SANAE 49 NEWSLETTER

JULY 2010 **Vol. 06**

MONTHLY NEWSLETTER OF THE 49TH SOUTH AFRICAN NATIONAL ANTARCTIC EXPEDITION OVER-WINTERING TEAM

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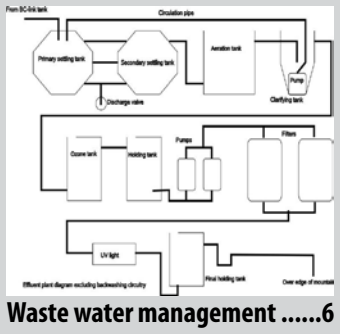

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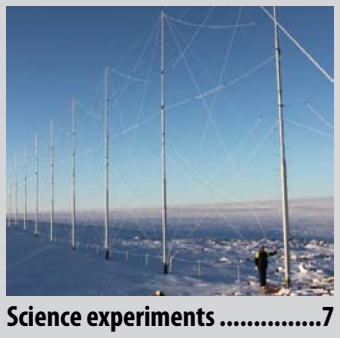

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EDITORS:
James Hayes & Ryno Jordaan

THE GOOD, THE BAD AND THE SMELLY!

How many engineers does it take to change a smelly line?

A RATHER SMELLY AFFAIR

Lowellen Clarke

A lot of sweat and no showers

As Samuel Taylor Coleridge's Ancient Mariner so eloquently put it in the late 1790's: "*water, water, everywhere, nor any drop to drink...*" Such seemed to be the situation when a segment of the pipeline which joins the snow smelter to the SANAE IV base was blown off its elevated perch one fateful evening in July. As André Harms rather bluntly put it that eve: "why do these 'flipping' things always happen on a Friday night...?"

By losing the link between the snow smelter ("Smelly" as it is affectionately known) and the base, S49 had effectively lost the capability to pump any 'manufactured' water up to our home. Until the matter was rectified, we only had recourse to the water in our storage tanks, which at that time amounted to something in the order of 23 000 litres. This may seem a great deal, but in the presence of extensive pipeline damage, potential equipment failure, limited spares, near perpetual darkness and unpredictable Antarctic weather, we had no idea as to how long the repairs would take. The irony that we are sitting on the continent which harbours over two thirds of the world's fresh water supply (in the form of ice) was lost on none of us.

Of course, we realised that we would not wither away with an unslakable thirst as did that crew of old; if push comes to shove, we can always melt ice on the stove to provide drinking and cooking water. What we did realise though, was that we would be severely limited as to the many other uses of water in a self-sustaining household – the little luxuries that one no longer fully appreciates in the modern world. Case in point: Etienne and Rob (they that love spending 'quality time' in the shower) were in a state of near apoplexy when showering rations were imposed! We were indeed in for trying times...

However, let us take leave of the imminent problems facing S49 for a moment and scamper on back to the beginning...

The full operating mechanics of a 'Smelly' (ie. the whats, whys and hows) can be found later in this publication – please feel free to peruse them at this point.

"So", one may ask, "what is the recipe for losing a life-line so vital to the existence of a fully operational base in Antarctica?" Especially one which had undergone another extremely traumatic experience last winter (the pipeline froze and consequently burst) and which had been repaired as recently as the 2009/2010 summer take-over? Well, it takes surprisingly few ingredients: One dash of human error, whereby the 220m long pipeline had not been securely strapped down to its supporting columns. One generous measure of a vicious Antarctic blizzard. Blend together in a howling wind at 70 knots (approximately 130km/hr). Chill for a few minutes at minus 30 odd °C, and Bazinga!! Before you can say "HIJKLMNO" *(Editor's hint: recite the alphabet from "H" to "O", for those who missed it)*, there is a 75 metre-long 'Wasser Wurst' laying on the ice!

It was Ryno who discovered that the smelly line had gone down on the evening of Friday 2nd July during routine base checks. Although a blizzard was blowing outside, the heater-tape lights which are normally visible from the base had disappeared. In the light cast by flood-lights which are attached to the smelly support poles at various points, it could be made out that a proximal segment of the smelly line was no longer on said poles. But where had it gone? Had the mythical 'Antarctic polar moles' carried it off, or had visiting aliens beamed it up as a memento of their unforgettable trip to the awesome SANAE IV base? A brief excursion outside confirmed that hectic winds had blown the pipeline clean off its nesting perch, severing it at various points in the process. Any thoughts of an early commencement of repairs flew away on the wind, as the weather was not conducive to working outside.

Indeed, the storm proceeded to worsen, and it was about 4 days before we were able to venture outside into what was surprisingly

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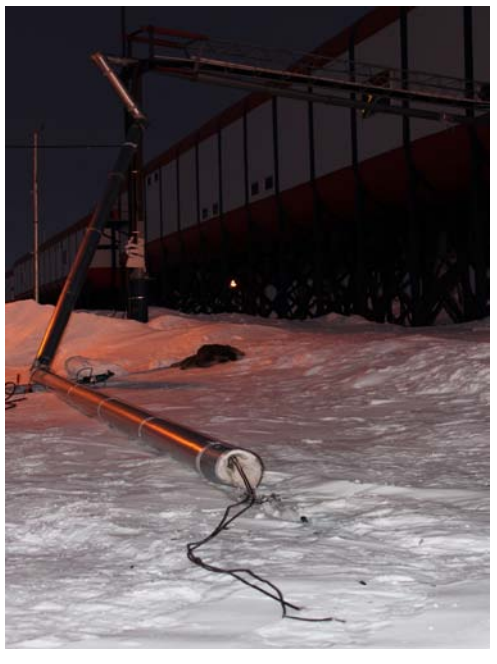


The topmost severed section of pipe, showing exposed heater-tape

« A rather smelly affair, continued

(...from pg. 1) good weather. The well oiled machine which S49 has become in such circumstances set to work with a calculated coolness that rivalled the surroundings. The distal 40m segment of the derailed portion was still attached to the intact pipeline, and appeared to be whole. It was lifted back into place with a crane and secured with stay ropes in order to prevent a recurrence of events. The remaining 35m of the derailed portion was lifted onto the heli-deck in 3 segments and brought into the hangar for repairs.

Johan played the part of boiler-maker par excellence, and concerned himself with welding broken-off flanges back onto lengths of pipe. Ryno did what he does best – joining and pulling wire (err... heater tape). James, Tyrell and Etienne proceeded to strip off the insulating layer which surrounds the actual water-conveying metal pipe, check for any fractures, and then reclad the pipe in insulation. Marlon (aka Super M) and Roger put their collective strength into bending and shaping one of the poles, whilst André (aka Bossman) oversaw the whole operation and acted as quality control. He also put the smelly into manual overdrive so as to prevent it pumping water into the middle of nowhere and thereby possibly freezing what length of tubing was left. Rob and I, being something of spare wheels hanging about when it comes to doing things mechanical, played base secretary and tea-lady, respectively, and also provided moral support. Within two days, all repairs had been effected, and we were once again ready to brave the elements in order to reattach the missing segments.

Unfortunately the weather was predictably against us. In fact, during the whole 3 week repair job, the most debilitating and time-consuming factor was poor weather, which severely hampered the speed of the 'Smelly Renaissance'. It was another 3 day long wait through yet another blizzard before a weather window opened in which it was possible to safely work outside. But like some badly scripted B-grade movie, Circumstance was not yet done with us.

On a beautifully crisp and windless Antarctic winter day, with the entire team outside and ready to finish off the job, equipment failure put a spanner in the works. It was so cold that both the Caterpillar bulldozers which house the cranes necessary for lifting the pipes off the heli-deck and into place were unable to start. The batteries had been sapped by the cold, and in addition, the Webasto heating devices could not fire up. Cue another few-days-long wait as we charged batteries and waited for the temperature to 'climb'.

Finally, with patience and clean underwear rapidly running out, on the eve of the 16th July, our weatherman gave us the green light for a wickedly good next day based on his 'Rob-servations' and astute forecasting ability (actually, it's a computer weather forecasting programme called 'The Amps Model'!). Bossman and SuperM were up at some ludicrous hour of the morn armed with a propane heater, (as well as sporting some rather cool looking capes!) the purpose of which was to heat the Caterpillar engine so that it was warm enough to try and start, should the Webasto not fire up. Suggestions to build a bonfire under the engine, or throw a burning rag into the diesel tank had been swept under the table...

A few hours later, having first indulged in a killer breakfast cooked by our superhero friends, we all traipsed out into the dark with a resolve second to none and positive waves emanating into the wild Antarctic distance. And voila! Success... mostly!

The dozer started up the first time, the initial 2 segments of piping were raised, slotted in and reattached perfectly. The final segment however, (the one with the bend in it) proved to be a rather stubborn, unmountable beast in the wrong shape and size! We were in effect trying to play Tetris with a box whose dimensions were incorrect. It was thus back to the hangar with the final segment, where, during the remainder of the day and into the evening, Roger and Super M once again removed all cladding, heated and reshaped the tubing, and finally redressed it in its insulation. And guess what? Déjà vu - the elements turned on us yet again, I kid you not. I was seriously starting to look for a hidden Big Brotheresque camera in all available nooks and crannies. I mean, what are the odds?

Finally, on the 22nd July, we managed to attach the final piece of the puzzle with relative ease. Time-lapse footage of this procedure as posted by André can be found at the following 'You-Tube' link: *http://www.youtube.com/watch?v=NsYsG7kgmts* It really is worthwhile to watch (and check out his other 2 time-lapses while you are there – Aurora Australis and the July sunrise – awesome stuff!). All joints were inspected, re-fastened and insulated. The entire pipeline was strapped down to its supporting columns with metal banded straps, as well as tied down at intervals with stay ropes. All electrical connections were finalised and the heater tape was turned on. The smelly was turned up a few notches. In short, we were just about ready for a test run, which occurred the next day. Barring a few leaks at some joints, this was a success. These leaks were fixed over the next couple of days, and all joints insulated and sealed.

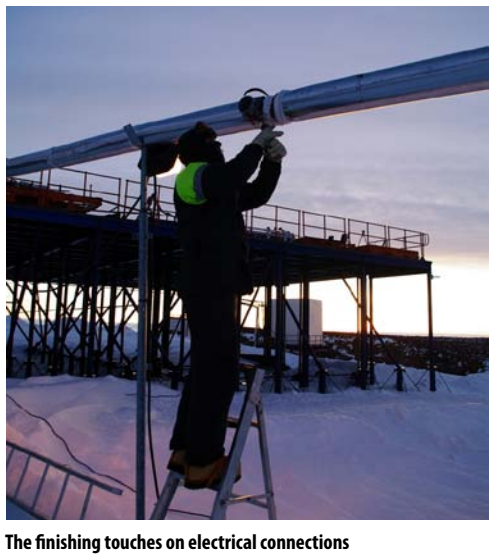
Full functionality was resumed on the 25th July to a chorus rejoicing, the sound of beers and bubbly being cracked open, and what was possibly the longest shower on record, taken by Etienne. During the 23 day ordeal good water conservation was practised - we still had approximately 5000 litres remaining in our storage tanks. All repairs were conducted in as safe an environment as possible and no injuries were incurred. Other records were also set up. The most notable of these was the longest-time-without-bathing, in which I (Doc) pipped Roger to the post by 11 days to 10! In fact, at one point, what with the showering restrictions, SANAE IV resembled something of a male pheromone factory! Fret not ladies – there are more than enough of us to go round...⬣

The bare trellis making an iconic silouette against the noontime dusk

The severed pipe can be seen on the middle left, whilst a fine specimen of an Antarctic rock-spider can be spotted towards the right

Damage assesment was characterised by grave faces

A damaged link, showing the insulating cladding



The finishing touches on electrical connections

On the higher sections, Roger donned a rigging harness and was lifted and positioned with careful manoeuvring of the Cat crane

SUNRISE

James Hayes

Oh, how have we pined for it!

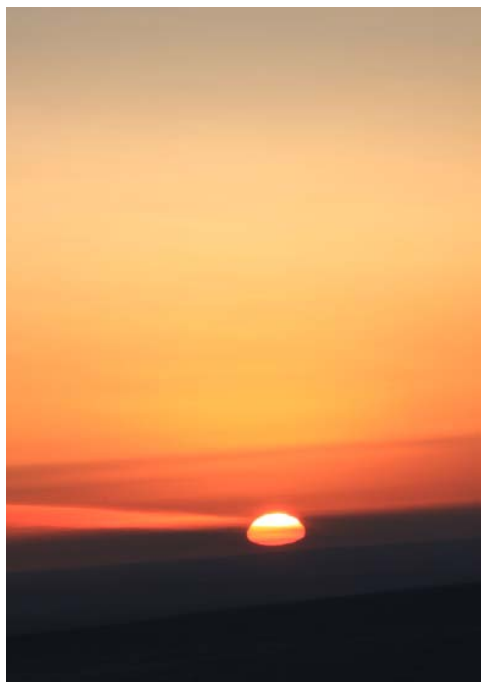
The long-forgotten day was dawning after almost three months of darkness. Our concept of day and night, our bearing on conventional sleeping patterns, and any semblance of a summer tan had abated long ago. The only reminder of the fact that we were on a planet that possessed its very own star, was the casual dawn, sans sunrise, at noon every day.

By mid-July, we had pulled through the harshest part of winter and enjoyed almost a quarter of our planet's orbit around its Sun, without seeing it once. We had expected adverse emotional and possible physiological degradation due to the lack of sunlight. However, we were unscathed by the psychological tarnish of the dreaded T3-syndrome, which is a medically-documented ailment similar to the more commonly known Seasonal Affective Disorder (SAD).

For our team, the most prevalent symptom of Polar T3-syndrome manifested itself as the "Antarctic Stare". The most severe and disconcerting hybrid of this symptom would be experienced in the uneasy moment when Marlon would freeze his gaze upon you at the dinner table, whilst incessantly chewing on the same bite and clutching his steak-knife in a menacing grip. The symptom would be promptly remedied by a smack on the side of the head, a click-click of fingers in front of his eyes, whilst the rest of the gang would let him have it with a series of wise-cracks. As an aside, it has been observed that the onset of Antarctic Stare for most team-members (including yours truly) often correlates with dinner-time tech-talk between certain electronic engineers.

So, with the mid-winter being a thing of the past, and with the team's collective mental faculties (mostly) intact, we were in high spirits. It was unanimously decided that the return of our Sun was cause for another celebration. As we neared the end of July, the dawns around noon-time were becoming longer and more pronounced, and on the morning of the 26th of July we had reason to believe that we would witness our first sunrise. Prediction models indicated that the sun would rise in the ballpark of 12:30 GMT.

We were intent on enjoying the experience in the company of nine other sunlit faces. We packed a cooler bag (to keep our drinks warm) and headed out, into a blissfully wind-still minus 25 degrees Celsius. Skimpy outfits were the order of the day: most party guests donned beanies and buffs, minus the usual goggles, thermal fleeces and windproof balaclavas. Our final destination was a short stroll away from the base, to a spot that offered a brilliant view of a long-awaited sunrise over vast plains of ice. With pops of corks, general cheer, and a few anticlimactic sips of rapidly freezing celebratory bubbly, we squinted at a sight for sore eyes.



The fiery sunrise was spectacular but short-lived

The ephemeral heat and light from the fiery orb on the horizon cast a hue of life on our exposed faces. It didn't climb high into the sky, but hugged the horizon as though it was fixed on rails, and barely lifted its full form from behind the white curvature of Earth, before disappearing again. It shimmered and pulsed ever so slightly, as thermals in the air created mirages over the ice. All the time, we sipped sparkling wine and refreshingly 'warm' beer (once again, with much gratitude to our beverage sponsors). As you can imagine, some team-members' skin complexions are verging on bio-luminescence, and the touch of sunlight was a scant, but much appreciated experience.

The ten pairs of vigilant eyes kept probing the horizon till the sun lavished its last rays of wholesome light on us. The entire show didn't last more than two hours. There is something deeply reviving about watching any sunrise, and this moment had profound significance for each one of us. It is as though the brief moments of light were a trophy of endurance, as much as it was a sign that we weren't there yet. We made our way back to base, with the experience bringing perspective on our situation and serving as a reminder of a busy summer that lay before us. The preparations for the summer relief expedition and the new over-wintering team are almost upon us, and retrospect has taught us not to procrastinate in this place.

We look forward to the advent of yet another season of perpetual sunlight, and eagerly anticipate the sensation of sunlight on bare skin – we are on the home stretch, with memories of our sunny motherland hard-pressed in our hearts. ⬣

POLAR T3 SYNDROME

Lowellen Clarke

Polar T3 syndrome (or Polar 3,5,3' – Triiodothyronine Syndrome) is common in humans that live in polar regions for more than 5 continuous months. It is characterised by a collection of symptoms found in the presence of altered thyroid function tests.

T3 is a thyroid hormone that acts as a neurotransmitter and also regulates body temperature. In extreme cold, T3 gets used predominantly to keep the body warm and consequently the brain is left with a less than adequate supply of the hormone.

Symptoms include: irritability, mood and sleep disturbances, memory deficit, lack of focus, the '1000 yard stare', social withdrawal, depression, fatigue and weight gain (secondary to carbohydrate cravings).

Treatment includes measures such as

- adjunctive remedies - light therapy (during winter), exercise, sleep hygiene,
- supplements - thyroxine (T4) or tyrosine (a thyroid hormone precursor), and
- further symptomatic treatment (such as antidepressants).

The Antarctic stare (and flavour savers) in action

Ten rugged faces, and one Sun-rise

Joy to the world - we had cause to celebrate

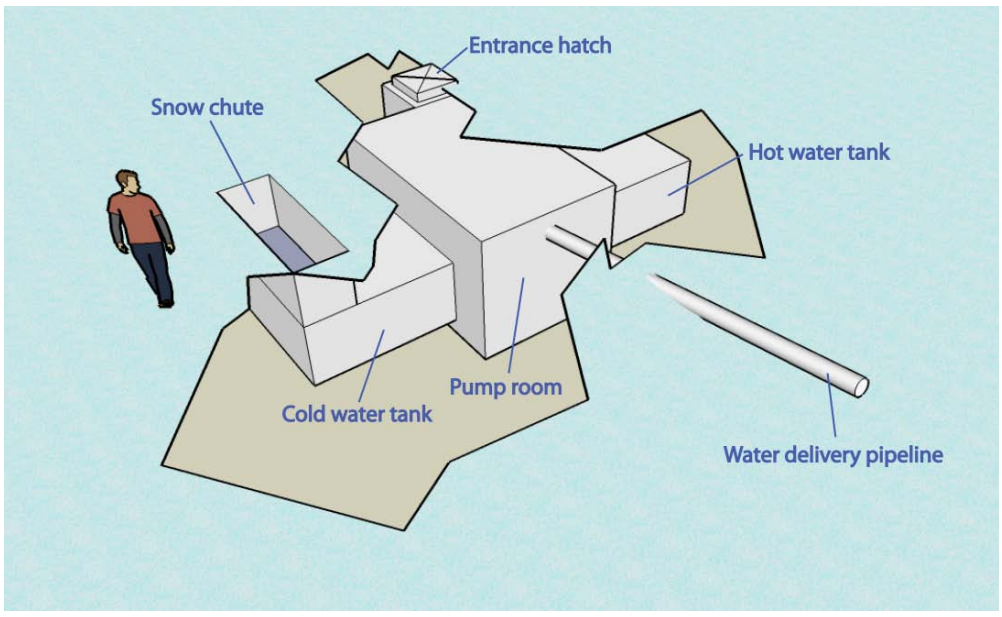
Hours earlier, we observed an epic "moon-set" across the Alman-Rygen mountains

MAKING WATER IN A DESERT

Ryno Jordaan

According to the copy of Encyclopædia Britannica in the base's library, the definition of a desert is an area with an annual precipitation of less than 250mm. For the interior of Antarctica this figure is about 50mm (equivalent in water as all precipitation is in the form of snow), according to www.coolantarctica.com. Still, when you step outside, you are literally walking on water (or a form of it in any case) - it is quite strange to think of this place as a desert. Anywhere you go you can pick up the "sand" of this desert, put it in your mouth and you have water that will be cleaner than any bottled water you can find anywhere on Earth.

On average we use between 1500 and 2000 litres of water per day between the 10 team members of SANAE 49; water that needs to be melted from snow that has to be shovelled into the chute of the ice-smelter. It requires an almost daily effort to go outside and "throw Smelly".



The structure of the snow smelter under the ice

SANAE IV is built on a rocky outcrop (called a nunatak). There is not sufficient snow build-up in its immediate surroundings to sustain the base's water requirements. The Smelly had to be constructed approximately 220m from the base, where it could be built under the snow. This makes the shovelling of snow into the chute a lot easier as the opening of the chute is normally close to 'ground' level.

The snow smelter's structure basically consists of three parts: a cold water tank, hot water tank and a pump room. Each of the tanks has a capacity of 2,150 litres.

The snow is melted electrically via up to six electric water heating elements (a combination of 6kW and 2kW elements) in the cold water tank and heated further by the same number of elements in the warm water tank.

The pump room contains two pumps of which only one is working at a time. Pipe and valve arrangements allows for two states of operation: circulating or pumping. The pump circulates the water by drawing from the bottom of each tank and discharging into the top of each tank, effectively mixing the water and levelling out the tanks. The circulating water is sprayed into the cold water tank which aides in the melting of the snow.

Water is pumped up to the base when the tanks are 100% full and the warm and cold water tanks are above 13.5 °C and 6.5 °C respectively.

The entire process, from the number of elements that are on at a time to the valve draining the Smelly pipeline after water was pumped, is automatically controlled via a programmable logic controller in the pump room. Therefore we only need to shovel open the entrance hatch every now and again to see whether everything is still okay.

Occasionally the pump chamber is flooded from ice melting around the walls of the Smelly and this water needs to be pumped out with a small submersible pump. Amazingly the melted ice is so pure that it does not conduct electricity and the electric motors keep on running even when emerged halfway into the water.

So there you have it: the only thing you need in this desert to create an oasis, is energy: from the generators and the sweat of your brow. ⬣

The ice bridge that forms over the opening chute is always approached very carefully

Entering the smelter pump room via the access hatch

The pump room with cold water tank on the right hand side

Occasionaly the ice around the snow chute becomes very hard and needs to be broken with a Bucket CAT or Bulldozer

Shoveling snow into the chute

Ice bridges starts forming downwind and will eventualy cover the entire chute

At times, the smelly has to be filled during prolonged and heavy snowstorms. In high-wind situations, the necessary safety precautions such as "roping-up" team-members are implemented, and communications in maintained with the base throughout the excursions. There is a cut-off speed where it is unsafe to venture outside, which is strictly adhered to.

THE SNOW WHITE ASPIRATION

James Hayes

"Mirror mirror on the wall, who is the fairest one of all?" Could you imagine a version of that story, with Snow White being a heinously unattractive hag? How about a version where the prince's saving kiss doesn't revive the dame from the deathly vice of the poisoned apple?

Not that it's a particularly manly thing to admit, but I'm quite a fan of the "happily-ever-after" ending to the story we know.

The beauty and serenity of the Antarctic continent has captivated many, and possibly one of most befitting descriptions of it's indescribable qualities would be echoed by the words of Australian media host, Andrew Denton: *"If Antarctica were music it would be Mozart. Art, and it would be Michelangelo. Literature, and it would be Shakespeare. And yet it is something even greater; the only place on Earth that is still as it should be."*

Per analogue, Antarctica is the Snow White of this planet. It is an environmental gem, unspoilt in its beauty. It has become one of the last strongholds of Nature.

During the latter half of the previous century, human activity on this continent increased. Hind-sight teaches that the sustained presence of man inadvertently shoves Nature out of balance. Once environmental damage has occurred, it cannot easily be undone. We have witnessed humanity taint the Planet over more than two centuries of industrialisation. There is no prince in our Planet's story, no saving kiss.

The Madrid Protocol was ratified in 1998, almost four decades after the Antarctic Treaty entered into force. This protocol is an ammendment to the Antarctic Treaty System of 1961, and is geared specifically towards the environmental protection of the Antarctic continent. The cardinal environmental issues that are addressed in the articles of the ammended treaty are based on the the fundamental consideration that the environment must be preserved for its immense aesthetic and scientific value. All mineral resource exploitation is banned. Environmental impact assessment is enforced for all activities in the region. Such activities include, inter alia, construction and tourism.

In the following articles, we will delve into the dirty side of preserving the continent. We will explore the stringent considerations that are necessary to mitigate enviromental damage that is inevitable due to the waste and pollution that is generated by a human habitation. ⬣

The clean green Antarctic machine

Tyrell Sassen

One of the consequences of living in a totally self-contained habitat at the edge of the world is that many of the services that we take for granted in South Africa become entirely our responsibility. This is especially true for the handling and disposal of waste.

The Antarctic Treaty has guiding regulations regarding the proper handling of waste that must be adhered to by all signatory countries. Along with these international protocols, there are a number of local South African legislations, which also apply.

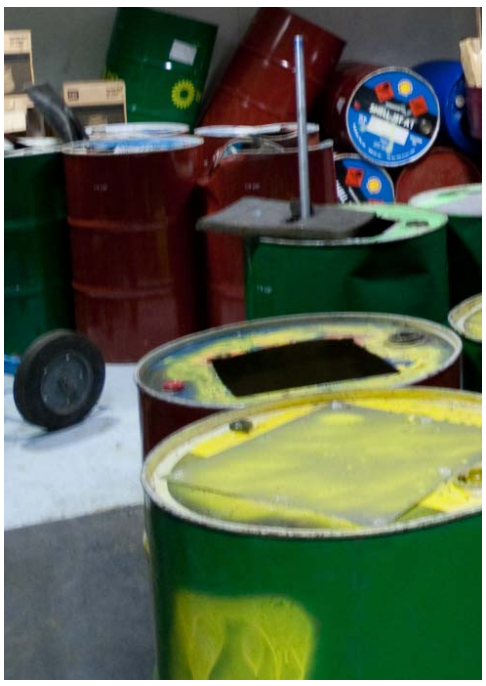
The purpose of these regulations is to ensure that our presence in Antarctica will have as small as possible an effect on the environment. This is accomplished by ensuring that as little waste as possible is produced; also, that which is produced is returned to South Africa to be disposed of there.

These principles are followed on every level of waste management, from the very large scale, where a decommissioned site is disassembled and returned to its country of origin (as was the case with the old German base, Neumayer II, earlier this year), to the small scale, where all waste produced in SANAE IV is stored and shipped back to South Africa at the end of each summer.

At SANAE we have eight different categories for waste. Each type of waste is stored separately from the rest and is colour coded to ensure correct handling on return to South Africa. Different coloured bins are distributed throughout the base. For example, orange is used for general waste, green for glass and blue for metal. All waste is disposed of in the correct bin and at the end of each week it is processed as part of our base duties. This takes place in the designated waste room where cans are crushed, glass is broken into shards and general waste is compacted. Keeping waste separate allows another important environmental conservation practice to take place: recycling.

The kitchen's waste drums are taken to the waste room every week

One of the waste-room ninjas next to the general waste compactor



Waste drums inside the waste room are colour coded and filled with the respective waste products

Can crushing (left) and glass crushing (right) is part of the weekly base-skivvie duties. These drums are sealed and shipped to South Africa.

The recycling mindset can also be seen with the decommissioning of Neumayer II. Many of the pieces from the decommissioned base were reused within Antarctica. The new South African/German emergency base (E-base) was constructed largely out of these decommissioned pieces. A few of the other pieces (including the sauna) found their way on to the Russian vessel, the Akademik Fedorov, to be reused by the Russians. Articles describing E-base and the Akademik Fedorov can both be found in the March edition of the newsletter.

A little bit closer to home (for us at least), both the glass and metal waste is separated for ease of recycling back in South Africa. Cardboard is also flattened and packed into its own shipping container. Currently paper and plastic are disposed of together with general waste (all waste that does not fit into one of the other categories) but hopefully these too will be recycled in the future.

Another example of the Antarctic waste management culture is the containers into which the waste is placed. Empty 220 litre fuel drums, which arrived at SANAE full of jet and skidoo fuel, are repurposed to store the separated waste during the year. Holes are cut into the tops of these drums, which are then filled with waste and resealed. These are then back-loaded onto the SA Agulhas at the end of the following summer, to be shipped back to South Africa.

These waste management principles apply to most of the waste produced at SANAE. Another part of waste management is how we deal with waste water that is produced at the base. Information on this topic can be found in the waste water management article on page 6.

One of the most serious issues we have to consider, with regards to waste, is how to minimise pollution from vehicle or pumping spills. This is an issue that is taken very seriously in Antarctica and there are a number of guidelines and procedures lined out by the international community to address it. For us at SANAE this means pumping fuel using pipes and couplings that don't allow liquid to flow when not connected; and inspecting vehicles for oil and antifreeze leaks, every time they are started. Even with these precautions, accidents still happen. In the event of a spill all contaminated snow is collected by hand. The snow is then placed in drums inside until it has melted, before being pumped into well sealed drums to be shipped back to South Africa. Any smaller spills that may have been missed are cleaned up as part of the annual 'chicken parade' at the end of summer. The entire summer team scours the areas around the base and fuel bunkers to collect any contaminated snow.

Another kind of waste to consider is exhaust gases, like those produced by the electric generators and vehicles. Proper maintenance and tuning of engines can reduce the amount of harmful components in the exhaust gases while also minimising the amount of fuel necessary to produce the required energy. Johan Nortje and Marlon Manko, the two diesel mechanics on the team, put many hours into tuning and servicing the engines, ensuring the minimum amount of air pollution.

Even with all the thought and effort that goes into waste management, we still have our reality checks. We were informed when arriving at the German base during our fuel pumping trip (see March 2010 newsletter) that they knew we were approaching, even before we were within sight. They had picked up the pollution from our vehicles with their air quality monitoring equipment, as we travelled from upwind.

In the end, although there are a number of procedures in place to limit the amount of waste introduced into the pristine Antarctic environment – an important goal for all countries involved in Antarctica – these procedures are never perfect. We can only hope that as we learn more and introduce modern technological advances (such as the wind turbine that was installed last year) we will reduce our impact here even further.⬣

Waste water management

André Harms

A real fun job

From SANAE, the nearest drain that is connected to a municipal waste water treatment plant is a whopping 4500km away, so simply 'connecting us up' will not work. Storing all black- and grey- water throughout the year and returning it to South Africa is just not possible either. Just digging a white (initially) equivalent to Kimberly's famous hole and dumping everything in it would be a contravention to the Madrid Protocol, which addresses Environmental Protection issues in the Antarctic Treaty. SANAP has elected to go beyond the requirements of the Madrid Protocol and treat SANAE's waste-water with the same stringent standards it applies at home, in South Africa.

The above-mentioned arguments warranted the construction of a modern and efficient waste water treatment plant inside SANAE. ***This is how it works:***

From various intermediate holding tanks throughout the base, effluent is collected in the settling tanks where sedimentation of solids occurs.

From there it flows via gravity into the aeration tank, also known as the bio-filter, where a fan blows air into the tank to oxygenate the water. In this aerated water our little minions, different aerobic bacteria, thrive and happily multiply. These critters digest organic matter like methanol and ethanol as well as inorganic matter like ammonia. The organic matter breaks down into biomass which settles as sludge and carbon dioxide which is released into the atmosphere. The inorganic matter is converted to nitrates which is further broken down by anaerobic bacteria to Nitrogen gas.

Once the bacteria have digested their "poo-rridge" the effluent passes to the next stage, the clarifying tank. Here solids, or sludge, settles to the bottom of the tank and is returned to the settling tanks so that the majority of solids do not proceed further. Another advantage of returning the sludge is that digestion can already start in the settling tanks (especially the anaerobic part, due to the lack of aeration).

Now that our little friends have done all the hard dirty work of digesting the solids it is time to dispose of them. Legislation (described above) stipulates that it is not allowed to let them escape with the grey water, so the not-so-lucky ones that escape from the clarifying tank to the next step face a horrible fate.

In the ozone tank they are bombarded with ozone, a bleaching and disinfecting agent. Despite the rather disconcerting disadvantage of being quite dangerous to human health at high concentrations, ozone has further advantages. It chemically attacks remaining contaminants in the water like undigested nitrites and organic matter and iron increasing the chance of the product being filtered in the next phase. Also ozone kills some water borne parasites should they miraculously appear in our effluent.

The disinfected and bleached water runs into a holding tank from where it is pumped through filters containing sand and carbon granules that is highly porous and consequently traps suspended solids.

After the filters, en route to the final holding tank, the water passes a UV light just encase the ozone was not effective enough. This light fries any remaining living organisms, friendly bacteria or menacing virus.

All that remains is to pump the grey water, now complying to South African legislated levels for water being released into rivers, over the edge of the cliff.

This all sounds rather matter of fact and clinical but unfortunately taking care of the treatment plant can sometimes be a real "k@k" job. So many areas that need attention or places where something can go wrong:

These include regular maintenance activities of draining and cleaning tanks, backwashing and dosing with bacteria. Or attending to the following, which could all result in spills of varying severity: leaking or blocked pipes, failed pumps, faulty or incorrectly set valves, over-exerting of the system's limited capacity – especially in summer with the large take-over crew.

It is also in summer that we remove the sludge that accumulated over the past year from the settling tanks. Usually about 6 tons of it is pumped into a tanker for removal to SA, leaving space for the next year.

To ensure that the levels actually are within the stipulated limits and that the plant is running optimally I get to analyse samples of the effluent at different stages in the process on a monthly basis. Various tests are performed and respective parameters are measured to ensure that the system is working properly. Just another reason why I certainly have the most 'poop-ular' job at SANAE.⬣

The Beard, doing his monthly chemistry practical

The water treatment plant

The lovely "assistant" playing with chemicals

The "Lolly", where grey water is pumped off the Vesleskarvet's cliff face

SANAE TRENDS

Current affairs, statistics, conditions and fads

Temperature Trends

Minimum: - 39.6°C (7 July 2010)
Maximum: - 13.7°C (28 July 2010)
Average: - 24.9°C

Wind-speed Trends

*Maximum: 144.7*km/h (2 July 2010)

Day Lengths

1 July 2010: 0 hours
31 July 2010: 1 hour 56 minutes

Quotes of the Month

Tyrell with an attempt to convince us that that T3 syndrome actually stands for Tyrell-3 syndrome:
"When is Easter? We haven't had Easter yet."
Reply from half the dinner table in unison: ***"You even baked hot-cross buns, remember?"***

Ryno while watching the first sunset in 10 weeks:
"I believe we have been drinking beer and wine from sunrise to sunset."

Marlon: ***"It's Friday afternoon. I wonder what is going to break tonight."***

Song of the Month

Ghostwriter - RJD2

Movie of the Month

Kickass

Belated birthday snowbath of the Month (due to poor weather)

Johan Nortje 31 July 2010

THE COLD SCIENCE

Etienne Kruger

An introduction to the scientific research and monitoring systems at SANAE IV

As most of you know, SANAE-IV is the South African scientific research base on Antarctica. The main purpose of the base is to enable the scientific community to perform research on the white continent. In the editions of this newsletter that follow we will be giving you, our readers, a grand tour of the scientific installations at SANAE. This article will serve as your introduction to the tour.

The scientific data gathered at SANAE fall into three main categories relating to the physical regions we are interested in. With increasing distance from the surface of earth, the regions are the ionosphere, magnetosphere and the heliosphere.

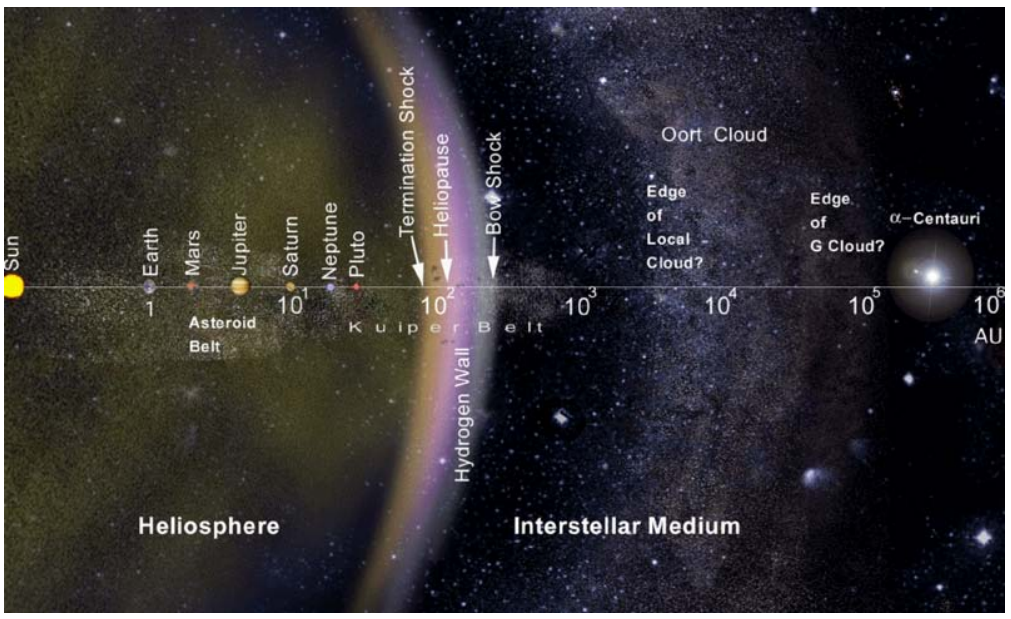
The ionosphere is the uppermost region of earth's atmosphere, approximately 50km to 1000km from the surface, and consists of particles ionised by solar radiation. This region of the atmosphere is very important to most technological developments because it has an enormous influence on long distance radio propagation and can have very pronounced effects on communication with satellites in space. In modern day we rely completely on satellites in orbit around earth for everything from communications and navigation to entertainment. They are used for GPS navigation, satellite telephones, internet access and even digital satellite television.

The second region, the magnetosphere, extends to approximately 10 earth radii from Earth. This is the region around the earth where the solar wind, a stream of particles emitted from the Sun, interacts with the magnetic field around earth. Put simply, the solar wind pushes Earth's magnetic field away from the Sun. Sudden variations in the solar wind can cause the magnetic field to vibrate much in the same way as a rubber band would vibrate if is bumped while under tension. We call this effect a geomagnetic storm. This variation in the magnetic field can induce currents in conductors, especially very long ones such as power transmission lines. These current spikes could permanently damage electrical equipment. This happened in 1989 in Québec and the north-east U.S. leaving over 6 million people without electricity for 9 hours.

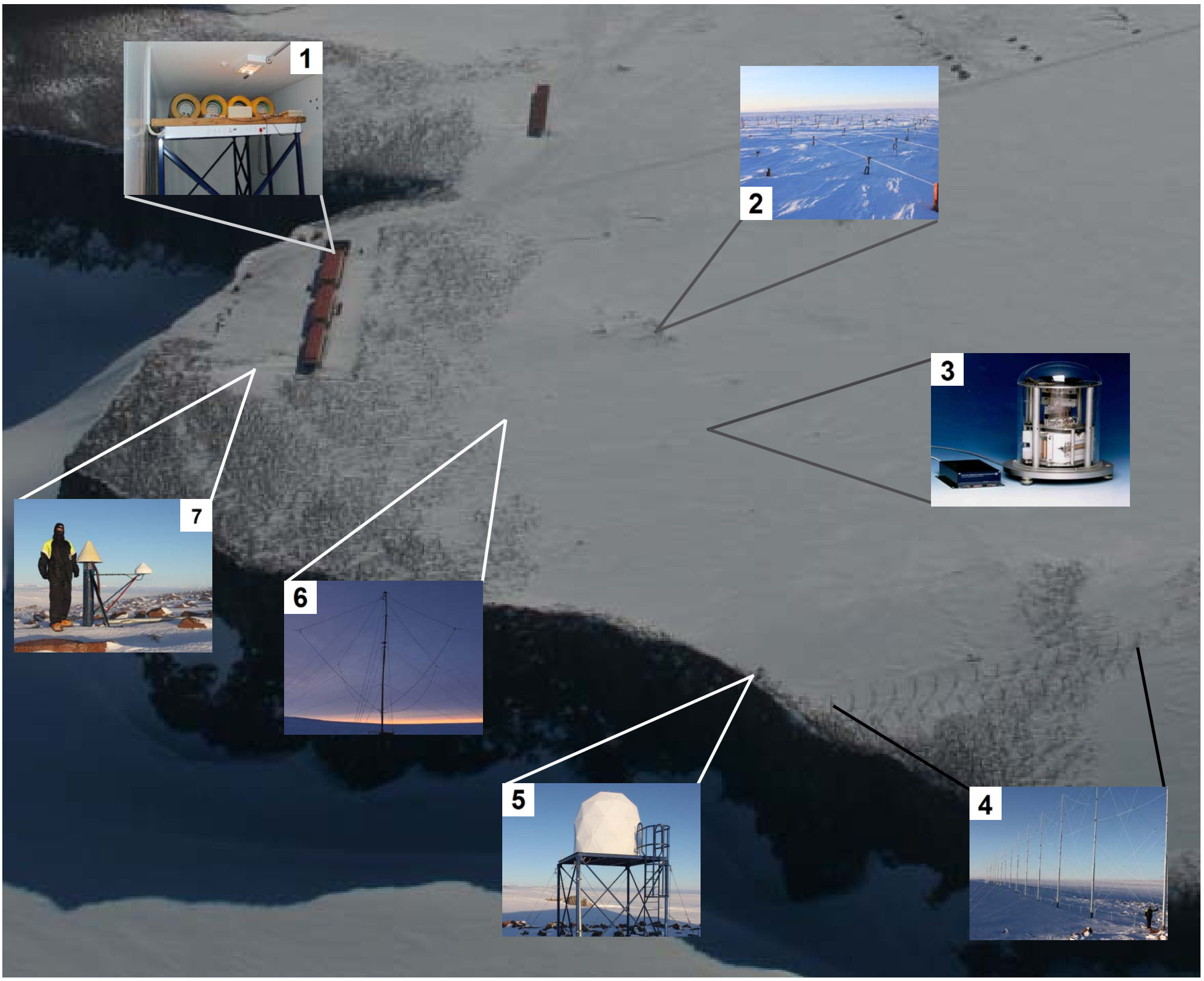
Our third field of study is the heliosphere. This region is a sort of bubble 'blown' into the medium of space by the solar wind, and is believed to stretch around 75 to 90 astronomical units around the sun. An astronomical unit is defined as the mean distance between the earth and the sun during one earth orbit around the sun. This means that the heliosphere stretches to more than 10 billion kilometres around the sun. Virtually all particles in this area come from the sun. The heliosphere effectively shields the area around the sun from particles emitted from intergalactic sources.

In the tour of our scientific installations at SANAE we will discuss the equipment used to gather some of the data fuelling the scientific community in South Africa and the rest of the world. We will also give you some examples of what makes this research important, and why this data should be gathered on Antarctica. For those who want more information this article is just a start. Read more at the Wikipedia links below...

Related links for further reading:
http://en.wikipedia.org/wiki/Ionosphere
http://en.wikipedia.org/wiki/Magnetosphere
http://en.wikipedia.org/wiki/Heliosphere
http://en.wikipedia.org/wiki/Geomagnetic_storm



The solar system, in logarithmic scale, showing the outer extent of the heliosphere, the Oort cloud and Alpha Centauri (image courtesy of www.wikipedia.org)



Some of the major scientific systems at SANAE, and their ball-park locations: 1. The neutron monitor's sensor is housed in the C-block 2. The RIOmeter antennas 3. The Fluxgate magnetometer as is one of the four magnetometers that are buried in the magnetically quiet area 4. The radar array 5. The Swedish telemetry dome 6. One of the VLF antennas 7. The GPS scintillation receiver's choke-ring antenna & IGS GPS antenna

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