



MAWSON'S HUTS CONSERVATION EXPEDITION 2002



EXPEDITION REPORTS



Australian Antarctic Division 2003

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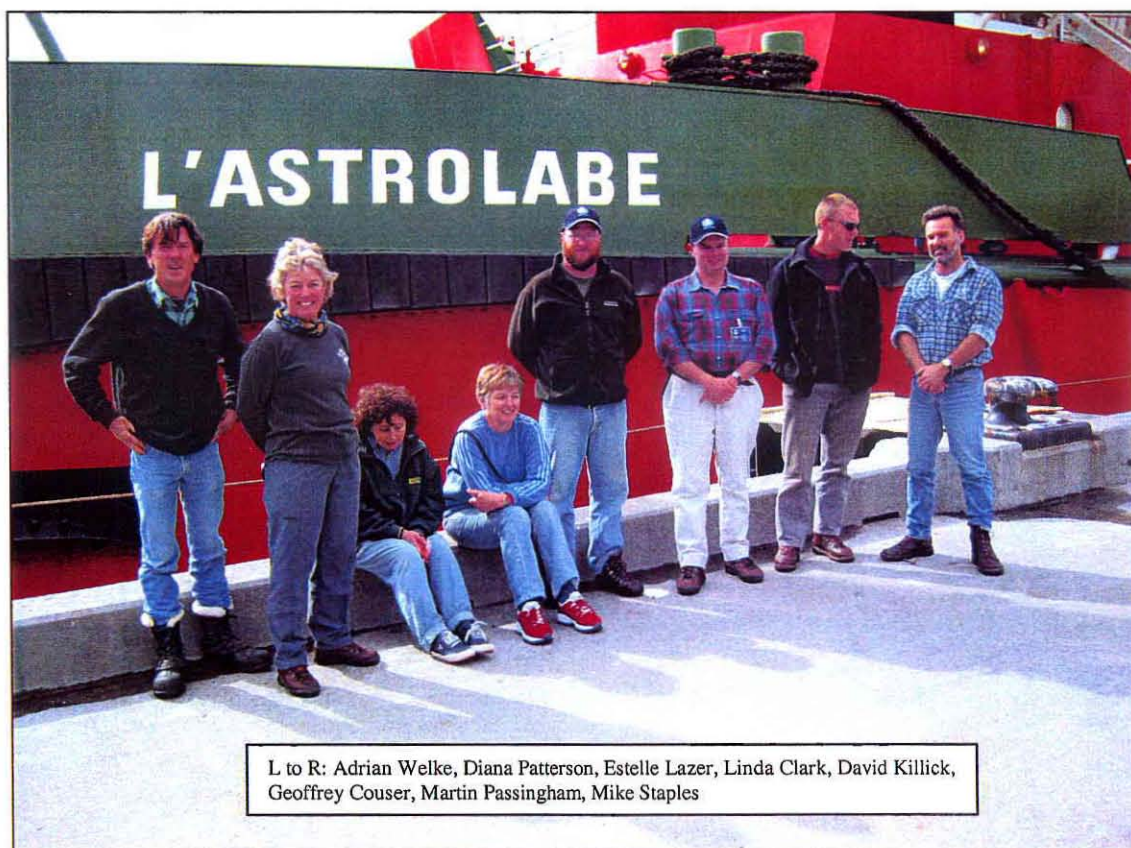
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FIELD LEADER'S REPORT



Australian Antarctic Division 2003

MAWSON'S HUTS EXPEDITION 2002

FIELD LEADER'S REPORT

EXECUTIVE SUMMARY

INTRODUCTION

It is a pleasure to be able to provide a report that is overwhelmingly positive: in fact, one which reports that everything went according to plan. There were no surprises and all aspects of the expedition were well covered in advance. The team greatly appreciated the operational leadership provided by Rob Easter and the policy support provided by Andrew Jackson and Stephanie Pfennigwerth. For the purpose of this report I have provided a brief overview only of the tasks completed. The more specific reports will be forthcoming from expedition members.

1 CONSERVATION WORKS PLAN

1.1 Achievement of defined tasks

The key tasks identified in the Works Plan were all addressed. An integrated approach to the program by the team was reinforced at every opportunity. Extensive photographic recording was made at all stages throughout the Works program.

- **Main Hut Sub-floor Structural Investigation**

The prevailing ice conditions limited the extent of investigations and at all times due consideration was given to the potential impact on artefacts and to the ongoing integrity of the foundations. The conservation architect will address specific details.

- **Temporary Tie Down of Main Hut**

This section was omitted from the Works plan. It was however the subject of some discussion and it would be beneficial to canvass the relative merits of future inclusion with the conservation architect.

- **Main Hut General Structural Investigation**

The connections appeared to be in good condition and performing to the near original specification. There was no evidence from external perspective that the possible expansion of ice was causing any effect on the connections.

Some deterioration in fixings was noted but was considered to be of no structural consequence. All timber members were in good condition. Considerable shrinkage and deterioration of the timber cladding was observed. Repair works of a varying nature were undertaken. The deterioration of the cladding was such that concern was expressed of the potential impacts of the loss of individual timbers.

- **Ice Removal**

The ice removal was carried out with due consideration given to the effect on the long-term structural integrity of the hut and its fabric, structures and artefacts. The snow and ice inside the workshop was removed to approximately a metre below the eaves. Ice was then removed from the centre to what is believed to be the level exposed in 1978. Ice

was also removed from the western wall above the bench. Shelving has been exposed in the SE corner, as has the bench on the western wall.

In the living quarters soft snow and suspended ice was removed in areas where it threatened the structural integrity of the bunks. Ice removal was conducted in a very cautious manner with frequent reference to available photographs and prior reports. Detailed photographic recording and drawings were made at varying stages of removal.

A very positive result was achieved in terms of restoring the interiors to reveal the space and fabric of the period of occupation.

▪ **Workshop Roof Structure**

The tasks defined in this section were fully and very efficiently achieved, particularly the installation of new collar ties and repair of three broken rafters. The original collar tie U-bolts were straightened and refitted and the original collar tie packing blocks reinstated.

▪ **Snow and Meltwater Ingress**

The tasks defined in this section were fully achieved. However, as discussed re. the roof structure it is an impossible task to prevent further incursions. The discussion within the Works Plan of the rate of snow ingress and consequent relationship to the issue of recladding from my mind is an analysis which does not adequately address the very real impacts of failure of parts of the roof structure. The occurrence of a number of blizzards provided a further opportunity to identify areas of snow ingress and to observe the build-up of snow in what were relatively minor events. However the conservation architect is more qualified than I am to comment.

▪ **Site Works – GIS Framework**

It is believed that considerable advances were made in achieving this task. This is very much due to the perseverance of carpenter Mike Staples with the Total Station survey. Achievement of tasks was carried out to the best of the team's ability given the available time.

▪ **Site Works – Main Valley – Visual Protection Zone - Works**

Assessment and conservation works were undertaken to other AAE structures within the Main Valley. The visual amenity was also improved with the removal of post-BANZARE drums and scattered debris.

▪ **Moveable Heritage Conservation Program**

The materials conservator and archaeologist adopted a joint approach to condition reporting and the documentation of artefacts. Artefacts that had been labeled and stored in various receptacles and locations on previous expeditions were consolidated in plastic bins in the southeast corner of the Workshop. An inventory was also completed.

▪ **Archaeology Program**

An extensive program, including cataloguing and photographic recording of artefacts, was undertaken. It included the documentation and survey of the artefact scatters around the Main Hut, and the documentation of the artefact scatter on Penguin Knob and the

sites of cached seals. A comprehensive cataloguing of artefacts was also carried out within both the living quarters and the Workshop.

The boxed husky was excavated and relocated to the southeast corner of the Workshop. It was considered to be the optimum location for conservation due to the fact that the eastern veranda could not be accessed and the western veranda is subject to summer snowmelt.

The very considerable, very detailed data that has been accumulated over this and previous expeditions presents a considerable challenge in both its presentation and interpretation.

▪ **Monitoring, Research and Records**

This was a very significant component of the program in terms of time commitment required. It involved the location, removal, then reinstallation of various sensors and data loggers. The monitoring equipment is positioned in the southeast corner of the Workshop and data is now being transferred to Australia weekly via satellite telephone.

1.2 Future challenges identified from the conservation program

Reflecting on the overall program and from the, at times, animated discussion between members of the expedition a number of issues were identified for future management of the site and its interpretation.

The first issue identified by the team in our initial forum at Cape Denison was the need for a **clear direction and policy** regarding the future of the Mawson's Huts site.

The observation was made that the Works Plan was contradictory in part and this was attributed to the lack of clarity regarding direction. In this context the issue of the **recladding the Main Hut roof** was considered. The fundamental conservation principle applied to the Works Plan was to do as much as necessary but as little as possible. However, given that the Main Hut is also identified as the major artefact on site it became evident to the team that the consequences of the "little as possible" approach needs to be confronted. Whilst the argument has been put that the building has lasted 90 years or so it is apparent that the cladding is progressively deteriorating.

This consideration was also seen in the context of the frequency of restoration programs. On our arrival at Cape Denison we were able to witness the movement of roofing timbers in strong winds. Whilst repairs were carried out to loose battens and boards the very real concern is that even with cyclical maintenance parts of the roof could be blown away. Even with the recladding of the main roof the continual ingress of snow will result in further build up of ice; however, this could be managed with perhaps more frequent but shorter programs.

The **collation and presentation of data** is regarded as another challenge. There is now a huge amount of documentation and it is seen as a huge task to collate and to make it accessible. From my perspective I do not have a feel for the clear objectives and refer again to the need for a clear articulation of the policy directions for management of the site and for its interpretation. Appendix E of the Works Plan identifies a number of ways

to present the data; however, significant resources would need to be committed and priorities determined.

The **management of artefacts** was also cause for considerable team discussion. The storage of items, specifically building materials (be it tar paper, nails or other fabric) within the huts was regarded to be at odds with the objective of projecting the aesthetic values and conveying a sense of space where the men of the AAE lived and worked. The value of some of the artefacts stored by previous expeditions was seriously questioned.

A perspective put forward during discussions was that the **environmental monitoring program** risks being an end in itself. There is considerable merit seen in the inclusion of the monitoring program within the AAD's State of Environment Reporting Framework.

2 EXPEDITION TEAM

2.1 Team selection

The result achieved in completion of the Works Plan directly relates to the skill and commitment of the expedition team. The significant compatibility amongst the team members further enhanced productivity over the period of the expedition. Estelle Lazer, the archeologist, and Linda Clarke, the materials conservator, adopted a joint approach to their work, integrating the cataloguing of artefacts and condition reporting. Carpenter Michael Staples in fact spent more time working with Linda on the environmental management program and on the Total Station Survey work than on building works. However, this did not comprise the latter, as carpenter Marty Passingham and architect Adrian Welke also proved to be a very efficient and effective team.

The success in achieving the results against the Works Plan should also be assessed against the overall challenges presented in working in such an environment where we experience extreme windy conditions and very cold temperatures. In summary, we spent 51 days at Cape Denison. Of these we spent 4 days setting up and packing up the field camp; 7 days hutbound due to extreme winds or blizzards; and 1 day off for recreation. In effect, the results were achieved in the 39 available working days on site.

A major input to the Works Program was also made by other members of the party who were not identified against specific tasks defined in the Plan, namely Dave Killick and Dr. Geoff Couser.

2.2 Occupational health & safety

The team proved to be a responsible group. There were no concerns regarding inappropriate unsafe field practices. At all times personal wellbeing was a major concern and all team members adhered to safe practices. The inappropriate issue of some items of personal clothing is discussed in more detail in my report.

3. ENVIRONMENTAL PERFORMANCE

3.1 Compliance with prescribed management activities

There were no significant incidents resulting in adverse environmental impacts. The expedition complied with all requirements prescribed in pre-expedition approvals relating

to environmental impacts under the *Antarctic Treaty (Environmental Protection) Act 1980* and the *Environment Protection and Biodiversity Conservation Act 1999*.

3.2 Environmental resources

A record of flora and fauna observations was taken to contribute to the overall knowledge of the Cape Denison environment.

4. TOURIST VISITATION

There was one scheduled and one unscheduled visit by tourist ships to Cape Denison during the period of the expedition. The *Kapitan Klebnikov* arrived as planned on Thursday 5th December, although blizzard conditions and strong winds prevented any landing by either helicopter or by sea. The *Sir Hubert Wilkins* arrived on the evening of Friday 13th December. A Japanese natural history television crew had chartered the vessel and the primary purpose of the visit was a diving operation. Some 24 visitors were escorted through the Main Hut on the Saturday. The visit was conducted in accordance with all tourist protocols and was a pleasure to host.

5. LOGISTICS

5.1 Timing of the Expedition

The late October arrival at Cape Denison was considerably earlier than previous restoration expeditions. Extreme cold conditions were experienced; however, on balance the team believed that this contributed to safer and more comfortable working conditions inside the huts. The warmer conditions experienced by other expeditions have resulted in wetter conditions which would not have been as conducive to ice removal and the recording required for the archaeological and environmental monitoring programs. Although more time was required to access the huts due to the cold conditions, this did not adversely impact on the Works program.

5.2 Pre-departure planning

The expedition was extremely well-organised and supported by the AAD. Subsequent logistic issues, which arose during the course of the expedition, were relatively minor and at no stage resulted in an adverse impact on the Works program. In fact, recommendations made are considered to be more in the form of “enhancements” based on the benefit of experience in somewhat different conditions to earlier expeditions.

5.3 Logistical support provided by the French Polar Institute

The support provided by the French through shipping and helicopter operations was excellent. Every endeavour was made to facilitate our transport from *L’Astrolabe* to Cape Denison, and again on our return. Given the reputation of the Commonwealth Bay weather it was somewhat remarkable that in a little over 48 hours from arrival at the ice edge some 29 nautical miles from Cape Denison, we were fully established at our field camp. The co-operative arrangement greatly facilitated the project and it is believed this can be directly attributed to the shared understandings and experience of our respective polar administrations.

5.4 Helicopter operations

The use of helicopters proved to be very efficient and safe given both the period of the expedition and the nature of our cargo. The number of flights was minimised due to prior organisation of cargo and general preparedness. The planning of operations was appropriate for the conditions at the time of incoming and outgoing flights.

Recommendations for future expeditions are of a minor nature only.

5.5 Field camp

The field camp was well established and comfortable and worked extremely well for 8 people. Despite the extreme cold conditions the team was generally comfortable.

Recommendations for improvements are of a minor nature only.

5.6 Catering

The group was extremely well catered for. Dave Killick did an excellent job and the variety and quality of the provisioning was greatly appreciated. Again, in the extreme conditions and with the long hours worked this made a very valuable contribution to the expedition.

EXPEDITION REPORT

is comprised of:

1. Executive Summary
2. Field Leader's report

ATTACHMENTS

- A. Achievement of Works Plan, Archaeological & Materials Conservation
- B. Environmental Performance Report.
- C. Wildlife Observations
- D. Weather Summary

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Field Leader's Report - Mawson's Huts Expedition 2002

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Field Leader's Report - Mawson's Huts Expedition 2002

1. INTRODUCTION

The report discusses the conduct of the expedition. Specific components of the Works Plan have been presented as Attachments; namely details relating to tasks as defined by the Works Plan 2002; the report on environmental performance and a summary of weather conditions. Separate reports are also provided, namely the expedition log and a report, which details recommendations, or rather provides a checklist for the planning of future expeditions based on or experience. Finally an inventory of equipment and materials remaining at Cape Denison is also documented.

2. EXPEDITION TEAM

2.1 Team Composition

Expedition team

Rob Easter	Project Manager
Stephanie Pfennigwerth	Project Co-ordinator
	Joining the group via cruise ship early December.
	(Did not eventuate)

Field party

Diana Patterson	Field leader
Estelle Lazer	Archaeologist
David Killick	Cook, communications and photographer
Adrian Welke	Conservation Architect
Linda Clark	Materials conservator
Martin Passingham	Carpenter
Michael Staples	Carpenter/Environmental Monitoring
Geoff Couser	Doctor

2.2 Team Performance

The result achieved in completion of the Works Plan directly relates to the skill and commitment of the expedition team. The significant compatibility amongst the team members further enhanced productivity over the period of the expedition. Estelle Lazer, the archaeologist, and Linda Clarke, the materials conservator, adopted a joint approach to their work integrating the cataloguing of artefacts and condition reporting. Carpenter Michael Staples, in fact spent more time working with Linda on the environmental management program and on the Total Station Survey work than on building works. However this did not comprise the latter as carpenter Marty Passingham and architect, Adrian Welke, also proved to be a very efficient and effective team.

The success in achieving the results against the Works Plan should also be assessed against the overall challenges presented in working in such an environment where we experience extreme windy conditions and very cold temperatures. In summary we were 51 days at Cape Denison of these we spent 4 days setting up and packing up the field camp; 7 days hutbound due to extreme winds or blizzards and 1 day off for recreation.

In effect the results were achieved in 39 available working days on site. In short, the whole expedition team worked extremely hard. A major input to the Works Program was

also made by other members of the party were who were not identified against specific tasks defined in the Plan, namely Dave Killick and Dr Geoff Couser.

The additional expertise of Dave and Michael proved invaluable in the reliance on computers for both recording data collected the environmental monitoring program and the operation of the Total Station for survey.

3.0 ACHIEVEMENT OF CONSERVATION WORKS PLAN

3.1 Overview

In summary objectives of the Works Plan were met. **Attachment A** reports against the specific task defined in the Works Plan this has been also addressed in the Executive Summary. As field leader I have focused more on process and outcomes rather than interpretation and recommendations arising from the work program. Team members will provide individual reports and documentation.

3.2 Adherence to the program

The Expedition Team was well briefed about the policy framework and operational requirements of the expedition. Familiarity of the team with the Conservation Management Plan and Works Plan 2002 was ensured both through formal team meetings and informal discussions, which were held throughout the expedition.

In its application the Works Plan was frequently found to be contradictory which had potential to generate tension between different expedition members. Specifically this related to the identification of priority tasks. It is a credit to all that the approach adopted by the team ensured that tension was in fact minimal and communication was maintained to ensure that any issues could be resolved. It was considered that the late receipt of the plan precluded any opportunity to meet and resolve these issues prior to departure, which would have been the optimal time. Another issue raised was the resources required to support the monitoring program and it was questioned as to whether this compromised the conservation works on the huts. I don't believe in fact turned out to be the case. In fact carpenter Michael Staples devoted considerable time, not only to the environmental monitoring program but also to the Total Station survey. The skill of carpenter Marty Passingham and the effective teamwork with architect Adrian Welke did ensure that the building component of the program was achieved and compromises between different elements of the program did not eventuate.

The effectiveness in delivering on the program was enhanced by the good team work that existed between members. While there was a times a difference of opinion the active mediation or intervention of the field leader was not required.

Extensive recording of tasks carried out in the works plan was made through use of digital photographs and slide film. Video recording of activities was also extensive. Dave Killick and Dr Geoff Couser provided invaluable support.

3.3 Resources and Training

The late receipt of the Works Plan meant that attention to specific tasks was perhaps insufficient pre departure; however, I don't believe this ultimately compromised the program. For future expeditions training in ice removal techniques would require a longer

lead in time. The use of the survey equipment brought results specifically because of the persistence of carpenter Mike Staples. It proved to be problematic and the conclusion could be reached that there was insufficient time for training. It was somewhat surprising that GPS equipment was not taken and the archaeologist and materials conservator relied on the personal equipment of Dave Killick.

Some difficulties were experienced with computers and this is an area for specific consideration on future expeditions. The team was fortunate that Dave Killick was also very skilled in operational aspects. The monitoring program and equipment was very resource hungry in terms of the time commitment. This was specifically due to difficulties experienced with the calibration of equipment.

3.4 Future challenges

Reflecting on the overall program and from the, at times, animated discussion between members of the expedition a number of issues were identified for future management of the site and its interpretation.

The first issue identified by the team in our initial forum at Cape Denison was the need for a **clear direction and policy** regarding the future of the Mawson's Huts site. It is appreciated that the opportunity presented for the 2002 expedition did limit the lead in time for planning however the clarification of these matters would facilitate the planning and effectiveness of future expeditions.

The observation was made that the Works Plan was contradictory in part and this was attributed to the lack of clarity regarding direction. In this context the issue of the **recladding of the Main Hut roof** was considered. The fundamental conservation principle applied to the Works Plan was to do as much as necessary but as little as possible. However given that the Main Hut is also identified as the major artifact on site it became evident to the team that the consequences of the "little as possible" approach needs to be confronted. Whilst the argument has been put that the building has lasted 90 years or so it is apparent that the cladding is progressively deteriorating.

This consideration was also seen in the context of the frequency of restoration programs. On our arrival at Cape Denison we were able to witness the movement of roofing timbers in strong winds. Whilst repairs were carried out to loose battens and boards the very real concern is that even with cyclical maintenance parts of the roof could be blown away. Even with the recladding of the main roof the continual ingress of snow will result in further build up of ice, however this could be managed with perhaps more frequent but shorter programs.

The **collation and presentation of data** is regarded as another challenge. There is now a huge amount of documentation and it is seen as a huge task to collate and to make it accessible. From my perspective I do not have a feel for the clear objectives and refer again to the need for a clear articulation of the policy directions for management of the site and for its interpretation. Appendix E of the Works Plan identifies a number of ways to present the data however significant resources would need to be committed and priorities determined.

The **management of artefacts** was also cause for considerable team discussion. Specifically the storage of items, specifically building materials (be it tar paper, nails or other fabric) within the huts was regarded to be at odds with the objective of projecting the aesthetic values and conveying a sense of space where the men of the AAE lived and worked. The value of some of the artefacts stored by previous expeditions was seriously questioned.

A perspective was put forward during discussions that the **environmental monitoring program** risks being an end in itself. There is considerable merit seen in the inclusion of the monitoring program within the AAD's State of Environment Reporting Framework.

There is no doubt that Field Camp support – cooking, communications, computer support and general household task undertaken also allowed the maximum time to be spent on the Works Program.

4. ENVIRONMENTAL PERFORMANCE

The expedition complied with the conduct of activities as described in the management of activities the pre expedition description of Environmental Impacts under the *Antarctic Treaty (Environmental Protection) Act 1980* and the *Environment Protection and Biodiversity Conservation Act 1999*. A report of activities and impacts is provided in **Attachment B**.

Bird and seal sightings were recorded in the daily log and a summary report is attached. Photograph images were also taken by Dave Killick of the different varieties of lichens observed on the two ridges north of Round and Long lakes. A report is provided in **Attachment C**.

5. TOURIST ACTIVITY

5.1 Visitation

There was one scheduled and one unscheduled visit by tourist ships to Cape Denison during the period of the expedition. The *Kapitan Klebnikov* arrived as planned on Thursday 5th December. Blizzard conditions and strong winds prevented any landing by either helicopter or by sea. The *Sir Hubert Wilkins* arrived on the evening of Friday 13th December. A Japanese natural history television crew chartered the vessel and the primary purpose of the visit was a diving operation. Some 24 visitors were escorted through the Main Huts on the Saturday. The visit was conducted in accordance with all tourist protocols and was a pleasure to host.

The pre-visitation advice from AAD was most comprehensive. The visitors from the *Sir Hubert Wilkins* appeared to be well briefed and adhered to all visitation protocols.

5.2 Tours of Mawson's Huts

The time taken for each tour averaged 15 minutes which was manageable with the small party. However it was found that it was necessary, in addition to the guide within the Hut, to have someone outside beside the artefact scatter to explain its heritage significance.

5.3 Impact on Wildlife

The timing of visits by tour ship will, from our observations while at Cape Denison, have variable impact on wildlife. For example, by the first week in December the sea ice had all but disappeared from Boat Harbour. This resulted in a congregation of Weddell seals on the sea ice close to the Hut; however, in the days preceding the visit by the *Sir Hubert Wilkins* the 20 or so hauled out had relocated to the remaining sea ice to the east of Boat Harbour. This facilitated the landing of passengers from the Zodiacs. The visitors observed appropriate distances from both seals and Adélie penguins.

6 LOGISTICS

6.1 Timing of the Expedition

The late October arrival at Cape Denison was considerably earlier than previous restoration expeditions. Extreme cold conditions were experienced however on balance the team believed that this contributed to safer and more comfortable working conditions inside the huts. The warmer conditions previously experienced have resulted in wetter conditions which would not have been as conducive to ice removal and the recording required for the archaeological and environmental monitoring programs. Although more time was required to access the huts this did not adversely impact on the works program. A summary of weather conditions for the duration of the expedition is provided in **Attachment D**.

The timing of future expeditions can be directly related to the proposed work plan as earlier in the season was conducive to ice removal yet precluded observations relating to summer melt conditions.

6.2 Pre departure planning

The expedition was extremely well organised and supported by the AAD. Subsequent logistic issues, which arose during the course of the expedition, were relatively minor and at no stage resulted in an adverse impact on the Works Program. In fact recommendations made are considered to be more in the form of “enhancements” based on the benefit of experience in somewhat different conditions to earlier expeditions.

6.3 Logistical support provided by the French Polar Institute

The support provided by the French through shipping and helicopter operations was excellent. Every endeavor was made to facilitate our transport from *L'Astrolabe* to Cape Denison, and again on our return. Given the reputation of the Commonwealth Bay weather it was somewhat remarkable that in a little over 48 hours from arrival at the ice edge some 29 nautical miles from Cape Denison, we were fully established at our field camp. The co-operative arrangement greatly facilitated the project and it is believed this can be directly attributed to the shared understandings and experience of our respective polar administrations.

6.4 Shipping operations

The travel and operational support provide by *L'Astrolabe* was excellent. A close and effective working relationship was achieved with the Voyage Leader. Travelling conditions were excellent; at all times our expedition was fully supported to achieve our objectives.

The only matter arising of concern for future expeditions is ensuring that paperwork requirements from Customs are more explicit. I may have been able to expedite Customs clearance with greater attention to the detail required. However it is appreciated that the problems experienced were not restricted to our expedition.

6.5 Helicopter Operations

6.5.1 Operations

The use of helicopters proved to be both very efficient and safe given both the period of the expedition and the nature of our cargo. The number of flights was minimised due to prior organisation of cargo and general preparedness. The planning of operations was appropriate for the conditions at the time of incoming and outgoing flights.

Recommendations for future expeditions are of a minor nature only and identified in the report, **Notes for Future Expedition Planning**.

On the ingoing operation the only issues were:

- a. inability to communicate directly with helicopters because of incompatibility of radios; and
- b. the mix of transport via cage pallet or carried internally. This proved to be very efficient re helicopter hours. The contents of a number of pallets was broken down and transported internally. We had anticipated this in terms of identifying weight however a number of light items posed potential hazards in terms of securing in moderate wind. A potential serious hazard was fortunately identified early with the cable ties used to secure the lids of the Nally Bins having a tendency to break. The majority of lids had been taped down and it is essential with helicopter operations that the lids are fully secure with cord tie downs at both ends and taped down

The outgoing operation was very efficient. One additional flight was required above what the VL anticipated due to the fact that we could only send out 3 passengers on the first flight. We held off completely winterising the field camp until we were sure the operation was on. The remaining tasks re winterising the last quad, dismantling aerals and managing cargo required 5 of us. Four caged pallets were slung the rest of our gear transported in cargo nets. The large stuff sacks proved invaluable for containing small or light items.

On the outgoing operation communications were not a problem as the VL and additional French communicated with the French pilot.

6.5.2 Safety and training

The predeparture helicopter training operations for Marty and Mike proved invaluable; however it would have been beneficial to have more team members familiar with helicopter operations. Specifically we were stretched when we utilised two sites for unloading. It was practical to sling some items to the area adjacent to the Sørensen Hut whilst the majority of caged pallets were deposited at the helicopter landing site to the south of Main Valley. Mike and Marty also assisted with helicopter operations, refueling and cargo on *L'Astrolabe* which helped to consolidate working relationships.

The pre-flight briefing by the Australian chief pilot was not as comprehensive as I would have liked. In anticipation of future trips with uncertainty re the quality of briefings it would be advisable to include a briefing pre-departure which the field leader could then reinforce. Particular emphasis would be on protocols of movement around a working machine.

6.5.3 Landing sites

The October arrival ensured minimal impact on the bird populations. The designated landing site in the Main Valley required some leveling prior to the outgoing operation. The snow conditions were such in early October that it would have required greater labour. The distance of this site from the Sørensen Hut would also have made it extremely difficult to secure items if in fact the full discharge of cargo had occurred there in October. It would have been impossible to contain items that had been transported inside the helicopter and to conduct an efficient operation and reduce helicopter hours. An arrival later in the season would necessitate at the very least cargo nets that could be used to anchor loose items to ensure against any change in wind conditions.

6.5.4 Designated flight path

During the period of the expedition Wilson's storm-petrels were not observed on the areas marked on the ridges below Round lake and Long Lake. This was specifically monitored when their absence was noted. In fact the only nesting pair was located on the eastern slope south, of the shaded area on the ridge to the east of Long Lake. The area of greatest highest numbers of Wilson's storm-petrels was in fact south east of Adélie rookeries No.54 and 55. Further details will be recorded on a map of the area.

6.6 Field Camp

6.6.1 Amenity

The field camp was well established and comfortable and worked extremely well for 8 people. Despite the extreme cold conditions the team was generally comfortable. The bunks in the kitchen were dismantled to allow more space for storage of kitchen food and items. They have been secured under the hut and can be readily reassembled. The extensive use of computers as part of the program, for example each night digital images were downloaded and catalogued, resulted in a mass of leads and general crowding in the hut. It worked relatively well for eight people however for a greater number addition of a fit out of the apple hut with bunks and shelving may reduce the amount of personal gear retained in the hut.

Recommendations for improvements, specifically addressing potential hazards are of a minor nature only and are detailed in the report, **Notes for Future Expedition Planning.**

6.6.2 Works

The priority was accorded to works seen to enhance safety, for example the construction of a safety rail on the Apple Hut platform. A new shelf was also constructed in the kitchen.

Tasks not completed, such as the extension of the tent platform, were given a lower priority than other tasks in the Works Plan, specifically those that related to Mawson's Hut. General maintenance work, specifically addressing problems that arose with the

built up of snow drift in the generators, problems associated with the operation of the quads, and installing the solar panels and wind generator were also seen as a priority and were generally quite time consuming. The **Notes for Future Expedition Planning** suggest means to overcome the problems experienced. Mike Staples and Marty Passingham detail discussion of specific problems in their respective expedition reports.

6.7 Catering

The group was extremely well catered for. Dave Killick did an excellent job and the variety and quality of the provisioning was greatly appreciated. Again in the extreme conditions and with the long hours worked this made a very valuable contribution to the expedition. An inventory of food remaining at the Sørensen Hut is detailed in a report, **Inventory of Food Remaining at Cape Denison December 2002.**

6.8 General Amenities

The inclusion of Wet Ones (also known as Baby Wipes) in the amenities proved invaluable, given the cold and the need for melt snow for water. The team felt that these were very effective given the inability to wash both bodies and clothes. The small camp washing machine proved very effective for tea towels later in the expedition. Baby powder also improved the amenity of the toilet.

6.9 Field Equipment

6.9.1 Quads and trailer

The two quads and trailer proved invaluable for transporting the larger generators and were greatly appreciated for daily tasks such as the disposal of liquid waste. All travel was restricted to over snow, with the exception of a very short distance over rocks between the Sørensen Hut and Alga Lake. The **Notes for Future Expedition Planning** details recommendations for future expeditions.

6.9.2 Tents

The tents were very comfortable especially given we had allowed for two sleeping bags per person which was necessary in the early weeks of the expedition. For future expeditions it is recommended that only tents in new or near new condition are taken as we had concern that the aging fabric on our tents would not withstand the strong winds once they had torn.

6.10 Communications.

Dave Killick will be address communications in his report, however whilst there were difficulties experienced these did not at any time compromise our operations or safety. The **Notes for Future Expedition Planning** detail recommendations for future expeditions

The Iridium phone proved to be invaluable especially given difficulties experienced with the HF radio access. The small unit was equipped with a data cable, providing the expedition with Internet. It proved to be reliable, portable and easy to use. The expedition used a normal dial-up account through Telstra Bigpond. The telephone was used for business and personal telephone calls and e-mail from both the ship and from Cape Denison. From the ship the built-in antenna and a small magnetic antenna was used, at

Cape Denison a fixed mast antenna was installed. All three proved to provide excellent reception.

The Iridium phone suffered a little from poor battery life in the cold temperatures. The one drawback with the unit was the lack of a battery charger for the spare battery, charging could only be done via the phone. While this is not unusual for a phone of this type, an external charger would help keep spare batteries topped up without taking the phone out of service.

The HF radio unit supplied to the expedition proved unsuited for the task. The unit had no external speaker, merely an earpiece on a short length of wire. Modifications to this met with only modest success.

A broken aerial connection rendered the unit unserviceable in the first week of the expedition. Temporary repairs enabled a short period of poor communications with the *Aurora Australis*. The broken connection turned out to be not user-serviceable and no spare had been provided. There was no option for the unit to operate with a whip aerial. The unit also did not allow the user to select or program their own frequencies so was unsuitable for interoperability with *L'Astrolabe* or with the ship's helicopters, even if it had worked. Future expeditions to Cape Denison would do well to avoid this unit.

The expedition was provided with six of the well-used Icom Handheld VHF radios which were to be used as the main means of communications across the site.

One unit ceased functioning almost immediately and the other five proved to be unreliable, mainly due to the indifferent quality of the batteries—some of which seemed to have difficulty holding a charge. The general condition of these radios was poor, with loose or missing screws, cracked housings, and a poor fit between some batteries and some units. These units, while excellent in their day, were well past their use-by date and should have been retired rather than foisted upon this expedition.

Some radios proved to work only intermittently and messages frequently had to be relayed through the base station in the Sørensen. They were unable to raise *L'Astrolabe* and the *Kapitan Khlebnikov* only two kilometres offshore and sometimes unable to raise the *Sir Hubert Wilkins* only one kilometre out. The small modern radios used by *L'Astrolabe*'s shore party seemed to have no trouble. The charger provided to the expedition was faulty, with one of the six charging bays indicating a full charge regardless of the true state of the battery.

Given that their welfare or indeed survival may well depend on good intra-site communications, future expeditions to Cape Denison should ensure they are provided with more up-to-date VHF handheld radio units.

7. OCCUPATIONAL HEALTH AND SAFETY

7.1 Overview

General safety issues were in fact more comprehensive than identified in the Works Plan. It proved essential that the chainsaw operators had undertaken training and this was

reflected in the adherence to safe practices including the use of protective clothing. The quad training provided by the AAD was excellent.

The lack of formal field training prior to departure did not impact adversely on the group. The combination of prior experience and the small group ensured that appropriate field practices could be promulgated.

Occupational health and safety issues were canvassed at the first team meeting prior to the program commencing at Cape Denison. At this time Marty covered the operation of fire-fighting equipment. Introductory training on the general site was provided initially at Kingston then reviewed at the first team meeting at Cape Denison.

The team proved to be a responsible group. There were no concerns regarding inappropriate unsafe practices field practices. At all times personal wellbeing was a major concern and all team members adhered to safe practices.

Potential hazards have been identified and recommendations detailed in the report, **Notes for Future Expedition Planning**.

7.2 Clothing and Kitting

The demands of living and working at Cape Denison for an extended period of time warrant due consideration for kitting. The application of a “summer” formula to clothing neglected to reflect the occupational hazards. Specifically:

- **Footwear**

Ill-fitting boots, that do not come in half sizes, present a specific hazard given the terrain. Previously worn boots also present a hazard in that no two people wear their boots in the same way. This resulted in one instance of extreme rubbing. However I am most critical of boots being issued that have virtually no tread left. This situation contributed in conjunction with the issue of sizing, specifically, I contend, to an ankle injury caused by slipping on the stairs of *L’Astrolabe*.

- **Indoor footwear**

The cold conditions experienced within the Sørensen Hut, combined with inactivity, caused great discomfort; however, the two members of the party who wore Ugg boots did not appear to suffer as much.

- **Freezer suits**

With the benefit of hindsight the issue of two suits would have been appropriate, especially for members of the team with physical jobs, as we lived and worked in them. The nylon freezer suits were a real hazard in the kitchen, where food was cooked on open flames.

- **Ill-fitting gear**

Provision should be made for the petite person. Ill-fitting gear posed a potential hazard, specifically over-large sheepskin hats which create a risk of cold injuries and great discomfort in the extreme wind conditions.

ATTACHMENT A CONSERVATION WORKS PLAN

1. Report Against Detailed Tasks

Ref 1 AAD Responsibilities

The tasks defined in the Works Plan lay outside the brief of the Expedition Team however we were well briefed about the requirements of the policy framework and operational requirements with which we must comply.

Ref 2 Works Team responsibilities and Decision Making

Familiarity of the team with the Conservation Management Plan and Works Plan 2002 was ensured through both formal team meetings which were held as follows

1- 2 nd September - Liawannee	Initial team planning
14 th October - Kingston.	Briefing by Expedition Manager
27 th October - Cape Denison.	Review and planning sessions to ensure integrated approach and common understanding of the works plan
24 th November - Cape Denison.	Review of progress against work plan.

Informally discussions were held throughout the expedition. Each night the activities of the day were reviewed with each member for preparation of the Sitrep and in the mornings advice sought re proposed action for the day. It was common to have a discussion after breakfast regarding proposed actions. Throughout the expedition the team frequently consulted both documents

In its application the Works Plan was frequently found to be contradictory which had potential to generate tension between different expedition members. Specifically this related to the identification of priority tasks. It is a credit to all that the approach adopted by the team ensured that tension was in fact minimal and communication was maintained to ensure that any issues could be resolved. It was considered that the late receipt of the plan precluded any opportunity to meet and resolve these issues prior to departure, which would have been the optimal time. Another issue raised was the resources required to support the monitoring program and it was questioned as to whether this compromised the conservation works on the huts. I don't believe in fact turned out to be the case. In fact Carpenter Michael Staples devoted considerable time, not only to the environmental monitoring program but also to the Total Station survey. The skill of Carpenter Marty Passingham and the effective teamwork with Architect, Adrian Welke, did ensure that the building component of the program was achieved and compromises between different elements of the program did not eventuate.

The effectiveness in delivering on the program was enhanced by the good team work, which existed between members. While there was a times a difference of opinion the active mediation or intervention of the field leader was not required.

Extensive recording of tasks carried out in the works plan was made through use of digital photographs and slide film. Video recording of activities was also extensive. Dave Killick and Dr Geoff Couser provided invaluable support.

Ref. 3 Resources and Training

The late receipt of the report with detailed tasks meant that attention to specific tasks was perhaps insufficient pre departure, however I don't believe this ultimately compromised the program. For future expeditions training in ice removal techniques would require a longer lead in time. The use of the survey equipment brought results specifically because of the persistence of carpenter Mike Staples. It proved to be problematic and the conclusion could be reached that there was insufficient time for training. It was somewhat surprising that GPS equipment was not taken and the Archeologist and Materials Conservator relied on the personal equipment of Dave Killick.

As Field Leader I was not involved in the development of a collections data base prior to departure however I believe the AC did meet with the data management group at AAD. I did feel as Field Leader that did not have a good grasp of how material was intended to be presented post expedition. Some difficulties were experienced with computers and this is an area for specific consideration on future expeditions. The monitoring program and equipment was very resource hungry in terms of the time of the MC and B. This was specifically due to difficulties experienced with the calibration of equipment.

General safety issues were in fact more comprehensive than identified in the works plan. It proved essential that the chainsaw operators had undertaken training and this was reflected in the adherence to safe practices including the use of protective clothing. Occupational health and safety issues were canvassed at the first team meeting prior to the program commencing at Cape Denison. At this time Marty covered the operation of fire-fighting equipment. Introductory training on the general site was provided initially at Kingston then reviewed at the first team meeting at Cape Denison.

Ref. 4. Main Hut Sub-floor Structural Investigation

Achievement of the defined tasks is the subject of a separate report from the Conservation Architect. The prevailing ice conditions limited the extent of investigations. At all times, due consideration was given ongoing integrity of the foundations. The potential impact on artifacts was also considered and the Archaeologist consulted. It was not however possible to access the cellar as it was considered unsafe to attempt to excavate in the confined area. In addition it was considered that the commitment of resources required to access the cellar would be a considerable and when considered against other priorities it was resolved not to proceed with the excavation.

Ref. 5 Temporary Tie Down of Main Hut

This section was subject to revision and omitted from the Works plan. It was however the subject of some discussion and it would be beneficial to canvass the relative merits of future inclusion with the Conservation Architect.

Ref. 6 Main Hut General Structural Investigation

This section to be subject of more detailed report from the Conservation Architect. However as reported midway through the expedition the connections appeared to be in good condition and performing to the near original specification. There was no evidence from external perspective that the possible expansion of ice was causing any effect on the connections.

Some deterioration in fixings was noted but was considered to be of no structural consequence. All timber members were in good condition. Considerable shrinkage and deterioration of the timber cladding was observed. Repair works of a varying nature were undertaken. The deterioration of the cladding was such that concern was expressed of the potential impacts of the loss of individual timbers.

Ref. 7 Ice Removal

Ice removal was conducted in a very cautious manner with frequent reference to available photographs and prior reports. Detailed photographic record and drawings taken at varying stages of removal.

The ice removal took approximately two weeks and was carried out with extreme care given to the effect on the long term structural integrity of the hut and its fabric, structures and artefacts. The amount removed from both the Workshop and the Main Hut equated to an estimated 35 cubic metres. In the workshop the ice was removed in a systematic manner working from the top and middle of the room, working from the centre outwards. The snow and ice inside the workshop was removed to approximately a metre below the eaves. Ice was then removed from the centre to what is believed to be the level exposed in 1978. Ice was also removed from the western wall above the bench. Shelving has been exposed in the SE corner, as has the bench on the western wall. The chainsaw was used to cut block until reaching sensitive areas wire probes were utilised, and where necessary, hand tools. Ice removal was conducted in a very cautious manner with frequent reference to available photographs and prior reports

In the living hut soft snow and suspended ice was removed in areas where it threatened the structural integrity of the bunks. Detailed photographic record and drawings taken at varying stages of removal.

A very positive result was achieved in terms of restoring the interiors to reveal the space and fabric of the period of occupation.

Ref. 8 Workshop Roof Structure

The tasks defined in this section were fully and very efficiently achieved. The results achieved can be seen in the extensive photographic recording. Four new collar ties were installed three broken rafters repaired. The original collar tie U brackets were straightened and refitted and the original collar tie packing blocks reinstated. The two original straps, which extend from the ridgeline to the collar ties, were also retrieved from the ice and reinstated. Lining boards were replaced in their original position. Only one piece could not be reinstated.

The accumulated snow and transformation to blue ice, once removed, was found to have damaged shelves and artefacts. Observation of snow ingress after blizzards revealed that the overcladding of the roof was limited.

Ref. 9 Snow and Meltwater Ingress

The tasks defined in this section were achieved to the optimal level given the parameters laid out by the Works Plan. A cover was made for the dormer roof of the Workshop and a cover strip fixed to the top of the north facing wall to reduce the most recognisable points of ingress. However as discussed with the roof structure it is an impossible task to prevent further incursions. The discussion within the Works Plan of the rate of snow ingress and consequent relationship to the issue of recladding from my mind is an analysis which does not adequately address the very real impacts of failure of parts of the roof structure. The occurrence of a number of blizzards provided a further opportunity to identify areas of snow ingress and to observe the build up of snow in what were relatively minor events. However the Conservation Architect is more qualified than I am to comment.

Ref. 10 Site Works – GIS framework

It is believed that considerable advances were made in achieving this task. This is very much due to the perseverance of Carpenter Mike Staples with the Total Station survey. Achievement of tasks was carried out to the best of the team's ability given the available time.

Some initial difficulties were experience in the operation of the Total Station by Michael Staples. It was extremely advantageous that expedition communications allowed these problems to be addressed. Once the initial set-up was completed the system worked well and allowed a large number of points to be accurately located in a relatively short time

The survey of the artefact scatter around Mawson's hut was carried out from two new survey marks fitted with three tie down points which allowed a tripod to be set up and left over each mark. Efficient use of the system required three people; one on the machine, one holding the pole, and one to make notes and to keep track of the number sequence of recorded points. It was a resource hungry exercise for a small team. However this could be reassessed regarding the level of detail to which survey work was carried out.

There was a sense that attention to this section of the works program would have benefited from a greater degree of prior planning and involvement at AAD as it was considered that the expedition did not have capacity or means to complete to the degree identified. Specifically the assessment of recording and data collected and provision of feedback to optimise the input by team members. It was felt that the checking of data could more easily and efficiently be done by staff at Kingston, allowing more time for work in the field. Whilst support was forthcoming there was a sense that it was reactive rather than proactive from AAD.

Ref. 11. Site Works –Main Valley – Visual Protection Zone - Works

Tasks related to the Transit, Magnetograph and Absolute magnetic Hut were carried out. The other identified structures were also assessed.

Post BANZARE fabric, specifically drums and scattered debris south of the Granholm Hut were collected and returned to Australia. The Granholm Hut and Materials stockpile was not removed due to insufficient time and higher priorities within the work program which were specific to Mawson's Hut. The Granholm Hut proved invaluable as a working area for storage of the considerable variety of tools required. It also contributed to greater efficiency in the use of time, as it is an ideal refuge given its proximity to the main working areas.

It was considered that the relocation of the AWS was beyond the scope of the expedition team and was a matter for the AAD to resolve with the University of Wisconsin. However it is considered that the removal could have a negative impact in the recording of weather data in relation to historical records. It was evident to the team that at a possible alternative location, say Beryl Hill, the conditions were often substantially different.

In relation to investigations proposed to further the creation of an Antarctic Specially Managed Area the planned late addition of the EA to the team did not eventuate. However considerable information and photographs of flora and fauna was gathered.

Ref. 12 Moveable Heritage Conservation Program

The Materials Conservator and Archaeologist adopted a joint approach to condition reporting and the documentation of artefacts. An extensive program including recording and monitoring was undertaken.

Artefacts that had been labeled and stored in various receptacles and locations on previous expeditions were consolidated in plastic bins in the South East corner of the Workshop. An inventory was also completed.

Ref. 13. Archaeology Program

An extensive program including cataloguing and photographic recording of artefacts was undertaken. It included the documentation and survey of the artefact scatters around the Main Hut; the documentation of the artefact scatter on Penguin Knob and the sites of cached seals. A comprehensive cataloguing of artefacts was also carried out within both the Main Hut and the Workshop.

The boxed husky was excavated and relocated to the south east corner of the Workshop. It was considered to be the optimum location for conservation due to the fact that the eastern veranda could not be accessed and the western veranda is subject to summer snowmelt.

There was a sense of an enormous amount of data being gathered which raises the question of management and communication.

Ref. 14 Monitoring, research and records

This was a very significant component of the program in terms of time commitment required. It involved the location, removal then reinstallation of various sensors and data loggers. The program was fully achieved except where limitations occurred to a lack of equipment or where proposed actions proved not to be practicable because of the prevailing conditions.

The monitoring equipment is positioned in the South East corner of the workshop and data is now being transferred weekly via satellite telephone.

2 Summary

The team had extraordinary success rate in achieving the results against the Works Plan. This should also be assessed against the overall challenges presented in working in such an environment where we experience extreme windy conditions and very cold temperatures.

In effect, of the 51 days the expedition was at Cape Denison, the results were achieved in 39 available working days on site at Mawson's hut. This was due to

- 7 days hutbound due to extreme winds or blizzards
- 1 day off for recreation
- 2 setting up field camp – pre planning works program
- 2 packing up field camp

A major input to the Works Program was made by other members of the team, namely:
Still and video photographic recording – Dave Killick and Dr Geoff Couser
Labouring – and it was heavy work transporting ice blocks a distance from the Main Hut
Mainly Geoff but also Dave and myself

Field camp support – cooking, communications, computer support and general household task undertaken also allowed the maximum time to be spent on the Works Program.

3. Future challenges identified from the program

Reflecting on the overall program and from the, at times, animated discussion between members of the expedition a number of issues were identified for future management of the site and its interpretation.

The first issue identified by the team in our initial forum at Cape Denison was the need for a **clear direction and policy** regarding the future of the Mawson's Huts site.

The observation was made that the Works Plan was contradictory in part and this was attributed to the lack of clarity regarding direction. In this context the issue of the **recladding the Main Hut roof** was considered. The fundamental conservation principle applied to the Works Plan was to do as much as necessary but as little as possible. However given that the Main Hut is also identified as the major artifact on site it became evident to the team that the consequences of the “little as possible” approach needs to be

confronted. Whilst the argument has been put that the building has lasted 90 years or so it is apparent that the cladding is progressively deteriorating.

This consideration was also seen in the context of the frequency of restoration programs. On our arrival at Cape Denison we were able to witness the movement of roofing timbers in strong winds. Whilst repairs were carried out to loose battens and boards the very real concern is that even with cyclical maintenance parts of the roof could be blown away. Even with the recladding of the main roof the continual ingress of snow will result in further build up of ice, however this could be managed with perhaps more frequent but shorter programs.

The focus of the Archaeology program appeared to be primarily on recording rather than extraction of artefacts from the ice and for future expeditions further consideration and training in **fine ice removal techniques** would appear to be required.

The **collation and presentation of data** is regarded as another challenge. There is now a huge amount of documentation and it is seen as a huge task to collate and to make it accessible. From my perspective I do not have a feel for the clear objectives and refer again to the need for a clear articulation of the policy directions for management of the site and for its interpretation. Appendix E of the Works Plan identifies a number of ways to present the data however significant resources would need to be committed and priorities determined.

The **management of artefacts** was also cause for considerable team discussion. Specifically the storage of items, specifically building materials be it tar paper, nails or other fabric within the huts was regarded to be at odds with the objective of projecting the aesthetic values and conveying a sense of space where the men of the AAE lived and worked. The value of some of the artefacts stored by previous expeditions was seriously questioned.

A perspective was put forward during discussions that the **environmental monitoring program** risks being an end in itself. There is considerable merit seen in the inclusion of the monitoring program within the AAD's State of Environment Reporting Framework.

ATTACHMENT B

Environment Performance Report

Mawson's Hut Conservation Works - Cape Denison, 2002

1. Period of expedition

Eight members of the expedition arrived on 25th October and departed on the 16th December 2002.

2. Activities

The activities of the expedition were consistent with the "Mawson's Hut Historic Site Works Plan 2002" prepared for the Australian Antarctic Division by Godden Mackay Logan. In addition to the Works Plan a census of the Adelie penguin population was carried under the direction of AAD ornithologist Dr Eric Woehler. All activities carried out as part of the expedition are detailed in the daily log.

3. Impacts

3.1. Flora, fauna and ecological processes

3.1.1 Expedition Awareness

Expedition awareness of the potential to impact on the flora and fauna was promoted formally through team meetings and informally through the active discussion regarding observations made throughout the period. There was keen interest in these observations and contributions made by team members. Recordings of sightings, for example of seals were recorded as a matter of course in the daily log.

On a number of occasions Weddell seals hauled out quite close to the Main Hut within the distance prescribed by the wildlife approach guidelines however there was no evidence of any impact or effect on these seals.

3.1.2 Helicopter Operations

The impact of helicopters on bird species was minimal. The number of helicopters was kept to a minimal number through efficient packing of materials. Unloading was carried out rapidly and at no time were the helicopters required to shutdown. Operations occurred on the afternoons of Friday 25th and Saturday 25th October. At this point in time only two of the four species of birds, Adélie penguins and Snow Petrels were present at Cape Denison. The disturbance in the initial period was of a very brief duration and was restricted to the two Adelie rookeries to the north of the Sorensen Hut. These rookeries were monitored and there was subsequently no divergence from the breeding patterns of rookeries on other parts of Cape Denison in that there was a concurrence in major dates for the laying of eggs and hatching of chicks.

Helicopter operations conducted on Monday 16th December for the retrieval of the expedition team were much briefer with only 6 flights conducted between 1000 to 1230. Operations were confined to the designated helicopter landing site to the south of the Main valley. There was no impact observed on the flora and fauna.

3.2 Ice

Removal of ice was carried out as defined in the Assessment of Environmental Impacts. However, it did not proceed with relocation of the husky to the eastern verandah. The ice removed from the hut was located on a snowbank some metres to the west of the Hut. Much of this ice had ablated through wind action by the time of departure on the 16th of December.

The impact from the movement of team members was minimised by following routes which were largely covered by ice and snow and which avoided areas of vegetation, seals, nesting birds and artefacts. Blizzard lines were not erected as the relative benefits were outweighed by the commitment of resources it would have taken.

There were no unforeseen activities which could have resulted in adverse environmental impacts.

3.3 Water: Marine environment.

There were no unforeseen activities which resulted in adverse environmental impacts.

3.4 Water: Freshwater environment.

Due to the period of the expedition the lakes remained frozen until the beginning of December. There was no melt stream flows of any significance prior to departure. There was no evidence of contaminants infiltration of fresh water and no incidents which resulted in contamination. Refuelling was conducted with the due care specified.

3.5 Air quality

Helicopter operations were carried out efficiently for a limited duration as specified. Rock drilling was minimal with only 16 holes were drilled, taking approximately 16 minutes.

3.6 Surface quality

The tie down component of the works plan was not proceeded with. did not occur

4. Heritage values

4.1 Removal of post Banzare rubbish.

Two 200 litre fuel drums were removed from the site, an old sled dismantled and components returned to Australia. A further clean –up occurred in the vicinity of the Granholm Hut.

5. Waste Management

In purchasing food supplies packaging was a major consideration was eliminated where feasible. One caged pallet contained all field camp waste.

Summary

Household waste – that is foodscraps, packaging

- estimated at 170 kilograms
- recycled 2 polyweave bags of aluminium cans and 1 bag of PET plastic
- 5 kilograms of cardboard

On average 25 litres of grey water and 18 litres of human liquid waste, and 3 kilograms of solid human waste were disposed of into the ocean each day.
All waste building material was removed and returned.

6. Energy Consumption

Approximately 67.5 kilograms of gas was consumed. Or 8.4 kilograms per person.
An estimated 330 litres of petrol was consumed. This fuels the generators used for the computers, lighting, recharging batteries, electrical tools, as well as the two quads.

7. Impacts of visitation

The scheduled visit of the tourist ship the Kapitan Khlebnikov did not eventuate due to adverse weather conditions. The vessel Sir Hubert Wilkins arrived at Cape Denison on Friday the 13th December. A group of approximately 24 were taken on an escorted tour of the huts on that date only. The group fully complied with all visitation requirements.

8. Significant Negative Impacts

The installation of tie downs was identified as the most significant impact and this was not proceeded with under the revised Works Plan..

9. Mitigation Measures

All mitigation measures identified were carried out. However the extreme wind conditions at Cape Denison means that there is potential for loose objects to be carried away. At all times there was a great awareness and preventative action taken to secure all items which could be blown away. However over the period one plastic Nally bin (also known as a fishbin) and one lid, one small camera case and one pair goggles were blown away and unable to be retrieved.

ATTACHMENT C

WILDLIFE OBSERVATIONS – CAPE DENISON OCT – DEC 2002

Arrived Cape Denison **25th October 2002**
Departed Cape Denison **16th December 2002**

SKUAS

30/10 First sighting of skuas returning to their home base.

SNOW PETRELS

10/11 -started with the observation and recording of the nesting birds – confirmed 8 snow petrel nesting sites on the western slope of memorial cross
18/11 Surveyed snow petrel nesting sites and made substantial additions to the map supplied.
22/11 The SP's appear to have departed – there was no sign of them at Snow Petrel Gully and only two pairs seen all day.
24/11 flock of 18 SP's sighted flying east across Boat Harbour at approximately
25/11 2 pairs below Sorensen hut
2/12 found dead Snowie emerging from ablated snow on the eastern side of Petrel Gully – assume suffocated during snowfall on the 17th November.
8/12 Snow petrels have returned to their nesting sites. The previous three days blizzard and strong winds prevailed so sites couldn't be checked.
Identified additional nesting sites

WILSON STORM PETRELS

16/12 - first of the WSP were observed on their return
24/11 WSP's appear to be active in courting behaviour and their territory is becoming more evident.
8/11 sites on seaward end of petrel Hill with return of SP's SP's appeared to be hassling WSP's
additional sites added to map

CAPE PETRELS

18/11 Three separate sightings were made of a single Cape Petrel.

ANTARCTIC PETRELS

23/11 One lone APetrel sighted.
24/11 3 petrels sighted then an hour later a flock of 18 were observed flying east.
4/12 Six AP's sighted late afternoon
8/12 2100 3 AP's sighted flying east
2200 1 sighted flying west

GIANT PETREL

The nearest known colonies are at Dumont & Casey

- 21/11. sighting of a sole Giant Petrel at 1700. It appeared to be a first stage juvenile and was observed cruising over the rookeries toward John O'Groats for some ten minutes.
- 25/11 suspected sighting lone GP
- 29¹¹ Further sighting and photographing of the Giant Petrel in the evening, this confirmed two other observations during the week.
- about 2045 at John O'Groats then
- 2055 further sighting at Boat Harbour on the ice and photographed
- 8/12 2000 GP sighted on ice near Main Hut
- 2130 grey GP sighted skimming over water at eastern end of Cape Dension flying east
- 2210 GP flying east grey white headed
- 2400 unconfirmed – large white bird fling east from book assume to be GP

ADÉLIE PENGUINS

- 17/11 The first of the Adelie eggs were observed in the rookeries.
- 14/12 First chicks sighted

ROYAL PENGUIN

- 18/11 Corpse of Royal penguin in excellent condition with no evidence of predation by skuas found on the rocks on the western shore below the Memorial Cross

CHINSTRAP PENGUIN

- 13/12 LONE Chinstrap penguin sighted with a group of Adélies on Round Lake.

WEDDELL SEALS

- 14/11 The first Weddell seal hauled out on the ice adjacent to Boat Harbour. It appeared to be a young juvenile.
- 18/11 Three Weddells were recorded on the ice in Boat Harbour
- 21 11 The number of WSeals in Boat Harbour increased to 9
- 22/11 8 WS in Boat Harbour
- 24/11 -1/12 4-5 WS hauled out on the sea ice in Boat Harbour
- 2/12-16/12 20 -24 WS hauled out on average

ELEPHANT SEALS

- 19/11 An elephant seal pulled out onto the ice in Boat Harbour early afternoon.
- 9/12-10/12 An elephant seal was sighted floating in the Harbour

11/12-16/12 The elephant seal hauled out and began moulting on the 13th. It is a smaller animal than the one sighted on the 19/11. It is in very good condition and has no scarring on its upper torso.

LEOPARD SEALS

18/11 a fine Leopard seal, which we concluded was a female because of its size, was sighted on the ice in Boat Harbour

ATTACHMENT D

Mawson's Huts Conservation Expedition 2002

Summary of weather conditions

Week One 25th October – 1st November

Two relatively calm days greatly assisted the consolidation of the field camp. Extreme windy conditions kept the party hutbound on one day only. Temperatures dropped to minus 20 midweek and were consistently in the minus 10 to minus 20°C range.

Week Two 2nd October - 8th November

Extreme windy conditions kept the party hutbound for two days, Sunday and Thursday. Strong winds were experienced all week with only two days where the wind dropped to between 30 – 50 knots an hour. Temperatures have consistently been minus 10 to minus 11°C. The inside of the Sorensen Hut remained in the minus temperature range.

Week Three 9th November - 15th November

Strong windy conditions prevailed for the period. With the exception of one day the wind did not dropped below 40 – 50 knots an hour. The team was restricted to the hut for one day only because of extreme conditions. Temperatures have consistently been minus 10 to minus 11°C range. The inside of the Sorensen hut continued remained below zero.

Week Four 16th November – 22nd November

Excellent weather conditions with three days experienced with virtually no wind, three days with winds to 50 knots and only one day when the team was restricted to the hut because of blizzard conditions. Two days of light snowfall occurred. Temperatures fluctuated between minus 10 and minus 5°C.

Week Five 23rd November - 29th November

A week of typical katabatic conditions with strong winds easing to calm conditions by early afternoon of 15 - 25 knots on five days. Minimum temperatures were in the range of minus 12 - minus 6.2°C. with maximums from minus 0.8 - minus 5°C.

Week 6 30th November - 6th December

A very calm week with four days of minimum winds in the range 15-20 knots and three days of wind in the 45 -60 knot range. Two days of blizzard conditions. The minimum temperatures ranged from minus 15.0°C to minus- 4.4°C with positive temperatures of +0.8°C. being recorded on Wednesday.

Week 7 7th December - 13th December

One day of very strong winds six days of near absolute calm. Snowfalls were recorded on one day. Temperatures were warmer with minimums hovering below zero and three days where the temperature reached plus three degrees.

Week 8 14th December - 16th December

Calm conditions continued with winds rising to 2- - 25 knots on the morning of our departure. Temperatures ranged from minus 1.5 - plus 2°C.

ATTACHMENT C

WILDLIFE OBSERVATIONS – CAPE DENISON OCT – DEC 2002

Arrived Cape Denison **25th October 2002**
Departed Cape Denison **16th December 2002**

SKUAS

30/10 First sighting of skuas returning to their home base.

SNOW PETRELS

10/11 -started with the observation and recording of the nesting birds – confirmed 8 snow petrel nesting sites on the western slope of memorial cross
18/11 Surveyed snow petrel nesting sites and made substantial additions to the map supplied.
22/11 The SP's appear to have departed – there was no sign of them at Snow Petrel Gully and only two pairs seen all day.
24/11 flock of 18 SP's sighted flying east across Boat Harbour at approximately 25/11 2 pairs below Sorensen hut
2/12 found dead Snowie emerging from ablated snow on the eastern side of Petrel Gully – assume suffocated during snowfall on the 17th November.
8/12 Snow petrels have returned to their nesting sites. The previous three days blizzard and strong winds prevailed so sites couldn't be checked. Identified additional nesting sites

WILSON STORM PETRELS

16/12 - first of the WSP were observed on their return
24/11 WSP's appear to be active in courting behaviour and their territory is becoming more evident.
8/11 sites on seaward end of petrel Hill with return of SP's SP's appeared to be hassling WSP's
additional sites added to map

CAPE PETRELS

18/11 Three separate sightings were made of a single Cape Petrel.

ANTARCTIC PETRELS

23/11 One lone APetrel sighted.
24/11 3 petrels sighted then an hour later a flock of 18 were observed flying east.
4/12 Six AP's sighted late afternoon
8/12 2100 3 AP's sighted flying east
2200 1 sighted flying west

GIANT PETREL

The nearest known colonies are at Dumont & Casey

- 21/11. sighting of a sole Giant Petrel at 1700. It appeared to be a first stage juvenile and was observed cruising over the rookeries toward John O'Groats for some ten minutes.
- 25/11 suspected sighting lone GP
- 29/11 Further sighting and photographing of the Giant Petrel in the evening, this confirmed two other observations during the week.
- about 2045 at John O'Groats then
- 2055 further sighting at Boat Harbour on the ice and photographed
- 8/12 2000 GP sighted on ice near Main Hut
- 2130 grey GP sighted skimming over water at eastern end of Cape Dension flying east
- 2210 GP flying east grey white headed
- 2400 unconfirmed – large white bird fling east from book assume to be GP

ADÉLIE PENGUINS

- 17/11 The first of the Adelie eggs were observed in the rookeries.
- 14/12 First chicks sighted

ROYAL PENGUIN

- 18/11 Corpse of Royal penguin in excellent condition with no evidence of predation by skuas found on the rocks on the western shore below the Memorial Cross

CHINSTRAP PENGUIN

- 13/12 LONE Chinstrap penguin sighted with a group of Adélies on Round Lake.

WEDDELL SEALS

- 14/11 The first Weddell seal hauled out on the ice adjacent to Boat Harbour. It appeared to be a young juvenile.
- 18/11 Three Weddells were recorded on the ice in Boat Harbour
- 21/11 The number of WSeals in Boat Harbour increased to 9
- 22/11 8 WS in Boat Harbour
- 24/11 -1/12 4-5 WS hauled out on the sea ice in Boat Harbour
- 2/12-16/12 20 -24 WS hauled out on average

ELEPHANT SEALS

- 19/11 An elephant seal pulled out onto the ice in Boat Harbour early afternoon.
- 9/12-10/12 An elephant seal was sighted floating in the Harbour

11/12-16/12 The elephant seal hauled out and began moulting on the 13th. It is a smaller animal than the one sighted on the 19/11. It is in very good condition and has no scarring on its upper torso.

LEOPARD SEALS

18/11 a fine Leopard seal, which we concluded was a female because of its size, was sighted on the ice in Boat Harbour

Mawson's Huts Log – 2002 Expedition

Expedition team

Rob Easter	Project Manager – Kingston Based
Stephanie Pfennigwerth	AAD Policy
	Joining the group via cruise ship early December.
	(Did not eventuate)

Field party

Diana Patterson	Field leader
Estelle Lazer	Archaeologist
David Killick	Cook, communications and photographer
Adrian Welke	Conservation Architect
Linda Clark	Materials conservator
Martin Passingham	Carpenter
Michael Staples	Carpenter/Environmental Monitoring
Geoff Couser	Doctor

Predeparture:

Liaweeni - 2nd and 3rd of September

The 2002 Mawson's Hut Expedition team came together for the first time on at Liaweene in the great lakes district on the central Tasmania plateau. At this time Ted Bugg, Carpenter was on the team. Marty attended as a reserve. Ted subsequently withdrew. However his knowledge and input proved invaluable in the expedition planning phase. The two days provided the opportunity for Rob to present an overview of the objectives of project and for initial discussion between the team members. Prior expeditions and activities were covered together with initial works plan proposals. Equipment, purchasing, training and specific needs were canvassed.

The venue, a Rangers hut, together with the program content, provided an excellent foundation for an integrated team approach to the expedition.

Establishment of Expedition team

Mike and Dave were the first of the team to begin preparations. In early September Dave began to organise the food and household provisions, fitting this in with his normal employment as an AAP journalist. Mike and Marty commenced organising the great variety of tools needed for conservation works some three weeks before our scheduled departure.

I commenced on Monday 7th of October and commenced the organisation of the cargo the volume of which was equivalent to a 20 foot sea container. Estelle, the archaeologist, was the next to arrive from Sydney on the 8th as was Linda, the materials conservator who travelled down from Launceston. Adrian the conservation architect from Darwin came via Sydney where he met up with Rob and the projects heritage consultants. The predeparture time was used to consult with various people at the AAD and undertake training in various activities including use of chainsaws, quads and the Total Station survey equipment. On Tuesday night Dave, Estelle and I packed the ration packs. Mike

and Marty also spent a great many late nights in the store organising their tool boxes. On Saturday, with the exception of Dave and Geoff, who were still working at their regular jobs, and Linda who had returned to Launceston, we gathered in the store to pack. Ted had arrived in Hobart the previous night to assist. Our packing and inventories were complete by 1730.

On Monday Ted and I spent at the wharf ensuring all our cargo was loaded on the French Antarctic resupply ship, L'Astrolabe. It proved worth the time on the wharf in terms of providing advice re access to priority pallets and sorting out last minute oversights – such as the non arrival of 4 drums of petrol. The stowage was still incomplete when the wharfies knocked off at 2000. At 1645 I was advised that the proposed Tuesday 1700 departure was postponed until midday Wednesday. Tuesday the whole team gathered at the AAD for a couple of hours to complete the briefing. Including a briefing from the French Voyage Leader, Patrice Godon.

Day 1 Wednesday 16th October

The team was at Self's Point, the ship's bunkering point, at 0900 ready to depart. With a revised departure of 1300 we dispersed, most going for that last cappuccino at Salamanca. Back to the ship again at 1230 only to discover it was now to be an 1830 departure so again we headed back to Salamanca.

We finally departed at 1830 – a somewhat strange departure with 4 wharfies and about seven others to wave us goodbye. We were all pretty apprehensive about sailing on the Astrolabe as it had quite a reputation – when it was mentioned at the Antarctic Division that we were sailing on her – there was a rolling of eyes then the horror stories of sea sickness, terrible food. They were wrong. The first night the food was fantastic. The Astrolabe catered for 51 passengers and we were 42. Estelle, Linda and I were in one small cabin, the five guys together in a brighter cabin. The mess areas were quite small so meals were organised in two sittings.

Day 2 Thursday 17th October

Once we cleared the Derwent and headed south it seemed the other part of the tales was true, L'Astrolabe really rocked and rolled and seemed to bounce along. Very little sleep for any of us. The rolling continued for the remainder of the day and we began to believe Ted's stories of a series of low fronts rolling in following our path south. Very few appeared at meal times – most staying in their bunks for the day.

I didn't sleep at all too much with the rattling in the cabin and my mattress kept sliding backwards and forwards in my bunk. I went up to the bridge at about 7 am but didn't stay for long as I started to get queasy – the bridge is so close to the bow that we were constantly rocketed by waves. Along with others I spent most of the day in my bunk however did encounter two fellow passengers at meal times. CSIRO is conducting monitoring of sea temperatures with two scientists – Cedric- and Englishman based in Adelaide and Jean Yves from New Caledonia.

Had a minor panic attack – wondering if our meat had in fact been loaded. It was the one thing I hadn't sighted on the wharf. At midday our position was 46° 43' S, 146° 39'E

Day 3 Friday 18th October

Temperature +8°C continuous cloud coverage. Sea slight.

Conditions were calmer last night which made for very comfortable travelling. We decided to commence our bird observations from the bridge however it was somewhat difficult with all the bridge windows shuttered with the exception of the central one. We later learnt that on one voyage south L'Astrolabe had these windows shattered in very rough seas. The resulting damage was pretty dramatic with the L'Astrolabe incapacitated for a number of days in extreme conditions. Adrian, Linda and I conducted our first observations at 1400 by stepping outside for the 10 minute period. We rapidly discovered that bird identification was not one of our strong points. Our first two hour observations recording unidentified birds! By the third hour we figured out that we had seen one Cape Petrel. At 1500 our position was 51° 07' S, 145° 44'E

Day 4 Saturday 19th October

Temperature +3°C Continuous cloud coverage . Sea slight.

The calm conditions didn't continue and by mid afternoon we were back to rocking and rolling and most of us retired to our bunks, missing the evening meal.

At 1300 our position was 55° 30' S, 144° 27'E

Day 5 Sunday 20th October.

Temperature -5.8°C continuous cloud coverage. Seas slight.

Relatively calm seas again today. Very little bird life. We passed 60°S. Dave slipped down the stairs. His ankle is quite a sight, extremely bruised. It is possible that he has received a fracture. It was severe enough for him to speculate about being unable to continue if it was broken. At the very mention of not continuing I felt great dismay.. Cooking maybe we could cope – the crash course in comms would be challenging not to mention his knowledge and experience of Cape Denison.

By evening we were making slow progress through heavy ice. At 2145 the ship stopped and we sat for most of night. It was somewhat eerie with the quietness. At 2315 our position was 59° 28' S, 143° 39'E

Day 6 Monday 21st October

Temperature -1.7°C Partly cloudy. Seas Calm Sea ice 9/10

Linda and Estelle woke me at 5 am with the news that we were in pack ice. It was worth getting up to see the sun rise over the ice. We sighted the first Adelie penguin not long after then our first Crabeater seal at 1100 at 63° 32'S 145° 65' E. Two observation periods went by with no sea birds sighted.

It was a magnificent day on heavy ice in the morning easing to 5/10 ice coverage in the afternoon. – and I spent most of the day on the bridge – the first iceberg was not sighted until early evening. We have been teasing Estelle about her tendency to continuously apologise. An alternative response was suggested, and Estelle is very much entering into the spirit of it.

First discussions with Patrice re fly-off. He had been right about not seeing him for the first 4 days of the voyage. Patrice offered to supply us meat from DDU if it was in fact missing. I was somewhat relieved to hear that our meat had in fact been loaded.

We had our first “team meeting” in this morning in the guy’s cabin – informal and fun – a great omen to begin. The French were wonderful to travel with – though we had little to do with the expeditioners. We were all vastly amused when Estelle asked the captain – Yvon who by this stage had a 5 day stubble and looked a tad unkempt if he was going to Dumont d’Urville (the French base) he replied no, she then asked if he worked on the deck – to the great amusement of all the crew and the Yvon himself.

Meal times are in two shifts and Linda, Estelle and I are at different times to our guys however we were with two of the helo crew and two CSIRO marine science guys. The ice conditions were fascinating – a great deal of new ice – new pancake ice in varying stages and ages. Very few sea birds – but a first for me – a Minke whale sighting within metres of the ship when we were in the pack ice. At 1350 our position was 63° 47’ S, 145° 20’E

Day 7 Tuesday 22nd October

Temperature -13.7°C Continuous cloud coverage. Sea slight. Sea ice 9/10

There was great variation in the sea ice with sheets of new ice sent sliding over each other as the ship progressed. At times you could see three layers of ice. Between midday and 1400 we were in heavy 10/10 ice and made very little progress. At 1745 the helicopters were out for a sea ice recce. At 1825 we were beset and waited for change in tidal movement which was about two hours later. The ice was heavily rafted. At 2045 the master decided to sit for the night.

At 1120 our position was 64° 45’ S, 145°45’E and by evening we had only made 64° 47’S, 145° 40’E.

Day 8 Wednesday 23rd October

I was up at 3.30, initially from necessity then discovered that it was magnificent morning. The sun came up at 0410. By 0425 the helicopters were in the air for an ice recce. Slow progress again in the morning, but by afternoon we were on the move again. With arrival at the ice edge anticipated on Thursday we started to discuss offloading operations. Initially Patrice had plans to send a number of French ashore with us to help with cargo however I was able to convince him that it was not necessary and that we had things under control. It helped having the detailed manifest as I was assured that Patrice understood our requirements. We had further team meeting in the guy’s room to discuss

final plans for fly off ops and arrival at Cape Denison. It was a good meeting and ended up with us speculating what we would do if the situation at Cape Denison was not what we anticipated – that is if the huts had disappeared in the past twelve months!

Minor drama when an irate Patrice arrived. The cause of the concern being a rather long email attachment sent to Estelle. Poor Estelle – it was a time when an apology was called for but it didn't seem to help in the first instance. Dave, thankfully, was able to fix the ship's email system and unclog the offending email.

Day 9 Thursday 24th October

When we woke we were making rapid progress through young ice 20-30 cm thick. The rising slope of the continent was visible in the distance. A little after midday the ship reached the fast ice with ice recce conducted with the helos. By 1300 we were in position in a channel made by the ship well into the fast ice and ready to start operations. Our position was 66°37 S 141°52' E, some 29 nautical miles to the west of Cape Denison.

At 1430 we flew on our first recce of Cape Denison - Dave and I with chief pilot Roger De Souza, in the Squirrel. Conditions at the ship were relatively calm with wind at about 20 to 25 knots. However once we flew east the conditions deteriorated rapidly and by Cape Hunter it was evident that it was far too windy to consider commencing our unloading operation. We radioed back to the ship to give notice for the French to commence their unloading to Dumont d'Urville. We flew over Cape Denison and were able to establish that Mawson's Hut was in fact still standing as was the Sorensen, the apple hut and the Granholm refuge. Our contingency plans were not required!

I had hoped, that as the afternoon wore on, the conditions would improve and we were all packed ready to fly-off. It was not to be. The French, however were able to get on with their operations as the weather was fine to the east. After discussions with Patrice the plan then was for a recce at 0700 on Friday morning. I was not optimistic as Cape Denison is notoriously windy – especially am when the katabatic winds roll down off the plateau. I thought that the late afternoon was going to be our best bet. I convinced Patrice that we should be prepared during the recce to land an advance party – myself and one other with enough gear so that we at least could report on weather conditions for flying from the Cape Denison end given the distance from the ship

It was a great location to be passing the time. Behind the ship there were Emperor penguins jumping out of the water onto the ice and Minke whales cruising down the lane we had cleared in the ice. There were about 4 Minkes together at one stage.

Marty and Mike assisted with the refuelling of the helos and with the cargo. At the completion of the fly-off operations for the evening we had a quiet celebration of Adrian's success in winning five national architectural awards.

Day 10 Friday 25th October

Temperature -8°C Wind 28 knots which eased later in the day.

It was a 0600 start in anticipation of a clear run. The wind was blowing 28 knots at the ship. Over breakfast Roger advised that we could take 3 in the squirrel. Mike had about 15 minutes warning to accompany Dave and I. We took off at 0730, pretty jammed in, packs and all. Half way it wasn't looking good and advised the ship that fly-off ops were off so they could prepare cargo for DDU. We decided on a closer look, a decision very quickly overturned when right above Cape Denison we encountered extreme conditions and were caught momentarily in a huge down draft- which the helo at full throttle wasn't countering. It was a tad hairy but we were able to turn and head back to the ship.

So we were on hold again – the Captain was pessimistic after consulting the three day weather map. The indication was that the conditions were likely to stay constant for the following three days. The guys continued to assist cargo ops, Linda and Estelle started to talk about the MH Works Plan.

I was never far from the bridge or the back helo deck. At 1355 the Master came back on the bridge, closely followed Patrice, the Voyage leader. Almost immediately it was “be ready to go in 18 minutes.” The verdict was that the conditions looked good. Looking at the horizon Yvon had decided it may be a goer. At 1415 Mike, Dave and I were again wedged in the Squirrel with our gear.

Once in the air we all expected a repeat of the 0730 recce. The conditions looked very much like our earlier flight. Once at the ice edge it was evident that they had in fact improved, the sea being quite calm. Likewise at Cape Hunter, a little over half way, when we realised we were on a roll. We contacted the ship to advise that we intended to land and to commence cargo ops. We were offloaded at the Sorensen Hut at 1500. We were amazed to find the conditions so much better than at the ship. Quite calm in fact with wind estimated at 5 knots gusting to 10 or 12. We checked out the Sorenson Hut which was in perfect condition, the apple – snow filled, the rest of the site perfectly contained. With the availability of the Iridium telephone I was able to ring Rob Easter to let him know we had arrived.

The BK (the second helicopter) was working Dumont d'Urville and a further flight was planned to clear the deck of the French cargo to then allow our operations to commence. The next 1 hr and 40 minutes before the Squirrel returned with a cage pallet was great. The dialogue was pretty basic, like – “we cannot believe it is this calm”, and many, “wows”! Actually we were proactive and prepared the hut and commenced to get the communications established. First task was to remove a frozen, leaking battery from the Sorensen. It was a great break before it was go go go. Marty and Geoff were next to arrive on the BK, Geoff in the back with a heap of cargo.

The rest of the afternoon was full on with Estelle, Linda and Adrian arriving to very calm conditions at 1730. It was a relief that the wind wasn't stronger as the equivalent of 3

caged pallets of gear was transported inside the squirrel or BK. We rushed to get everything secure expecting a return of the 50K winds. Linda and Estelle shovelled the snow out of the apple. A great deal of gear was then stowed inside. The only remaining gear to come ashore being the quad trailer and 5 caged pallets.

By 2210 we were eating a hot cooked meal. We all slept in the Sorenson Hut, Linda and Estelle in the bunk in the kitchen, Marty on the table and the rest of us lined up on the floor on mattresses in our sleeping bags. Conditions remained calm all night. At 0230 it was dead still outside.

Day 11 Saturday 26th October

Temperature -8.6°C Wind very slight, blowing at an estimated 10 –15 knots

It was still incredibly calm when we stirred on Sunday at 0700. I woke the guys and we called L'Astrolabe anxious to make the most of the conditions. However they were experiencing snow showers which persisted throughout the morning. From Dave's small digital gauge which measured internal and external temperatures we were able to ascertain that the external temp was - 8.6°C, and within the hut it was + 4.1°C .

Dave attempted to get the HF radio operational to no avail so we had to rely on the Iridium phone.

The delay in flying provided a good opportunity to consolidate the field camp. Estelle, Adrian, Linda and Geoff went on an initial visit to the Mawson's Hut site. Mike and Marty got the two quads going and visited the fuel depot and decanted petrol to smaller containers, then commenced clearing the Granholm hut for their tools. Dave, Adrian and Geoff investigated water collection, the lake proved impenetrable for water collection so currently we are relying on snow melting. I stayed by the Sorensen to monitor the Astrolabe's position regarding flying operations.

By 1300 we were all back in the Sorensen and at 1345 we had an informal team meeting to clarify priorities for action. Two of the polar pyramids were erected by early afternoon. At roughly 1400 we were advised that conditions had lifted at the ship and that the BK was on its way. The equivalent of 5 caged pallets and the plywood was then ferried in by the BK and the Squirrel and by 1745 all of our cargo was ashore.

We were delighted with our progress and believe we were now very well organised. So much so that when the wind sprung up at 2100 (right on dinner time) a quick recce confirmed our confidence that we were. Linda and Estelle slept in the apple hut, the 4 guys in the tents, Dave and I still in the Sorensen and will move out once we have established another tent site. The Works program includes constructing a third tent platform however the priority at the moment is accessing the huts and allowing the commencement of the broader program.

Day 12 Sunday 27th October

Temperature – 16.5° Strong winds estimated at 60k + and gusting over 70k.

The strong winds proved a good introduction to those in the polar pyramids. We did in fact have some reassuring discussion during the evening of the capacity of the PP's to sustain strong winds. We were very relieved to have completed the helo ops. A slow start as we had a pretty late evening and all somewhat tired after the previous 24 hours and still coming to grips with the fact that we were actually here.

We conducted a meeting before lunch where I went over the leaders brief, covered all items and reviewed field camp processes and how we intend to operate re day to day tasks. We were very well established already with snow collection, waste etc. Marty and Adrian doing the first slops and human waste run to the bay. This is where the quads and trailer proved invaluable. We reviewed a couple of immediate OH & S issues and Marty gave an overview on the use of fire extinguishers.

A couple of issues had arisen since we landed.

- Batteries for RTA

Two lead acid batteries in the hut were damaged and leaking. They are now contained in a fish bin and within a heavy plastic caged pallet liner- located outside the Sorensen. Our intention is to attempt to maintain frozen state – will cache in appropriate site in ice fridge. Will seek advice from Rob re RTA (L'Astrolabe quite rightly wouldn't take it)

- Iridium phone calls –need to clarify cost per minute for personal use.

- HF Dave will have another go and if not will try contact with Ian Bruce and talk it through – the fundamental issue initially was not being able to adapt our frequencies to the ships or helos .

Sunday afternoon we formally commenced the actual MH works plan. We decided to have a round table discussion to ensure that the whole team had common understandings of the way forward. It was a very useful session and has set the basis for an integrated approach. Estelle gave a really good introduction basically giving a potted history of the site post 1911/14. It set a number of matters in context for us. We then briefly revisited the Conservation Management Plan prior to discussing the Works Plan and priorities for commencing work. The catch up on the current thinking on ice removal was important given Marty and Mike hadn't been brought up to speed given the lateness of the advice received from the heritage consultants. The session took much of the afternoon.

Day 13 Monday 28th October

Temperature -14° C. Wind 70k gusting to 80k+ for most of the day. Clear sunny skies. Light occasional blowing ground drift. White caps and rough seas. Minus 10°C inside the Sorensen Hut.

Strong winds persisted throughout day. Field camp routine has been established with late morning start to working late in the day, in anticipation of the winds abating. This did not happen again today.

A preliminary photographic and video recording of the conditions around the huts was carried out. This was essential work before the Main Hut and Magnetograph Hut can be entered as snow removal will be necessary. Recording was also made of the condition of the external walls of the main huts. The positive of the strong windy conditions was that the significant movement of battens and sailcloth was able to be recorded on video. A preliminary examination of the artefact scatter was conducted to enable prioritising actions for recording. There are more artefacts visible than anticipated given it is October. This is a reflection of the strength of winds in the area. Estelle and Linda are happy with achievements today

Considerable time was spent in ensuring all equipment was functional- specifically generators, battery boxes and quads. The Granholm Hut has now been kitted as a refuge and equipped with the many boxes of tools required for work on the site. The Granholm demonstrated its value with the prevailing conditions in that it allowed the team respite time, then to continue their program without taking the extra time to return to the field camp.

A number of difficulties were experienced with the small generators – they are basically not functioning- in fact Mike has had a total A factor day addressing a number of issues. The last straw for him was when I inadvertently locked him in the toilet (briefly thankfully) Marty also had an A factor day on a number of tasks he was undertaking. It was a clear lesson in how long some tasks can take down here. Dave has started constructing an igloo to sleep in.

Day 14 Tuesday 29th October

Temperature min-18°C, max -14° C. Wind 70K+ gusting to 100K+
Winds abated to 40K by 1700 however picked up again by 1900.

The adverse conditions kept us hut bound for most of the day. We were still able to effectively use our time. Mid afternoon Estelle and Linda conducted further photographic recording around the huts prior to accessing, then relocated a seal cache at Penguin Knob and further discovered an additional cached seal. They further developed their proposed methodology for survey work.

The extreme conditions are impacting on gas usage given need to melt snow. Despite the cold morale is excellent. We did expect it to be cold and windy.

Day 15 Wednesday 30th October

Temperature min-20°C, max -14 C. Wind max 50 k easing to still late afternoon.

The temperature inside the Sorensen Hut was estimated at minus 11.4°C this is. The wind was still robust however late morning a trip over to the MH site revealed somewhat better conditions. The wind abated, the sun came out and the day was declared “perfect”. So much so the working day continued until 2130. The photographic record of the exteriors of all the huts was completed as was the digital video recording of the artefacts scatter. This will be repeated over the period of the expedition. The seal caches were

photographed and catalogued. A further seal was discovered – rocks and evidence of butchering confirming they in fact had been cached. Preliminary assessment of the condition of the cladding commenced. Clearing snow to access the Main Hut was also commenced by Adrian using an ice saw but declared it a slow process and preferable to use the chainsaws. This will require the generators and all the associated safety gear so Mike and Marty continued to get the Granholm Hut established as a workshop.

Adrian and I excavated a flat snow platform for the third polar pyramid in the snow bank behind the other tents and David and Di moved in, so the field camp is now complete. We celebrated my birthday with great dinner, Yalumba Mawson's Blend and individual choc cakes. We made the first sighting of skuas returning for the summer.

Day 16 Thursday 31st October

Temperature min-18°C, max -12°C. Light winds gusting 5-10K initially then a very calm beautiful day. Wind picked up again at 2115.

Temperature inside the Sorensen Hut was estimated at minus 8.3°C this am. Estelle and Linda continued documentation of artefacts on penguin knob and of the western wall of the main hut. A major effort over six hour period was made to clear snow to access the door of the main hut and footings at the northwest corner. The chain saws made a huge difference and by cutting blocks it was easier to remove the snow and ice away from the hut. Marty and Mike wielded the chainsaws Mike on the NW corner, Marty on the entrance. Adrian monitoring in relation to the building, with the rest of Geoff, Dave and I moving the ice blocks. The whole exercise took about 6 hours.

We took advantage of another perfect day, finally packing up and heading back to the Sorensen Hut at 2100. A very satisfying day although it was frustrating having only one quad operational. Mike will try and diagnose the problem – if we cannot it is probably better to RTA it. It appears to be an electrical problem it has a very weak spark. (we have even resorted to consulting our field manual) another option is for Steph to bring a new spark plug and maybe be some sort of ignition electricals. Dave had another go at the HF radio without success.

Day 17 Friday 1st November

Temperature min-15°C, max -5.4°C. A calm beautiful day. Sunny cloudless sky. No wind until at 2200.

We celebrated our first week at Cape Denison. Despite the extreme cold everyone seems to be coping with their gear. Main complaint frozen feet – changing the liners makes a huge difference. We envied Adrian and Dave for their Ugg boots.

Mike and Dave got the battery banks operational and installed the inverter reducing the reliance on the generator. Mike also ensured the generators were earthed. We are optimistic that it will at some time be getting warmer and constructed a freezer for the meat. Geoff commenced meteorological observations and we discovered that our small household thermometer had been reasonably accurate.

Linda and Estelle continued surveying Penguin Knob for artefacts. The site is some 300 metres downwind from the Main huts and the extent of artefact scatter is testimony to the wind strength. In this area Linda also found parts of the timber skylight installed by the AAP team in 1997/98.

Adrian oversaw further excavation of snow and ice by Marty and Mike with Geoff and I providing the labour to remove the growing accumulation of snow from the immediate vicinity of the hut. The footings were exposed on the North West corner but due to presence of artefacts, further excavations have not proceeded at this stage. The intention is to expose footings where the least number of artefacts will be disturbed. After some 4-5 hours at 1900 the Main hut was accessible and Linda, with Mike's assistance, retrieved monitoring equipment, namely agar plates, leather and paper samples, from the Workshop and Main Hut.

We all then savoured the moment of being in the Living area and each had our own "explore". According to Estelle the interior of the Main Hut had not the accumulation of ice and snow as was anticipated. There was however evidence of the 2001/02 summer melts in the form of icicles on the eastern bunks. The stove, previously having only one foot visible, is now nearly fully exposed. There appears to be evidence of melt and refreeze on the floor and on some large ice blocks near the kitchen area. The ice removed from the workshop in 2001/02 does not appear to have re accumulated.

We had wonderful weather for the snow and ice clearing from the hut. It was a pretty content bunch walking home the ocean route at 2100 last night. I had headed back about 30 mins earlier and sat up on Beryl Hill admiring the view and watching the yellow suits come into sight. Dave meanwhile had started to assemble the wind generator.

Day 18 Saturday 2nd November

Temperature min -11.9°C, max -7.4°C. Full cloud cover all day. Wind consistent, strong gusts to 70K overnight easing to 30- 35 K during the day.

Linda, Estelle and Adrian conferred over breakfast the plan of action regarding ice removal before spending a number of hours in the Main Hut. The ice accumulated on back plastic placed in the workshop and living area in January 2001 was collected and weighed. The accumulation in the workshop weighed 9 kg, with further 16 to 17 kg collected from the living area. Ice profiles in both areas were photographed to document new ice and snow collection. Commenced "measured survey" of ice profiles and given integrated issues of the site are now considering the next steps regarding ice removal.

Linda collected the corrosion coupons left in 2000/01, part of a CSIRO developed process for exposing different steel, which are part of an ongoing monitoring process. New ones will be put in place prior to our departure in December.

Mike and Marty have further organised their materials in readiness for their component of the program to begin. Mike again had one of the small generators apart on the table in the Sorensen – and he seems now to have the knack of diagnosis and fixing.

Geoff and Dave continued to capture day to day activities on video including the construction of a meat freezer and later in the day they organized to film the three returning from MH. Hilarious footage of Geoff running to get ahead of Adrian, Linda and Estelle. Apparently not on the script given D's expletive.

Equipment has been a challenge – glad I swapped a couple of the polar pyramids – but still should have rejected another which now has a huge split in the valance – Also am a tad annoyed at Don R issuing boots to Dave which have virtually no tread – reckon it contributed to his fall on the ship. If the Aurora makes contact I will try and see if I can arrange a swap. Plus will need to do a few repairs on other clothing – ditto packs – I am surprised things go back on the shelf when broken! However I guess it is all a matter of resources.

It is blessing to have the quad and the trailer. Had a laugh to myself the other day watching M2 very slowly making their way back below the moraine line, Mike sitting in the trailer – they looked like Noddy and Big Ears from a distance.

Dave got a great email from Ted re punters complaining of cold in the Cradle Mtn huts – apparently he showed them Dave's email of our group decision not to light the gas heater unless it gets below minus 10 inside. It gave us a great laugh.

Day 19 Sunday 3rd November

Temperature min -8.6°C, max – 4.5 °C. Cloudy. Wind 20-30K

Adrian had a disaster late last night losing all photographic images he had downloaded to his computer. There is a remote chance of retrieval so his computer is now out of action. The computers are an essential part of modern expeditions, in fact we are under resourced. A good thing Geoff and Mike bought theirs. Adrian and Marty are using Goofs and Linda and Estelle are sharing. The problem is that we all look to access the machines at the same time before or after dinner.

We finished the second gas bottle after breakfast – again lasting four days only so mid morning we had a full team discussion re the fuel situation. On current usage we determined that we would fall well short – by 20 days in fact. So we have to get an additional 3 days out of every bottle. We cannot rely on any deliveries from the KK in early December. Snow melting and bread was considered to be the main user. The petrol consumption is not cause for concern unless we make excess use of the generators. We had a pretty good brainstorm of how we could extend the bottles we have remaining.

It was resolved that we should make every effort to get the solar panels and wind generator operational which can cover our lighting and computers. We have also instigated greater conservation measures in the use of the gas stove. Much discussion took place over alternative systems to snow melting as this was having the greatest impact on gas usage.

Linda, Estelle and Adrian headed off to MH. Linda and Estelle made progress using the GPS to locate artefacts. In fact I was surprised that they used Dave's personal GPS. Linda, Estelle and Adrian were able to spend some hours continuing the work initiated on Saturday within the Workshop and Living Area in the Main Hut. Linda measured moisture content of the wooden cladding at various locations inside the living hut. Adrian and Estelle began excavations of the toilet and the North West corner footing of the Main Hut. We called them back at about 1900 as it looked as though there was a blizzard brewing. There was some light snow fall but it didn't amount to much.

By 2100 Marty with assistance from Adrian and myself, installed the two solar panels on the northern side of the Sorensen just as it appeared that a blizzard was brewing. At 2315 and Mike had the wind generator operational however it not yet charging the batteries. Dave had commenced constructing an ingenious snow melter utilising six halogen lamps as a heat source. A review of the petrol consumption indicated that this was unlikely to be a concern.

Day 20 Monday 4th November 2002

Temperature min -7.4°C, max -2.2°C. Clear Sky. Wind 20-30K increasing late evening to 50K plus.

An earlier start with the calmer conditions. Adrian, Linda and Estelle worked within the Main Hut excavating the north west footing of the main building clearing accumulated snowdrift from the toilet area. Estelle and Linda undertook further recording using the GPS. Dave, assisted by Geoff undertook a comprehensive photographic record of the interior of the workshop and main living area, which was then repeated with a video survey by Geoff. Dave was later able to transmit 10 images back to Australia.

Marty and I headed up to the lake behind the Sorensen to cut ice blocks with the chain saw. We came back with 4 bins of the largest ice cubes you are likely to see for our water supply. Mike had the wind generator operational by early morning. "I could watch it all day," "isn't she a beautiful thing" it proved to be a source of great pleasure for Mike. We all took our turns in admiring her. Marty and Mike, assisted by Geoff then completed a number of tasks around the Sorensen Hut, addressing safety concerns and finally constructing our alternative snow melter.

Mike with his assistant B1 (alias Geoff) constructed a new shelf for the kitchen which has made a huge difference to the clutter. There still seems to be plenty of bench space despite the new snow melter box in the corner. Marty constructed a safety rail for the Apple hut landing which will make it safer for Linda and Estelle during strong wind events.

Adrian was interviewed by ABC radio Darwin. I spoke to Rob Easter on the telephone during the day. Dave, assisted by Marty, made great schnitzel for dinner.

Day 21 Tuesday 5th November

Temperature: min – 10.5°C, max – 3.5°C. Light cloud. Wind 70-80 gusting to 90K

Extreme wind conditions kept the party Sorensen hut bound for the day. Fortunately given it is the “computer age” in Antarctic endeavours all were operational and time was taken cataloguing and describing the multitude of digital images taken of artefact scatters and details of the Main Hut. It also provided an opportunity for discussion regarding progressing on the works plan for the hut to ensure an integrated approach. Linda and Mike have had pre planning session re installation of environmental monitoring systems. Dave completed his weekly column for the Canberra Times.

Estelle and Linda expressed gratitude to Marty for his construction yesterday of the safety rail on the apple hut platform. Even the short trip along the veranda to the toilet had us lurching from hand hold to hand hold. It was however extremely cold in the hut and complaints of cold feet were plentiful. We utilised a rucsac and sleeping fluffy rug as a respite measure for our feet and it seemed to work quite well. Bit of recreational reading going on pretty much for the first time since we arrived.

Mike and I had the opportunity to discuss helicopter operations and as a result I sent an email back to Rob re likely scenario for RTA. Marty had really been suffering from cold feet so he disappeared for a time back to the sleeping bag in the tent. I did the same not long after. The ingenious snow melter required some modifications and is now creating one litre of water an hour while we run the generator.

The wind dropped at about 1900 for an hour or so which gave Marty and I a chance to do a waste run to the ocean. Geoff captured it on video. At 2100, when the wind had dropped to about 50K, Mike started work on the second quad and managed to it running again.

Day 22 Wednesday 6th November

Temperature: min – 9.6°C, max – 5.6°C. Light cloud. Wind 30-50K

The examination of the integrity of the footings is a key component of the Works Program for Adrian so the surface of the footing of the north west corner of the main hut was reached however excavation ceased given that two or three stones exposed are solidly embedded in ice (at this stage working 4-5 feet below the snow line). Despite reasonable efforts to remove the stones there was no success. To continue could have had an adverse impact with the potential for a long term problem of trying to reinstate a secure footing. Adrian recommends against proceeding for the present time subject to further thawing. It is proposed to commence exposing the footings at the south west corner of the main hut and the north east corner of the workshop.

The environmental monitoring program was a key activity for the day for Linda and Mike. The solar radiation sensor, the melt water sensors and 8 relative temperature and relative humidity sensors were located and removed. Two vibration sensors were installed and the south east corner of the living hut was cleared in preparation of the

installation of the displacement sensor. Marty assisted Estelle in the collection of ice samples for oxygen isotope analysis and chloride analysis from various places within and outside the hut.

The quad Mike had spent so much time on yesterday refused to start this morning and then the second quad died for no apparent reason and though restarted it is now proving to be temperamental, in turn testing our temperaments. Dave spent the afternoon working on the HF radio with some success some channels now audible and now investigating aerial length. Dave transmitted a number of photos back to AAD. Lamb curry for dinner. The group of us, remarkably, seem to enjoy the same sort of food.

Day 23 Thursday 7 November

Temperature: min – 12.8°C, max – 8.6°C. Wind constant all day gusting over 100 K.

Very extreme conditions kept us hutbound all day. It would have to be a memorable birthday for Adrian, and a great contrast to the conditions currently being experienced in his home town of Darwin. The warmest place to be was in our sleeping bags though everyone was up and in the hut by late morning. There was some use of computers documenting work, writing emails and for some reading. Cabin fever saw a few of us out later in the day – but seeing a pair of goggles catapult over the ice, become airborne then disappear north confirmed the importance of securing our gear. Dave, Adrian and I ventured out late afternoon for a walk when the wind dropped to about 70-80K. We headed over towards Lands End getting as far as the southern end of the first ridge to the east of MH valley. It was a pretty challenging walk where you had to assume a half seated position when walking down wind then coming back into the wind bend double, stopping at times to lie down on the snow to get your breath back. The worry was that the wind gusts would suddenly cease and therefore you would lose its support.

At 2100 and 2200 HF radio contact was made with the Aurora Australis. They advised that they were heading back to Hobart so we wouldn't see them. We celebrated Adrian's birthday with a roast lamb dinner and individual chocolate cakes and more red wine.

Day 24 Friday 8 November

Temperature: min – 11.5°C, max – 8.6°C. Clear sunny skies. Wind constant all day 50-70 K

The temperature inside the Sorensen Hut now appears to be 2 degrees warmer than the external temperature. It was minus 9.5 inside the hut this morning. Everyone was glad to get out of the hut today to warm up with more activity. So we headed over to start the ice removal from the workshop. Linda and Estelle however continued transferring data onto the computer regarding the documentation of the western wall of the Main hut. They came over at about 1600 when we were having lunch in the Granholm Hut. A major effort, some 6 hours, was made in removing snow and ice from inside the workshop. The accumulated snow was level with eaves with quite a clear space under the pitch of the roof to allow initial access. Five of us worked moving the snowblocks out and away from the hut. Mike and Marty on the chainsaws with Adrian first on hand monitoring the

removal of ice and proximity to the walls, Adrian and Geoff moving the ice blocks out of the hut, while I gathered up the blocks moving them further away from the entrance and attempting to make an ice wall to shelter the generator making it easier to refuel.

Linda and Estelle began cataloguing artefacts in the living area of the Main Hut. A start was also made by Estelle on scripting a Briefing Video for tourists to the site. Dave took the opportunity to clear and clean the Sorensen an impossible task when all 8 of us are in residence, especially to give some order to the plethora of leads to computers, our new snow melter and on.

We were delighted to be rewarded with our efforts to conserve gas with the current bottle now serving 5 days. Dave baked bread again and the cold lamb sandwiches for lunch were very much appreciated. Pasta Carbonara for dinner. Dave has done a great job in ensuring great diversity in our food. The beer was frozen tonight and once open it was a losing battle to drink it before it completely froze. The piss run was also a real challenge for Adrian and I – we reckon the wind at 70 k or so was about a maximum you would want to undertake the task. The number of drums is another limitation. However if it is not done daily it is a hassle when the contents in the drums freeze.

Day 25 Saturday 9th November

Temperature: min – 13°C, max – 8.4°C. Wind constant all day gusting over 80 K easing to 50K around 1900. Minus 11.4°C inside the Sorensen this am.

There was some debate in the morning regarding the trip over to the Main Huts. No one relished the idea of sitting around in the Sorensen all day. It is impossible to avoid the feet freezing though we reckon we are all getting used to the pain, though Adrian's are also itchy. The consensus was that the risk of being blown over and incurring injury was too great to go over to the huts. The wind was stronger than when we came home last night and then it was getting on the hazardous side. More than that is the worry that it will build up even more and the thought of being camped out in the Granholm Hut doesn't appeal. There is frustration when we feel we can not advance the program however the time is usefully spent in updating documentation on the computers.

The wind generator was modified to reduce the number of blades from 6 to 3 due to the strength of the winds and a fear that she would be overtaxed. It took all five of the guys supporting blades in the first part of the exercise. When they came back inside the hands were really suffering, though Mike seems to have quite a tolerance for the cold. To complete the exercise all five ventured out again – 4 holding the generator while Mike did the attachment. I filmed the action from the window and you really got a sense of the strong winds.

With the temperature within the Hut at minus 11 this morning it is a cold exercise. The fingers and feet suffer so much so that Adrian, Marty Geoff and Linda returned to their sleeping bags to raise the core body temperature.

Mike also demonstrated his versatility and now is chief mechanic as well as a carpenter. He successfully solved the problem of the failure of our second quad and it has now operated for successive days. We were most impressed when he took the carburettor apart and put it back together without any spare parts remaining on the table!

Our third gas bottle has now lasted seven days so our conservation measures have been a success. There are some obvious side effects by reducing water production however according to Linda "it is a very bonding experience". We are getting more conscious of the need to drink more as the symptoms of dehydration become evident. Dinner last night was tomato soup, followed by freeze dried chicken teriyaki, Deb potatoes and peas. We are so water aware we insisted using our soup bowls for the main course, much to Dave's disgust.

Day 26 Sunday 10th November

Temperature: min – 13°C, max – 7.4°C. Wind initially gusting to 50K easing to 20-25K mid afternoon and rising again to 50K around 2200. No clouds. Minus 11.4°C again inside the Sorensen this am.

The improved conditions were conducive for an earlier start and led to a good working day. Adrian, Marty and Geoff headed off before 1130 to continue the removal of snow and ice from the Workshop, removing an estimated 3 cubic metres. The removal slowed as a more sensitive approach was required closer to the workshop walls. The growing mountain of snow and ice outside the hut is evidence of the labour and Geoff's effort as he was pushed to keep up with clearing the snow away from the hut.

An unknown artefact was uncovered. There was much speculation and initial thoughts were that it may be a sail for one of the sleds. Linda and Estelle completed documenting and recording of the western wall of the Main Hut and commenced and completed 75% of documentation of the eastern wall. They also undertook the preparation of a condition report and cataloguing of two shelves of artefacts in the Living Hut. Further cached seals were found close to the Granholm Hut and on the shore to the east of the Sorensen Hut, bringing the total now to 11.

Despite the cold conditions we are beginning to note the snow retreating around rocky areas. The wind has a significant impact on snow ablation and Dave's igloo walls did not survive very long.

The calm conditions saw us finish work at 2100 then lounge around the rocks having a beer until the sun disappeared off the rocks at 2130. Given it was minus 8.5° C we must be acclimatising. I think there was also a bit of wishful thinking or kidding ourselves after the days of strong wind. While cold conditions persisted the long hours of sunlight allowed the thin mattress to dry when placed between the inner and outer skins of the PP tent. We receive an email from Rob confirming recommendations to RTA artefact timber. Ron also emailed positive feedback re progress detailed in our weekly report.

I started with the observation and recording of the nesting birds and confirmed 8 snow petrel nesting sites on the western slope below the cross. Estelle cooked a great pasta dish for dinner. Our gas bottle has now lasted 8 days.

Day 27 Monday 11th November

Temperature: min – 10.9°C, max –4.1°C. A calmer day wind initially 20-25K mid afternoon and rising again to 30-35K late afternoon. Still minus 8.3°C inside.

Calmer conditions resulted in another earlier start and the ice removal from the workshop was completed. A further estimated half cubic metre of ice was removed. The ice level was reduced to approximately a metre below the eaves which will allow space to carry out any remedial work on the roof structure. An ice shelf was created in the living hut to accommodate the environmental monitoring equipment and Linda and Mike were able to commence the calibration program. Cataloguing of artefacts also continued. Rob emailed that he conducted another radio interview it is pleasing to know that there is considerable interest in our activities. He also advised that our photos are now on the web and looking good.

Dave and I went for a walk to locate by GPS and describe all cairns at Cape Denison. We completed the outcrops at the Land's End of the Cape Denison site. Roast dinner again.

Day 28 Tuesday 12th November

Temperature: min – 8.9°C, max –6.5°C. Overcast clearing to sunny skies later in the day. Wind consistently gusting over 50K. Minus 8.1°C inside.

Marty and Adrian prepared the interior roof of the Workshop for the installation of new collar ties. In some places the ceiling lining boards were removed and accumulated snow and ice taken out. I assisted the guys and it proved to be quite a dirty job because of all the tar paper. Very good progress was made with no surprises and work is progressing in accordance with the works plan.

Linda and Mike continued to work on the environmental monitoring program and installed the data logging program it proved somewhat problematic and will require further attention. The cold conditions made it difficult for the computers to operate in the Living area of the Main Hut.

The snow and ice excavation in the workshop exposed what is believed, after consulting the 1978 Ledingham Report of works in the Hut, to be the tail the air tractor. Shelves on the southern wall of the Workshop were cleared and Estelle recorded the artefacts. Estelle also worked on the script for the tourist briefing video. Received an email from ABC Radio Newcastle seeking to conduct an interview with me.

We are now onto our fourth gas bottle and if we can maintain our consumption patterns we are more confident lasting the distance. This still prohibits heating and limits water making. Dave cooked a curry for dinner.

Day 29 Wednesday 13th November

Temperature: min – 10.9°C, max –6.1°C. A partially cloudy day clearing later. Wind consistent 25-40K. Minus 8.7°C inside.

Mike and Linda continued with the installation of the environmental monitoring equipment overcoming some initial difficulties. A wet candle for assessing exterior salt concentration was installed. External corrosion bolts were retrieved. Geoff excavated an area of solid snow in the meat cellar in preparation for the installation of a thermocouple to measure sub floor temperatures. Adrian and Marty continued in the Workshop with repair of three broken rafters and with further preparations for the installation of the new collar ties. Estelle also continued in the workshop working on recording the shelving contents of the southern wall. Geoff and Dave excavated the snow to allow access to the Magnetograph Hut. Interest in our activities continues. Dave, Geoff and I also photographed the variety of lichens on the ridge between Mawson's Hut and the field camp.

I was interviewed by ABC Radio Newcastle and Linda prepared an article for the Launceston Examiner. Dave wrote another column for the Canberra Times. It was a typical evening in the Sorensen with the evening joking set off by a great steak dinner, cooked to order by Dave. We sat down to dinner at 2300 and joked about nicknames and other things before the first departure for bed at about 0100. Marty and Geoff gave Linda and Estelle a break from the evening dishes.

Day 30 Thursday 14th November

Temperature: min – 10.6°C, max –8.9°C. Clear sunny day. Wind consistently gusting over 50K all day. Minus 8.9°C inside.

Marty and Adrian continued with the repairs to the rafters in the Workshop. Preparations also continued for replacement of collar ties with the installation of a string line and by preparing replacement timber. The environmental monitoring program and calibration of sensors continued to be problematic for Linda and Michael. However the Magnetograph Hut was accessed and the agar plates which are a culture medium designed to detect any mould spores in the air were removed. Lead and paper samples were also collected. The installation of an antennae for the satellite telephone to transfer environmental monitoring data was also initiated by Mike.

Estelle and Linda commenced cataloguing and recording the condition of Sir Douglas Mawson's cubicle, his personal space within the Living area of the Main Hut. Geoff and Dave began preliminary excavation of the footings of the North east corner of the Workshop. Marty constructed a grid for Estelle to assist her in mapping the artefact scatters. I cooked beef burgundy for dinner.

The first Weddell seal hauled out on the ice adjacent to Boat Harbour. It appears to be a young juvenile.

Day 31 Friday 15th November

Temperature: min – 10.4°C, max –6.1°C. Clear sunny day. Wind consistently gusting over 50K all day. Minus 9.9°C inside.

Marty and Adrian completed the installation of the four new collar ties in the Workshop. New *U* bolts were fashioned because the detail of those brought down was incorrect. Mike installed the satellite telephone antennae. Tiny tag data loggers to measure temperature were installed in the Main and Magnetograph Huts. Linda and Mike continued to experience difficulties with the calibrations and telephoned Vinod in Sydney to discuss the options

Linda and Estelle continued cataloguing and recording the condition of Sir Douglas Mawson's cubicle. Excavation of the footings of the North east corner of the Workshop was discontinued at the level where artefacts emerged.

I sent the weekly report to AAD and included notes for website on waste generation and energy consumption. After three weeks we have estimated that we have accumulated 55-60 kilograms of household waste – or 7 kg per person. We are recycling aluminium cans and PET plastic. We have consumed 4 kilogram of gas per person. Gas is used only for cooking and water melting. An estimated 37 litres of petrol per person has been consumed. This fuels the generators used for the computers, lighting, recharging batteries, electrical tools, as well as the two quads. On average we dispose of 30 litres of grey water and 18 litres of human liquid waste, and 3 kilograms of solid human waste into the ocean each day. Rob emailed details of purchases to be put a board the KK and arrangements for the timber to come on L'Astrolabe.

Day 32 Saturday 16th November

Temperature: min – 8.2°C, max – 4.6°C. Clear sunny day. Wind consistent 30-40 K increasing in the evening. Temperature inside was minus 8°C.

It ended up being a long working day taking advantage of good weather conditions starting with an earlier departure from the Sorensen than usual for all. Adrian and Martin continued with the repair work in the Workshop continued with the replacement of lining boards in the roof. I was given the task of branding the new boards with AAD 2002. The installation of presslite bitumen foam sealing under the ridge capping was initiated. The foam proved to be too thick and some modifications are required. Adrian excavated the north east corner footing of the north east corner down to level of the ice.

Linda and Mike continued with the environmental monitoring program with the installation of corrosion coupons in the workshop and on Anemometer Hill. Mike also assisted Linda prepare the condition report on the stake at the of the Main building. Linda and Estelle completed the condition report of battens of northern apex roof of the living hut and commenced reporting on the southern roof. Geoff took some excellent video footage of them at work.

Geoff and Estelle spent some hours working on the second of three video recordings of artefacts scatter around the Main Hut. Estelle and Mike undertook a very comprehensive planning session establishing the parameters of the survey using the Total Station was completed.

Dave, Mike and I decanted 7 petrol containers and resecured the drums at the fuel depot site. A curry prepared by Dave for dinner, magnificent sunset and an earlier night for all. Our rest day was declared for tomorrow which everyone very much appreciated as it will be our first since we arrived.

The first of the Wilson Storm Petrels were observed on their return to Cape Denison.

Day 33 Sunday 17th November

Temperature: min – 8.4°C, max –5.1°C. Blizzard conditions prevailed all day. Minus 7°C inside.

We woke to strong winds and blowing snow. Most of us had a sleep in with Mike setting a record emerging at 2030. An official blizzard was declared at 1130 when visibility reduced to 6 metres. Conditions kept us hut bound all day. While it was a “first” for many to experience a blizzard it was hardly the day off that we planned as the intention was to explore Cape Denison. Linda cooked pancakes for breakfast, then for lunch sardines on toast then a beef roast for dinner. So we had a great eatathon. Reading was main occupation for the day.

There was a quite spectacular spray off the ocean from the combination of a large swell and the prevailing wind. Late in the day the first of the Adelie eggs were observed in the rookeries.

Day 34 Monday 18th November

Temperature: min – 3.2°C, max –0.3°C. Zero wind. Light snow falling in the morning. Minus 0.3°C inside (the warmest yet but it did not feel like it).

We adopted a more leisurely approach to the day and it was clear that we needed some respite from the work program so tasks were undertaken which provided the opportunity for enjoying Cape Denison, specially as we woke to a rare morning of no wind. Linda and Estelle conducted condition report of memorial cross in perfect conditions. Marty, Adrian and I took a detour on the way to the Huts on the quads and visited Land’s End. It was the first time that the two of them had been there despite its close proximity to our workplace. It was a perfect morning for it with the dusting of fresh snow over the Adelie rookeries. It was interesting then to note the amount of overnight accumulation of snowdrift within the Workshop and living area of the Main Hut, and points of ingress. A downside of the blizzard was the fact that the generators all required a total work over to clear out the snow drift.

In the afternoon we all, except Mike and Adrian who worked on the generators headed off to John O’Groats. I undertook an initial survey of snow petrel nesting sites and made

substantial additions to the map supplied. Three separate sightings were made of a single Cape Petrel. Three Weddells were recorded on the sea ice in Boat Harbour along with a very fine Leopard seal which we concluded was a female because of its size. Linda and Estelle found a corpse of a Royal penguin on the shore of the western side of the cross.

The fourth gas bottle died while Dave was cooking the evening meal, lamb satay. This was lasted 7 days so we are on track to make the gas last the distance.

Day 35 Tuesday 19th November

Temperature: min – 5.2°C, max –0.5°C. Overcast clearing to clear and sunny late afternoon. Wind 20-30 knots. Blowing ground drift. Minus 5.2°C inside.

It was quite a spectacular morning with the return of the winds lifting the new snow fall. By evening the blue ice of the plateau was again evident after the coverage yesterday. The lake behind the Sorensen was still frozen and we decided to cut ice blocks as a way of reducing gas on the snow melting, assuming we would get a better yield.

It was a great contrast to the classic Hurley photograph of collecting ice in front of the huts, leaning into the wind with the ice axe. Picture the same conditions, blowing drift and the 2002 expedition version, using the chainsaw to harvest ice on the frozen lake close to the Sorensen Hut. Marty carved out a large section of blocks, Adrian and I harvested them, while Geoff and Dave took video footage. We collected three bins of very large ice cubes which we are hoping will now last until the lake melts.

Linda and Estelle continued with recording of artefacts in Mawson's cubicle and Marty and Adrian with the replacement of lining boards in the workshop. Mike concentrated on the generators and by the end of the day had them all functional again. Further planning occurred for survey points for Local Station with Mike setting up two survey points on rocks either side of Mawson's Hut. A large elephant seal pulled out onto the ice in Boat Harbour early afternoon. There were also a couple of Weddell seals but no sign of the Leopard seal. Dave cooked roast lamb for dinner.

Day 36 Wednesday 20th November

Temperature: min – 9.5°C, max –5.2°C. Light snowfall overnight wind gusting to 35knots, easing to 5-10knots during the afternoon. Clear sunny skies.

Light blowing snowdrift in the morning. Over breakfast we discussed the utilisation of the Total Station. Some concern was expressed re expectation of the amount of work that this could take. Adrian and Marty completed the replacement of the lining boards in the Workshop and conditions were fine later in the afternoon for working outside. They placed a foam-sealing strip under the south east ridge cap on the Main Hut. Linda and Estelle continued with their condition reporting and cataloguing of Mawson's cubicle. Linda also took moisture readings taken outside the Magnetograph Hut. Mike started on the excavation within the left side of the entrance porch in preparation for placement of temperature probes. He reported that it was going to be very difficult to access as an old box place there has completely been ice in.

Mike anchored the tripods in place ready to commence the survey using the Total Station surveying equipment.

A census of the Adelie penguin rookeries and nesting birds was also continued. Four weddell seals spent the day on the sea ice in Boat harbour.

Day 37 Thursday 21st November

Temperature: min – 9.9°C, max –4.5°C. Light breeze 0-5 knots. A clear sunny day.

The conditions were ideal for working outside and the insertion of the sealing strips under the roof capping of the Main Hut was completed by Marty and Adrian. Marty came back to the Sorensen late afternoon with a headache – dehydration is a major concern now with the hot sunny days. I worked shovelling snow which had re accumulated from around the footings which were previously exposed and wore only my thermal top and bottoms and woollen tights. I was still hot.

Thickness management, moisture readings and condition report of the Magnetic Absolute and transit Huts was completed by Linda and Estelle and they commenced recording of cached seal blubber and bones west of the Main Hut. A concentrated effort was made by Geoff and Mike and to get the Total Station operational with the fixing of nine survey points in different locations.

The census of Adelie populations was continued. The number of seals in Boat Harbour increased and there was sighting of a sole Giant Petrel at 1700. It appeared to be a first stage juvenile and was observed cruising over the rookeries toward John O’Groats for some ten minutes.

Dave took advantage of the warm day to wash the tea towels. Washing is still problematic with the need to melt water. Dave cooked one of the freeze dried risotto, an enhanced version, and I to my surprise made a baked jam roly poly which turned out pretty well.

Day 38 Friday 22nd November

Temperature: min – 6.4°C, max –4.5°C. No wind. High cloud which cleared later in the day. For the first time the hut was zero degrees inside in the morning.

It proved to be another balmy day with no wind. It was idyllic conditions and a great scene in Boat Harbour with 8 seals and heaps of penguins gathered at the ice edge, quite beautiful. The snowies appear to have departed. There was no sign of them at Snow Petrel Gully and only two pairs seen all day.

The environmental monitoring equipment was brought back to the Sorensen Hut as it proved too cold in the Main Hut for the computers to function. Linda and Estelle completed a condition report was on the roof cladding on the east side of the main hut. The documentation of the artefact scatter of the north side of the hut continued proceeding by category with seal parts and bones recorded.

Marty assisted Estelle in collecting ice samples were taken in and around Mawson's Hut to compare with samples taken in 1997. The installation of lead flashing to the eastern and western skylights in the Main Hut was successfully completed by Adrian and Marty and they then cut new over battens in readiness for repairs to the Main Roof. In conjunction with the working of the Total Station, Mike and Geoff were measured by tape the buildings surveyed yesterday.

The count of Adelie rookeries continued toward John O'Groats. Dave took panorama shots around the site and got some fantastic footage on video of the Adelies trying to jump out of the ocean – with many unsuccessful attempts. It was hilarious to watch. We received an email from Rob in which he confirmed that the KK is due here on December the 5th and provided contact details.

Day 39 Saturday 23rd November

Temperature: min – 10.1° C, max – 2.0° C. Wind 45-50 knots easing to 15-25 knots and by mid afternoon increasing again to 65-80 knots at 2130. Minus 2°C inside.

An estimated 9 cubic metres of ice was removed from the workshop taking the level down to approx. 700mm above floor level. The ice removal revealed the broken collar ties and U bolts. The U bolts will be retrieved and if practicable will be reinstated on the new collar ties. The recording of the artefact scatter to the north of the hut continued. Measurements of thickness were taken in the north west corner of the Main Hut.

I continued with the penguin counting. One lone Cape Petrel sighted. Beef burgundy and a magnum of the Mawson's red for dinner.

Day 40 Sunday 24th November

Temperature: min –6.2° C, max – 0.8° C. A calm overcast day wind picked up late afternoon 10-25 knots then by 2100 had increased to 35-40knots. Back to zero inside.

Geoff prepared a cook up for breakfast, bacon, baked beans and cheese on toast. A team meeting was conducted in the morning to review our progress against the Works Plan. It provided a good opportunity to discuss individual programs. A report was then prepared for AAD. I stayed back in the hut to write up a report to allow a review before it was sent off to Rob Easter.

The calm conditions were ideal for outside work and flashings were installed on the two remaining skylights of the main Hut by Marty and Adrian. The application of putty to the glazing on two skylights was also completed by Mike. The cataloguing and recording of artefacts by Estelle and Linda again concentrated on the north side of the huts and when the wind picked up back in Mawson's cubicle. Excavation in the workshop released the straps for the collar ties.

Four Weddell's remained hauled out on the sea ice in Boat Harbour. Early evening 3 Cape petrels sighted then an hour later a flock of 18 were observed flying east. The snow petrels have not returned to their nesting sites however a flock of 20 were observed late

afternoon. The Wilson Storm Petrels appear to be active in courting behaviour and their territory is becoming more evident. They will however approach you very closely, gliding around you. The lakes are starting to show signs of melt so our reliance on cutting ice blocks may change in the forthcoming week. This is eagerly awaited as it will provide the first opportunity to wash clothes since we arrived. Tuna mornay for dinner.

Day 41 Monday 25th November

Temperature: min -6.2°C , max -2.5°C . Overcast clearing to sunny late afternoon. Wind was consistent for most of the day at 40-50 knots, easing late afternoon to 15-25 knots. Minus 2° inside.

Work concentrated in the Workshop. Further ice removal was made to allow the relocation of the boxed husky to the SE corner. The excavation of what is believed to be the tail part of Mawson's air tractor was slow process. It was evident that it had been stored on the collar tie platform. It proved to be somewhat crowded with 5 all working around the tail piece and with different approaches to the ice removal. This resulted in some tension.

The ice in the Workshop is now in the centre excavated down to what is believed to be the level exposed in 1978. Ice still remains around the walls, however shelving has been exposed in the SE corner. The floor is in fact, much safer to walk on and this should prove beneficial when the tourist ship arrives.

Mike placed four thermocouple wires in the Workshop in readiness for final installation as part of the environmental monitoring program and Mike drilled a hole into the subfloor space in the south west corner of Main Hut. The drilling through the floorboards below the bunks revealed an air gap of approximately 20mm then through approximately 60 mm of ice before reaching rock. Steak and apple pie for dinner.

Day 42 Tuesday 26th November

Temperature min -6.9°C max -2.5°C Wind 25–30knots increasing in the afternoon.

Advice was received via Rob that Dave had successfully rebooted the University of Wisconsin's Automatic weather station which had been inoperative since the 18th of September. We were amused that Dave was to be rewarded with a sticker.

Marty and I checked out the siting helicopter landing site and believe only minimal excavation will be needed on the site marked on the map. There were also various options nearby for storing the wood to be delivered on L'Astrolabe. Some of the tension that arose yesterday appears to have been sorted out without my active intervention. The discussion after breakfast re regarding the order of tasks to proceed on appears to have cleared the air somewhat.

Work was completed in the workshop other than additional ice removal if time allows. The environmental monitoring equipment is now positioned in the SE corner of the workshop and the satellite phone has been connected. It is now in readiness for a check

to be made in Australia regarding receipt of data. Snow samples were collected from the Workshop. The cataloguing and recording of Mawson's cubicle was completed and work on Hurley's darkroom commenced. The artefacts on the shelving exposed in the SE corner of the Workshop were also documented.

Adrian cleared approximately 80 kilograms of soft snow from the ceiling of Mawson's cubicle and points of snow ingress noted.

Two juvenile Weddell seals had hauled out to a wind scour within 50 metres of the Main Hut. There are consistently 4-5 adults on the remaining sea ice in Boat Harbour each day. We are also regularly treated to the spectacle of Adelie penguins leaping from the water. One after another they emerge rising some two metres before landing on the ice. Two Antarctic Petrels sighted and a few pairs of Snow Petrels have returned. Marty cooked a great curry for dinner. The fifth gas bottle gave up after dinner. This one lasted 8 days so we are finally out of the woods regarding gas consumption.

Day 43 Wednesday 27th November

Temperature min – 11.5°C max – 5.2°C Wind 25 –30knots easing to 0-5 knots late afternoon. Back to minus 5.3°C inside.

A photographic survey and documentation of the area under the bunks in the SW corner to western wall to Hurley's darkroom and in the darkroom was conducted by David and Estelle. The cataloguing of artefacts in the Workshop continued. Artefacts that have been labelled and stored in various receptacles and locations on previous expeditions have been consolidated and the intention is to store in Nalley bins in the SE corner of the Workshop.

Ice was removed from the south west corner and west wall of the living hut. Marty constructed a replacement hatch for the western skylight of the Main Hut. Mike was worked on rehabilitating the original U bolts for the collar ties in the workshop so they can be reinstalled.

Linda and Michael spent the morning on the environmental monitoring data and made a couple of calls to Brisbane. They were delighted when the successful receipt of data in Brisbane via the newly installed satellite phone was confirmed. The Local Station was used to survey the artefact scatter to the north of the Main Hut.

Geoff successfully tested the MHL defibrillator in the field at air temperature of minus 7°C. Promotional photographs were also taken around Mawson's Hut with a curious penguin adding to the Antarctic flavour. Rob emailed details of the timber which is to be sent down on L'Astrolabe we now have to determine where to depot it. Adrian, Estelle and I went for a walk to John O'Groats as Adrian had yet to visit that end of Cape Denison. Salmon Mornay for dinner, it is very popular much to Dave's surprise.

Day 44 Thursday 28th November

Temperature min – 11.9°C max – 7.2°C Wind 30 – 35 knots easing to 5-15 knots early afternoon.

It was very windy overnight but had eased by morning. I emailed Rob to clarify a number of things regarding our departure from Cape Denison. Adrian removed further ice removed from the south east corner of Mawson's cubicle. In the Workshop progress began on removing ice from the western wall above the bench.

Marty completed installing the western skylight on the Main Hut. It was replaced on a previous restoration expedition was found shattered on Penguin Knob not long after we arrived. Another replacement skylight had to be constructed. Marty also constructed a platform for storage of what is assumed to be the air tractor tail piece. The original collar tie U bolts straightened by Mike were refitted. The original collar tie packing blocks were also reinstated. Considerable time was spent by Mike attempting to verify the accuracy and usefulness the previous day's survey of the artefact scatter and coal dumps.

Linda and Estelle continued cataloguing and condition reporting with 50% of the western roof now completed. Artefacts on Bage's bunk were also catalogued. Further work continued on de icing artefacts labelled and stored on bunks on the western wall.

Two further penguin carcasses were identified, we believe, as Royal penguins. These were found in rocks close to Boat Harbour. A sighting of an Antarctic Petrel confirmed that we have made an error in descriptions and what we had identified as Cape Petrels were in fact Antarctic Petrels. Spaghetti bolognaise for dinner. Dave continues to provide variety and great meals.

Day 45 Friday 29th November

Temperature min – 12.0°C max – 5.0°C Cloudy clearing to sunny skies by mid afternoon. Wind 35-45 knots easing to 5-10 knots.

We were all pleased to receive good positive feedback on our progress report from Rob. Mike and I prepared an email to send off to AAD re the Total Station – specifically seeking feedback on the quality of our data. Mike is getting increasingly frustrated and is naturally concerned that for all the effort he is putting into it that there will be insufficient return. The good conditional allowed Mike to apply further putty to the skylights.

Marty and Adrian worked on ice removal from above the collar ties over the kitchen area in the Main hut to allow for the location of the wiring for the environmental monitoring program. The suspended ice over the bunks in the SE corner was identified as posing a threat to the integrity of the bunks if further accumulation added to the existing weight of the ice. Linda removed ice from the tail piece of the air tractor. Recording of the biological items in the artefact scatter to the north of the Main Hut was completed by Estelle and Linda and Estelle continued the documentation of artefacts in the Main Hut. Mike spent more time preparing the wiring for the environmental monitoring program.

The environmental monitoring program appears to be consuming an inordinate amount of time which raises questions of the relative priorities within the Workplan.

There was further sighting and photographing of the Giant Petrel in the evening, this confirmed two other observations during the week. I first saw it at about 2045 at John O'Groats then Geoff called me up on the radio to say that they had seen it on the ice near Boat Harbour. Adrian got a couple of great photos of it. Dave cooked a beef curry for dinner which we finally all sat down to at about 2300.

Day 46 Saturday 30th November

Temperature min – 14.2°C max – 3.5°C A fine sunny day. Wind 30 knots easing to 5-10 knots.

Mike and Marty completed puttying of eastern and northern skylights and sealed the southern skylight to Main Hut. There was little to do in terms of labouring so when I arrived at the hut late afternoon after completing the weekly report, Dave and Geoff were enjoying the sun talking to Mike while he applied the putty. Marty constructed and installed a cover for the northern roof vent and installed a cover batten to the eave of the north wall of the Workshop. Adrian cleared the remainder of the ice from Mawson's cubicle and recorded various connections within the Main Hut.

Linda completed documenting the roof cladding on the western side of the Main Hut and together with Estelle completed the condition report and catalogue of the tail plane and continued to remove the Project Blizzard documented artefacts and relocate them in an alley bin in the Workshop as they had all been frozen together. They also commenced preparing an inventory on all artefacts packaged from previous restoration expeditions. Documentation proceeded of the artefacts on the floor of Hurley's darkroom. Cataloguing continued of items in the artefact scatter and further photographic recording was made of the artefact scatter on the west side of the Main Hut.

Over lunch there was a somewhat intense discussion regarding the treatment of artefacts, specifically the tail plane of the tractor. Various opinions were offered but consensus was not reached. We decided after lunch at 1700 that we should knock off early make it a long weekend, so to speak, as it had been decided to have Sunday off. However we were still messing around at the hut for another hour or so. Mike and I went for a walk down to John O'Groats which was the first opportunity Mike had to go there. It was a lovely evening and we ran into Geoff and spotted Linda and Estelle on the way back. Adrian got his sketch pad out and spent time drawing a couple of Adelies. A bottle of Yalumba Mawson's Red and roast fillet proved to be the catalyst for a long night. It was a great break for us all. Heading of the tent at 4am confirmed that we are well into 24 hours of daylight.

Day 47 Sunday 1st December

Temperature min – 15.0°C max – °C Clear sunny day. Wind 5-20knots.

Our long awaited rest day and perfect conditions for it this time. As it turned out it was a quiet day spent around the Sorensen Hut. We emerged at different times and varying stages of headaches. The plans for soccer and games and walks came to nothing. It was a good day for reading and writing emails. Linda erected the fourth polar pyramid assisted by Mike and Marty and moved in. Adrian prepared an email for Rob E on the ice removal and footings. Pasta was a good choice by Dave for dinner.

Day 48 Monday 2nd December

Temperature min – 12.8°C max 0°C. Clear sunny day. Wind 15-20 knots easing late afternoon to 5-10 knots increasing again to 40 knots towards midnight.

Estelle completed cataloguing of Hurley's darkroom and together with Linda progressed with the recording of two further categories in the artefact scatter, the dog chains and boots. Photographic recording of the scatter was also carried out again by Dave. The coverage of large gaps in the Main Roof with over battens was completed by Adrian and Marty and the relatively new boards of the area around the kitchen flue were replaced. Preparations for RTA of post BANZARE material commenced, this included the dismantling of an old sled and transport of a drum to the caged pallets.

19 Weddell seals had hauled out on the remaining sea ice in Boat Harbour and we were treated to an ongoing chorus of seal calls throughout the day.

Day 49 Tuesday 3rd December

Temperature min – 9.2°C max -1.5°C. Cloudy. Wind 45 – 60 knots all day.

It was a surprise to be experiencing windy conditions again. The changing cloud conditions gave a sense of heavy weather setting in. Mike and Linda put in a long day in the Main Hut. The temperature and relative humidity sensors were installed as part of the ongoing environmental monitoring program. They were installed in the apex and centre of the living hut, one on a shelf on western side of the workshop and two in central places in the workshop and two installed externally. They finally returned to the Sorensen at midnight. There was little else that could be done in the Main Huts with the wiring going on but Estelle managed to catalogue the artefacts on the western wall of the living hut. The two original straps hanging the ridge to collar ties in the workshop were replaced.

In the afternoon, Marty, Dave, Geoff, Adrian and I levelled the designated helipad area. Geoff and I checked to see if the snowies had returned but there was no sign of them nesting on the western side of the cross. Dave attacked the melt lake with his ice axe and with persistence managed to break through so we were finally able to give up on the snow and ice melting. I emailed the Kapitan Klebnikov with our contact details in anticipation of their arrival.

I cooked dinner a fillet steak with garlic onion and rosemary stack and a cheese cake on a pastry and jam base.

Day 50 Wednesday 4th December

Temperature min – 4.9°C max +0.8°C. Cloudy. Wind 15-20 knots increased later in the day to 30 knots

This morning we found that a large part of the remaining sea ice in Boat Harbour had disappeared overnight. 13-14 Weddell seals remained close to the rafted ice. Adrian and Dave had a beer on the hill near the AWS late evening and saw more ice break out from Boat Harbour. Six Antarctic petrels were sighted late afternoon

Marty, Geoff and I excavated some more snow from the helipad area and marked it out with a coffee mix in the expectation that the Kapitan Klebnikov may use their helicopter to deliver Stephanie and the equipment she was bringing as they are due tomorrow.

Mike and Linda continued with the wiring for the environmental monitoring program and installed four thermocouples below the sub floor; at north west footing outside the workshop, in the vicinity of the meat cellar, under the bench on the western wall of the Workshop, in Hurley's darkroom and a five was installed in the apex of the Workshop. Linda proudly reported that she had "dressed" the cables so the Main Hut was ready for tourists.

Adrian and Marty completed the fastening of loose battens on the roof of the Main Hut. Conservation works on the Transit and Magnetograph Huts was completed. The timber bracing fixed to the Transit Hut on a previous restoration expedition had failed and was refixed. On the Magnetograph Hut a cover batten was installed to the south wall at the eaves line to cover the corroded tops of the wall cladding. On the west wall a section was overlaid on the northern end. There was no work done on the Absolute Hut.

Cataloguing of artefacts on the western wall of the Living Hut continued by Estelle and David made a photographic record was made of the artefact scatter on the eastern side of the Main Hut.

In anticipation of tourists arriving tomorrow the compacted surface outside the Main Hut was made safe. An offering of butter and beer was made to the Wind Gods at the AWS by Dave in anticipation of the arrival of the KK tomorrow. Dave cooked a great lamb roast and we polished off another of the Magnums of Yalumba Mawson's blend.

Day 51 Thursday 5th December

Temperature min – 4.4°C max -2.3°C. Blizzard conditions to mid morning. Blowing ground drift throughout the day, winds to 45-50 knots increasing from 1730.

A late night for some of us. Geoff was heard calling at 0630 that it was snowing. Snowing it was, and it didn't let up all day. By 1000 when I was in the Sorensen, anticipating of a call from the KK, conditions deteriorated until it meet the official

definition of a blizzard. Within an hour the winds had dropped somewhat and visibility had increased to some 2 kilometres. Contact was made with the Kapitain Klebnikov late morning and their Voyage leader, Werner, advised that they expected to be at the anchorage point off Boat Harbour by 1600. The drop in winds was not however sustained.

Further contact was made by VHF at about 1500 at which time a group of us went and checked the conditions in Boat Harbour. The wind was stronger over there and showed no sign of abating. We estimated that it was blowing over 40 knots. The KK was in its anchorage point at about 1640, however although it was only 3 kilometres out we could barely make it out in the blowing drift. The adverse wind conditions persisted and Dave, Geoff, Mike and Adrian made another trip over to Boat Harbour. They further reported that with the sea ice blowing out yesterday the ice edge did not have an easy landing site. It was finally resolved at 1710 that small boat operations could not be conducted safely at either end. The KK then advised that they would abandon the attempt to land Stephanie and our gas bottles and then departed for Port Martin and Casey Station. Their decision to depart was further justified with the concurrent increase in wind speeds and further deterioration of conditions.

I had rang Rob Easter in the morning to let him know the situation re the KK and then again after 1700 when it was evident that there would be no operations. It proved to be a funny sort of day, waiting and waiting, nothing we could really do other than hang around the hut. In some ways it was a real anticlimax and somewhat ironic after the relatively calm weather we had experienced. I emailed Rob with details of our cargo for RTA on L'Astrolabe.

Dave cooked spaghetti Bolognese for dinner and most of us had a relatively early night.

Day 52 Friday 6th December 2002

Temperature min – 4.2°C max -0.3 °C. Blizzard conditions. Winds to 45-50 knots increasing late afternoon.

We woke again to blizzard conditions and quite a build up of snow outside the tent. The blizzard continued all day keeping us bound to the Sorensen. Late afternoon Adrian, Geoff, Estelle, Linda and I ventured over to the huts. The wind was pretty strong and at times visibility, due to blowing snow, was very limited. There was a bit of build up of snow inside the door but inside the Workshop and Living Hut it was revealed that there was very little snow ingress. We returned via the rookeries north of the Magnetograph Hut and were interested to see a few Adelies in various stages of snow cover. On the limited number of nesting sites we saw no evidence of partners. I emailed Werner on the KK to advise of the ongoing adverse conditions in the advent that there had been some doubt that he had made a hasty decision to depart!

Rob emailed regarding ice removal and advised that he had put a hamper on L'Astrolabe. It was a day of reading for most. Dave cooked a tuna, pasta, dish for dinner. I constructed a dessert pizza.

Day 53 Saturday 7th December

Temperature min – 0.3°C max 0.2 °C. Strong winds throughout the day gusting to 70 to 80 knots.

A third day of strong winds gusting 70 to 80 knots. Conditions were not conducive to many activities. Adrian sent off a report on ice removal to Rob in the morning. Linda and Mike packaged up the environmental monitoring samples. Adrian headed over to the huts at 1500 and reported back that the worst of the journey was at this end, where in fact we had seen him struggle up the slope. Linda and Estelle followed not long after.

Mid afternoon Dave and Marty did the piss run as we had accumulated 3 drums and 3 of kitchen slops, plus 2 nug bags. They got bogged in the soft snow close to the rocks. The experience also confirmed that the wind was at the extreme level for emptying the drums. They then continued on to the lake to fill a couple of water containers.

Adrian continued to do measured drawings of the interior of the hut. Estelle catalogued items stored on McLean's bunk. Initial planning for our departure commenced. Marty and Mike brought back the generators in preparation for securing the ply at the Sorensen and also decided where to winterise the quads. Dave cooked a beef burgundy for dinner.

Day 54 Sunday 8th December

Temperature min +1.8°C max + 3.5 °C. Calm conditions all day with no wind.

We woke to dead calm conditions the only sounds being the breaking waves and occasional penguin sqwark. It was a good time to air the sleeping bags and dry the mattresses. We changed our clothing to lighter gear and started to pack up some items ready for RTA. The temperature inside the hut reached 10°C a great contrast to the initial weeks. It really felt as though summer was here.

Survey of the artefact scatter using the Total Station was carried out and 9 categories of items completed. This involved Estelle, Linda, Mike and Geoff and they seemed to be pretty happy with what had been achieved. Though it went on too long for Geoff. He had decided to take a break and shortly after gave himself a nasty crack on the head, severely jarring his neck, as on the doorway to the main hut. He returned to the Sorensen shortly after 2000. It had left him with quite a bad headache and he went to bed relatively early for him.

Linda took further moisture readings inside and outside the hut. Adrian continued with the measured drawings of the hut. Dave carried out further photographic recording of the roof and walls of the Main Hut.

Preparations commenced for departure. Mike and Marty completed the tie down of plywood on the Apple Platform. Marty constructed stands to put the quads on and it was determined to winterise them on the tent platforms. He also dismantled the solar panels. The accumulated waste was transported to the helipad and stored in a caged pallet. One battery box was also prepared for RTA. Mike and I prepared an inventory of all material

at the Sorensen Hut. We are now very much focused on preparing for an anticipated departure on 15/12. In the evening an email was received from the Master of L'Astrolabe regarding plans for our pick-up.

At 0230 Mike and Marty had sighted six Giant Petrels on the shore close to the Sorensen Hut. A further three sightings were made of individual giant petrels at different times in the day, with one landing near Boat Harbour and another two sightings recorded after 2130. The Snow Petrels have returned to their nesting sites. The sea ice has virtually disappeared from Boat Harbour and 14 or 15 Weddell seals were hauled out close to the rocks. Dave cooked spaghetti and meatballs for dinner and a cheesecake for dessert.

Day 55 Monday 9th December

Temperature min - 0.4°C max 3.0 °C. Calm conditions all day with a light breeze developing early evening.

Mike and Linda started the wind up of the environmental monitoring program with the placement of the last of the thermocouples. Moisture readings were taken for the interior of the hut. Estelle and Linda continued with the photographing and documentation of the coal dumps in the artefact scatter and commenced on the clothing. Estelle also continued detailing of books and magazines on the southern shelves and Linda photographed damaged caused by melt water in the Main Hut. Geoff found some artefacts in the rocks on the Granholm side of the valley which turned out to be a Nautical Almanac dated 1911 and some broken glass. Estelle collected the last of her snow samples. Adrian worked around Mawson's cubicle and found that the snow which accumulated since the last clearance weighed 14.2 kilograms. It was evident that snow had entered in a number of points in Mawson's day as stuffing was found in cracks. He plugged a couple of holes but thought that much of the snow came in through the veranda. He completed measurements within the hut and further battens were secured on external walls. Preparations for departure continued with the organisation of tools and equipment and Dave made major inroads on clearing out the kitchen.

We received an email from Rob attaching details of a proposed visit to Cape Denison by the Sir Hubert Wilkins apparently the sea ice around the Balleny's caused a change of plan. It appears that they will arrive on the 12th, a day or so before our scheduled pick up. The Voyage Leaders are the Claypoles. I emailed Rob regarding our proposed timing for sealing of the hut. I also emailed the L'Astrolabe to acknowledge their advice and provide an overview of our cargo. An elephant seal was sighted floating around in Boat Harbour.

Day 56 Tuesday 10th December

Temperature min - 0.8°C max 1.4 °C. Cloudy. No wind.

A late night for all of us again. It started when a tally was done last night of the beer an estimate of how much every one had to consume a night to finish it. We hadn't made a significant impact on our stocks. So there are a few headaches this morning. Mike and Linda virtually concluded the environmental monitoring program with confirmation that

the relative humidity and temperature checks were operating. The satellite phone was earthed and the agar plates were placed in the Magnetograph hut which will now be sealed.

We received very positive feedback regarding the progress of the environmental program with an email from Rob. He also provided further advice re the proposed visit of the SHW and advice given to them re accessing the hut if we have departed. I spoke to Ron then emailed Rob with advice that accessing the hut after it is sealed would have an adverse impact on the environmental monitoring program. It was agreed that we could delay sealing the hut until the Saturday depending on advice from the French re our retrieval.

Rob emailed the details of the approval for ice removal. Marty and Adrian, with assistance from Geoff started on the south east corner of the living hut. It was a very gratifying exercise to see the bunks emerge and board still undamaged. The removal of suspended ice revealed that these corner bunks belonged to Mertz and Ninnis. Their initials on the bunks made a definitive statement regarding ownership. There is a board at the top of wall height in the corner which reads "Hyde Park Corner." The find seemed all the more poignant given that next Saturday is the 90th anniversary of the death of Ninnis.

Further cataloguing of artefacts in the living hut was carried out by Estelle and the third and final video filming of the external artefact scatter completed by Geoff. Mike and I prepared the fuel drums for RTA with two drums to remain.

An elephant seal was again sighted in Boat Harbour along with over 20 Weddell seals.

Day 57 Wednesday 11th December

Temperature min – 0.8°C max 1.4 °C. Overcast with light snow falling in the evening.

We received another email from Rob re the proposed SHW visit. They have been advised regarding the situation of accessing the hut. Their ETA is now midday on Friday the 13th. We were also delighted to receive an email from Rob with extracts from Ninnis's diary.

Adrian continued clearing some of the snow in Mawson's cubicle. On the top shelf of the cubicle was a biscuit tin, that while it had been seen before, for the first time a handwritten note was found on the lid. Estelle said it was in Mawson's handwriting and it read "list- gear & stores to be carefully guarded until my return from sledging". Estelle further documented items on the southern shelves and completed the eastern and western bunks. Dave completed the photo survey of the bunks and meltwater.

Packing continued and Mike and Marty have the majority of the tools boxes completed. Adrian decanted the old drum of ATK next to the Granholm and moved it up to be RTA'd and Adrian Geoff and I emptied out the old drum that had been used as an incinerator and prepared it for RTA.

The elephant seal that had been seen cruising in the harbour for two days hauled out and it appeared to be relatively young and in great condition. It bore none of the usual sign of fighting and scarring around its neck and upper body.

Day 58 Thursday 12th December

Temperature: min -0.8°C , max -0.2°C . A sunny day with no wind.

Estelle is still completing her program, today cataloguing artefacts on the western wall of the living hut. The remainder of us were all focused on packing for our departure. It had been intended the Marty would seal up the hut today or tomorrow however with the receipt of advice regarding the likely arrival of the Sir Hubert Wilkins from Rob it was resolved to defer it until Saturday. After a steak sandwich lunch at the Sorensen it was decided to take a final group photo. On the walk over to take the photo with the empty Yalumba Mawson's red wine bottles Geoff and Adrian found another cached seal in the rocks some 50 metres south east of the main hut. Estelle had not discovered this one before. So it is amazing that we are still experiencing "new finds". It had a great set of teeth!

While we were waiting south of the hut for everyone to gather a line of Adelies walked past. One stopped a metre or so from Dave, decided that he took exception to him and advanced and began to beat him with his flippers. Dave made a very rapid retreat. We reckon they are getting noticeably stropky and put it down to the fact that the hatching of eggs is within a week off and they are dreading the demand feeding which follows.

Day 59 Friday 13th December

Temperature: min -1.2°C , max -3.3°C . Overcast clearing to a sunny day. No wind

Estelle completed documenting the South East corner and the artefacts under the bunks on the western side of the living hut. This completed the documentation of all the visible artefacts. The environmental monitoring equipment box was sealed and the program completed. The Granholm Hut site was cleared and secured and the timber stack was wired down. The packing is now virtually complete. We were advised by email in the evening of a likely pick up by L' Astrolabe of Sunday afternoon or Monday morning.

Jim Claypole made contact and advised re the anticipated arrival time of the Sir Hubert Wilkins. We all headed over to Boat Harbour to greet them at about 2200. The ship dropped anchor west of Boat Harbour at 2235. The vessel has a Japanese film crew and Japanese and new Zealand Dive team on Board. The Claypoles who wintered at Cape Denison in 1999 are Voyage Leaders. We met with them and discussed taking them through the Mawson's Hut before we seal it on Saturday. It was a weird feeling sitting on the rocks waiting for them to get the Zodiacs in the water. There was a sense of loss that our time together was almost over. The arrival was pretty low key.

A lone Chinstrap Penguin was sighted on Round Lake with a group of Adelie penguins late afternoon. Believe also that an Antarctic Fulmar was sighted. The Elephant seal is still hauled out and is now moulting.

Day 60**Saturday 14th December**

Temperature min - 1.4°C max 1.8°C. Clear sunny skies. No wind

Estelle headed off early to complete photographic recording within the Main Hut. We had advised the Claypoles that we would conduct tours of the Hut at 1100 and their first group was ashore when we arrived there shortly before. At 1130 Estelle conducted the first tour with a Japanese film crew from a natural history unit. Geoff took some video footage to be used in tourist briefing sessions of the second tour. Linda then took over from Estelle who then with Mike continued to undertake more survey work. Marty then I assisted with the pole holding. At 1430 the visitors returned to the SHW and then commenced diving operations off the icebergs near the Mackellar Islands. They had a close encounter with an Adelie penguin when it jumped into their Zodiac when, earlier they came into Boat Harbour.

The survey of the artefact scatter using the Total Station was completed. The final monitoring equipment was placed in the hut and it was sealed late afternoon and the secured both skylight shutters which had been removed. We all took advantage of the time before Linda installed the monitoring equipment and Marty secured the shutters to have one last look and photographic opportunity of the hut which looked very different to when we arrived. Adrian was seen sitting on a small ladder sketching the hut. In the past few days he is adding to his collection of drawings of Cape Denison.

Late evening I received an email from Patrice advising that we should be ready for retrieval on Monday morning. The Claypoles joined us in the Sorensen Hut at 2200 and we had a most enjoyable evening chatting to them.

An Antarctic Fulmar was sighted early evening. The first of the Adelie penguin chicks were also observed in the rookeries.

Day 61**Sunday 15th December**

We sat around after the Claypoles departed some time after midnight but it was an earlier night than most. The day was spent finishing some of the packing and transferring gear to the rocks near the helicopter site. We will now have very little to transport prior to departure. The opportunity was taken for a last walk around so generally it was a quiet day. There were no visitors ashore from the SHW and we saw their dive boats operating north of the entrance to Boat Harbour. The helicopter was also heard although it did not come over Cape Denison itself.

Our last night together was a very quiet affair. It was probably the most sedate night of the whole trip. We were in bed a lot earlier than normal in anticipation that it would, in fact, be our last night

Day 62 Monday 16th December.

Wind 15 – 30 knots. Light cloud.

I woke earlier and for the first time in a week the tent was really flapping. My initial thought was that we were heading for a repeat of the KK visit but fortunately the wind was only about 15 knots, gusting to 20. The ship made contact at 0900 and they confirmed that given the good conditions the helicopter would now depart from Dumont d'Urville. We arranged a further radio schedule for an hour later and we started to make final arrangements to pack up the camp. The tasks remaining were to drop the 4 tents, pack up our sleeping bags and lilos, dismantle the radio aerals, undertake our last P run, winterise the quads which we were leaving behind, seal the door on the apple hut, bolt the toilet door shut then finally secure the Sorensen Hut. While the variety of tasks was being undertaken one of the quads and the trailer was used to transport the last of our gear to the helipad site which was in the next valley.

By 1000 I was at the helipad site with Marty and the last quad load, when I learnt that the helicopter was on its way and Patrice, the French Voyage leader wanted 5 passengers on the return flight. This didn't suit the plan I had in mind so instead sent three, Geoff, Linda and Estelle and quite a bit of gear. From then it was all go. Patrice had arrived with another Frenchman, Allain, and together with Marty we prepared the last of our cargo in nets for slinging to the ship. Meanwhile Adrian took the last quad back to the Sorensen. Allain was to be responsible to depot our timber on the next voyage so Marty showed him the preferred site. Patrice expressed concern re the condition of the timber in that we may think it occurred during shipping. I was able to allay his fears as Mike and Marty had sighted it in the store in Kingston and had advised me of the poor condition given the years it had been sitting around.

Cargo operations went extremely smoothly, so much so that the 7 of us shared a beer between helicopter loads. We also had time to take Allain and Patrice over to the Sorensen. The other 4 guys departed on the next flight so I lead a quick tour down to Mawson's Hut then finally, some two and a half hours after we commenced operations I was in the helicopter flying out to the ship.

It was pretty good being back on board, with a very warm welcome from all the crew. Once on board we learnt that we would be sailing back to Dumont d'Urville (DDU), and would remain there for about three days before setting sail for Hobart. We were all delighted as it is a rare opportunity to visit the Antarctic station of another country.

Day 63 Tuesday 17th December

Overcast. No wind

We had a slow trip to DDU and arrived early morning. DDU is built on an island so the first buildings you see stand out as they are built on scaffolding above sheer cliffs and snow banks. L'Astrolabe moored next to the notorious runway that the French constructed in the late 1980's. It is interesting to see old photos as the landscaping to build the runway was very extensive.

Up close the station is incredible as it coexists with Adelie penguin rookeries. You can see the rookeries on the steep slopes and cliffs then the buildings perched on top. We had been invited ashore for lunch and early morning were ferried across the narrow channel to the island by a small boat. We then walked up to the station via a steel mesh walkway on scaffolding. The Adelies are nesting right next to the ramp and underneath it. About 50 metres up we found we were within metres of snow petrel nests. They were undisturbed by our presence and the ignored us as did the Adelies. It was quite amazing as the Adelies at Cape Denison have been quite aggro this past week or so as it came closer to chick hatching time. The walkway goes between two high rock faces and on one there were many Cape Petrel nests. Their chattering being quite distinctive from the Snow petrels. The first building we encountered was the biological science labs then as the slope flattened out, the mechanical workshops. Finally at the top where it is quite a large relatively flat area is the dining, kitchen and recreation building. There are Adelies nesting within metres of the front door and all around the buildings and adjacent to the roads. The helicopter was operating from just behind this central building and slinging equipment to various parts of the station. The Adelies have obviously adapted and ignored you.

One of the Meteorological team took us for a tour of part of the station. We only went inside the Met building and the original hut in which 7 men, including one Australian, Bob Dovers, lived the first winter in 1951. We joined the French for lunch and it was very much like being at an Australian station except that they have table service! It seems to operate in a very similar fashion with rosters as one of our attendants was a glaciologist. I was very impressed with the dining and recreational area. It was smaller and more compact than the Australian stations but worked really well as we numbered nearly 80 people for lunch.

After lunch we had a most unexpected treat which was to be taken on a tour to the nearby Emperor penguin rookery by one of the scientists. Pierre Jouventin, it transpired, was a very eminent French scientist. Our Met guide, Alex, was most envious when he learnt that we were being taken on the tour as he said that most of them on station would have jumped at such an opportunity. So the 8 of us traipsed after him and one of his students. He specialises in penguin communication so our first stop was at an Adelie rookery where he gave us great impressions of the different language and situation in which they communicate. Then we headed off to see if the sea ice was still solid enough as the Emperor rookery is on the sea ice some distance away, perhaps nearly 2 kilometres behind another two islands. In fact you can see it from the walkway leading up to the base. We were told that it was unusual to still see the Emperors in the rookery at this time of year. Apparently this year the breeding cycle is about a month later than normal due to the sea ice conditions during the winter. There was a large break out of ice and clear water around the islands in June and July. Fifty years ago the rookery had 7,000 breeding pairs, now there are only 3,500. The decline is attributed to declining sea ice and general warming. We also learnt more about the behaviour of the rookery during the winter months.

We were able to sit on the rock and observe a group which was within 50 metres. Pierre interpreted the different calls for us. Then Pierre requested assistance as he had to isolate and capture an adult. Adrian won the job and the two rounded up an Emperor. It took off pretty quickly and got away from Adrian who was then overtaken by Pierre, who in a burst of speed he took off and rugby tackled him. We were pretty impressed as we reckon he is about 60. Adrian then lay on him while Pierre took his samples. He cut off a lot of the orange feathers at his collar. The research is looking at the attractant of the pigment in the selection of mates. The theory being that the birds with the brightest colouring are selected as mates because it demonstrates that they have good immunity systems and are particularly healthy birds. Because it is the end of the breeding season the loss of his colour and feathers shouldn't affect the bird. Adrian later gave us an account of what it was like to lie on a penguin. So it was quite a tour. We finally ended up back on the ship at about 6pm, and then another very late night.

Day 64 Wednesday 18th December

This morning we headed back to the station at 0900 for a tour of the bios lab and a briefing on other programs. It was really interesting especially their fishing program. We were back on the ship for lunch then this afternoon we have lazed around. We were invited back to the station after dinner and I gave a brief powerpoint presentation on our program on Mawson's Hut, complete with a very brief introduction in French! The 2002 winterers put on concert – reproducing the one they prepared for Midwinter. It was great – very impressive. Then the dancing started. We hadn't expected to go to a French disco in Antarctica. It was great fun. All too conscious of the fact that we had to negotiate the walkway back to the ship, followed by the small boat crossing, besides that we thought it was better not to overstay our welcome, we headed back to the ship at 1230.

Day 65 Thursday 19th December

I had a brief trip back to the station this morning with Adrian. We dropped in 3 casks of wine and some of our remaining beer as a thankyou for the hospitality the previous night. We all had a quiet day, walking on the runway, washing clothes and reading. I did a further interview with radio ABC in Newcastle.

Day 66 Friday 20th December.

We set sail from Dumont d'Urville at about 1030 on The French winterers returning with us flew in by helicopter at about 0930. As we departed their wintering colleagues who were remaining lined the rocks, stood on the roofs of buildings as we slowly steamed away.. It was a calm, beautiful morning as we made our way out from the coast past a myriad of icebergs. The last of the sea ice had disappeared over the past few days and the icebergs now stood out from the deep blue of the ocean. It was some five hours of such scenery until we appeared to have left the last of the bergs behind us then at 1520 we sighted a huge tabular iceberg. From the radar we determined that it was over 10 kilometres away and over 6 kilometres long.

Days 67- 71 Saturday 21st to Tuesday 24th December

The voyage home was again remarkably calm. We continued to have a fairly active social time with the small number on board. Again it was a great voyage. It was a touch rough

for only a day or so and Geoff was called on for his medical expertise when one of the French women fell out of her bunk. Fortunately she was not badly injured and Geoff distinguished himself by throwing up in the middle of the examination. However as one prone to sea sickness he travelled remarkably well, as did Estelle.

Day 72 Wednesday 25th December

We seemed to average 12 knots most of the way and arrived back a day ahead of schedule. This posed some problems being Christmas day and when I woke on Christmas morning we were very slowly drifting past South Bruny Island. It was a beautiful day so we hovered about on deck until it was time for a memorable Christmas Dinner – the 8 Australians or the “Cape Denison geese” as we sometimes describe ourselves, sat down at a table together for the last time. It was good to find that we were still laughing together as much as we had at times in the Sorensen Hut. We hovered around in the Derwent River until 1530 when the pilot finally came aboard. Our arrival back was somewhat subdued as we went straight to the small wharf a kilometre or so above the bridge where the ships are refuelled.

It was a happy and close knit group who took some time in departing from the wharf.

FUTURE EXPEDITION PLANNING LOGISTICS

Compiled by Diana Patterson, Field Leader 2002 Expedition

Refer also to Reports -

- **Inventories of Materials and Equipment Remaining at Cape Denison December 2002**
- **Inventory of Food and kitchen equipment Remaining at Cape Denison December 2002**
- **Fastenings returned to store**
- **Timber landed by French Jan 2003**
- **Heritage program tools re-packed in AAD field store**

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INTRODUCTION

In the compilation of this report recommendations have been incorporated from the reports of participants in the 2002 Expedition namely:

Michael Staples	Carpenter
Marty Passingham	Carpenter
David Killick	Cook/Communications/Photographer.

1. FIELD CAMP

1.1 Sørensen Hut

- Guy wires

The tension of wires was found to be satisfactory. The three guy wires at the southern end of the hut are secured only to large rocks. For greater security longer wires could be fitted to rock bolts in the bank behind the hut.

- Electrical system

The Sørensen Hut is a potentially hazardous environment in which to use 240V electricity, given the metal clad wall panels and the frequently high levels of condensation on the internal walls.

The electrical safety and efficiency could be improved by

- ☐ Fitting weatherproof external caravan-type power input sockets; this would allow power input from wind, solar and mechanical generation systems without the need to run cables through the entrance doorway and door seal.
- ☐ Wiring the interior of the hut with conduited 240V and 12V systems with fixed output sockets; possibly also computer network cabling.
- ☐ Fitting a power distribution board with appropriate circuit breakers and earth leakage protection.
- ☐ Fitting appropriate metering to the distribution board to allow the input from the various generation systems to be measured.
- ☐ Fitting a permanent earth for the hut wiring system.

1.2 Apple Hut

- Door

The door of the hut is badly warped, making it impossible to seal at the lower end.

The inside handle has broken off the latch, which proved impractical to repair; a spanner must be kept inside to allow the door to be opened from inside.

The simplest solution to these problems would be to fit a complete new door.

- Functionality

There is currently no fit out in the hut. It is recommended that the standard bunk fit out be prefabricated beds for assembly on site.

1.3 Tent Platforms

- Existing platform.

The platform, which accommodates two polar pyramid tents, requires extension for the valance to lay flat. The current arrangement contributed to the tearing of the valance in the high winds.

- Capacity

For an expedition in late October and early November there is a suitable site for a further tent south of the platform. This would not be suitable for a later starting program due to snow ablation and exposure of rocks. Tents were difficult to secure in soft snow conditions from late November. Materials are on site for construction of a further platform. (See inventory)

1.4 Tool set

- **mechanical tool set**

A separate additional mechanical tool set should be kept at the Sørensen Hut for repair of the equipment at that end of the site. This will avoid having to carry tools between the Sørensen and the Main Hut every day in order to allow repairs to be made at either end.

This kit should include a multi-meter, water trap funnel, and spare electrical components.

2. FIELD EQUIPMENT

2.1 Mechanical generators

For discussion of the operation of the small generators on the 2002 expedition refer to Michael Staples Report 2002.

- troubleshooting

It is suggested that;

- ☐ All generators be provided with a weatherproof box to allow them to be safely run and stored in drift conditions; at the very least, all generators should be fitted with a pair of weatherproof bags before leaving Kingston.
- ☐ All generators should be fitted with an adaptor in the fuel system to allow them to be gravity fed from a 20litre Jerry can or drum to eliminate the risk of fuel contamination during re-fuelling in drift conditions.
- ☐ A minimum of three water trap funnels should be taken; one for Sørensen, one for the work site and one spare.
- ☐ All generators to be furnished with an earth wire of ca. 10m. length with secure fittings to allow attachment to a rock bolt or earth stake.
- ☐ All generator outlet boards to be fitted with IP66 weatherproof sockets.
- ☐ A distribution board fitted with an earth leakage safety device, voltmeter and ammeter is provided for use inside the Sørensen Hut to allow the generator load to be monitored and the available output used most efficiently.
- ☐ A number of small switchable electrical heating elements be provided to allow the generator to be effectively loaded when otherwise only charging lightly; e.g. running a single computer.

2.2 Wind generators

For discussion of the operation on the 2002 expedition refer to Michael Staples Report 2002.

- Capacity

The output of a single wind generator is limited especially with half of the blades only; a group of two or three and a healthy battery bank would probably be capable of providing

all power necessary for communications equipment and computers on a longer trip.

- Improved Performance
 - ☐ The generator be mounted further away from the Hut where it can operate in undisturbed air.
 - ☐ Large diameter cable is provided to minimise voltage drop between the generator and the battery box, preferably run in conduit for protection.
 - ☐ The larger size base fitting is used on the wind generator to allow it to be mounted on a 1 1/2" diameter mast.
 - ☐ Take a number of spare nuts and bolts to secure the blades.

2.3 Water Pump

A water pump is required there is none at the field camp. This should be robust and taken with a compatible pipe fitting. A good quality metal bodied pump, with a spare diaphragm would be most durable. Approximately 2.5 metres of inlet and outlet hose are required.

2.4 Quads

For discussion of the problems arising on the 2002 expedition refer to Michael Staples Report 2002.

- Condition of Quads

The two quads were tied down on the tent platform, supported on fish bins under the chassis. The air cleaners were removed and the carburetor intake tubes and the exhaust pipes taped over. The ignition switches were taped over. The fuel tanks were left full.

- Accessories

All spare parts and lube oil were returned to AAD. The keys to both quads are hung on a nail by the eastern window of the living area of the Sørensen Hut. The two spare tyres were stored in the Apple Hut. The pumps are stored in the Sørensen;

- The next expedition should take
 - ☐ Sufficient lube oil to service both quads
 - ☐ One complete set of ignition system components.
 - ☐ Workshop manual; check that there are no major differences between the two machines; one is a Big Red, the other a Fourtrax.
 - ☐ A quantity of hydraulic fluid for the braking system.
 - ☐ New batteries for both quads (both batteries were RTA'd)

- Operation

The ends of the storage tubes for the pumps should be taped over to prevent the ends coming loose and the pumps being lost when traveling over rough ground.

2.5 Computers

- Operating in cold conditions

Ensure all computers have new batteries. A mouse should be provided with each computer, as the trackpads often failed to work in the cold.

2.6 Snowmelter

- multi-fuel stove

For expeditions arriving before December the provision of a small multi-fuel stove for melting water would be worth considering.

3 COMMUNICATIONS

For discussion of 2002 experience refer to Dave Killick's Report

3.1 Iridium Satellite Telephone

From the ship the built-in antenna and a small magnetic antenna was used, at Cape Denison a fixed mast antenna was installed. All three proved to provide excellent reception.

The Iridium phone suffered a little from poor battery life in the cold temperatures. The one drawback with the unit was the lack of a battery charger for the spare battery, charging could only be done via the phone. While this is not unusual for a phone of this type, an external charger would help keep spare batteries topped up without taking the phone out of service.

3.2 HF radio.

Consideration should be given to a unit which has an external speaker; the option for the unit to operate with a whip aerial and one which allows the user to select or program their own frequencies.

3.3 Handheld VHF radios

Reliable intra-site communications are required given the nature of expeditions to Cape Denison given the 2002 experience,

- smaller VHF sets with new batteries and aircraft frequencies would be more practicable than the older type.
- allow for one radio per expedition member and two spare radios in light of the extensive and consistent use
- ensure clothing issued has suitable and secure pockets fitted in the in which the radios could be conveniently kept at all times.

4 ELECTRICALS

For discussion of the problems experienced on the 2002 expedition refer to Michael Staples Report 2002.

4.1 Materials 240V

All extension cords and power cords fitted to tools should be of silicon; the PVC sheathed cords were difficult to use in the cold temperatures.

All plugs and sockets should be of the weatherproof IP66 type.

4.2 Voltage Systems 12V

- cabling

All cabling for 12V systems should be dimensioned according to the length of the cable run to avoid significant voltage drops.

4.3 Battery Boxes

- **New Batteries**

Battery boxes provide an excellent source of alternative power during the expedition. The use of new batteries only is recommended, preferably of the sealed type to prevent acid spills.

- **Safety**

The addition of an isolation switch to each battery box would be a valuable safety feature and would simplify the process of switching from bank to bank in order to manage charging and consumption.

(See diagram of hut dimensions)

5. HELICOPTER AND CARGO OPERATIONS

5.1 Communications

Ensure compatibility of systems between the Australians and the French communications systems

5.2 Safety and training

Predeparture helicopter training operations should be provided for a minimum of three members of the team, specifically for those scheduled for the first flights. Given that helicopter operations may be conducted by non-AAD contractors, it is also suggested that an additional detailed briefing be given predeparture regarding movement around a working machine.

5.3 Transport of cargo

- **Securing loads**

Anticipate that some caged pallet cargo is unpacked and transported within the helicopter. This can present a problem unloading especially if at the designated helicopter landing site. Consider the availability of the light nets with metal snap hooks to contain loads in the event that the wind picks up these proved most practicable in field conditions for securing cage pallets as opposed to ply lids.

- **Nally bins (fish bins)**

Loose lids can present a serious hazard during unloading of the helicopters. Cable ties are not sufficient. In 2002 many were broken during transport. It is suggested that all lids be secured with VB cord ties at both ends and in addition tape all lids to the boxes.

6. FUEL

Refer to inventory for details of fuel and containers at Cape Denison and for Michael Staples Report 2002 on operational experience in 2002.

6.1 Refueling

- Filtering fuel

Care should be taken to filter all fuel from the Jerry's in the Sørensen Hut and the Apple Hut; some of this fuel was drained from the generators at the end of the expedition and may contain water droplets or rust particles. Take a spare filter.

- Emptying drums

A drum pump and cap wrench would be handy; it was not possible to completely empty the drums by siphoning before they were moved to the higher position on the rocks.

Suggest also a 3/4" jigger syphon for decanting fuel from drums into jerrys.

- plastic Jerry cans with built in funnels

Loose blanking pieces for the caps were difficult to keep track of in windy conditions.

The small breather caps were also easily lost; some spare breather caps and blanking pieces would be advisable if this type of Jerry can.

7. TOOLS AND BUILDING MATERIALS

7.1 Toolboxes

- Driftproof toolboxes

It is suggest to driftproof the steel toolboxes by fitting a neoprene sealing strip around the inside of the lids.

- Weight

The weight of the packed toolboxes should be kept to 30kg. or under. Heavier toolboxes are difficult to carryover the rocks to the Granholm Hut.

7.2 Granholm Hut

- Access to stored materials

On a future expedition, it would be worthwhile re-arranging the building materials stored under the hut to make them more accessible, and re-drilling the six rock bolt holes around the timber stack to allow the expansion bolts to be fitted correctly.

8. HOUSEHOLD ITEMS

8.1 Household Waste

- Reducing Waste

Select food items to eliminate glass and excessive packaging where possible.

- Containing waste

To contain household waste and separate recycling Poly weave bags were very functional. Allow 1 bag for every 2 days kitchen waste. These can be effectively packed in a caged pallet.

- Volumes

Estimate one caged pallet will readily contain 50 days of household waste.

8.2 Human waste and Grey water

- Solid human waste.

Allow 1 Superstrength paper bag per day.

- Liquid waste

Take extra seals for flour drums for transporting liquid waste. Say one extra for each week. These break easily.

9. KITCHEN

Suggest include the following items

A toilet roll holder,
3x medium mixing bowls,
3x rotary can openers,
4x wooden spoons, mop and bucket,
2x slotted serving spoons,
6x tea towels, 3x 'gas matches',
2x 10 litre pots with lids,
One metal dustpan and broom.

10. GENERAL HOUSEHOLD ITEMS

Other useful items to include

String

Large textas

Clothing repair kit (heavy duty needles, wide Velcro, heavy duty thread, scissors)

Large draw string stuff sacks - useful for containing cargo such as sleeping bags

Wet ones/baby wipes & Panty liners - for personal hygiene.

11. CLOTHING AND KITTING

11.1 Specific conditions at Cape Denison

The timing and duration of the expedition should determine the kit issues rather than the application of a "summer" formula due to the nature of the field conditions. It is suggested that the Field Leader be present assist the Clothing Store Officer in the issue of kit to avoid ill fitting gear.

11.2 Footwear

That the sizing and condition of boots be considered closely due to the specific hazards presented by the terrain.

For a late October or early January expedition that consideration be given to supplying Ugg boots to expeditioners for indoor use, or at the very least suggest that that individuals purchase these themselves.

11.3 Freezer suits.

For a late October or early January expedition that consideration be given to supplying two freezer suits which would enable a change for hut use. The nylon freezer suits should not be supplied.

11.4 The petite expeditioner

Provision should be made for the petite person. Ill- fitting gear poses a real hazard.

INVENTORY OF MATERIALS AND EQUIPMENT

REMAINING AT CAPE DENISON DECEMBER 2002

Building Materials at Granholm Hut

Wood stack on rocks to south of Mawson's Hut

Building Materials at Sorensen Hut -

Field equipment -Sorensen Hut

Fuel

MATERIALS LEFT IN GRANHOLM 13/12/02

In the Hut:

Miscellaneous equipment

600mm. pinchbar

Fire blankets x 3

Rock bolts and wedges, standard ANARE 25mm, 7 off.

Putty, linseed oil, ca. 1.5kg.

Tie wire, 2 rolls

Metre squares, 3 off

Salt candle housing for SW corner of Living Hut

Siphon hose for fuel with jiggler valve

Plastic tube, clear;

2m. of 20mm. O.D.

1m of 25mm. O.D.

1m. of 8mm. O.D.

Buckets;

10 litre galvanised

10 litre plastic

Silver rope, 8mm., ca.30metres.

Folding chairs, 4 off

Folding table

Step ladder, 1800mm., 1 only

Companion 2 burner stove, low pressure; **NB. There is no gas bottle for this stove, or adaptor for 9kg. bottles.**

Pressure lamp

Ratpacks, ANARE, 2 off, marked 2000

Building Materials

Compriband, bituminous compressible polyurethane joint sealer, 6m per pack;

100mm. x 25mm., 11 packs.

75mm. x 25mm., 4 packs

assorted small cut lengths

Aluminium angle;

50mm. x 50mm. x 2m, 4 off.

25mm. x 25mm.; 1 @1m, 1@ 2m

Malthoid; 150mm. wide x 20m; 2 rolls

Strap iron, perforated; 25mm.W, 2 rolls.

Fastenings

The fastenings are stored in three ex-ANARE plywood boxes under the bench at the south end of the hut.

Batten Screws, Bugle Head, Plated

14g. x 75mm...	955
14g. x 100mm.	450
14g. x 100mm.	500

Bolts, Cup Head

8mm. x 75mm., zinc plated, with nuts/washers	25
10mm. x 75mm. galvanised, with ca.20 washers	7
10mm. x 75mm., with nuts	50
10mm. x 100mm., with nuts	130
10mm. x 120mm. galvanised, with nuts and washers	5
10mm. x 125mm.	25
10mm. x 150mm. with nuts and washers.....	28
12mm. x 170mm. with nuts	10
12mm. x 165mm. galvanised, with nuts	5

Bolts, Hex Head

1/4" X 2 1/2", zinc plated, with nuts.....	32
1/4" x 2 1/2", zinc plated, with nuts/washers.....	45
3/8" x 3" galvanised with nuts/washers	4
1/2" x 2" zinc plated with nuts/washers.....	4

Coach Screws

Unknown size, plated with washers.....	50
5/16" x 3", zinc plated, with washers	25
3/8" x 2", zinc plated with washers	20

Hinges

Scotch "T" hinges, 400mm.	1 pair
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Nails, Bullet Head Galvanised

25mm. x 1.6 mm	3kg
50mm. x 2.15mm.	25kg.
75mm. x 3.75mm.	25kg.

Nails, Copper Flat Head Square

25mm. x 2.03mm.	3.5kg
40mm. x 3.25mm.	5kg.
50mm. x 3.25mm.	5kg.
76mm. x 3.66mm.	5kg.

Nuts, Brass

5/16" Whitworth, with nuts.....	30
3/8" Whitworth	ca.30

Nuts, Galvanised

3/8"	50
5/8", zinc plated, with washers	40

Pop Rivets, Nickel Copper

1/8" x 3/8"	100
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Roof Screws, Hex Head Class 3 Coating

14g. x 150mm.	500
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Screws, Robertson Drive Flat Head

10g. x 62mm. stainless steel	350
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Steel Flat Bar, Galvanised,

50mm. x 6mm. x 600L.....	4
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Threaded Rod

Steel, galvanised;

10mm. x 1m. lengths.....	25
12mm. x 330mm. lengths.....	8

Steel, zinc plated, 900mm. lengths;

6mm.	3
10mm.	2
16mm.	2

Brass;

6mm. x 600mm. lengths.....	5
8mm. x 1000mm. lengths.....	2
10mm. x 1000mm. lengths.....	14

Washers, Brass

3/8"	200
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Washers, Steel

5/8", zinc plated	25
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Woodscrews, Countersunk Slot Head, Zinc Plated

10g. x 50mm.	50
12g. x 40mm.	50

Tent pegs	18
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Under the Hut

Galvanised steel flat bar;

230mm. X 6mm. x 1800mm.L; 4 off

150mm. x 6mm. x 1800mm.L; 1 off

130mm. x 6mm. x 1800mm.L; 1 off

100mm. x 6mm. x 1800mm.L; 2 off

50mm. x 5mm. x 2000mm.L; 4 off

Galvanised steel sheet, 3mm.T

Most of one sheet 1800mm. x 900mm.

Ridge capping, black steel, 260mm. x 2.5mm. x 3000mm; 2 off.

Lead flashing, 20kg/ sq.m. x 300mm.W; 6 1/4 rolls

Step ladder, 1800mm., 1 only

Saw horses, folding; 2 off

Plywood litter for carrying loads

Plywood sheets 1800mm. x 1200mm.

4.5mm; 3 off

9mm; 2 off

12mm; 2 off

All in poor condition

In the timber stack to the east of the Hut

Baltic pine T&G boards

as described in GML 1998 report.

77 full lengths, with some shorter off-cuts.

The two wrapped bundles remain.

Oregon

50mm. x 70mm; 6 off

60mm. x 60mm./70mm. x 70mm.; 16 off

100mm. x 25mm; 8 off

100mm. x 50mm. 25 off

130mm.x 40mm; 14 off

150mm. x 50mm. 8 off

200mm. x 50mm. 5 off

250mm. x 50mm. 3 off

250mm. x 38mm. 1 off

250mm. x 25mm. 3 off

Note that ca. 15% of the T&G boards have damaged edges.

The existing rope lashings were left in place.

Six 14mm. rock bolts (Hilti expanding type) were fitted alongside the timber pile, and three 6mm. galvanised wires run over the stack. The wires are doubled and secured with bulldog grips; to allow extra timber to be added to the stack without replacing the wires. The rock bolts had to be driven without the expansion lock because the correct size drill bit was not taken; ideally these could be re-drilled and the bolts fitted correctly in the future.

Wood stack on Rocks 100m south of Mawsons Hut and 10m east of designated helipad site

No of boards by length

Baltic Pine

Packs of;

14 @ 5.6m

24 @ 5.1m

24 @4.7

24 @4.7

24 @4.7

28 @ 4.5m

24 @4.4

20 @4.2

22 @3.6m

Oregon

Packs of;

25 @5.4

15 @5.4

35 @3.7

Dimension of total quantity of timber is ca. $5.4 \times 1.2 \times 1.5 = 9.75$ cubic metres.

Each pack may be ca. 200kg. (one is marked 192kg.)

Total weight of Baltic pine may be ca. 1800kg.

MATERIALS AT SORENSEN HUT -

Description	Quantity
17 mm form ply new 2.4 x 1.2	7
“ “ old “ “	1
CD grade 12 mm 2.4 x 1.2	1
Ladders	
7' Step	1
3m-6m extension	1
saw stools	2
threaded rod, 12.5mm galvanised	
1300mm L	4
1800mm L	1
3000 L	6
mild steel tube, 50OD	
2.500mm L	1
500mm L	1
2.300mm L	1
Scaffold tube galvanised 50 OD 6.5 m	1
Antenna Mast 45OD, 2200 L with 3 welded lugs upper end and 250 x 350 base plate	
Wind generator mast – 25 OD black steel tube x 1300 one end ground to fit 1” wind generator mount.	
5 old star pickets x 1.6m	
10 new star pickets x 1.3 m	
tension rod, ½” galvanised x 2300 L	6
(plain galvanised rod with 130mm of threaded rod welded to each end)	
Tension rod, 16mm galvanised x 1700 L	4
(plain rod w 50mm threaded at each end and fitted with nyloc nuts – 2 nuts missing)	
Steel flat bar – galvanised	
50mm x 5mm @ 2metres L	2
Aluminium angle	
40x 40 x3 @ 1700L	1
40x 40 x3 @ 2100L	1
Acroprop 1.7 to 2.8 m	1

Galvanised steel cable 12mm

Stainless steel rod 316 grade

10mm @ 2.8m 1

10 mm @ 1150 1

12.5 mm @2.8 1

12.5 mm @1150 1

Nylon Threaded Rod 16mm x 3m 2

FIELD EQUIPMENT -SORENSEN HUT

Inside Living area

Sleeping bags	4
Liners	4
foam sleeping mats	6
mattresses - thick (from bunks)	2
medium	2
thin	2
Pillows	10
Double Bunk (dismantled secured under Sorensen)	
Large table (seats 8 – 10 comfortably)	
Plastic stackable seats	8

Bike Helmet	1 (NB should be 2 but we couldn't account for one on the last day or so)
Plastic/rubber Bucket v large	1
1.6ml wire – 60 metres	
portable washing machine	
polyweave bags	15
Solar panels 75W	2 (mounts are on north face of Sorensen)
Drums (flour) with lids	3 in toilet, 2 kitchen slops, 3 unused* (need extra fastners as are essential for transferring slops and these break easily)
Baby powder 375ml	1 (for toilet amenity –1container lasts approx a month)
Gas reflective heater – to fit 9kg gas bottle	
One siphon hose with a jiggler valve	

Tied down on tent platform

Quads	2
Quad trailer	1

Below Sorensen Hut

plastic sleds – large	2
Shovels	3

FUEL - Petrol

Approximately 490litres remains;

- ☐ 2 x full 200 litre drums stored upright on the rocks to the west of the helicopter landing site; one drum remains sealed, the other has been opened but topped up from jerrys.
- ☐ 4 x 20 litre plastic jerry cans stored in the Apple Hut.
- ☐ 1 x 20 litre plastic jerry can stored beneath the Sorenson Hut.

Care should be taken to filter all fuel from the jerrys in the Sorenson and the Apple; some of this fuel was drained from the generators at the end of the expedition and may contain water droplets or rust particles.

A drum pump and cap wrench would be handy; it was not possible to completely empty the drums by siphoning before they were moved to the higher position on the rocks. Two siphon hoses with a jiggler valves remain at Cape Denison, one in the Sorenson Hut, the other in Granholm.

The smaller generators consumed ca. 0.5 litres/hr when used for powering the Sorenson Hut in the evenings; a normal workday involved ca. 6hrs of time on the small generators, more on blizz. days when the Sorenson was occupied all day.

Gas

Under Sorensen Hut

Gas bottles 9kg - 3 full, 1 part full

At Granholm Hut

Companion 2 burner stove, low pressure;

NB. There is no gas bottle for this stove, or adaptor for 9kg. bottles.

INVENTORY OF FOOD AND KITCHEN EQUIPMENT

REMAINING AT CAPE DENISON DECEMBER 2002

KITCHEN EQUIPMENT - SORENSEN HUT

The Sorensen kitchen is generally very well equipped. It contains:

4 Burner gas stove

1 large, 3 small frying pans; 4 non-stick bread loaf tins; 1 aluminium mixing bowl; 1 colander; 1 12x muffin tin; 3 measuring jugs; 3 baking trays; 3x 2 litre pots; 1x 5 litre pot; 2x 20 litre pots; 1x 10 litre metal bucket; 5x 20 litre jerry cans; 8x 20 litre flour drums with lids.

FOOD

The following items have been left in the Sorensen kitchen in Nally bins.

Under kitchen bench:

4x 1.5 litre Cold Power liquid.

2x 750ml Wool Mix

1x 150m Alfoil

1x 30m Glad Wrap

1x 15m Glad Wrap

1x 10m Alfoil

4x 500ml Dettol liquid soap

1x 500ml pump-pack SPF 30 sunscreen

4x 80 Huggies baby wipes

5x 100 satay sticks

4x 500ml dishwashing liquid

40x Chux superwipes

3x dish brushes

15x Glad Tuff-Stuff garbage bags

20 bars hand soap

3x sponge scourers

11x pairs assorted dishwashing gloves

500ml Methylated Spirits

2l white vinegar

1 small bag of pegs

6 aluminium pie tins

10 aluminium meal tins

2 nail brushes.

3x 4l olive oil.

23x 750g Milk powder.

13x 115g Deb instant potato

54x 100g surprise peas, corn and carrots.

The following items are in Nally bins against the rear wall of the kitchen:

14x 200g Peanut butter smooth
 6x 115g Vegemite
 9x 250g honey
 5x 250g jam, various

 30x 250g Vita Weet crispbread.

 24x 354g tinned butter

 18x 375g Weetbix

 17x 750g Museli

 16x 1kg white sugar
 15x 50 Bushells Tea Bags

 6x 5kg bread flour mix

 100x 300g instant meal pouches, various varieties.

 32x 2 serve freeze dried meals, various varieties.

 205x muesli bars

 82x 1 litre soup mix, various

 c80x sachets Tang, makes 1 litre.

 8x 16 person day ration packs, various.

The following items are loose on the shelf under the bench:

6x 200g International roast instant coffee.
 7x 50 Bushells team bags
 4x 1kg white sugar
 6x 250g Vitaweed crispbread
 4x 250g Salada
 30x sachets yeast
 10x 300g meal pouches
 6x 350g popping corn
 1x 5kg white flour
 3kg white rice
 70% x 300m roll Glad wrap
 80% x 150m roll tin foil
 2x 250g sultanas

The following items are on the shelves above the bench:

40x boxes Greenlite matches
4x 350g custard powder
3x 300g Cornflour
2x gas regulators
24x 85g smoked oysters

The following items are stacked in the north-east corner of the kitchen:

18 toilet bags
5x 20 litre jerry cans
30 polyweave bags
8 flour drums and lids

The following items are on the shelf in the living section of the Sorensen:

6x 500g Uncle Toby's Oats.

FASTENINGS TAKEN TO MAWSON'S HUT, OCTOBER 2002

Robertson Drive fastenings

Purchased from Sachys Robertson Screws (Aust)
Box 4123 Mail Centre
Mulgrave VIC
3170

ph/fax 03 9803 2370

Countersunk head stainless steel screws, 304 grade

6g x 31mm.....	100
8g x 31mm.....	400
8g x 37mm.....	400
8g x 50mm.....	1000
10g x 62mm.....	300
10g x 75mm.....	100
12g x 50mm.....	200
14g x 75mm.....	100

Pan head stainless steel screws, 304 grade

8g x 19mm.....	700
8g x 25mm.....	700
8g x 50mm.....	700

Countersunk head silicon bronze screws

8g x 37mm.....	100
10g x 37mm.....	100
10g x 50mm.....	100
10g x 75mm.....	100
12g x 75mm.....	100

Landscape screws

6.5mm. x 150mm.....	30
6.5mm. x 200mm.....	30

OTHER

Threaded rod, galvanised

M10 x 1 metre lengths.....	22
M12 x 1 metre lengths.....	2

Threaded rod, brass

M8 x 1 metre lengths.....	2
M10 x 1 metre lengths.....	2

Plain rod, stainless steel 316 grade

3/8"	4 metres
1/2"	4 metres

Coach screws, galvanised

M10 x 75mm.....	20
M10 x 100mm.....	20
M10 x 120mm.....	20
M10 x 150mm.....	20
M12 x 75mm.....	20
M12 x 100mm.....	20
M12 x 120mm.....	20
M12 x 150mm.....	20

Cup Head Bolts, galvanized

M10 x 100mm.....	20
M12 x 100mm.....	20

Nuts, galvanized

M10	300
M12	30

Nuts, Brass

M8	30
M10	30

Washers, galvanized

10mm.	400
12mm.	130

Washers, brass

M8 x 17 x 1.2.....	30
M10 x 21 x1.2.....	30

Washers, stainless steel 304 grade

1/4" x 7/16"	400
1/4" x 5/8"	100
3/8" x 1 1/2"	20
1/2" x 1 1/4"	20

Michael Staples
5/2/03

FASTENINGS RETURNED TO STORE, in FISH BIN 1

Robertson Drive fastenings

Countersunk head stainless steel screws

6g x 31mm.....	100
8g x 31mm.....	400
8g x 50mm.....	950
10g x 62mm.....	280
10g x 75mm.....	100
12g x 50mm.....	200
14g x 75mm.....	200

NB 400 8g x 37 Robertson screws were used on the job; all of this size taken were used.

Pan head stainless steel screws

8g x 19mm.....	500
8g x 25mm.....	600
8g x 50mm.....	650

Countersunk head silicon bronze screws

8g x 37mm.....	100
10g x 37mm.....	100
10g x 50mm.....	50
10g x 75mm.....	100
12g x 75mm.....	100

Landscape screws

6.5mm. x 150mm.....	30
6.5mm. x 200mm.....	30

OTHER

Coach screws, galvanised

M10 x 75mm.....	20
M10 x 100mm.....	20
M10 x 120mm.....	20
M10 x 150mm.....	20

M12 x 75mm.....	20
M12 x 100mm.....	20
M12 x 120mm.....	20
M12 x 150mm.....	20

Cup Head Bolts, galvanized

M10 x 100mm.....	6, with nuts
M12 x 100mm.....	20

Nuts, galvanized

M10	280
M12	30

Nuts, Brass

M8	30, with washers, see below
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M10	30, with washers, see below
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Nuts, stainless steel 304 grade

3/8" UNC	200
1/2" UNC	200

Washers, galvanized

10mm.	380
12mm.	114

Washers, brass

M8 x 17 x 1.2.....	30
M10 x 21 x 1.2.....	30

Washers, stainless steel 304

3/16" x 7/16"	400
1/4" x 5/8"	100
3/8" x 1"	200
3/8" x 1 1/2"	20
1/2" x 1 1/4"	220

Self tapper countersunk head, stainless steel 304 grade

10g x 2"	200
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Strapping iron tensioners for 25mm. strap	18
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Michael Staples
5/2/03

**THIS TIMBER WAS LANDED ON THE SLOPE TO THE SOUTH OF
MAWSON'S HUT IN JANUARY 2003.**

The list below was made prior to the removal from Sandfly store in October 2002.

Baltic Pine

Nine packs, made up of;

14 boards @ 5.6m
24 boards @ 5.1m
24 boards @4.7m
24 boards @4.7m
24 boards @4.7m
28 boards @ 4.5m
24 boards @4.4m
20 boards @4.2m
22 boards @3.6m

Oregon

Three packs, made up of;

25 boards @5.4m
15 boards @5.4m
35 boards @3.7m

Dimension of total quantity of timber is ca. $5.4 \times 1.2 \times 1.5 = 9.75$ cubic metres.
Each pack may weigh ca. 200kg. (one is marked 192kg.)

Total weight of Baltic pine may therefore be ca. 1800kg.

**Michael Staples
5/2/03**

HERITAGE PROGRAM TOOLS REPACKED JANUARY 2003, AFTER COMMONWEALTH BAY

All hand and power tools are stored in the 12 steel toolboxes and one wooden box shrink wrapped on a pallet.
Larger items and the Fish Bins are stored in two yellow plastic cages and one green plastic cage.

The only loose items are;
crowbar, 1.8m

PVC tube containing one fluorescent worklight, 1200mm., with another taped to the outside.

PVC tube containing spare worklight globes

Items placed in the Flammable Store and the gas bottle cage in 2001 may remain, these were not checked; see notes from 2001 re-packing.

Yellow Cage 1

Fish Bins 1, 2, 3, and 4
jerry cans, 4l red plastic x 2
oxy set
rags, one bag
rope, silver, 250metre coil
saw horses, folding, x 2
shovel, wide mouth
shovels, narrow mouth x 2
spade
step ladder, 900mm.

Yellow Cage 2

respirator, full face and cartridges
hard hat
chainsaw helmets x 2
asbestos bags
zinc flashing, 1 roll
cut off and grinding discs, 115mm. and 230mm.
jerry cans, 20 litre red plastic x 6
sledge hammer, 4.5kg.
soft seal, 1 1/2 tins

Green Cage

carry bin, plastic
crowbars, 900mm. x 2
Fish Bins 5, 6, 7, and 8
shovel, wide mouth

sledge hammer, 4.5kg.
work benches, folding ,x 2

CONTENTS OF TOOLBOXES ON PALLET

Box 1

adjustable spanner 150mm.
adjustable spanner 200mm.
adjustable spanner 250mm.
adjustable spanner 300mm.
caulking guns, skeleton type, x 2
cold chisels x 6, (2 x 1", 2 x 3/4", 2 x 1/2")
countersink bits x 3
cutting fluid, 500ml.
drifts , stainless steel x 4
drill bits, long series, 2 x 1/16", 1 x 1/8", 2 x 3/16", 2 x 1/4", 2x 5/16"
drill bits, spare , 1/8", 1/4", 3/8", 1/2"
drill sets x 2, metric and imperial, 0 to 13mm.
driver extensions, Insty bit, 6" and 10"
expansion bolts, SS for survey tags, 9 off, 2" x 1/2" and 4" x 3/8"
file handles x 8
files and rasps
hacksaw blades, spare, 1 box
hacksaws x 2
hammer, 1.8kg sledge
hammer, engineers ball pein, 1.15 kg
hammers, claw, x 3
hole saw set
jemmy bar, small
large vise grips x 2
Letter and number punches
lump hammers x 2
masonry drills, 6.5mm., 10mm., and 13mm., 2 of each.
multigrips x 3, 10", 12", 14"
nail pincers x 2
neatsfoot oil, 250ml.
oil can
oil, 3 in 1, 2 bottles
paint scrapers x 2
pinchbar
pliers x 2
pliers, needlenose x 2
rivet gun, hand type
Robertson hand drivers x 5
Robertson power driver bits, 4 packets
screwdriver bits and nut setters for cordless drills
screwdriver set
screwdriver, large

shears, straight Gilbow
side cutters X 2
snips, offset
spring clamps, plastic, x 4
tin snips, straight cut, x 2
twist drills, spare
vise grips, needlenose x 2
wire brushes, stainless steel x 3

Box 2

auger bit, 25mm.
bevel gauges x 2
blocks x 2, double and triple
bolsters, 100mm., x 2
callipers, bow, 250mm.
carpenters brace
chisel sets x 2
clothes pegs
combination squares x 2
cutter blades, spare, 2 packets
cutter knives x 2
drills, telecom, 3/8" and 1/2"
feeler gauges x 2
fishing line, 1 roll
fuses, glass, AG, various, 3A, 10A, 15A
glad wrap, 1 box
hammers, peening x 2
handsaws x 5
Hex keys, metric and imperial
mallett
matches, 4 boxes
multi saw and spare blade
nail bags and hammer loops x 2
nail punches, 2 x 1/8", 2 x 3/32"
oil stone
Plane, Stanley No.4
plumb bobs x 2
putty knife
rules, steel, 12", x 2
rules, steel, 6", x 2
sandpaper, assorted sheets
screwdriver bits for brace x 2
screwdrivers, jewellers
speed bores and extension bits x 2
stapler
staples, 8 boxes
string line
tape, insulation, x 11 rolls
tape, thread sealing, x 3 rolls

tapes, 5m x 2
tapes, 8m x 2
tapes, 30m x 2
tool bags, canvas x 2
triangle scrapers x 2
trowels, garden type, x 2
twine, 1/2 roll

Box 3

Assorted small nuts and bolts
G clamps, 10", x 2
gas handpiece and fittings
gas heater
gas hose and regulator
globes and spare digital calliper batteries
hand cleaner, 500g.
hose clamps, assorted
Loctite 577 and 243
regulator, spare
ring and open end spanners, metric and AF
sliding bar clamps, 250mm. x 4
sliding bar clamps, 600mm. x 4
socket sets x 2, 1/2" and 1/4" drive
stillsons
tap and die set and spare dies
WD40 squirter bottles x 2

Box 4

heat gun nozzles, spare x 2
Makita circular saws x 2
Makita planer
Metabo 115mm. angle grinder
Metabo heat guns x 2
pencils, red and green x 2 boxes of each

Box 5

bench vice
chain hoist
drill bits for Hilti TE72 rock drill;
12mm. x 2
25mm. x 2
32mm. x 2
drill press vice
drill stand
folding workbench parts

Hilti epoxy, applicator gun
Hilti hole brushes x 2
Hilti hole pump
hydraulic jack
tyre pump
wedges, hardwood, 2 pairs

Box 6

box of power tool parts, handles, spanners, and spares
circular saw blades spare, x 3
circular saw guides
dressing stick for bench grinder
jig saw blades, spare
Makita 3/8" drill
Makita metal cutting saw
Metabo 9" grinder
recipro saw blades, spare
router bits

Box 7

bench grinder
coarse wheel for bench grinder, spare
cut off wheels for 115mm. angle grinder (30 off)
cut off wheels for 230mm. angle grinder (25 off)
grinding wheels for 115mm. angle grinder (16 off)
grinding wheels for 230mm. angle grinder (10 off)
instruction manuals for power tools
sanding discs for 115mm. angle grinder, 1 1/2 boxes
wire cup wheel for 115mm. angle grinder

Box 8

chainsaw chaps x 2
double adapters x 2
extension cords, regular sockets, x 2
extension cords, IP66, x 7
fluorescent work lights, 900mm. x 2
inverter, 300W
IP66 sockets, spare, 1 x male, 1 x female
plastic coveralls, lightweight yellow XL, x 3
power board, domestic type, 6 outlet
PVC trousers and jacket, 2 sets L
PVC trousers, 1 XX L, 1 x M
RCD 4 outlet IP66 power board
Tyvek overalls x 6 (4L, 2XL)

Box 9

candles, 18
crimping tool
Dolphin torches x 2 (batteries removed)
electrical components, spare
field note books x 6
fluorescent worklights, small, 1 x 12V, 1 x 240V
grease, 500g
heat shrink tube
hole punch, 2 hole paper
lock wire, SS, 1 can
multi-meters x 2 (9V batteries removed)
Panasonic lamps x 2
power adapters x 2
siphon pumps x 2
solder, 1 roll
soldering iron, small 240V
vernier calipers, digital, (battery removed)
worklights, 500W x 2
worklights, 150W x 2

Box 10

air filter, spare for chain saw
angle brackets, light gauge galvanised, 20 off.
bowsaw blade, spare
bolt cutters and spare jaws
chain saw files x 6 and file holder
chain saw, Stihl
chain, spare for chainsaw
cutting wheels for demolition saw, 20 off (2 boxes)
demolition saw, Stihl
file guide
fuel filter, spare for chainsaw
funnel set, small
funnel, large, with filter
funnel, water trap
hose clamps, assorted, 1 box
ice cream containers, brushes, mixing sticks
jumper leads
Nisbet bolts and plates for Mawsons Hut WS collar ties
particle board screws, assorted, 1 box
plug spanner for chain saw
rope, 8mm. red braided, ca.30m.
spark plugs x 2, spare for chainsaw
stump vice
wedges, plastic
WEST system 403 fibres, 4 litres

WEST system pump set

Box 11

AAD EMU stencil
Arbortech sharpening kit
DANGER ASBESTOS stencil
framing square
HEARD ISLAND stencil
Makita 1/2" drill
Makita jigsaw
Makita recipro saws x 2
Panasonic drills x 2
probe rods, steel, 3mm. x 1 metre, 4 off
spirit level
surveyors scale
whiteboard square
wire cutters

Box 12

angle grinder 115mm., variable speed, with Arbortech
bars for chainsaws, new, x 2
bars for chainsaws, used, x 2
belt sander, 100mm.
belts, spare, 13 off
chains, new spare, x 11
chains, used, x 3
chainsaws, Makita UC 4000 x 2
drill, 3/8"
drive sprockets, new spare, x 2
router
sharpening kit for chainsaws and three new files

CONTENTS OF FISH BINS IN PLASTIC CAGES

Fish Bin 1

Fastenings returned from Commonwealth Bay, see separate list.

Fish Bin 2

bugle batten screws, 150mm., 500 off
bulldogs, galv. for 10mm. wire rope, 24 off
bulldogs, galv. for 12mm. wire rope, 2 off
bulldogs, galv. for 6.5mm. wire rope, 47 off
plastic basins x 2
rigging screws, eye/eye, 10mm., 4 off

shackles, assorted D and bow, 8 and 10mm., ca 18 off
shackles, D , galv. 10mm., 8 off
thimbles, 10mm., 10 off
thimbles, 5mm., 24 off
wire rope, 10mm. galv., ca.20m
wire rope, galv., 6.5mm. ca. 20m

Fish Bin 3

quad slings, 1 pair
ratchet straps, Spanset 9 metres x 2000kg, x 7 off

Fish Bin 4

garbage bags
linear displacement sensor wire, 1 roll
thermocouple wire, 1 roll
water pump

Fish Bin 5

cotton gloves, 3 packs
ear muffs x 3
knee pads, neoprene, 6 pairs
latex gloves, 1 box
nitrile gloves, 1 box
safety goggles, 3 pairs
safety specs, 3 pairs

Fish Bin 6

dust masks, 1 box
dust masks, 5 bags of 10 each
knee pads, hard rubber, 2 pairs
paper bags, small, x 20
pee bottle
rubber gloves, blue, 1 pair
strap iron, 30m x 25mm.wide
wettexes, 1 pack
woollen gloves, 4 pairs

Fish Bin 7

tool box liners

Fish Bin 8

Cold Gal, 1 litre
contact adhesive, 1 litre
duck tape, 2 rolls
gaffer tape, 5 rolls
masking tape, 4 rolls
paint for Granholm, 3 x 1 litres
paint tray
raw linseed oil, 500ml.

Cable ties;
368mm.; 3 packs of 100, 3 packs of 60, heavy
368mm.; 2 packs of 100, lighter
286mm.; 1 pack of 80
200mm.; 2 packs of 80, 1 pack of 100
142mm.; 1 pack of 100, 1 pack of 80, 1 pack of 40
100mm.; 1 pack of 80

Wooden Tool Box

angle grinder, 230mm.
claw hammer
drill, 3/8"
electric plane
hacksaw
power saw, 185mm. with guide
vise grips, 250mm.

REPAIRS AND MAINTENANCE REQUIRED BEFORE NEXT USE

See also notes from 2000.

Repair or replace the damaged Panasonic charger; replacement cost in January 03 was \$186.

Check capacity of Panasonic batteries; additional Panasonic batteries are \$145, January 03.

Check the chainsaws for internal corrosion. Check the operation of the micro-switch on the kickback guard of the saw with the long lead; this was repaired with gaffer tape during the 2002 trip.

Replace the orange handled hardpoint saw; ca. \$20

Replace two Insty-Bit quick change chucks; ca. \$25 each.

Re-glue the end on the PVC tube for the 1200mm. worklight.

Replace the plug on the 1200mm. worklight taped to the PVC tube.

Replace 1/8" long series twist drill.

Repair the zip on one of the chainsaw chaps.

Replace two string lines

Replace one small jemmy bar.

Replace 4 litre plastic jerry cans for generator lube oil

A box or canvas roll is required for the metric ring/open ender spanner set.

All chisels require grinding and sharpening.

Plane blade requires grinding and sharpening.

Check and replace or sharpen twist drills.

Sharpen 1/2" Telecom bit.

Sharpen both handsaws.

Check the fit of grinding discs on the smaller angle grinders, and determine how to remove the guard from the 115mm. Metabo.

Check output of the inverter; was only producing 180V.

Mark all extension cords with length.

Replace;

VB cord

8mm. silver rope

8mm. braided rope

turps

metho

acetone

WD40

Masking tape

Insulating tape

Gaffer tape

Replace all batteries for;

Dolphins, multi-meter and vernier calipers

Replace dust pans and brushes, metal only

SUGGESTED ADDITIONS AND ALTERATIONS

See also notes from 2000.

Fit neoprene seals around toolbox lids; this may help to driftproof them.

Pack to 30kg. maximum for each box if possible.

Replace all power tool leads with silicon

Suggested additions;
disposable cigarette lighters
ziplock bags, a selection of sizes
neoprene tube, assorted sizes

1/4" bolts, selection of sizes with nuts and washers

two extra water trap funnels
a large funnel
jiggler siphon tube, 3/4"; ca. \$13
drum key for 200litre drums

selection of good quality crimp terminals and electrical spares
larger soldering iron
very small soldering iron
soldering flux
more heat shrink, assorted sizes
more spare IP66 sockets
saddles and clips for wiring, with fastenings to suit

bearing puller
circlip pliers
extra screwdriver set
complete set of tools to kept at the Sorenson

more lunch boxes for small tools and parts
10mm. bit for Hilti drill

CHECK; BEFORE NEXT USE

Check operation of all power tools.
Tag and test power tools and leads.
Check capacity of Panasonic batteries.
Check all adhesive tapes, replace if necessary.
Test drill and fit rock bolts to ensure that drill bits are the correct size.

Michael Staples
5/2/03

Carpenters Report: Mawson's Hut Expedition 2002

Martin Passingham

Contents

- Pre-departure
- Arrival/Set up
- Helicopter operation
- Tools/Equipment
- Ice removal
- Workshop
- Main hut
- Magnetograph hut
- Transit hut
- Sorenson Hut/Field camp

The following report provides information on works carried out to Mawson's Hut from October to December 2002. The recommendations aim to assist with future planning and have been reached through direct experience of the extreme weather conditions in Commonwealth Bay and a thorough assessment of the heritage buildings located at Cape Denison.

Pre-departure

The preparation for this expedition required a great deal of time and care. Comprehensive knowledge of the Conservation Management Plan and Works Plan were essential prior to organising the project. The input from previous expeditioners was of great assistance, particularly with regard to logistical issues.

The organisation of equipment requires: knowledge of the work scopes; the materials that are present at Cape Denison; the tools required to complete works; the length of time needed to organise the necessary items and the ability to liaise with other members to ensure that their needs are met before departure. A variety of skills are required of a carpenter at Cape Denison. These primarily include the ability to marshal helicopters, ride quad bikes and chainsaw ice. Adequate time is required to train people in these procedures.

In our lead up to departure, Michael Staples and I were responsible for all the tools and materials and completed the required training. These procedures took place over a three week period, however many days included substantial overtime. It would be realistic to allow four weeks to organise an expedition of this size.

Arrival/set up

The arrival at Cape Denison was a well planned and executed operation, which required input from all members of the team. Co-operation from the French division as well as the helicopter pilots assisted the effort, as did the good weather.

Priorities such as food, fuel, bedding and gas must be organised before landing, as the team immediately needs to cope with severe conditions. The worst is to be expected and careful consideration must be given to all the necessary requirements before reaching the ice. Prioritisation of cargo to ensure the most important loads arrive first is vital, as it can be several days in between helicopter drops, which are dependent on weather conditions. The first duties on arrival included removing the vent caps (for co2 release), setting up communications equipment and gas connection to enable cooking.

Helicopter operations

Helicopter operations at Cape Denison require great care due to high wind and often, poor visibility. Once again, organisation and planning is the key to safe and successful manoeuvring of cargo and people. Arrival at Cape Denison involved guiding the helicopters to specific locations in order to sling loads and successfully land cargo. This task was assigned to the team carpenters, and at this point we were grateful for any experience or training that was previously provided due to the responsibility involved. In future expeditions, I would recommend a minimum of three trained marshals to ensure safer operations.

Tools/equipment

In any remote area expedition, the compilation of the tools and equipment required to carry out works is a large task. A significant proportion of our time was devoted to this preparation, and consequently the tool kit we assembled met all requirements and allowed us to successfully carry out the necessary duties. An inventory of tools and equipment should be compiled after checking that all the appropriate items are incorporated to complete the specified tasks.

In order to monitor the large amount of equipment used at Cape Denison, a checklist was compiled. Equipment was managed in small toolboxes to deal with the considerable distance between working stations. Four generators were supplied however they were not sufficiently contained, which lead to snow build up within the electrical components. Consequently, a large amount of time was assigned to maintenance.

Ice removal

Approximately two weeks was allocated to ice removal. The amount of ice removed from the workshop and the main hut equated to approximately 35 cubic metres. The ice was extracted primarily through the use of chainsaws, pinch bars, cold chisels and shovels. After gaining entry to the workshop, the system of ice removal involved working from the top and middle of the room, from the centre outwards. We carved manageable sized ice blocks until reaching sensitive areas, where block size was decreased and hand tools and wire probes were introduced. This proved to be a successful method of ice removal as little damage or scarring was evident. Now that the bulk of the ice has been removed, finer methods of extraction are required and need to be considered before further work is carried out. In order to remove ice successfully, it is important to gain as much knowledge as possible pertaining to the internal content and structure of the hut. This is best achieved through gathering photographs, original drawings and prior reports.

Work shop

The principal component of work in the main hut was the replacement of four collar ties and lining boards with original fixtures. Firstly, the broken collar ties were removed from the ice and these were used as a template to ensure their precise relocation (using the original sizes and species of timber). We then reinstated the original four u-brackets to intersections of the collar ties and also the two original straps, which extend from the ridgeline to the collar ties. The work plan specified the use of rods rather than straps for the later process, however the methods employed were suitable and proved to be very successful. Lining boards were replaced in the original position and all were retrieved from the ice except for one 1.2 metre piece. When the collar ties collapsed through ice damage, three rafters were shattered. Restoration of the rafters involved gluing the broken parts and attachment of backing pieces, which were the same size as the original material.

The conclusion reached was that damage to structural members, shelves and artefacts, was due to constant snow ingress and the subsequent formation of blue ice. This ice created a destructive mass, putting severe stress on the internal integrity of the hut. The damage to the shelves and artefacts was obvious as ice had accumulated and transferred the objects far from their original position.

The previous expedition carried out over cladding of the workshop roof, which appears to have reduced snow ingress, hence the problems of intense ice build up. It is hoped that the recent covering of the vent on the dormer roof and a cover strip at the top of the north-facing wall will also reduce snow ingress. With the abovementioned improvements, future ice removal will be more easily managed and major structural damage to the hut will cease to be an issue.

Main hut

Previous internal work to the main hut has proved to be successful, with no change occurring to any structural members. On this expedition, the majority of work was undertaken on the external roof structure as well as small repairs to the external walls. The west facing skylight cover was noted to be missing on our arrival at Cape Denison, therefore it was rebuilt and reinstated. The lead flashings were fitted above all of the skylights to reduce melt-water entering the main hut via the ceiling space. All of the glazing was fitted with putty beads. To minimise snow ingress, cover battens were installed to the joins in tongue and groove boards where a gap was visible. A previously patched hole above the kitchen stove showed signs of large snow ingress, so the decision was made to replace the previous patch with a more weather proof version. Ormanoid press-tight was used as a sealant under all ridge caps, again helping to prevent further ingress. Time was also allocated to re-fixing the original sail battens with Robinson screws.

Although the main structures at Cape Denison demonstrate integrity in many areas, some issues require attention to prevent degradation. The two main negative forces placed up on the structures are very high winds and the constant ice ingress. The integrity of the structural members and fixing remains high, however constant ingress of snow followed by the formation of large ice masses will jeopardise this in time. Approximately 2.5 cubic metres of heavily consolidated ice was removed from the south eastern corner, weighing approximately 1 tonne. The mass was attached to the main hip and stretched across two bunks and two shelves. The shelves had been forced from their original place and were suspended in the ice. Structural members in the building were not designed to carry this extra burden, as indicated by the shattering of collar ties in the workshop.

The wind at Cape Denison is an extreme in which few buildings exist. The wearing down or ablating of the outer cladding is the most obvious visible effect. This condition has left the cladding one third of its original thickness in some places and it is possible that the outer skin will be removed at some stage. Should this occur, the entire cladding is likely to be torn from the roof due to the circular air currents that are created when one cladding

board is lifted. Once the roof is lost the rest of the building may then follow. An example of this force was observed with the discovery of the skylight cover, which was located approximately 800 meters from the Main hut, in several pieces. The skylight cover is one metre square and in normal conditions would be carried a very short distance by wind.

The issue of overcladding the main hut is controversial, however it must be considered due to the benefits of halting both high wind and snow ingress problems. Over cladding will extend the life of this structure and an aesthetic sacrifice may need to be made. Not only will the integrity be reinstated to the whole structure, but the internal components and artefacts will endure far less stress by reducing the damage caused by ice accumulation. It should be noted that there are several ways in which to over clad and this process must be of least interference to the original fabric.

Magnetograph hut

A small amount of work was completed on the magnetograph hut. The hut was re-roofed in the 97/98 expedition and appears to have been successful. Little work was required on this expedition apart from sealing the south wall between the roof and wall connection with Ormanoid press-tight and a timber strip. A patch was fitted to wall cladding on the west-facing wall near the door. A note should be made that all fixings were silicon bronze.

Transit hut

Works carried out in the transit hut included refixed of the cross braces on the north and south facing walls. Cladding was also refixed on the west facing wall.

Sorenson Hut/Field camp

The addition of shelving in the kitchen and a handrail in front of the apple hut were the main works carried out in Jubilee Base. No time was spare to allow extension of the tent platforms. All the required materials are still there to complete this task. Other future works include increasing the deck space outside Sorenson Hut and a set of stairs leading into the hut.

2002 MAWSON'S HUT EXPEDITION
COMMENTS; MICHAEL STAPLES, CARPENTER

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HUTS

Sorenson

All guy wires were checked and found to be in satisfactory condition; none were re-tensioned.

The three guy wires at the southern end of the hut are secured only to large rocks. A better arrangement would be to fit longer wires to rock bolts in the bank behind the hut; this would interfere with access around the south side of the hut, but would be much more secure.

The existing electrical system in the Sorenson could be improved on in a number of ways.

The Sorenson Hut is a potentially hazardous environment in which to use 240V electricity, in view of the metal clad wall panels and the frequently high levels of condensation on the internal walls.

The electrical safety and efficiency of the Sorenson Hut could be improved by

- ☐ Fitting weatherproof external caravan-type power input sockets; this would allow power input from wind, solar, and mechanical generation systems without the need to run cables through the entrance doorway and door seal.
- ☐ Wiring the interior of the hut with conduited 240V and 12V systems with fixed output sockets; possibly also computer network cabling.
- ☐ Fitting a power distribution board with appropriate circuit breakers and earth leakage protection.
- ☐ Fitting appropriate metering to the distribution board to allow the input from the various generation systems to be measured.
- ☐ Fitting a permanent earth for the hut wiring system.

A stainless steel rock bolt was fixed ca. 4 metres from the north-west corner of the hut to allow an earth wire to be fitted to the generators.

A shelf was constructed over the kitchen bench along the north wall.

The plastic water pump failed at the end of the expedition and was RTA'd. A replacement pump and hoses are required; a good quality metal bodied pump, with a spare diaphragm would be more durable than the pump which was damaged.

Approximately 2.5 metres of inlet and outlet hose are required.

Apple

The tie down wires are in fair condition and reasonably tensioned; none were adjusted.

A few small gaps along the joint between the wall and floor panels were sealed with silicone.

The door of the hut is badly warped, making it impossible to seal at the lower end.

The inside handle has broken off the latch, which proved impractical to repair, a spanner must be kept inside to allow the door to be opened from inside.

The simplest solution to these problems would be to fit a complete new door.

A pack of plywood was secured beneath two bolted clamp beams on the bearer ends to the north of the Apple;

7 sheets 2400mm. x 1200mm. formply, new.

1 sheet 2400mm. x 1200mm. formply, old.

1 sheet 2400mm. x 1200mm. 12mm.CD grade ply, new.

Granholm

All guy wires were inspected and found to be in fair condition; none were re-tensioned.

A number of small holes in the walls and floor of the plywood annex were filled with silicone.

The latch of the entrance door was freed and oiled.

Note that of the materials listed as being left at the hut in January 1998, the Megapoxy, methylated spirits, paint, and acetone had been removed.

On a future expedition, it would be worthwhile re-arranging the building materials stored under the hut to make them more accessible, and re-drilling the six rock bolt holes around the timber stack to allow the expansion bolts to be fitted correctly.

TOOLS, MATERIALS AND CARGO HANDLING

A separate additional mechanical tool set should be made up to be kept at the Sorenson Hut for repair of the equipment at that end of the site; a bag of tools and the water trap funnel had to be carried between the Sorenson and the Main Hut every day in order to allow repairs to be made at either end.

This kit should include a multi-meter, water trap funnel, and spare electrical components.

The steel toolboxes were not driftproof; they could possibly be improved by fitting a neoprene sealing strip around the inside of the lids.

The weight of the packed toolboxes should be kept to 30kg. or under; the heavier toolboxes were difficult to carry over the rocks to the Granholm Hut.

The cable ties used to secure the lids of the fish bins were not a success; many were broken during transport; the loose lids presented a serious hazard during unloading of the helicopters.

A better solution maybe to secure the lids with VB cord ties at both ends, and in addition tape all lids to the boxes.

The light nets with metal snap hooks provided by the French to secure loads within cage pallets were simple and effective and allowed odd shaped loads to be safely secured.

The Purbond woodworking glue worked very well at low temperatures.

Some difficulty was experienced in fixing rock bolts with the Hilti drill.

None of the smaller drill bits and rock bolts matched properly.

In the future all rock bolts should be matched to the drill bits by fitting in test holes before leaving Hobart.

The electric chainsaws performed very well during ice removal; a stiff bristle brush and a screwdriver are required to regularly clear the saws of accumulations of ice around the triggers and cooling vents.

4 litres of vegetable oil for chain lubrication was only just adequate for the amount of chainsawing on this trip.

QUADS

The two quads performed very well; they were more or less essential for moving the large quantities of equipment up the hill to the helicopter site and were a great time saver when doing slops runs and transporting materials or equipment between the Sorenson and the work site.

One quad was unserviceable for approximately one week due to a flooding carburettor. It was necessary to remove the carburettor and dismantle it in order to fix the problem; it appeared to be caused by a sticking choke needle, possibly related to the cold temperatures experienced at the beginning of the trip.

The oil in both quads appeared to become slightly emulsified fairly early on in the trip, probably due to the low temperatures and short low speed runs. Neither quad used any appreciable quantity of oil.

The ball type towing hitch fitted to the trailer was not a complete success;

- ☐ the release handle on the trailer hitch limited the travel of the rear suspension by contacting the bodywork at the rear end of the quad.
- ☐ The inside of the ball fitting on the trailer was easily packed with snow if the trailer was disconnected from the towball, making it very difficult to re-connect without clearing it; a simple pin type hitch may be more practical.

All spare parts and lube oil were returned. The quads were tied down on the tent platform, supported on fish bins under the chassis.

The air cleaners were removed and the carburettor intake tubes and the exhaust pipes taped over. The ignition switches were taped over.

The fuel tanks were left full.

The keys to both quads were hung on a nail by the eastern window of the living area of the Sorenson Hut.

The two spare tyres were stored in the Apple.

The pumps are stored in the Sorenson; the ends of the storage tubes should be taped over to prevent the ends coming loose and the pumps being lost when travelling over rough ground.

The next expedition should take

- ☐ Sufficient lube oil to service both quads
- ☐ One complete set of ignition system components.
- ☐ Workshop manual; check that there are no major differences between the two machines,; one is a Big Red, the other a Fourtrax.
- ☐ A quantity of hydraulic fluid for the braking system.
- ☐ New batteries for both quads (both batteries were RTA'd)

FUEL

800 litres of unleaded petrol was taken to Commonwealth Bay in 4 x 200 litre drums.

Approximately 490 litres remains;

- ☐ 2 x full 200 litre drums stored upright on the rocks to the west of the helicopter landing site; one drum remains sealed, the other has been opened but topped up from jerrys.
- ☐ 4 x 20 litre plastic jerry cans stored in the Apple.
- ☐ 1 x 20 litre plastic jerry can stored beneath the Sorenson Hut.

Care should be taken to filter all fuel from the jerrys in the Sorenson and the Apple; some of this fuel was drained from the generators at the end of the expedition and may contain water droplets or rust particles.

A drum pump and cap wrench would be handy; it was not possible to completely empty the drums by siphoning before they were moved to the higher position on the rocks.

Two siphon hoses with jigglers remain at Cape Denison, one in the

Sorenson Hut, the other in Granholm. Both of these are 1/2" I.D.; a 3/4" siphon hose and jigler valve would speed up the process of filling jerry's from the drums.

The plastic jerry cans with built in funnels worked well, but the loose blanking pieces for the caps were difficult to keep track of in windy conditions. The small breather caps were also easily lost; some spare breather caps and blanking pieces would be advisable if this type of jerry can is to be used in the future.

The smaller generators consumed ca. 0.5 litres/hr when used for powering the Sorenson Hut in the evenings; a normal workday involved ca. 6hrs of time on the small generators, more on blizz. days when the Sorenson was occupied all day.

MECHANICAL GENERATORS

Four generators were taken for this expedition;

2 x Makita G650R, 650W
1 x Makita G3500R, 3000W
1 x Honda ES4500, 4.5kVa

All generators performed well, although all were easily packed with drift if exposed.

The combination of two small and two large generators was good and provided some protection against mechanical failure.

Although various combinations of machines were inoperable at various times, at least one machine was always available to provide power for re-charging communications equipment or computers.

The two smaller generators suffered from chronic icing at the carburettor intake in temperatures below ca.-8°.

This could only be cured by removing the side cover and the air filter and mechanically removing ice particles causing the blockage in the air intake passage.

The generators would run for 6 to 8 hours in low temperatures before stopping

It was possible to run the smaller generators in drifting conditions by placing them in a fish bin with another fish bin attached as a lid, propped slightly open with a stick to allow exhaust to escape and some fresh air to enter.

Waste heat from the exhaust raised the air temperature around the generator sufficiently to prevent carburettor icing, but care was required to ensure that sufficient ventilation remained in order to prevent overheating of the generator and possibly a fire if the exhaust was to become constricted.

Unfortunately any arrangement of the fish bins which allowed good ventilation also allowed considerable quantities of drift to enter; due to the elevated

temperatures inside the bins, this drift became liquid with the result that the generators were continually operating in a wet environment.

When not in use, the fish bin arrangement was not effective in protecting the generators from drift accumulation; time was required every morning to remove the build up of drift from the inside of the bins.

Re-fuelling the generators in drift conditions required at least two people; it was impossible to prevent a certain amount of drift entering the tank at each re-fuelling.

A prolonged period of drift would inevitably result in contamination of the fuel systems to the point where stoppage would occur and dismantling and cleaning would be required.

It was difficult to perform maintenance work on the generators outside in bad weather; this required them to be drained of fuel before bringing them inside for repair, and restricted the use of the hut stove while the fuel tanks remained fitted.

It was difficult to assess the load placed on the generators by the various hut electrical systems, except when operating close to the limit of the generator's capacity; this made it difficult to efficiently utilise the full capacity of the generator and to operate the generator at a satisfactory loading.

No earth wires were provided for the generators; sufficient wire was found in the Sorenson Hut to allow connection to a stainless steel rock bolt placed ca. 4 metres from the north-west corner of the Hut.

The larger Makita generator suffered from corrosion inside the fuel tank; this resulted in stoppage within 15 minutes of first starting the machine, and required repeated cleaning of the filter bowl and pipe during the course of the expedition.

This corrosion was probably a result of the water contaminated fuel which caused stoppage of this generator on the last expedition remaining in the tank during storage.

The Honda generator performed very well, although loss of packing around a cable outlet in the underside of the wiring box allowed drift to enter through a hole ca.45mm.square.

This generator consumed some oil; the oil level required regular checking.

The two larger generators could only be drift proofed for storage by placing them inside two draw-string bags.

This system worked well, but required two people to fit the bags, made the generators difficult to move with the bags fitted, and did not allow them to be operated in drift conditions.

Both of the larger generators became badly packed with drift on one occasion. This required major dismantling (removal of the rotors from the stator housing), mechanical removal of drift, followed by drying in the wind and sun and with a hot air gun before re-assembly.

The rear bearing of the Honda alternator was damaged during dismantling.

For future expeditions I suggest that;

- All generators be provided with a weatherproof box to allow them to be safely run and stored in drift conditions; at the very least , all generators should be fitted with a pair of weatherproof bags before leaving Kingston.
- All generators should be fitted with an adapter in the fuel system to allow them to be gravity fed from a 20 litre jerry can or drum to eliminate the risk of fuel contamination during re-fuelling in drift conditions.
- A minimum of three water trap funnels should be taken; one for Sorenson, one for the work site and one spare.
- All generators to be furnished with an earth wire of ca.10m. length with secure fittings to allow attachment to a rock bolt or earth stake.
- All generator outlet boards to be fitted with IP66 weatherproof sockets.
- A distribution board fitted with an earth leakage safety device, voltmeter and ammeter is provided for use inside the Sorenson Hut to allow the generator load to be monitored and the available output used most efficiently.
- A number of small switchable electrical heating elements be provided to allow the generator to be effectively loaded when otherwise only charging lightly; eg. running a single computer.

WIND GENERATORS

The Aerogen (ex Heard Is.) wind generator performed well, although it was necessary to remove three of the six blades to allow it to be left unattended in strong winds.

With three blades only the generator was happy in gusts up to ca. 80knots, but output appeared to be limited in winds below 40knots.

The generator was mounted ca. 6m.from the eastern side of the Sorenson Hut; this was probably too close as the generator appeared to be operating in turbulent air.

The 25mm. mast flexed noticeably in stronger winds.

The output of a single wind generator is limited especially with half of the blades only; a group of two or three and a healthy battery bank would probably be capable of providing all power necessary for communications equipment and computers on a longer trip.

For future expeditions I suggest that;

- The wind generator be mounted further away from the Hut where it can operate in undisturbed air.

- Large diameter cable is provided to minimise voltage drop between the generator and the battery box, preferably run in conduit for protection.
- The larger size base fitting is used on the wind generator to allow it to be mounted on a 1 1/2" diameter mast.
- a number of spare nuts and bolts to secure the blades are taken.

ELECTRICAL

240V

All extension cords and power cords fitted to tools should be of silicon; the PVC sheathed cords became brittle and difficult to use in the colder temperatures.

In one instance, two layers of PVC insulation cracked at the base of a plug to expose the live wires.

All plugs and sockets for outdoor work should be of the weatherproof IP66 type.

12V

All cabling for 12V systems should be dimensioned according to the length of the cable run; significant voltage drops, (up to 1V) were experienced due to inadequate sized 12V cabling, making it difficult to operate the inverter except when the battery banks were fully charged and being constantly fed at a high rate by the wind generator.

The battery banks taken on this trip were ex-Heard Is., at least 2 1/2 years old.

Many of the connections were heavily corroded and several of the fuse strips were broken off. Both battery boxes contained acid spilled from the batteries during transport to Commonwealth Bay.

The capacity and performance of these banks appeared to be somewhat less than might be expected in view of their size.

The poor performance of these batteries was probably due to a combination of cold, age, and undersize wiring.

For future expeditions, I would recommend the use of new batteries only, preferably of the sealed type to prevent acid spills.

The addition of an isolation switch to each battery box would be a valuable safety feature and would simplify the process of switching from bank to bank in order to manage charging and consumption.

A good selection of assorted spare plugs, terminals, fuses and fittings is required.

COMMUNICATIONS

The handheld VHF units provided were simple to operate and worked well

when properly powered.

However, they were relatively bulky in comparison to more modern units, which made it difficult to keep them close at hand while working.

There were few suitable and secure pockets fitted in the clothing issued in which the radios could be conveniently kept at all times.

There appeared to be a problem either with the batteries or the charging system supplied; it was often necessary to take up to three spare batteries in order to guarantee a reliable performance for an afternoon.

On two occasions while doing Total Station work loss of communication due to flat batteries interrupted proceedings.

Given that this work could only be done during periods of good weather and involved up to three people placed up to 300 metres apart, interruptions from this cause were frustrating and time wasting.

One radio was damaged during the course of the expedition, leaving one person short; perhaps two spare radios could be taken in the future.

It was not possible to communicate with the helicopters during the unloading operation due to lack of correct VHF frequencies on the supplied handhelds; while not a serious problem, this did not help, given that loads needed to be delivered to two sites and the loading at the ship end was not necessarily following a pre-arranged system.

For future expeditions;

- ☐ smaller VHF sets with new batteries and aircraft frequencies
- ☐ additional spare units.
- ☐ secure pockets for the radios fitted to clothing.

COMPUTERS

Several of the computers appeared to have been fitted with old batteries; this limited their use in the field as they could not be used for even the shortest time without organising a generator and cabling to provide power.

This added to the difficulty of installing the Environmental Monitoring System, where frequent checks on its operation required the use of a laptop in the Hut.

A mouse should be provided with each computer, as the trackpads often failed to work in the cold.

I recommend that all computers sent to this site in the future be fitted with new batteries, or that computers designed for use in cold conditions be used.

TOTAL STATION

This system worked very well after some early problems due to lack of experience on the part of the operator.

It allowed a large number of points to be accurately located in a relatively short time, once the initial set-up had been completed.

The survey of the artefact scatter around Mawson's Hut was carried out from two new survey marks fitted with three tie down points which allowed a tripod to be set up and left over each mark.

This significantly reduced the set-up time required for each session and allowed the machine to be left unattended on the tripod for short periods in good weather.

It was possible to set the tripod up on rock at some of the older survey marks, but this arrangement was relatively insecure and once set up the machine could not be left unattended.

Efficient use of the system required three people; one on the machine, one holding the pole, and one to make notes and keep track of the number sequence of recorded points.

Reliable radio communication between the machine operator and the pole holder is essential.

The battery life of the machine proved to be very good, up to 5hrs from one of the small batteries, although the machine was only used in fine conditions with temperatures around -3° to -5° . The large battery was not used.

A major problem was lack of familiarity with the Liscad software, which did not allow us to check the validity of measured data as it was collected.

The ability to view this information would serve as a check for errors and would assist in keeping track of the job as a whole.

Where project work is being carried out for AAD staff in Kingston, it is essential that regular communication and feedback is maintained.

This system is a costly one, is dependent on the weather, and requires the time of two or three people.

Unnecessary repetition of work is a waste of expedition time, as is collection of unwanted or incorrect data.

Checking of data can most easily and efficiently be done by staff at Kingston, allowing more time for work in the field.

For future expeditions I suggest;

- ☐ taking an extra prism as a spare, and for use as a permanent local backsight mark.
- ☐ pre-calculation of back-sight angles from all survey marks likely to be used
- ☐ agreed co-ordinate positions for all survey marks.

It may be worth re-painting some of the orange rings surrounding Crispo's survey marks, as these are the only means of identifying the dimples in the rock.

Michael Staples
5/2/03

MAWSONS HUT CONSERVATION EXPEDITION 2002

**REPORT BY DAVID KILLICK
COOK, COMMUNICATIONS PHOTOGRAPHY.**

Food.

The expedition's food supply was based on a customised variant the Antarctic Division's 16-person-day ration pack, supplemented with a supply of frozen meat and some fresh vegetables. Supplies were bought from the wholesaler and the usual providores. Special thanks to Luke Vanzino for help and Di and Estelle for packing.

The meat was buried in a snow bank near the Sorensen Hut and accessed as required. The vegetables were stored inside the Sorensen Hut, but suffered from the low temperatures at the start of the expedition, the pumpkin and most of the potatoes were spoiled after being frozen then thawed. Garlic, onions and to a lesser extent carrots were largely unscathed.

Food items were chosen to eliminate glass and excessive packaging where possible.

In general the catering for the expedition was highly successful and was well received by the group who were a pleasure to cook for. Although we had planned to eat freeze dried meals one evening in three, this proved to be unnecessary and the pouch meals were left for a future expedition to enjoy. Sufficient flexibility was built into the food planning that were able to stretch a two-day ration pack out to three days on several occasions without any hardship. Similarly the rations could have been extended to nine people had the ninth expeditioner been able to get ashore.

Fresh bread proved to be one of the highlights of the expedition. Providing loaves of hot fresh bread had a positive effect on people's morale and was greatly enjoyed. In general bread was baked every second day. The bread mix was easy to use. Similarly steak and roast meat meals were popular with the members of the expedition. Vacuum sealed feta cheese was consumed with alacrity; vacuum sealed olives were only slightly less popular. One of the more popular meals, which ended up supplanting freeze -dried food from the menu, was a Cape Denison lasagne, of pasta, tinned fish, Mornay sauce, instant potato, and grated cheese baked in the oven.

Several guest cooks made excellent contributions to the menu: Geoff Couser with his shepard's pie, Diana Patterson with her Jam Roly Poly and Marty Passingham with his lamb curry.

Several items were not popular with the expedition. Museli bars were almost untouched, Weetbix was only eaten on a few occasions.

There were some shortages which although minor could be avoided in future. The chocolate ration of one bar per person per day should be increased to two bars per person per day.

The expedition's menu plan was based on an expedition of around 60 days in length, allowing around a 10% reserve. 30 ration packs were made up in Nally bins. There was an additional four Nally bins of vegetables, four of cooks supplies, three of bread flour and six boxes of frozen meat.

There were six versions of the same basic ration pack, allowing the dinner menu to repeat every 12 days. Each ration pack contained the following basic items:

Each ratpack contains:

(Breakfast items)

1x235g peanut butter (smooth)
1x250g honey
1x250g jam
1x115g vegemite
1x (non-toasted) muesli 750g
1x Weetbix or similar cereal 375g
4x serves instant porridge
2x 354g butter, tinned

(Hot and Cold Drinks)

1x50 tea bags
1x 250g (or equiv) plunger coffee
1x500g Tang or similar.
1x750g instant milk powder (to make 6 litres)
1x sugar 500g

(Sweet Snacks)

16x100g assorted chocolate bars
16x assorted muesli bars or similar
32 serves soup
4x250g dried apple rings, dried apricots, sultanas or similar
2x sweet biscuits, Arnotts assorted creams or similar.

(Lunch items)

16 serves crispbread
4x100g tuna
4x100g salmon
2x100g sardines (or similar)

(Evening meals)

2x100g g dried peas
2x 100g dried corn
6x 115g Deb

(Savoury snacks: Smoko and chompers)

8 serves sledgies
8 serves powdered dips, hummous or similar
2x tinned oysters
1x vacuum packed olives or vacuum packed marinated feta cheese

1x jar sun dried tomatoes
1x75g anchovies
2x250g assorted nuts

(Sundries)

4x matches, waterproof.
1x can opener, flat.

Additional contents of ratpack type 1:

8 serves freeze dried meals
(additional ingredients for roast beef)

Gravy

<and>

peanuts 500g

Fruitcake

custard powder

Scourer

Additional contents of ratpack type 2:

8 serves freeze dried meals
(Ingredients for roast lamb)

Gravy

<and >

cashew nuts 500g

packet cheesecake

Pot scourer

Additional contents of ratpack type 3:

8 serves freeze dried meals
(Ingredients for lamb curry)

<and>

peanuts 500g

Dried apples, sultanas and custard

Pot scourer

Additional contents of ratpack type 4:

(Ingredients for steak meal)

8 serves freeze dried meals

<and>

cashew nuts 500g

pancakes, UHT cream, maple syrup

Pot scourer

Salami

Additional contents of rat pack type 5:

(Additional ingredients for pasta meal)

Tinned tomatoes
Dried parsley, basil, pesto, pine nuts.
(Additional ingredients for Rice Stir Fry(?))
<and>
mixed nuts 500g
2x tinned pear halves
2x UHT cream.
Pot scourer

Additional contents of rat pack type 6:
(additional ingredients for pasta - spaghetti bolognese)
spiral pasta
tinned tomatoes
parmesan cheese
(Additional ingredients for rice - salmon risotto)
tinned salmon/chicken stock
<and>
mixed nuts 500g
parmesan cheese
Pot scourer

Eight ration packs were left over at the end of the expedition and have been left in the Sorensen Hut. A full list of food left in the hut appears later in this report.

Meat ordered:

The expedition's meat supplies were of the highest quality and the providore is to be complimented upon them. The following items were ordered:

Beef fillet x 16 min weight 1.5kg each
boned lamb leg x 12 min weight 1.5kg each
scotch fillet steak x 60
diced lamb 10kg
bacon, sliced x 10kg
beef mince x 20kg
salami 10kg

Meat left over:

25 scotch fillet steaks, 3x 2kg mince, 3x 2kg diced beef, 5x beef fillets, 16x 500g salami.

Alcohol and soft drinks:

The expedition's alcohol supplies were graciously supplied by the AAP's Mawson's Huts Foundation, and on behalf of the expedition I would like to convey our thanks for this

kind gesture which was greatly appreciated. Quantities were based on a modest ration per person per day. No glass containers were taken.

25 x 2 litre casks red wine (Banrock Station Cabernet Merlot)
10 x 2 litre casks white wine (Yalumba Chardonnay)
30 cases full strength beer cans
10 cases lite beer: Cascade Premium light cans or similar
48 x 1.25 litre coca cola
12x 1.25 litre lemonade

Alcohol left over:

2 cases full strength beer, 2 case light beer, six casks red.

Kitchen equipment

The Sorensen kitchen is generally very well equipped. The only item we really needed was a small multi-fuel stove for melting water.

The kitchen contains: 1 large, 3 small frying pans; 4 non-stick bread loaf tins; 1 aluminium mixing bowl; 1 colander; 1 12x muffin tin; 3 measuring jugs; 3 baking trays; 3x 2 litre pots; 1x 5 litre pot; 2x 20 litre pots; 1x 10 litre metal bucket; 5x 20 litre jerry cans; 8x 20 litre flour drums with lids.

Any future expedition may wish to add the following items: a toilet roll holder, 3x medium mixing bowls, 3x rotary can openers, 4x wooden spoons, mop and bucket, 2x slotted serving spoons, 6x tea towels, 3x 'gas matches', 2x 10 litre pots with lids, one metal dustpan and broom.

Food left behind

The following items have been left behind in the Sorensen kitchen in Nally bins for the benefit of future expeditions:

Under kitchen bench:

4x 1.5 litre Cold Power liquid.
2x 750ml Wool Mix
1x 150m Alfoil
1x 30m Glad Wrap
1x 15m Glad Wrap
1x 10m Alfoil
4x 500ml Dettol liquid soap
1x 500ml pump-pack SPF 30 sunscreen
4x 80 Huggies baby wipes

5x 100 satay sticks
4x 500ml dishwashing liquid
40x Chux superwipes
3x dish brushes
15x Glad Tuff-Stuff garbage bags
20 bars hand soap
3x sponge scourers
11x pairs assorted dishwashing gloves
500ml Methylated Spirits
2l white vinegar
1 small bag of pegs
6 aluminium pie tins
10 aluminium meal tins
2 nail brushes.

3x 4l olive oil.

23x 750g Milk powder.

13x 115g Deb instant potato
54x 100g surprise peas, corn and carrots.

The following items are in Nally bins against the rear wall of the kitchen:

14x 200g Peanut butter smooth
6x 115g Vegemite
9x 250g honey
5x 250g jam, various

30x 250g Vita Weet crispbread.

24x 354g tinned butter

18x 375g Weetbix

17x 750g Museli

16x 1kg white sugar
15x 50 Bushells Tea Bags

6x 5kg bread flour mix

100x 300g instant meal pouches, various varieties.

32x 2 serve freeze dried meals, various varieties.

205x muesli bars

82x 1 litre soup mix, various

c80x sachets Tang, makes 1 litre.

8x 16 person day ration packs, various.

The following items are loose on the shelf under the bench:

6x 200g International roast instant coffee.

7x 50 Bushells team bags

4x 1kg white sugar

6x 250g Vitawheat crispbread

4x 250g Salada

30x sachets yeast

10x 300g meal pouches

6x 350g popping corn

1x 5kg white flour

3kg white rice

70% x 300m roll Glad wrap

80% x 150m roll tin foil

2x 250g sultanas

The following items are on the shelves above the bench:

40x boxes Greenlite matches

4x 350g custard powder

3x 300g Cornflour

2x gas regulators

24x 85g smoked oysters

The following items are stacked in the north-east corner of the kitchen:

18 toilet bags

5x 20 litre jerry cans

30 polyweave bags

8 flour drums and lids

The following items are on the shelf in the living section of the Sorensen:

6x 500g Uncle Toby's Oats.

Communications

The expedition was provided with a satellite phone, six VHF handheld radios, a VHF base station with two antennae and an HF radio. Power for the communications equipment was supplied via generators and by battery banks and inverters powered by wind and solar generators.

Iridium Satellite phone

This small unit was equipped with a data cable, providing the expedition with internet access. It proved to be reliable, portable and easy to use. The expedition used a normal dial-up account through Telstra Bigpond.

The telephone was used for business and personal telephone calls and e-mail from both the ship and from Cape Denison. From the ship the built-in antenna and a small magnetic antenna was used, at Cape Denison a fixed mast antenna was installed. All three proved to provide excellent reception.

More than 1,000 e-mail messages were sent and 800 received during the expedition. 30 small images (400 pixels horizontally) were sent back for web use and 18 larger images were sent back for newspaper use. These varied in size from 138kB to 610Kb. The larger images were split into 40kB pieces using a freeware file splitter (HJsplrit) and reassembled at the Antarctic Division, which helped to avoid the problem of server time-outs which happened when large files were sent.

The Iridium phone suffered a little from poor battery life in the cold temperatures. The one drawback with the unit was the lack of a battery charger for the spare battery, charging could only be done via the phone. While this is not unusual for a phone of this type, an external charger would help keep spare batteries topped up without taking the phone out of service.

All-in-all this was an excellent unit.

Icom Handheld VHF radios

The expedition was provided with six of these ancient and well-used radios which were to be used as the main means of communications across the site.

One unit ceased functioning almost immediately and the other five proved to be unreliable, mainly due to the indifferent quality of the batteries - some of which seemed to have difficulty holding a charge. The general condition of these radios was poor, with loose or missing screws, cracked housings, and a poor fit between some batteries and some units. These units, while excellent in their day, were well past their use-by date and should have been retired rather than foisted upon this expedition.

Some radios proved to work only intermittently and messages frequently had to be relayed through the base station in the Sorensen. They were unable to raise the Astrolabe

and the Kapitan Khlebnikov only two kilometres offshore and sometimes unable to raise the Sir Hubert Wilkins only one kilometre out. The small modern radios used by the Astrolabe's shore party seemed to have no trouble. The charger provided to the expedition was faulty, with one of the six charging bays indicating a full charge regardless of the true state of the battery.

Given that their welfare or indeed survival may well depend on good intra-site communications, future expeditions to Cape Denison should ensure they are provided with more up-to-date VHF handheld radio units.

HF radio

The HF radio unit supplied to the expedition proved unsuited for the task. The unit had no external speaker, merely an earpiece on a short length of wire. Modifications to this met with only modest success.

A broken aerial connection rendered the unit unserviceable in the first week of the expedition. Temporary repairs enabled a short period of poor communications with the Aurora Australis. The broken connection turned out to be not user-serviceable and no spare had been provided. There was no option for the unit to operate with a whip aerial. The unit also did not allow the user to select or program their own frequencies so was unsuitable for interoperability with L' Astrolabe or with the ship's helicopters, even if it had worked.

Future expeditions to Cape Denison would do well to avoid this unit.

Power.

Battery banks

Two battery boxes each containing three 12v 70 amp-hour batteries were used during the expedition. One of each was powered using two 70 watt solar panels and a wind generator. Late in the expedition the batteries were charged with the petrol generators. The battery boxes provided an excellent source of alternative power during the expedition.

Wind Generator

The wind generator supplied to the expedition was erected directly behind the Sorensen Hut.

Medical Report – AAD Mawson's Hut Expedition 2002

Dr Geoff Couser

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1. Summary
2. Equipment
 - a. General equipment
 - b. MRL defibrillator
3. Medical duties
 - a. Voyage
 - b. Cape Denison
4. General duties
5. OH & S Issues
6. Recommendations

1. Summary

Medically very little happened on this field expedition. There were few formal consultations as evidenced by the paucity of entries in the medical log. Medical capabilities were never exceeded and a sense of good general health permeated the expedition. I mostly performed as a general hand and assisted the specialist members of the expedition and carried out my own program of video recording and meteorological observations. It was a significant expedition and I consider myself privileged to have participated.

2. Equipment

a. General equipment

I found the medical equipment and supplies to be most satisfactory. Obviously space was a major consideration and previous ANARE field parties had dealt with this issue long before me. I am grateful to Drs Jenny Mackenzie and Peter Gormly for assembling the supplies – I was the last member to join the expedition and was unable to spend any time at Kingston prior to departure. They did an excellent job. The equipment and supplies I took was fairly standard issue with only some minor modifications by me: eg, I'm not a great fan of colloids so therefore took the equivalent volume in crystalloid; and there were some minor alterations with respect to antibiotics, with an increase in the amount of 3rd generation cephalosporin taken. There were no problems with equipment failure at Cape Denison and I wanted for nothing.

b. MRL defibrillator

Semi-automatic external defibrillators (SAEDs) are on the verge of being a part of BLS protocols and have recently improved in design, specificity, versatility and cost. I took an SAED with me to Cape Denison and tested it in the field when the temperature was -7 degrees. It passed its self-tests each time. It was kept in a dry bag when not in use and was placed in a prominent location in the living hut. It was a useful insurance policy, especially given that we were essentially a construction site using electrical power. It has the advantage over large traditional-type manual defibrillators in that they can be used by a first-responder, rather than a health professional trained in its use. This has implications for on-going credentialing and training for personnel on field parties and bases. Its advantages as far as weight and space are obvious.

3. Medical duties

a. Voyage

L'astrolabe sails fairly poorly in my opinion, but I get seasick quite readily. Promethazine Theoclate (Avomine) proved to be a most effective sea-sickness medication and was used by most expeditioners each way. It also had the advantage of the French thinking we were all pretty tough because we didn't have the visible hyoscine patches behind our ears...they simply thought we were doing without any medication! Preventive medicine was emphasised regarding rolling ships and the potential for injury.

One of our members had a fall on the trip down and injured his ankle. He was wearing his Sorell boots which were not fitted particularly well, and this may have contributed to the incident.

On the trip home I was the only doctor on the ship and provided medical services to all passengers; however very little happened.

b. Cape Denison

A full record of medical consultations can be found in the medical log. The conditions which occurred could be described as relatively minor and virtually all resolved fully. These include polar fingers, frostnip of the face and hands, an early dental abscess, and a minor head injury. A number of conditions were not logged, based on the assessment that the expeditioners would not have consulted a doctor usually. These included cases such as tinea of the feet, sunburn, cracked lips and the like. Supplies were provided from the medical kit and proved to be most satisfactory.

4. General duties

As a consequence of little medical work I of course made myself available to any of the specialist team who required assistance. As a result I found myself lugging cubic metres of ice from the inside of the hut, being a chainman for the surveying project, and being a Tradesman's assistant whenever required. At no time did I ever go looking for a left-handed screwdriver. There was always something to do with such a project.

I did have a number of specific non-medical tasks. I had been provided with a video camera and had been sent to a film-making workshop prior to departure. I took a number of hours of video footage with the aim that it be used for a number of projects: a broadcast-quality documentary, web images, archival material and a tourist briefing video. These will all need to be edited and I understand that plans are underway to do this.

I also performed meteorological observations for the Bureau of Meteorology. This consisted of regular temperature observations (wet-bulb and dry-bulb), cloud observations, and general observations. Unfortunately an anemometer was not supplied – we would have loved to know just how strong the wind was blowing at “The Home of the Blizzard”.

5. OH & S Issues

Obviously preventive medicine is essential in with a field party in an inhospitable environment. This can be enhanced by appropriate equipment to prevent falls and cold-related injury. For the most part this proved adequate and nothing too serious occurred, but comment must be made regarding our issued clothing. Most of it appeared to be well and truly used and in fairly ordinary condition. I understand that the AAD has a policy of not providing half-sizes in boots: this led to some problems with our party regarding stability and comfort (depending on whether the boots were too big or too small). Poor footwear could have led to some serious problems in our situation: when we arrived in late October the outside temperature was –20 degrees Celsius, and with wind speeds of –80 to –100 knots at times the equivalent temperature would have been approaching –50. At times the temperature inside the living hut was –10, and with minimal physical activity due to being hut-bound, a number of us suffered cold injury to our toes. This was mainly in the form of numbness and paraesthesiae, which combined with ill-fitting shoes is a dangerous combination. A number of the party had numb toes on return to Hobart, though I understand the problem is largely resolving with the warmer weather.

6. Recommendations

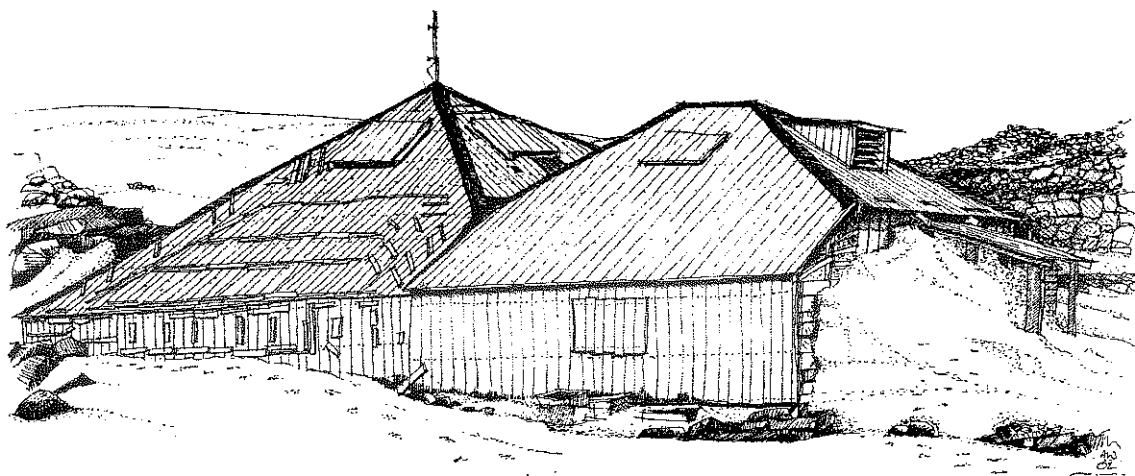
Recommendations can be summarised as follows:

1. That SAEDs be taken on field parties and that consideration be given to using them on the stations.
2. That closer attention be paid to clothing when issued to members of a field party – the stresses and strains on clothing and equipment is much greater in situations such as ours and the standard of equipment needs to reflect this.
3. That no major change be made to the composition of the medical kit used for field parties. The general contents are most suitable and should only be slightly modified to reflect the preferences of the specific doctor on the field party.

Dr Geoff Couser MBBS FACEM
Medical Officer
AAD Mawson's Hut Expedition 2002

17th January 2002

MAWSON'S HUTS CONSERVATION EXPEDITION 2002



CONSERVATION ARCHITECT'S REPORT

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- A. WORKS PLAN
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1. INTRODUCTION

This document reports on the architectural conservation works undertaken during the 2002 Mawson's Huts Expedition. A detailed description is given of the investigations undertaken and the physical restoration work carried out on all the structures as prescribed under the Works Plan.

Additionally observations and recommendations have been recorded in respect to various aspects of the expedition and structures for consideration in future expedition planning.

This Report is an attachment to the "Expedition leader's Report – Mawson's Huts Expedition 2002 and should be read in conjunction with that report.

2. EXPEDITION TEAM & RESOURCES

The individual members of the expedition team combined exceptionally well to provide all the necessary skills to successfully carry out and complete all the tasks outlined in the Works Plan. Of particular note were the skill and dexterity of Michael Staples and especially Martin Passingham in operating the chain saws and the huge labouring efforts of David Killick, Geoff Couser and Diana Patterson in removing 20 tonnes of ice out by hand.

The amount of time and effort required by Michael Staples in the setting up of the monitoring equipment resulted in Mike only undertaking limited building works. More efficient use of the valuable time resources on site might direct planning to be more skill based personal in respect to the larger tasks involved.

Although the removal of ice from the huts was not a priority of this program, the removal of ice that was undertaken did present issues in respect to the 'approved' techniques to be used and the skills available to undertake them. Future excavation of ice, or more specifically the removal of artefacts from the ice, should only be planned if there is agreement on the procedures to be adopted and training in those procedures prior to the departure of the expedition.

The expedition was well supplied with both tools and materials. The meticulous planning, purchasing and packing by the carpenters, Michael and Martin, ensured that the works were extremely well resourced and able to be all completed.

Refer also the Expedition Leader's Report.

3. WORKS PLAN

The tasks undertaken on the expedition were directed by the Works Plan prepared by Gooden MacKay Logan. Refer Attachment A for a copy of the summary of the Works Plan.

The works outlined were of three general types:

- *repair works to the Main Hut Workshop internal roof framing that had failed through snow ingress. This work was first identified in the 1980s but was not completed during the 1997–1998 and 2000–2001 expeditions;*
- *works identified in the CMP that are consistent with conservation policy objectives for the site but require monitoring and assessment before implementation; and*

- *ongoing site research, investigation and recording programs identified in the CMP, either associated with the works program or separate programs in their own right.*

The following were given as priorities for the Works Plan:

- *investigate and assess the structural integrity of the Main Hut, in particular the sub-floor structure. If necessary, as a result of the sub-floor assessment, temporarily tie down the Main Hut;*
- *remove ice from the internal rooms of the Main Hut in a staged manner ensuring that potential impacts on structure and artefacts are minimised and ice is retained on the floors to provide a thermal mass for the sub-floor;*
- *investigate snow and meltwater ingress, provide flashings to skylights and make patch repairs to specific points of ingress; and*
- *undertake survey and recording works (previous and new records for buildings, structures and artefacts) to create a GIS framework linked to database records of individual objects.*

The scope of works outlined in the original Works Plan would have proved ambitious if not for the deletion of the 'tie-down' requirements. The balance of the works was however successfully achieved excepting the structural investigations outlined. Refer Sections 5.

The Works Plan was found to be clear and precise in respect to all tasks to be undertaken. Issues did arise in respect to the priority to be attributed to certain tasks but these were resolved within the work group.

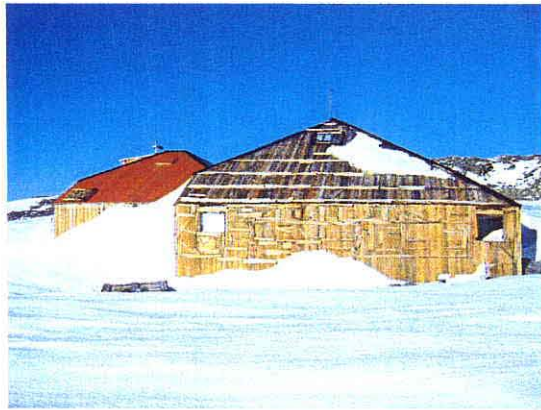
4. SITE CONDITIONS

4.1 EXTERNAL

The arrival at Cape Denison in late October is much earlier than previous expeditions. As a result, the Huts still retained considerable deposits of snow/ice drift around them. Conditions also prevailed for the duration of this expedition that did not allow in the comprehensive melting of these deposits as previously recorded i.e. Greenpeace and Godfrey visits.

These conditions made it difficult to access and undertake the sub-floor and structural investigation work outlined in the Works Plan. This in turn hindered proceeding to other tasks that were predicated on the outcome of these investigations.

The 'cold' conditions did however contribute to dryer and safer working conditions.



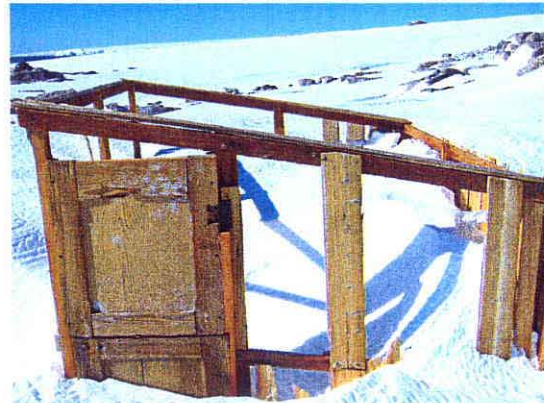
MAIN HUT



TRANSIT HUT



MAGNETOGRAPH HUT



ABSOLUTE HUT

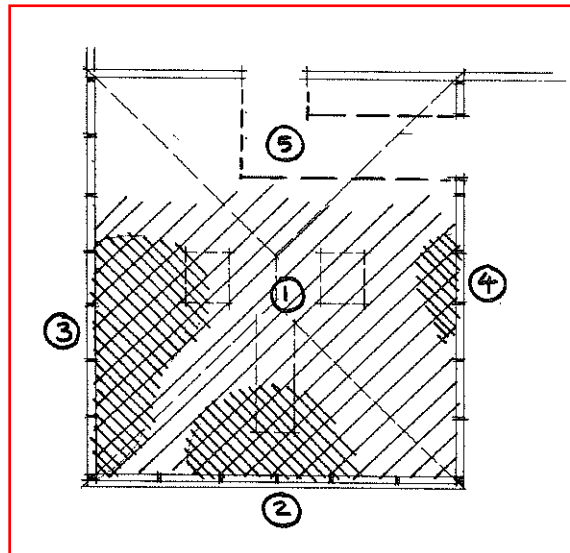
4.2 INTERNAL

The following is a record of recent snow / ice deposits found within spaces of the Main Hut. No detailed measured survey work was undertaken of the existing profiles. The survey equipment provided was not suited to taking measurements of any real use. It is noted that the same conclusion/outcome has been made from previous expeditions.

A detailed photographic record was made of all salient features.

4.2.1 WORKSHOP

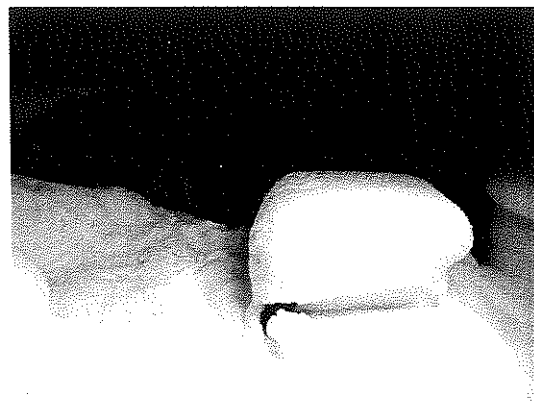
The over-cladding of the Workshop roof in 2000-01 has proved to be successful in keeping out snow / ice. The source of the small deposits of snow / ice recorded in the interior could be sourced to a number of identifiable points.



1. A thin layer of soft snow / ice shown by the single hatching covered the whole of the ice platform excavated during the last expedition.
2. A build up of soft snow ice was located just below the dormer vent. Clear openings could be seen through and around the edges of the vent. It is noted that the vent is lined on the inside with original boarding.
3. The largest deposit within the Workshop was along the eastern wall. Evidence suggested that the snow had entered the roof space (between the ceiling and roof cladding) along the northern wall roof junction and entered the interior via the collapsed section of ceiling lining to the east and north wall.
4. Only a small amount of material was deposited on the wet wall. The same mode of ingress as 3 was apparent.
5. Large sections of solid melt ice were experienced in the roof space to the southern roof plane, these deposits possibly dating back to pre over-cladding of the roof. The remainder of the roof contained only recent deposits of soft snow /ice. It is assumed that the solar gain to these planes ensures that the snow / ice melts and ice does not accumulate.



VIEW TO NORTH



SNOW / ICE OVER MONITORING BOX



ACCUMMULATION BELOW EAST SKYLIGHT



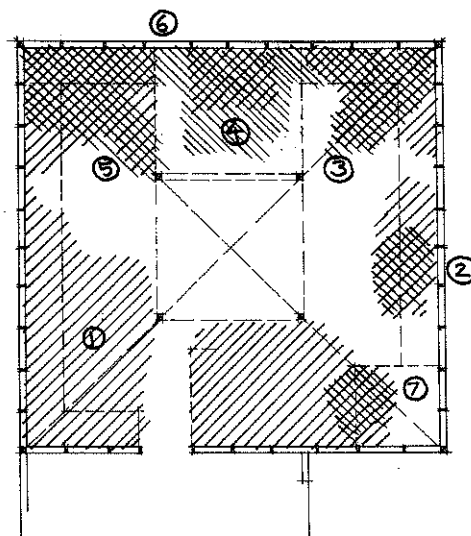
NORTH-EAST CORNER

4.2.2 LIVING QUARTERS

Unlike the Workshop, the Lining Quarters still experiences significant build-up of soft snow / ice deposits and melt water stalagmites. The number of points identified for possible ingress to the interior of the hut and the condition of the roof cladding on the exterior makes it difficult to pinpoint the sources.

What is clear is that the ceiling lining itself is a form of membrane barrier. Snow / ice appears to travel through the roof space and enters at the edges/junctions of the ceiling lining with the hips and 'exposed' rafters. Therefore, the deposits noted below along the ridgelines and elsewhere may not indicate a problem with the ridge capping and other more direct paths.

Deposits were also greatest along the southern wall of the Living Quarters. The condition of the external roof membrane and the direction of the prevailing blizzards are obvious causes of this concentration.

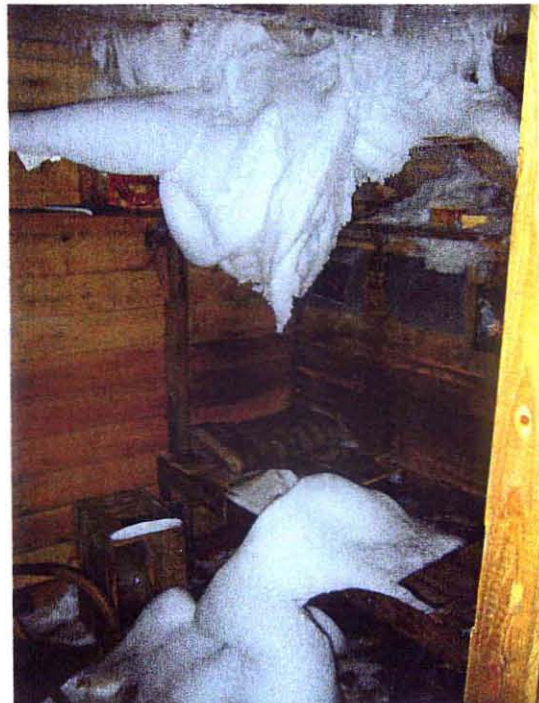


1. Nominal location of older ice deposit. The older sections of solid ice shown with the single hatch remain mostly free of any new deposits of soft snow / ice.

2. An amount of snow / ice was deposited on the older ice accumulation to the central bunk on the western wall. Light could be clearly seen through the ceiling and external roof cladding along the rafters in this location.
3. A line of soft snow / ice has continued to accumulate below the southwest ridgeline. Also the area to the south wall suggests snow / ice is entering through the back wall/ceiling junction.
4. Soft snow / ice has continued to accumulate on top of Mawson's Room as noted on previous expeditions. A primary source for this deposit is through a gap identified in the skylight.
5. An accumulation continues here similar to the southwest corner although in greater volumes.
6. A significant accumulation of snow / ice forms and suspended by the shelf in the southeast top corner of Mawson's Room. Recent expeditions have also removed this deposit. It is apparent that this snow comes via the verandah space through the wall roof junction.
7. An accumulation of soft snow / ice was recorded on top of the dark room. Failure of some of the new cover battens was identified as the most likely source.



SOUTH – WEST CORNER



SOUTH – EAST CORNER MAWSON'S ROOM



SNOW / ICE ON TOP OF MAWSON'S ROOM

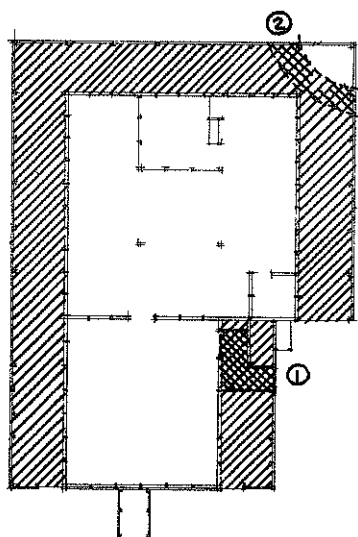


SOUTH – EAST CORNER

4.2.3 VERANDAHS

The verandahs were almost entirely iced in on arrival at the site. Due to the weather that prevailed for the duration of the expedition this condition did not change substantially.

Of interest is the amount of ice that was ablated from the southwest corner of the verandah due to the failure of a number of wallboards on the south (east end) of the wall.



1. Ice excavated to gain access to the interior of the Main Hut
2. Area ablated due to wind action through the south wall.



FRONT DOOR READY FOR EXCAVATION

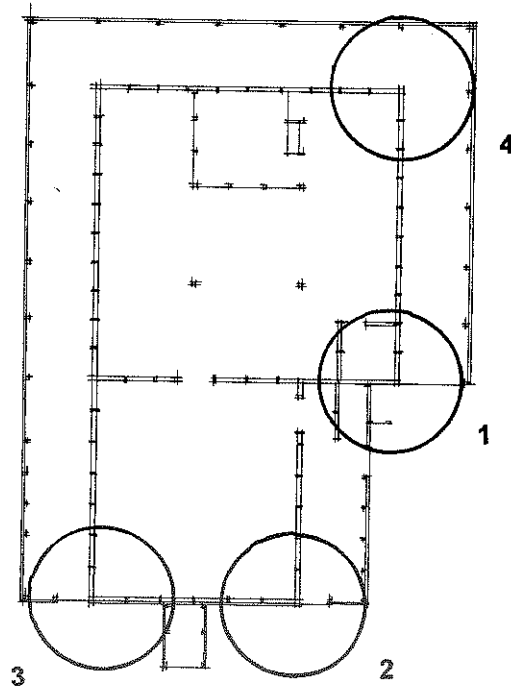


VERANDAH SOUTH – WEST CORNER

5. SUB FLOOR STRUCTURAL INVESTIGATION

5.1 FOOTING / FOUNDATION INVESTIGATION

The Works Plan required the investigation of footings at 4x specified locations.



FLOOR PLAN LOCATING POSTS/FOOTING IDENTIFIED IN THE WORKS PLAN

Snow and ice conditions that prevailed on site was always going to be problematic in undertaking this investigation prior to proceeding to other works as outlined in the Works Plan. At all locations snow drift (and ice) accumulation experienced was substantial dictating not only difficult access but also ensuring very 'frozen' conditions at footing level. None-the-less, excavations were undertaken as per the following:

EXCAVATION 1 - NORTH WEST CORNER OF THE MAIN HUT

This corner was identified as the most appropriate corner to start investigations for the following reasons:

- The area required excavation to access the front door to the Workshop / Main Hut.
- The area appeared from photos to be relatively clear of artefacts.
- The corner is protected from the southerly winds.

The snow and ice has been excavated to expose the top of the footing and corner post, fixing stumps for the building and floor framing.

Excavation did however only achieve the removal of 1x 'footing' rock. All remaining rocks (varying in size from medium to large) were firmly embedded in ice and despite considerable force (short of causing fracture and/or significant damage to the rock itself) would not budge. All further attempts to dislodge these rocks were abandoned subject to further melt of the surrounding ice. No significant change in this was experienced for the duration of this expedition.



EXCAVATION – N-W CORNER LIVING
QUARTERS



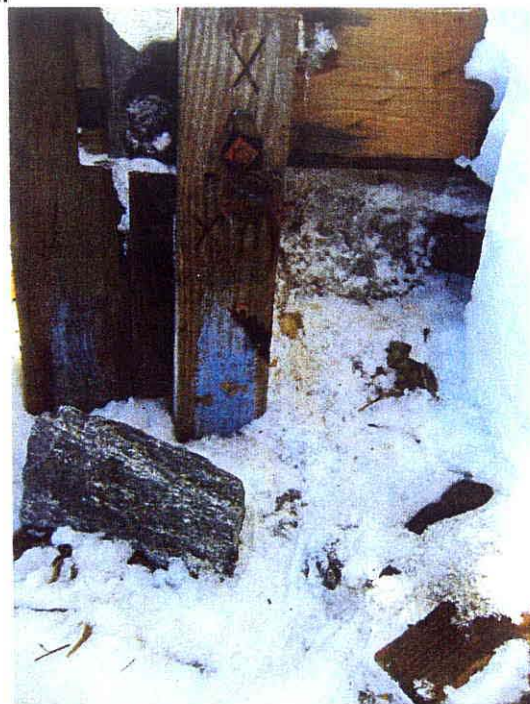
ROCKS EMBEDDED IN ICE AT BASE OF
FOOTING

The construction / framing system employed for the Main Hut is clearly evident and was documented. The system revealed is consistent with previous descriptions and photographic evidence. The photographic evidence clearly supports the use of the same system along each wall line.

The condition of all exposed timbers (including stumps into the footing ice) and fixings appear in good condition and are consistent with conditions in the remainder of the Huts. Refer also the Material Conservators report for more detail.



STRUCTURAL DETAIL – VIEW SOUTH



STRUCTURAL DETAIL – VIEW EAST

Solid ice was been encountered under the floor structure of the Main Hut at this corner. This ice is above the level (approx 300mm) of the surrounding melt ice level encountered. This profile could suggest that the ice under the floor structure has not experienced any significant melt in recent time (eg during the Ian Godfrey visit). This could however only be tested by taking ice samples for further analysis.

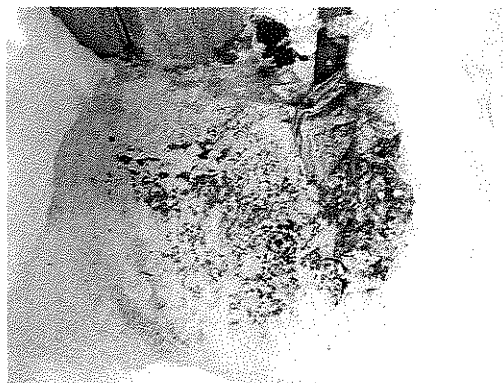


SOLID ICE UNDER FLOOR STRUCTURE

The placement of rocks encountered at this location could support the proposition that the stumps are founded in 'large' open excavations with rock in an ice matrix as a support for the building. No clear indication was apparent of a 'small' rock excavation for the stump to penetrate and/or rocks being placed in a fashion that might suggest the any 'wedging' function is being performed.

EXCAVATION 2 - NORTH WEST CORNER OF THE WORKSHOP

Excavation was started at this location.



ARTEFACT DETAIL

A deposit of organic material and bagging has been encountered at or about ground level. Following an inspection by Archaeologist it was agreed that any further excavation at this location be abandoned subject to conditions at the remaining 2x locations. Given the problems experienced during excavation at first location no further work was undertaken here.

Evidence at the surface did not reveal anything about the form of excavation made into the rock and / or placement of rock around the stump. Further excavation would be required to be more definitive.

The condition of the timber stump and fixings were found to be in good condition as per Excavation 1 of the Living Quarters.

EXCAVATION 3 - NORTH EAST CORNER OF THE WORKSHOP

Previous photos (Ian Godfrey's) indicate this corner contains a number of artefacts close to the area to be investigated.

Excavation was commenced but only taken as far as the melt ice level. A wooden box and metal container were encountered in the vicinity of the footing requiring excavation. A deposit of organic material also lay at the base of the post.



**EXCAVATION – N/E CORNER
WORKSHOP**



ARTEFACT DETAIL

Given the unlikelihood of being able to undertake any significant excavation as per Excavation 1 a decision was made not to proceed and all artefacts were left in place.

EXCAVATION 4 - SOUTH WEST CORNER OF THE MAIN HUT

This corner is in the inside of the verandah surrounding the Living Quarters and remained full of snow and ice for the duration of the expedition. A decision was made to leave this excavation until more of the existing snow/ice had ablated but little change was experienced. It is also clear from photos that this corner of the building contains many artefacts and excavation will be a delicate proposition.



VIEW TO SOUTH WEST CORNER OF LIVING HUT

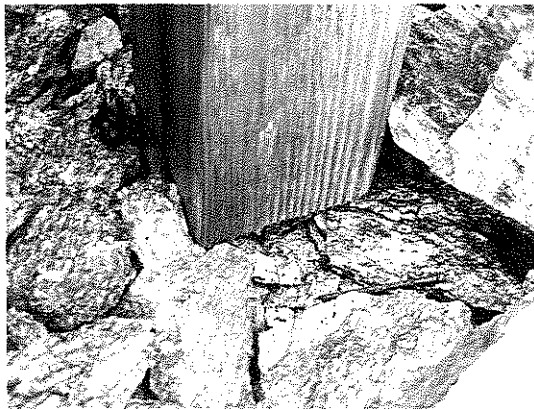
No further attempts were made to excavate at this location.

SUMMARY

Preliminary evidence would suggest the following:

- The building is likely to be supported on a footing of rock in an ice matrix.
- There is evidence to suggest that the under floor ice mass has not experienced a recent melt showing a distinct profile from the outside surrounding area.
- The condition of timber stumps and building framing is good and adequately performing its intended function.
- The condition of all fixings (principally bolted connections) appeared to be good, and on the surface, consistent with bolted connections exposed elsewhere in the building.

It has been noted from our inspection the posts to the verandah exposed during the time of the expedition show no form of direct mechanical connection to the ground (either by being embedded into a footing or cleated/fixed to the surface rock. It is presumed that the verandahs are held in place by the cantilevering action of the roof structure.



VERANDAH POST DETAIL – WEST
ELEVATION



VERANDAH POST DETAIL – WEST
ELEVATION

5.2 SUB-FLOOR INVESTIGATION

The Works Plan specified the excavation of the meat cellar to investigate the subfloor structural and environmental conditions.

Ice was removed from around the vicinity of the cellar door/hatch previously excavated during the 2000-01 expedition. The wooden box (and ice saw, although not sighted) was firmly reset in solid melt ice and excavation proved difficult and potentially damaging to the artefacts themselves.

The process was abandoned on the following grounds:

- Potential disturbance /damage to known surrounding artefacts
- The solid nature of the melt ice would result in slow progress with the prospect of yielding limited knowledge of the structure
- The confined space available in the under floor 'cellar' would present a tight and difficult work environment, especially in respect to the use of power tools, and likely damage to the building fabric
- Environmental monitoring can be installed through the floor surface without requiring access to the underside of the floor

6. TEMPORARY TIE DOWN

The scope of work relating to the Tie Down of the Huts in the Works Plan was withdrawn prior to the departure of the expedition to Cape Denison. Refer Section 2.

From the structural investigations undertaken on this expedition there does not appear to be the need to provide any structural upgrading of any sort in the short term. The structure of the building remains in tact and in good condition and the ice banks both in the Huts and in the surrounding verandahs remain substantially in place. There is also little evidence on site to suggest any of the major 'melts' that have occurred at the site have had any effect on the ice mass both inside and immediately under the structures.

It is alternatively proposed that the temperatures of the subfloor of the Main Hut should continue to be monitored to record any temperature fluctuations and long term variations as well as the effects of the stage removal of ice from the interior of the hut. Any substantial changes /

progression in conditions may then require the reconsideration of the need to reassess the anchoring of the structure.

If any 'tie down' requirement similar to that outlined in the Works Plan be deemed to be necessary (in the medium to long term) then consideration should be given to the incorporation of a system of 'tie-down' with any proposed over-cladding of the roof of the Living Quarters.

7. MAIN HUT STRUCTURAL INVESTIGATION

CONNECTION OF ROOF TO FLOOR STRUCTURE VIA WALLS AND INTERNAL POSTS

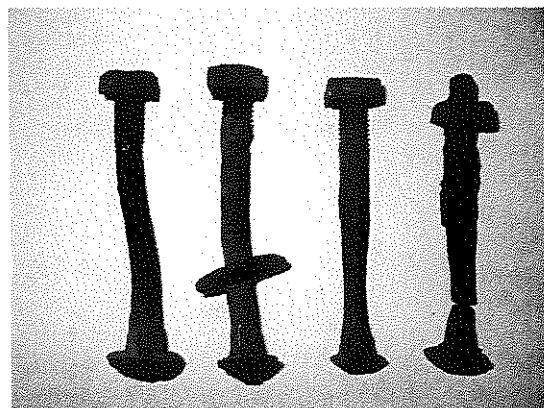
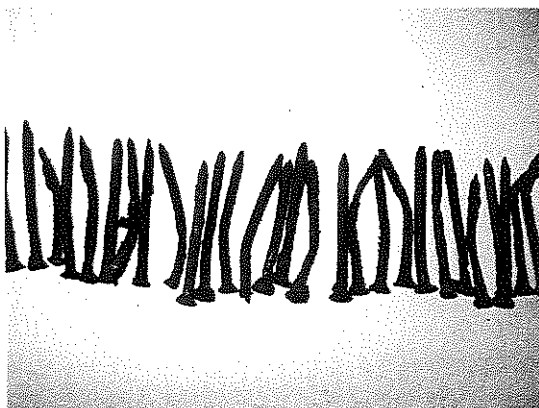
As a process of undertaking the remedial works to the roof structure of the Workshop Hut the structure has been fully revealed and documented. Detailed drawings are currently being prepared and a photographic record compiled. Measured surveys were also undertaken of the following:

- Ceilings to Workshop
- Interior walls revealed in the Workshop
- External walls to Main Hut including locating all battens
- Updating and completing existing roof plans to the Main Hut
- Transit hut wall cladding

Refer Appendix B

There was no evidence of melt water having caused any damage to the roof or wall structures and/or connections (other than that which has been recorded to the collars ties). All wall lines inspected both internally and externally remain true with no evidence of any damage due to any displacement. It was decided not to remove any wall cladding (internal or external) because of the inevitable damage that would be caused to the t&g joints and the unlikelihood of revealing any relevant information.

All materials and connections inspected were in good condition and performing their function adequately. Bolts retrieved from the collar ties indicate nominal corrosion but not sufficient to effect their performance. The level of corrosion is consistent with bolts removed during the replacement of beams etc in the Living Quarters (some stored on the platform of the Hut and others under the Granholm). Nails retrieved during ceiling removal also indicated a level of corrosion but not sufficient to effect their performance in securing the ceiling lining as a shear plane.



Samples of both bolts and nails were collected for further analysis.

The structure of the Living Quarters was similarly inspected and recorded. As the same structural system, material and fixings has been employed as per the Workshop it is deemed unnecessary to undertake any further invasive investigations of this structure at this time.

An aspect of the structural integrity of the Living Quarters that has not previously been considered is the wracking, or shear capacity of the t&g roof cladding. The shear plane provided both in the walls and the roof is clearly a significant contributor to the overall capacity for the structure to withstand high wind speeds. The deterioration of the roof cladding especially, both in thickness and the gaps appearing between boards, is severely reducing this capability.

8. WORKSHOP ROOF STRUCTURE

8.1 ICE REMOVAL

During the 2000-01 expedition access was gained through the western skylight and approximately eight tonnes of ice was removed. This created a nominal platform of ice at about the level of the top plate of the walls in the centre of the Workshop. Ice build up around edges (other than those areas excavated to assess the condition of the rafters) remained in place up to the underside of the ceiling lining.

In order to provide sufficient working space to be able to carry out the works prescribed it was necessary to immediately excavate the ice to a level approximated 600 below the top plate.

Significant amounts of solid melt ice and softer snow ice had built up between the ceiling and roof linings. A concerted effort was required to remove this ice/snow with impacting on the existing fabric of the building. Unavoidable damage was caused to the tarpaper membrane between the two linings. This paper had already been damaged by the earlier failure of the roof cladding and ingress of large quantities of snow/ice.

It proved unnecessary to prop the roof (either during the ice removal stage and/or during the repair work) as outlined in the Engineer's Report' as the roof structure was found to be structurally sound in its own right.

As identified in the Works Plan, the ice in this area was assessed as substantially 'sterile' being previously excavated in 1978. A number of artefacts (all items either resting or fixed to the collar ties) were however excavated. Refer the Archaeologists Report. A number of remnants of the tarpaper membrane were also encountered during the excavation of this area.

During the excavation all of the dislodged ceiling boards were recovered except 1x section from the southern plane (possibly excavated during the excavation of the access tunnel to the Living Quarters). The location of this section remains unknown.

Sufficient sections of the failed collar ties were also exposed to be able to assess the potential for reuse of these elements in the upgrading program.

Refer Section 10.1 for the second stage of ice removal

8.2 RECORD / ASSESSMENT OF EXISTING CONDITION

8.2.1 RAFTERS

The Works Plan identified 6-8 rafters that requiring restoration/reconstruction due to damage caused by the failure of the collar ties. The Works plan outlined

Closer inspection of the rafters facilitated by the removal of ice and sections of the ceiling (refer below) indicated that only 3x rafters had sustained any structural damage. All three rafters had the section below the bolthole fixing the collar tie to the rafter torn away. In all cases, the broken sections of the rafters were recovered and original locations for sections determined for refixing.

The strength of the broken rafters had been substantially reduced and would require upgrading with additional timber to reinstate the original structural integrity of the roof frame.



RAFTER 1 (NORTH EAST)



RAFTER 2 (SOUTH EAST)



RAFTER 3 (SOUTH WEST)

8.2.2 LOWER COLLAR TIES

All collar ties had comprehensively failed (evidence from the 1978 photos indicate that members were already damaged) and had collapsed under the weight of the incoming snow/ice. In the process of collapsing, it was evident that the ties had shattered into a number of sections with no single length being greater than 1.5-2m.

The remanent sections of the collar ties were embedded in the snow/ice nominally down to the floor (or to the level previously excavated to in 1978).

The decision to replace the collar ties with new members was based on the following:

- The exposed sections of the collar ties indicated that the timbers were badly fractured and in short lengths
- The remanent sections were buried deep into the ice mass and at the time there was no clear direction that the balance of the ice mass was to be removed during this expedition.
- The structural integrity of the roof could be guaranteed with the use of continuous new members.



REMANANT ENDS OF COLLAR TIES
PROJECTING FROM ICE MASS BELOW
ORIGINAL FIXING LOCATIONS



FRACTURED CONNECTION AT LOCATION
OF COLLAR TIE JUNCTION

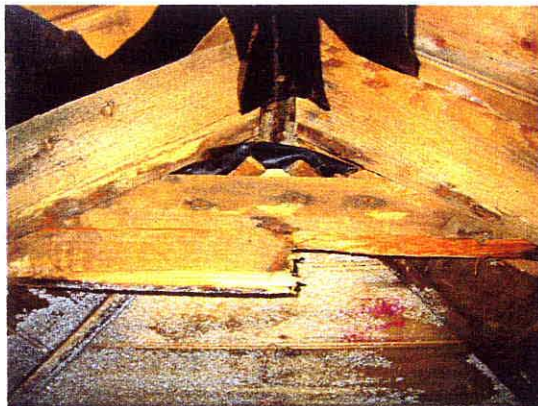
8.2.3 APEX COLLAR TIES

The 2x apex collar ties failed through the pulling down of the hanging straps fixed to the lower collar ties. The straps were nailed to the sides of the collar ties. The bottom sections of the ties fractured away and in both cases splits in the ties continued to the boltholes on each side.

The dislodged sections of the ties were all recovered and original locations determined to verify the 'hanging' detail.

The existing ties were replaced with new material (not strengthened as per the rafters) for the following reasons:

- The detail (proximity to the incoming hip beams) prohibited the stitching of an addition section to the sides of the original on the northern collar.
- The structural integrity of the roof could be guaranteed with the use of continuous new members.
- The collars needed to line up with the new ties below to be able to reinstate the hanging straps to the original detail.



SOUTH APEX COLLAR TIE



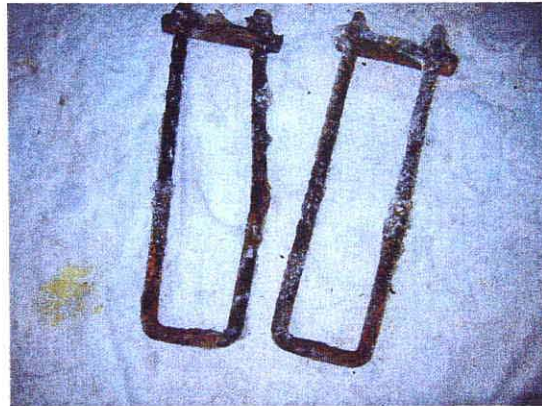
NORTH APEX COLLAR TIE

8.2.4 'U' BOLT CONNECTORS

New stainless steel 'U' bolts were manufactured to detail provided in the Works Plan. These bolts were found to be not useable as they were detailed not recognising the spacer used between the intersection of the collar ties and were subsequently fabricated too short. During Stage 2 of the ice excavation in the Workshop, the original 'U' bolts were recovered and found to be still serviceable and suitable for reinstatement. Nominal bending had occurred during the collapse of the collar ties. The metal was also partly corroded but the threads were still useable without the need for re-tapping.



'U' BOLTS STILL FIXED TO BROKEN COLLAR TIES IN THE ICE



RECOVERED BOLTS INDICATING NOM. BENDING DUE TO FAILURE OF COLLAR TIES



TIMBER SPACER BLOCK FROM BETWEEN COLLAR TIES AT INTERSECTIONS

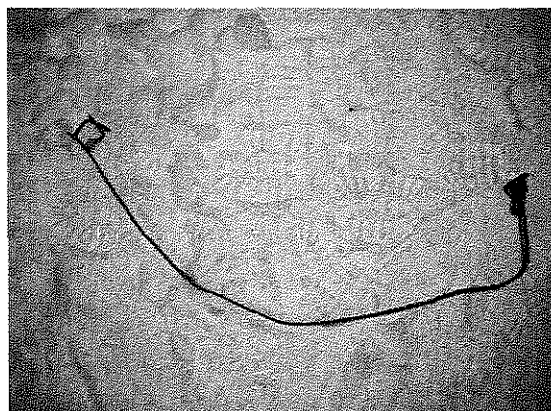
8.2.5 HANGING 'STRAPS'

The Works Plan / Engineer's Report described (in lieu of no known/documented detail) a stainless steel hanging rod to connect the lower collar ties to the apex ties.

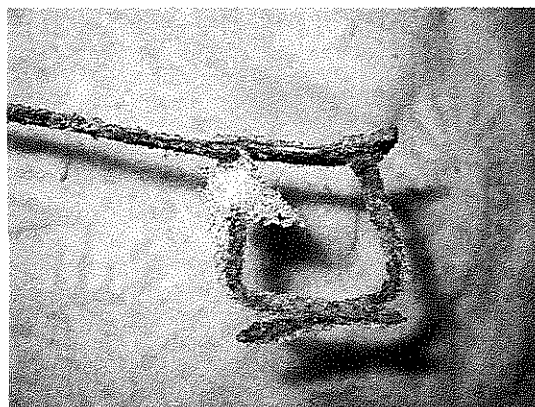
Closer inspection of the apex collar ties revealed that it was unlikely that a metal hanging rods detail was used. There was no evidence of any fixing method to the remaining collar to be able to support this detail.

During the second stage of ice removal, metal straps were found still fixed to the central sections of the broken collar ties.

The straps (nominally 35mm x 2mm) were fixed to the side of the apex collar ties with 2x 100mm nails bent over. The fixing to the lower collar ties was by a single nail through the side of the tie and one through the strap wrapped under the tie.



RECOVERED HANGING STRAP



TOP FIXING FOR HANGING STRAP

The straps showed varying levels of corrosion and generally in a condition to be of doubtful structural capacity. The lower end of the northern strap was corroded to a stage where the end turned under the collar tie had broken away.

The decision to replace the original straps was made on the following grounds:

- The straps were considered to be of doubtful (or at least nominal) contributor to the structural integrity of the roof as a whole.
- The Expedition did not have at its disposal suitable new material to be able to fabricate a matching detail.

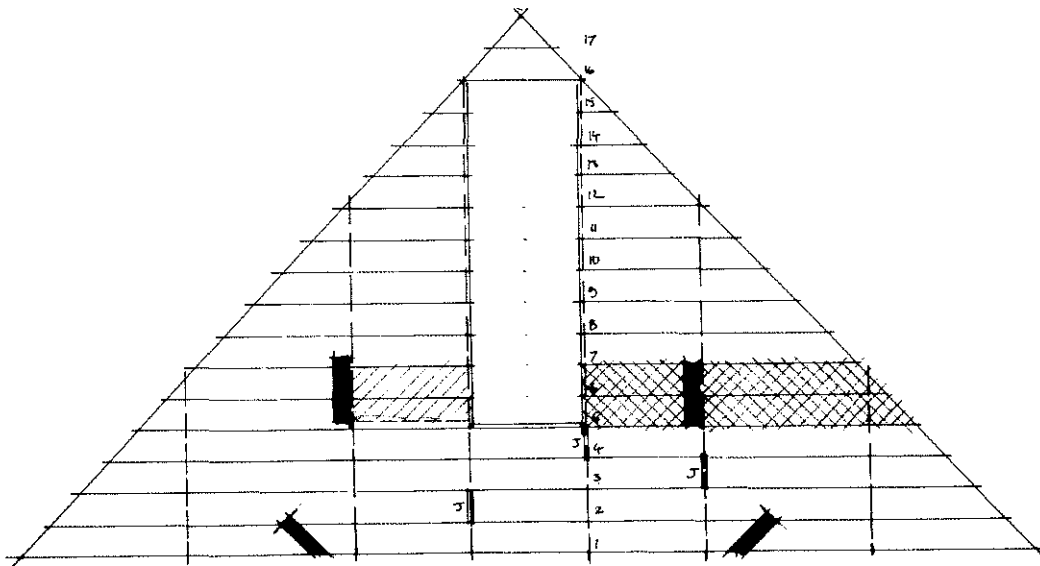
8.3 CEILING REMOVAL

Sections of the ceiling had been dislodged by the action of the collapsing collar ties. Some boards had fallen and were recovered from the ice. Fixings on other boards had failed and partly separated from the rafters. A number of these boards were twisted and deformed.

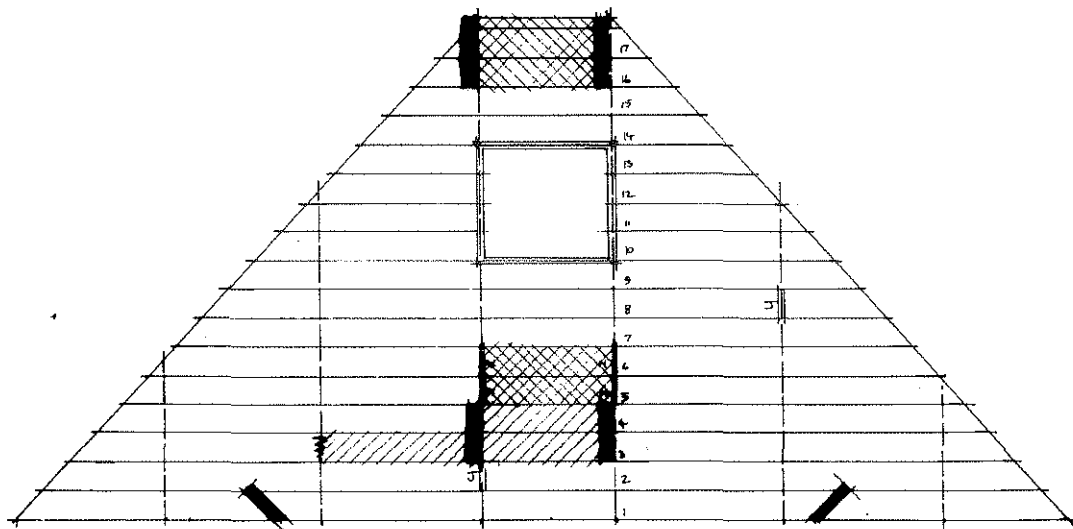
Additional ceiling boards also were required to be removed to enable ice removal and allow access to be able to undertake the work. In some instances the damaged tongues of boards were required to be removed to minimise potential damage to surrounding boards.

Where possible advantage was taken of existing jointing in the boards to restrict the amount of material to be disturbed. A number of new cuts were however required as shown on the following plans.

During this stage it was noted that a number of boards had clearly been refixed at some stage. Different fixing nails and evidence of the tongues of a number of boards suggested that these boards were the boards refixed in 1978. A full investigation of the extent of this work was not undertaken.



NORTH ELEVATION



WEST ELEVATION



CEILING BOARDS DISLODGED
RECOVERED FROM ICE AND REFIXED.



CEILING BOARDS REMOVED DURING STRUCTURAL
PROGRAM AND REPLACED.



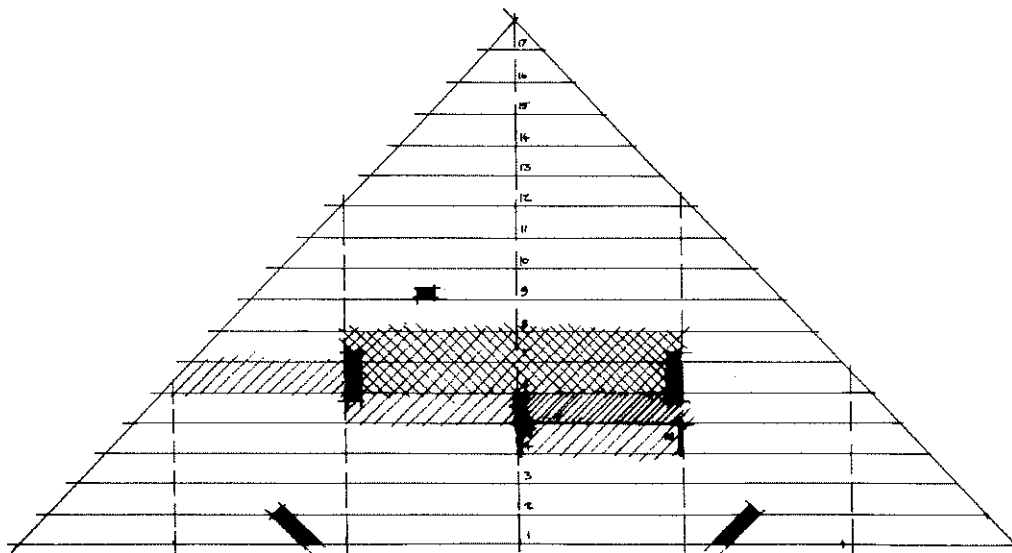
CEILING BOARDS DISLODGE BUT NOT RECOVERED.
PLYWOOD PANEL INSTALLED (TEMP)

J

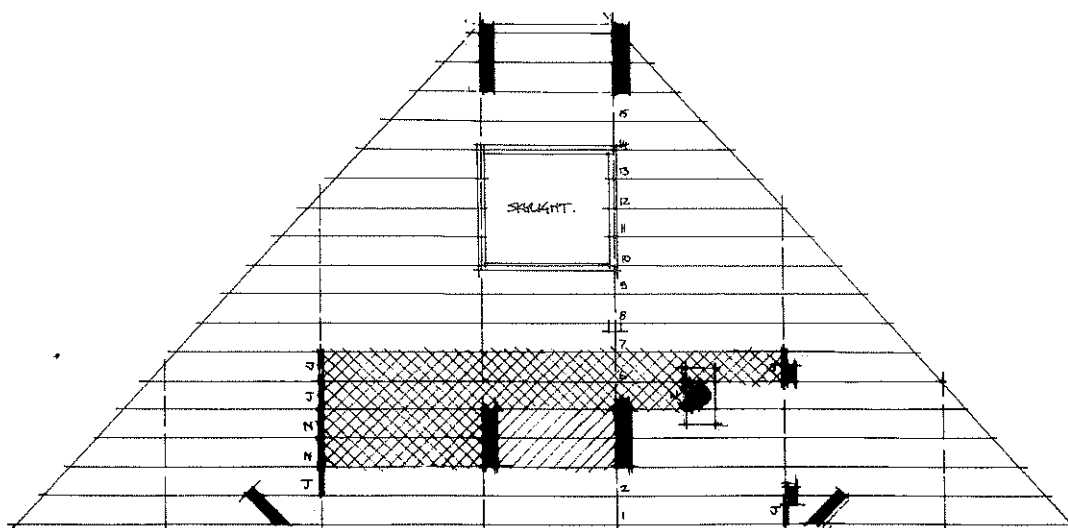
EXISTING JOINT IN CEILING BOARDS.

N

NEW CUT MADE TO FACILITATE STRUCTURAL PROGRAM.



SOUTH ELEVATION



EAST ELEVATION.



CEILING BOARDS DISLOOGE
RECOVERED FROM ICE AND REFIXED.



CEILING BOARDS REMOVED DURING STRUCTURAL
PROGRAM AND REPLACED.



CEILING BOARDS DISLOOGE BUT NOT RECOVERED.
PLYWOOD PANEL INSTALLED (TEMP)

J

EXISTING JOINT IN CEILING BOARDS.

N

NEW CUT MADE TO FACILITATE STRUCTURAL PROGRAM.

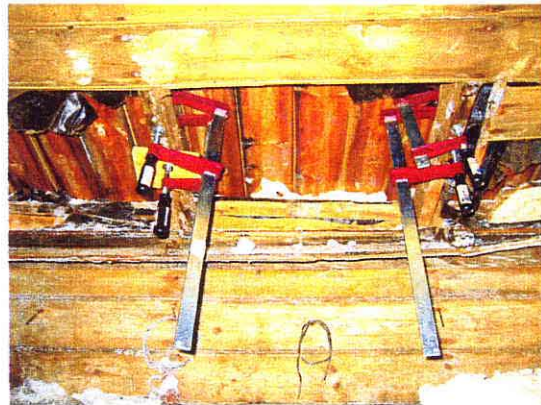
8.4 RAFTER REPAIRS

The broken section of the rafters were repaired in the following way:

- Broken sections of the rafters were located and their original location determined
- Sections and splits in timber were glued and clamped until set
- Tek screws were installed to strengthen the glued joints
- A new section of rafter was glued and stitched with tek screws to the side of the repaired rafter.



SECTIONS OF RAFTER RECOVERED AND ORIGINAL LOCATIONS DETERMINED



SECTIONS AND SPLITS IN TIMBERS GLUED AND CLAMPED



TEK SCREWS USED TO STRENGTHEN BROKEN SECTIONS OF RAFTER



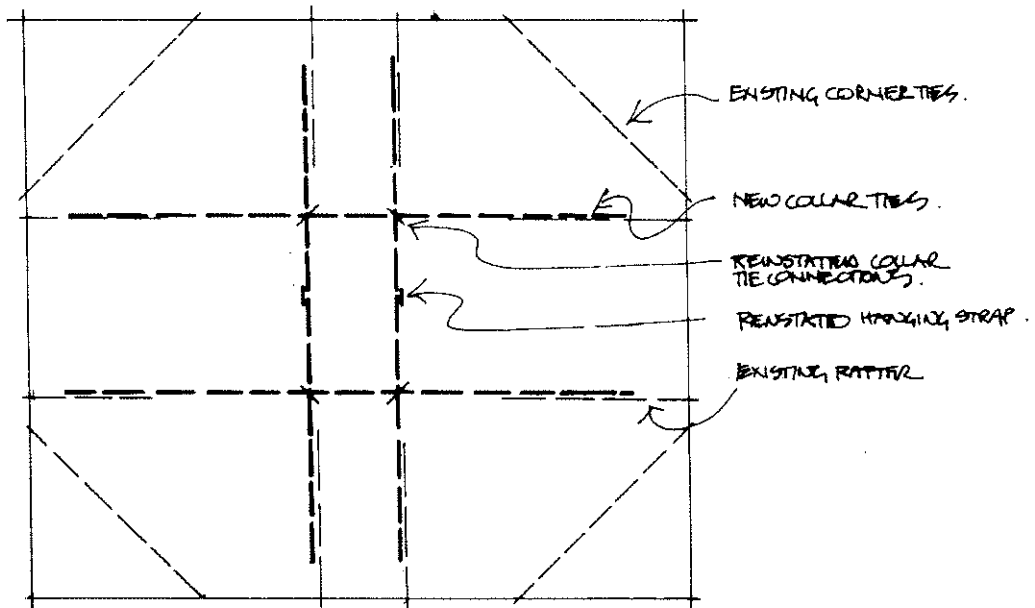
NEW SECTION STITCHED TO SIDE OF BROKEN RAFTER

8.5 COLLAR TIE REPAIR/REPLACEMENT

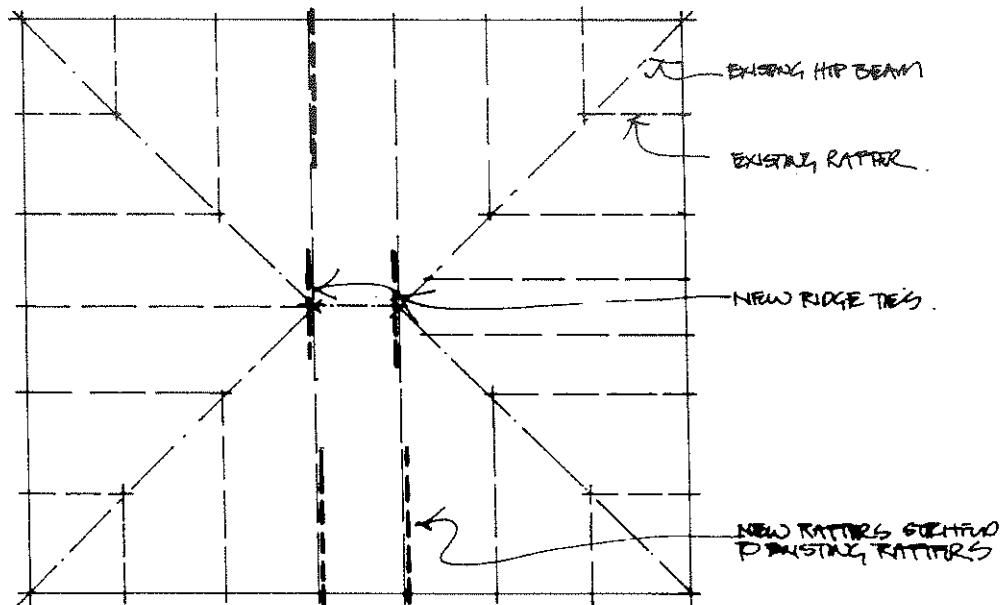
8.5.1 4X LOWER TIES

4X new collar ties were installed using timber and section to match the original. No removal of the external roof cladding to either access the rafters and/or the delivery of the lengths of timber was required as suggested in the Works Plan. Timbers were cut to length outside and delivered successfully through the western skylight on the roof.

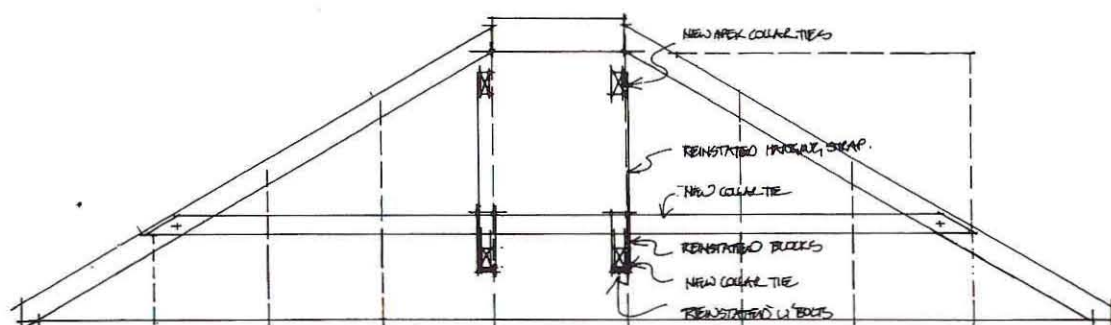
The collar ties were fixed to the rafters with 2X 12mm new galvanised bolts to match the original. Bolts were installed each side of existing bolt hole to improve the strength of the connection.



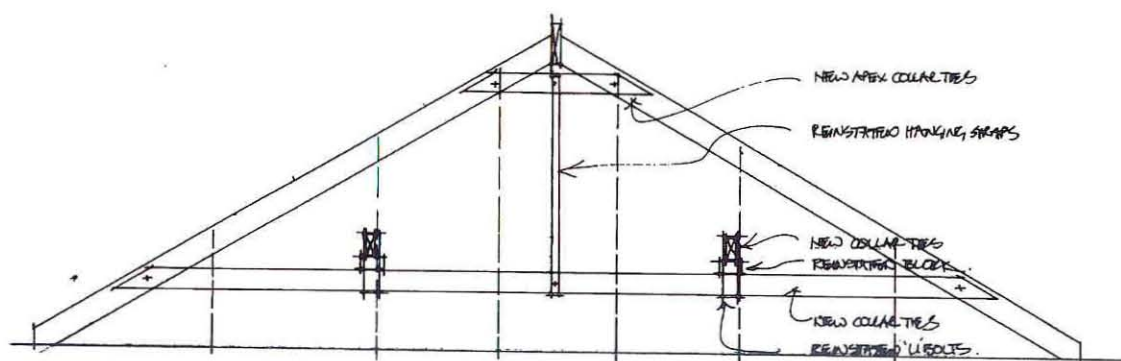
LOWER FRAMING PLAN



UPPER FRAMING PLAN



SECTION A-A



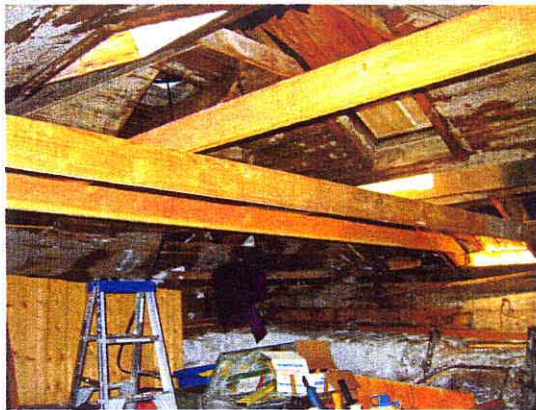
SECTION B-B.



CUTTING NEW TIES OUTSIDE



DELIVERING NEW TIES THROUGH SYKLIGHT



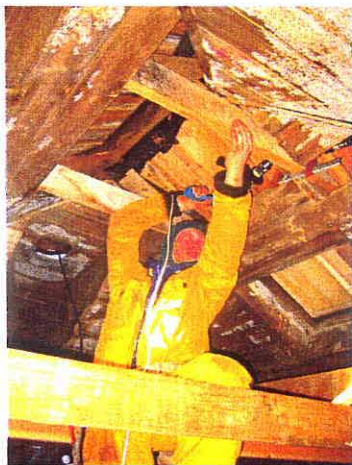
NEW LOWER COLLAR TIES IN PLACE



FIXING OF NEW TIE TO RAFTER

8.5.2 2X APEX TIES

The existing apex collars ties were removed and ties installed to match the existing timber and section. The ties were bolted to the rafters using 2X 12Mmm new galvanised bolts to improve the strength of the connection.



INSTALLING NEW APEX COLLAR TIES

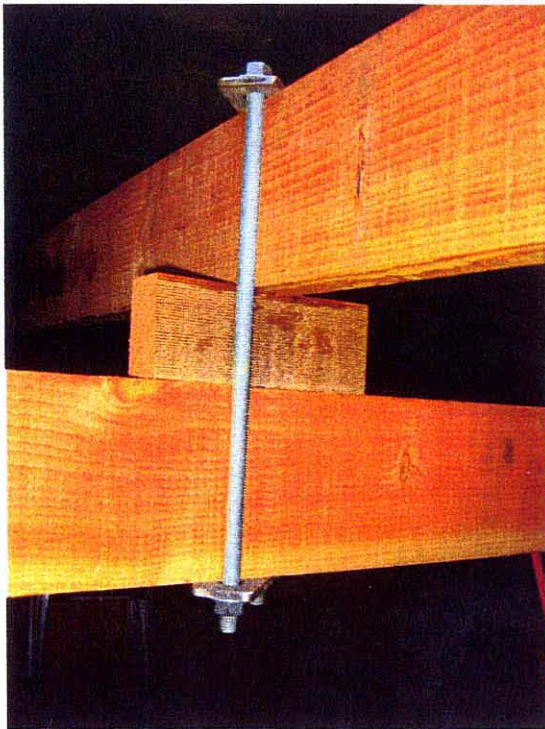


FIXING OF NEW TIE TO RAFTER

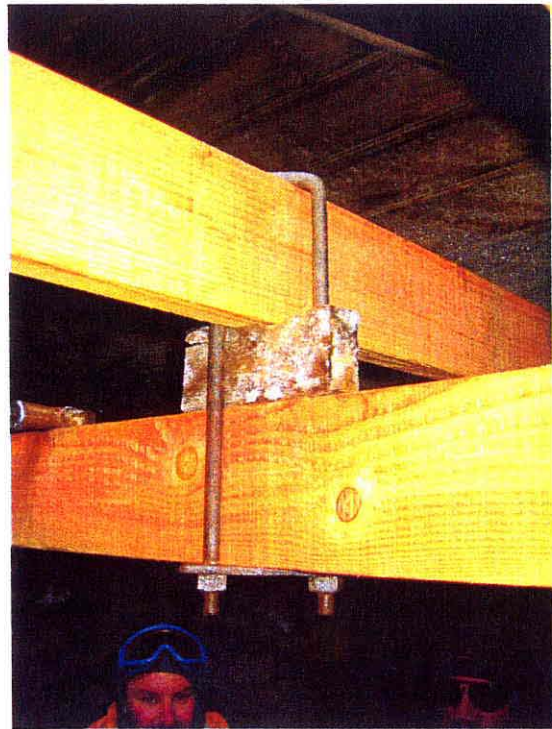
8.6 TIE CONNECTORS AND HANGING STRAP

8.6.1 COLLAR TIE CONNECTORS

New spacer blocks and 'U' bolts fabricated from stainless steel rod (to accommodate the additional length required to span the spacer) were initially installed to complete the structure. When the original material was recovered during the second stage of ice removal these elements were reconditioned and installed.



INITIAL BLOCK AND 'U' BOLT INSTALLED

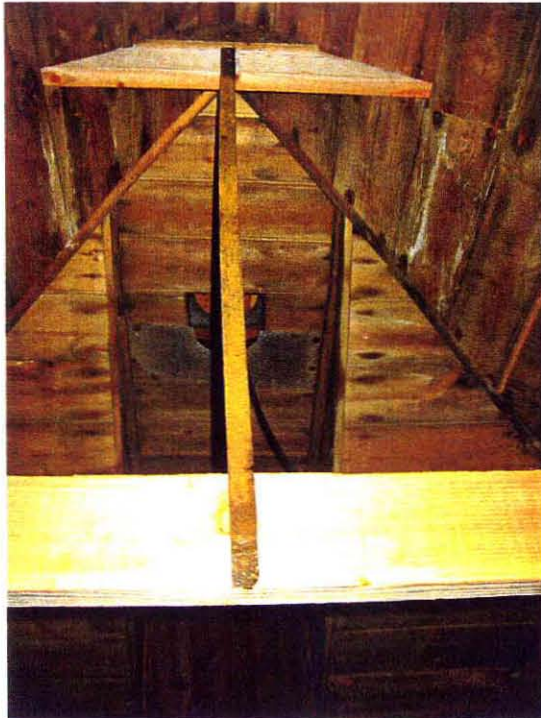


ORIGINAL BLOCK AND 'U' BOLT
RECOVERED AND REINSTATED

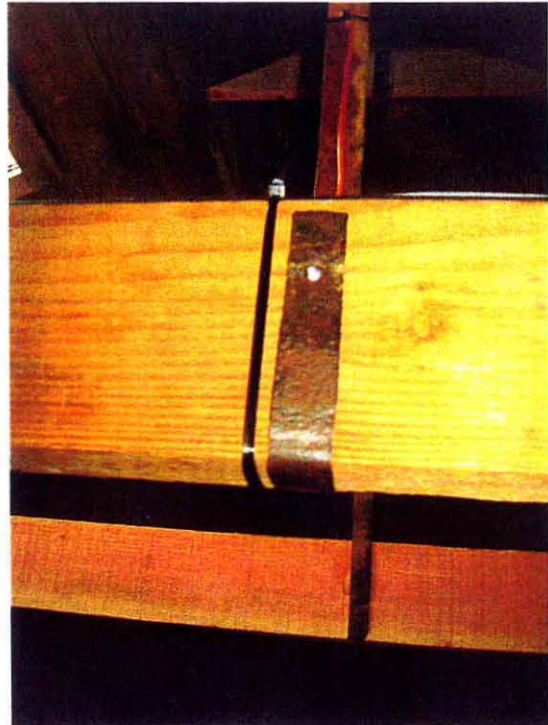
8.6.2 HANGING STRAPS

The original straps were recovered during the second stage of ice removal.

Straps were refixed using stainless steel tek screws.



ORIGINAL STRAP REINSTATED



DETAIL OF STRAP FIXING WRAPPED UNDER COLLAR TIE

8.7 CEILING REPLACEMENT

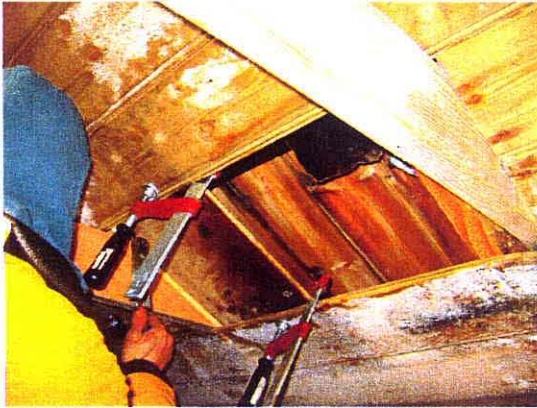
Following the completion of the repair work to the structure of the roof framing (and investigation of the structure generally, refer Section 7) the ceiling boards were refixed to their original locations using 30mm galvanised nails.

To accommodate the replacement / refixing without the removal of whole panels of boards a number of tongues of boards were required to be removed.

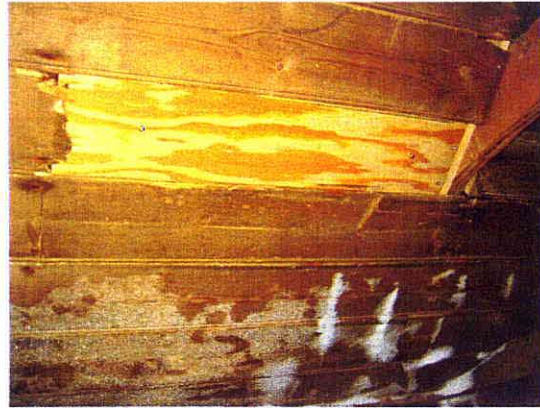
All trims etc removed and/or recovered were refixed into original locations.

2X boards (in the centre of the east and west planes) were unavoidably damaged during Stage 1 of the ice removal. These boards have been refixed but consideration should be given to these sections being replaced with new material machined to match.

Additionally, a section on the south plane could be located. It is most probable that this piece has previously been excavated and no longer exists on site. A temporary panel of plywood has been installed to seal the ceiling lining but a new section of material should be installed as above.



PLYWOOD BACKING PIECE BEING
INSTALLED TO SUPPORT DAMAGED
CEILING BOARD



PLYWOOD PANEL TO MISSING SECTION –
SOUTH PLANE

8.8 MATERIAL IDENTIFICATION

All new material introduced during this work was identified by the following stamp 'AAD 2002'. Sections were stamped either hidden or out of general view.



8.9 REPATRIATION OF REDUNDANT BUILDING FABRIC

An amount of building fabric was collected from the roof repair work. The materials collected included the following:

- Fragments of tarpaper either retrieved from the ice and/or removed from the roof structure to make way for the installation of new material.
- Sections of fracture timber member, mostly collar ties and trims.
- Bolts removed from repaired connections where new bolts were installed
- Nails removed from ceiling boards etc. New nails were used to reinstate all existing boards.

The decision was made to RTA this material on the following grounds:

- The material was assessed as being unsuitable for use in the repair program
- All material was documented before removal

- All the material collected is now redundant to the building by the installation of new replacement material.
- The material collected contains nominal interpretative value.
- The growing stockpile of this material (from earlier expeditions) presents a longer term management issue, including documentation records, loss of identification tags from stored material and no suitable storage place.

Refer also Material Conservator's Report for detail.

9. SNOW AND MELT WATER INGRESS

9.1 INVESTIGATION

The roof and internal ceiling claddings were visually inspected to determine the possible sources of snow / ice ingress. Access to smoke/gas equipment as suggested in the Works Plan, to assist in the investigation was not available and on inspection unlikely to be of any assistance in accurately pinpointing sources. Refer below.

9.1.1 WORKSHOP

From the investigation of soft snow / ice accumulation on the surface of the older mass of ice recorded in the Workshop it is clear that the over cladding of the roof undertaken in 1998 has been substantially successful. The only sources of ingress can be directly attributed to the following:

- Rear wall / roof junction (Refer 11.3)
- Dormer Vent (Refer 11.2)

9.1.2 LIVING QUARTERS

A detailed inspection of the main roof cladding to the Living Quarters revealed the following:

- The roof cladding clearly never sealed the building from snow and ice as evidenced from the efforts made internally and externally to block up any leakages.
- The 2x layers of tarpaper referred to in the Works Plan (suggesting some sealing capability) was observed through numerous cracks in the cladding to be either fractured or completely missing.
- The t&g junctions between practically all boards could be deemed as possible sources of ingress
- Junctions between a number of the boards had weathered to a degree where there was a clear visible passage to the roof space behind.
- The accumulation of soft snow / ice observed in the interior of the Hut was substantially associated with the ridges and the 'exposed' rafters i.e. a junction in the ceiling t&g boards. This would suggest that the ceiling lining is in itself assisting in the sealing of the roof and that snow drift occurs within the roof space and only manifests itself to the interior at the junctions of the ceiling lining along the rafters and hip beams. This being the case, the use of smoke or similar methods would not be very definitive in determining the actual path of ingress.
- A section of 'new over-cladding' in the vicinity of the kitchen flue penetration did not adequately cover the fire damaged section of the roof.

9.2 REPAIRS TO ROOF CLADDING

9.2.1 WORKSHOP

No additional work was identified as being necessary on the Workshop roof at this time.

9.2.2 LIVING QUARTERS

Over-battening work was reluctantly undertaken to seal the larger of the gaps evident in the roof plane and those that could be reasonably be assumed to be associated with accumulations inside the building. Each new batten was fixed over a strip of bituminous foam using stainless steel screws. All new battens were marked in the standard manner and recorded.

Further over-battening of the roof is clearly not going to substantially reduce the ingress of snow unless practically each joint is covered. The visual impact of this work and its damage to existing fabric (especially roof battens and remnant material under them) directs consideration again be given to the over-cladding of the whole of the roof plane.

The option of replacing whole areas (to a max. of 1.2m² to any one roof plane) was not adopted on the grounds that:

- No single section of the roof was any worse than the rest
- The action would not prove very successful given the ability of the snow to travel through the roof space
- The max. area nominated to each face appeared to arbitrary
- The destruction of original fabric (including battens) would be significant
- The visual impact would be substantial

It was also considered an undesirable action given that the CMP recognises that the over cladding of the roof is likely to be necessary in the medium term.

The 'new over-cladding' to the roof around the kitchen flue was removed and new boards installed and coverage increased to ensure an adequate seal.

Black plastic sheeting was installed in both the Workshop and the Living Quarters where snow ingress was most likely to occur to be able to more accurately determine the source, measure the volumes being experienced and to protect vulnerable artefacts inside the hut.



SHEET ON TOP OF MAWSONS' ROOM



SHEET ON BUNK IN S-E CORNER

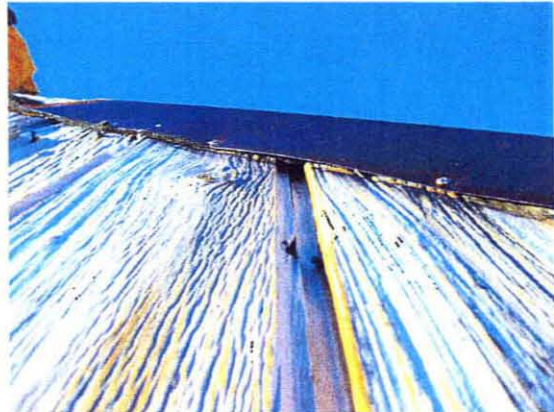
9.3 SEALING RIDGE CAPPING

Ridge capping to the Living Quarters was removed and a strip of bituminous impregnated foam was carefully secured along the line of the edge of the capping to ensure none was exposed after refixing the cap. The cap was resecured with the same stainless steel screws.

In most instances the foam did press tight into the gaps in the roof boards but it is noted that in some instances the gaps were sufficiently wide and long enough that the foam will only be partially successfully in preventing any further ingress. Refer also above for general comments on the roof repairs.



FOAM STRIPS IN PLACE FOR CAPPING TO BE FIXED OVER



DETAIL OF FOAM PRESSING INTO GAPS

9.4 SKYLIGHT FLASHING

Observations made during the 2000-01 Expedition identified melt water dripping from the skylights to the Living Hut and resulting stalagmites forming below these points inside the Hut. The Works Plan adopted the recommendation from this expedition to install flashings to apex side of all of the skylights.

A sheet of 300 X 3mm lead sheet was installed to the apex side of all four skylights. The lead was formed around the corners of the skylight to run water away from the side junction of the skylight. The lead flashing was secured with stainless steel screws and over battens as shown below.

All side and edge battens were removed to facilitate the installation and to allow sealing of the junction with silicone. Battens (and any associated fabric) was then refixed to its original location.

All new material was stamped as per the collar tie work.



LEAD FLASHING TO APEX SIDE OF EAST SKYLIGHT



OVER BATTENS AND REMNANT CANVAS REPLACED AND REFIXED TO SOUTH SKYLIGHT

9.5 SKYLIGHT GLAZING

The puttying of the glazing to the skylights of the Living Quarters had commenced during the 2000-01 Expedition but not completed.

Weather conditions and time prevailed to be able to complete this task on all windows.



PUTTYING TO EAST SKYLIGHT

10. ICE REMOVAL

10.1 WORKSHOP

Refer Section 8.1 ICE REMOVAL for the details of Stage 1 removal of ice from the Workshop to allow roof repairs to be undertaken.

Stage 2 was undertaken to remove the broken collars ties remaining in the ice and to locate original 'u' bolts and straps. Additional excavation was also undertaken to excavate a new home for 'Dog' in the southeast corner of the Workshop. Refer Material Conservator's Report.

Snow/ice was retained to a minimum of approx 600 above the FFL of the Hut. Additionally ice has also been retained against the northern wall returning half way down the east and west walls. This ice was not removed to retain an 'ice bank' against the warmer north wall (there being iced in verandah to this façade of the Workshop) and to minimise exposure to any artefacts left on the shelves in this area. The ice retained steps down with 600 min at the top and approx. 1200-1500 at the current floor level.

The excavation for the 'dog' was taken down the ice level retained by Leddingham and approx 300-400 mm retained around all edges and top.

The remaining ice against the walls within the Workshop is likely to contain remnants of shelving and other artefacts identifiable in photographs taken after the 1978 excavation. Sections of the shelving exposed during the most recent excavation indicates that substantial damage has occurred to them collapsing under the weight of snow and ice. Any proposal to remove further ice from this area will need to consider the identification, restoration and refixing methods required for these shelves.

A number of artefacts were also encountered during excavation. Most of these items were located on the floor indicating possible displacement from shelves as they collapsed. It is noted that most artefacts from the 1978 excavation were collected and stored under the workbench along the west wall. These boxes remain in place and intact but no attempt was made to open and or remove during this expedition.

Refer Material Conservator's Report for detail on the decision to RTA fragments of the building fabric retrieved from this stage of ice removal (principally sections of the former collar ties) that could not be reinstated and of no future use on site.

10.2 LIVING QUARTERS

Removal of snow / ice from the Living Quarters was determined as a low priority and only commenced upon completion of all other tasks required under the Works Plan.

Sections of ice removed were considered on the following grounds:

- Areas that could be determined as not directly assisting in the overall holding down of the structure.
- Accumulations of ice most likely to cause either structural damage and / or damage to internal elements of the building and artefacts eg those suspended on bunk rails, shelves etc.
- Areas where artefacts were most unlikely to be encountered either on shelving etc or floating in the ice.
- Older Accumulations of ice where there was no evidence of continued build up of soft snow / ice.
- Areas that might reveal important elements of the interior of the building for interpretation.

The following sections of snow / ice were approved for removal:

1. Above Kitchen Area. Approx 2 cubic meters of ice was been removed from on top of this area to provide access to a section of the ceiling adjacent to stove flue that has been dislodged. Excavation was taken to approx 600mm below the collars ties. It was noted on removal of this ice that sections of the ceiling boards have been dislodged. It is recommended that these boards be refixed to assist in the sealing of the roof.



REMOVAL IN PROGRESS WITH FINISHED LEVEL AT THE BOTTOM OF IMAGE



DISLODGED CEILING BOARDS

2. Upper Bunk (Correll's/McLean's) on the west wall.

Approx. 1 cubic meter of ice was removed that was entirely suspended from the centre of the upper bunk.



BEFORE



AFTER – NOTE LAYER OF ARTEFACT RICH LEFT REMAINING ON HURLEY'S BUNK

3. Upper Bunks in the south west corner. Approx. 1.5 cubic meters was removed for the same reasons as above. Removal of ice from this area also allowed access to inspect the southern wall / roof junction for possible leaks. Refer Section 11.5.



BEFORE



AFTER

4. South East Corner

Approx. 4 cubic meters was removed.

This ice mass was suspended between the bunks in the corner and the top of Mawson's room and had already caused visible damage to this area. Access to the top southeast corner also assisted in the determination of snow ingress into this part of the room.

This section revealed 'Hyde Park Corner' and the bunks of Mertz and Ninnis.

A layer of ice was retained on the top bunk as it was likely this area contained artefacts. It is also not known if further snow / ice will accumulate in this area and recover an artefacts retrieved.



BEFORE – NOTE CAVAIITY UNDER ICE MASS



AFTER – NOTE ICE RETAINED ON TOP BUNK

5. Top of Mawson's Room

The accumulation of soft snow/ice was removed.

Additionally, small sections of solid ice remaining (after collar tie repair work in 1998) were removed to a level created in the first stage removal. No further excavation work was undertaken due to the presence of artefacts in the ice.



6. Interior of Mawson's Room



ACCUMULATION BEFORE REMOVAL



AFTER

All excavation will be taken down to the level of the existing ice floor in the centre of the Hut (approx 700mm). It is noted that the floorboards to the southeast and southwest corner are partly exposed.

All sections of ice were removed taking care not to either damage and / or bury artefacts with ice fragments and shavings. Temporary platforms of timber and plastic sheeting were used to protect vulnerable areas.

When completed, plastic sheeting was placed in areas to protect exposed artefacts from any further snow / ice ingress.



PLATFORM FOR PROTECTIVE SHEET TO BE LAID OVER READY FOR ICE EXCAVATION



PLASTIC SHEET LEFT OVER BUNKS TO PROTECT COLLECTION OF ARTEFACTS UNDER

11. ADDITIONAL WORKS

11.1 LIVING QUARTER'S SKYLIGHT COVER

The cover to the west skylight to the Living Quarters had blown off during a strong wind event. Remnants of the cover were found at Penguin Knob. There was evidence of the impact of the cover on the southwest ridge of the Workshop. All fragments were within a small area suggesting the cover remained airborne for the approx. 200m before impacting.

Evidence clearly indicated that the screws used were not sufficiently long enough to bind into the fixing frame. It is noted that this cover included the original cover boards making it thicker than the remaining cover. The other covers were inspected and are securely fixed.

A new cover was fabricated and installed to match the other.

Remnants of the 'original' cover were collected and returned to Australia with other materials. Refer Section 8.9

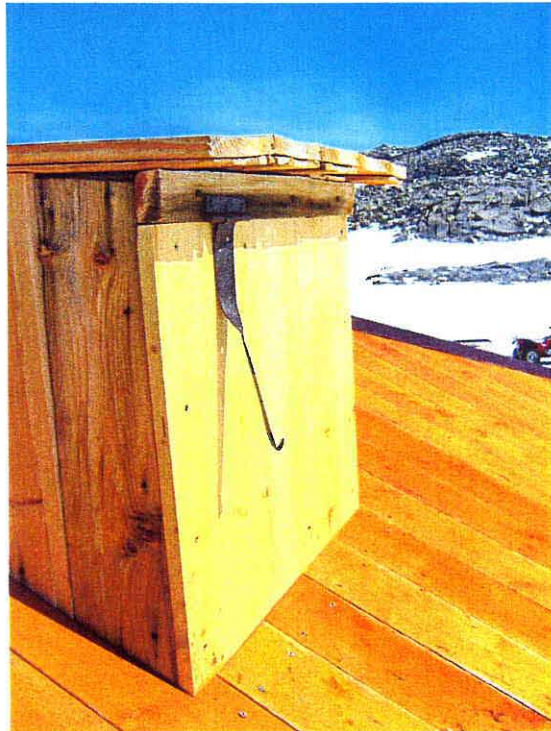


NEW COVER BEING FABRICATED

11.2 WORKSHOP DORMER VENT COVER

The dormer vent was identified as one source of snow / ice ingress to the workshop. Refer Section 4.2.1

A cover was fabricated using 25mm t&g Baltic pine boards and fixed to the outside face of the vent and sealed with silicone. The cover was fixed to the outside on the grounds that sections of the vent, including the blades, were becoming fragile and the fixing not secure. The cover would protect this fabric.



COVER TO DORMER VENT IN PLACE

11.3 WORKSHOP NORTH WALL SEALING

Evidence of snow / ice deposits in the Workshop suggested the primary source was along the northern wall / roof junction. Refer Section 4.2.1. Light and air movement were clearly apparent through openings along this connection.

A cover batten was fixed over the join for the full length of the north wall. The batten was fixed over a strip of bituminous impregnated foam and secured using stainless steel screws.



GAP IN JUNCTION



DETAIL OF COVER BATTEN AND FOAM STRIP BEFORE FIXING

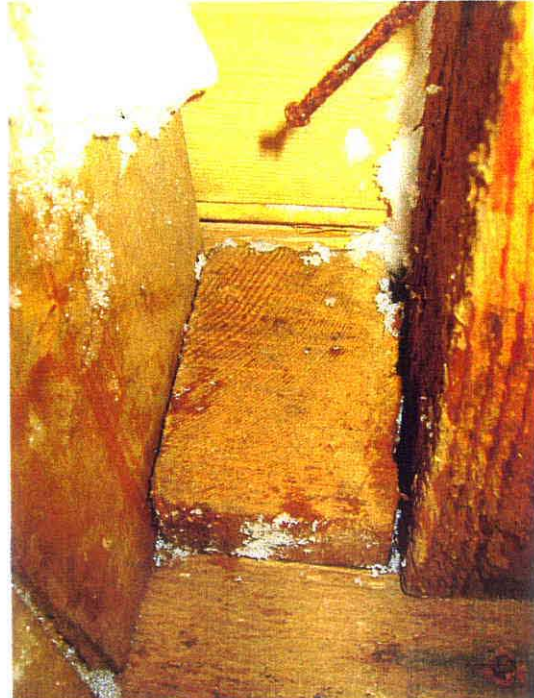
11.4 MAWSON'S ROOM

Snow / ice ingress into the top south-east corner of Mawson's Room has been previously recorded and removed. Following the removal of ice from the Living Quarters (Refer Section 10.2) there was clear evidence of snow / ice entering along the southern roof / wall junction. The source in this location is believed to be the same.

Bituminous impregnated foam blocks were installed into the far top corner between the sidewall and ceiling joist from inside the room. This plug was installed and can be removed with no damage to the existing fabric.



FOAM SEAL BEING INSTALLED



EXISTING BLOCK REPLACED

11.5 LIVING HUT – SOUTHERN WALL SEALING

As per 11.4, it is understood that snow/ ice is entering through the wall / roof junction via the southern. A significant amount was recorded in the southwest corner.

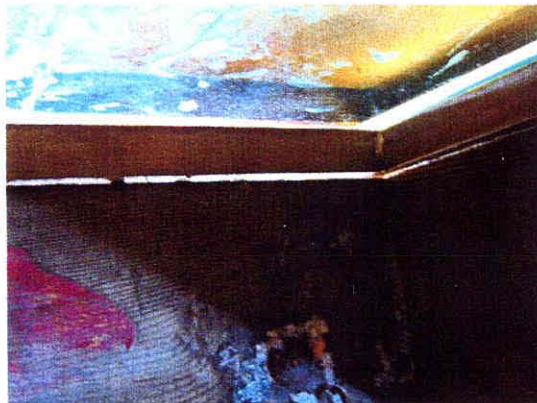
Bituminous impregnated foam blocks were installed into the obvious points of entry from the verandah side. These plugs were installed and can be removed with no damage to the existing fabric.



SEALING FOAM IN PLACE ON SOUTH WEST CORNER

11.6 SEALING SKYLIGHT, SOUTH ROOF OF LIVING QUARTERS

A gap was identified in the south skylight to the Living Quarters as the primary source of snow / ice ingress to the top of Mawson's Room. The cover and glazing panel removed and the gap sealed with silicone.



GAP IN SOUTH SKYLIGHT

12. SITE WORKS – MAIN VALLEY

12.1 TRANSIT HUT

The fixings to a number of bracing members in the Transit Hut had failed and had fallen and remained inside the structure. It was noted that all these members had been previously secured using stainless steel screws. It was apparent that the screws had failed/fractured at the joint between members. It is probable that these fixings have fatigued due the wind induced vibration observed to be occurring during this expedition. It is recommended that the fixings be inspected on all future expeditions for fatigue.

All dislodged members were replaced in their original positions and refixed.

Elements of the building have eroded to a degree that the integrity of whole structure is becoming marginal. No new members would improve this situation to any significant level and it was determined not to install any.

All loose battens / wallboards were checked and secured as required with stainless steel screws.

Locations for all new fixings were recorded.

12.2 ABSOLUTE HUT

The Absolute hut remained substantially buried in snow / ice for the duration of the expedition.

The thickness of wall boards projecting out of the ice on the southern side of this building are now becoming very thin. The ice embedded around these boards secures them sufficiently to stop them from becoming detached from the structure.

Refer also the Material Conservationist's Report.

It was determined that no remedial work was necessary to be undertaken.

12.3 MAGNETOGRAPH HUT

The Magnetograph Hut remains substantially intact and structurally sound.

The over-cladding of the roof has been successful in maintaining the interior of the building free of snow / ice. The 'Intergarin' finish to the new cladding is showing little sign of weathering as per the Workshop roof.

Areas of the wall cladding (specifically areas on the south and western planes at the top plate were now sufficiently corroded to a level where the tarpaper membrane in the wall is clearly visible. It was noted that a section of the southern wall at this level was covered with a wallboard at the time of the roof over-cladding.

In order to prevent further corrosion of the timber and ultimately the failure of the tar paper an additional board was fixed to match the existing. A strip of bituminous foam was also installed at the top of the wallboards.

The section to the west wall was over-clad with new boards down to the rock line where only nominal corrosion has occurred.



SECTION OF OVERCLADDING TO WEST WALL – NORTH END



NEW COVER BOARD TO UNDER SIDE OF ROOF EAVE – NOTE LIGHT SECTION IS EXISTING SECTION

12.4 MEMORIAL CROSS

The Memorial cross was inspected and determined that no action was necessary.

Refer also the Material Conservator's Report.

12.5 SURVEY POSTS

A number of exposed timber posts from survey markers were inspected. Many more survey markers were located but no timber elements exposed.

It was determined that no action was necessary.

12.6 BANZARE POLE

The BANZARE Pole was inspected and determined that no action was necessary.

12.7 GRANHOLM HUT AND MATERIAL STOCKPILE

No action was taken to remove either the Hut and / or the Stockpile on the following grounds:

- Safety issues in respect to the use of the Hut as an emergency shelter for the duration of the restoration program on the Main Huts. The removal of the Hut should be readdressed only on the completion of this work.
- The close amenity the Hut provides for workers and storage of tools and loose items for the restoration program.
- The stockpile should remain where it is until the completion of the restoration program. Consideration should be given to its removal only when completed.

Refer also Field Leader's Report.

12.8 POST BANZARE FABRIC

A collection of post BANZARE materials, including a number of oil drums, was retrieved and returned to Australia.

13. SUMMARY OF RECOMMENDATIONS

The following is a summary of the recommendations arising from the investigation work outlined in the Works Plan and observations made generally during the carrying out of the restoration works:

- Urgent consideration is given to the over-cladding of the roof of the Living Quarters. This over-cladding should be undertaken on all 4X planes of the roof.
- Detailing should be included in the over-cladding to incorporate a future system of 'tie-down' if and when it is required.
- Consideration should be given to the need in the medium term to protecting the wall cladding to the walls (most urgently to sections of the south wall) to preserve the original fabric as well as maintaining the 'ice bank' to the verandahs.
- Section of ceiling above kitchen to be carefully removed and replaced / refixed.
- Skylight covers to Workshop to be removed and new covers fabricated to sub-frame and new fixing rails to roof. The broken pane of glass in west skylight to be replaced at the same time.
- Techniques for the removal of artefacts, especially fragile items such as glass and paper, from crystalline ice and solid melt ice be agreed upon and training undertaken prior to any future ice excavation.

APPENDICES

- A 2002 WORKS PLAN**
- B DRAWINGS**

APPENDIX A WORKS PLAN (GODDEN MACKAY LOGAN)

Godden Mackay Logan

Table 2.1 Mawson's Huts Historic Site – Works Plan 2002

To be read in conjunction with Section 2.0

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
1.0 AAD Responsibilities						
1.1	Approval of this Works Plan by the Director of AAD after environmental assessments and referral to the AHC and to Environment Australia	11.4, 11.6				AAD
1.2	Consult with the Steering Committee					AAD/AH C/MHF
1.3	Consult with stakeholders	11.6				AAD
1.4	Advise Antarctic Treaty Party members of proposed management actions	12.4, 12.16				AAD
2.0 Works Team Responsibilities and Decision Making						
2.1	All team members required to be familiar with CMP				AAD	Team
2.4	Team group discussion on CMP and Works Plan				AAD	Team
2.5	Team briefing from GML				AAD	Team
2.6	Works proposed by team outside scope of Works Plan require approval by Director AAD may require Section 30 referral to AHC	11.4				AAD/AH C
3.0 Resources and Training						
3.1	Training in ice removal techniques including use of equipment such as variable speed angle grinder	12.17			Variable speed angle grinder	AC/B
3.2	Training in tie-down procedures	12.7	Appendix B			B/CA
3.3	Training in surveying equipment (EDM) + GPS	12.17			Consultant to AAD	B/AC/MC

Key
 FL: Field Leader
 CA: Conservation Architect
 MC: Materials Conservator
 AC: Archaeologist
 B: Builder/Carpenter
 GH: General Hand
 EA: Environment Audit Officer

X

X

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
3.4	Create a collections management database prior to expedition (and take computer equipment).	12.17	Appendix E, F		AAD, computers, software	FL/AC/MC
3.5	Monitoring equipment and training	11.9, 12.6	Appendix G			MC/B
3.6	Fire-fighting equipment (extinguishers and fire blankets) and training (CMP Fire Plan Section 12.15)	12.6 12.15				Team
3.7	General site introductory training (CMP Section 11.13 eg site no-go zones etc)	11.13	AAD Guide		AAD	FL
4.0 Main Hut Sub-Floor Structural Investigation						
4.1	Refer also to Engineer's Report Appendix B	12.7	Appendix B		Hughes Trueman	Team
4.2	Excavate around 4 main frame posts (2 in Living Quarters and 2 in Workshop) to determine anchorage conditions of posts	12.17	Appendix B	3.4, 4.1		CA/B/AC
4.3	Monitoring by Archeologist of all excavations	12.17	Appendix E	3.4, 4.1		AC
4.4	Document and check connections between floor and foundation posts	12.17	Appendix B	4.1		CA
4.5	Reinstate foundation conditions		Appendix B	4.1		B/AC/CA
4.6	Excavate ice in 'meat cellar' area to gain access to cellar investigate sub-floor structural and environmental conditions	12.17	Appendix E	3.4, 4.1		B/CA/MC/AC
4.7	Monitor sub-floor temperature with 4 thermocouples	12.17	Appendix G	3.5		MC/B
5.0 Temporary Tie Down of Main Hut						
5.1	Refer also to Engineer's Report Appendix B		Appendix B			Team
5.2	Assessment by Conservation Architect (with advice from team) that if pre-requisite actions in 4.1–4.5 above show ice is a factor in anchorage then temporary tie down Main Hut in manner specified by the Structural Engineer		Appendix B	5.1		CA/Team
5.3	Monitor vibration and uplift before (and after) tie downs installed using 1 linear displacement sensor fixed to Hut and bedrock and vibrations sensors fixed to roof (1 Living Quarters, 1 Workshop)		Appendix G	5.1		MC/CA
5.4	Install tie downs to Living Quarters and Workshop as per Appendix B		Appendix B	3.2, 5.1, 5.2	Rock drilling etc	B/CA
5.5	Tie-downs separated from the roof fabric by timber spacers and loads directed off the roof by posts introduced adjacent to the building		Appendix B	3.2, 5.1, 5.2	Appendix B	B/CA
5.6	Monitor condition tie-downs regularly throughout the expedition			3.2, 5.1, 5.2		CA/B

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
6.0 Main Hut General Structural Investigation						
6.1	Investigate the condition of Main Hut structure generally as recommended in the Structural Engineer's report Appendix B		Appendix B			CA/B/MC
6.2	Establish the adequacy of the connections between floor and walls and walls and roof with, if necessary, minor intervention in fabric		Appendix B	6.1		CA/B
6.3	Assess the condition of fasteners and timber fabric generally		Appendix B	6.1		CA/b/MC
6.4	Use survey equipment to record information to enable a measured drawing record of Main Hut		Section 2.15	3.3, 6.1		CA/B
6.5	Investigate claddings generally, including its thickness on different roof planes and the adequacy of fixings		Appendix B, F	6.1		CA/MC
6.6	Undertake repair works to loose connections, cladding boards and battens using stainless steel fixings		Appendix B		Robertson SS screws	B/CA
6.7	As an emergency, if assessment is that roof structure is under an immediate threat of total structural failure, then repair using traditional mechanical repair and fixing means; eg re-fixing loose boards with screws and/or reinforcing the timber framing structure with bolts, adding new framing timber laid over the roof or adding internal bracing		Appendix B	6.1, 6.2, 6.3, 6.5	Baltic pine & Oregon on site & steel strapping	CA/B
6.8	As an emergency measure over-cladding could only be considered for structural reasons (not snow ingress reasons) if the roof was assessed as being under an immediate threat of total structural failure and could not be repaired using the techniques outlined in 6.5 and decision-making process outlined in Sections 2.10 and 2.3 were followed		1.2, 6.1, 6.2, 6.3, 6.5			FL/CA/B
7.0 Ice Removal						
7.1	Record in three dimensions (EDM) survey and drawings and make photo archival record of the existing ice in the Workshop, Living Quarters and Verandahs prior to any ice removal (photos and drawings)	12.17	Appendix A			B/AC/GH
7.2	Ice removal would be approached in a very cautious manner to avoid fabric impacts (structure and artefacts). Proceed only after processes used for ice removal can demonstrate a lack of fabric impacts.	12.7 & 12.17	Appendix E	3.1, 5.2, 7.1	Variable speed angle grinder	AC/B
7.3	Remove ice in Workshop to approximately 200mm above floor using electric chain saw and agreed techniques near structure/artefacts		Appendix E	3.1, 7.1, 7.2	Chain saw & VSA	B/AC
7.4	Remove ice in Living Quarters to approximately 200mm above floor using agreed techniques (do not use chain-saws in Living Quarters)		Appendix E	3.1, 5.2, 7.1	Chain saw & VSA	B/AC

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
7.5	Essential: collections management database and Archaeologist and Materials Conservator undertake cataloguing and condition monitoring (including emergency conservation if necessary) as part of the ice removal	11.10, 12.11, 12.16, 12.17		3.4	AAD computers	MC/AC
7.7	Install temporary timber board near Main Hut entrance		Report 2000			B/CA
7.8	Install timber 'baffles' to Main Hut entrance at completion of expedition					B
8.0 Workshop Roof Structure						
8.1	Refer to Appendix B for details contained in Structural Engineer's report and drawings	11.6, 12.16, 12.17	Appendix B ANARE 1978		See also GML 1997, 1998	CA/B
8.2	Photographic archival record of existing damage to rafter, collar ties, platform and platform steel tie rods	11.6, 12.16, 12.17				GH
8.3	Repair works done in a similar manner to that in the Living Quarters repaired in 1998, using new timber sections scarfed into good timber. The approach would be to retain the maximum amount of original fabric.	11.6, 12.16, 12.17	GML 1998 Report			CA/B
8.4	First priority is to do work from inside Workshop. Carefully ease ceiling lining boards off to gain access to rafters to effect repairs. Insert new timber through skylights. Second priority is work from outside through new and old roofs.	11.6, 12.16, 12.17	Appendix B			CA/B
8.5	Restore/reconstruct the ends of between six and eight rafters where the collar ties joined the rafters that have also failed	11.6, 12.16, 12.17	Appendix B			CA/B
8.6	Re-fix rafters to purlins and rafters to top plates with stainless steel screws	11.6, 12.16, 12.17	Appendix B		Oregon 8 x 1.5m x 125 x 38mm	CA/B
8.7	Restore/reconstruct the four collar ties that have failed and fix to rafters	11.6, 12.16, 12.17	Appendix B	GML 1997	Oregon 4 off 6m x 125 x 38mm	CA/B
8.8	Repair steel tie rods that connected the collar ties to the apex boards, preferably re-using original fabric	11.6, 12.16, 12.17	Appendix B		M12 threaded stainless steel rods x 2	CA/B
8.9	Use steel plates to connect collar ties at crossing points if evidence suggests use of this technique	11.6, 12.16, 12.17	Appendix B		Stainless steel connector Appendix B	CA/B
8.10	Restore (preference) or reconstruct damaged lining boards and other fabric including shelves inside Workshop	11.6, 12.16, 12.17	ANARE 1978			CA/B
8.11	Use repair works as opportunity to investigate connections between wall studs and top plate and top plate and rafters		Appendix B			CA/MC

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
9.0 Snow and Meltwater Ingress						
9.1	Record any recent ingress and undertake investigation of where snow and meltwater gains ingress to the Living Quarters using non intervention techniques, if possible (gas/smoke) or intervention (for example ceiling lining board removal)	12.6, 12.17				CA/B
9.2	Undertake flashing repairs and finish the puttying of glazing to the skylights	12.17	Report 2000	9.1		B
9.3	Make patch repairs to specific and limited areas of roof cladding; eg continue previous approach of timber strips over gaps in T&G joints, if this is where ingress is shown to be happening			9.1		CA/B
9.4	Install flexible/compressible fabric under ridge caps to provide a weatherproof seal where the edges of the ridge capping meet the roof cladding		Report 2000			CA/B
9.5	Protect artefacts in areas where ingress may occur or relocate after recording					AC
9.6	Monitor locations of any further ingress using black plastic, etc					MC/AC
10.0 Site Works — Establish GIS Framework						
10.1	Create a survey framework to link collections management information to existing and historic survey information	11.10, 12.11, 12.16, 12.17		3.3, 3.4		FL/B/MC
10.2	Link site surveys to 'real world' location if possible via GPS or similar			3.3		FL/B
10.3	Check and incorporate existing survey information: 1985/1986 Crispo survey, 1998 Alan Grant survey and satellite imagery held by the AAD		AAD maps & satellite photos	3.3, 3.4	GIS database/computer	FL/B
10.4	First priority should be to record and fix the relationship between objects on the site			3.3, 3.4		B/AC
10.5	Second priority should be to locating objects on site to 'real world' using techniques such as differential GPS			3.3, 3.4		B/AC
10.6	Survey and assessment of potential ASMA and ASPA boundaries	12.3				EA
11.0 Site Works — Main Valley — Visual Protection Zone — Works						
11.1	Undertake assessment and stabilisation conservation works to the Transit Hut	11.11, 12.17 Fig 7.2	GML 1998		As for Main Hut	CA/B/MC
11.2	Undertake assessment and conservation works to the Magnetograph House	11.11, 12.17 Fig 7.2				CA/B/MC

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
11.3	Undertake assessment and stabilisation conservation works to the Absolute Magnetic Hut	11.11, 12.17 Fig 7.2				CA/B/MC
11.4	Inspect other AAE structures including Memorial Cross, survey posts and BANZARE pole	12.17, 7.5				CA/B/MC
11.5	Undertake investigations as part of creating an Antarctic Specially Managed Area over the whole of Cape Denison and an Antarctic Specially Protected Area over the AAE Main Valley and other investigations to assist the preparation of a Plan of Management of the site	11.3, 12.3				EA
11.6	Continue to record & remove post BANZARE fabric from the AAE Main Valley	12.15				AC/B
11.7	Record and remove Granholm Hut and the material stockpile adjacent to the Granholm Hut at end of this works program if another significant short-term works program is not required.	12.16, 12.17				FL/GH/B/ AC
11.8	Investigate relocation out of the VPZ the Automatic Weather Station that is near the BANZARE Proclamation Pole	12.17				FL/EA
11.9	Undertake works outside VPZ including the re-establishment of the materials stockpile to and the extension of the tent platform at the Jubilee Base site	12.17				FL/B
12.0 Movable Heritage/Collections Management						
12.1	Refer also to Materials Conservation Program Appendix F		Appendix F			Team
12.2	Undertake materials conservation program as part of the Collections Management Policy for artefacts/movable heritage on site, in association with the Archaeologist	11.10, 12.11	Appendix F	3.4		MC
12.3	Deploy new and ongoing monitoring programs	12.6	Appendix G	3.5	Australian Museum	MC
12.4	Undertake other building investigations in association with the Conservation Architect	11.8				MC/CA
13.0 Archaeology Program						
13.1	The Archaeology Program will be undertaken by the Archaeologist who will implement the Collections Management Policy with the Materials Conservator. See Appendix E for details.	11.10	Appendix E			AC
13.2	Highest priority is to monitor and assist with ice excavations for structural investigations and any required artefact removal during ice removal generally using agreed techniques to limit impacts	12.7	Appendix E	3.1, 3.4		AC/MC

Task Ref	Task Detail	CMP Ref	Other Refs	Pre-requisite Tasks	Resources/Materials	Action
13.3	Record (agreed AAD database), label and locate (Total Station survey) artefacts within the Main Hut and across the site generally. Artefacts within the Main Hut are highest priority.	11.10	Appendix E	3.1, 3.4		AC/MC
13.4	Assess significance and advise on policy for individual artefacts including conservation, protections, relocation on site, and, as a last resort, repatriation to Australia (in association with the Materials Conservator)	11.10, 12.17	Appendix E			AC/MC
13.5	The Archaeologist will, with the Materials Conservator, relocate the AAD Husky dog remains in one of the Main Hut verandah areas	11.10, 12.17	Appendix E			AC/MC
13.6	Archaeologist to assist with management of any tourists that visit the site.					FL/AC
13.7	After the expedition the Archaeologist will work at the AAD to enter artefact records from previous expeditions, yet to be fully catalogued, and new records from this expedition in a database linked to a GIS system. Make the database accessible and available interested persons.	11.10, 12.17	Appendix E		AAD GIS/database	AC
14.0 Monitoring/Research/Records						
14.1	Continue existing monitoring programs to monitor impacts of ice removal on the internal environment	11.9, 12.6, 12.16, 12.17	Appendix G			MC
14.2	Undertake new monitoring programs on building movement and vibration, corrosion and salt impacts	11.9, 12.6	Appendix G			MC/B
14.3	Undertake monitoring identified in the CMP	11.9, 12.6	Appendix G			MC/B
14.4	Undertake research identified in the CMP on AAE survey marks and AAE animal caches	12.9	Appendix G			MC
14.5	Archival photographic record during all works and in particular before removal of fabric eg Granholm Hut					GH
14.6	Date stamp new fabric introduced as part of conservation works					B
14.7	Review earlier photogrammetric measurement of Main Hut and continue if time permits (refer to 1998 Field Leader's report) in association with EDM survey of Main Hut and artefacts to provide a new measured drawing of the Main Hut					CA
14.8	Record condition of timber and fasteners (including bolts and nails) and record cladding condition and thickness	11.8	Appendix B			MC/CA
14.9	Make a full post-expedition report that documents all works and identifies location of all records.					FL

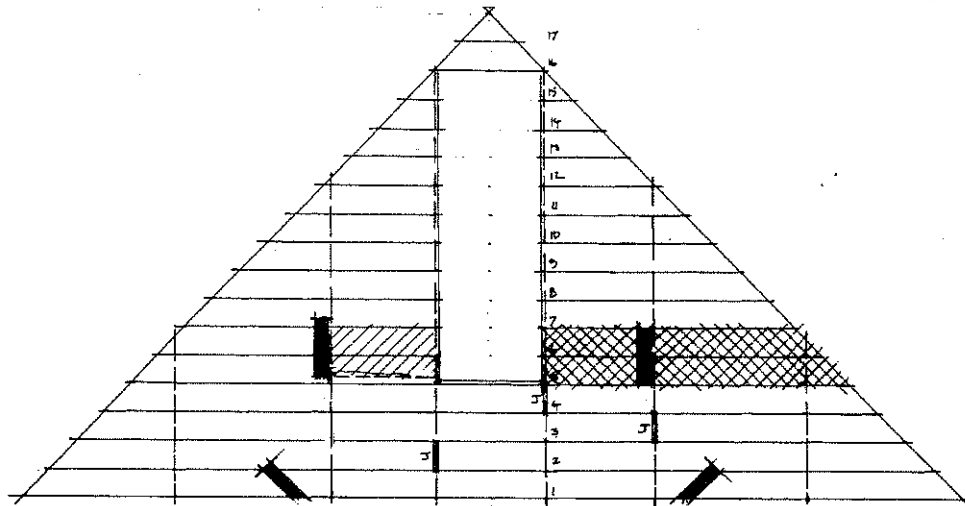
APPENDIX B DRAWINGS

01	WORKSHOP CEILING – NORTH & WEST ELEVATIONS
02	WORKSHOP CEILING – SOUTH & EAST ELEVATIONS
03	WORKSHOP ROOF – COLLAR TIE REPAIR PLANS
04	WORKSHOP ROOF – COLLAR TIE REPAIR SECTIONS
05	WORKSHOP – ROOF FRAMING PLAN
06	WORKSHOP – DETAILS
07	WORKSHOP – DETAILS
08	WORKSHOP – INTERNAL WALL ELEVATIONS
09	MAIN HUT ROOF – NORTH ELEVATION
10	MAIN HUT ROOF – WEST ELEVATION
11	MAIN HUT ROOF – EAST ELEVATION
12	MAIN HUT ROOF SOUTH ELEVATION
13	MAIN HUT WALLS – EAST & WEST ELEVATIONS
14	TRANSIT HUT – FLOOR & FRAMING PLAN
15	TRANSIT HUT – SOUTH & WEST ELEVATIONS

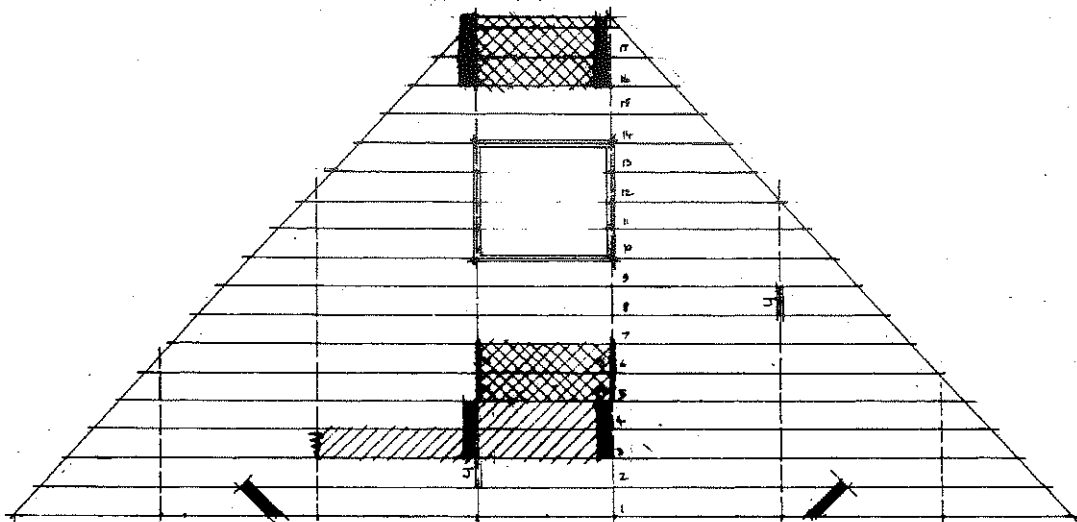
MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP CEILING – NORTH & WEST ELEVATIONS 01






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NORTH ELEVATION



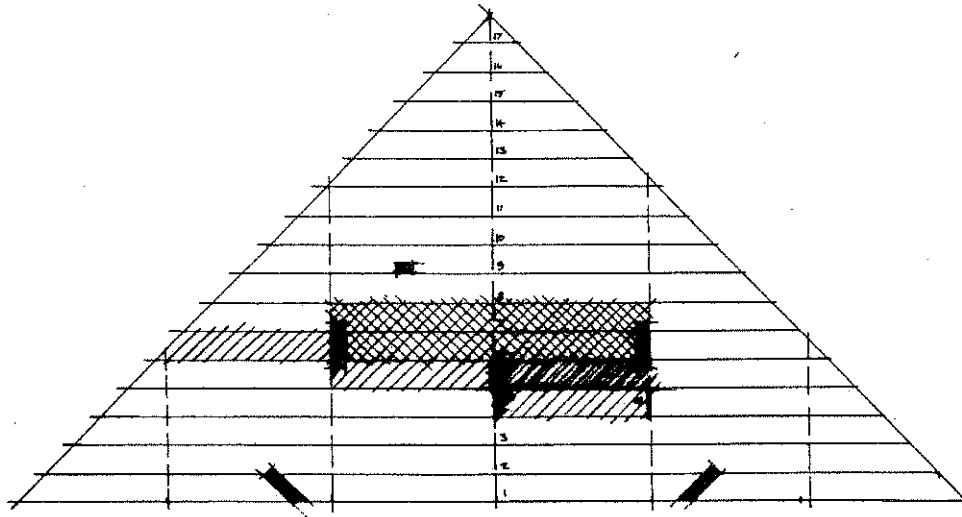
WEST ELEVATION

-  CEILING BOARDS DISLODGED, RECOVERED FROM ICE AND REPAIRS.
-  CEILING BOARDS REMOVED DURING STRUCTURAL PROGRAM AND REPLACED.
-  CEILING BOARDS DISLODGED BUT NOT RECOVERED. PLYWOOD PANEL INSTALLED (TEMP).
-  EXISTING JOINT IN CEILING BOARDS.
-  NEW CUT MADE TO FACILITATE STRUCTURAL PROGRAM.

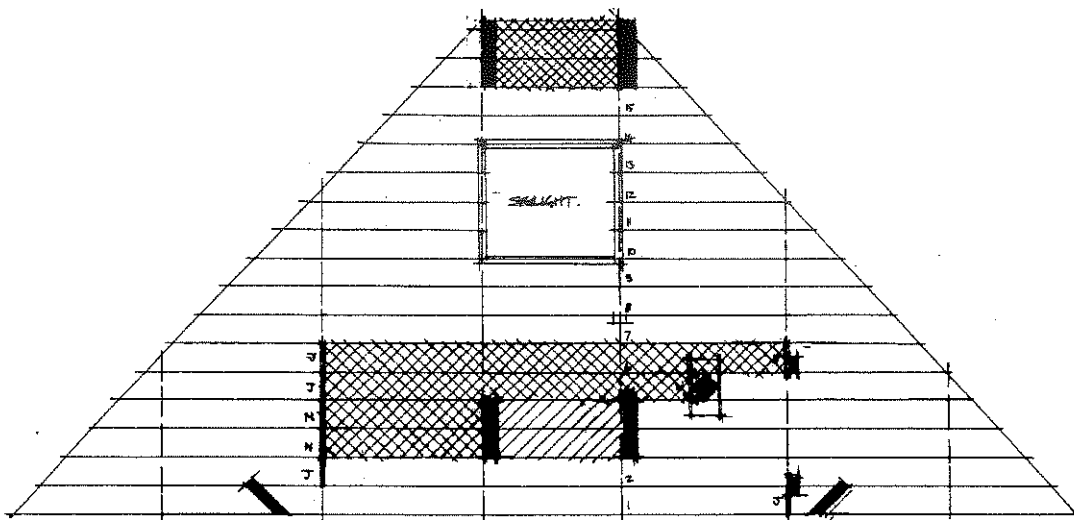
MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP CEILING – SOUTH & EAST ELEVATIONS 02




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SOUTH ELEVATION



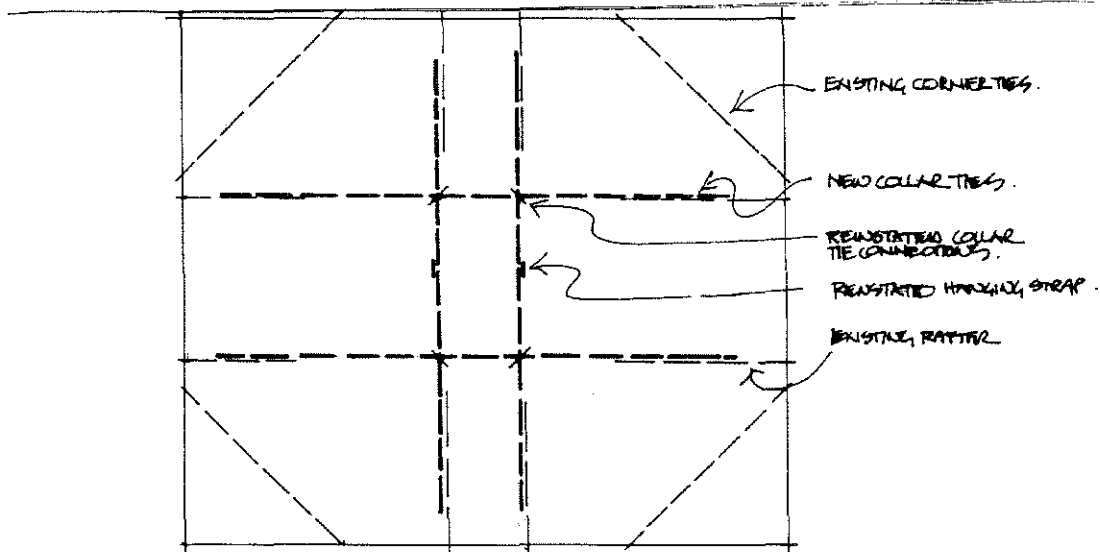
EAST ELEVATION.

-  CEILING BOARDS DISLODGED
RECOVERED FROM ICE AND REFIXED.
-  CEILING BOARDS REMOVED DURING STRUCTURAL
PROGRAM AND REPLACED.
-  CEILING BOARDS DISLODGE BUT NOT RECOVERED.
TIMBER PANEL INSTALLED (TEMP)
- J EXISTING JOINT IN CEILING BOARDS.
- N NEW CUT MADE TO FACILITATE STRUCTURAL PROGRAM.

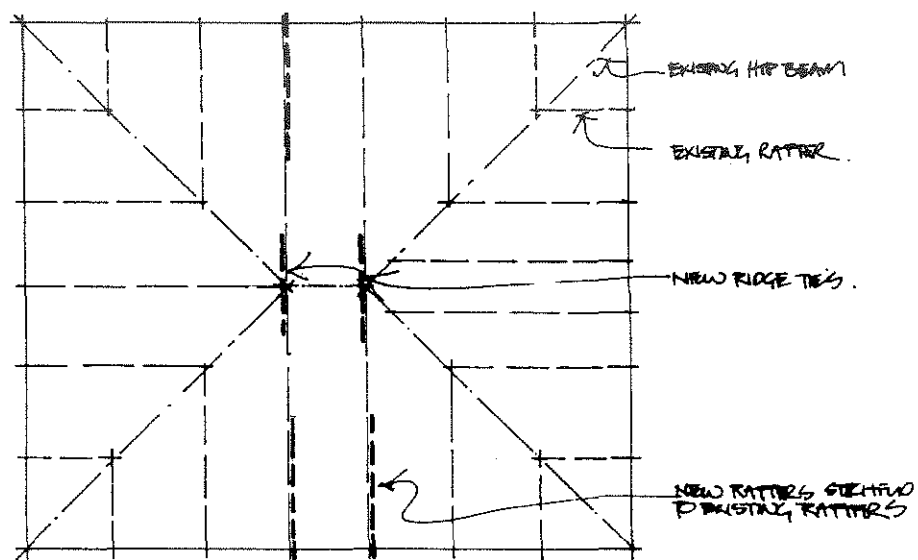
MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP ROOF – COLLAR TIE REPAIR PLANS 03

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LOWER FRAMING PLAN

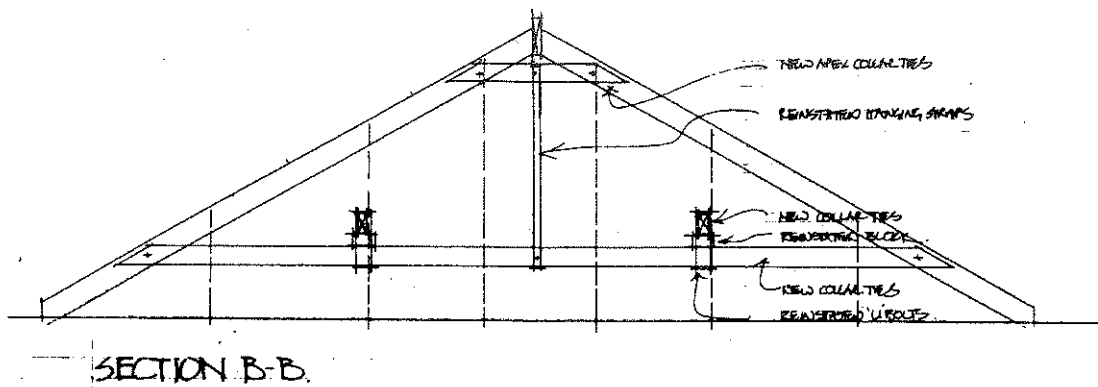
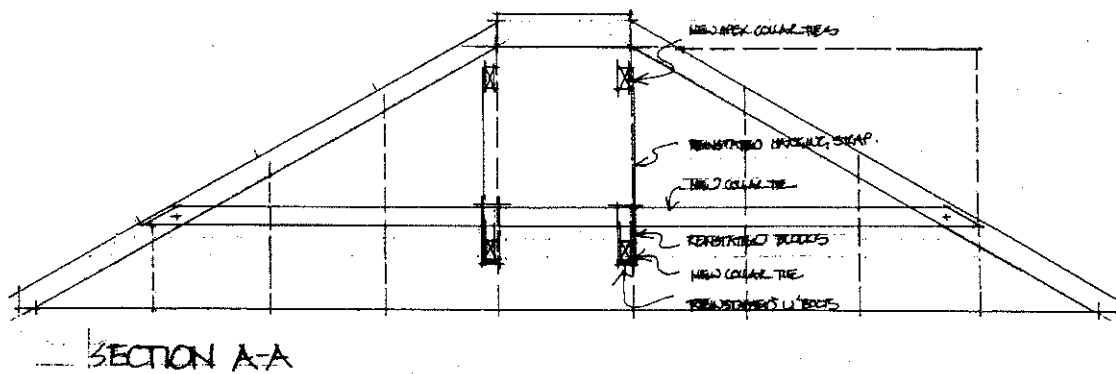


UPPER FRAMING PLAN.

MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP ROOF – COLLAR TIE REPAIR SECTIONS 04

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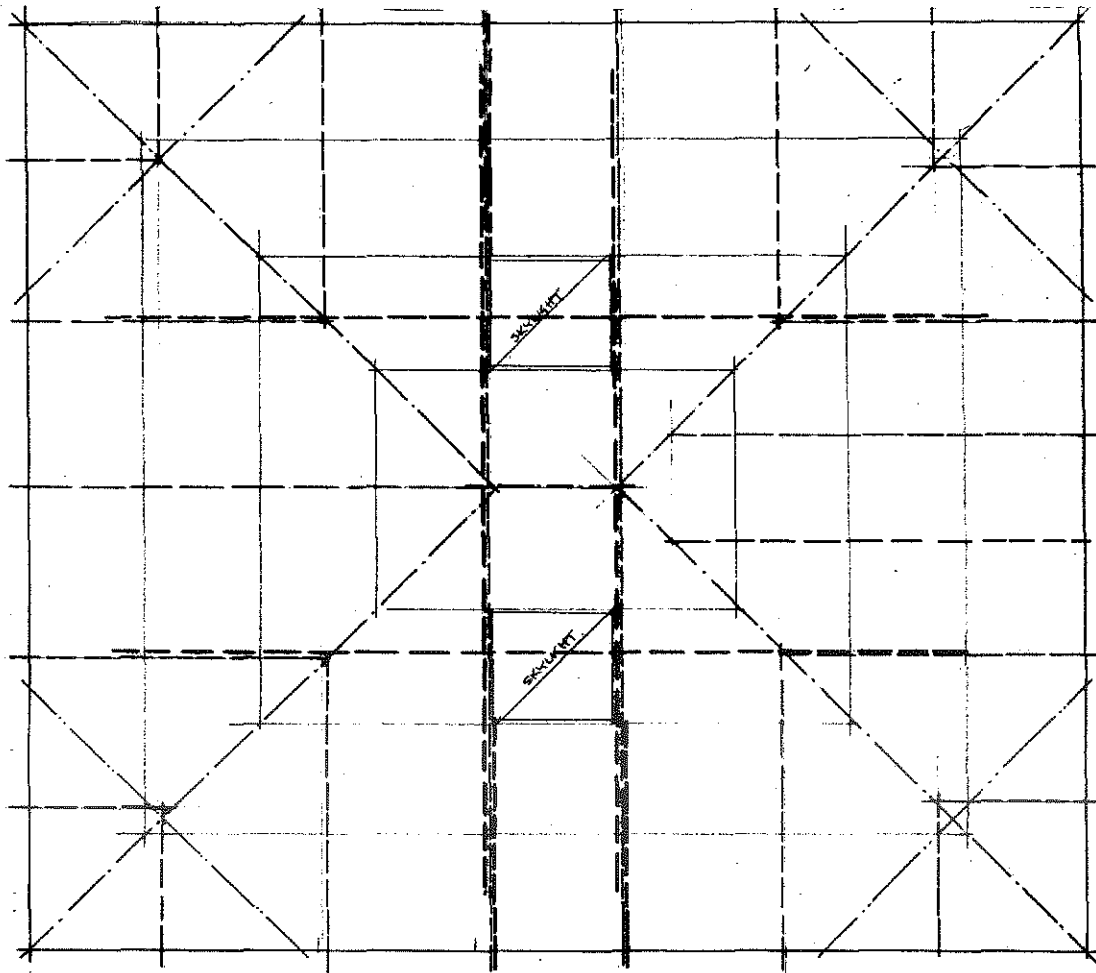


MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP – ROOF FRAMING PLAN

05

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ROOF FRAMING PLAN.

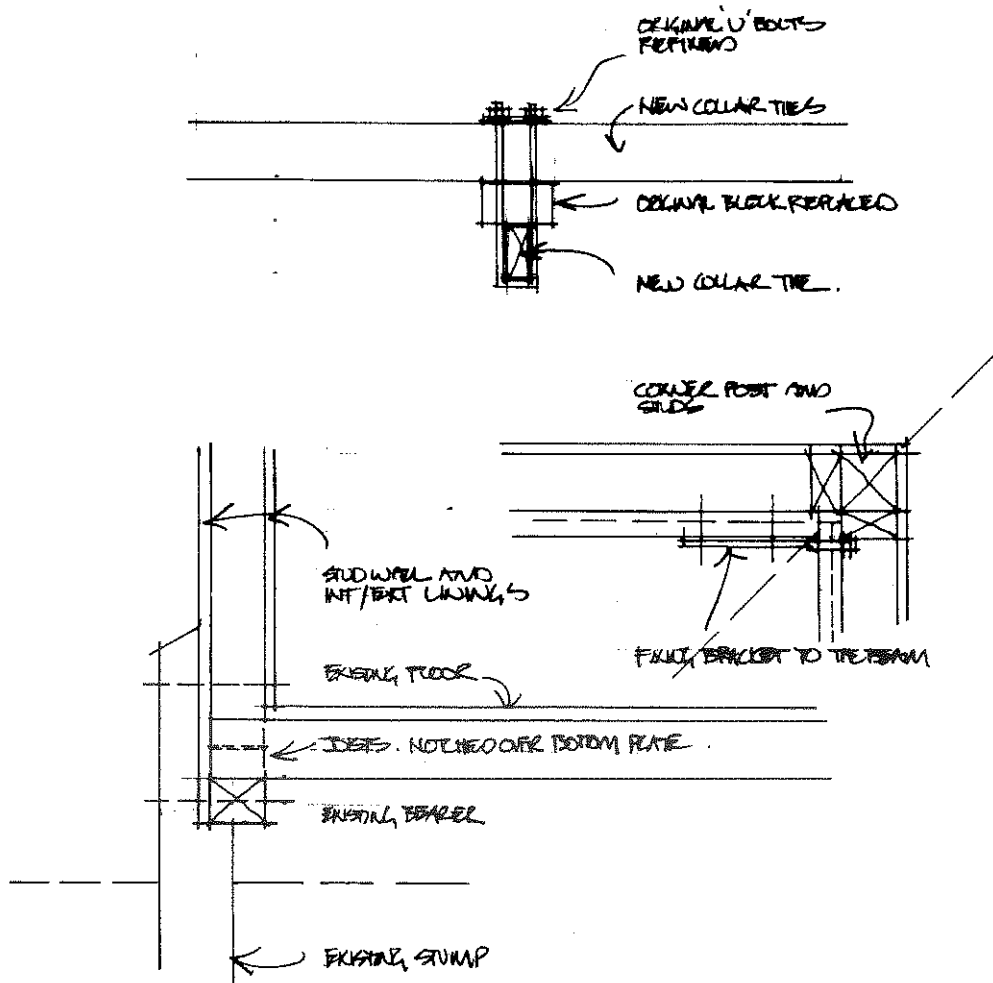
- 125x38 RAFTERS.
- 250x38 FLOOR BEAMS.
- 100x50 CORNER TIES
75x50 CORNER TIES.
- NEW 100x50 CORNER AND FLOOR TIES.
- NEW 125x38 RAFTERS (GIVEN)
TO BRISTOL.

MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP – DETAILS

06

TROPPO ARCHITECTS NT P/L PO BOX 483 DARWIN NT 0801 PH 08 89819585 FX 08 89812006

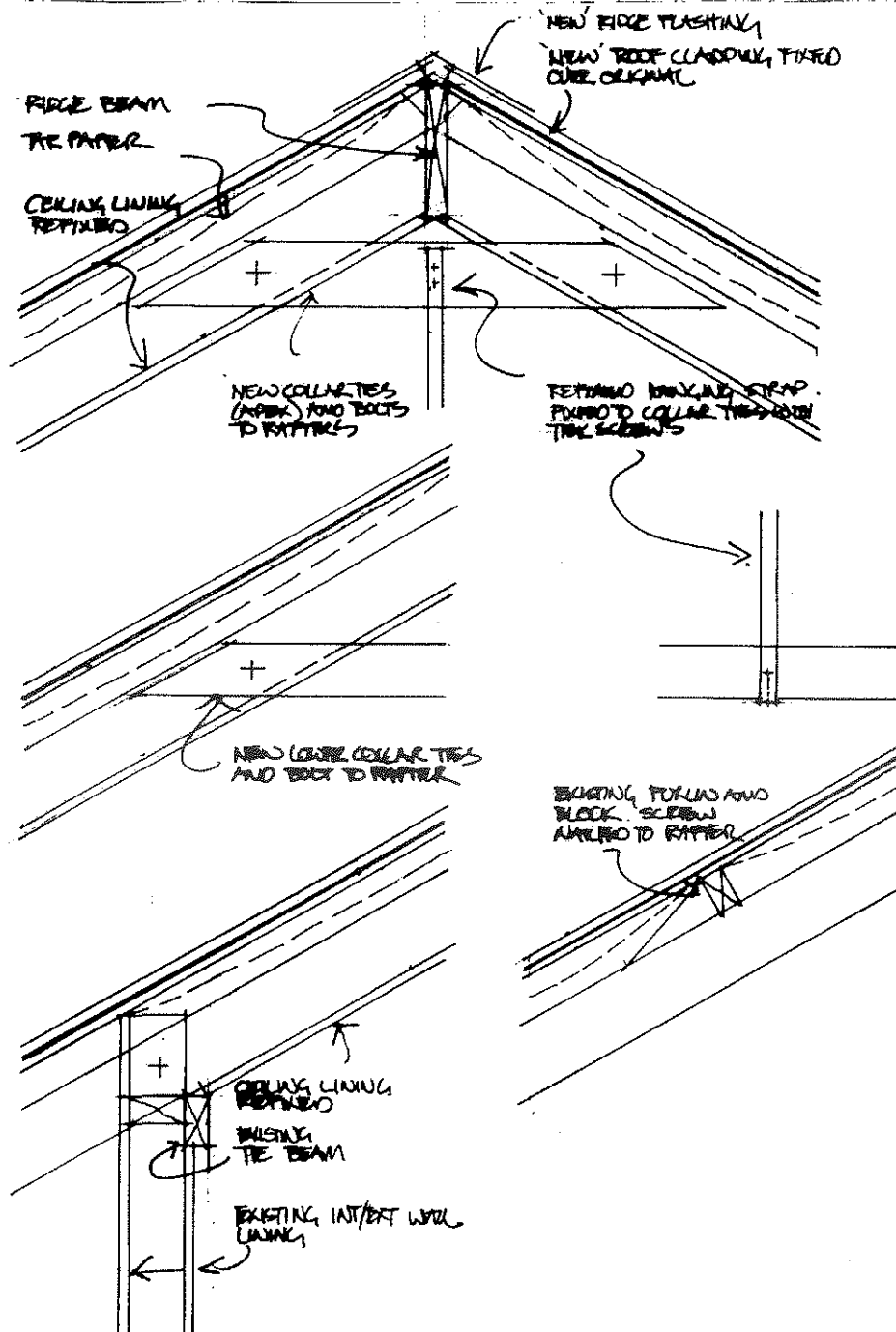


MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP – DETAILS

07

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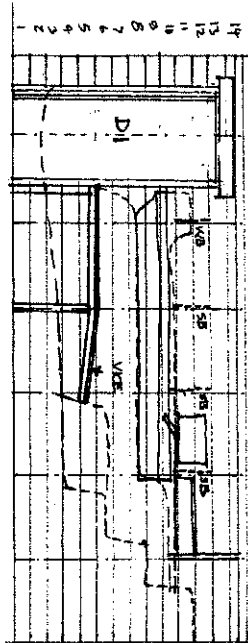
MAWSONS HUTS – 2002 EXPEDITION

WORKSHOP – INTERNAL WALL ELEVATIONS

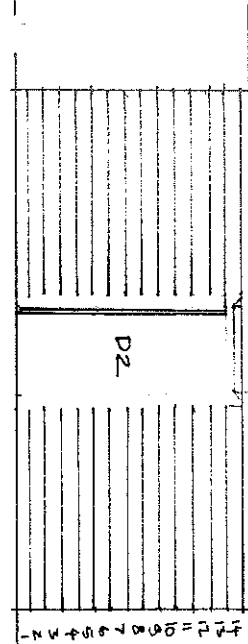
08

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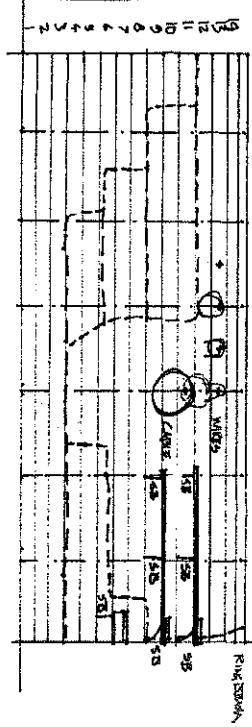
WEST ELEVATION



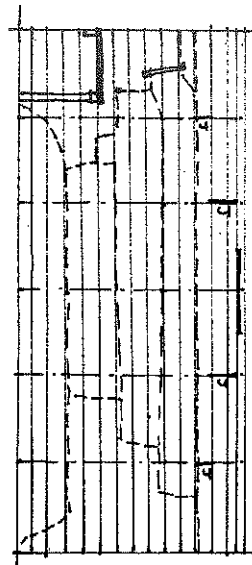
SOUTH ELEVATION



EAST ELEVATION



NORTH ELEVATION



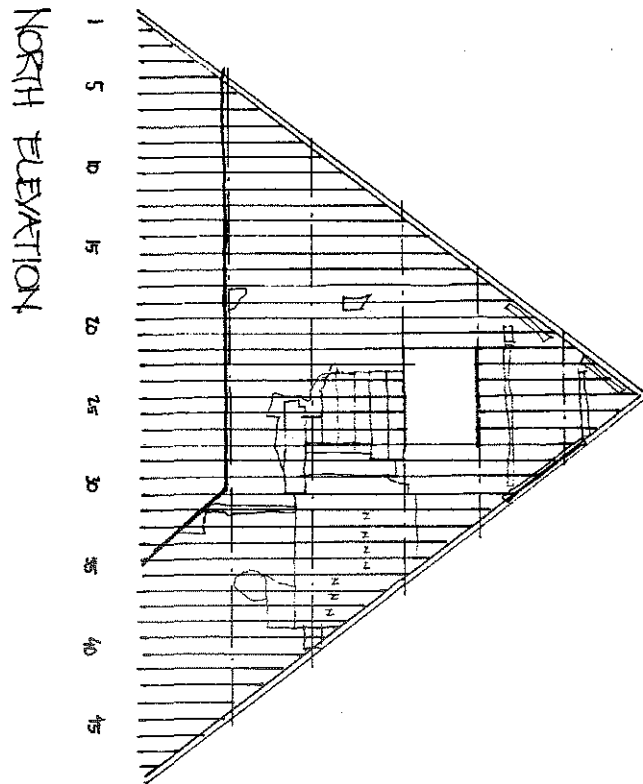
WORKSHOP
SCALE 1:50

MAWSONS HUTS – 2002 EXPEDITION

MAIN HUT ROOF - NORTH ELEVATION

09

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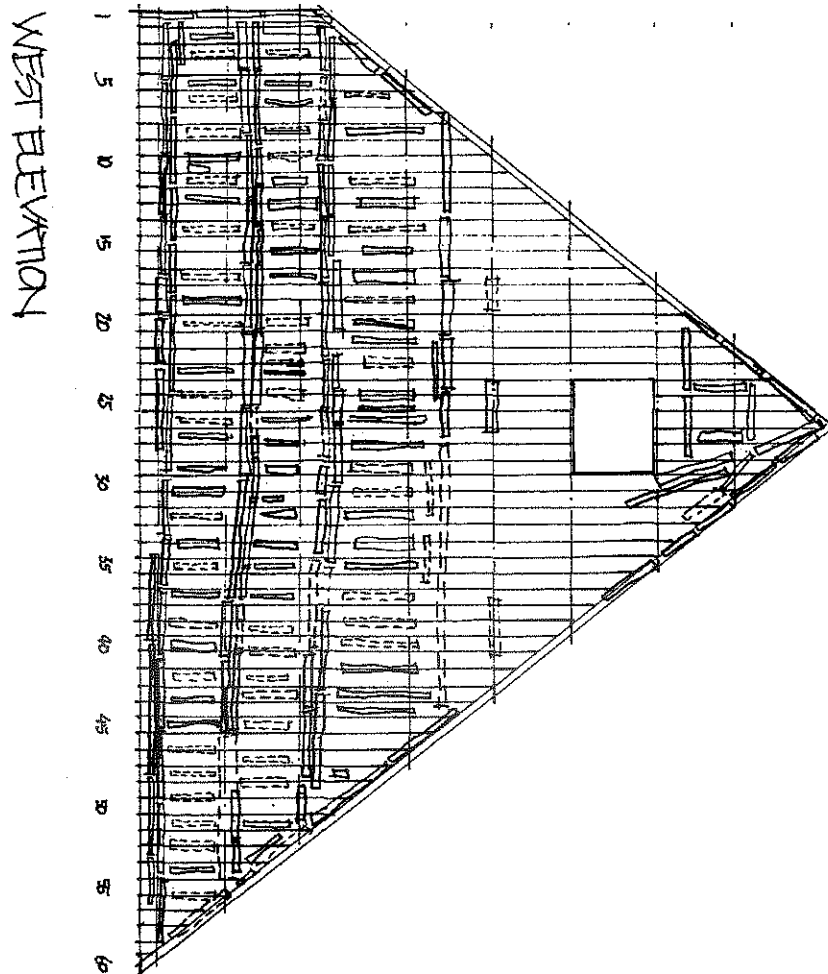


MAWSONS HUTS – 2002 EXPEDITION

MAIN HUT ROOF – WEST ELEVATION

10

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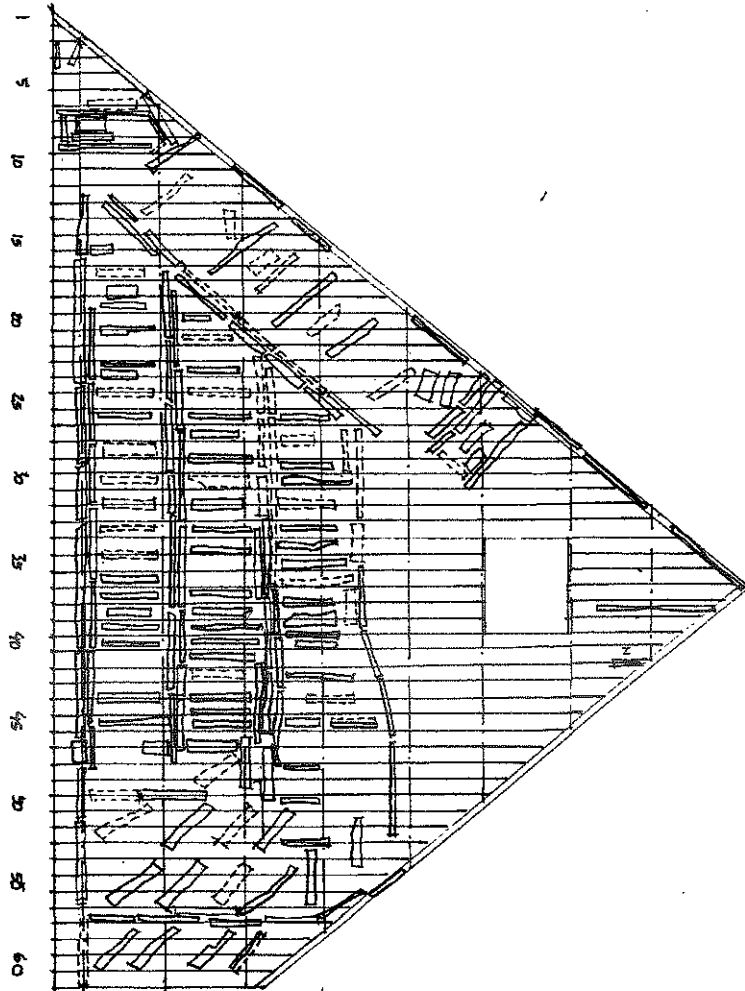
MAWSONS HUTS – 2002 EXPEDITION

MAIN HUT ROOF – EAST ELEVATION

11

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EAST ELEVATION



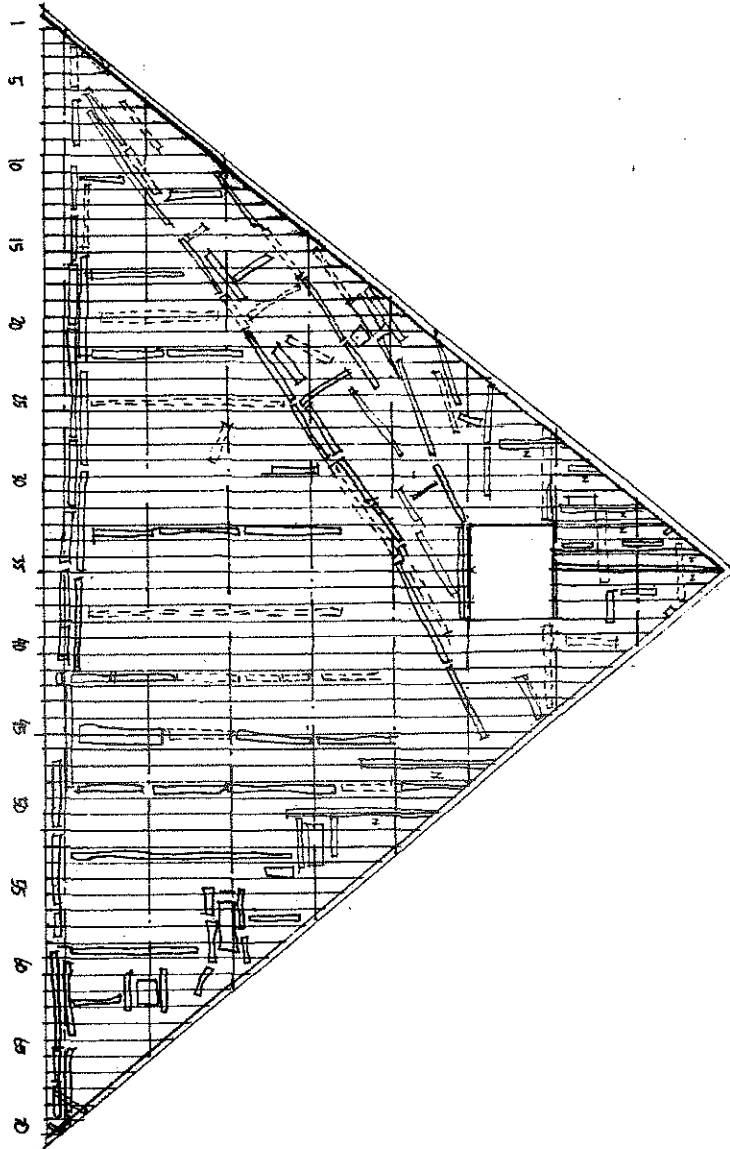
MAWSONS HUTS – 2002 EXPEDITION

MAIN HUT ROOF – SOUTH ELEVATION

12

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SOUTH ELEVATION



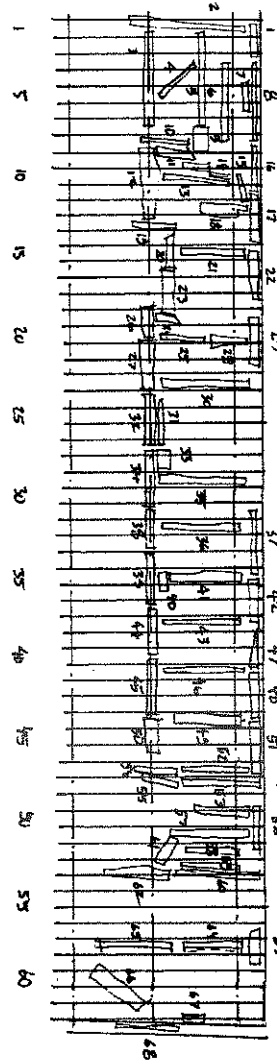
MAWSONS HUTS – 2002 EXPEDITION

MAIN HUT WALLS – EAST & WEST ELEVATIONS

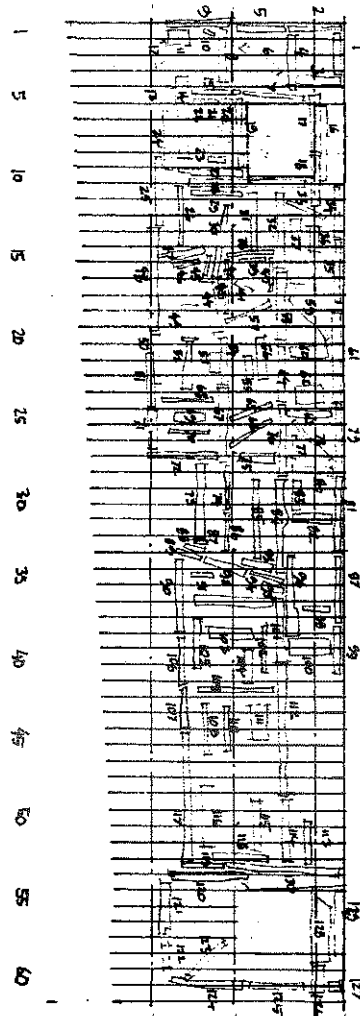
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EAST ELEVATION



WEST ELEVATION

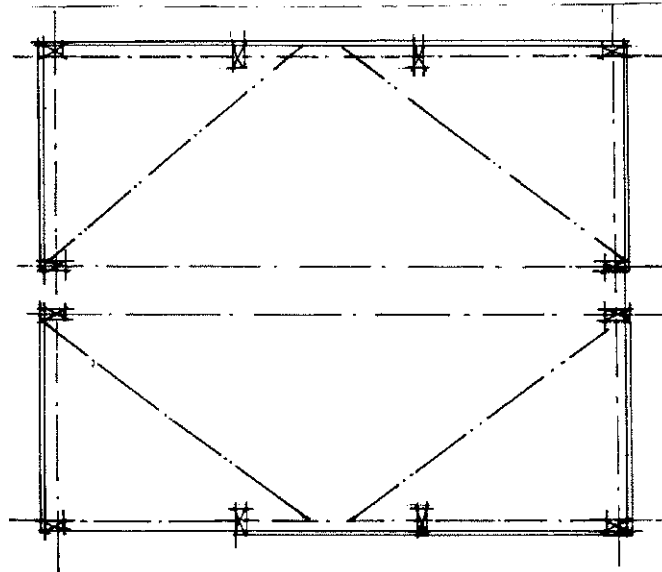


MAWSONS HUTS – 2002 EXPEDITION

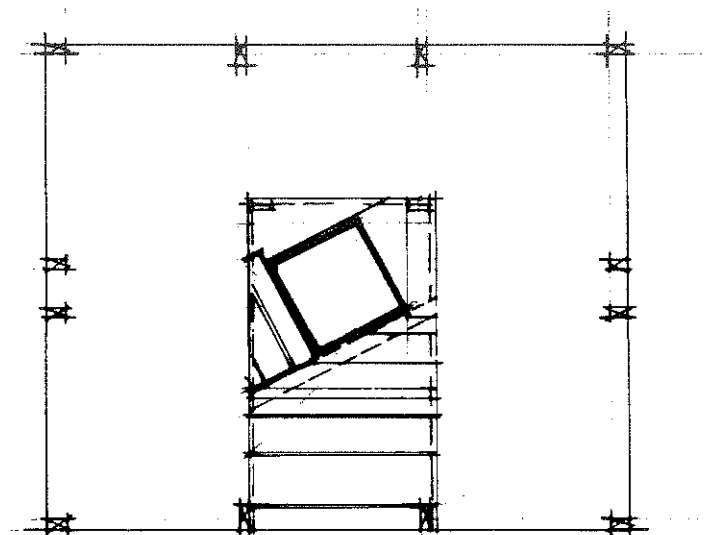
TRANSIT HUT – FLOOR & FRAMING PLAN

14

TROPPO ARCHITECTS NT P/L PO BOX 483 DARWIN NT 0801 PH 08 89819585 FX 08 89812006



FRAMING PLAN
SCALE 1:20



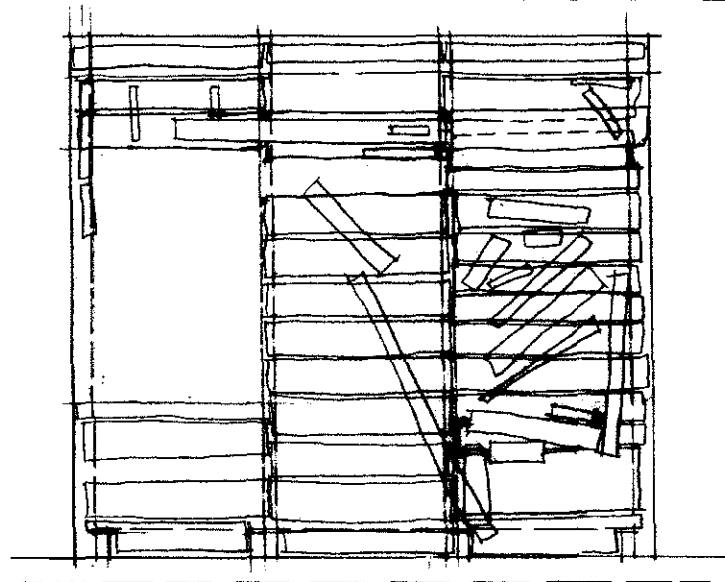
FLOOR PLAN
SCALE 1:20

MAWSONS HUTS – 2002 EXPEDITION

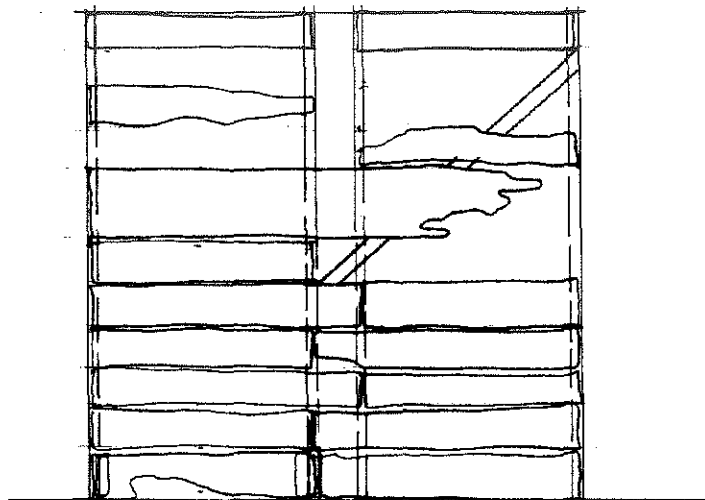
TRANSIT HUT – SOUTH & WEST ELEVATIONS

15

TROPPO ARCHITECTS NT P/L PO BOX 483 DARWIN NT 0801 PH 08 89819585 FX 08 89812006



ELEVATION - WEST
SCALE 1:20



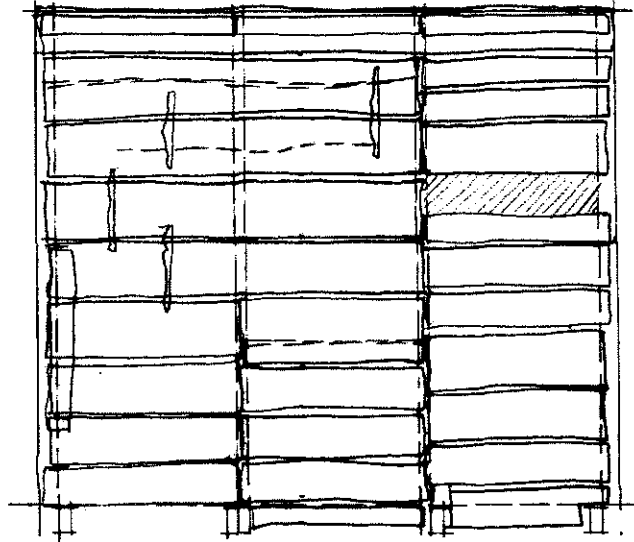
ELEVATION - SOUTH
SCALE 1:20

MAWSONS HUTS – 2002 EXPEDITION

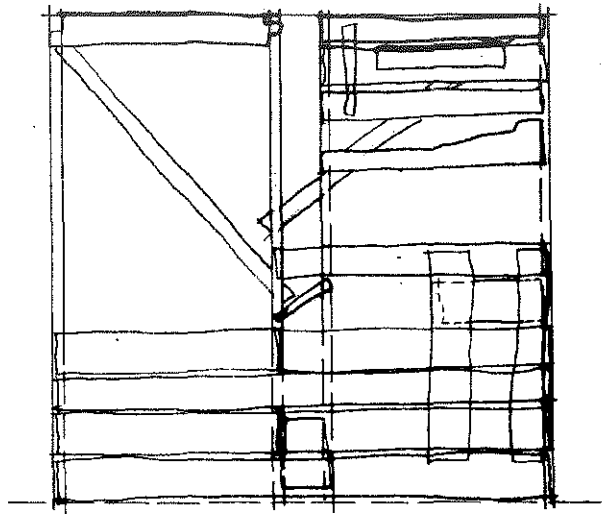
TRANSIT HUT – NORTH & EAST ELEVATIONS

16

TROPPO ARCHITECTS NT P/L PO BOX 483 DARWIN NT 0801 PH 08 89819585 FX 08 89812006



ELEVATION - EAST
SCALE 1:20



ELEVATION - NORTH.
SCALE 1:20.



ARCHAEOLOGICAL PROGRAM AT MAWSON'S HUTS 2002 - REPORT TO THE AUSTRALIAN ANTARCTIC DIVISION

Dr Estelle Lazer

Work on the Main Hut was given first priority as it has been identified as the major artefact in the field of artefacts that makes up the site associated with Mawson's 1911-14 expedition to Cape Denison.

Ice excavation

The techniques that were pioneered in the 1997-98 season were again successfully employed. Most of the excavation was carried out with chainsaws, with fine work being done with pinchbars, chisels, small trowels and brushes. Variable speed angle grinders were not considered necessary to liberate the artefacts that were exposed in the 2002 season as the majority of artefacts were more easily exposed with the cautious use of chisels, fine trowels and brushes.

Ice was removed from a large area in the Workshop to facilitate structural repairs. Ice was also removed from various areas in the Living Hut, especially where the ice load was likely to be causing damage, for example, to bunks.

The Workshop had been cleared by the ANARE in 1978. It was reported that after artefacts had been documented, they were placed in boxes that were stored under the bench on the western side of the Workshop. The hard ice above the floor was not excavated. It was therefore assumed that the Workshop would contain no artefacts above floor level. A number of artefacts, however, were revealed on shelves, the collar ties and hooks on the walls. The most significant artefact that was revealed was the tail of the air tractor. At least one other portion of the air tractor was uncovered inside the Workshop. Portions of the tyres were identified in the artefact scatter to the northwest of the Main Hut. These remains reflect the first attempt to use an aeroplane in Antarctica.

The tail of the air tractor was exposed at the eastern side of the Workshop. It had originally been stored on the collar ties but had been brought down by their collapse. This artefact, which consisted of fabric laced to a metal frame, required special treatment. The conservator decided that damage to the fabric would be minimised if it were liberated from the ice with the use of heat guns and fine trowels and brushes. This method proved successful.

Ice removal from the Living Hut included the excavation of ice above the southeastern, southwestern and western upper bunks, as well as above Mawson's cubicle and the top shelves on the southern and eastern walls. Minimal ice was removed from the northern end of the Living Hut as this area was considered to be likely to be artefact-rich and time and resources were not available to adequately deal with the documentation and

conservation of artefacts that would have been exposed. Among other finds, the ice removal revealed the bunks that had been used by Mertz and Ninnis in 1912 at the southeast side of the Living Hut, and a tin with a handwritten note by Mawson on its lid on the top shelf on the eastern wall of Mawson's cubicle.

Artefacts were documented by the archaeologist and materials conservator as they were exposed. Artefacts that required special treatment, such as the air tractor tail, were treated by the materials conservator. Where possible, artefacts were replaced in their original locations after ice removal. When this was not possible, for example, when they were found floating on ice or their survival would be compromised by future ice ingress, they were allowed to ablate, labelled and stored at the southeastern end of the Workshop.

Ice samples

This part of the program was undertaken to provide additional information to assist in the interpretation of the ice cores taken from the Living Hut and Workshop in the 1997-98 season. This work is being done in conjunction with the Department of Glaciology at the University of Tasmania. Twenty five ice samples were collected from a number of specified locations in and around the Main Hut. These samples will be subjected to oxygen isotope analysis, which should provide information about the microclimate inside the Main Hut as well as establishing whether the main snow and ice buildup inside the huts was primarily the result of one season's snow ingress as suggested by the preliminary examination of the ice core samples.

Documentation of artefacts inside the Main Hut

The documentation of artefacts inside the Main Hut was a high priority as it is important for the Australian Antarctic Division to be aware of the extent of the collection so that appropriate policies can be developed to manage the site.

Documentation of the artefacts inside the Main Hut was initiated by the 1978 ANARE and has been continued in varying degrees of detail by subsequent expeditions. Artefacts that had not previously been documented as well as those that had been described were catalogued to produce a standardised record of all the accessible artefacts inside the Main Hut. This work was done in conjunction with the materials conservator. The catalogue will include detailed condition reports so that the rate of deterioration of artefacts can be monitored by future expeditions. Written and photographic records from previous expeditions enable the assessment of changes to artefacts over the last twenty-four years. For example, magazines on a shelf on the northern outer wall of Mawson's cubicle that could be examined individually in 2001 are now frozen into a solid mass.

Out-of-context artefacts

A number of items dating to the period of Mawson's occupation but no longer in context have been stored inside the Main Hut. These included excavated artefacts stored in

plastic containers by Project Blizzard in 1986, and artefacts originally on the platform and structural elements that were removed from the platform as part of the conservation program of the 1997-98 AAP Mawson's Huts Foundation expedition. It could be argued that as these artefacts are no longer in their original context, they should no longer be stored inside the Hut.

Permission was granted to return failed building materials to Australia. Some of these items, such as samples of tar paper and a variety of metal fixings, will be used to establish a reference collection of building materials for researchers and future field parties planning to undertake repairs.

An area at the southeastern corner of the Workshop has been set aside for stored artefacts until a policy is established to deal with these objects.

The freeze-dried remains of an AAE husky found on the plateau have been stored in the Workshop since 1998. A kerosene tin found near the remains has also been stored in the Workshop. The Works plan indicated that the dog should be reburied in the eastern verandah of the Main Hut, but this was found to be impractical. After the dog was inspected to ensure that it is not deteriorating, it was relocated to the southeast corner of the Workshop.

The conservator ablated, dried and labelled all the artefacts left in plastic containers by the 1985-86 Project Blizzard expedition. These were also stored in the same area.

Artefacts exposed by the 2002 excavations that could not be returned to their original locations were also, ablated, labelled and stored in this area.

Documentation of the fabric of the huts

The history of the occupation of the site is embedded in the fabric of the huts. For example, the battens on the Main Hut are a reflection of the attempt to arrest snow and ice ingress into the Hut in the second year of the expedition. Documentation of the fabric of the huts on the site is therefore important for the interpretation the site. It is also important for conservation management.

Outdoor site survey

The distribution of artefacts across Cape Denison provides a basis for the identification of the boundaries of the site. The outdoor artefacts also reflect the activities of the members of the AAE and provide a means of gaining some understanding of their behaviour during the period of occupation. Further, this material provides information that is not included in the AAE's written records.

Priority was given to the continuation of the survey of outdoor artefact scatters across Cape Denison that was commenced in 1984-85. It was considered important to record

these scatters as they are potentially vulnerable to damage or collection by unsupervised tourists.

Emphasis was placed on the artefact scatter to the north of the Main Hut as this has the richest artefact field and is in an area most likely to attract tourists.

The key aim of the 2002 season's documentation was to establish a GIS framework that will be linked with a database to make this material accessible for research and educational purposes.

Total Station and hand-held GPS

A number of classes of artefacts in the scatter to the north of the Main Hut were recorded and surveyed using a Total Station. Artefacts in the vicinity of the Granholm Hut, to the south of the Main Hut, around Penguin Knob, and to the east of the Sørensen Hut were also surveyed using this method. Artefacts that could not be recorded with the use of this method were recorded with a hand-held GPS (Garmin GPS 12). As a number of artefacts that were resurveyed with the hand-held GPS at different times were found to have substantially different margins of error, some artefacts were surveyed both with a GPS and the Total Station. The resulting data should give some indication of the margin of error of the hand-held GPS.

This is a cumulative survey as the amount of ablation across the site varies from season to season. As this work was undertaken early in the season, only a limited amount of the artefact scatter was visible. It is known from previous expeditions that there is a much larger area of artefact scatter across the site. Only a small area of the known scatter was visible in the large scatter to the north of the Hut. A number of artefacts across the site that have been observed on earlier expeditions were not visible during this season. However, a number of artefacts that have not previously been recorded were seen at various times in the 2002 summer season. This included a number of seals that were cached in areas known to house the remains of seals that were killed by members of the AAE, such as Penguin Knob, to the northwest of the Granholm Hut and to the east of the Sørensen Hut. Up until this season, all the cached seals that were observed were found in the vicinity of the sea edge. The discovery of seals some distance from the water, such as two seals to the north east of the Transit Hut and a seal to the east of Anemometer Hill, were therefore of some interest. It was also interesting to note that certain artefacts were visible only for a short period during the 2002 season, such as the two seals recorded to the northeast of the Transit Hut and some of the seals to the west of the Magnetograph Hut in the region of Penguin Knob. This confirms the need for a continuing study of the site over time, preferably during different seasons.

Three metre square grids with hundred-millimetre divisions were constructed at Cape Denison by one of the carpenters to enable dense areas of artefacts to be quickly documented photographically for later mapping. Artefacts in each grid were described. This method was particularly useful for recording the artefacts beneath the bunks on the

southwestern and western sides of the Living Hut and the floor of the darkroom. It was also used to record artefacts outside the Main Hut, especially on the relatively flat ground to the east and west of the Main Hut. The only disadvantages with this method were that the squares could not easily be held down on windy days and they were difficult to set up on very uneven terrain.

Digital video records were made of the artefact scatter around and to the north of the Main Hut. Three detailed video studies were recorded in October, November and December to show the density and distribution of artefacts revealed over the period of the expedition. These will be used in conjunction with digital video footage taken in the 2000-2001 season as part of the detailed record of the site for the GIS. They will also provide a detailed record of the degree of ablation associated with the artefact scatter in the vicinity of the Main Hut over time. An understanding of the patterns of artefact exposure will assist in the development of management strategies for the site.

Tourism

Passengers travelling on the *Sir Hubert Wilkins* visited Cape Denison in December. About four hours were devoted to taking tours through the Main Hut, guided by either the materials conservator or the archaeologist. As on previous occasions, each tour group was limited to two or three individuals. The slippery, ice-covered floors and low doorways present a definite safety hazard for individuals.

Digital video footage was taken for the purpose of making a briefing video to be shown to visitors prior to landing at Cape Denison. This included footage of one of the guided tours of visitors from the *Sir Hubert Wilkins*. The footage could also be incorporated into an education package about the site.

Post-BANZARE artefacts

Documentation and removal of post-BANZARE artefacts was an important component of the 2000-2001 Works program. This work was continued in the 2002 season. A conservative approach was taken so that if an object could not be dated with certainty, it was left *in situ*.

RECOMMENDATIONS

- That there be a briefing prior to departure to enable priorities of different programs to be established so that there is no conflict of interest between completion of various programs in the Works plan and so that personnel can be deployed in the most useful ways for the time available on site.

- If possible, ice removal should be planned for the earlier part of a season as time is required for the documentation, conservation and management of artefacts that are exposed by excavation.
- The use of the Total Station proved to be an excellent way to record a large number of artefacts in a short period of time. The operator, though not a trained surveyor, was able to successfully use the equipment. Despite the fact that training and support were required, once the system was up and running it proved to be a fast and efficient method of surveying the artefacts across the site. It should be noted that this system is most effective on days with little or no wind. Further, it took three people at a time to complete a survey: one operating the equipment, a person holding the staff and a person identifying and documenting artefacts as they were surveyed. To make the process faster, artefacts were described and photographed prior to the actual survey. This did help but artefacts still had to be found again, and occasionally artefacts documented on one day were found to have disappeared under snow and ice on the day of the survey. Conversely, new artefacts had often ablated out between the period of documentation and the day of the survey.

Perhaps other methods of surveying, such as the use of a differential GPS, should also be considered for future expeditions. Differential GPS has the advantage of being able to be used by one operator once it is set up. Also, it can be used in more extreme weather conditions than the Total Station.

MATERIAL CONSERVATION REPORT – 2002 AAD MAWSON'S HUTS EXPEDITION

This report describes the work undertaken by the materials conservator during the 2002 AAD expedition to Mawson's Huts. The report is divided into three sections:

- environmental monitoring program
- building program
- collection management program

Attachments:

- A** Condition of buildings and structures
- B** Moisture content profiling
- C** Timber thickness measurements
- D** Artifacts returned to Australia

ENVIRONMENTAL MONITORING

Task	Estimated time needed at site	Actual time spent at site
Calibration	3 days	6 days
Data logger set up	10 days	12 days
Vibration sensor	2 days	1 day
Salt candle	2 days	1 day

Environmental Monitoring Program

Continue monitoring the internal environments of the Main Hut and Magnetograph Hut and the external environment at Cape Denison. Monitoring will produce data that can be used to provide information on biological activity, corrosivity, the impact of partial snow and ice removal and the structural stability of buildings. This information will be used in developing a management strategy for the cultural resources at Cape Denison.

The 2002 monitoring program involved:

- re-establishing the Campbell's Scientific CR10X monitoring system;
- collecting two meltwater sensors, an external solar radiation sensor and bundles of wire used by previous expeditions and returning them to Australia;
- installing two vibration sensors in the Living Hut;
- collecting and reinstalling agar plates, leather and paper samples, corrosion coupons and three Tiny Tag Ultra dataloggers at various locations in the Main Hut and Magnetograph Hut;
- installing three salt candles inside and outside the Main Hut for the duration of the expedition.

Campbell Scientific CR10X Monitoring System

The Campbell Scientific CR10X monitoring system is designed to collect information provided by a variety of environmental sensors and transmit this information back to Australia via a satellite phone. The data will be downloaded and processed from the Australian Museum during 2003.

The sensors installed by the 2002 expedition included eight Vaisala temperature and relative humidity (T/RH) sensors and six thermocouples. A linear displacement sensor was not installed as insufficient cable was supplied.

The base unit consists of a CR10X datalogger (including replacement datalogger canister), wiring panel, multiplexer, satellite phone and batteries for the datalogger and satellite phone. The base unit is housed in a white plastic box, which was set up in the south east corner of the Workshop. The

sensors were installed at various locations inside and outside the Main Hut and fed back to the base unit where they were wired into the datalogger through the multiplexor.

For the duration of the expedition, the datalogger was run from one of the old batteries (voltage 12.42 volts on 6/11/02). The system was connected to new batteries at the end of the 2002 expedition (Iridium phone battery 15.5 volts, datalogger battery 15.66 volts on 3/12/02).

The system was connected as per. Campbell Scientific instruction manual. All equipment was well-designed and easy to use. The unit was slightly modified (by moving the multiplexer and terminal block one hole closer to the edge of the box) in order to fit the permanent batteries and allow cable entry to the terminal block. The box housing the system is full and replacement batteries will need to be of similar size to those already in place.

The instruction manual was easy to read and follow but did not always describe the design configurations and part numbers supplied (for example, ribbon cables did not always have the same number as indicated in the instructions). Communication (via e-mail and phone) with Vinod Daniel, Ian Godfrey and Campbell Scientific was excellent and all queries were promptly and thoughtfully answered, enabling the program to proceed without unnecessary delay.

The main difficulties experienced with the Campbell Scientific CR10X monitoring system were:

- *Insufficient pre-departure training and preparation time.*

Linda Clark and Michael Staples spent only one day in Hobart with Vinod Daniel and Ian Godfrey going over the system. This time was not sufficient to understand and test all equipment and software.

Fortunately Michael was able to work at the Australian Antarctic Division headquarters at Kingston for four weeks prior to departure (this time was not originally allocated). During this time he successfully installed monitoring software on two expedition computers and assembled and tested all equipment. The satellite phone was found to be faulty and was replaced.

It is absolutely essential that all expedition equipment and software is first assembled and tested in Australia by expeditioners/AAD staff to ensure:

1. all components are functional and compatible;
2. computer software is installed in appropriate computers;
3. enough time is available to source and replace faulty equipment and software;
4. equipment is inventoried and securely packed.

- *Locating previously used monitoring equipment inside the Main Hut*

Previous visitors to Cape Denison have commented unfavourably on the tangle of monitoring equipment, electrical wires and cables strewn around the interior of the Main Hut. To make it easier for future expeditions to relocate, identify and access monitoring equipment, approximately 6 days were spent running sensor cables neatly back to the base unit via the ice free roof rafters and tying cables at frequent intervals to the rafters. The cable and wire layout was photographically documented.

Some sensors in both the Workshop and Living Hut were covered with snow. The datalogger box and some T/RH and meltwater sensors in the Workshop were buried under 10 cms of snow. The plastic coating on the wire leading to the external radiation sensor was accidentally damaged while removing snow from the inside the entrance door..

- *Limited veranda access due to snow/ice build-up.*

It was originally intended that some sensors would be installed in, or their cable/wires would pass through, the verandas. However, the verandas remained filled with snow and ice for the duration of the 2002 expedition and therefore inaccessible. Exterior sensor cables previously led through the western Workshop veranda had become frozen in ice and could not be removed.

Generous amounts of cable, wires, clamps, cable ties (in various sizes) need to be supplied, as it is often impossible to run cables via the most direct route back to the datalogger.

Satellite Telephone

A satellite telephone was installed so data can be regularly transmitted back to Australia. As the telephone may consume a large volume of current, it is designed to turn on and access data at selected intervals. As a back-up, a replacement canister was inserted into the datalogger. The existing datalogger canister was returned to Australia.

A satellite phone antenna was installed on a short piece of steel tube attached (with hose clips) to the corrosion coupon frame erected on the dormer ventilator on the northern roof of the Workshop. A reinforcing bracket of 25 x 25mm aluminium angle was bolted to the corrosion coupon frame and secured to the edge of the dormer roof over-cladding in order to reduce vibration and resist the additional wind load imposed by the mounting of the antenna.

The antenna was led inside the Workshop through a hole bored in the over-cladding covering an existing flue hole in the original cladding. The hole was sealed with a backing ring of plywood set in silicone on the exterior of the cladding. The antenna cable was led to the datalogger along the eastern collar tie (of the pair of N-S collar ties) and secured to the collar tie with plastic cable ties. All exterior connections were sealed with self amalgamating tape.

Because of the amount of snow and ice surrounding the building, it was difficult to find a suitable place to secure the rock bolt for the earth wire from the satellite phone FMA surge protector. Eventually, the earth wire was secured with hose clamps to a galvanised steel stake driven down alongside the northwest Workshop footings to provide contact with underlying rocks and gravel.

TEMPERATURE/RELATIVE HUMIDITY MONITORING

The internal and external environment of the Main Hut was monitored using Vaisala T/RH sensors, Tiny Tag ultra data loggers and thermocouple (temperature only) sensors installed at various locations inside and outside the Main Hut. The Vaisala T/RH cables and thermocouple wires were fed back to the datalogger unit in the south east corner of the Workshop and wired into the datalogger via the multiplexor. A great deal of time was spent feeding and securing cables and wires to roof rafters so they would remain unobtrusive but easy to relocate.

Vaisala T/RH Sensors

These sensors monitor conditions at a number of locations inside the Main Hut as a basis for assessing the impact of ice removal on the microclimate.

Seven old T/RH sensors were collected from the following locations on the 6/11/02:

- exterior, north west corner of the Workshop veranda;
- centre of the Workshop (3 sensors, buried under 10cm ice);
- shelf above centre (upper) bunk, west wall, Living Hut (buried under ice);
- shelf above centre (upper) bunk, east wall, Living Hut;
- suspended from platform near kitchen area, Living Hut.

Eight Vaisala T/RH sensors were installed at new locations inside and outside the Main Hut. These sensors included four new sensors (1-4) and the four most accurate old sensors.

Calibration of T/RH sensors

It was originally intended to calibrate the old sensors using a Vaisala calibration unit containing two set point saturated salt solutions of sodium chloride (RH =74.5%) and magnesium chloride (RH = 33%) in separate sealed chambers.

Calibration commenced on 13/11/02 and continued until 4/12/03. Unfortunately, relative humidity measurements were considerably higher and more varied than anticipated (40-60% for magnesium chloride solution and 70-90% for sodium chloride), even though the sensors remained in the sealed chambers for much longer than suggested. Although the calibration unit was transferred to the warmer Sorenson Hut in an attempt to achieve more consistent results, the sensors still failed to reach equilibrium in the sub zero temperatures. Calibration was made more difficult by the failure of computers to power up and the keypads to operate at the low temperatures.

The Vaisala calibration unit was eventually discarded as a means of calibrating the old sensors. As an alternative, sensors were bundled together inside a plastic bag and the temperature and relative humidity measured after 24 hours. The new sensors consistently gave RH readings within 1.5% of each other. The four old sensors giving relative humidity readings closest to the average reading given by the new sensors (within 3.5%) were selected for re-use.

The sensors finally selected and their new locations (the numbers in front of the location refer to the location numbers used in the Works Plan) are:

Sensor	Previous number	Location
1	1 tip and base (new sensor)	7 – suspended, north east Workshop
2	C tip (old sensor), 2 base	9 – west wall on workbench, Workshop
3	3 tip and base (new sensor)	4 – suspended north east Living Hut
4	4 tip and base (new sensor)	6 – suspended, south west Workshop
5	2 tip (new sensor), A base	2 – exterior (top), north west Workshop
6	ext tip, E base (old sensor)	8 – suspended, apex, Living Hut
7	B tip, ext base (old sensor)	3 – exterior (lower), north west Workshop
8	E tip, D base (old sensor)	5 – suspended south west Living Hut

The location of each sensor was photographed in situ. The external sensors at the north west corner of the Workshop veranda were moved away from the corner to prevent them becoming covered with drift snow. The twelve plate radiation shield was not covered with gauze as the material supplied was in poor condition.

THERMOCOUPLES

Designed to monitor temperatures in the sub floor and assist in predicting possible melting of the sub floor ice.

Six thermocouple sensors were installed in the Main Hut; one outside the Workshop veranda; one at the Workshop apex and four at sub floor level in the Workshop and Living Hut.

Ice was removed from all sub floor interior locations to allow access to floor-boards. A small (3mm diameter) hole was drilled through the timber boards and underlying ice to a depth of approximately 118mm. The soldered tip of the thermocouple wire was inserted into the hole to the full depth. Water was poured into the hole to freeze the tip securely.

Thermocouple sensors 1- 5 were installed on 4/12/02. Thermocouple 6 was installed on 9/12/02. The thermocouple sensors are located in the following places (the numbers in brackets refer to the multiplexor terminal they are wired into):

- 1 (6) – exterior, 118cm into hard ice below footings level, north west corner Workshop;
- 2 (7) – 113 mm below surface of trapdoor (trapdoor approx 40mm thick, ice under door) above meat cellar, against east wall of west veranda;
- 3 (8) – 118mm into hard water ice, below floorboards under workbench, west wall Workshop;
- 4 (9) – apex, Workshop;
- 5 (10) – 118mm below surface of floorboards (boards approx 25mm thick, then approx 30mm air then ice), north west corner, Hurley's Darkroom (under sink);
- 6 (11) – south west corner Living Hut. Three lengths of thermocouple wire had to be joined together by soldering and insulated with heat shrink over join. Inserted 118mm below surface of floorboards (boards approx 25mm thick, then approx 30mm air then ice).

All installed thermocouples were photographed in position.

It was originally intended to place thermocouples 5 and 6 in the north west and south west verandas near the Living Hut footings. As these areas were filled with snow and ice (and therefore inaccessible), these thermocouples were instead placed in the north west and south west corners of the Living Hut and not in the adjacent veranda areas.

Limited amounts of thermocouple wire were supplied. All verandas fill with snow and ice in winter, making direct access through them difficult (except possibly in January and February). Obstacles inside the Main Hut (for example snow, ice, artefacts, building fabric) further restrict direct access. Three lengths of wire needed to be soldered together so that thermocouple 6 reached the datalogger.

TINY TAG ULTRA DATALOGGERS

Designed to monitor temperature and relative humidity.

Two Tiny Tag Ultra dataloggers were retrieved from the second shelf on the south wall (outside Mawson's Cubicle) of the Living Hut and from a shelf on the north wall of the Darkroom on 6/11/02. A third Tiny Tag Ultra datalogger was collected from a shelf in the north east corner of the Magnetograph hut on the 6/11/02.

Three new Tiny Tag Ultra data loggers were installed on 15/11/02 in the same locations:

- Logger 1 Living Hut - second shelf on southern wall (outside Mawson's Cubicle) at 13.43 (CD time);
- Logger 2 Darkroom - shelf on north wall, at 13.43 (CD time)
- Logger 3 Magnetograph Hut - shelf in north east corner at 21.12 (CD time).

The two Tiny Tag Ultra dataloggers left in the Main Hut were both placed in white cardboard trays. The Tiny Tag Ultra datalogger left in the Magnetograph Hut was placed under a perforated tin can to protect it from falling hoar frost.

The new Tiny Tag Ultra dataloggers were pre programmed to start reading on 16/11/02 at 15.00 (EST). New batteries had been inserted on 2/10/02.

BUILDING STABILITY

It was intended to monitor the stability of the Main Hut in strong winds and following partial snow and ice removal by a linear displacement sensor and two vibration sensors.

LINEAR DISPLACEMENT SENSOR

Designed to monitor vertical movement (lifting) of hut and will assist in justifying necessary tie down of the Hut.

The linear displacement sensor was not installed as insufficient cable (only 5 meters) was supplied. The sensor was designed to be fitted to the south east corner of the Main Hut, the side of maximum Hut movement. As the verandas surrounding the Hut were filled with snow, approximately 40 meters of cable was needed to run around the external walls of the building and back to the datalogger box in the south east corner of the Workshop.

It was originally intended that one end of the sensor would be attached to an exterior (veranda) wall and the other end fixed to the ground. However, the movement of the veranda walls does not reflect the movement of the Hut walls and data measured by the linear displacement sensor should not be used to justify tie down of the Hut (refer CA's report). The CA suggested that attaching one end of the sensor inside the hut to the south wall (either the south east or south west corner) would more accurately indicate the stability of the Hut. However, no suitable location was found where the displacement sensor could be adequately secured without damaging original building fabric.

VIBRATION SENSORS

Designed to monitor vibration of the roof as an indication of the stability of the building in strong winds and the impact of snow and ice removal.

Two Tiny Tag Plus vibration dataloggers were screwed to the ceiling cladding above the southern Living Hut skylight (the side of maximum movement) on 6/11/02 at 20.00 (EST). The sensors were installed before any substantial amount of snow was removed from either the Workshop or Living Hut.

During the expedition, a large quantity of snow and ice was removed from the Workshop and a smaller quantity of snow was removed from the south east and south west corners of the Living Hut.

The sensor attached above the western side of the skylight was removed at 13.30 hours (EST) on the 10/12/02 and given a sharp knock to register the time of removal. This sensor was returned to Vinod Daniel at the Australian Museum, Sydney. The second vibration sensor was left in place and will be returned to Australia by the next expedition.

BIOLOGICAL ACTIVITY

Biological activity inside the Main Hut and the Magnetograph Hut is being monitored with agar plates and paper and leather experimental samples.

AGAR PLATES, PAPER AND LEATHER EXPERIMENTAL SAMPLES

Samples to be analysed.

Agar plates and leather and paper experimental samples were collected from the following locations inside the Main Hut (on the 1/11/02) and Magnetograph Hut (on the 14/11/02):

- **MH1** Ice free lower shelf, outer northern wall, Mawson's Cubicle;
- **MH2** Ice free lower shelf adjacent to the developing tank, Darkroom;
- **MH3** Ice free shelf on outer northern wall of Mawson's cubicle;
- **MH4** Shelf above upper bunk (CL 1912), east wall, Living Hut;
- **MH5** Shelf above upper bunk immediately outside Darkroom, west wall, LivingHut. Note samples covered by snow;
- **MH6** Centre of Workshop. Note: all samples covered by snow;
- **MH7** Ice enclosed shelf on southern wall of the Workshop. Note: paper sample - the blue printed lines in the centre of the top two pages had lost definition;
- **MH8** Ice free shelf in north eastern corner of the Magnetograph Hut.

To prevent contamination of the agar plates, they were sealed and removed before any other work was done inside the Huts. Samples were collected from the Workshop and sealed before entering the Living Hut.

Dust masks and nitrile gloves were worn while collecting samples. Glass lids were replaced over each agar plate and the join between the lid and plate sealed with the plastic adhesive tape supplied (the tape was extremely brittle and had little stickiness at the cold temperatures inside the hut). The plate location was written in black felt tip marker on the outside of each agar plate. Each agar plate was sealed in a zip lock bag and all plates were then placed together inside a large zip lock bag.

Leather samples were individually wrapped in the un-buffered acid free tissue supplied and paper samples individually wrapped in the buffered acid free tissue supplied. Samples were returned to the Sorenson Hut and immediately prepared for RTA. All wrapped leather and paper samples were individually sealed in zip lock plastic bags. To maintain a dry environment, a small amount of blue silica gel was added to each bag. Samples were regularly checked during the expedition and any silica gel that had turned pink was replaced with blue silica gel. The pink silica gel (indicates moisture absorption) was regenerated by heating in the oven until the blue colour returned.

Small isolated spots of white mould were observed on the part of all agar plates exposed to air. No mould was observed on the part of the plate protected by the lid. No mould was visible on any of the leather or paper samples.

All samples were returned to the Australian Antarctic Division and collected by Dr. Ian Godfrey of the Western Australian Maritime Museum in January 2003.

Replacement agar plates, leather and paper samples were installed in similar locations at the end of the 2002 expedition, just before the buildings were sealed for the final time. Samples were installed in Magnetograph Hut on 10/12/02 and in Main Hut on 14/12/02.

All agar plates were inspected prior to installation to ensure they remained sterile. A dust mask and nitrile gloves were worn during installation to prevent contamination. The lid of each agar plate was slid off to expose approximately half of the lower plate (with the lid resting on the lower plate). After placing samples in the Living Hut, the door between the Living Hut and Workshop was sealed before Workshop samples were exposed. When all samples were in position, the inner Workshop veranda door was sealed.

New sample identifying numbers and locations are as follows:

- **MH1A** (agar plate, leather and paper sample) Ice free lower shelf, outer northern wall, Mawson's Cubicle;
- **MH2A** (agar plate, leather and paper sample) Ice free lower shelf, eastern end of north wall, Darkroom;
- **MH3A** (agar plate, leather and paper sample) Ice free shelf (2nd from top) on outer northern wall of Mawson's Cubicle;
- **MH4A** (agar plate, leather and paper sample) Shelf above upper bunk (CL 1912), centre of east wall, Living Hut;
- **MH5A** (agar plate and paper), **C2A** (leather) Shelf above upper bunk (JFH 1912), immediately outside Darkroom, west wall, Living Hut;
- **MH6A** (agar plate, leather and paper sample) Ice platform approximately 300mm above vice, western side of Workshop;
- **MH7A** (agar plate, leather and paper sample) Ice enclosed lower shelf on southern wall of the Workshop;
- **MH8** (agar plate, leather and paper sample)???Ice free shelf in north eastern corner of the Magnetograph Hut;
- **MH9A** (leather and paper), agar plate. Ice platform approximately 1.2m above floor level, northern side of Workshop;
- **MH10A** (leather and paper), agar plate. 1m above floor level, on datalogger box, south east corner of Workshop;
- **C1A** (agar plate, leather, paper) Shelf above upper bunk (JFH 1912), centre of west wall, Living Hut;
- **C2A** (agar plate, paper) On plastic on ice platform approximately 2m below ceiling, Kitchen area, northern wall, Living Hut;
- Agar Plate 400mm above floor level on plastic on ice surface in centre of Workshop.

CORROSIVITY

Corrosion coupons, wet candles and snow and ice samples, were installed to monitor the corrosivity of the internal and external environment of the Main Hut and the Magnetograph Hut.

CORROSION COUPONS

Check collection and installation dates

Corrosion monitoring CLIMAT bolts and copper steel coupons were collected from various internal and external locations in the Main Hut and the Magnetograph Hut at the start of the expedition (before people and work inside the huts influenced the extent and composition of corrosion on the coupons). The coupons on a shelf on the west wall of the Living Hut and in the centre of the Workshop were found buried under snow and the bolts were covered with dark orange corrosion.

To minimise post removal changes, coupons were handled by their perspex base wearing nitrile gloves. As soon as possible after collection, coupons were heated (in the Sorenson Hut oven) to approximately 90C for 2 hours. Coupons were then placed in individual calico bag inside a zip lock bag containing blue silica gel. All samples were then placed in a large zip lock bag containing blue silica gel.

Corrosion coupons were forwarded to the Aeronautical and Maritime Research Laboratory, Defence Science and Technology Organisation, 506 Lorimer St, Fisherman's Bend VICTORIA 3207 for analysis

New corrosion coupons were installed externally on a purpose built frame previously erected on the north facing Workshop roof and on the automatic weather station on Anemometer Hill on 16/11/02. A corrosion coupon was placed in the Magnetograph hut on 2/12/02 (following completion of other work inside the Main Hut) and seven corrosion coupons were placed in the Main Hut on 14/12/02 (following completion of other work inside the Magnetograph Hut).

- **CC2701** Attached to automatic weather station on Anemometer Hill (Faint orange brown on edges of flat plate and flat surface of top bolt);
- **CC2702** Attached to a purpose built frame previously erected on the north facing Workshop roof;
- **CC2703** Ice free lower shelf, outer northern wall, Mawson's Cubicle (Digital photo 4486-7, CD #Photos).
- **CC2704** Ice free lower shelf, eastern end of north wall, Darkroom (Digital photo 4485, CD #Photos).
- **CC2705** Ice free shelf (2nd from top) on outer northern wall of Mawson's Cubicle (Digital photo 4488, CD #Photos).
- **CC2706** Shelf above upper bunk (CL 1912), centre of east wall, Living Hut (Digital photo 4489, CD #Photos).
- **CC2707** Shelf above upper bunk (JFH 1912), immediately outside Darkroom, west wall, Living Hut (Digital photo 4490, CD #Photos).
- **CC2708** Ice platform approximately 300mm above vice, western side of Workshop. Note: corrosion coupon damaged prior to installation and one plastic bolt sheared into two parts. (Digital photo 4495, CD #Photos).
- **CC2709** Ice enclosed lower shelf on southern wall of the Workshop. (Digital photo 4494, CD #Photos).
- **CC2710** Ice free shelf in north east corner of the Magnetograph Hut.

WET CANDLES

Designed to measure internal and external levels of atmospheric salt as an indication of the corrosivity of the environment.

Three wet candles were installed at the beginning of the expedition; one in the Workshop, one in the Living Hut and one outside, near the south west corner of the Main Hut.

The CSIRO produced wet candle consists of a polypropylene screw top bottle filled with a glycerol solution and containing gauze covered stainless steel wick support. The candles were installed by inverting the wicks, exposing them to the atmosphere and letting the gauze strips dangle in the glycerol solutions. Nitrile gloves were worn to prevent contamination when handling the wicks. Plywood housing was constructed to support and protect the candle exposed in the south west corner of the Main Hut veranda. This housing was designed so it could be clamped to the veranda window without permanently damaging the wooden building fabric.

(Note: a previously constructed housing supposedly stored in the Granholm Hut was not found. These supports are time consuming to construct and their storage location should be carefully recorded so they can be reused by future expeditions.)

The three wet candles were installed as follows:

- 12/11/02, below A McL 1912 bunk, west wall, inside Living Hut;
- 12/11/02, on ice shelf, north wall inside Workshop;
- 13/11/02, in veranda window, near the south west corner of Living Hut.

All exposed wet candles were photographed in situ.

All three wet candles were collected on 10/12/02 by re-inverting the wicks, replacing the flat plastic covers (rinsed with methylated spirits) and screwing the retainer caps on tightly. The candles were returned to Ian Godfrey, West Australian Maritime Museum for analysis.

The external candle housing was dismantled, clearly labelled and stored in the Granholm Hut.

SNOW AND ICE SAMPLES

Collected for conductivity and chloride content determinations, as an indication of the corrosivity of the internal and external environment.

Snow and ice samples were collected from various places inside and outside the Main Hut for conductivity and chloride content determinations. Four samples of coloured (brown and purple) snow were also collected from inside the hut. No examples of aromatic snow were discovered.

Where possible, samples were collected by pushing a clean plastic sample bottle into the snow. In some instances however, a drill, chainsaw, cold chisel or brush was used to collect the sample. All equipment was wiped between uses to avoid contaminating samples with snow from another sample. Contact with skin was avoided by wearing nitrile gloves when collecting samples.

The samples were stored in screw topped polythene bottles. Tape was wound around the outside of lids to prevent evaporation and subsequent increased concentration of salts. The location, depth, date collected was recorded for all samples.

Ice sample 1

Living Hut - interior northwest corner, above stove

Collected 6/11/02, 350 mm below top edge of ice bulb.

Ice sample 2

Living Hut - interior SE corner above SE bunks

Collected 6/11/02, 300 mm below top of ice bulb.

Ice sample 3

Living Hut – interior SE corner

Collected 6/11/02, level with Mawson's ceiling, 900mm below top of ice bulb.

Ice sample 4

Living Hut – interior SE corner

Collected 6/11/02, 1700mm below top of south eastern ice bulb.

Ice sample 5

Living hut – interior northwest corner

Collected 6/11/02, 1350mm from top of ice bulb.

Ice sample 6**Living Hut – interior northwest corner**

Collected 6/11/02, 2150mm from top of ice bulb, northwest corner.

Ice sample 7**Workshop – interior south east corner**

Collected 26/11/02, 300mm above floor level (approximately 1978 excavated level) – brown stained ice

Ice sample 8**Workshop – interior south east corner**

Collected 26/11/02, 1000mm above floor level – icy snow

Ice sample 9**Workshop – interior, under eastern skylight**

Collected 26/11/02, approximately 300mm above floor level under eastern skylight – brown coloured ice

Ice sample 10**Main Hut – exterior northwest footing near latrine**

Collected 6/11/02, from 1000mm northwest of intersection of Living Hut and Workshop and 300mm below level of toilet floor.

Ice sample 11**Workshop – exterior, northwest footing**

Collected 6/11/02, 2400mm east and 300mm north of northwest corner of Workshop.

Ice sample 12**Workshop – exterior north east corner**

Collected 6/11/02, 400mm due north of north east corner of Workshop.

Ice sample 13**Workshop verandah – west side above meat cellar**

Collected 20/11/02, from excavated area above black plastic (placed over trapdoor to meat cellar by 2000/2002 expedition).

Ice sample 14**Mawson's cubicle – bunk**

Collected 24/11/02 from snow deposited on Mawson's bunk (deposited post Jan 2002 when bunk cleared of snow by Ian Godfrey)

Ice sample 15**Workshop - interior, southern end of workbench, west wall**

Collected 29/11/02 from orange stained ice, above the surface of the workbench, approximately 64 cm from the southern end of the workbench on the west wall of the Workshop.

Ice sample 16**Workshop - interior, southern end of workbench, west wall**

Collected 29/11/02 from purple stained ice, above the surface of the workbench, approximately 50 cm from the southern end of the workbench on the west wall of the Workshop.

Ice sample 17

Workshop – interior, eastern skylight

Collected 6/11/02 from ice under the eastern skylight.

Ice sample 18

Living Hut – exterior, south east corner

Collected 9/12/02 from 10cm below the surface of fresh (undisturbed) snow, approximately 2m south east of the corner of the Living Hut.

Ice sample 19

Living Hut – exterior, south west corner

Collected 9/12/02 from 10cm below the surface of fresh (undisturbed) snow, approximately 3m south west of the corner of the Living Hut.

Samples were returned to Ian Godfrey at the West Australian Maritime Museum for analysis.

BUILDING PROGRAM

CONDITION OF BUILDINGS

The condition of the Main Hut, Magnetograph Hut, Magnetic Absolute Hut, Transit Hut, Memorial Cross, Proclamation Plaque and the stake at the apex of the Main Hut were visually examined and photographed (Appendix A). Moisture profiles (Appendix B) and thickness measurements (Appendix C) were determined.

EXTERIOR WOODEN CLADDING

The exterior cladding provides a physical barrier to snow ingress, contributes to the structural stability of the buildings (refer CA) and significantly influences the aesthetic values of Mawson's Huts. To assess its effectiveness, the following characteristics were visually assessed (refer Appendix B):

- location;
- intactness;
- surface colour;
- erosion;
- corrosion;
- surface texture;
- staining – metal, mould, melt water;
- shrinkage;
- residual material under battens;
- condition and type of metal fastenings.

The exterior cladding was originally intended to provide an intact, impermeable barrier to snow. Drift snow penetrates the smallest openings and historical records indicate that even the 1911AAE had difficulty keeping snow out of the Main Hut. Substantial amounts of drift snow continue to penetrate the exterior cladding, filling the roof and wall cavities and entering the living spaces through gaps in the interior cladding.

Wooden cladding covers most exterior walls of the Main Hut and Magnetograph Hut, although there is some loss from the southern end of the west veranda and the northern end of the west Workshop veranda. Most boards remain securely fastened.

Snow appears to enter the roof cavities along the ridge cappings, around skylights and through gaps within and between boards. The tar paper lining in the Main Hut is fragmentary and ineffective in preventing snow passing from the roof cavity into the interior spaces. The tar paper lining the interior of the Magnetograph Hut remains substantially intact.

CONDITION OF IRON FITTINGS AND FASTENERS

Iron fastenings and fixings deteriorated rapidly following extraction from wooden building fabric and from snow and ice showing weeping corrosion and flaking of surface.

'U' bolts extracted from ice showed weeping within 2 days of being re-installed. Weeping concentrated in areas of stress, that is at top of 'U' and to a lesser extent on nuts. Re-installation coincided with increase in external temperatures and dripping water inside hut and increase humidity inside. 'U' bolts removed, surface slightly pitted and very small corrosion flake breaking away from surface. No evidence of weeping. Cracks and delamination in bend areas visible in 2 bolts. Nuts seized by corrosion. 2 slightly distorted sides, damaged as collar ties collapsed. surface wire brushed to remove loose surface and immersed in WD 40 to loosen nuts. Within a few days all reinstalled bolts show beads of orange brown liquid on surface. This acidic chloride rich solution indicative of active corrosion. Observed on surface of bolts and fittings removed in 1997 and stored on platform in LH

Bolts, nuts and washers removed during building repairs to the Workshop Oct-Dec 2002

Surface has a thin layer of red brown corrosion. Powdery orange brown rust covers some shaft surfaces. Shafts generally of fairly uniform thickness, although one the shaft diameter of one bolt is considerably reduced approx 10mm below the bolt head. Soft concretion (corrosion, wood fibres and soil) are present on the shafts and under the heads of some bolts. Thick corrosion flakes have broken off the surface of the domed head of two bolts and flakes are breaking away from some nuts. The exposed surface is covered with a thin, red, crystalline corrosion material. Very small droplets of orange liquid have formed on the thread, nuts and under the heads of two bolts since they were removed from wood and ice.

The shafts of some of the bolts and nails were twisted when removed from the building fabric, however only one nail snapped (just under the head). Broken nails in the reference collection were deliberately cut to facilitate removal from timber.

SNOW INGRESS

The continuing ingress of snow into the Main Hut emphasises the need for regular building maintenance. The 2002 AAD expedition identified where snow was entering the interior of the Main Hut and made repairs necessary to block further ingress at these areas. However, given the deterioration of the building fabric and exposure to extreme winds, it is most likely new entry points will continually appear.

The 2002 expedition observed fresh snow in the:

- Workshop;
- Living Hut platform above Mawson's Cubicle and overhanging the eastern side;
- Mawson's Cubicle;

- Living Hut, south west corner;
- Living Hut, on bunk at northern end of west wall;
- Living Hut, northwest corner.

To monitor the effectiveness of past attempts to seal the Main Hut, black plastic sheeting had been left in the centre of the Workshop and on a platform above Mawson's Cubicle by the 2000/2001 AAP Mawson's Huts Expedition. Although these sheets were clear of snow in Jan 2002 (refer I Godfrey report), by October 2002 a substantial amount of snow had collected on both sheets.

The AAD 2002 expedition removed and weighed (using a spring balance) fresh snow that had collected on these sheets and in Mawson's cubicle.

Workshop Platform

A considerable amount of snow had entered the Workshop, extending from the north east corner to the eastern skylight and into the centre of the room. The lid of the Campbell Scientific datalogger box in the centre of the Workshop was covered with a 90mm layer of snow. Only snow that had collected on the plastic sheet, measuring 900 x 1300mm and lying 1440 from the west wall and 2800 from the south wall, was weighed.

<i>Weight of snow removed (2/11/02)</i>	52.5Kg
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Platform above Mawson's Cubicle, Living Hut

A considerable amount of snow had entered the Living Hut through the southern skylight, covering the entire platform above Mawson's Cubicle, including the black plastic sheet.

Snow was carefully removed from the black plastic sheeting on 2/11/02. The entire platform was later cleared of snow to carry out repairs to the southern skylight to stop further ingress (refer CA's report).

<i>Weight of snow removed from black plastic sheeting (2/11/02)</i>	80.4Kg
<i>Weight of additional snow removed from platform (26/11/02)</i>	<u>62.25Kg</u>
Total snow removed	142.65Kg

Mawson's Cubicle

Mawson's Cubicle was emptied of fresh snow in January, 2002. By October, 2002, the room had partly refilled with snow, entering from the south east corner and cascading over the corner shelves and onto the floor in front of the bed. Additional snow collected on the shelves above Mawson's bunk after a mild two day blizzard.

<i>Weight of snow removed (check date)</i>	75.65Kg
<i>Weight of snow removed (3/12/02)</i>	17.45 Kg
<i>Weight of snow ingress after a two day blizzard (9/12/02)</i>	14.25gKg
Total snow removed	107.35Kg

SNOW DRIFT PROFILES

The north, east, south and west face of all buildings (Main Hut, Magnetograph Hut, Transit Hut and Magnetic Absolute Hut) were photographed in early November before a substantial amount of snow ablation had occurred. Two metre ranging poles (500mm divisions) were used as a scale in all

photos. Due to the strong wind and hard icy ground, the poles had to be hand held in photographs (ie documentation required two people). The photographs record the extent of snow cover and amount of wind scour around the buildings in early November 2002.

MELT WATER PROFILES

The snow around the Main Hut remained frozen throughout November and early December. Snow first began to melt around the Main Hut on the 8th December, forming small melt pools on the eastern and western sides of the Hut. Scale photographs of all sides of the Main Hut were taken on the 9/12/02 to document the extent and location of the melt pools and visible tide marks on the exterior cladding.

The photographs show that during summer, water accumulates against the east side of the Main Hut and many hut timbers are in contact with melt water. Melt pools did not form against the north, south and west sides, although two previously frozen pools melted a short distance from the west side of the Main Hut. Submerged artefacts were observed in all melt pools.

<i>Melt pool Location (9/12/02)</i>	<i>Size (cm)</i>
80cm west of Main Hut at northern end	190 (wide) x 250 (long)
? west of Main Hut at southern end	190 (wide) x 490 (long)
Centre of east wall (between 34-49 from southern end)	120 long
Under north east corner of Workshop veranda	Not recorded

Tide Line Location (9/2/02)

East wall - tide marks visible on most boards at the southern end, approximately 10-30cm above the level of snow and water. Snow and rock cover the base of most boards, except those in the centre of the wall (34 – 49) which are in blubber/water and the 15 boards at the northern end which are in air.

Eastern end of south wall (4 boards) - faint tide mark above snow line. The base of the two eastern board rest in water. The lower 50cm of the boards are a grey colour.

Western end of south wall (9 boards) – faint tide line above snow cover. Boards are a grey colour below tide line. Snow still covers most of south wall.

Northern end of the west wall (36 boards) - jagged tide line extended between 0-25mm above the base of the cladding boards. Below the tide line, the boards are a dull grey colour.

Western end of south roof (boards 31 – 54) - jagged tide line extends approximately 0-80cm from the roof edge.

DEFIBRING UNDER TARRED GALVANISED METAL

Not located

TIMBER LOSS AROUND A CIRCULAR METAL CHANNEL ON NORTHERN PLANE OF LIVING HUT ROOF

To complete

Circular outline made by a loose batten (since lost) rotating around an iron nail. The nail protrudes 6mm above the wooden cladding. The circular impression extends over 2 cladding boards (boards 17-18 from the eastern end).

Impression is not visible as a continuous circle - most distinct at the top and bottom, not evident on eastern and western sides

Shallow depression, approx 2mm wide with rounded sides

Colour –?

TIMBER THICKNESS

The exterior timber cladding provides a protective barrier against the strong and very abrasive winds at Cape Denison. To provide some indication of the integrity of this barrier, the thickness of wood at selected points on the Main Hut, the stake on the apex of the Main Hut, Absolute Magnetic Hut, Proclamation Board and Memorial Plaque were measured. Many of these timbers had previously been measured in Jan 2001.

Result recorded in appendix

MOISTURE CONTENT PROFILING

The moisture contents of a selection of Main Hut, Magnetograph Hut, Absolute Magnetic Hut timbers were determined in early November and repeated in December 2002, using a Protimeter Mini C moisture meter (refer Appendix B). Moisture content had previously been determined at similar locations in January 2001.

The November readings were determined before snow began to melt. December readings were taken while snow was melting in roof and wall cavities and on the ground, and pools had begun to form against the east wall of the Main Hut.

The results show a steady increase in moisture content (for nearly all timbers) between November and January that corresponds to warmer ambient temperatures and increasing melt. As a rough guide, moisture contents increased approximately 2-5% each month between November and January.

Exterior timbers have significantly lower moisture contents than interior timbers – drying effect of the wind and sun and reduced humidity of the air.

<i>Main Hut (interior)</i>	<i>Moisture content (%)</i>		
	3/11/02	8/12/02	1/01
East wall	17-20	22-28	22-32
South wall	17-19	20-28	25-28
West wall	19-20	20-23	23-25
East ceiling	Not recorded	Not recorded	23-28
Outer walls Mawson's cubicle	19-20	23-28	23-28
Darkroom east wall	19-26	18-40+	23-50
<i>Main Hut (exterior)</i>			
	3/11/02	8/12/02	1/01
East veranda	6-9	6-20	8-9
South veranda	11-12	12-14	14-15
West veranda	6-8	6-9	8-11
North Workshop wall	6	6	8-9
<i>Magnetograph Hut (interior)</i>			
Stable door 1		17	20-25
Stable door 2		20	20-23
Stable door 3		20-26	20-23
Inner porch		17	22-23
East wall		17-23	19-28
South wall		20-26	22-60+
West wall		19-22	22-23

North wall	17-26	17-60+
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Absolute Magnetic Hut

East wall	6	9-17
South wall	6-11	11-17
West wall	6	6-8

Wet timbers (those in contact with melt water) recorded moisture contents up to and exceeding 60%.

Interior battens along the top of the north wall of the Magnetograph Hut recorded moisture contents in range 28-35% in December 2002. This is significantly greater than recorded in Jan 2001. No evidence of snow ingress into the Magnetograph Hut.

Interior timbers against east wall higher moisture content in Dec and Jan as base of boards in contact with water and not dried by sun.

Moisture readings of exterior timbers on the south wall of the Main Hut were slightly higher than for other walls. This probably caused by melting of drift snow resulting in damp timbers shaded from direct sunlight.

COLLECTION MANAGEMENT

ARTEFACT DOCUMENTATION

The materials conservator and the archaeologist work together to describe, photograph, locate and condition report artefacts inside and outside the Main Hut. Priority was given to documenting selected artefacts in the scatter north of the Main Hut, seal caches distributed throughout Cape Denison, artefacts in Mason's cubicle and Hurley's darkroom. A detailed inventory was completed of the exposed artefacts in the Living Hut.

CONDITION OF ARTEFACTS

Bone

Variety of sheep, seal, penguins, and possibly dog. Many of the penguin bones are probably not related to Mawson artefacts (no evidence of cut marks, use).

Some bones complete, many incomplete and fragmentary and unable to be identified.

All bones sun-bleached a brilliant white.

Green algal stains on bones in contact with artefact soil.

Most bones fully exposed but some still partly buried in snow.

Some bones show distinct cut marks.

Surface of many bones partly eroded, exposing cancellous tissue

Ligaments and other soft tissue remain on some bones – light yellow, stiff inflexible.

Iron artefacts

Surface generally smooth and slightly iridescent

Dark reddish brown uniform colour, dotted with small areas of bright orange (1-3mm diam)

Small corroded flakes breaking away from surfaces (2-5mm)

Many artefacts distorted - missing areas with brittle, jagged edges. Some tins only remain as corroded base or top open rings

No remains of tinning visible on cans.

Wooden artefacts

Iron fittings

Surface has a thin red brown corrosion layer with a solid metal core. Powdery orange brown rust covers some shaft surfaces. Shafts generally of fairly uniform thickness, although the shaft diameter of one bolt is considerably reduced approx 10mm below the bolt head. Soft concretion (corrosion, wood fibres and soil) are present on the shafts and under the heads of some bolts. Thick corrosion flakes have broken off the surface of the domed head of two bolts and flakes are breaking away from some nuts. The exposed surface is covered with a thin, red, crystalline corrosion material. Very small droplets of orange liquid have formed on the thread, nuts and under the heads of two bolts since they were removed from wood and ice.

The shafts of some of the bolts and nails were twisted when removed from the building fabric, however only one nail snapped (just under the head). Broken nails in the reference collection were deliberately cut to facilitate removal from timber.

Wood surrounding in situ fixtures stained concentric oval shaped rings with greatest along wood grain. Orange coloured next to metal gradually becoming grey outer ring.

Shelf brackets

Remnants of black enamelled surface – variable amount left.

Many distorted and broken due to weight of overlying snow.

Severe delamination

Orange brown crystalline powdery surface. Some active weeping

Tin cans

Variable condition, some good, some less so, depends on contents, moisture etc. Tin cans in Hurley's darkroom very poor. And many completely eaten through – possibly contents or locally higher humidity as result of small confined space (check T/RH sensors) and some weeping in this room. No detectable parts of hut worse.

tinned surface broken with powdery crystalline orange brown small spots in places becoming continuous reddish brown surface. Rims, particularly base generally most corroded – continuous. Where tin open and inside visible, gen heavier corrosion inside. Small flakes often cover shelves around tins.

Copper alloy artefacts

Inside – brown patina interrupted to varying extent with smooth, powdery bright aqua green blue corrosion. When copper alloy artefacts covered with hoar frost, the surrounding ice is stained and impregnated with green corrosion.

Wood

Excellent condition, dimensionally stable and little shrinkage and separation between boards.

Stained by metals, particularly iron stains (refer above).

Mould visible only areas with locally high humidity (eg Hurley's bunk, Hurley's darkroom above sink, inside entrance W doorway) and where paper tape sealed over joins. Generally grey to vivid black,, mostly staining, some rased bits??

Smoke etc darkened grubby surface, as indicated by lighter areas which originally protected and hidden by tape.

Structural strength not assessed.

Paper

Generally okay, limp. Some mould stained and some have small spots of powdery black mould. depending on location.

CONSERVATION

Rex

Detailed description and condition previously recorded. Compared with, seems little changed, mould extensive but not worse as present when removed from plateau. Smell not thought to be attributable to active rot – doctors assessment. No sign of thaw inside box Not rewrapped in bubble pack as damage likely to be cause bone fragments caught in plastic when unwrapping when unwrapping etc as plastic catches in claws etc. Sat on a bed of bubble wrap
No sign of thaw inside box.

Tail Plane

Soft snow on south side

Tail Plane – North side hard ice, south side less compacted softer snow. Large areas of ice sawn away using chainsaws (mark on frame on north side). Cold chisels used to approximately define the extent of the frame and to chip away ice to within 1-5cm of the canvas. Comment – hard ice frozen to and supported by fragile canvas – great care required, can't be quick as risk tearing canvas. Requires understanding and patience of all concerned as slows down ice removal. Heat gun set on low heat and used approx 20cm away and continually moved used in combination with cold chisels to soften and chip ice – two people one to operate hot gun and support canvas as nec and one to chip and remove ice (without melting too much). Archaeologist did not consider variable speed grinders appropriate given the extreme delicacy of the canvas. Heat gun quickest and safest means available although extreme care as easy to burn fabric and concern at wetness

STORAGE OF OUT-OF-CONTEXT ARTEFACTS

Ice removal by the 2002 expedition and by previous expeditions has exposed a large number of 'out of context' artefacts. Future ice removal will yield even more 'out of context' artefacts that cannot be returned to their original location (in many cases the original location was destroyed during ice removal). Photographic and other evidence indicates that many artefacts inside the Main Hut have been moved, possibly by past expeditions and visitors to the Hut, and are no longer in their original location (that is 'in context').

'Out of context' artefacts excavated by previous expeditions were scattered throughout the Main Hut. Many of these artefacts had become frozen in ice (for example, artefacts stored on bunks on the west wall of the Living Hut, in plastic containers in the south east corner of the Workshop and under the lower bunks in the south east corner of the Living Hut). Frequently artefact labels had been lost or become illegible. A variety of storage containers had been used, contributing to the untidy and confusing impression inside the hut.

To consolidate artefact storage, all freshly excavated 'out of context' artefacts and many previously excavated 'out of context' artefacts were relocated to a temporary storage area in the south east corner of the Workshop. This area appears to be free of drift snow, is the coldest part of the Workshop and is visually unobtrusive (it is partly hidden behind the door leading into the Living Hut). Unfortunately, time did not permit the relocation of all 'out of context' artefacts stored by previous expeditions to this area.

The following 'out of context' artefacts are presently stored inside the Main Hut:

- Rex, a freeze dried husky, collected from the plateau in 1997/98 - stored in a large pine crate buried in ice in the south east corner of the Workshop;
- artefacts exposed by the 1985/86 Project Blizzard excavation (to install Acrow props in the Living Hut) - stored in a covered black plastic bin in south east corner of Workshop (previously stored in plastic bags and boxes on bunks on the western side of the Living Hut and south east corner of the Workshop. This material was completely frozen in hard ice when we arrived in October 2002);
- miscellaneous organic and metal artefacts liberated from ice in Workshop and Living Hut by 2002 expedition – stored in covered black plastic bin in south east corner of Workshop;
- large tin and acetylene tubing excavated by 2002 expedition in the Workshop - stored in covered black plastic bin in the south east corner of the Workshop;
- kerosene tin collected from the plateau in 1997/98- stored in wooden AAD crate in south east corner of the Workshop;
- air tractor tail excavated by 2002 expedition - stored on a specially prepared wooden framed string support on collar ties below the west skylight in the Workshop.
- artefacts exposed by the 1978 Workshop excavation - stored in large wooden boxes (including large pine box) under the west workbench in the Workshop. Only three boxes are partially visible although other boxes may be buried under snow.
- artefacts excavated from the Living Hut platform in 1997/98 - stored on labelled mylar sheets under the eastern bunks in the Living Hut. This material is now partly frozen in hard ice.
- metal building fixings replaced during the 1997/98 expedition - individually labelled and stored on the shelf adjacent to the acetylene plant. This material is actively corroding.?????

'Out of context' artefacts excavated during the 2002 expedition and 1985/86 Project Blizzard expedition were freed of ice, labelled (brown cardboard labels found in the Granholm Hut) and stored in covered black plastic bins (reused food bins).

Ice was removed from artefacts using a combination of percussion and natural freeze drying techniques. On calm days, the artefacts were placed outside in plastic containers or on black foam sleeping mats for the snow to melt and ablate. Artefacts were stored dry.

Fragmentary artefacts were placed with a label in brown paper bags or zip-lock plastic bags. Ideally labels should be made from an inert material that remains flexible in freezing temperatures and is easy to remove from ice (cardboard sticks to ice). Permanent, non fade and non bleeding pens should be used for writing.

Although the Artefact Implementation Guidelines state that 'out of context' artefacts and replaced building fabric should be clearly labelled and stored in the building from which it is removed, this is neither practical nor appropriate in the long term. The policy of using the hut as a dedicated storage space seems at odds with the plan to open the hut to visitors. The presence of large quantities of stored artefacts and building debris obscures significant fabric and spaces inside the hut and diminishes visitor experience and understanding of the hut as a living space. According to the CMP, the building material can not be (and generally could not be) reused.

Eventually, 'out of context' artefacts should either be removed to a dedicated storage area outside the Hut (either at Cape Dennison or in Australia) or reinstalled in an appropriate, visually accessible setting inside the hut.

It would be inappropriate to move 'out of context' artefacts from other historic buildings, including tin cans and stove parts in the Magnetograph Hut, into the Main Hut for storage. The clothing in the Magnetograph Hut is in its original location and should remain in situ.

REFERENCE COLLECTION

Shattered collar ties and a large amount of failed tar paper were collected during the 2002 season. This material was all recorded in situ prior to commencement of excavation and restoration work. A substantial amount of replaced building fabric from previous expeditions, including the collar ties replaced during the 1997/98 season, was stored in or under the Granholm Hut. Although clearly labelled at the time, most labels had been lost or become illegible and therefore the context was no longer certain.

Replaced building materials from all expeditions and representative samples of lining (including tar paper), insulation, fittings, wooden building materials and wooden battens were assembled and (following approval from the AAD) returned to Australia for assessment. It is proposed to form a reference collection of building materials at the AAD for research and the preparation of future expeditions. Returned material not required should be disposed of as the AAD sees fit. Appendix D lists items returned to Australia for assessment.

APPENDIX A CONDITION OF BUILDINGS AND STRUCTURES

PROCLAMATION PLAQUE

Description

The proclamation plaque is attached to the base of a metal pole located east of the automatic weather station near the top of Anemometer Hill and southeast of the Main Hut. The rectangular plaque is secured against the north side of the pole with ferrous wire threaded through the centre top and bottom of the plaque. Rocks partly cover the south side. Wood grain runs horizontally. Letters (partly hidden by pole and rocks) carved on southern side read: 'CO BY CLS HUSTER ACT: 1986'

Condition

The north surface of the board is a uniform grey colour and all lettering is distinct with sharp edges. The southern side is a golden colour with white streaks towards the base.

The thickness of the board increases towards the bottom edge, which is protected to a greater extent from the abrasive, south (katabatic) winds.

Faint brown metal staining extends along the wood grain both sides of the metal wire. Water staining of top 2 cm of west side.

Wood split top west corner and extends for 5cm along top edge and down west side. Fine cracks extend inwards from the east and west edges. Larger cracks extend from the eastern edge to the 'r' of British and from the western side to the 'y' in Sovereignty.

Slight corrosion present on top edge. Wind eroded top west and east edges. Wind eroded scar above the rock on west edge.

Moisture contents of the north and south sides were 6% or less.

Thickness measurements

Thickness measurements – eastern side from top to bottom

Top edge (10mm below)	21.17mm
Middle	22.37mm
Lower (20mm above)	23.18mm

Thickness measurements – western side from top to bottom

40 mm below top edge	22.78mm
Middle	22.87mm
Depression upper edge	23.41
In depression	20.80

Thickness measurements – top edge behind pole 22.52mm

MEMORIAL CROSS

The memorial cross is located near the crest of the rocky ridge on the western side of the Main Hut. The commanding location exposes the cross to abrasive windborne particles carried by the prevailing katabatic winds.

The cross is presently structurally sound in its rock foundations and the join between beam and post.

Description

The memorial cross is constructed from two large wooden pieces (post and beam) and metal bolts and brackets. The post is embedded in rock and protected by a rock cairn near its base. The crossbeam was re-erected in 1997 with new metal bolts and brackets. An original bolthole in the centre of the post and crossbeam was not reused.

The replica plaque consists of three individual wooden boards bolted together at all four corners. The grain runs horizontally in the outside boards and vertically in the middle board. The plaque is bolted to the northern face of the cross with two metal bolts. The bolts pass through the cross post and the two southern most boards of the plaque.

Condition

The ridged west, south and east surfaces of the cross indicate corrosion by windborne ice particles. Corrosion is particularly severe on the south east corner of the post and under and on the south facing side of the crossbeam. The north east and northwest corners of the post, immediately above the plaque are corroded and have been hollowed out (approximately 30 x 30mm each side) by the wind (photo CD1 122-2291). Very little corrosion is evident near the ground, where rocks protect wood surfaces from abrasive wind. The replica plaque exhibits minimal corrosion.

Abrasive winds have significantly reduced the thickness of the wooden cross and the south facing board of the replica plaque. Where wood is covered by metal fittings (for example iron brackets cover the ends of the cross beam), it has nearly retained its original shape and thickness (photo CD1 122). For example, the wood is approximately 10-22mm thicker where the upper bolt attaches the plaque to the post. The lower bolt is not raised above the surrounding wood as the rock cairn and snow protects it from abrasive winds. The corners of all the cross timbers are rounded, except near the base of the post which is protected by rocks and also snow for much of the year. The southern face of the plaque has worn very thin, except where it is protected from the wind by the post, the rock cairn, snow and the metal bolts (photo CD1: 122-2294). The northern face of the plaque exhibits little loss of surface and the edges of the letters remain sharp.

Timber thickness measurements of the replica plaque were taken to indicate the abrasive nature of the wind and assess the rate of timber loss. These measurements repeated measurements taken during the AAP Mawson's Huts Expedition 2000/2001. Timber thickness measurements are listed in Appendix C. The length of the north side of the cross in contact with the plaque is 10.94cm

Severely corroded wooden surfaces are a rich golden brown colour, indicating recent surface loss. The northern side of the cross and plaque has oxidised to a bleached grey colour. A white material, probably salt, is present on the western, southern and eastern sides. The lower western and eastern sides of the plaque are a darker brown colour, possibly water stained by melting snow and through contact with wet rocks (photos CD: 122-2289, 122-2295).

Longitudinal cracks are present on the north face of the plaque, originating from the western and eastern edges. (oxidation progressively results in decomposition of lignin causing staining and longitudinal cracking Kaila). Cracks are also present on the south face of the plaque.

<u>Dist from top eastern edge (cm)</u>	<u>Length of crack (cm)</u>
7.8	5
15.5	9.3
22	10.3
26.6	13
32.2	5
39	9.2

<u>Dist from top western edge (cm)</u>	<u>Length of crack (cm)</u>
15	9.7
24	7
27.5	58
37	5

A small amount of defibring is present on the plaque; on the middle of the west side and on the north side, extending from the top left corner to the post. The wood surrounding the metal bolt at the top left corner is also rust stained (photo CD1: 122-2284). The wood around the three other plaque bolts is unstained. Both defibring and rust stains indicate the presence of high humidity and salts.

Thickness measurements were taken along the upper and side edges of the memorial cross plaque at 5cm intervals (Appendix C).

STAKE AT APEX OF LIVING HUT

121-2193	16/11/02	Facing south east	Michael Staples measuring thickness of stake at apex of Living Hut roof.
121-2194	16/11/02	Facing north east	Corrasion at base of stake on apex of Living Hut roof.
121-2195	16/11/02	Facing north east	Lower copper alloy fitting on stake on apex of Living Hut roof.
121-2196	16/11/02	Facing south east	Upper copper alloy fitting on stake on apex of Living Hut roof.

No scale used because of difficulties with wind and location Apex orientated in nw-se plane, in line with iron topped roof ridge capping

Description

Wooden stake projects 1115mm (measured on northwest side) above the apex of the Living Hut roof in (approximately) a north east- south west orientation (ie. parallel with roof ridge capping). Slightly crumpled iron cladding covers the roof at the base of the stake.

There are four holes in the stake. The top two holes (diam. 6.5mm or ¼") lie in a north east-south west direction. The lower two holes lie in a north west-south east direction and a bolt passes through these two holes. Both bolts are threaded with a ferrous nut either side of the wooden stake and a short length of a copper alloy cylinder are soldered to the southeast ends. A pink rubber

washer fills the interior of the lower cylinder. The upper cylinder is empty. Copper alloy wire is loosely wound around the bolts.

Length of upper bolt between faces of nut and cylinder	153mm
“ lower “ “ “	157mm
Diameter of bolts	9.5mm
?Outside diameter of nuts	22x 25.4mm (1")
?Inside diameter of nuts	19-34mm??
?Outside diameter of copper alloy cylinder	22-25mm
?Inside diameter “ “	
Inside diameter of rubber tubing	5.5mm (3/16")
Diameter of wire	1.4mm

Condition

The stake is very fragile and visibly moves in medium and strong winds.

The stake is a golden colour on all sides.

All wooden surfaces facing the prevailing katabatic winds are severely corradd (photo CD1, 121-2194).

Above the roof flashing, the stake rapidly reduces in thickness. The greatest loss occurs in the NW/SE plane, 85mm above the flashing (photo CD1 121-2194). The original size of the stake is indicated by its dimensions at the roof flashing (53.2 x 56.1mm). Originally, the stake probably had parallel sides, as the distance between the nuts on both bolts is approximately 53 mm. The northwest side remains relatively straight as this side is protected from the wind.

Thickness of stake in WSW/ENE direction

Top of stake	41.03mm
Above top bolt (105mm)	46.51
Midway between bolts	47.5
Above lower bolt	45.8
85mm above flashing	43.7
Flashing	53.2

Thickness of stake in WNW/ESE direction

Top of stake	29.05mm
Above top bolt	44.30
Midway between bolts	36.25
Above lower bolt	36.6
85mm above flashing	2.8
Flashing	56.1

The stake exhibits no defibring, longitudinal cracking or splitting.

The copper alloy cylinders have a smooth, dull green/brown patina with light blue/green corrosion near the soldered bolt join. The bronze bolt have a red/brown patina and steel nuts are dark brown/black. Dark brown metal staining discolours wood above and below the lower bolt on the northeast side of the stake , and to a lesser extent the upper bolt (photo CD1: 122-2195, 122-2296).

The pink rubber washer is inflexible and cracked.

Movement of the bolts by wind has enlarged the bolt holes.

MAGNETOGRAPH HUT

Roof

The south sloping roof of the Magnetograph Hut was over-clad with bright golden coloured Integrain varnished Baltic pine timber boards in 1997. The Intergrain varnish is beginning to weather at the edges of individual boards. Board are slightly cupped and have shrunk a little (photos 124-2468 – 124-2476).

Original roof battens are present on the northwest corner, eastern end of north edge and western end of south edge. Battens are a light golden colour and severely eroded, particularly on their southern edge. Knots (slightly harder) protrude above surface. Roof battens are generally secured with copper alloy rose-head nails. Fragment of two layers of sheepskin and layer of hessian survive under the roof batten at the eastern end of the north edge (photo 124-2476).

The timber around the vent on the western edge of the roof is severely corroded (photo 124-2475).

South wall

The south wall is almost completely protected by a rock wall which butts against the wall. Solid snow drifted against the rock wall. A small amount of timber is exposed above the wall, varying between 0-300mm (note in snow drift profile snow covers all boards and part of top batten). An uneven tide mark exposed later in the season. Above the tide mark, boards are a polished light golden colour. While below, the boards are light grey with black mould on boards behind rocks. Fragments of the hessian that originally covered the external wall surface are visible. Hessian a dark brown colour. The hessian appears to have been held in place by copper alloy tacks with square copper alloy washers present on boards 10, 12, 16, 17, 18, 19, 22, 28 (from eastern end). All exposed nails are copper alloy rose head nails with brown/green patina.

The exposed part of boards from western end to 16th board (from eastern end) are severely corroded and boards 16, 19, 23 and 24 from eastern end there is complete loss of soft tissue in places (corroded boards covered as part of the 2002 building program – refer CA's report).

East wall

Timber cladding bleached a light cream colour, grading to grey with black mould surface behind rocks. Boards slightly corroded. Boards have shrunk slightly and there is shallow spits along grain in boards and gaps (up to 5mm) between boards. Boards secured with copper alloy rose head nails. Hessian fragments visible between rocks and boards 1, 2, 5, 6 (from northern end). Snow obscured other boards near rock wall edge. Copper alloy washers are present on the following boards (from northern end)

Board 1	2 washers
Board 2	2 washers (fragment of hessian under lower washer)
Board 5	1 washer
Board 7	2 washers (fragment of hessian under lower washer)

North wall

Covered with snow except western end which cleared around stable door to gain access inside. Boards above stable door – some corrosion and shrinkage with gaps between boards up to 10mm. Flapping board east of stable door. Melting snow dripping onto east side of door. Mixture of iron and copper alloy nails used in door.

West wall

Timber boards at the northern end are severely corroded at the top. Boards 1-3 (from northern end) complete loss of soft tissue near top. Wood is a deep golden colour.

Iron and copper alloy fittings nails used to attach wall cladding. Hessian fragments and copper alloy washers, visible between rocks and wall from 4th board (from northern end) to southern end. Copper alloy washers present on 4th and 8th boards. Tide mark visible approx 6cm above snow line on boards 1-7.

124-2468	20/11/02	Facing north	Eastern end of south wall, Magnetograph hut. Note tide marks on wall cladding above snow and rocks. Under the tide mark (where boards are protected by the rock wall) the boards are a grey colour with areas of black mould. Above the tide mark the boards are a light golden colour and are splitting and there is some loss of tongue and groove parts. The Intergrain roof boards are beginning to cup and crack at their ends (particularly boards 5-7 from eastern end).
124-2469	20/11/02	Facing north	South end of roof of Magnetograph Hut (point to ranging pole 8th board from eastern end). Note hessian fragments between the rocks and the wall cladding. Note erosion of Integrain varnish from the edge of roof boards.
124-2470	20/11/02	Facing north	South end of roof of Magnetograph Hut (point to ranging pole 8th board from eastern end). Note hessian fragments between the rocks and the wall cladding. Note erosion of Integrain varnish from the edge of roof boards.
124-2471	20/11/02	Facing north	South end of roof of Magnetograph Hut (point to ranging pole 14th board from eastern end). Note copper alloy tacks and square washers originally used to secure hessian against the wall. The 16-21 st boards (from eastern end) are severely corroded under the roof-line.
124-2472	20/11/02	Facing north	Detail of corrosion of 16 th board (from eastern end), under the roof line. Note that in some places the soft tissue has been completely lost.
124-2473	20/11/02	Facing north	South end of roof of Magnetograph Hut (from 21st board from eastern end).
124-2474	20/11/02	Facing north	South end of roof of Magnetograph Hut (point of ranging pole on 22nd board from eastern end).
124-2475	20/11/02	Facing north	North west corner of Magnetograph Hut roof. Note severe corrosion of timber around vent and erosion of southern edge of the batten on the northern edge of the roof
124-2476	20/11/02	Facing north	North east corner of roof, Magnetograph Hut. Note thick layer of sheepskin under batten and eroded south side of batten
124-2477	20/11/02	Facing west	Linda Clark in front of northern end of east wall of Magnetograph Hut. Note sheepskin under batten at top northern edge of east wall
124-2478	20/11/02	Facing south west	Northern end of east wall of Magnetograph Hut. Note sheepskin under roof batten and black mould on wood under sheepskin. Note corroded surface of wall cladding.
124-2479	20/11/02	Facing north east	Severe corrosion of timber wall cladding, northern end of west wall
124-2480	20/11/02	Facing east	Severe corrosion of timber wall cladding, northern end of west wall

MAIN HUT

West wall, Living Hut

Wood rich golden colour,

Fairly smooth surface with some splitting along grain
Erosion indicated by thicker wood where battens lost
Blackish under battens
Brown streaks below and above iron nails. No staining from Copper alloy nails
Copper alloy nails green patina – continuous and uniform – concentrated at S end
Iron nails dark brown colour
Metal fastenings for cladding boards gen tight and close to wood surface
Severe corrosion of some battens
No evidence of tide marks on exposed boards (tide marks became visible later when snow at base melted)

West wall, Living Hut

Wood rich golden colour,
Surface texture – smooth dry surface, little sponginess. Loss of surface evidenced by raised surface where battens missing. Little evidence of corrosion of wall cladding but some battens severely corroded.
Copper alloy, concentrated at southern end, nails have uniform green/brown patina and little metal staining of surrounding wood
Iron nails smooth red brown surface. Staining of surrounding wood – long thin brown/black streak above and below nail along grain, pronounced at S end.
Grey black wood surface under battens and on northern edge (leeward edge) of battens and near base. No grey staining where battens lost – only raised wood
No evidence of tide marks until very end of expedition
Surface splitting along grain
Grey staining where battens lost (some, also on roof)

East wall

Boards grey brown increasingly wind polished and bleached towards S end and more bleached towards roof. Grey weathered in areas frequently wet at base are weathered a dark grey
Defibring evident on N edge of boards as soft white fluff. No evidence towards S end (from board 23 from S end)
Longitudinal cracking at LH end with and across 9DIAG) GRAIN and some splitting along grain in greyer boards
East facing Living Hut roof
Cladding boards are generally bleached a light golden/grey with black mould????? Shrinkage of boards opened gaps between adjacent boards up to 10mm. Tongue and grooves are generally intact although some part lost. Shallow splitting of boards along grain.
Boards on Workshop more golden – quite sharp transition and knottier and knots dark brown
Slight cupping at southern end
Long brown streaks
Separation between boards 1cm about. T gen intact

North Facing walls

Mostly covered by snow except extremities east and west. Boards golden under eaves north west corner (upper) of Workshop (not veranda) Black mould along edges of golden boards.. Where boards are often covered by snow – surface colour is weathered grey/brown with black (mould?) about below second row of nails from top. Tongues, where visible (as result of shrinkage) is also surface grey colour. Shrinkage, as indicated by gaps between boards is greater at the roof line and progressively becomes less at lower level where boards covered by snow more. Boards tightly fitting together at foundation level.

Horizontal cladding exposed at NE veranda corner – cladding attachment not secure – sep from eastern end

Softish rough surface. Splitting along grain

Small dark brown pronounced knots.

Iron staining thin brown streak

South wall

Not cupped

Smooth surface

Little corrosion – boards towards w end severely corroded and corrugated.

Significant loss of part of western most boards at top – entry into veranda

Long thin streaks from iron nails

Jagged tide mark visible as ice ablates in summer

Splitting along grain exposed boards at south east corner

East roof, LH

Eroded polished surface

Gaps between boards

Fragments of iron cladding (northern near ridge capping)

Colour – variable golden grey with black mould where batten lost Light bleached golden grey towards south

Surface splitting

Separation with gaps between boards 1cm. T and G generally intact.

Dotted with square FE washers with tar paper – top southern quarter to north mostly round Fe washers with nothing underneath

North roof

Dark, grey brown, bleached to an increasing extent towards apex and east side. Black mould

Splitting along grain of surface all over, lots of

Boards shrunk – sep between boards 1-2cm. Cupping

T and G lost partly or completely from many boards. T and G mostly grey with black mould

Surface hardish

Streaky water? Stains from apex – brown coloured jagged tide marks above skylight and below apex

Round iron washers except above skylight and lower W corner. Iron cladding fragments on lower half. Fragments of sailcloth above skylight

Thin brown metal staining from iron nails and washers from E end to board 16

Putty in fire damaged area shrinking

No corrosion, although battens corroded near apex.

Snow ingress through fire damaged patch over kitchen – refer CA

Cladding timbers near the roof apex and above the skylight are a bleached and streaked with water stains and black (mould?). The grey/brown boards on western end gradually shade to a light golden brown on the eastern end. Boards have shrunk to a considerable degree, all show surface splitting along grain and separation between boards. There are significant gaps (caused by loss of tongue or shrinkage) between (from eastern end) boards

5-6

6-7

12-13

13-14

24-25
32-33
33-34 (note, board 34 cracked below chimney)
38 (note: lower corner of board 38 missing)

Small round iron washers dot the roof except in the area above the skylight and at the lower western corn (west of batten 33). Fragments of iron cladding are present on the lower part of the roof.

West roof

Light gold, with grey mould, especially at S end
Sailcloth under battens rust stained near ridge capping
Eroded at southern end
Horizontal battens lighter?? than vertical ones and darker towards the lower S end.
Cladding darker above top row of battens near apex. Below top row, cladding bleached golden colour, occasionally with black mould. Golden boards polished but with surface splitting.
S edge – cladding boards eroded and thin
Cladding boards slightly cupped.
Significant gaps between many boards.
Orange metal staining on boards above skylight (from ridge capping)
No round or square Fe washers on W roof

South roof

Rope along some battens
No corrosion
Surface eroded (diff thickness where battens lost), edges of boards rounded, greater towards W end
Polished surface
No defibring
Golden colour, bleached light golden
Shallow surface cracking along grain – less deep than on N roof
Meltwater staining – some at roof edge (jagged tide mark) and below skylight
Slight cupping
Metal staining – thin brown streak from nails, not so long
Sep between boards 1-2cm
Some partial loss of T and G. T and G gen golden colour
Eroded surface, rounded splitting and edges
No black staining on lost batten areas

Workshop

NW corner of veranda, N side
Min corrosion or erosion (though knots raised). Horizontal boards at corner (not T and G) flapping and fluttering with gaps between boards and eroded. Golden colour with black on edges. Many horizontal boards lost
Colour of boards away from NW corner – grey brown with black mould? where covered by snow for most of year.
Gaps between boards greatest at roof line. Little gap at foundation level
Slight cupping

Workshop Grey brown surface colour. Splitting along grain

Latrine corner

Uneven colour – grey brown to golden, T and G dark grey
Corrosion of horizontal boards on N wall of NW corner of W veranda (4-5 from base)
Some splitting along grain
T and G intact and complete but some looseness between boards
Meltwater staining in corner above and below Hurley's drain and on inside wall of W veranda
Metal staining – thin brown streaks from nails on boards facing north. Concentric orange to dark brown rings by Hurley's drain. Bright orange streaks from iron nails between door and latrine.
Defibing on 2 boards below drain outlet.
N facing boards close together and T and G intact
Green algal growth on ends of exposed floorboards of dunny and at base of drain (chute)
Hessian fragments around chute rfragmentary and torn and bleached a light grey.

East wall

streaky bleached golden and grey
Dry feel
Soft, slightly defibing on N side where splitting along grain occurs – slightly streaky surface (hard grain golden colour, soft grain white)
Corrugated surface of boards near N end.
Knots dark tan colour, slightly raised
Some deep spitting along grain and cracking
T and G damaged on many boards with gaps from loss under roof line and elsewhere
Sep between boards pronounced
Base of boards grey (protected by snow, melt water)
Narrow grey brown streaks from iron nails, not as long as on other sides

West wall

Separation between boards from N edge and 300 below roof
Many tongues lost and significant shrinkage - gaps (2-5mm) between boards
Cladding golden colour, grey brown staining of edge of some boards and on T and G
Corrosion of 2 N most boards, lessens towards S end
Thin brown stain above and below Iron nails – quite long
Nails generally protrude 1-3mm above boards. Nails secure (tight)
Knots prtude – knotty
Boards golden colour with grey staining on edges
Minimal splitting or cracking
South of doorway into Main Hut, boards weathered grey

BATTENS

MAGNETIC ABSOLUTE HUT

Incomplete with substantial loss of cladding.
All copper alloy nails with dark green brown patina. Minimal metal staining on wood.
All boards thin and become progressively thinner towards the top.
Timber frame corrased on east, south and west faces.

East wall

Bleached a very light golden colour.

Corrasion increases towards eastern end.

Prominent dark brown knots.

Board 2 (from northern end) split along grain.

South wall

13 very eroded boards survive. Corrasion of boards at eastern end

There are large gaps between the boards and tongues lost from most boards near top. Fragment of tar paper under board 3 (from west). Boards vulnerable and board 1 (from west end) flapping

West wall

Two boards survive at southern end. Boards thicker than on other sides but corrased and eroded.

North wall

Three detached boards protrude from snow. Boards bleached a golden colour.

Severely eroded on south facing side of boards

125-2506	21/11/02	Facing north	Western end of south wall, Magnetic Absolute Hut. Note eroded surface of cladding boards; gaps between boards and thinness of boards towards the roof line. Note tar paper fragment under the third board from the western end.
125-2507	21/11/02	Facing north west	Western end of south wall, Magnetic Absolute Hut. Note eroded surface of cladding boards; gaps between boards and thinness of boards towards the roof line. Note tar paper fragment under the third board from the western end.
125-2508	21/11/02	Facing north east	Eastern end of south wall, Magnetic Absolute Hut. Corrasion of boards increases towards the eastern end.
125-2509	21/11/02	Facing north east	Eastern end of south wall, Magnetic Absolute Hut. Corrasion of boards increases towards the eastern end.
125-2510	21/11/02	Facing west	Southern end of east wall, Magnetic Absolute Hut. Boards bleached a light cream colour with prominent dark brown knots. Boards very thin as a result of erosion of their surface, particularly near the exposed roof -line.
125-2511	21/11/02	Facing east	Northern end of west wall, Magnetic Absolute Hut

TRANSIT HUT

To complete and format

East wall – battens severely eroded and corrased (south edge by katabatic winds). Attached with iron nails and fragments of sailcloth held under battens.

Some battens secured with S/S screws – refer CA's report

Intactness of cladding

Many boards horizontally laid.

Snow cover

Horizontal boards – T and G?

Interior

Fine and medium weave hessian frozen in snow in north west corner.

Four iron brackets uniform dark reddish brown wind polished surface.
 East wall lined with fibro sheeting.
 Blue strip painted onto north face of southern most timber upright in east wall.
 'ROO" painted in black on 2nd surviving board from top at eastern end of south wall.
 Blue strip painted on southern end of west wall.
 Exposed light grey coloured floor boards in good condition.

Central pillar

South, north and east facing sides are a golden colour. Brown strip painted on southern side near base and black lettering painted onto northern side.
 West facing side is a light grey brown colour
 Two battens on the north east and south west top of the block.
 Six iron nails in the south east corner top of the block and five iron nails on the north west corner top
 Three copper alloy nails in the edge of the north east side and two in the north west side with fragments of fine white fabric under nails heads. One iron nail on both other sides.
 Raised black lettering 'longitude 9 30 10E F1' ?? painted onto north face of central pillar

Face	Length at top (cm)
South west	38
South east	35.3
North east	35
North west	34.5

East wall

Horizontally laid
 Cladding generally intact with one board missing.
 Cladding boards light brown becoming dark brown towards base
 Some cracking along grain.
 Prominent dark brown knots.
 Brown streak short distance along grain from iron nails.
 Boards corrugated
 Battens have severely eroded undulating southern face
 dark brown where battens originally were.
 Gaps of between 1-2cm between boards

South wall

Many boards missing from top. Significant gaps between boards.
 Light golden brown colour
 Prominent dark brown knots.
 Cladding severely eroded with uneven thickness, Generally thin
 Severe corrosion of boards at lower western end and top eastern corner. Severe corrosion of exposed southern face of building frame.
 1-5cm gaps between boards
 Fragments of tar paper at the lower south east corner between cladding and rock foundations.

West wall

Exposed frame timbers severely corrugated on all sides.
 Cladding boards generally golden to reddish brown colour stained with brown.

Some loss of cladding boards
Brown iron stained streaks
Prominent knots

North wall

Significant loss of cladding except for lower boards and top west corner.
Surviving boards vary from light to dark brown.
Raised black surface where battens lost.

APPENDIX B

MOISTURE CONTENT PROFILING

The moisture contents of a variety of internal timbers of the Main Hut and external timbers of the Main Hut, Magnetograph Hut, Absolute Magnetic Hut and TH? were determined in November and December 2002 using a Protimeter Mini C moisture meter. These readings repeated similar reading previously determined in December 2000/January 2001 also using a Protimeter Mini C moisture meter and taken from similar place.

Readings taken in early November were determined before/prior to any snow melt. Readings taken in middle December when were taken after significant amount of snow had ablated and melt pools forming at base of the Main Hut. At this time the temperature inside the Main Hut had risen considerably as a result of human activity inside the hut and sun melting ice and snow trapped inside the roof cavity.

Board numbers run from the ground to the ceiling unless otherwise stated. Ie board number 1 is the lowest board next to the ground. Data has not been corrected to compensate for the wood type being measured (baltic pine).

MAIN HUT INTERNAL TIMBERS – 3/11/02

Board No.	Moisture Reading
1	20
2	19
3	19
4	19
5	19
6	19
7	19
8	covered in hoar frost

Structural timbers of Hurley's bunk

Uprights	19
Beams	17
Bookshelf	19
Board with name on	19
Bunk above Hurley's	19
Side rail board	19
Dark room door(all four panels in centre of door)	17

Darkroom -East wall

A series of readings were taken approximately 15 cms north of the darkroom entrance door on the east wall. Measurements were taken from the lowest board upwards.

The east wall of the darkroom abuts the ice and snow filled kitchen area of the Living Hut. Boards 10 and 11 felt damp to touch on 8/12/02

<i>Board No.</i>	<i>Moisture reading (%) – 3/11/02</i>	<i>Moisture reading (%) – 8/12/02</i>
1	19	18
2	20	22
3	19	22
4	22	26
5	25	26
6	26	28
7	22	28
8	22	28
9	20	26
10	25	38
11	20	40+
12	22	26
13	20	28

Darkroom – south wall

The only accessible board (mid way up the wall) had a moisture content of 23%.

Darkroom – north and west walls and ceiling

A variety of readings were taken from accessible boards, all giving values between 20-23%

Northern outer wall Mawson's Cubicle

The northern outer wall of Mawson's cubicle was not covered with thick hoar frost, compared to many other walls. Readings were taken near the western end of the north wall. Boards 8 and 9 are immediately under shelves

<i>Board No.</i>	<i>Moisture reading (%) – 3/11/02</i>	<i>Moisture reading (%) – 8/12/02</i>
1	20	22
2	22	23
3	20	23
4	23	23
5	19	23
6	20	23
7	20	23
8	19	28
9	19	26
10	20	23
11	19	23
12	20	23
13	19	23

Eastern Outer Wall, Mawson's Cubicle

The south eastern corner of the Living Hut was partially filled with snow and ice suspended from the platform above Mawson's Cubicle. The snow obscured the power boards of the eastern outer wall of Mawson's Cubicle. This snow was removed at the end of the 2002 expedition revealed the eastern outer wall

<i>Board No.</i>	<i>Moisture reading (%) – 3/11/02</i>	<i>Moisture reading (%) – 8/12/02</i>
1	Unable to measure	Unable to measure
2	Unable to measure	Unable to measure
3	20	26
4	20	26

5	20	26
6	20	26
7	20	26
8	20	26

Platform

Southern wall, Living Hut

The south west corner of the Living Hut was, at the start of the expedition, partially filled with suspended drifted snow. This snow was removed revealing the southern wall of the Living Hut.

Readings were taken vertically above and below the 'H' of AJH bunk as this area was free of ice and hoar frost.

<i>Board No.</i>	<i>Moisture reading (%) – 3/11/02</i>	<i>Moisture reading (%) – 8/12/02</i>
1	19	20
2	19	23
3	19	22
4	19	22
5	17	26
6	19	24
7	19	26
8	19	26
9	17	24
10	19	20
11	17	26
12	covered in hoar frost	26
13	covered in hoar frost	28
14	covered in hoar frost	20
15	covered in hoar frost	20 – under top bunk?
16	obscured by snow	20
17	obscured by snow	22
18	obscured by snow	22
19	obscured by snow	22
20	obscured by snow	24
21	obscured by snow	22
16	obscured by snow	20

Eastern wall

<i>Board No.</i>	<i>Moisture reading (%) – 3/11/02</i>	<i>Moisture reading (%) – 8/12/02</i>
1	20	
2	17	
3	17	
4	20	
5	20	
6	20	
7	20	
8	20	
9	20	

Further measurements taken of timbers made up wall of upper bunk (C,L. bunk).

<i>Board No.</i>	<i>Moisture reading (%) – 3/11/02</i>	<i>Moisture reading (%) – 8/12/02</i>
9	no reading	28
10	23	28
11	19	26
12	19	24
13	20	26
14	19	22
15	19	22
16	17	26

Ceiling boards

All ceiling boards covered in hoar frost and could not be measured

EXTERNAL TIMBERS MAIN HUT

(Climatic conditions when readings taken.)

Southern veranda walls

13th board from south west corner covered in ice from just below second batten. No tide marks exposed. Moisture readings vary from 12-14%

Exposed timbers on southern wall generally vary from 14-15%.

South East corner

Southern veranda wall – random readings 12-14%

Living Hut - Southern Roof

1-3 boards from south east corner, 11% 75cm below level of roof. 12-14 % just under eaves all along roof. Note most of wall covered by ice.

Living Hut - Eastern Veranda Wall

Moisture readings on the 8/12/02 determined on a sunny day following a three day blizzard and the first day when small melt pools formed at the base of the eastern wall. Readings determined from the 34th board from south east corner

<i>Board position</i>	<i>Moisture reading – 3/11/02</i>	<i>Moisture reading – 8/12/02</i>
Wet patch	—	20%
Above frozen pool	6%	14
5cm above frozen pool	6%	9
10cm above pool	6%	6
15cm above pool	6%	6
half way up board	6%	8
just under eaves	9%	8

random measurements along wall <6-9%

5-7 boards (Boards around penguin cache, frozen melt pool in contact with boards) on eastern wall from northern end, 5-40 cm above ice. Under eaves 8%– 11%

Main Hut eastern roof

Just above eaves <6-8% all along roof

Main Hut western wall veranda

Random readings immediately above ice 8-9%. Body of wall vary from 9-11%

Workshop veranda wall

10th board from northwest corner, immediately 65cm below roof 15%

37cm	11%
12cm	11%

14th board from northwest corner, 30 cm below roof 14%

14cm below roof 9%

Workshop northern wall west of auroral shelter (refer Ian's diagram)

2nd board at melt zone (damp timber) 38%

10cm above melt zone <6%

all other wall timbers were too dry to give a reading (>6%)

Eaves out of reach, no readings taken

Workshop northern wall east of auroral shelter

Covered in snow, no readings taken

MAGNETOGRAPH HUT**Absolute Magnetic Hut**

These measurements were taken before snow began to melt significantly, although small pools formed in rock crevices during the sunny afternoon.

South Wall

Board (from west)	Top	250mm below top	500mm below top
1	12	9	11
3	12	9	11
5	12	11	11
7	12	11	12
9	12	11	11
11	12	11	11
13	12	9	11

West wall

Board (from north)	Top	250mm below top	500mm below top
1	9	8	6
2	8		6

East wall

Board (from north)	Top	250mm below top	500mm below top
1	8	12	under snow
2	14	17	under snow

Note: readings 250mm below top were close to the snow line.

Board numbers run from the ground to the ceiling unless otherwise stated. Ie board number 1 is the lowest board next to the ground.

APPENDIX C

Timber Thickness Measurements

Stake at apex of Living Hut

Thickness of stake in WSW/ENE direction

Top of stake	41.03mm
Above top bolt (105mm)	46.51
Midway between bolts	47.5
Above lower bolt	45.8
85mm above flashing	43.7
Flashing	53.2

Thickness of stake in WNW/ESE direction

Top of stake	29.05mm
Above top bolt	44.30
Midway between bolts	36.25
Above lower bolt	36.6
85mm above flashing	25.8
Flashing	56.1

Proclamation plaque (from top to bottom)

East side Thickness (mm)

Top edge (10mm below)	21.17
Middle	22.37
Lower (20mm above)	23.18

West side Thickness (mm)

40 mm below top edge	22.78
Middle	22.87
Upper edge of depression	23.41
In depression	20.80

Thickness of plaque in front of pole 22.52mm

Memorial Plaque

Thickness measurements were taken along the upper and side edges of the memorial cross plaque at 5cm intervals, using a digital vernier caliper.

The readings confirm a decrease in the thickness of timber when exposed to katabatic winds. Iron fittings, rocks and snow significantly protect wood from the abrasive action of the wind.

Thickness of top edge of southern plaque board

<u>Distance from east edge (cm)</u>	<u>Thickness (mm)</u>	<u>Distance from west edge (cm)</u>
3	-	3
	4.1	
5	5.9	5
	4.1	
10	5.9	10
	4.6	
15	3.8	15
	4.6	
20	7.0	20
	3.5	
25	16.0	25
	7.7	
30	22.7	30
	21.5	

Thickness of east and west sides of plaque

<u>Distance from top (cm)</u>	<u>East elevation (mm)</u>	<u>West elevation (mm)</u>
0	9.9	6.2
5	9.3	8.7
10	10.9	10.2
15	16.3	12
20	18.9	15
25	19.7	16.3
30	21.8	18.8
35	22.8	21.2
40	23.1	21.4
45	22.4	22
55	21.6	21.6

Length of north side of post in contact with plaque = 10.94cm.

Absolute Magnetic Hut

South wall

Note all board measured 100mm from the top of the wall cladding and taken at the eastern edge. Measurements taken using the full (4cm) jaws of the digital vernier callipers.

Board	Thickness
1	11.45mm
3	8.45mm
7	inaccessible
12	3.57mm (4.15 200mm blow top of board)
13	4.63mm

West wall

Note all board measured 100mm from the top of the wall cladding and taken at the northern edge. Measurements taken using the full (4cm) jaws of the digital vernier callipers.

Board 1	
Distance from top (mm)	Thickness (mm)
100	29.5
200	15.14
300	14.92
400	15.18

Board 2 (south edge)	
Distance from top (mm)	Thickness (mm)
100	14.10
200	13.14
300	13.78
400	13.55
500	13.79

Stable Door

Measurements taken as per Ian Godfrey's diagram in his 2000/2001 report.
Measurements taken at 50mm intervals from top to bottom.

Top	17.89
50	20.9
100	19.9
150	19.83
200	19.57
250	19.84
300	20.45
350	19.89
400	20.33
450	20.54
500	20.75
550	21.26
600	21.45

Note while these results show the same general pattern of increase from top to bottom as Ian's results the amount of increase and the measurements are very different.

East wall

Board 1(north edge), 100mm from top – 9.97mm.. Measurements taken using the full (4cm) jaws of the digital vernier callipers.

No other measurements possible as design of callipers prevented access between boards.

APPENDIX D

List of artefacts to be returned to Australia for assessment (attn: Estelle Lazer) - either to be incorporated into a Mawson's Hut reference collection or discarded.

Iron fittings removed during AAP 1997/98 building program and stored on platform above kitchen.

- Ferrous spade fitting, nut and washer from bolt A junction NW – E, with washer and nut.
- Ferrous spade fitting (junction NS-E at B1.
- Ferrous spade fitting, bolts, nuts and washer from junction NS-W collar tie at B1 bearer.
- Ferrous bolt, nut and washer from junction post P2 and joist J4.
- Ferrous bolt and nut from lower shelf support, through junction 3x2.
- Ferrous platform bolt connection between collar tie and western post.
- Ferrous platform collar tie connection between post and joist.
- 7 ferrous washers.
- 6 ferrous nuts.
- Ferrous hinge.
- 3 ferrous screws and 1 ferrous nail.
- Unlabelled ferrous bolts and washer.
- Unlabelled ferrous bolt fragments and nut.

Iron fittings removed during AAD 2002 building program

- 3/8" bolts, nuts and washers removed from Workshop apex.
(*Condition:* Weeping corrosion on and under heads and threaded part of shaft and washers. Shafts slightly twisted during extraction. Small flakes, approximately 1mm thick, breaking away, leaving a pitted surface. Dark brown corrosion covered with fine orange brown powdery material).

	<i>Dimensions (mm)</i>
<i>Shaft length</i>	97 – 120
<i>Shaft diam – square</i>	11 – 12
<i>Shaft diam – round</i>	8.35 (max), 7.6 (min)
<i>Nut</i>	16.5
<i>Washer – ext. diam.</i>	33

- 6 strapping flathead nails (90.x.4mm) removed from Workshop collar ties.
(*Condition:* 4 complete, 2 fragments. Thin brown/black corrosion layer, shallow pits. No flaking under on or under head. Metallic core visible where nail surface scratched when extracting nail. One fragment longitudinal cracks. Many shafts thinner approximately 40 – 45mm from top.

	<i>Nail 1(mm)</i>	<i>Nail 2(mm)</i>	<i>Nail 3(mm)</i>	<i>Nail 4(mm)</i>
<i>Shaft length</i>	86.62 (bent)	83 (Bent)	79.6 (bent)	87.75 (straight)
<i>Head diam</i>	10.17	10.42	10.09	10.33
<i>Shaft diam (max)</i>	4.17	4.52	4.25	4.5
<i>Shaft diam (min)</i>	-	3.43	3.8	3.69

- 3 round and one square tar paper fixings, collected from Living Hut east roof. (*Condition:* dark red brown polished surface interrupted all over with orange pits (1 – 2mm). Fixings consist of slightly domed round or irregular shaped square washer pierced by a small flat headed tack).

	<i>Dimension (mm)</i>
<i>Round washer</i>	22 – 24
<i>Square washer</i>	5 - 10
<i>Tack head (diam)</i>	6.26
<i>Tack length</i>	13.86

- Approximately 40 ceiling lining nails (3 – 4.2mm) removed from Workshop. (*Condition:* fine powdery light brown surface on thin dark brown adherent corrosion. Metallic core visible where nail surface scratched when extracting nail. Many nails thinner approximately 30 – 33mm from top.

	<i>Dimension (mm)</i>
<i>Shaft</i>	57 – 68
<i>Head (diam)</i>	57 – 67
<i>Shaft (diam)</i>	3 – 3.15

- 8 bullet head nails removed from Workshop. (*Condition:* thin dark brown corrosion layer. Very small flakes breaking away from surface, leaving a pitted surface Metallic core visible where nail surface scratched when extracting nail.

	<i>Dimension (mm)</i>
<i>Shaft</i>	54 - 57
<i>Head (diam)</i>	4.3 – 4.7
<i>Shaft (diam)</i>	2.6 – 2.7

- 1 flat headed nail collected on Living Hut east roof
- Misc nails removed from Workshop.
- 13 nails (3.50mm), possibly used by 1978 expedition, removed from Workshop.
- Skylight window glass, collected from Living Hut east roof.
- Grass insulation excavated from SE corner Living Hut.
- White paper tape, excavated from SE corner Living Hut.
- Tar paper, excavated from SE corner Living Hut.
- Paper tape and white crumpled paper (used to push into cracks between timber lining board) excavated from SE corner Living Hut.
- Cotton wool, (used to push into cracks between timber lining board) excavated from SE corner Living Hut.
- Hessian fragments collected by Ian Godfrey in January 2002 from timbers associated with offcuts and equipment left by 1997/98 AAP expedition, outside the Main Hut and stored in the Granholm Hut.

Tool box 1

- Timber with 'W' carved on one side, removed from Living Hut during 1997/98 building program.
- Timber with a diamond carved on one side, removed from Living Hut during 1997/98 building program.
- Timber packing crate board stamped with 'AA.' and 'S.Y.AU...' and a red painted strip, collected by Ian Godfrey in January 2002 from timbers associated with off-cuts and equipment left by 1997/98 AAP expedition, outside the Main Hut and stored in the Granholm Hut.
- Iron strap removed during building works in Living Hut, AAP expedition 1997/98

Tool box 8

- Four pieces of wood collected as experimental wood samples for Ian Godfrey

RTA Timber Bundle 1

- collected by Ian Godfrey in January 2002 from timbers associated with offcuts and equipment left by 1997/98 AAP expedition, outside the Main Hut and stored in the Granholm Hut.

RTA Timber bundle 2

- Building timbers removed during the AAD 2002 expedition during building work in the Workshop, including 2 apex collar ties.

RTA Timber bundle 3

- Part of a Main Hut skylight constructed by AAP 1997/98 expedition, including original timbers.

RTA Timber bundle 4

- Collar tie timbers removed during the AAD 2002 expedition during building work in the Workshop.

RTA Timber bundle 5

- Timbers removed from the Living Hut by AAP 1997/98 expedition.

RTA Timber bundle 6

- Timbers removed from the Living Hut by AAP 1997/98 expedition.

RTA bundle 7

- Tar paper extracted from ice removed from Workshop as part of AAD 2002 conservation program.

RTA Timber Bundle 8

- collected by Ian Godfrey in January 2002 from timbers associated with offcuts and equipment left by 1997/98 AAP expedition, outside the Main Hut and stored in the Granholm Hut.