



Preventing Non-Native Species Introduction to Antarctica

ESH-SOP-0046

Version 2

September 2016

This document applies to the following locations:

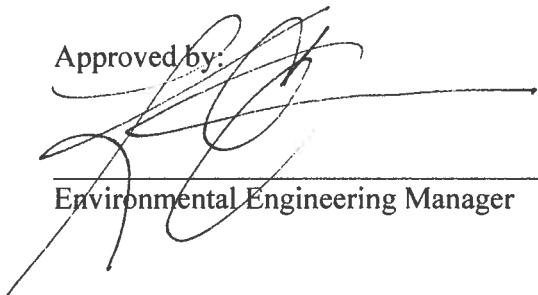
ARL <input checked="" type="checkbox"/>	CHC <input checked="" type="checkbox"/>	DEN <input checked="" type="checkbox"/>	LMG <input checked="" type="checkbox"/>	McM <input checked="" type="checkbox"/>	NBP <input checked="" type="checkbox"/>	PAL <input checked="" type="checkbox"/>	PTH <input checked="" type="checkbox"/>	PUQ <input checked="" type="checkbox"/>	SP <input checked="" type="checkbox"/>
---	---	---	---	---	---	---	---	---	--

Prepared by the Antarctic Support Contractor
for the
National Science Foundation Division of Polar Programs

Version History

Version	Date	Section	Author	Change Details
1	June 2015	All	Nathan Williams	New Document
2	September 2016		N. Williams J. Baird	Updates to Purpose, Scope, Applicability, Responsibilities, Procedure, References, Records sections. Updated cover page.

The document library holds the most recent versions of all documents.

Approved by:

Environmental Engineering Manager 9/14/16 Date

All brand and product names remain the trademarks of their respective owners.

This publication may also contain copyrighted material, which remains the property of respective owners. Permission for any further use or reproduction of copyrighted material must be obtained directly from the copyright holder.

Table of Contents

Purpose	1
Authorities	1
Risk Factor	1
Scope	1
Applicability	2
Responsibilities	2
Procedure	3
Prevention	4
Response	5
Reporting/Monitoring	5
Destination – All USAP Locations	5
Destination – McMurdo or South Pole Station.....	6
Common Issues	6
Routes of Entry	7
Prevention.....	7
Destination – McMurdo Dry Valleys	7
Common Issues	8
Destination – Palmer Station/ Vessels	9
Common Issues	9
Routes of Entry	9
Prevention.....	10
Boot Washing	10
References	11
Records	11
Glossary	12

List of Figures

Figure 1: Non-Native Species Reporting Form Example	6
--	---

List of Tables

Table 1: Routes and Types of Contamination.....	2
Table 2: Records.....	11

Purpose

The introduction of non-native species into Antarctica poses a major threat to the Antarctic ecosystems and native animals and plants. In addition, cross-contamination between ice-free field locations is an increasing concern for scientists working in the Antarctic, particularly the Dry Valleys. This procedure establishes and defines best practices for preventing the introduction of non-native species into Antarctica; the handling, removal, and management of non-native species inadvertently brought into Antarctica by United States Antarctic Program (USAP) participants; and improvements to cross-contamination prevention. This procedure will address the National Science Foundation (NSF) and international community's concerns about widespread introduction of non-native species to the continent because of increased human activity.

Authorities

The authority for this procedure is established in order to address regulations outlined in Sections 670.36 – 670.39 – *Introduction of Non-Indigenous Plants and Animals*, of Subpart H of 45 Code of Federal Regulation (CFR) 670, *Conservation of Antarctic Animals and Plants*, which implements the *Antarctic Conservation Act of 1978* (ACA), Public Law 95-541, as amended by the *Antarctic Science, Tourism, and Conservation Act of 1996*, Public Law 104-227.

The USAP maintains a permit system for the introduction of plants and animals to the Antarctic for food and for research. The permit system is described under Subpart C – *Permits*, of 45 CFR, Section 670.11 – *Applications for Permits*. The process complies with Annex II, Article 4 – *Introduction of Non-Native Species, Parasites and Diseases* and Appendix B – *Importation of Animals and Plants*, of the *Protocol on Environmental Protection to the Antarctic Treaty*.

Risk Factor

This procedure is assigned a risk factor of 1. Failing to follow this procedure may result in the import of unauthorized food plants, plants, and/or seeds, which would result in a violation of the food exceptions list provided in the ACA regulatory requirements (45 CFR Section 670.7 - *Food exceptions*).

Scope

This document identifies contamination types and routes, as well as methods of cross-contamination prevention.

The primary methods of entry identified in audits of USAP support operations includes, but is not limited to, the items in Table 1 below.

Table 1: Routes and Types of Contamination

Common Sources	Route of Contamination	Possible types of non-native species	Best Practices
Personal Clothing	Footwear tread/laces Pants' cuffs Pockets Personal outdoor equipment Bags/packs	Seeds/grasses Fruit flies Bed bugs Insect eggs Microorganisms	Clean and examine gear before mobilization to the Continent Report all pests to On-Ice ASC Environmental Engineering (EE) Representative
Procured Items	Soil in tread/tracks Pallets Food containers	Seeds/grasses Fruit flies Spiders Insect eggs Microorganisms Slugs Algae Soil	Clean and examine gear before mobilization to the continent Report all pests to On-Ice ASC EE Representative
Cargo	Dirt or debris on cargo or air field pallets.	Soil Soil-associated organisms	Inspect pallets before they leave the cargo yard and ensure that all dirt and/or associated materials are removed prior to airfield movement. Report to ASC Environmental and/or request assistance in cleaning
Equipment	Reuse of uncleaned sampling or operational equipment and supplies in multiple locations	Microbial Soil Lake water Soil or Water microorganisms	Clean sampling equipment following/between each use and prior to deployment in a different location (e.g. different lake or dry valley location).

Applicability

This Standard Operating Procedure (SOP) is applicable to all USAP locations, including McMurdo, South Pole, and Palmer Stations, outlying facilities, field camps, and USAP research vessels operating in the Antarctic. The procedure also applies to the Antarctic Support Contractor (ASC), its subcontractors, all ASC employees, and all USAP personnel travelling to and from Antarctica. Guidance will be provided to all USAP personnel travelling to and from the continent.

Responsibilities

ASC Environmental Engineering

ASC Environmental Engineering (EE) personnel are responsible for assisting with clean up as needed (if EE personnel are available on site) or providing recommendations for cleanup methods. The EE department is responsible for submitting an annual summary report to the NSF that encompasses non-native species encountered at all USAP locations. The ASC EE will provide further guidance and support to work center staff for rapid reporting and quarantine of non-native species on the station.

ASC Managers

All ASC managers are responsible for the development and upkeep of procedures that directly or indirectly promote environmental protection in Antarctica. Prior to staff deployment to a station, ASC managers are responsible for familiarizing their staff about non-native species introduction into Antarctica.

ASC Field Safety and Training

ASC Field Safety and Training may be required to assist ASC EE to initiate non-native species and cross contamination prevention efforts by assisting with providing field supplies and assisting (minimally) with education and/or coordination.

ASC Waste Management Specialist – Palmer Station and Winter Operations

ASC Hazardous Waste Technicians will act as the ASC EE representative during winter operations at all stations. Personnel are responsible for assisting with clean up as and providing recommendations for cleanup methods. The information will be transferred to the EE department is responsible for submitting an annual summary report to the NSF that encompasses non-native species encountered at all USAP locations. The ASC EE will provide further guidance and support to work center staff for rapid reporting and quarantine of non-native species on the station.

Work Center Supervisors and all USAP Personnel and Subcontractors

All staff will attend the required training that addresses the importance of eliminating non-native species introduction into Antarctica. Education about potential inadvertent methods of transporting non-native species is identified addressed in the required training. Inspection and removal of non-native species should be performed by all staff prior to mobilization to a station. Reporting of all non-native species is the responsibility of all USAP personnel in order to be in compliance with ACA regulations, USAP policy, and ASC procedures.

USAP Grantees

To avoid the introduction of non-native species into Antarctica, all science gear and personal equipment shall be checked for the presence of non-native species before arrival in Antarctica to ensure none are present. Cross contamination between field sites shall be minimized by cleaning gear and personal equipment before mobilizing to the new site. Reporting of all non-native species is the responsibility of all USAP personnel, including grantees.

Procedure

These procedures are designed to prevent the unintentional introduction of non-native species to Antarctica. The procedures outline the framework for non-native species management in Antarctica, in general, and specific procedures at all USAP locations, including McMurdo, South Pole, and Palmer Stations and outlying facilities/field camps, and USAP vessels operating in the Antarctic.

General procedures for all USAP locations include:

- Prevention
- Response
- Reporting/Monitoring

All USAP locations, including McMurdo, South Pole, and Palmer Stations and outlying facilities/field camps, and USAP vessels operating in the Antarctic have unique aspects that influence the possible non-native species introduced and the route of introduction.

For more detailed information, please refer to the following:

- *Protocol on Environmental Protection to the Antarctic Treaty, Annex II, Article 4 – Introduction of Non-native Species, Parasites, and Diseases*
- *Antarctic Conservation Act of 1978 [Public Law 95-541], Section One: Regulations Pursuant to Antarctic Conservation Act as Amended by the Antarctic Science, Tourism, and Conservation Act, Part 670, Subpart H – Introduction of Non-Indigenous Plants and Animals (45 CFR 670)*
- *Committee for Environmental Protection (CEP) NON-NATIVE SPECIES MANUAL EDITION 2016* http://www.ats.aq/documents/recatt/att608_e.pdf

Prevention

Prevention occurs at many levels of the deployment or procurement process.

Awareness and education prior to any deployment is a process that should begin early to most effectively mitigate the risk of possible non-native species introduction. ASC personnel attend annual trainings to maintain awareness and prevention techniques and guidance is provided in the *USAP Participant Guide*.

Awareness and education prior to any deployment is a process that can mitigate risk. All USAP participants are provided access to the online version of the *USAP Participant Guide*¹, which states:

Plants, seeds and animals. The Antarctic Treaty, which all participants must adhere to, prohibits the importation of any seeds (including chia seeds), plants (except food plants under controlled conditions for use in the greenhouse), or animals (including insects) to Antarctica. Be sure to clean your clothing prior to packing it so you can prevent inadvertently importing organic material. For example, be sure there are no seeds on Velcro®, mud on boots or grass inside cuffs. When leaving the continent, it is prohibited to remove any materials such as wood, bone, eggshells, feathers, and plant or animal parts, unless specifically authorized by permit issued from the NSF. In addition, you may not collect any of these items while working on the continent without a permit.

USAP personnel deploying to the Antarctic are required to view the environmental education video entitled “Protecting Antarctic Environments.” The video explains that

¹ *USAP Participant Guide* can be found at www.usap.gov/USAPgov/travelAndDeployment/documents/ParticipantGuide_2014-16.pdf

the United States is one of 53 nations that have signed the Antarctic Treaty governing activities in Antarctica. This treaty designates that the Antarctic continent be used only for peaceful purposes and for cooperative scientific investigation. The video module states:

“Your responsibilities begin before you arrive on the ice with ‘Don’t Pack a Pest’.² Hundreds of alien species have been identified in the Antarctic, particularly in the sub-Antarctic islands. Some of these invasive species are able to thrive and overtake native species. You can do your part by carefully cleaning your gear before your arrival in Antarctica, such as checking Velcro straps for seeds and washing your footwear. If you do identify a non-native plant or insect when you get to Antarctica, please report it to your Environmental representative right away. Necessarily, this means that no one is allowed to grow living plant[s] or animal[s], such as chia pets or tomato plants. Once you are in Antarctica, it is important that you continue to clean your gear in between visits to field locations to avoid cross contamination between unique and localized ecosystems.”

Response

Responses to non-native species introductions should be undertaken as a priority to prevent an increase in the species’ distribution range and to make eradication simpler, reduce the cost, and improve the success rate.

A rapid response to quickly eradicate the non-native species is important at all USAP locations. Any non-native species discovered will be placed in food waste for incineration following eradication. Key items being brought to the continent and likely routes of contamination can be monitored for early response and prevention. Routes of contamination are listed in Table 1, above.

Reporting/Monitoring

Reporting of all non-native species occurrence is a requirement of the Environmental Protocol, the NSF, and ASC. EE will keep a record of all non-native species. Reporting can identify areas or species of concern. Reporting can aid in determining if the species is entering the continent through natural process or as a result of ASC operations.

Destination – All USAP Locations

It the responsibility of all ASC personnel and subcontractors to report all non-native species identified while in Antarctica. All non-native species shall be reported to the EE

² The *Don’t Pack A Pest* brochure can be found at www.usap.gov/USAPgov/travelAndDeployment/documents/PackaPest_brochure_Final.pdf

representative on station. The Hazardous Waste Technician serves as the EE representative during the winter and at Palmer Station. The Marine Laboratory Technician serves as the EE representative on vessels. South Pole station management serves as the EE representative at the South Pole.

The response to the threat will vary based on the type of contamination. EE will guide the response activities. The non-native species will be photographed and documented for end-of-season reporting. All non-native species will be destroyed and placed in the waste stream for removal from the continent.

EE personnel use the *Non-Native Species Collection and Disposition Form* (ESH-FRM-0072) to track and report non-native species identified at any USAP locations in Antarctica.

Non-Native Species Collection and Disposition Form

Collection Date	Summary/Description	Genus/Species	Name of Collector	Additional Information/Picture
	Example: Found in galley lettuce			
	Example: DO NOT USE			

Figure 1: Non-Native Species Reporting Form Example

Below is additional information specifically for those traveling to the New Zealand/Continental side of Antarctica, followed by a section for Chilean/Peninsula operations.

Destination – McMurdo or South Pole Station

McMurdo Station is positioned near environmentally sensitive areas, including the McMurdo Dry Valleys Antarctic Specially Managed Area (ASMA), the South Pole ASMA, numerous Antarctic Specially Protected Areas (ASPA), penguin colonies, seal populations, and other sensitive scientific locations.

Common Issues

Common/historic non-native species identified at McMurdo Station include:

- Fruit flies
- Maggots

- Spiders
- Insects in vegetables
- Slugs
- Microorganisms in soil
- Bed bugs

Routes of Entry

Routes of introduction of non-native species include:

- Personal Clothing
- Procured items
- Personal Mail
- Food
- Tourists

Prevention

The New Zealand government already has strict guidelines for the entry of non-native species into New Zealand. All baggage and personal gear is subject to inspection upon arrival in New Zealand. Mail is also shipped through New Zealand and is subject to New Zealand regulations. Additional screening shall be performed by ASC cargo personnel to avoid shipment of nonnative species.

Prevention should be initiated by all personnel prior to arrival in New Zealand. Prevention is best accomplished by:

- Awareness
- Education
- Inspection/Screening
- Permitting

Additionally, education is provided in Christchurch prior to deployment. The information in the *Don't Pack a Pest* brochure is also in the *Participant Guide*. Copies of the brochure are also available in Christchurch, the stations, and on the research vessels.

Permits are required for the importation and exportation of all plants, animals, or rocks. Permits for items entering or leaving Antarctica require an Antarctic Conservation Act Permit. Items entering New Zealand need permits issued by New Zealand.

Destination – McMurdo Dry Valleys

The McMurdo Dry Valleys Antarctic Specially Managed Area (ASMA) is a unique environment with special protections and unique needs. Distinct soil geochemistry and distinct soil microbial communities have been identified in adjacent valleys of the McMurdo Dry Valleys (Lee et al., 2012). Human traffic via walking or by helicopter can easily move soil from one valley to another. Per the Dry Valley ASMA Management

Plan (2015), it is recommended that researchers use separate samplers (e.g. water collectors, plankton nets) and instruments, if feasible, for each lake to avoid cross contamination. Samplers or instruments used in more than one lake should be thoroughly cleaned (sterilize if possible) prior to reuse in a different lake.

Common Issues

Traffic to the McMurdo Dry Valleys ASMA is via helicopter from McMurdo Station. Common and historic non-natives species identified in the McMurdo Dry Valleys ASMA would be from the work of USAP science events and supporting USAP Operations in the ASMA. Reports of non-native species in the Dry Valleys are minimal, but possible issues include:

- Food with non-native species from McMurdo Station
- Soil from McMurdo Station
- Science Equipment from U.S. that had not been decontaminated between sampling locations

Routes of Entry

Routes of introduction of non-native species to the Dry Valleys include:

- Personal Clothing
- Procured items
- Personal Mail
- Food
- Tourists
- Helicopters
- Field equipment
- Sampling equipment

Prevention and Cross Contamination

USAP staff, grantees, and other participants make frequent helicopter landings in multiple valleys within the McMurdo Dry Valleys and can potentially carry contaminants or soils on their shoes, clothing, and equipment.

Distinct soil geochemistry and distinct soil microbial communities have been identified in adjacent valleys of the McMurdo Dry Valleys (Lee et al., 2012). Human traffic via walking or by helicopter can easily move soil from one valley to another. Soil can also be transported by:

- Footwear
- Tools/equipment
- Helicopter skids
- Slingloads/cargo
- Sampling equipment and supplies

USAP ASC EE is initiating a focused and small-scale cross-contamination prevention effort in the Dry Valleys, which will include decontamination kits for cleaning of boots and equipment before travel between valleys. The kits will contain:

- Brush for removal of gross contamination from boots and equipment
- Alcohol wipes for cleaning equipment
- Alcohol spray

The kits will be placed at all major McMurdo Dry Valleys facilities, including Marble Point, New Harbor, F6, Fryxel, Lake Hoare, and Lake Bonney. Brushes and spray will also be available at the McMurdo Station Helicopter Pad. The kits will also be provided to science events planning stops in multiple valleys in the Dry Valleys. A phased approach will be implemented to ensure the proper tools are procured and the proper level of effort is employed. Input from science and operational events will be addressed following the 2016-2017 season.

Destination – Palmer Station/ Vessels

Palmer Station, located in the Southwest Anvers Island and Palmer Basin ASMA, is positioned near a dense array of environmentally sensitive locations, including several ASPAs, penguin colonies, seal populations and other sensitive scientific locations. Research vessels may make stops at several locations, creating the potential to cross contaminate among locations. The Palmer area also receives visits from an increasing number of tourist ships, carrying tourists from around the world.

Common Issues

Common/historic non-native species identified at Palmer Station include:

- Fruit flies
- Spiders
- Insects in vegetables
- Plants
- Algae

Routes of Entry

Routes of introduction of non-native species include:

- Vessels
- Tourists
- Personal clothing
- USAP Cargo
- Personal mail
- Food (see ESH-SOP-0004)
- Sampling equipment

Prevention

Prevention efforts should be initiated by all personnel prior to arrival in Chile.

Prevention is best accomplished by:

- Awareness
- Education
- Inspection/screening
- Boot washing (see MAR-SOP-0008)
- Permitting
- Cleaning sampling equipment between sample locations

Education is also provided in Punta Arenas and on the research vessels to capture non-ASC USAP participants. At the shore party briefing, the Marine Project Coordinator (MPC) or shore party leader will inform shore parties of the need to use the boot-washing station prior to and after a shore landing.¹

Permits are required for the importation and exportation of all plants, animals, or rocks. Permits for items entering or leaving Antarctica require an Antarctic Conservation Act Permit. Items entering Chile need permits issued by the Chilean government.

Boot Washing

USAP research vessel staff and crew, grantees, and other participants make frequent shore landings and can carry contaminants ashore on their shoes, clothing, and equipment. Boot washing is a critical prevention method used in peninsula operations to help mitigate this problem.

The recommended practices mirror the cross-contamination prevention guidelines suggested by the International Association of Antarctica Tour Operators (IAATO) (Appendix B). ASC adopted this practice to meet the requirements set forth by the Protocol on Environmental Protection to the Antarctic Treaty and the ACA.

Both research vessels are equipped with a boot-washing station. The washing of all boots and equipment must be performed prior to and after shore landing.

The boot washing station consists of:

- Macro rinse container and scrub brushes: one trough or bucket (large enough to easily accommodate the largest of boots) full of fresh water (no disinfectant solution) to dunk boots, cuffs, packs, tripods, etc. in order to facilitate thorough washing with scrub brushes
- Contact mat: a trough with a 1% solution of Virkon (DuPont trademark) disinfectant, which saturates a mat for participants to walk across after rinsing and scrubbing of boots is complete

Refer to the SOP, *Terrestrial Cross-Contamination Prevention on USAP Research Vessels (aka: The Boot Washing Station)* (MAR-SOP-0008), for more detailed instructions.

References

- 2016 CEP Non-Native Species Manual (http://www.ats.aq/documents/recatt/att608_e.pdf)
- Antarctic Conservation Act of 1978 Public Law 95-541
- Antarctic Science, Tourism, and Conservation Act of 1996 Public Law 104-227
- The Antarctic Treaty UN registration #I-5778
- Conservation of Antarctic Animals And Plants 45 CFR 670, Subpart H
- Don't Pack A Pest RPSC-07-36
- Importation and Use of Food Plants and Productions of Food in Greenhouses ESH-SOP-0004
- The Inter-Valley Soil Comparative Survey: the ecology of Dry Valley edaphic microbial communities. Lee CK, Barbier BA, Bottos EM, McDonald IR, Cary SC. (2012).
- Management Plan for Antarctic Specially Managed Area No. 2 McMurdo Dry Valleys, Southern Victoria Land, 2015 (http://www.ats.aq/documents/recatt%5Catt579_e.pdf)
- Non-Native Species Reporting Form ESH-FRM-0072
- Permits 45 CFR 670, Subpart C
- USAP Master Permit Application (30 September 2014) and Permit No. ACA 2010 WM-004
- USAP Participant Guide ASC-16-001
- Protocol on Environmental Protection to the Antarctic Treaty, Annex II, Article 4 – Introduction of Non-native Species, Parasites, and Diseases
- Protocol on Environmental Protection to the Antarctic Treaty, Annex II, Appendix B – Importation of Animals and Plants
- Terrestrial Cross-Contamination Prevention on USAP Research Vessels MAR-SOP-0008
- Update on Boot and Clothing Decontamination Guidelines and the Introduction and Detection of Diseases in Antarctic Wildlife: IAATO's Perspective. International Association of Antarctica Tour Operators (IAATO).

Records

Table 2: Records

Record ID (& Owner)	Format & Location	Protection & Retrieval	Retention & Disposition
ESH-FRM-0072 (EE)	Electronic Copy Located on the Denver ESH departmental drive (J:)	Electronic copy on secure ASC ESH department drive (J:)	Completed forms are destroyed after three years. Form information archived in annual Work Plan Summary

Glossary

ACA

Antarctic Conservation Act

ASC

Antarctic Support Contract(or)

ASMA

Antarctic Specially Managed Area

ASPA

Antarctic Specially Protected Area

CFR

Code of Federal Regulations

MPC

Marine Project Coordinator

Virkon

A commercial brand name of disinfectant to be used on the contact mat.

IAATO

International Association of Antarctica Tour Operators www.iaato.org/

USAP

United States Antarctic Program