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Our ref.

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Date

19 December 1986

Dear Dr Heymann

Thank you for your letter of 28.11.86 and the copy of the feasibility report of the proposed runway on Marion Island. My research group's response to it is appended.

The Entomological research so far undertaken on the Island gives us a totally inadequate picture of what the position is as regards the insects, so it will make very little sense to determine impact on insect populations - we are not even sure what is there so to speculate on the impact on something you're not sure exists is circular reasoning. However, intuitively, I suspect the effects will be disastrous. Likewise, to monitor effects on the populations after the event, when you have no idea what was there before, is likely to give very little idea of the real situation.

It is my very sincere wish that the problem be approached with sensitivity and real concern and that competent biologists be allowed to monitor impact of the construction and attendant workers to limit damage and littering to the absolute minimum. It is very regrettable that yet another pristine part of South Africa should be desecrated in this way.

I trust you will forgive the excess of emotion and lack of logic in this letter but I'm sure you will understand our feelings on this very special island.

With very best wishes for the festive season and a prosperous New Year.

Yours sincerely

C H SCHOLTZ

*draft*

The possible environmental impact of a runway on Marion Island.

## Introduction

It is generally agreed that the Prince Edward Islands represent natural areas of exceptional beauty and profound scientific interest. Amongst other things, they present us with unique opportunities for the formulation and testing of scientific theory - serving, as it were, as "...ready made evolutionary laboratories, offering replicate 'natural experiments' in community assembly." (Diamond and May, 1981). As such, but also for reasons more subtle and approaching the realm of ethics, they warrant extraordinary protection from environmental destruction.

The above, one would hope, is understood and acknowledged by all parties with vested interests in the future of the Prince Edward Islands and Antarctica. What is perhaps not yet understood, or at least not understood completely, is that the islands' youthful terrestrial ecosystem is fragile - and that, by its very nature, it is in fine and precipitous balance. Terrestrial plant- and invertebrate communities within this, and similar ecosystems, have been shown to have a limited capacity for recovery after decreases (e.g. Crafford and Scholtz, in press). They also have "(inadequate) ability to adjust to physical perturbations or to counter the introduction of new species, whether accidentally by man... or naturally by colonization." (Block, 1985).

The following critique of the proposal, and the assessment of the possible environmental impact of a runway and its associated infrastructure on Marion Island, is based on our own incomplete knowledge of the island's terrestrial ecosystem. Our strong instinctive bias against the proposal may become apparent, and we therefore state it beforehand, without apology.

## Reasons for the proposal

Although valid reasons for the construction of a runway on Marion Island undoubtedly exist, we allow ourselves two comments in this regard:

1. No mention is made of cost-effectiveness. Mention is made only of emergency provisioning of the Marion Island base. Presumably, normal provisioning of the base by ship will continue? It would then appear that emergency- and territorial/military control facilities (not necessarily in that order) are the major considerations behind the proposal.

2. The fact that "...in the past four years it has been necessary to mount four separate voyages to evacuate injured persons (from Marion Island)" should be seen in proper perspective: How often had it been necessary to mount rescue voyages to Marion Island during the preceding 33 years of occupation? At least two of the injuries that necessitated rescue voyages were entirely avoidable in that they involved thoughtless and even irresponsible behaviour on the part of the injured; a third might have been avoided through more rigorous preliminary medical screening.

## The proposal

The investigating team visited Marion Island for a period of four days (2-5 October 1984) on what they stress must be regarded as a "reconnaissance visit" (p. 6 of their report). Their survey was done under "appalling weather conditions" (p. 4).

We do not doubt the technical expertise of the surveyors and the compiler of the feasibility report, and we are obviously in no position to comment on its technical aspects. However, we seriously question the confidence with which the undertaking is, at this stage, pronounced feasible. We are convinced that a more detailed study of the terrain (specifically, the sites proposed for the harbour/beaching facilities and the connecting road) may reveal problems that, although not insurmountable with generous applications of bulldozers and explosives, may require far greater financial and logistical input than outlined in the current assessment.

At this stage it may be (im)pertinent to point out that a previous multi-million rand construction undertaken on Marion Island failed precisely (and dismally) because of inadequate assessment of all the environmental variables on the island. More importantly, even that undertaking, on a much more limited scale, had far-reaching effects on the environment: physically, in the form of a "peat slip" of several thousand tonnes that left huge tracts of bedrock exposed, and biotically, in the form of the introduction of an aggressive alien plant invader with the building material.

Incidentally, no mention is made of a road to connect the runway to the existing base. Such a road would facilitate the transport of supplies and casualties to and fro - a distance of approximately three kilometers over very difficult terrain.

#### **Possible environmental impact of a runway on Marion Island**

The following infra-structural requirements were identified and need to be considered here:

1. Harbour/beaching facilities to transfer construction equipment from ship to shore.
2. A road linking the beach with the runway site.
3. A runway approximately 1 500 m long and 30 m wide (4,5 hectares in surface area) with parking and turning facilities on its extremities.
4. Accommodation and fuel storage facilities.

Not in the proposal:

5. A road or route linking the runway and/or the beach to the existing base.

In addition, a low-lying area at the western end of the site will have to be filled in to achieve the desirable minimum runway length. "Rockfill drainage layers" will also be required to prepare the surface of the runway.

#### **Physical impact**

The peat overlying relatively smooth, glaciated outcrops of grey lava (like the proposed site for the runway) is extremely unstable. Even relatively minor disturbances, such as well-trodden footpaths against slopes, may precipitate "peat slips," like the one referred to earlier. A total area of at least 5 km<sup>2</sup> will be affected by intensive human activity during the construction of the proposed infrastructure (roads and airstrip), and it can be predicted that the most severe damage will be caused by "associated activities" rather than the actual construction.

From the longitudinal section of the proposed runway site (Fig. 5 of the report) it can be calculated that at least 50 000 cubic meters of landfill will be required to level the airstrip to its required length. Will the

material for this landfill be obtained on the island?

The point is that it is impossible to foresee the eventual extent of the physical impact on the environment, which is likely to "snowball" once construction is initiated.

### Biological impact

The fragility of Marion Island's terrestrial ecosystem is not hypothetical - it has been vividly demonstrated, as the following examples will show. Two aggressive, man-introduced alien plant species (Agrostis magellanica and Sagina apetala) have vastly increased their range on Marion Island over the past decade - as a direct result of increased disturbance of the natural vegetation through increased human activity. The two plants form dense "monocultures" in disturbed areas, which are accompanied by sharp decreases in the diversity of the associated soil fauna. The likelihood of introducing alien species (both plants and invertebrates) to Marion Island will increase a thousandfold, with an accompanied creation of favourable (disturbed) conditions for aggressive pioneer species to displace the already severely limited ecological diversity on the island. We have suggested elsewhere (Crafford and Scholtz, in press) that the subtle and far-reaching effects of human disturbance may have contributed to the complete disappearance of an insect species (the indigenous flightless moth, Pringleophaga kerguelensis) from Marion Island. We are currently (Crafford and Chown, in press) investigating the possibility of eradicating a recently introduced alien insect pest (the cabbage moth, Plutella xylostella) that poses a threat to the "Kerguelen cabbage" (Pringlea antiscorbutica) on Marion Island.

We are not qualified to speculate on the impact on bird populations on Marion Island, but we are aware that the proposed site will occupy one of few known nesting sites of the Kerguelen tern (Sterna virgata) on Marion Island. The number of annual breeding pairs of this locally rare species is not known. The most likely (and unmeasurable) effect on birds will probably be one of stress.

### Conclusions

The proposed venture on Marion Island will have serious and far-reaching effects - not only direct, measurable and physical, but also subtle, biological and long-term. It may be possible to assess only the physical impact fully.

"Environmental impact assessments" in advance of an event are necessarily strictly theoretical; practical assessment of the impact on the biota will be possible only by long-term monitoring after the event. And where powerful vested interests are at stake, "before the event" assessments invariably amount to pure tokenism. A dismal record in this regard speaks for itself.

The present Marion Island entomological project will continue until April 1989. No further projects are currently envisaged by our research group.

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J.E. Crafford

20 December 1986



## References

- Block, W. (1985). Arthropod interactions in an Antarctic terrestrial community. In: Antarctic nutrient cycles and food webs. Eds W. R. Siegfried, P. R. Condy and R. M. Laws. Springer-Verlag, Berlin. pp. 614-619
- Crafford, J. E. & Scholtz, C. H. (in press). Quantitative differences between the insect faunas of sub-Antarctic Marion and Prince Edward Islands: a result of human intervention? Biological Conservation
- Crafford, J. E. & Chown, S. L. (in press). Plutella xylostella (Lepidoptera, Plutellidae) on Marion Island. Journal of the Entomological Society of Southern Africa.
- Diamond, J. M. & May, R. M. (1981). Island biogeography and the design of natural reserves. In: Theoretical Ecology. Ed. R. M. May. Blackwell Scientific Publications, Oxford. pp. 228-252

**KONSEP MEESTERPLAN**

**MARION EILAND**

**L.J. HOLTZHAUSEN  
MEI 1994**

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**AANHANGSEL A**

**Bestaande Terreinplan**

**AANHANGSEL B**

**Voorstel vir Opgradering van Bestaande Kombuis**

## 1. INLEIDING:

Suid-Afrika bedryf 'n wetenskaplike navorsingstasie op Marion eiland nadat dié eiland en Prins Edward eiland in 1948 as soewereine gebied van Suid-Afrika verklaar is.

Navorsing het reeds begin met 'n spesiale ekspedisie na Marion en Prins Edward eilande in 1965/1966. Vanweë die koue, stormagtige oseaanklimaat het 'n behoefte aan 'n meer permanente navorsingstasie ontstaan.

Bepanning en oprigting van die eerste permanente basis is in die vroeë laat sestiger jare sewentigs gedoen en staan bekend as Marionhuis. Verskeie uitbreidings, veranderings en sloping van geboue is sedertdien deur Departement Openbare Werke onderneem.

Gegewens in hierdie verslag is benaderde syfers en word bloot gebruik om omgewingstoestande te beskryf waarteen 'n konsep meesterplan vir 'n toekomstige navorsingstasie ge-evalueer kan word.

## 2. AGTERGROND

### 2.1 Klimaat:

Die laagste gemiddelde jaarlikse temperatuur is  $\pm 4,4^{\circ}\text{C}$  terwyl temperature tussen  $-6,8^{\circ}\text{C}$  tot  $7,9^{\circ}\text{C}$  oor 'n jaarperiode kan wissel. Westelike seewinde oorheers  $\pm 70\%$  van die jaar met 'n gepaardgaande hoë reënval van  $\pm 2,5\text{m/jaar}$ . Windsterktes van tot  $\pm 170\text{km/uur}$  is onlangs aangeteken.

Die klimaat kan as koud, nat en winderig opgesom word.

### 2.2 Funderingstoestande:

Die Nellie Humps gebied waar die huidige basis geleë is, beskik oor tipiese Swartlandvloei-topografie wat redelik goed oorgroeid is met gras en mos.

Die grondoppervlakte is moerasagtig met 'n waterinhoud van ongeveer 70%. Meeste van die reënwater word na die see afgevoer via ondergrondse dreinerings wat onstabiele en sponsagtige grondtoestande veroorsaak. Semi-soliede fundering kom op  $\pm 4\text{m}$  diepte voor en soliede fundering op 'n diepte van  $\pm 8\text{m}$ .

Die eiland verteenwoordig blykbaar die toppe van 'n groot vulkaan wat vanaf die seebodem opstyg. Die eiland kan dus as 'n aktiewe vulkaan beskou word. Die mees onlangse uitbarsting in 1980 het by Wespiek plaasgevind. Beweging van die eiland kan waargeneem word in ligte skuddings, wat 'n paar sekondes lank duur.

### **2.3 Huidige Infrastruktuur:**

Die basis bestaan huidiglik uit die hoofgebouekompleks ni. Marionhuis, Sea View en die latere toevoeging van slaapkwartiere bekend as Sandton. 'n Verdere totaal van 16 losstaande geboue is verspreid opgerig oor 'n area van ongeveer 1 hektaar. Bykomend tot die gebouestrukture kom wetenskaplike meetinstrumente, radio-maste ens. oor die hele basis voor. "Cat walks" verbind al die geboue met mekaar en 'n paaie netwerk bestaan reeds vir beide voetgangers en trollieverkeer.

Bestaande geboue kan met behulp van meegaande sleutelpian geïdentifiseer word:

1. Marionhuis, slaapkwartiere, kantore en ontspanningsarea.
2. Sea View, kombuis, eetkamer en slaapkwartiere.
3. Sandton, slaapkwartiere en ablusies.
4. Doris bakenhut.
5. Noodbasis (hoofsaaklik radio kommunikasie toerusting).
6. Laboratorium A.
7. Laboratorium B.
8. Laboratorium C.
9. Helikopterloods.
10. Laboratorium D (Weerkundig).
11. Chemikalieë stoor.
12. Kragopwekkers.
13. Slaapkwartiere (Dieselwerktuigkundige).
14. Transformatorkamer.
15. Noodkragkamer.
16. Gimnasium.
17. Werkswinkel en materiaalstoor.
18. Laboratorium E ("Wet lab").
19. Voedselstoor.

Geboue is hoofsaaklik op 'n onderboursaamwerk opgerig met houtvloerkonstruksie en metaalbekleding vir mure en dakke.

### 3. PROBLEEMSTELLING

#### 3.1 Oorsig:

Benewens die huidige geboue op die basis bestaan volop oorblyfsels van vorige geboue. Stukke van die oorspronklike strukture en afval boumateriale kom verspreid oor die terrein voor. Dit wil voorkom asof geboue lukraak verrys het aangesien 'n oorhoofse meesterplan nie bestaan het nie. Geboue is vervang of verskuif sonder dat die geraamtes van die ouer geboustrukture behoorlik verwyder is. Hierdie tendens wek ernstige kommer.

Dienste word plek-plek eiehandig deur lede van die oorwinterspan aangebring wat onaanvaarbare praktyk is. Gevalle kom voor waar spanlede vir hulleself slaap"suites" inrig in 'n desperate poging tot groter privaatheid en vryheid. Vuilwaterafvoer word ongekontroleerd uitgestort en die instandhouding van onkonvensionele dienstenetwerk word 'n groot probleem.

Die moontlikheid om 'n alternatiewe ligging vir 'n nuwe basis te identifiseer is ook genoem.

#### 3.2 Kommunikasie:

Kontak tussen die spanlede is baie ongerieflik en tydrowend. Persone moet tussen die onderskeie geboue en in slegte weerstoestande tussen die geboue rondbeweeg.

#### 3.3 Dienste:

Water, vuilwaterafvoer, elektrisiteit en brandbestrydingstoerusting moet oor uitgestrekte areas voorsien en instand gehou moet word.

#### 3.4 Energieverbruik:

Verhitting, verligting en ventilasie vereistes blyk van die belangrikste areas van oneffektiwiteit te wees. 'n Groot aantal geboue impliseer uiteraard 'n groot aantal deure na buite met onnodige verlies aan warm lug. Duplisering van teemaak fasiliteite, yskaste, ens. is aan die orde van die dag.

#### 3.5 Besoedeling:

Die uitgestrektheid van die basis lei noodwendig tot groter blootstelling van menslike aktiwiteite en omgewings besoedeling. Daar is skynbaar van die

mossoorte wat nagenoeg 10 jaar neem om na die oorspronklike toestand te herstel nadat daarop getrap is. Menslike indringing bring ook uitheemse plantegroei en lewende organismes saam. Die meeste uitheemse plantegroei word juis gevind in die onmiddellike omgewing van die huidige basis. Veertien verskillende tipes uitheemse plantegroei is al op die eiland geïdentifiseer. Vlieë, erdwurms, kakkerlakke en forelvis is ook deur menslike indringing na die eiland gebring.

### **3.6 Estetika:**

Die lap-en-plak indruk wat die basis tans skep lyk uiters onprofessioneel en moet dringende aandag kry.

### **3.7 Nuwe behoeftes:**

Versoeke vanaf wetenskaplikes en ander personeel blyk drupsgewys gedoen te word en 'n behoefte aan 'n globale akkommodasie behoeftelys is noodsaaklik.

### **3.8 Instandhouding:**

Oornames geskied eenmalig per jaar gedurende April/Mei maand. Departement Openbare Werke word gemagtig om ongeveer 10 persone na die eiland te stuur. Konstruksiewerk asook instandhoudingswerke moet gedurende hierdie kort periode gedoen word.

Die uitgestrektheid van die basis veroorsaak groter blootstelling aan die omgewingsfaktore wat instandhouding van strukture en dienste onnodig laat eskaleer.

### **3.9 Opsomming:**

Departement Omgewing Sake rig voortdurend versoeke vir nuwe of addisionele akkommodasie aan departement Openbare Werke vir beplanning en oprigting, waaraan foutiewelik uitvoering gegee word.

Die huidige posisie is van so 'n aard dat geen fondse meer vir adhoc geboue uitgelê gaan word nie. 'n Oorhoofse meesterplan moet opgestel word ten einde 'n aanpasbare boukonsep, by die nuwe gedeelte van Marionhuis, te verkry.



## 4. AANBEVELING

### 4.1 Inleiding:

Die posisie van die huidige ligging van die basis blyk die beste te wees om die volgende redes:

- \* Windbeskutting wat die bergpieke teen die heersende winde bied.
- \* Die toeganklikheid vanaf die see via "Boulders Beach" wat een van slegs twee toeganklike strande op die eiland is.
- \* Die ideale eienskappe van "Gunners Point" wat die oprigting van 'n hyskraan teenaan die see moontlik kon maak. Vrag kan gemaklik en redelik naby aan die huidige basis gelaai word.
- \* Grootskaalse menslike indringing op 'n alternatiewe plek 'n uiters ongewenste uitwerking op die eiland omgewing sal hê.

### 4.2 Boukonsep:

#### 4.2.1 Primêre behoeftes:

Die basis word vir  $\pm 85\%$  van die jaar deur slegs 10-12 persone bewoon. Dit wil egter voorkom asof die basis vir die oorblywende 15% van die jaar, tydens die periode van oorname, beplan is.

Konseptueel behoort slegs op die primêre behoeftes gefokus te word by die ontwerp van 'n basis. Dit sal voorkom dat die uitsondering die behoeftestelling dikteer.

#### 4.2.2 Bestaande Geboue:

In die verlede is van 'n verskeidenheid van funderingskonstruksiemetodes gebruik gemaak. Aanvanklik is betonvoetstukke met 'n onderbou van houtraamwerk gebruik maar nadat die gebruik van beton verbied is, is staalpype in die grondoppervlak ingekap. Die nuutste metode wat onlangs gebruik is, behels vlekvrystaalleipype met vlekvrystaalbalk en -traliwerk onderbou. Die bo-bou bestaan uit geïsoleerde plaatmetaal muurpanele en ooreenstemmende konstruksie vir die dakke.

Meegaande tabel gee 'n opsomming van die geboue met dieselfde tipe funderingkonstruksie.

TABEL 4.1

A	B	C	D	E	F
BETONGEVULDE DROMME MET GELAMINEERDE HOUTBALKE ONDERHOU	BETONVOET-STUKKE MET HOUTKOLOMME EN HOUTBALK ONDERBOU	VOLLEDIGE BETONBLAD MET 'N VERSKEIDENHEID VAN BO-BOU STRUKTURE	GEBOU OP HOUTPALE EN GELAMINEERDE HOUTBALK ONDERBOU	GEBOU OP 50 PYPWERK STELLASIE EN HOUTBALK-KONSTRUKSIE	GEBOU OP 100 VLEKVRYESTAALEIPALE, TRALIE-BALKE EN I-BALK KONSTRUKSIE
4. Doris bakenhut  6. Laboratorium A. 19. Voedselstoor	7. Laboratorium B. Horisontaal  18. Laboratorium E. (Vertikaal)	11. Chemikalieë stoor  16. Gimnasium * Ou Koelkamers	13. Slaapkwartiere (Diesel-werktuigkundige)	1. Marionhuis 2. Seaview 5. Noodbasis 8. Laboratorium C. 14. Transformator kamer 15. Noodkrag-kamer 17. Werkswinkel en materiaal stoor	9. Helikopterloods 12. Kragopwekkers 10. Laboratorium D-(Weerkundig) 3. Sandtonslaapkwartiere en ablusies

#### 4.2.3 Nuwe Geboue

Alle geboue moet beplan word volgens 'n oorhoofse meesterplan. Dit blyk egter van kardinale belang dat die aantal geboue op 'n sinvolle en sistematiese metode afgeskaal word na 'n plasing met hoër digtheid. 'n Verskeidenheid van kriteria vir die afskalingsproses kan gebruik word. Die tipe funderingsmetode en onderbou blyk die aangewese maatstaf te wees aangesien die primêre probleem met betrekking tot konstruksie aangespreek word.

Die opstel van 'n meesterplan waarbinne toekomstige uitbreiding, opgradering of vervanging beplan is, moet soos versoek, dringende aandag ontvang.

#### 4.3 Implementering:

#### 4.3.1 Aksiestappe:

Die volgende aksies word voorgestel vir uitvoering en word tesame met die verantwoordelikhede in tabel 4.2 aangetoon.

TABEL 4.2

AKSIE	VERANTWOORDELIKE PERSOON
1. Volledige oorkoepelende/allesomvattende akkommodasie behoeftelys. Slegs die werklik noodsaaklikhede.	Departement van Omgewing Sake
2. Opruim van alle bourommel, ander afval en nuttelose items.	Departement Omgewing Sake en Departement Openbare Werke
3. Afbreek en verwydering van alle uitgediende en/of oorvoersende geboue.	Departement Openbare Werke
4. Verwydering van alle uitgediende en ou rioolpype en ander dienste.	Departement Openbare Werke
5. Die opstel van 'n meesterplan na kommentaar van DOS.	Departement Openbare Werke
6. Noodsaaklike items waaronder die kombuis. (Sien aanhangsel B)	Departement Openbare Werke
7. Vraelys wat behoeftes van spanlede ten opsigte van gebou uitlegte, weerspieël	Departement Openbare Werke

#### 4.3.2 Omgewingsimpak:

Dit is belangrik om omgewingsimpakstudies te doen alvorens nuwe konstruksie aktiwiteite aangepak word. Ten spyte van die meesterplan waarbinne konstruksie sal plaasvind, sal dit ten doel hê om die werklike noodsaaklikheid daarvan te verseker sodat die omgewing tot die uiterste minimum beskadig sal word.

#### 4.4 Meesterplan:

##### 4.4.1 Dringende Behoeftes:

##### 4.4.1.1 Die Kombuis:

Die kombuis is klein en uiters onprakties ingerig. Alhoewel ruimte beperk is blyk die primêre probleem swak uitleg en onvoldoende toerusting te wees.

Van die oorsigtelike probleme is die te kort aan:

- \* Geen behoorlike oppervlaktes vir voorbereidings nie.
- \* Nie behoorlike opwasgeriewe nie en die was van potte is 'n probleem.
- \* Areas waar gevriesde produkte ontvries kan word.
- \* Geen opskep fasiliteite nie.
- \* Te veel deurgange en verkeer deur die kombuis.
- \* Beknopte vullisarea vir afvalkos en ander vullis.
- \* Die blikkieskompakteerder word, tans buite in 'n ou koelkamer gebruik.
- \* Slegte skakeling met die res van die basis.

Die huidige kombuis is in die "Sea View" gedeelte van die basis geleë en sal van die eerste strukture wees wat vervang moet word. 'n Voorstel word gedoen waar die kombuis heringeruim word (Kyk aanhangsel B) of as latere alternatief 'n nuwe kombuis opgerig word volgens die voorskrifte van 'n Meesterplan

##### 4.4.1.2 Bolug-gebou:

Die behoefte bestaan aan die plasing van 'n bystandeenheid waterstofontwikkelaar wat waterstofgas vervaardig. Chemikalieë en toerusting hiervoor word huidiglik buite die gebou onder seile en afval materiaal geberg.

Kommer bestaan oor die besoedeling wat veroorsaak word deur die chemikalieë en verwerking van toerusting in die wind en weer.

Die versoek om twee addisionele vertrekke met 'n vloeroppervlakte van  $\pm 20\text{m}^2$  te voorsien moet ernstig bevraagteken word. Die volgende besware bestaan:

- \* Dit in stryd met die toekomstige konsep sal wees waar die aantal geboue verklein en geminimiseer moet word.
- \* Die huidige bolug-gebou oor onder benutte oppervlakte beskik. Her-inruiming sal voldoende wees om die behoefte aan te spreek.
- \* Die gebruik van gasbottels as bystand oorweeg moet word in plaas van die metode waarby chemikalieë gebruik word.
- \* Die omvang van die chemikalieë wat gestoor moet word heeltemal te veel blyk te wees.

Dit word aanbeveel dat die voorsiening van 'n waterstofbystandeenheid binne die bestaande bolug-gebou ingeruim word sonder die byvoeging van addisionele vloeroppervlakte.

#### **4.4.1.3 Kompakteerderkamer:**

Die kompakteerder staan tans in een van die uitgediende vrieskamers, langs die kombuis. Hierdie situasie is 'n direkte gevolg van die kombuis wat te klein is en totaal onprakties uitgelê is.

Die behoefte aan 'n kompakteerderkamer word saam met die kombuis probleem hanteer.

#### **4.4.1.4 Satelietskottel:**

Satelietskommunikasiesistels is reeds aangekoop om die huidige HF-radiokommunikasie te vervang. Tydens 'n satelietskommunikasievergadering gehou op 28 Mei 1993 is daar voorlopig besluit dat die beste posisie vir die oprigting van die satelietskottel by die twee hutte, ongeveer 500m weg van die basis, sal wees.

Daar word voorgestel dat die satelietskottel op een van die bestaande betonfunderings opgerig moet word.

Meer opsies sal bestaan sodra van die ouer strukture afgebreek en binne 'n nuwe konsep geakkommodeer sal word. Dit sal ideaal wees indien die satelietskottel binne  $\pm 100\text{m}$  vanaf die radio-kamer kan wees.

#### 4.4.2 Langtermyn Behoeftes

Die langtermyn behoeftes sal eers behoorlik aangespreek kan word sodra 'n allesomvattende behoeftelys van Departement Omgewing Sake ontvang is.

#### 4.5 Opsomming:

Die basis is al ongeveer 25 jaar oud en die verwering wat in slegte klimaatstoestande plaasgevind het, blyk grootskaalse herstel en opknappingswerk te benodig.

Buiten die moontlike opknapping van die huidige kombuis word sterk aanbeveel dat geen verdere konstruksie aktiwiteite met betrekking tot nuwe geboue onderneem word nie.

Dit word voorgestel dat departemente Omgewing Sake en Openbare Werke 'n baie sterker houding moet inneem ten opsigte van die afskaling van die aantal en groottes van geboue op Marion eiland.

#### 5. **SAMEVATTING:**

Die konstruksie en bedryf van 'n navorsingstasie soos by Marion eiland, met die gepaardgaande probleme van vullisverwydering, opwekking van energie, vervoer en voorrade berg, bied 'n ooglopende bedreiging vir die eiland se natuurlewe en voorkoms. Gelukkig is die bedreiging gelokaliseer en op 'n klein skaal. Tog moet daar met nuwe oë en objektiwiteit teruggekyk word na hoeveel skade reeds aangerig is en 'n program van rehabilitasie behoort ingestel te word.

## **"Hou Marion Eiland Skoon "**

FIRST SOUTH AFRICAN BIOLOGICAL SURVEY IN DRONNING MAUD LAND, ANTARCTICA

By Peter G. Ryan & Barry P. Watkins, Percy FitzPatrick Institute of African Ornithology, University of Cape Town, Rondebosch 7700, South Africa.

South African biological research inland in continental Antarctica was initiated during the 1987-88 summer season when a two-man team from the Percy FitzPatrick Institute of African Ornithology, University of Cape Town, undertook a preliminary biological survey of Robertskollen, a group of nunataks in the northern Ahlmannryggen, western Dronning Maud Land. Robertskollen had been selected as a potential site for a biological research programme planned to focus on ecosystem structure and functioning on nunataks, with emphasis on the effects of ornithogenic products. Snow Petrels (*Pagodroma nivea*) were known to breed at some of the Robertskollen nunataks.

The expedition visited Robertskollen between 22 December 1987 and 27 January 1988. All nunataks in the group were visited, searched for breeding birds, and their macrofauna and flora sampled quantitatively. Vegetation, soil and water samples were collected for examination for micro-organisms and measurement of nutrient concentrations.

Approximately 600 pairs of Snow Petrels were breeding at three of the five large nunatak complexes. Three other bird species were occasional visitors to the area, although small numbers of Wilson's Storm Petrels (*Oceanites oceanicus*) may breed there. Snow Petrel nest-site choice was investigated, and birds were individually marked in a study colony to investigate aspects of the breeding biology during the incubation and brooding periods. Analyses of soil nutrient concentrations at sites close to and distant from bird colonies indicated that ornithogenic products significantly increase the nutrient status of soils on nunataks with bird colonies.

Preliminary examinations indicate that at least four moss species, 20 lichen taxa, 9 alga taxa, 9 cyanobacteria taxa, and 12 species of fungi occur at Robertskollen. Species composition is essentially similar to that reported from adjacent mountain ranges. The distribution and abundance of macrophytes was determined primarily by nutrient enrichment from bird colonies and by the availability of liquid water.

At least three species of mite were found at Robertskollen, the most abundant being the oribatid *Maudheimia wilsoni* which is endemic to western Dronning Maud Land. Mite abundance was correlated with total macrophyte cover. Surprisingly, no collembolans were found, despite an intensive search. Soil and vegetation samples have been examined for tardigrades (5 taxa), nematodes, rotifers and protozoans (10 ciliate taxa); preliminary findings include a previously undescribed ciliate genus and a new tardigrade species.

This work is being followed up in summer 1989-90, when a five-year inter-disciplinary research programme will commence.

[Most of the results of this preliminary survey are published in: Ryan, P.G., Watkins, B.P., Lewis Smith, R.I., Dastyh, H., Eicker, A., Foissner, W., Heatwole, H., Miller, W.R. and Thompson, G. 1989, and Ryan, P.G. and Watkins, B.P. 1989; see Bibliography].

- PICKUP, J. 1988. Ecophysiological studies of terrestrial free-living nematodes on Signy Island. British Antarctic Survey Bulletin 81:77-81.
- POOLE, A.L. 1987. Southern beeches. Science Information Publishing Centre, Wellington, DSIR, p. 148.
- PRISCU, J., HOWARD-WILLIAMS, C. and VINCENT, W.F. 1989. Inorganic nitrogen uptake and regeneration in perennially ice-covered Lakes Fryxell and Vanda, Antarctica. Journal of Plankton Research 11:335-351.
- QUILHOT, W., GARBARINO, J.A., PIOVANO, M., CHAMY, M.C., GAMBARO, V., OYARZUN, M.L., VINET, C., HORMAECHEA, V. and FIEDLER, P. 1989. Studies on Chilean lichens. XI. Secondary metabolites from Antarctic lichens. Serie Cientifica Instituto Antartico Chileno 39:75-89.
- RAY, M.K., SHIVAJI, S., SHYAMALA RAO, N. and BHARGAVA, P.M. 1989. Yeast strains from the Schirmacher Oasis, Antarctica. Polar Biology 9:305-309.
- ROWE-ROWE, D.T., GREEN, B. and CRAFFORD, J.E. 1989. Estimated impact of feral house mice on subantarctic invertebrates at Marion Island. Polar Biology 9:457-460.
- RUSSELL, S. 1987. Water relations and nutrient status of bryophyte communities at Marion Island (sub-Antarctic). Symposia Biologica Hungarica 35:39-57.
- RYAN, P.G. and WATKINS, B.P. 1988. Accumulation of stranded plastic objects and other artefacts at Inaccessible Island, central South Atlantic Ocean. South African Journal of Antarctic Research 18:11-13.
- RYAN, P.G. and WATKINS, B.P. 1988. Biological Survey of Robertskollen, western Dronning Maud Land, Antarctica. In A Report to the South African Scientific Committee for Antarctic Research, (Rondebosch, ed.), p. 80, Percy FitzPatrick Institute of African Ornithology, Cape Town.
- RYAN, P.G. and WATKINS, B.P. 1989. The influence of physical factors and ornithogenic products on plant and arthropod abundance at an island nunatak group in Antarctica. Polar Biology 10:151-160.
- RYAN, P.G., WATKINS, B.P., SMITH, R.I.L., DASTYCH, H., EICKER, A., FOISSNER, W., HEATWOLE, H., MILLER, W.R. and THOMPSON, G. 1989. Biological survey of Robertskollen, western Dronning Maud Land: area description and preliminary species lists. South African Journal of Antarctic Research 19:10-20.
- SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH 1989. The Role of Antarctica in Global Change. ICSU Press, Cambridge, p. 28.

TERMINES  
 AVAILABLE  
 ON  
 SUBJECT



I therefore write to request a few moments of your time to fill in the attached simple questionnaire. Based on the reponse, an attempt may be made to reinstate the SAAA and its bulletin to act as the independent forum I think we need.

I look forward to hearing from you

With kind regards and best wishes for 1990

A handwritten signature in cursive script that reads "John Cooper". The signature is written in black ink and is positioned above a horizontal line.

John Cooper



Council for Scientific and Industrial Research

**FOUNDATION FOR RESEARCH DEVELOPMENT (FRD)**

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Our ref: NP14/56/2/12 Your ref:

TO: MEMBERS, MARION ISLAND EXPEDITION TEAM, 1986/87

1987 -01- 29

Dear Colleague

PROPOSED LANDING STRIP ON MARION ISLAND : ENVIRONMENTAL IMPACT ASSESSMENT

The Department of Environment Affairs (DEA) has proposed the construction of a landing strip on Marion Island. The reasons given for this are listed in the enclosed INFORMATION SHEET, and details of the proposal itself are given in the enclosed copy of a feasibility study report.

An independant panel of experts serving in their personal capacities, with the CSIR providing them with back-up support services, is conducting an environmental impact assessment (EIA) of this proposal. Further details about this process are also given in the enclosed information sheet.

You are cordially invited to make a submission to the Panel on any aspects of your choice about the proposal. Non-confidential written submissions should reach me before our departure and must be signed and dated by those whose opinion(s) they represent. Feel free to consult with all members of your group on the island during the preparation of written submissions. A meeting to which the whole expedition team is invited will be arranged during the Panel's visit, at which you may make verbal submissions and ask questions if you prefer.

We regret the domestic inconvenience and intrusion our visit may cause, and we thank you in advance for your hospitality, assistance, and cooperation. May the remainder of your stay on Marion Island be happy and successful.

P R Condry  
EIA Panel Secretariat

P31.letter



## Council for Scientific and Industrial Research

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Our ref: NP14/56/2/12

Your ref:

PERSONAL

Dr C Scholtz  
Department of Entomology  
University of Pretoria  
Hillcrest  
PRETORIA  
0083

1986-11-23

Dear Dr Scholtz

PROPOSED LANDING STRIP ON MARION ISLAND : ENVIRONMENTAL IMPACT ASSESSMENT

The Department of Environment Affairs is proposing construction of a landing strip on Marion Island. The reasons are;

1. To provide rapid attention to or evacuation of station personnel, for example for medical reasons (in the past four years it has been necessary to mount four separate voyages to evacuate injured persons),
2. To provide search and rescue aircraft encountering bad weather with an alternative landing place, *could they land in A 100km/hr breeze??*
3. To enable better control of fishery zones and territorial waters, *BULL!*
4. To enable the supply of the station with emergency provisions. *"UNDER NO CIRCUMSTANCES will provisions etc."*

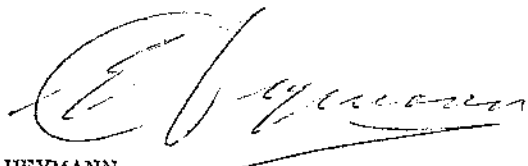
*What last BAS A STR AIR/SEA VESSEL HERE! Idrop for G-links*

I have accepted an invitation to arrange for an environmental impact assessment (EIA). A small, independent panel of experts, serving in their personal capacities, is being established to conduct the EIA. Its members will be visiting the island in February 1987. The Panel's report will be submitted to an external reviewer in March 1987. The reviewer's and the Panel's reports will be submitted to the Department of Environment Affairs in April 1987. Neither of these reports will be confidential.

You are cordially invited to make a non-confidential, written submission to the EIA Panel on the proposal (enclosed), and the impact it might have on the natural environment. It would be appreciated if

your submission could among other matters of your choice also focus on environmental considerations, and the effect the proposal might have on your present and possible future research programme at the island. Please feel free to consult with the members of your Marion Island research group in preparing your submission. The submission must be signed and dated by all those whose commentaries and opinions it represents, and posted to reach me by 5 January 1987 please, so that the EIA Panel can study it and other invited submissions before it makes its field inspection.

Yours sincerely

A handwritten signature in cursive script, appearing to read 'G. Heymann', written in dark ink. The signature is fluid and somewhat stylized, with a long horizontal stroke at the end.

G HEYMANN  
DEPUTY PRESIDENT

## INFORMATION SHEET

### THE PROPOSED LANDING STRIP ON MARION ISLAND

#### BACKGROUND

The Prince Edward Islands, comprising Marion Island (290 km<sup>2</sup>) and Prince Edward Island (44 km<sup>2</sup>) lie some 19 km apart at approximately 47°S, 38°E in the south Indian Ocean. They are part of the Republic of South Africa, sovereignty being declared through annexation in January 1948. A station, initially for meteorological observations, has been maintained on Marion Island since annexation. From the mid-1960s the station has developed gradually into what is today a well equipped scientific station capable of supporting up to 30 persons over-winter, and nearly double that number for shorter periods of time such as during the twice annual relief periods lasting up to six weeks each. Scientific research on and around the islands is organized and supported logistically under the auspices of the South African National Antarctic Research Programme (SANARP).

#### THE PROPOSAL

The Department of Environment Affairs (DEA), which is responsible for the administration of the Prince Edward Island territory and whose Antarctic Division is responsible for the logistical support of the South African National Antarctic Research Programme (SANARP), proposed the construction of a landing strip on Marion Island. The reasons that have been given for this by the DEA are:

1. To provide rapid attention to or evacuation of injured or sick personnel.
2. To provide surveillance and rescue aircraft with an alternative landing place.
3. To enable better control of territorial waters and the fishing zone around the islands.
4. To enable provisioning of the station with emergency supplies.

and the motivations are the following;

- during the four years up to and including 1985 it was necessary to conduct four evacuations of sick/injured persons by ship, and one parachute drop of emergency medical supplies,

2. The Panel and various other technical experts (aviation experts, design and construction engineers, etc) will visit the island for 7-10 days in February 1987 for on site inspections.
3. The Panel will hold discussions with members of current and past expeditions to the island, and with other persons/parties as the need arises.
4. In the light of its findings through 1 to 3 above and its examination of the reasons given for the proposal, the Panel will submit its report to DEA in March 1987.

The Panel's report to DEA will be subjected to independent review ('audit') by an invited expert from abroad (Dr W N Bonner, UK), who will visit South Africa to do this so that he can consult with the Panel and others as he deems appropriate. His report will be submitted independently to DEA. This process is expected to take place in March/April 1987.

Thereafter, the DEA is expected to make a decision on whether or not to proceed with the proposal, and if so how and under what environmental controls.

The Panel's report, as well as that of the independent reviewer, will not be confidential though common courtesy requires that they be submitted to DEA before public release by the DEA.

G HEYMANN

Panel Chairman  
28 January 1987

P30.programme

IMPACT EVALUATION OF A POSSIBLE LANDING  
FACILITY ON MARION ISLAND

As a result of confusing reports which have appeared in the media, I consider it necessary to clarify the situation and place matters in perspective.

The responsibility for Marion Island and related functions were transferred to the Department of Environment Affairs during October 1985. An aspect which received the early attention of the new management was the high costs involved in servicing the island in emergency situations. During the past 4 years it was necessary to mount four emergency voyages.

The Department is also responsible for the control of fishing in South African waters. The fishing zone ~~award~~<sup>around</sup> Marion Island, which is South African territory, receives very little attention at present and control in the zone must of necessity be upgraded to a considerable extent. It is also clear that much more information is required about the fishing potential of that region. It seems likely that people will in future pay more regular visits to the island and that the need for better and more reliable contact will be of growing importance. Furthermore search and rescue operations necessitate that a ~~th~~<sup>th</sup>rough study be made of the possibility of providing a usable landing facility in the area.

For some time now the idea of providing a landing strip of some sort on the island has been bandied about, particularly with a view to facilitating the movement of personnel. Because I am aware of the sensitivity of the environment of Marion Island, I approved, as a first step, that a ~~th~~<sup>th</sup>rough ecological evaluation of the construction of a landing strip on Marion Island be undertaken.

Consequently I decided that an environmental impact evaluation should be done completely independent of the Department. To this end a Working Group of ~~re~~<sup>re</sup>cognised scientists from various disciplines has been established, one of whom is from abroad. The Working Group is under the

IMPAKEVALUERING VAN MOONTLIKE VLIEGTUIGLANDINGSTROOK  
TE MARIONEILAND

As gevolg van verwarrende berigte wat in die nuus media verskyn het, is dit vir my nodig om sake duidelik in perspektief te stel.

Die verantwoordelikheid vir Marioneiland en verwante aangeleenthede is gedurende Oktober 1985 aan die Departement van Omgewingsake oorgedra. Een aspek wat onder die aandag van die nuwe bestuur gebring is, is die hoë koste wat in die verlede aangegaan is om die eiland tydens noodsituasies te bereik. In die afgelope vier jaar is reeds by vier geleenthede noodvaarte na die eiland onderneem.

Die Departement is verder belas met die beheer oor visseryaangeleenthede in Suid-Afrikaanse waters. Die vissery sone rondom Marioneiland, wat RSA grondgebied is, geniet tans minimale aandag en beheer aldaar moet noodsaaklikerwyse opgeskerp word. Hierbenewens is dit nodig om baie meer kennis op te doen oor die vispotensiaal in dié gebied. Dit wil dus blyk dat 'n groter aantal mense meer gereeld op die eiland gevestig sal moet word en dat meer en makliker kontak wenslik is. Verder noodsaak soek- en reddingspogings deeglike ondersoek na die moontlike aanbring van 'n bruikbare aanloopbaan in die omgewing.

Vir geruime tyd word reeds besin oor die wenslikheid om 'n vliegtuiglandingstrook op Marioneiland met die oog daarop om plasing van personeel aldaar te kan vergemaklik. Omdat ek terdeë bewus is van die omgewingsensitiwiteit van Marioneiland, het ek as eerste stap goedgekeur dat 'n deeglike ekologiese waardering vir 'n landingstrook op Marioneiland uitgevoer word.

Ek het derhalwe gelas dat die impakwaardering onafhanklik van die Departement uitgevoer word. Vir die doel het ek 'n werkgroep aangestel wat bestaan uit vier erkende wetenskaplikes uit verskillende vakdissiplines - waaronder een buitelanders. Die werkgroep sal onder leiding van dr G Heymann, Adjunk-president van die WNNR en Voorsitter van die Suid-Afrikaanse Wetenskaplike Komitee vir Antarktiese Navorsing, staan.