

## PROJECT INFORMATION

<b>Lead Principal Investigator</b>	Stephen Warren
<b>Institute</b>	University of Washington, Department of Atmospheric Sciences
<b>Project Title / Grant #</b>	Black carbon in Arctic snow and ice and its effect on surface albedo (0612636)
<b>NSF Program and Manager</b>	NSF/OPP ANS, Dr. William Wiseman
<b>PFS Project Manager</b>	Kim Derry (Greenland) and Faustine Mercer and Steve Hastings (Barrow, AK)

**Note: This plan documents support for the researchers' trips to Barrow, Alaska, and to Camp Raven, Greenland. After general project information, we present the Alaska plan, followed by the Greenland plan. The PI's success factors are last, followed by risk assessments as appendices.**

## LOGISTICS SUMMARY

With this project, researchers will collect snow to measure black carbon over a wide geographical swath of the Arctic. Information will update and make more comprehensive a 1984 survey of the soot content of snow on land and sea in the western Arctic. During the time of maximum snow depth, researchers will collect samples from arctic tundra, glacier ice, and sea-ice environments in Russia, Alaska, Canada, Greenland, Iceland and the Arctic Ocean. At times, cooperating researchers will collect the samples for this project's researchers; the samples will be kept frozen until the researchers can retrieve them. For other locations, the researchers will themselves travel to the research sites, collect the samples, and analyze them in the field. The researchers will conduct field work and sample analysis from 2006 to 2010.

Highlights from previous work: In 2006, a team of two participated in an August GEUS-sponsored research campaign in Northeast Greenland. In 2007, researchers traveled to Svalbard for a methods-intercomparison with a Scandinavian group. Later, researchers worked in Russia and Greenland. In addition, Matthew Sturm, scientists at Greenland's Summit Station and Thule Air Base and NPEO scientists collected samples for this team to analyze. During 2008, researcher (including 4 Scandinavian collaborators) conducted a spring campaign in Barrow. In addition, two UW researchers collected and analyzed snow in eastern Siberia. In addition, researchers collected snow south of Raven Camp, at the Dye-2 site. For 2009, a team sampled snow on the arctic islands of Canada. In Russia, the team's collaborators managed all sampling activities.

In 2010, two researchers will work at Barrow to monitor the vertical redistribution of soot during the snowmelt process, for approximately two weeks in May. They will drive snowmobiles daily to Elson Lagoon, 10-20 km east of Barrow, for sampling. Meanwhile, Russian collaborators will finish the sampling at Tiksi.

In mid-July, a team of three will travel to Greenland for field work at Raven Camp. After arriving Kangerlussuaq via the ANG logistics chain, the team will fly via ANG to Raven Camp. There, they will use snowmobiles to access sampling sites near the Dye-2 site. When this work is finished a bit more than a week later, the three will return to Kangerlussuaq and two will depart on 30 July (one via ANG to Scotia; one via commercial air to CPH). The PI will stay at Kangerlussuaq to analyze samples in the lab before departing on 19 August via ANG.

For 2010:

In Alaska, CPS will subcontract with BTS to provide (via on-the-ground logistics suppliers): rooms, meals, vehicle rentals, lab and work spaces, limited field gear, bear guards and guides. In Greenland, CPS will provide ANG coordination for passengers and cargo between New York and Raven Camp, user days in Kangerlussuaq and at Raven Camp, snowmachines and communications gear. All other logistics, including commercial travel on the return from Greenland, will be provided by the researchers from the grant.

For the complete CPS online project record for this grant, including science objectives, go to:  
[http://www.polar.ch2m.com/arlss\\_reports/arlss\\_projectsdetail.asp?cbPropNum=0612636](http://www.polar.ch2m.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0612636)

**OUTSTANDING ACTIONS AND NOTES**

<b>Issue</b>	<b>Responsibility</b>	<b>Date Due</b>	<b>Date Completed / Comment</b>
Visit all hyperlinks and review all documents referred to in the support plan	Field Team Members	Prior to fieldwork.	
Researchers are responsible for all permits required to conduct fieldwork, though assistance is available. Contact Glenn Sheehan to initiate the Barrow-area permitting process.	PI	Varying in complexity, from 6 months to 2 weeks before arrival date	Pending
Researchers must initiate contact with all Barrow and community organizations as appropriate to discuss and present their planned work (for example, whaling commission if research will occur during whaling season). Contact Glenn Sheehan for assistance in making these contacts.	PI	As early as possible before arrival date, at least 1 month ahead	No impact on the whaling or other local activities-- Elson Lagoon & BEO only.
Note: An on-site project POC must be identified if PI will not be part of field deployments	PI	Prior to deployment to Barrow	Thomas Grenfell will be the POC/field team leader
For Barrow freight, notify BASC via email ( <a href="mailto:ship@arcticscience.org">ship at arcticscience.org</a> ) with tracking numbers for all shipments. Detailed shipping information can be found at <a href="http://www.arcticscience.org/shipping.php">www.arcticscience.org/shipping.php</a>	Field Team Members	As soon as shipment information is available	Pending
Identify any hazardous materials and develop a plan describing their disposal by completing the form found at the following link: <a href="http://www.arcticscience.org/images/cheminvblank.xls">http://www.arcticscience.org/images/cheminvblank.xls</a> Submit this plan to <a href="mailto:chemicals@arcticscience.org">chemicals at arcticscience.org</a>	PI	At least 3 weeks before desired arrival date, depending on potential impacts of material	Small amount of chloroform (<100 ml) will be brought to Barrow and taken back home after field trip
Note: For long distance calls from Barrow, researchers should plan to bring phone cards or use their personal cell phone. Only certain cell phone suppliers work in Barrow (At&T, ACS, GCI, Verizon. For more information, please contact your supplier).	Field Team Members		
Make Barrow housing reservation and select meal plan.	Field Team Members	3 weeks before desired arrival date	Completed 4/12/2010
Keep boarding passes for meal reimbursements. Keep receipts for any other agreed-upon reimbursable expenses. Turn them in to Kim Derry (for Greenland) as soon as your fieldwork is complete.	Field Team Members	As soon as fieldwork is complete	
Please be prepared to participate in a teleconference with CPS, BTS and BASC to discuss in detail the logistic support expected by your project and make sure we have accurately identified your needs.	PI	At least 3 weeks before desired Barrow arrival date	Completed 04/07/2010

Please be prepared to attend an orientation with CPS/BTS and a BASC in brief upon arrival	Field Team Members	Upon arrival in Barrow	
If fuel is needed for your truck, a chip key is available at CPS office room L-203 (contact Faustine Mercer, see info below) or BTS office room L-204 (contact Russell Snyder, see info below).	PI	Before leaving Barrow	
<b>Note: Passports are required for Air National Guard and international travel. Also, please bring TWO copies of your passport to Greenland with you.</b>	Greenland Field Team Members		

### FIELD TEAM INFORMATION

Name	Location	Date In	Date Out	Email
Thomas Grenfell	Barrow	05/20/10	06/12/10	<a href="mailto:tcg@atmos.washington.edu">tcg@atmos.washington.edu</a>
Ryan Eastman	Barrow	05/20/10	06/12/10	<a href="mailto:rmeast@atmos.washington.edu">rmeast@atmos.washington.edu</a>
Brandt, Richard	Kangerlussuaq	07/19/10	07/20/10	<a href="mailto:brandt@atmos.washington.edu">brandt@atmos.washington.edu</a>
	Raven	07/20/10	07/29/10	
	Kangerlussuaq	07/29/10	07/30/10	
Doherty, Sarah	Kangerlussuaq	07/19/10	07/20/10	<a href="mailto:sarahd@atmos.washington.edu">sarahd@atmos.washington.edu</a>
	Raven	07/20/10	07/29/10	
	Kangerlussuaq	07/29/10	07/30/10	
Warren, Stephen	Kangerlussuaq	07/19/10	07/20/10	<a href="mailto:sgw@atmos.washington.edu">sgw@atmos.washington.edu</a>
	Raven	07/20/10	07/29/10	
	Kangerlussuaq	07/29/10	08/19/10	

### ALLOCATIONS AND SERVICES - ALASKA

The below tables describe the NSF-approved support scope for your project. Your support will be managed to these allocation levels. Requests to exceed this scope will require NSF approval. The Scope Management Policy is available here: <http://www.arcticscience.org/pdf/BarrowScopePolicy.pdf>

#### Housing & Meals

Support	Description	Unit	Allocation	Request	Comment
Barrow meals	2 people for 21 days	Days	42	46	Emailed researchers as more requested days than allocated
Barrow housing	2 people for 21 days	Days	42	46	The researchers will very likely be leaving early and therefore within the 42 day allocation, but they wanted to make sure they would have enough time to complete the research as the project depends critically on the weather and the predictions can only be approximate.

All team members should familiarize themselves with the Housing / Reservations Policy and the Meals policy at their earliest convenience. The complete policies can be found online at:

- <http://www.arcticscience.org/pdf/barrowreservationhousingpolicy.pdf>
- <http://www.arcticscience.org/pdf/barrowmealpolicy.pdf>

Make housing reservations and select a meal plan at least 3 weeks prior to your arrival date. The reservation form is available here:

- <http://spreadsheets.google.com/viewform?hl=en&formkey=cDcxU2ZhNmI0dy1mZ0FYQnNhLTiiUIE6MA>.

Confirmed reservations can be viewed here:

- <http://spreadsheets.google.com/pub?key=p71Sfa6itw-fgAXBsa-9bRQ>

**Lab Space**

Support	Description	Unit	Allocation	Comment
Lab space	BARC or L114/115	Days	21	Equipped with microwave to warm up samples, running water, sink
Freezer	Chest freezer or walk in freezer	Days	21	Access to freezer space to hold about 2 duffle bags of samples
Warehouse / Theater		Days	14	Staging, preparation for trips

**Vehicles**

Support	Description	Unit	Allocation	Comment
Truck	1 truck for the stay	Days	21	
Snowmachine	3 people for 14 field days	Days	42	Bear guard included

**Field Equipment Inventory**

Support	Description	Unit	Allocation	Comment
Sled	1 sled for 14 field days	Days	14	
Auger	2 days	Days	2	Preferred size 2x4 stake
Shotgun	1 gun for 14 days	Days	14	For bear guard

**Information Technology**

Support	Description	Unit	Allocation	Comment
Radio	1 radio for 14 field days and 2 people for 21 days	Days	56	Includes bear guard's radio
Internet				Available in the huts, building 360, BARC building and at Dario's

**Guides, coordinators, and community participants**

Support	Description	Unit	Allocation	Comment
Bear guard	14 field days	Days	14	

*For expense reimbursements please contact Faustine Mercer. See Project Contact Information, below.*

**Permits**

Support	Description	Unit	Allocation	Comment
UIC permit	1 permit per team member	Each	2	CPS covers fees. Contact Glenn Sheehan at least 2 weeks before arrival to issue the permits.
NSB permit	1 permit per project	Each	1	CPS covers fees. Contact Glenn Sheehan at least 2 weeks before arrival to issue the permit.

**Risk Assessment**

CPS has completed a risk assessment for this project's work in Alaska. Please see appendix.

## ALLOCATIONS AND SERVICES - GREENLAND

### Allocations from Inventory

Qty/Unit	Item
2	Ski-doo's while at Raven/DYE-2
2	Siglin sleds while at Raven/DYE-2

### Other Services

Service	Comments
ANG coordination: pax and cargo to SFJ	
User days – KISS and Raven Camp	
ANG Tickets SFJ><Raven Camp	Three people
Freight SFJ><Raven Camp	Snowmachines and sampling equipment
Freezer space in Kangerlussuaq for snow	Bringing 360 kg of snow samples from Raven

### Cargo

All cargo required for your project should arrive in Scotia, NY, **no later than 2 weeks prior** to the desired northbound Air National Guard (ANG) flight, must be entered into our online Cargo Tracking System, and must be properly registered with Customs.

For the most current ANG flight schedule go to <http://www.polar.ch2m.com/> and navigate to Greenland > Calendars/Schedules.

If you are a **new user** requiring access to the Cargo Tracking System, contact [Jason Buenning](#).

(If you need **technical support** with the Cargo Tracking System, contact [Mike Dover](#) .

Customs instructions are available on our Web site at <http://www.polar.ch2m.com/> (go to Greenland > Customs). More information is available via the *Greenland Guide*, under Greenland on the CPS site.

The following is our current understanding of your overall cargo requirements:

### Cargo List

Items	Weight (lbs)	Cubic feet
Snow sampling and analysis equipment	50	5.8
Microwave oven for melting snow samples	40	5.2
ASD Spectroradiometer	80	4.0
Snow grain photography equipment	60	5.8
ASD sled	40	5.6
Tents and sleeping bags	80	5.8
Cooking and survival equipment	80	5.8
TOTAL	430	38

For the most up-to-date information on the project's schedule, please view the online Greenland calendar (<http://www.polar.ch2m.com/> > Greenland > Calendars/Schedules).

## SAFETY, ENVIRONMENT, HEALTH and PERMITS

Effective January 1, 2010 the Government of Greenland assumed responsibility for the permitting process for research in Greenland. All science teams planning to conduct research in Greenland must complete an **annual application** in order to obtain approval from the Government of Greenland. The application forms are available from the Department of Domestic Affairs, Nature and Environment at <http://www.nanog.gl/expeditions> or by sending an email to [ekspeditioner at gh.gl](mailto:ekspeditioner@gh.gl). Applications are submitted directly through the Department of Domestic Affairs, Nature and Environment. Be advised that a new fee of 4000 DKK has been put in place for permits. For assistance with the application process, contact:

Martin Schiøtz  
 Head of Section  
 Section of Nature  
 Department of Domestic Affairs, Nature and Environment P.O. Box 1614  
 3900 Nuuk  
 Greenland  
 e-mail: [ekspeditioner at gh.gl](mailto:ekspeditioner@gh.gl)

**Risk Assessment**

CPS has completed a risk assessment for this project's work in Greenland. Please see appendix.

**PROJECT CONTACT INFORMATION**
**Research Team**

Role	Name	Email	Phone / Fax
Co-PI	Antony Clarke	<a href="mailto:tclarke@soest.hawaii.edu">tclarke at soest.hawaii.edu</a>	808 956.6215 /808 956.7112
Co-PI	Thomas Grenfell	<a href="mailto:tcg@atmos.washington.edu">tcg at atmos.washington.edu</a>	206 543.9411 /206 543.0308
Principal Investigator	Stephen Warren	<a href="mailto:sgw@atmos.washington.edu">sgw at atmos.washington.edu</a>	206 543.7230

**Support Team Members**

Contact for	Name	Email	Primary Phone(s)
<b>Alaska Support Team Contact Information</b>			
New science requests, scope changes to existing requests – CPS	Steve Hastings	<a href="mailto:steve@polarfield.com">steve at polarfield.com</a>	907.852.0904 (v) 907.388.0565 (c)
Expense reimbursements, BTS and BASC liaison - CPS	Faustine Mercer	<a href="mailto:faustine@polarfield.com">faustine at polarfield.com</a>	907.852.0904 (v) 907.750.1772 (c)
Barrow on the ground representative - BTSPS	Russell Snyder	<a href="mailto:Russell.Snyder@ukpik.com">Russell.Snyder at ukpik.com</a>	907.855.0374 (c)
Lodging and lab assignments – BASC	Bryan Thomas	<a href="mailto:bryan.thomas@arcticscience.org">bryan.thomas at arcticscience.org</a>	907.852.0903 (v) 907.367.3797 (c)
Station Management, Vehicles, Field Equipment, Temporary Labor - BASC	Lewis Brower	<a href="mailto:lewis.brower@arcticscience.org">lewis.brower at arcticscience.org</a>	907.852.0905 (v) 907.367.3813 (c)
IT Support - BASC	Brad Heaston	<a href="mailto:brad.heaston@arcticscience.org">brad.heaston at arcticscience.org</a>	907.852.0902 (v) 907.367.3836 (c)
Chief Scientist; Permitting and Local Community coordination – BASC	Glenn Sheehan	<a href="mailto:basc@arcticscience.org">basc at arcticscience.org</a>	907.852.4881 (v) 907.367.3815 (c)
<b>Greenland Support Team Contact Information</b>			
Thule science planning & support	Kim Derry	<a href="mailto:Kim@polarfield.com">Kim at polarfield.com</a>	Denver: 303.349.6382
Kangerlussuaq base operations	Kathy Young	<a href="mailto:Kathy@polarfield.com">Kathy at polarfield.com</a>	Denver: 720.320.6160 Greenland: 011.299.524218
Scotia (Stratton Air Base) operations & customs	Earl Vaughn	<a href="mailto:Earl.Vaughn@gmail.com">Earl.Vaughn at gmail.com</a>	Scotia cell: 518.605.0979

**Offices for Alaska Support**

Barrow/CPS	Barrow/BASC	BTSPS	Fairbanks/CPS
CH2M HILL Polar Services 360 NARL St. Room L-203 Box 947 Barrow, AK 99723	BASC 360 NARL St. Room L-206 Box 577 Barrow, AK 99723 T:907.852.4881 F:907.852.4882	615 E. 82 <sup>nd</sup> Ave. Suite 300 Anchorage, AK 99518 T:907.273.1817	CH2M HILL Polar Services Alaska Office 2325 King Rd. Fairbanks, AK 99709 T:907.455.4214 F:907.455.4126

**Offices for Greenland Support**

Kangerlussuaq	Scotia
CH2M HILL Polar Services Attn: Name of Employee/Researcher Postboks 1015 DK-3910 Kangerlussuaq, Greenland Tel: 011.299.841598 Fax: 011.299.841599	Earl Vaughn C/O 109 <sup>th</sup> Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Cell: 518.605.0979 Fax: 518.344.2537

**CPS/PFS Office**

Denver/CPS
CH2M HILL Polar Services Western Office 8110 Shaffer Pkwy Suite150 Littleton, CO 80127 T:303.984.1450 F 303.984.1445

**Other**

Organization	Internet	Phone
Medical Advisory Service (MAS) (see below for Remote Telemed #)	<a href="http://www.medaire.com/corp_medlink.html">http://www.medaire.com/corp_medlink.html</a>	Office: 480.333.3771

## CRITICAL SUCCESS FACTORS

During the planning stages for your project, your CPS PMs will work with you to identify the most crucial factors that must be in place upon your arrival. These factors will be documented in the below table. We track these factors in order to measure the success of CPS' support. Examples might be the availability of the helicopter or condition of camp gear

Location (AK/GL/Both)	Factor
Greenland	Freezer space in Kangerlussuaq July 19 - August 18 for 360 snow samples of 1 kg each to be brought from Raven
Alaska	Lab space and freezer space available upon arrival and freight in the lab Please notify when freight gets to Barrow
	Snowmachines, sleds, and other equipment for transportation to and operation at field sites available when needed

## GOVERNMENT AND PERFORMANCE REPORTING ACT OF 1993 (GPRA)

NSF/OPP requires your help in complying with the Government Performance and Reporting Act of 1993 (GPRA). One measure of CPS' performance is a "facility-performance metric" which counts the number of productive days your project has in the field while relying on CPS facilities or support. Please keep track of any "lost days" and report these to us at the end of the season.

## APPENDICES

**Risk Factors and Mitigation – Alaska**  
**Risk Factors and Mitigation – Greenland**

### **RISK FACTORS and MITIGATION - ALASKA**

<b>Factor</b>	<b>Mitigation and Control</b>
Bears	<ul style="list-style-type: none"> <li>-Hire Native guides (Provide clear expectations/procedure)</li> <li>-Install bear fence. Designate a fence monitor to check daily.</li> <li>-Carry radios to alert others to bear in area.</li> <li>-Develop a plan for bear in or near camp</li> <li>-Keep a clean camp</li> <li>-Participate in bear safety training</li> <li>-Carry bear spray</li> <li>-Use bear Containers</li> </ul>
Sea/Lake Ice Travel	<ul style="list-style-type: none"> <li>-Participate in sea/lake ice training</li> <li>-Have a SAR plan in place</li> <li>-Have a communication plan in place</li> <li>-Maintain proper rescue equipment and knowledge how to use it</li> <li>-Hire an ice safety expert</li> </ul>
Snowmobile Travel	<ul style="list-style-type: none"> <li>-Participate in a snowmobile training</li> <li>-Have SAR plan in place</li> <li>-Use appropriate Personal Protection Equipment/helmets</li> <li>-Carry Survival Gear on extended trips</li> <li>-Use radio communications between snowmachines</li> <li>-Carry a PLB (Personal Locator Beacon)</li> <li>-Carry a GPS (Global Positioning System) unit</li> </ul>
Cold Related Injuries- weather	<ul style="list-style-type: none"> <li>-Team members participate in a cold weather injury training course such as Wilderness First Aid or Wilderness First Responder</li> <li>-Wear proper clothing</li> <li>-Appropriate camping gear, insure sleeping bags are adequately rated</li> <li>-Check the forecast before going out of camp/town</li> <li>-Watch the weather while out</li> <li>-Be mindful of hydration, carry sufficient food</li> <li>-Develop and share your travel plans</li> <li>-Have and share an emergency plan for bad weather</li> </ul>
Drills/augers	Participate in drill/auger training
Hazardous Material-Haz Comm SMS (Safety Management Standard)	<ul style="list-style-type: none"> <li>-Haz Comm SMS (Safety Management Standard)</li> <li>-Identify items for hazardous material transportation</li> <li>-Review MSDS (Material Safety Data Sheet)</li> </ul>
Truck Travel	<ul style="list-style-type: none"> <li>-Participate in truck training</li> <li>-Do not ride in the bed of the truck</li> <li>-Insure the truck has spare tire and jack for extended trips</li> <li>-Carry survival gear and warm clothes for extended trips</li> <li>-Carry a radio for extended trips</li> </ul>

**RISK FACTORS and MITIGATION – GREENLAND**

<b>Factor</b>	<b>Mitigation &amp; control</b>
Cold Weather	<ul style="list-style-type: none"> <li>-Cold Weather injury training (WFR)</li> <li>-Proper clothing</li> <li>-Appropriate camping gear</li> <li>-Check forecast before going out of camp/town.</li> </ul>
Fixed Wing Travel	<ul style="list-style-type: none"> <li>-SAR plan in place</li> <li>-Pilot briefing</li> </ul>
Snowmobile Travel	<ul style="list-style-type: none"> <li>-Snowmobile training</li> <li>-SAR plan in place</li> </ul>
Structure Fire	<ul style="list-style-type: none"> <li>-Fire extinguishers available</li> <li>-SAR in place for remote camps</li> </ul>