

Please review all of the following information, including the gear allocations and field team information, to ensure accuracy. This plan is an agreement between CH2M HILL Polar Services (CPS) and your group, documenting the logistics support you will receive.

PROJECT INFORMATION

Lead Principal Investigator	Konrad Steffen
Institute	University of Colorado, Boulder, Cooperative Institute for Research in Environmental Sciences
Project Title / Grant #	Surface Processes of the Greenland Ice Sheet Under a Warming Climate (NASAAWS)
NSF Program and Manager	Other Agency - NASA, Dr. Thomas Wagner
PFS Project Manager	Susan Zager

LOGISTICS SUMMARY

In 1995, the PI began to develop a network of Automated Weather Sites (AWS) on the Greenland ice cap. Each year since then, a team of four to five travels to the project's sites via Twin Otter for maintenance, repairs, and upgrades. Additionally, the team tent-camps at Swiss Camp for several weeks to conduct more intensive measurements related to the state of the ice sheet. These include monitoring ablation in the Jakobshavn region (in collaboration with Dr. Jay Zwally [NASA-GSFC]); measuring accumulation variability, mass transfer, and surface energy balance. During most years, the PI has additional activities, as follows:

In 2007, one of the PI's students visited Summit Station (traveling to/from via Kangerlussuaq) to install a thermistor string to capture hourly temperature profiles in the upper ~100 m of ice. The work was done to prepare for a large IPY collaborative project whose researchers plan to conduct traverses in Antarctica from 2007 - 2009 (PI Ted Scambos, University of Colorado, NSF grant 0538103). The PI's graduate student also flew a NOAA-funded UAV experiment based from Ilulissat to collect high-resolution laser data around Swiss Camp during the pre-melt and melt season. These data will help researchers calculate surface water storage on the ice sheet.

In 2008, the PI's student again flew a UAV equipped with laser instruments to collect high-resolution data about surface water storage.

In 2009, the PI hosted two media visits in addition to science research:

1. MISCHIEF FILMS, Austrian documentary film about Albert Schweitzer. The crew spent one day/not with the Steffen team during the southern AWS maintenance trip.
2. National Geographic documentary called "The Big Picture." The crew visited Swiss Camp for several days in early May.

In 2010, the PI will do the following during a one-month deployment, late-April to mid-May:

AWS Maintenance
 The researchers will maintain the automatic weather station network. In the south, they will service the Dye-II, Saddle, NASA SE and S-Dome stations, and during the Swiss Camp put in the CP1 and NASA-U stations. See the flight plan for a complete list of sites.

While at Swiss Camp, the team will service the profile JAR2, JAR1, and CU/ETH. CPS note: Though this is a NASA project, NSF provides 50% of the logistics funding support.

Swiss Camp Research
 The research team will continue the effort to monitor ablation along a transect from Swiss Camp to the ice margin. The Swiss Camp team will service eight receivers in the GPS network in collaboration with Dr. Jay Zwally (NASA-GSFC). They will continue to collect high-resolution surface topography data using Trimble Pathfinder differential GPS measurements along several transects in the lower ablation region. In addition, they will acquire

a set of QuickBird satellite imagery during the onset of melt and the melt period to monitor the spatial variation and extent of snow fields, lakes, and surface hydrological channels in the ablation region.

NEEM-associated shallow cores

In 2010, DRI's Joe McConnell will join the AWS maintenance visits to Humboldt and TUNU to drill shallow cores for analysis related to the NEEM deep drilling project (0909541). See the support plan for Dr. McConnell's project for more information.

In addition to the spring work, the PI may return for additional work in the summer. This work, likely handled by direct bill between the PI's institute and CPS, is TBD.

CPS will support the team by arranging travel/lodging for both the NSF-supported (50% of AWS work) and cost-reimbursable (all other NASA) portions of the fieldwork. CPS also will provide camping gear (), fuel, safety and communications equipment. The PI will make all other arrangements himself and pay for them with NASA funds.

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=NASAAWS

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

OUTSTANDING ACTIONS AND NOTES

Issue	Responsibility	Date Completed
Review support plan for accuracy and distribute to all field team members	PI	
Obtain all necessary permits for fieldwork	PI	01 Apr 10
Visit all hyperlinks and review all documents referred to in the support plan	Entire Field Team	
For NASA project support, provide cost estimate for interagency transfer	CPS	Completed
Provide end-of-season actual costs		
<ul style="list-style-type: none"> Develop plan for additional summer work Provide cost estimate for billable support Develop a purchase order with CPS prior to field work Update season plan to include information on direct bill work, as needed Provide bill for actual support 	PI/CPS PI CPS/PI CPS	
Note: Passports are required for Air National Guard and international travel. Also, please bring TWO copies of your passport to Greenland with you.	PI	
Complete Critical Success Factors	CPS	
Complete planning for summer work; revise/distribute plan as needed	PI and CPS	

ALLOCATIONS AND SERVICES

Allocations from Inventory

Project	Quant/Unit	Item
Both	2	Iridium phones (1 AWS / 3 Swiss Camp)
Both	1	Medical kit
AWS	1	PLB
AWS	1	Coleman stove

AWS	1	Coleman fuel, gal
AWS	1	Kitchen box
AWS	2	Snow shovels
AWS	1	Aluminum Ladder
Swiss	3	Arctic Oven tent
Swiss	1	Nansen sledge (will return SFJ at end of field season)
Swiss	1	Ice drill for placing aluminum poles into the ice ~1m deep (will return SFJ)
Swiss	3	Gasoline/benzene, 55 gal drum
Swiss	6	Propane, 100# cylinders
Swiss	1	Two-cycle oil for skidoo mix, gal

For more information on satellite phones, radios, manuals and other field communications support, please visit the CPS communications Web site at <http://www.polar.ch2m.com/> .

CPS will provide the following support on a direct-billable basis.

CPS will provide the following support. With the exception of those associated with the summer work (which is TBD), all costs related to Swiss Camp work and 50% of AWS costs will be recouped via an interagency funds transfer between **NASA and NSF**. **Please see Appendix for an estimated cost.**

Other Services

Service	Comments
ANG clearances	All will use the ANG flights;
Twin Otter charters	AWS / Swiss
KISS, Ilulissat and Summit user days	AWS / Swiss
Thule lodging	No charge
Fuels as described in inventory list	Swiss
Helicopter support	Direct Bill component
Cargo	NY><SFJ AWS, Swiss

LOCATION INFORMATION

Please visit <http://www.polar.ch2m.com/> and navigate to the Greenland menu for en route and location-specific Greenland information. Prior to deployment, your entire field team should be familiar with the content of the *Greenland Guide* and, if traveling to Summit, with the guidelines provided in the *Summit Users' Guide*. Both are available electronically via our Web site's Greenland menu.

CARGO AND CUSTOMS

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 Buening](#).

(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/Cube
Snow machine	900 lbs.
Lumber	500 lbs.
AWS equipment, batteries	300 lbs.
Camping gear	500 lbs.

SUPPORT SCHEDULE

Approx Date	Location	Activity
26 Apr 10	NY, Kanger	Steffen, Colgan, McGrath, Bayou
27 Apr 10	No. AWS	6 PAX (Steffen, McGrath, Colgan, Bayou, McConnell, Kyne). Cargo: McConnell 400 lbs., Steffen 875 lbs. SFJ – GITS, Extend tower (4 hr stop) GITS – Thule overnight
28 Apr 10	Humbolt-NEEM	6 PAX (Steffen, McGrath, Colgan, Bayou, McConnell, Kyne). Cargo: McConnell 400 lbs. Steffen 875 lbs. Thule –Humboldt Extend tower and ice core (4 hr stop) Humboldt – NEEM download data, (1 hr stop) NEEM – Qaanaaq overnight
29 Apr 10	Petermann	6 PAX (Steffen, McGrath, Colgan, Bayou, McConnell, Kyne). Cargo: McConnell 400 lbs. Steffen 875 lbs. Qaanaaq–Petermann ELA, upgrade tower/electronics (4 hr stop) Petermann – Thule
30 Apr 10	Tunu-N	6 PAX (Steffen, McGrath, Colgan, Bayou, McConnell, Kyne). Cargo: McConnell 400 lbs. Steffen 875 lbs. Thule –Tunu-N, (upgrade tower /drill core) Tunu-N-Summit overnight
01 May 10	NASA-E, Summit	6 PAX (Steffen, McGrath, Colgan, Bayou, McConnell, Kyne). Cargo: McConnell 400 lbs. Steffen 875 lbs. Summit – Tunu-N Tunu-N – NASA-E (upgrade tower/ ice core, 4 hr stop) NASA-E – Summit, download AWS (1 hr) Summit overnight
02 May 10	NGRIP	6 PAX (Steffen, McGrath, Colgan, Bayou, McConnell, Kyne). Cargo: McConnell 400 lbs. Steffen 875 lbs. Summit – NGRIP, upgrade tower/ ice core (4 hr stop) NGRIP – SFJ SFJ overnight
03-04 May 10	SFJ	Potential weather days
05 May 10	Southern AWS	4 PAX (Steffen, McGrath, Colgan, Bayou). Cargo: 875 lbs. SFJ – Saddle, download AWS, 2 hr stop Saddle – NASA SE, download AWS, 2 hr stop NASA SE – Dye2, download AWS, 2 hrs Overnight SFJ
06 May 10	SFJ	Potential weather day
10 May 10	SFJ	Rial arrives
07 May 10	Swiss Camp	5 PAX (Steffen, McGrath, Colgan, Bayou, Rial). Cargo TBD SFJ – Swiss Camp

		Swiss Camp – Up50 50 download GPS Up50 – CP1 45 3 pax will stay at CP1 and work at AWS CP1 – SFJ Twin Otter return with old cargo from SC
18-19 May10	Swiss Camp	5 PAX (Steffen, McGrath, Colgan, Bayou, Rial). Swiss Camp pull out; exact day TBD.
21 May 10	SFJ > NY	Team departs via 109th
TBD	NY>SFJ	PI and xx return for summer work, plans TBD

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).

FIELD TEAM INFORMATION

Name	Email
Bayou, Nicholas	bayou_nicolas@yahoo.com
Colgan, William	William.Colgan@Colorado.EDU
Kyne, Jay	jaykyne@hotmail.com
McConnell, Joseph	jmconn@dri.edu
McGrath, Daniel	daniel.mcgrath@colorado.edu
Rial, Jose	jar@email.unc.edu
Steffen, Konrad	konrad.steffen@colorado.edu

PROJECT CONTACT INFORMATION

Research Team

Role	Name	Email	Phone / Fax
Principal Investigator	Konrad Steffen	konrad.steffen@colorado.edu	303 492.4524 /303 492.1149

CPS Team Members

Contact for	Name	Email	Primary Phone
Greenland science planning & support	Susan Zager	Susan@polarfield.com	Denver: 720.320.6159
Greenland science planning & support	Robin Abbott	Robin@polarfield.com	Denver: 303.748.8507
Summit science planning & support	Katrine Gorham	Katrine@polarfield.com	Denver: 303.349.2884
Thule science planning & support	Kim Derry	Kim@polarfield.com	Denver: 303.349.6382
Kangerlussuaq base operations	Kathy Young	Kathy@polarfield.com	Denver: 720.320.6160 Greenland: 011.299.524218
Scotia (Stratton Air Base) operations & customs	Earl Vaughn	Earl.Vaughn@gmail.com	Scotia cell: 518.605.0979
Sat phones & comms	Roy Stehle	Roy.Stehle@sri.com	Menlo Park: 650.859.2552
Remote Medical (kits & service) and Medical/Dental Clearance (PQ)	Robbie Score	Robbie@polarfield.com	Denver: 303.906.0093

CPS Offices

Denver	Kangerlussuaq	Scotia
Polar Field Services 8110 Shaffer Parkway Suite 150 Littleton, CO 80127 Tel: 303.984.1450/1439 Fax: 303.984.1445	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 th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Cell: 518.605.0979 Fax: 518.344.2537

Summit Station

Winter	Summer
Polar Field Services Attn: Name of Employee/Researcher 8110 Shaffer Parkway Suite 150 Littleton, CO 80127 Tel: 303.984.1450/1439 Fax: 303.984.1445	CH2M HILL Polar Services Attn: Name of Employee/Researcher - Summit Station C/O Earl Vaughn 109 th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Fax: 518.344.2537

Other

Organization	Internet	Phone
Medical Advisory Service (MAS) (see below for Remote Telemed #)	http://www.medaire.com/corp_medlink.html	Office: 480.333.3771
Summit Science Coordination Office (SCO)	http://www.geosummit.org sco at summitcamp.org	John Burkhart +47 96 82 5011

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.nanoq.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)

Medical Clearance

Arctic Program participants traveling into the Greenland field generally must pass a National Science Foundation-mandated physical and dental exam. All field team members should plan to complete their Physical Qualification (medical and dental clearance) process 6-8 weeks prior to travelling to Greenland. For more information, refer to CPS' *Greenland Guide*, available at <http://www.polar.ch2m.com/> under Greenland.

Medical Advisory Service (MAS) Support

If you need medical advice/assistance, do not hesitate to contact Medical Advisory Service (MAS) using the card included with the medical kit or the information below. Be sure that each team member knows where the kit is located and understands how to use the MAS service in the field. For further information on MAS, please visit our Web site <http://www.polar.ch2m.com/> and navigate to Medical>Remote Medical Services/Kits.

MAS 24/7 Telemed Service

Worldwide Phone: 1.480.333.3876
 Fax: 1.480.333.3821
 Member ID: CH2M HILL Polar Services

RISK ASSESSMENT

See Appendix for Risk Factors and Mitigation.

CRITICAL SUCCESS FACTORS

Please list the factors that are most important for the success of your science. We track these factors in order to measure the success of CPS' support. Examples might be the availability of the helicopter or camp gear.

Factors
NASA SWISS CAMP
Planning field season prior to field deployment
Purchasing fuels and gas for field camp
Cargo shipment via 109th to/from SFJ
Logistics support arranging Twin Otter charter
Logistics support in Kangerlussuaq prior to field work
Communication support during AWS maintenance in the field
Office support at KISS (email, fax, phone)
AWS SUPPORT
Planning field season prior to field deployment
Cargo shipment via 109th to/from SFJ
Logistics support arranging Twin Otter charter
Logistics support in Kangerlussuaq prior to field work
Field equipment and camp equipment support
Communication support during field project
Office support at KISS (email, fax, phone)
Post-expedition briefing and feed back

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**
- Site Names and Locations**

RISK FACTORS and MITIGATION

Factor	Mitigation and Control
Cold Weather	<ul style="list-style-type: none"> -Team members attend a cold weather injury training course such as Wilderness First Aid or Wilderness First Responder -Proper clothing -Appropriate camping gear, insure sleeping bags are adequately rated
Drills/augers	Drill/auger training/review from previous years experience
Fixed Wing Travel	<ul style="list-style-type: none"> -SAR plan in place -Attend a pilot briefing -Carry survival bags on the aircraft if doing day trips, or if multiple put in flights insure people travel with survival items from camp supplies
Heavy lifting/body strains and sprains	-Use proper lifting techniques
High Altitude	<ul style="list-style-type: none"> -Have SAR plan in place -Have oxygen available in high altitude camps -Develop plan to acclimatize -Consult with physician on use of medication for acclimatization

SITE NAMES AND LOCATIONS

Station Name	Latitude, Longitude, Altitude (m)
Swiss Camp	69 33' 49" N 49 20' 09" W 1122
Crawford Pt.	69 52' 37" N 47 00' 12" W 2004
Summit	72 34' 46" N 38 30' 19" W 3208
DYE-2	66 28' 50" N 46 16' 59" W 2099
Saddle	65 59' 59" N 44 30' 04" W 2499
S Dome	63 08' 56" N 44 49' 02" W 2901
GITS	77 08' 15" N 61 02' 28" W 1869
NASA U	73 50' 29" N 49 30' 25" W 2334
NASA SE	66 28' 45" N 42 29' 56" W 2373
Humboldt	78 31' 37" N 56 50' 10" W 2000
Petermann ELA	80 05' 02" N 58 04' 02" W 1180
NEEM	77 30' 09" N 50 52' 27" W 2450
Qaanaak	77 29' 14" N 69 23' 19" W 0
Thule	76 31' 49" N 68 44' 07" W 0
Up50	69 44' 51" N 48 07' 46" W 1700
N70	70 12' 22" N 49 30' 01" W 1169
Tunu-N	78 00'59"N, 33 59'00"W
NASA-E	75 00'02"N, 29 59' 50"W
NGRIP	75 05'58"N, 42 19'59"W
Crawford Pt.	69 52'42"N, 46 59'48"W
Danmarkshavn	76° 46' 0" North, 18° 40' 0" W