge to the station.

- Water Supply and Storage Facilities

According to the station, ice and snow collected from the ice sheet near the station are melted in a snow melting system using heat from a generator, after which the water is filtered, sterilized with UV light, and kept in a 3,600 liter storage tank. Per capita water use is 80 to 100 liters per day.

Putting snow into the snow melting system

Generator heat exchanger

Water purification equipment

- Power Generators

At the time of the inspection, two 300 kVA (240 kW) diesel generators were being used as the main power supply. There were two 80 kVA (64 kW) generators and one 60 kVA (48 kW) diesel generator for emergency use. According to the station, annually 250,000 liters of fuel are used for power generation. The generators were installed in a container, which appeared to have an automatic fire extinguishing system for emergencies.

Power Generator

Fuel tank for generators

- Renewable Energy

Equipment called a weather mast to measure wind velocities of up to 50 m/sec has been installed. It was in its third season of use for measurements.

According to the station, data will be used to decide whether to install wind power generation systems at the station in the future.

- Internet Environment

Probably due to the presence of Trollsat and for transmitting downlinked data from satellites to KSAT office in Norway, internet connection at this station was very broad at 60Mbps.

- Satellite Installation

There were installations of KSAT's "TrollSat" for reception of data at the station, and of "Galileo," an EU space project to construct a satellite positioning system comparable to GPS of USA.

According to its website, KSAT is a commercial Norweigian enterprise based in Tromso, Norway, and owned by the Norwegian Space Centre under the Ministry of Trade and Industry, and Kongsberg Defense Systems on a 50/50 basis. TrollSat at Troll station has been set to receive transmissions from polar orbit satellites since 2007.

- Troll Runway

The station has the Troll runway on ice with the full length of 3000 m that allows take-off and landing of large aircrafts such as Ilyushin (IL76) used by DROMLAN. The airfield has on several occasions been used for the landing and take-off of Gulfstream aircraft, i.e. in connection with a couple of rescue/medivac operations. It is the one and only alternative to Novolazarevskaya runway that is 300 km away. On the return trip for inter-continental flights after this inspection, the Ilyushin aircraft landed at Troll runway to pick up expedition personnel who had been unable to fly to Novolazarevskaya runway due to bad weather.

According to the station, the runway is subject to sand and gravel blown from nearby mountains scattering on the ice surface, which are melted by solar heat creating numerous holes. Routine repair work is carried out to

drill holes in the ice, remove the gravel and fill the holes with water so that it will freeze over. This repair work is considered part of the maintenance of the runway.

(ii) Station Operations

As per the station personnel list, 6 over-wintering personnel and 18 summer personnel have been dispatched to the 2010 expedition.

There were 27 personnel on duty at the time of the inspection.

- Recruitment

Recruitment of over-wintering non-scientific personnel is done with public advertisement through newspapers, TV and other media.

It was briefed that summer personnel were recruited primarily on the basis of recommendations at a personal level or prior experience in Antarctic expeditions. Many summer personnel come back to the expeditions in the following year or some years later.

- Training

According to the documentation, over-wintering personnel are dispatched to Antarctica after receiving intensive training in Norway. A number of field training courses including for safety, handling of heavy equipment, traversing glaciers and first-aid, are conducted at the station.

(3) Environmental Protection Measures

At the time of inspection, an environmental management handbook, jointly prepared by Finland and Sweden in 1999, was available for reference on a bookshelf at the station. The inspection team was told that the handbook was currently being revised.

(i) Waste Management and Disposal

- Waste Management

The inspection team observed that a waste management plan was being implemented with thorough management of the separation, reduction, and collection of wastes. According to the station, equipment to convert food waste from the kitchen into compost is used to reduce its volume to about one tenth. The compost is placed in buckets for this purpose and transported

outside of Antarctica. The water generated in the process is treated with sewage and other liquid wastes.

New equipment to compress plastic, cans, cardboard and other wastes was being installed.

The Inspection team observed that recyclable glass wastes, etc., are disposed of in Cape Town.

Equipment to convert kitchen food waste to compost

Signboard on waste sort

Containers with sorted waste

- Measures against oil leaks and spills

The environmental management handbook serves as a guideline for general environmental protection including measures against oil leaks and spills at the station. However, the handbook does not reflect the fact that the station has been renovated as a year-round station, and includes some outdated and impractical contents. It is due to be revised and updated in the near future.

- Handling of fuel drums

Drums are reused for storage of wastes, or compressed for transport out of Antarctica.

Used drum Compactor

Used drums

According to the station, small amounts of oil remaining in used drums are sucked out and collected in a separate drum. The empty drums are washed and reused. Drums are compressed, stored in a container, and transported away for disposal. Used drums in the field are cut into pieces to reduce their volume, and brought back to the station. Drums used on expeditions to coastal areas are brought back to the station.

Outdoor oil dispenser (there were signs of accumulation of small amounts of oil that had leaked during oil supply)

(ii) Treatment of Sewage and Domestic Liquid Wastes

Sewage is treated in a sewage treatment plant, and the sludge is separated, stored in buckets, and transported out. The treated sewage is partly reused to flush toilets, or discharged onto an ice-free ground to the east of the station. It was explained that discharged water should be kept approximate to drinking water quality.

Samples from the sewage treatment plant are examined by a medical doctor once a month. The inspection team was given the results of the previous water quality check (February 2nd, 2010), which shows the following items:

- COD (Chemical Oxygen Demand)
- Ntotal (Total nitrogen TNb)
- TSS (Total Suspended Solids)
- Conductivity (mikro Siemens μS/cm)
- FNU (Formazin Nephelometric Unit)
- Total Phosphate PO_4-P
- Ammonia NH_4^+-N
- pH
- Nitrate NO_3-N
- Nitrite NO_2-N


Sludge separated by sewage treatment


Drain outlet


Area of discharge

(iii) Conservation of Fauna and Flora

There is snow petrel habitat in mountains near the station. As nesting sites are spread throughout all nearby mountains, station personnel are instructed to keep distance when breeding takes place. There are a total of about 100 snow petrel nests, which have been monitored three times every summer by two expedition personnel since last year.

No permits for taking plants or animals have been issued recently, and there are no plans for collection of lichens or mosses for the season.

Mountains around the station

(4)Scientific Investigation and International Cooperation

- Scientific Programs

Scientific programs conducted at the station receive subsidies from the Research Council of Norway. Earlier international projects such as the Norwegian-U.S. Scientific Traverse of Antarctica during the International Polar Year (IPY) 2007-2008 have received funding from such organizations as the Research Council of Norway and the Norwegian Polar Institute.

Atmospheric observation equipment

A view of the atmospheric observation station

- Acceptance of scientists on exchange programs

Scientists from other countries wishing to engage in collaborative projects or their own research at the station are required to submit their requests to Norwegian scientists or the management personnel of the Norwegian Polar Institute. The station is also generally open to international cooperation activities.

(5) Use of Antarctica for Peaceful Purposes

The Norwegian Air Force has provided air transportation support for the Norwegian Antarctic program on several occasions, i.e. in connection with

the visit of a member of the royal family in 2005 and the Norwegian prime minister in 2008. The military provides no other assistance to the station.

(6) Tourism

The Norwegian government implements a strict policy towards tourists. According to the station, visits to the station for the purpose of tourism are not permitted.

(7) Summary and Findings

The station was converted from a summer station to a year-round station in 2005 and the installations have been expanded considerably. The inspection team finds that the station is operated efficiently by a small number of personnel.

Advanced waste treatment systems, such as a volume reduction system for food waste and sewage treatment facilities, have been installed. Treated sewage water is discharged onto an ice-free ground several dozen meters away from the station and this issue is referred to in Part I.

Consciousness of environmental protection seemed to be high. Introduction of renewable energy is not as fast as might be wished, and this is one of the areas that could be advanced significantly in the future.

Because of being located at a relatively high latitude, Troll runway, unlike Novolazarevskaya runway, is free from melting during summer. The station maintains and operates a 3000 m runway which requires labor-intensive work. It is thus a major contribution to DROMLAN and activities of the stations in the region.

It is noteworthy that Troll houses installations for K-SAT and Gallileo. K-SAT is a commercial enterprise (according to its website) and, though not clear, its operation seems to be on commercial purposes. As was mentioned in Part I, this is a case of rather unconventional use of Antarctic stations. It raises an interesting point of discussion as how to put this kind of new breed of activities into perspective.

6. Novolazarevskaya Station

(1) Overview

The inspection team arrived at the Novolazarevskaya around 9 p.m. on February 8th and carried out inspections over two days. On the 9th, the team conducted interviews in the morning and then inspected the station and its surroundings. On the morning of the 10th the team inspected the station facilities accompanied by station personnel, and conducted the last interview.

(2) Station Facilities and Operations

(i) Station Facilities

The former Soviet Union opened this year-round station in 1959. It was relocated to the current venue between 1977 and 1979. The inspection team found the facilities were aging overall.

- Water Supply

The station uses 30 liters of water per person per day. The inspection team observed that the station was drawing water from a nearby lake and it is concerned that the water quality might be deteriorated by steel panels, which appeared to be abandoned in the lake, as well as by possible oil leakage, which left traces on the upper bank area.

Water intake

- Transport Equipment

The transport equipment and machinery seemed to require urgent

improvement. It was briefed that Russian expedition personnel assisted fueling of DROMLAN aircrafts in exchange for air transportation service. DROMLAN uses Novolazarevskaya runway (Novo Runway), which belongs to Russia and flight operation and passenger facilities being managed by ALCI, is located about 10 kilometers away from the station. A convoy of 4 vehicles transports fuel (and waste from the station) two to three times a month from the port 80 kilometers away. It takes three to four days, even a week in some cases, and this has become a heavy burden on the station. It was found that the station was also confronting a waste treatment issue related to airfield operations.

Because the station provides equipment and machinery to support DROMLAN, shortage of these seemed to be causing serious impact. At the time of inspection, only 5 of 12 snow vehicles at the station were usable, including the oldest one made in 1983. The lack of containers was causing inefficiency, as each drum must be lifted from the trucks by a crane one by one.

Fuel transporters

Vehicles at car park

- Hazardous Waste

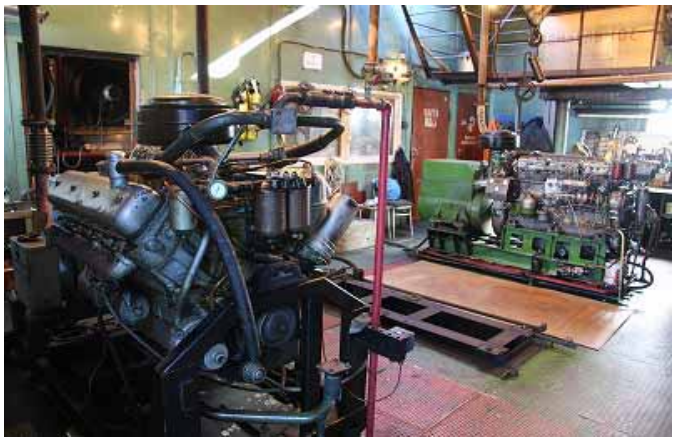
It was briefed that sulfuric acid (H_2SO_4) was used for battery fluid and it was being removed only in restricted areas. X-ray film developer was being used and disposed along with the waste from the weather monitoring station. The consumption of X-ray film developer in winter amounts to approximately 3 photos.

Used batteries

- Energy Use

Various types of power generators were being used, many of which were outdated. The station leader told the inspection team that he knew these old generators were inefficient to maintain and produce energy. The inspection team was explained that although the station has proposed AARI (Arctic and Antarctic Research Institute) to standardize the specification of these generators, it has not been realised yet. The station will replace one

old generator soon and another in the future.



Power generators

- Renewable Energy

From 1982 to 1996, three wind power generators with the capacity of 4 kW were used within the station, while four of the similar generators were used in the airfield. They went out of order and are no longer in use. There were no plans to introduce renewable energy at the time of the inspection.

- Internet Environment

The inspection team observed that the station did not have the internet access. The station personnel said they usually use radio or satellite telephone for communication. As Novo Runway has internet access, station personnel go there and use it when necessary.

(ii) Station Operations

There are 32 over-wintering personnel and 18 seasonal personnel.

At the time of the inspection, 55 personnel were involved in station operations (4 of them working at Novo Runway).

- Understanding of the provisions of the Antarctic Treaty System

It was briefed that all personnel of Russian expedition were obliged to take the exam covering the Antarctic Treaty and the Madrid Protocol on Environmental Protection. Along with emergency drills, an one-hour briefing was being held at the station every month to promote understanding of the treaty and the protocol.

(3) Environmental Protection Measures

(i) Waste Management and Disposal

- Waste Management

This year, the station transported 1,700 drums but only small portion of them were being used at the station (80 drums: 70 for engine oil and 10 for antifreeze). The rest were used by DROMLAN. After refueling, 100 drums had been pressed by the station staff in a peak day.

The Norwegian 2001 inspection noted a large area filled with operational and non-operational vehicles and equipment, and most of them were still there at the time of this Japanese inspection. The station was aware of the need to remove waste from Antarctica promptly and had been conducting cleaning campaign for 16 years. The inspection team was also informed that all the expedition members collected trash twice a week. According to the station, removing bulk waste is difficult due to the lack of the means of transportation, including vehicles. This year, 90 tons of wastes were planned to be shipped out, including 33 tons of compressed drums.

Drum disposal site

Used equipment left outs

Reused engines

- Amount of Waste Generation

The entire station seemed to generate about 30 kilograms of wastes per day at the time of the inspection.

- Measures against Oil Spills

There were no dikes around the fuel tanks and the inspection team found the traces of fuel.

The team was explained that when fuel spills take place, pumps are used to collect most of the fuel and remaining areas are cleaned manually. Station personnel in charge of environmental conservation were responsible for oil and fuel spills. Russian guidelines require that spilled oil and fuel should be kept in a barrel, marked in white, and removed from Antarctica.

Traces of oil spills on the soil

- Cleaning Spilled Areas

Fuel spills were left abandoned all around the station. Some patches were old and others were relatively new. These fuel spills might have been caused by various reasons including from vehicles and power generators, but no specific cause has been identified.

During the interviews, the inspection team asked the station personnel about clean-up plans and found that no specific measures seemed to be taken so far.

A fuel puddle that seeped up from the ground

- Status of Waste Reuse and Recycling

The inspection team observed that the renovation work was going on, such as adding exterior walls, at the station.

Waste was not reused, because the station felt that removing waste from

Antarctica as more effective. However, wood was being reused when practical.

- Method of Waste Sort, Collection, and Storage

It was briefed that wastes were sorted into seven categories: burnable waste, glass, metal, plastic, ash, oil, and batteries. Paper and combustible plastic were burned in a double-stage incinerator, metals were compressed and inflammable plastic, ash, oil and batteries were removed from Antarctica. Glass, garbage, and metals were disposed in Cape Town.

General guidelines on environment conservation were being posted near the station leader's office.

Sorted waste glass

Incinerator

- Radioactive Materials

The Finnish inspection report in 2004 mentioned the radioisotope thermal generator containing radioactive material. According to the leader of the over-wintering party, the generator was still located one kilometer from the Novo Runway. The generator was used at a meteorological weather station between 1982 and 1992; however, it was no longer in use. The inspection team was informed that there was no plan to remove the generator from Antarctica, because it is unlikely that permission of port calls to be issued by such states as South Africa for vessels and aircrafts transporting them, and that there is no direct means of transportation to Russia. According to the station, the generator is packed in lead, so there is no concern of radiation emissions.

(ii) Treatment of Sewage and Domestic Liquid Wastes

At the time of inspection, the station facilities were going through refurbishment, and new containers with sewage treatment system were installed. As a result, the inspection team was informed that waste water from certain buildings was being treated with bioreactors. The station had a plan to have all fresh water be treated in the future.

Water treatment plant

The wastewater is filtered through charcoal and sand, processed in an ozone treatment system. The ozone processed water is temporarily stored in a tank and automatically discharged every 10 cubic meters. There is a report that a water treatment system using magnesium ammonium phosphate ($MgNH_4PO_4 \cdot 6H_2O$) has been developed in Russia.


Ozone treatment unit for sewage water

The inspection team observed that treated sewage was being released into a lake near the station. The station explained that this lake is brackish as the lake is connected to the sea.

Sewage water from facilities without a treatment system is vacuumed out and released into the sea through a crack in the ice though inspection team did not have time to confirm.

No records of the amount of sewage have been kept and no water quality monitoring has been conducted.


Drain outlet

(iii) Conservation of Fauna and Flora

- Taking of Native Animals and Plants

According to the briefing, the Russian expedition party does not take animals. Plants are collected for research purpose with permission from the Russian Government.

- Status of Introduction of Non-Native Species

The inspection team did not see any of non-native plants, which were noted by the Norwegian inspection in 2001. The team was explained that they were removed and introduction of such plants is prohibited. Leftover vegetables and fruits, brought into Antarctica for food, are incinerated.

(4) Scientific Investigation and International Cooperation

- Exchange of Scientists

Usually foreign scientists are allowed after obtaining permission from AARI. The station accepts scientists from other stations like India to stay for a few days on an unofficial basis. At the time of the inspection, three researchers were at the station: two microbiologists from the University of Liege and one algologist from the Czech Republic who had completed their study in the surrounding area of the Princess Elisabeth under the Belgium programme. All of them had official permission.

(5) Use of Antarctica for Peaceful Purposes

No military support or personnel were found at the station.

(6) Tourism

The station neither invites tourists nor refuses them.

The inspection team observed an ALCI sign board on an old facility at the station, which was remodeled into a guesthouse, and it gave the inspection team the impression that the guesthouse is under the management of ALCI.

During the over-wintering of the 54th Russian Antarctic expedition, the inspection team was informed, about 15 tourists stayed at the guesthouse and some of them visited the station. The inspection team found cairns, possibly made by those tourists, around the station.

The inspection team later inquired about the guesthouse, and one of the Russian expedition officials explained that the guesthouse was located

within the area belonging to the station and it was not owned by ALCI.

ALCI guesthouse on the station property

(7) Summary and Findings

Novolazarevskaya has been in year-round operation since its foundation by the former Soviet Union. During the inspection, renovation work was underway and the team found some improvements, including the restructuring of interiors of the station premises and the installation of a waste water treatment system, compared to the situation in the 2001 Norwegian inspection report.

On the other hand, more work needs to be done to protect the environment. For example, soil contaminated by oil was found in many areas (large amount of contaminated soil was found in one area). Sewage from facilities without treatment system was released into the sea through a crack in the ice. Furthermore, large sized wastes including broken vehicles were left seemingly for a long time.

The inspection team lauds station personnel's effort to repair and use old vehicles and generators despite adverse conditions. However, with such an old station, the task ahead is by no means easy. Outdated equipment due to an insufficient budget seemed to be posing serious problems which need to be addressed by budget increase through internal consultation within the Russian Government aided by broad support and acknowledgement of the Russian Antarctic program. Lastly, the inspection team recognized heavy burden, part of which is caused by the support work for DROMLAN logistics,

on the station's activities.