Note: A copy of Contract OPP 0000373 follows. Proprietary information (financial information) has been withheld under Exemption 4 of the FOIA. Further, Raytheon Technical Services' proposal has not been set forth or incorporated by reference in the contract between NSF and Raytheon and is thus exempt from disclosure under Exemption 3 of the FOIA. The National Defense Authorization Act for Fiscal Year 1997 (Public Law No. 104-201), Section 821(b), specifically amended Section 303B of the Federal Property and Administrative Services Act of 1949 (41 U.S.C. §253b) to prohibit disclosure of civilian procurement contract proposals (including technical, management or cost proposals) unless the proposal is specifically set forth or incorporated by reference into the contract.

AWARD/CONTRACT	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350) ☑	RATING	PAGE OF PAGES 1 | 236+
2. CONTRACT (Proc. Inst. Ident.) NO. OPP 0000373	3. EFFECTIVE DATE November 1, 1999	4. REQUISITION / PURCHASE REQUEST/ PROJECT NO. OPP 98001	

5. [redacted] BY CODE

National Science Foundation
CPO - Contracts Branch
4201 Wilson Boulevard, Suite 475
Arlington, VA 22230

6. ADMINISTERED BY (If other than Item 5) CODE

7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP Code)

Raytheon Polar Services Company
8614 Westwood Center Drive
Vienna, VA 22182

CODE FACILITY CODE

8. DELIVERY
☐ FOB ORIGIN ☐ OTHER (See below)

9. DISCOUNT FOR PROMPT PAYMENT

10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN: ☑ ITEM Item 12

11. SHIP TO / MARK FOR

12. PAYMENT WILL BE MADE BY CODE
NSF/DFM
4201 Wilson Blvd, #575
Arlington, VA 22230

13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION:
☐ 10 U.S.C. 2304 (c) ( ) ☐ 41 U.S.C. 253 (c) ( )

14. ACCOUNTING AND APPROPRIATION DATA

15A. ITEM NO.	15B. SUPPLIES / SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
[redacted]	see Section B2				
				15G. TOTAL AMOUNT OF CONTRACT ☑	$ 576,665,452

16. TABLE OF CONTENTS

(X)	SEC.	DESCRIPTION	PAGE(S)	(X)	SEC.	DESCRIPTION	PAGE(S)
		PART I ⊘ THE SCHEDULE				PART II ⊘ CONTRACT CLAUSES	
	A	SOLICITATION/CONTRACT FORM			I	CONTRACT CLAUSES	
	B	SUPPLIES OR SERVICES AND PRICES/COSTS				PART III ⊘ LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.	
	C	DESCRIPTION/SPECS./WORK STATEMENT			J	LIST OF ATTACH MENTS	
	D	PACKAGING AND MARKING				PART IV ⊘ REPRESENTATIONS AND INSTRUCTIONS	
	E	INSPECTION AND ACCEPTANCE			K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
	F	DELIVERIES OR PERFORMANCE			L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
	G	CONTRACT ADMINISTRATION DATA			M	EVALUATION FACTORS FOR AWARD	
	H	SPECIAL CONTRACT REQUIREMENTS					

CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. ☒ CONTRACTOR'S NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return 3 copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. *(Attachments are listed herein.)*

18. ☐ AWARD *(Contractor is not required to sign this document.)* Your offer on Solicitation _____, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.

9A. [redacted]NAME AND TITLE OF SIGNER	20A. NAME OF CONTRACTING OFFICER
[redacted]nthia L. Hyland; Vice President, Contracts	William A. Bryant; Contracting Officer
9B. NAME OF CONTRACTOR / BY Cynthia L. Hyland (Signature of person authorized to sign)	19C. DATE SIGNED Oct. 28, 1999
20B. UNITED STATES OF AMERICA / BY Wm A Bryant (Signature of Contracting Officer)	20C. DATE SIGNED 10/28/99

OPP-0000373 Errata Sheet:

1. In Block 14 of the contract cover page (SF 26) include the following accounting and appropriations data:

   01020200-5140-02XX-2542 Increase: $10,000,000

2. In Section B5, *Contract Funding*, include the following table:

Element	Existing	Adjustments	OPP-0000373	Subtotals
Est. Cost	$0	$0	$9,794,040	$9,794,040
Billable Fee	$0	$0	$205,960	$205,960
Award & Base Fees	$0	$0	$0	$0
Total Allotted	$0	$0	$10,000,000	$10,000,000

It is estimated that these funds are sufficient for the performance of work through April 30, 2000.

TABLE OF CONTENTS

NSF CONTRACT NO. OPP-0000373

SCIENCE, OPERATIONS and MAINTENANCE SUPPORT
for the
UNITED STATES ANTARCTIC PROGRAM (USAP)

NOTICE

THE CONTRACTOR'S COMPLETED CERTIFICATIONS AND REPRESENTATIONS FROM SECTION K ARE HEREBY INCORPORATED BY REFERENCE IN THIS CONTRACT AWARD DOCUMENT.

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SECTION B – SUPPLIES OR SERVICES AND PRICES/COSTS

B1. SCHEDULE OF ITEMS

The Contractor shall provide science, operations and maintenance support services for the United States Antarctic Program (USAP), this nation's scientific research program in the Antarctic. The actual services provided shall be determined yearly in accordance with Program Plan accepted annually by NSF (refer to Section F).

B2. TOTAL ESTIMATED COST-PLUS-AWARD-FEE

CLIN	DESCRIPTION	AMOUNT
001	Total Estimated Cost (no fee) for the **Phase-In Period** – October 1, 1999 through March 31, 2000 (refer to §C10)	
002	Total Estimated Cost (except where noted) for **General Management** (refer to §C7.1):	
	Initial Period of Performance (April 1, 2000 through March 31, 2005)	
002.1	For the Period April 1, 2000 through March 31, 2001	
002.1.1001	Base Fee	
002.1.1002	Maximum Award Fee	
002.1.1000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 0002.1, 002.1.1000 and 002.1.1002)	
002.2	For the Period April 1, 2001 through March 31, 2002	
002.2.1001	Base Fee	
002.2.1002	Maximum Award Fee	
002.2.1000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 0002.2, 002.2.1001 and 002.2.1002)	
002.3	For the Period April 1, 2002 through March 31, 2003	
002.3.1001	Base Fee	
002.3.1002	Maximum Award Fee	
002.3.1000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 0002.3, 002.3.1001 and 002.3.1002)	
002.4	For the Period April 1, 2003 through March 31, 2004	

002.4.1001	Base Fee
002.4.1002	Maximum Award Fee
002.4.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.4, 002.4.1001 and 002.4.1002)
002.5	For the Period April 1, 2004 through March 31, 2005
002.5.1001	Base Fee
002.5.1002	Maximum Award Fee
002.5.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.5, 002.5.1001 and 002.5.1002)
002.[illegible]	Total Estimated Cost for the Initial Period of Performance (sum 002.x where "x" equals 1 through 5)
002.[illegible]	Base Fee for the Initial Period of Performance (sum 002.x.1001 where "x" equals 1 through 5)
002.[illegible]	Maximum Award Fee for the Initial Period of Performance (sum 002.x.1002 where "x" equals 1 through 5)
002.[illegible]	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 002.x.2000 where "x" equals 1 through 5)
	Optional Period of Performance (April 1, 2005 through March 31, 2010)
002.6	For the Period April 1, 2005 through March 31, 2006
002.6.1001	Base Fee
002.6.1002	Maximum Award Fee
002.6.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.6, 002.6.1001 and 002.6.1002)
002.7	For the Period April 1, 2006 through March 31, 2007
002.7.1001	Base Fee
002.7.1002	Maximum Award Fee
002.7.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.7, 002.7.1001 and 002.7.1002)
002.8	For the Period April 1, 2007 through March 31, 2008
002.8.1001	Base Fee

002.8.1002	Maximum Award Fee
002.8.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.8, 002.8.1001 and 002.8.1002)
002.9	For the Period April 1, 2008 through March 31, 2009
002.9.1001	Base Fee
002.9.1002	Maximum Award Fee
002.9.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.9, 002.9.1001 and 002.9.1002)
002.10	For the Period April 1, 2009 through March 31, 2010
002.10.1001	Base Fee
002.10.1002	Maximum Award Fee
002.10.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 002.10, 002.10.1001 and 002.10.1002)
002.C.6	Total Estimated Cost for the Optional Period of Performance (sum 002.x where "x" equals 6 through 10)
002.C.6.Base Fee	Base Fee for the Optional Period of Performance (sum 002.x.1001 where "x" equals 6 through 10)
002.C.6.Award Fee	Maximum Award Fee for the Optional Period of Performance (sum 002.x.1002 where "x" equals 6 through 10)
002.C.6.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 002.x.2000 where "x" equals 6 through 10)
002.C.Total	Total Estimated Cost for the Period April 1, 2000 through March 31, 2010 (sum 002.x where "x" equals 1 through 10)
002.C.Base Fee	Base Fee for the Period April 1, 2000 through March 31, 2010 (sum 002.x.1001 where "x" equals 1 through 10)
002.C.Award Fee	Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 002.x.1002 where "x" equals 1 through 10)
002.C.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 002.x.2000 where "x" equals 1 through 10)
002	Total Estimated Cost (except where noted) for Logistics (refer to §C7.2)

Initial Period of Performance
(April 1, 2000 through March 31, 2005)

003.1	For the Period April 1, 2000 through March 31, 2001
003.1.1	Travel Services (refer to §C7.2.5)
003.1.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.1.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.1.4	South American Operations (refer to §C7.2.8)
003.1.5	Logistics Management (CONUS) (refer to §C7.2.9)
003.1.6	Antarctic Logistics Activities (refer to §C7.2.10)
003.1.1000	Subtotal (sum 003.1.1 through 003.1.6 plus all ODC's)
003.1.1001	Base Fee
003.1.1002	Maximum Award Fee
003.1.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.1.1000 through 003.1.1002)
003.2	For the Period April 1, 2001 through March 31, 2002
003.2.1	Travel Services (refer to §C7.2.5)
003.2.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.2.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.2.4	South American Operations (refer to §C7.2.8)
003.2.5	Logistics Management (CONUS) (refer to §C7.2.9)
003.2.6	Antarctic Logistics Activities (refer to §C7.2.10)
003.2.1000	Subtotal (sum 003.2.1 through 003.2.6 plus all ODC's)
003.2.1001	Base Fee
003.2.1002	Maximum Award Fee
003.2.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.2.1000 through 003.2.1002)
003.3	For the Period April 1, 2002 through March 31, 2003
003.3.1	Travel Services (refer to §C7.2.5)
003.3.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.3.3	Christchurch, NZ Operations (refer to §C7.2.7)

003.3.3	South American Operations (refer to §C7.2.8)
003.3.4	Logistics Management (CONUS) (refer to §C7.2.9)
003.3.5	Antarctic Logistics Activities (refer to §C7.2.10)
003.3.6000	Subtotal (sum 003.3.1 through 003.3.6 plus all ODC's)
003.3.1001	Base Fee
003.3.1002	Maximum Award Fee
003.3.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.3.1000 through 003.3.1002)
003.4	For the Period April 1, 2003 through March 31, 2004
003.4.1	Travel Services (refer to §C7.2.5)
003.4.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.4.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.4.4	South American Operations (refer to §C7.2.8)
003.4.5	Logistics Management (CONUS) (refer to §C7.2.9)
003.4.6	Antarctic Logistics Activities (refer to §C7.2.10)
003.4.6000	Subtotal (sum 003.4.1 through 003.4.6 plus all ODC's)
003.4.1001	Base Fee
003.4.1002	Maximum Award Fee
003.4.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.4.1000 through 003.4.1002)
003.5	For the Period April 1, 2004 through March 31, 2005
003.5.1	Travel Services (refer to §C7.2.5)
003.5.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.5.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.5.4	South American Operations (refer to §C7.2.8)
003.5.5	Logistics Management (CONUS) (refer to §C7.2.9)
003.5.6	Antarctic Logistics Activities (refer to §C7.2.10)
003.5.6000	Subtotal (sum 003.5.1 through 003.5.6 plus all ODC's)
003.5.1001	Base Fee

003.5.1002	Maximum Award Fee
003.5.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.5.1000 through 003.5.1002)
003.x.1000	Total Estimated Cost for the Initial Period of Performance (sum 003.x.1000 where "x" equals 1 through 5)
003.x.1001	Base Fee for the Initial Period of Performance (sum 003.x.1001 where "x" equals 1 through 5)
003.x.1002	Maximum Award Fee for the Initial Period of Performance (sum 003.x.1002 where "x" equals 1 through 5)
003.x.2000	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 003.x.2000 where "x" equals 1 through 5)
	Optional Period of Performance (April 1, 2005 through March 31, 2010)
003.6	For the Period April 1, 2005 through March 31, 2006
003.6.1	Travel Services (refer to §C7.2.5)
003.6.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.6.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.6.4	South American Operations (refer to §C7.2.8)
003.6.5	Logistics Management (CONUS) (refer to §C7.2.9)
003.6.6	Antarctic Logistics Activities (refer to §C7.2.10)
003.6.100	Subtotal (sum 003.6.1 through 003.6.6 plus all ODC's)
003.6.1001	Base Fee
003.6.1002	Maximum Award Fee
003.6.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.6.1000 through 003.6.1002)
003.7	For the Period April 1, 2006 through March 31, 2007
003.7.1	Travel Services (refer to §C7.2.5)
003.7.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.7.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.7.4	South American Operations (refer to §C7.2.8)

003.7.5	Logistics Management (CONUS) (refer to §C7.2.9)	[redacted]
003.7.6	Antarctic Logistics Activities (refer to §C7.2.10)	
003.7.1000	Subtotal (sum 003.7.1 through 003.7.6 plus all ODC's)	
003.7.1001	Base Fee	
003.7.1002	Maximum Award Fee	
003.7.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.7.1000 through 003.7.1002)	
003.8	For the Period April 1, 2007 through March 31, 2008	
003.8.1	Travel Services (refer to §C7.2.5)	
003.8.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)	
003.8.3	Christchurch, NZ Operations (refer to §C7.2.7)	
003.8.4	South American Operations (refer to §C7.2.8)	
003.8.5	Logistics Management (CONUS) (refer to §C7.2.9)	
003.8.6	Antarctic Logistics Activities (refer to §C7.2.10)	
003.8.1000	Subtotal (sum 003.8.1 through 003.8.6 plus all ODC's)	
003.8.1001	Base Fee	
003.8.1002	Maximum Award Fee	
003.8.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.8.1000 through 003.8.1002)	
003.9	For the Period April 1, 2008 through March 31, 2009	
003.9.1	Travel Services (refer to §C7.2.5)	
003.9.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)	
003.9.3	Christchurch, NZ Operations (refer to §C7.2.7)	
003.9.4	South American Operations (refer to §C7.2.8)	
003.9.5	Logistics Management (CONUS) (refer to §C7.2.9)	
003.9.6	Antarctic Logistics Activities (refer to §C7.2.10)	
003.9.1000	Subtotal (sum 003.9.1 through 003.9.6 plus all ODC's)	
003.9.1001	Base Fee	
003.9.1002	Maximum Award Fee	

003.9.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.9.1000 through 003.9.1002)
003.10	For the Period April 1, 2009 through March 31, 2010:
003.10.1	Travel Services (refer to §C7.2.5)
003.10.2	Pt. Hueneme Terminal Operations (refer to §C7.2.6)
003.10.3	Christchurch, NZ Operations (refer to §C7.2.7)
003.10.4	South American Operations (refer to §C7.2.8)
003.10.5	Logistics Management (CONUS) (refer to §C7.2.9)
003.10.6	Antarctic Logistics Activities (refer to §C7.2.10)
003.10.1000	Subtotal (sum 003.10.1 through 003.10.6 plus all ODC's)
003.10.1001	Base Fee
003.10.1002	Maximum Award Fee
003.10.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 003.10.1000 through 003.10.1002)
003.O.Cost	Total Estimated Cost for the Optional Period of Performance (sum 003.x.1000 where "x" equals 6 through 10)
003.O.BaseFee	Base Fee for the Optional Period of Performance (sum 003.x.1001 where "x" equals 6 through 10)
003.O.AwdFee	Maximum Award Fee for the Optional Period of Performance (sum 003.x.1002 where "x" equals 6 through 10)
003.O.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 003.x.2000 where "x" equals 6 through 10)
003.C.Cost	Total Estimated Cost for the Period April 1, 2000 through March 31, 2010 (sum 003.x.1000 where "x" equals 1 through 10)
003.C.BaseFee	Base Fee for the Period April 1, 2000 through March 31, 2010 (sum 003.x.1001 where "x" equals 1 through 10)
003.C.AwdFee	Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 003.x.1002 where "x" equals 1 through 10)
003.C.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 003.x.2000 where "x" equals 1 through 10)

004	Total Estimated Cost (except where noted) for Station and Ship Operations (refer to §C7.3)
	Initial Period of Performance (April 1, 2000 through March 31, 2005)
004.1	For the Period April 1, 2000 through March 31, 2001
004.1.1	McMurdo Station (refer to §C7.3.1)
004.1.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004.1.3	Palmer Station (refer to §C7.3.3)
004.1.4	Research Vessels
004.1.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)
004.1.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004.1.5	Station and Ship Operations Management (refer to §C7.3.5)
004.1.1000	Subtotal (sum 004.1.1 through 004.1.5 plus all ODC's)
004.1.1001	Base Fee
004.1.1002	Maximum Award Fee
004.1.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.1.1000 through 004.1.1002)
004.2	For the Period April 1, 2001 through March 31, 2002
004.2.1	McMurdo Station (refer to §C7.3.1)
004.2.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004.2.3	Palmer Station (refer to §C7.3.3)
004.2.4	Research Vessels
004.2.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)
004.2.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004.2.5	Station and Ship Operations Management (refer to §C7.3.5)
004.2.1000	Subtotal (sum 004.2.1 through 004.2.5 plus all ODC's)
004.2.1001	Base Fee
004.2.1002	Maximum Award Fee
004.2.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.2.1000 through 004.2.1002)

004 3	For the Period April 1, 2002 through March 31, 2003
004 3 1	McMurdo Station (refer to §C7.3.1)
004 3 2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004 3 3	Palmer Station (refer to §C7.3.3)
004 3 4	Research Vessels
004 3 4 1	Ice Breaking Research Vessel (refer to §C7.3.4)
004 3 4 2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004 3 5	Station and Ship Operations Management (refer to §C7.3.5)
004 3 1000	Subtotal (sum 004 3 1 through 004 3 5 plus all ODC's)
004 3 1001	Base Fee
004 3 1002	Maximum Award Fee
004 3 2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004 3 1000 through 004 3 1002)
004 4	For the Period April 1, 2003 through March 31, 2004
004 4 1	McMurdo Station (refer to §C7.3.1)
004 4 2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004 4 3	Palmer Station (refer to §C7.3.3)
004 4 4	Research Vessels
004 4 4 1	Ice Breaking Research Vessel (refer to §C7.3.4)
004 4 4 2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004 4 5	Station and Ship Operations Management (refer to §C7.3.5)
004 4 1000	Subtotal (sum 004 4 1 through 004 4 5 plus all ODC's)
004 4 1001	Base Fee
004 4 1002	Maximum Award Fee
004 4 2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004 4 1000 through 004 4 1002)
004 5	For the Period April 1, 2004 through March 31, 2005
004 5 1	McMurdo Station (refer to §C7.3.1)

004.5.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004.5.3	Palmer Station (refer to §C7.3.3)
004.5.4	Research Vessels
004.5.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)
004.5.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004.5.5	Station and Ship Operations Management (refer to §C7.3.5)
004.5.1000	Subtotal (sum 004.5.1 through 004.5.5 plus all ODC's)
004.5.1001	Base Fee
004.5.1002	Maximum Award Fee
004.5.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.5.1000 through 004.5.1002)
004.x.000	Total Estimated Cost for the Initial Period of Performance (sum 004.x.1000 where "x" equals 1 through 5)
004.x.Base Fee	Base Fee for the Initial Period of Performance (sum 004.x.1001 where "x" equals 1 through 5)
004.x.Award Fee	Maximum Award Fee for the Initial Period of Performance (sum 004.x.1002 where "x" equals 1 through 5)
004.x.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 004.x.2000 where "x" equals 1 through 5)
	Optional Period of Performance (April 1, 2005 through March 31, 2010)
004.6	For the Period April 1, 2005 through March 31, 2006:
004.6.1	McMurdo Station (refer to §C7.3.1)
004.6.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004.6.3	Palmer Station (refer to §C7.3.3)
004.6.4	Research Vessels
004.6.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)
004.6.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004.6.5	Station and Ship Operations Management (refer to §C7.3.5)
004.6.1000	Subtotal (sum 004.6.1 through 004.6.5 plus all ODC's)

004.6.1001	Base Fee	
004.6.1002	Maximum Award Fee	
004.6.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.6.1000 through 004.6.1002)	
004.7	For the Period April 1, 2006 through March 31, 2007	
004.7.1	McMurdo Station (refer to §C7.3.1)	
004.7.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)	
004.7.3	Palmer Station (refer to §C7.3.3)	
004.7.4	Research Vessels	
004.7.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)	
004.7.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)	
004.7.5	Station and Ship Operations Management (refer to §C7.3.5)	
004.7.1000	Subtotal (sum 004.7.1 through 004.7.5 plus all ODC's)	
004.7.1001	Base Fee	
004.7.1002	Maximum Award Fee	
004.7.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.7.1000 through 004.7.1002)	
004.8	For the Period April 1, 2007 through March 31, 2008	
004.8.1	McMurdo Station (refer to §C7.3.1)	
004.8.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)	
004.8.3	Palmer Station (refer to §C7.3.3)	
004.8.4	Research Vessels	
004.8.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)	
004.8.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)	
004.8.5	Station and Ship Operations Management (refer to §C7.3.5)	
004.8.1000	Subtotal (sum 004.8.1 through 004.8.5 plus all ODC's)	
004.8.1001	Base Fee	
004.8.1002	Maximum Award Fee	
004.8.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum	

	004.8.1000 through 004.8.1002)
004.9	For the Period April 1, 2008 through March 31, 2009
004.9.1	McMurdo Station (refer to §C7.3.1)
004.9.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004.9.3	Palmer Station (refer to §C7.3.3)
004.9.4	Research Vessels
004.9.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)
004.9.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004.9.5	Station and Ship Operations Management (refer to §C7.3.5)
004.9.1.000	Subtotal (sum 004.9.1 through 004.9.5 plus all ODC's)
004.9.1001	Base Fee
004.9.1002	Maximum Award Fee
004.9.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.9.1000 through 004.9.1002)
004.10	For the Period April 1, 2009 through March 31, 2010
004.10.1	McMurdo Station (refer to §C7.3.1)
004.10.2	Amundsen-Scott South Pole Station (refer to §C7.3.2)
004.10.3	Palmer Station (refer to §C7.3.3)
004.10.4	Research Vessels
004.10.4.1	Ice Breaking Research Vessel (refer to §C7.3.4)
004.10.4.2	Antarctic Research and Supply Vessel (refer to §C7.3.4)
004.10.5	Station and Ship Operations Management (refer to §C7.3.5)
004.10.1000	Subtotal (sum 004.10.1 through 004.10.5 plus all ODC's)
004.10.1001	Base Fee
004.10.1002	Maximum Award Fee
004.10.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 004.10.1000 through 004.10.1002)
004.0.Cost	Total Estimated Cost for the Optional Period of Performance (sum 004.x.1000 where "x" equals 6 through 10)

004 C-Base Fee	Base Fee for the Optional Period of Performance (sum 004 x 1001 where "x" equals 6 through 10)
004 C-Awd Fee	Maximum Award Fee for the Optional Period of Performance (sum 004 x 1002 where "x" equals 6 through 10)
004 C-Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 004 x 2000 where "x" equals 6 through 10)
004 C-Cost	Total Estimated Cost for the Period April 1, 2000 through March 31, 2010 (sum 004 x 1000 where "x" equals 1 through 10)
004 C-Base Fee	Base Fee for the Period April 1, 2000 through March 31, 2010 (sum 004 x 1001 where "x" equals 1 through 10)
004 C-Awd Fee	Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 004 x 1002 where "x" equals 1 through 10)
004 C-Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 004 x 2000 where "x" equals 1 through 10)
005	Total Estimated Cost (except where noted) for Science Support (refer to § C7.4)
	Initial Period of Performance (April 1, 2000 through March 31, 2005)
005 1	For the Period April 1, 2000 through March 31, 2001
005 1.1	Science Support Process Management (refer to §C7.4.3)
005 1.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005 1.3	Science Program Technical Support (refer to §C7.4.5)
005 1.4	Field Party Support (refer to §C7.4.6)
005 1.5	Marine Science (refer to §C7.4.7)
005 1.6	Telecommunications (refer to §C7.4.8)
005 1.6000	Subtotal (sum 005.1.1 through 005.1.6 plus all ODC's)
005 1.1001	Base Fee
005 1.1002	Maximum Award Fee
005 1.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.1.1000 through 005.1.1002)
005 2	For the Period April 1, 2001 through March 31, 2002

005.2.1	Science Support Process Management (refer to §C7.4.3)
005.2.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.2.3	Science Program Technical Support (refer to §C7.4.5)
005.2.4	Field Party Support (refer to §C7.4.6)
005.2.5	Marine Science (refer to §C7.4.7)
005.2.6	Telecommunications (refer to §C7.4.8)
005.2.1000	Subtotal (sum 005.2.1 through 005.2.6 plus all ODC's)
005.2.1001	Base Fee
005.2.1002	Maximum Award Fee
005.2.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.2.1000 through 005.2.1002)
005.3	For the Period April 1, 2002 through March 31, 2003
005.3.1	Science Support Process Management (refer to §C7.4.3)
005.3.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.3.3	Science Program Technical Support (refer to §C7.4.5)
005.3.4	Field Party Support (refer to §C7.4.6)
005.3.5	Marine Science (refer to §C7.4.7)
005.3.6	Telecommunications (refer to §C7.4.8)
005.3.1000	Subtotal (sum 005.3.1 through 005.3.6 plus all ODC's)
005.3.1001	Base Fee
005.3.1002	Maximum Award Fee
005.3.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.3.1000 through 005.3.1002)
005.4	For the Period April 1, 2003 through March 31, 2004
005.4.1	Science Support Process Management (refer to §C7.4.3)
005.4.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.4.3	Science Program Technical Support (refer to §C7.4.5)
005.4.4	Field Party Support (refer to §C7.4.6)

005.4.5	Marine Science (refer to §C7.4.7)
005.4.6	Telecommunications (refer to §C7.4.8)
005.4.1000	Subtotal (sum 005.4.1 through 005.4.6 plus all ODC's)
005.4.1001	Base Fee
005.4.1002	Maximum Award Fee
005.4.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.4.1000 through 005.4.1002)
005.5	For the Period April 1, 2004 through March 31, 2005
005.5.1	Science Support Process Management (refer to §C7.4.3)
005.5.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.5.3	Science Program Technical Support (refer to §C7.4.5)
005.5.4	Field Party Support (refer to §C7.4.6)
005.5.5	Marine Science (refer to §C7.4.7)
005.5.6	Telecommunications (refer to §C7.4.8)
005.5.1000	Subtotal (sum 005.5.1 through 005.5.6 plus all ODC's)
005.5.1001	Base Fee
005.5.1002	Maximum Award Fee
005.5.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.5.1000 through 005.5.1002)
005.1.Cost	Total Estimated Cost for the Initial Period of Performance (sum 005.x.1000 where "x" equals 1 through 5)
005.1.Base Fee	Base Fee for the Initial Period of Performance (sum 005.x.1001 where "x" equals 1 through 5)
005.1.AwdFee	Maximum Award Fee for the Initial Period of Performance (sum 005.x.1002 where "x" equals 1 through 5)
005.1.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 005.x.2000 where "x" equals 1 through 5)
	Optional Period of Performance (April 1, 2005 through March 31, 2006)
005.6	For the Period April 1, 2005 through March 31, 2006
005.6.1	Science Support Process Management (refer to §C7.4.3)

005.6.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.6.3	Science Program Technical Support (refer to §C7.4.5)
005.6.4	Field Party Support (refer to §C7.4.6)
005.6.5	Marine Science (refer to §C7.4.7)
005.6.6	Telecommunications (refer to §C7.4.8)
005.6.1000	Subtotal (sum 005.6.1 through 005.6.6 plus all ODC's)
005.6.1001	Base Fee
005.6.1002	Maximum Award Fee
005.6.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.6.1000 through 005.6.1002)
005.7	For the Period April 1, 2006 through March 31, 2007
005.7.1	Science Support Process Management (refer to §C7.4.3)
005.7.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.7.3	Science Program Technical Support (refer to §C7.4.5)
005.7.4	Field Party Support (refer to §C7.4.6)
005.7.5	Marine Science (refer to §C7.4.7)
005.7.6	Telecommunications (refer to §C7.4.8)
005.7.1000	Subtotal (sum 005.7.1 through 005.7.6 plus all ODC's)
005.7.1001	Base Fee
005.7.1002	Maximum Award Fee
005.7.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.7.1000 through 005.7.1002)
005.8	For the Period April 1, 2007 through March 31, 2008
005.8.1	Science Support Process Management (refer to §C7.4.3)
005.8.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.8.3	Science Program Technical Support (refer to §C7.4.5)
005.8.4	Field Party Support (refer to §C7.4.6)
005.8.5	Marine Science (refer to §C7.4.7)

005.8.6	Telecommunications (refer to §C7.4.8)
005.8.1000	Subtotal (sum 005.8.1 through 005.8.6 plus all ODC's)
005.8.1001	Base Fee
005.8.1002	Maximum Award Fee
005.8.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.8.1000 through 005.8.1002)
005.9	For the Period April 1, 2008 through March 31, 2009
005.9.1	Science Support Process Management (refer to §C7.4.3)
005.9.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.9.3	Science Program Technical Support (refer to §C7.4.5)
005.9.4	Field Party Support (refer to §C7.4.6)
005.9.5	Marine Science (refer to §C7.4.7)
005.9.6	Telecommunications (refer to §C7.4.8)
005.9.1000	Subtotal (sum 005.9.1 through 005.9.6 plus all ODC's)
005.9.1001	Base Fee
005.9.1002	Maximum Award Fee
005.9.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 005.9.1000 through 005.9.1002)
005.10	For the Period April 1, 2009 through March 31, 2010
005.10.1	Science Support Process Management (refer to §C7.4.3)
005.10.2	Antarctic Laboratories and Observatories (refer to §C7.4.4)
005.10.3	Science Program Technical Support (refer to §C7.4.5)
005.10.4	Field Party Support (refer to §C7.4.6)
005.10.5	Marine Science (refer to §C7.4.7)
005.10.6	Telecommunications (refer to §C7.4.8)
005.10.1000	Subtotal (sum 005.10.1 through 005.10.6 plus all ODC's)
005.10.1001	Base Fee
005.10.1002	Maximum Award Fee
005.10.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum

005.10.1000 through 005.10.1002)

005.O-Cost — Total Estimated Cost for the Optional Period of Performance (sum 005.x.1000 where "x" equals 6 through 10)

005.O-BaseFee — Base Fee for the Optional Period of Performance (sum 005.x.1001 where "x" equals 6 through 10)

005.O-AwdFee — Maximum Award Fee for the Optional Period of Performance (sum 005.x.1002 where "x" equals 6 through 10)

005.O-Total — Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 005.x.2000 where "x" equals 6 through 10)

005.B-Cost — Total Estimated Cost for the Period April 1, 2000 through March 31, 2010 (sum 005.x.1000 where "x" equals 1 through 10)

005.B-BaseFee — Base Fee for the Period April 1, 2000 through March 31, 2010 (sum 005.x.1001 where "x" equals 1 through 10)

005.B-AwdFee — Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 005.x.1002 where "x" equals 1 through 10)

005.B-Total — Total Estimated Cost Plus Base and Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 005.x.2000 where "x" equals 1 through 10)

006 — Total Estimated Cost (except where noted) for **Information Technology and Communication Systems** (refer to §C7.5)

Initial Period of Performance
(April 1, 2000 through March 31, 2005)

006.1 — For the Period April 1, 2000 through March 31, 2001

006.1.1 — Reserved

006.1.2 — IT Management and Planning (refer to §C7.5.3)

006.1.3 — Technology Management (refer to §C7.5.4)

006.1.4 — Information Technology Systems Engineering (refer to §C7.5.5)

006.1.5 — Information Technology Infrastructure and Operations Support (refer to §C7.5.6)

006.1.6 — Customer Service and Science Support (refer to §C7.5.7)

006.1.7 — Electronic Dissemination of Information Content (refer to §C7.5.8)

006.1.8 — Technical Operations (refer to §C7.5.9)

006.1.1000	Subtotal (sum 006.1.1 through 006.1.8 plus all ODC's)
006.1.1001	Base Fee
006.1.1002	Maximum Award Fee
006.1.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.1.1000 through 006.1.1002)
006.2	For the Period April 1, 2001 through March 31, 2002
006.2.1	Reserved
006.2.2	IT Management and Planning (refer to §C7.5.3)
006.2.3	Technology Management (refer to §C7.5.4)
006.2.4	Information Technology Systems Engineering (refer to §C7.5.5)
006.2.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)
006.2.6	Customer Service and Science Support (refer to §C7.5.7)
006.2.7	Electronic Dissemination of Information Content (refer to §C7.5.8)
006.2.8	Technical Operations (refer to §C7.5.9)
006.2.1000	Subtotal (sum 006.2.1 through 006.2.8 plus all ODC's)
006.2.1001	Base Fee
006.2.1002	Maximum Award Fee
006.2.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.2.1000 through 006.2.1002)
006.3	For the Period April 1, 2002 through March 31, 2003
006.3.1	Reserved
006.3.2	IT Management and Planning (refer to §C7.5.3)
006.3.3	Technology Management (refer to §C7.5.4)
006.3.4	Information Technology Systems Engineering (refer to §C7.5.5)
006.3.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)
006.3.6	Customer Service and Science Support (refer to §C7.5.7)
006.3.7	Electronic Dissemination of Information Content (refer to

	§C7.5.8)	
006.3.8	Technical Operations (refer to §C7.5.9)	
006.3.1000	Subtotal (sum 006.3.1 through 006.3.8 plus all ODC's)	
006.3.1001	Base Fee	
006.3.1002	Maximum Award Fee	
006.3.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.3.1000 through 006.3.1002)	
006.4	For the Period April 1, 2003 through March 31, 2004	
006.4.1	Reserved	
006.4.2	IT Management and Planning (refer to §C7.5.3)	
006.4.3	Technology Management (refer to §C7.5.4)	
006.4.4	Information Technology Systems Engineering (refer to §C7.5.5)	
006.4.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)	
006.4.6	Customer Service and Science Support (refer to §C7.5.7)	
006.4.7	Electronic Dissemination of Information Content (refer to §C7.5.8)	
006.4.8	Technical Operations (refer to §C7.5.9)	
006.4.1000	Subtotal (sum 006.4.1 through 006.4.8 plus all ODC's)	
006.4.1001	Base Fee	
006.4.1002	Maximum Award Fee	
006.4.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.4.1000 through 006.4.1002)	
006.5	For the Period April 1, 2004 through March 31, 2005	
006.5.1	Reserved	
006.5.2	IT Management and Planning (refer to §C7.5.3)	
006.5.3	Technology Management (refer to §C7.5.4)	
006.5.4	Information Technology Systems Engineering (refer to §C7.5.5)	
006.5.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)	

006.5.6	Customer Service and Science Support (refer to §C7.5.7)
006.5.7	Electronic Dissemination of Information Content (refer to §C7.5.8)
006.5.8	Technical Operations (refer to §C7.5.9)
006.5.1000	Subtotal (sum 006.5.1 through 006.5.8 plus all ODC's)
006.5.1001	Base Fee
006.5.1002	Maximum Award Fee
006.5.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.5.1000 through 006.5.1002)
006.1.Cost	Total Estimated Cost for the Initial Period of Performance (sum 006.x.1000 where "x" equals 1 through 5)
006.1.BaseFee	Base Fee for the Initial Period of Performance (sum 006.x.1001 where "x" equals 1 through 5)
006.1.AwdFee	Maximum Award Fee for the Initial Period of Performance (sum 006.x.1002 where "x" equals 1 through 5)
006.1.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 006.x.2000 where "x" equals 1 through 5)
	Optional Period of Performance (April 1, 2005 through March 31, 2010)
006.6	For the Period April 1, 2005 through March 31, 2006
006.6.1	Reserved
006.6.2	IT Management and Planning (refer to §C7.5.3)
006.6.3	Technology Management (refer to §C7.5.4)
006.6.4	Information Technology Systems Engineering (refer to §C7.5.5)
006.6.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)
006.6.6	Customer Service and Science Support (refer to §C7.5.7)
006.6.7	Electronic Dissemination of Information Content (refer to §C7.5.8)
006.6.8	Technical Operations (refer to §C7.5.9)
006.6.1000	Subtotal (sum 006.6.1 through 006.6.9 plus all ODC's)
006.6.1001	Base Fee

006.6.1002	Maximum Award Fee
006.6.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.6.1000 through 006.6.1002)
006.7	For the Period April 1, 2006 through March 31, 2007
006.7.1	Reserved
006.7.2	IT Management and Planning (refer to §C7.5.3)
006.7.3	Technology Management (refer to §C7.5.4)
006.7.4	Information Technology Systems Engineering (refer to §C7.5.5)
006.7.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)
006.7.6	Customer Service and Science Support (refer to §C7.5.7)
006.7.7	Electronic Dissemination of Information Content (refer to §C7.5.8)
006.7.8	Technical Operations (refer to §C7.5.9)
006.7.1000	Subtotal (sum 006.7.1 through 006.7.8 plus all ODC's)
006.7.1001	Base Fee
006.7.1002	Maximum Award Fee
006.7.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.7.1000 through 006.7.1002)
006.8	For the Period April 1, 2007 through March 31, 2008
006.8.1	Reserved
006.8.2	IT Management and Planning (refer to §C7.5.3)
006.8.3	Technology Management (refer to §C7.5.4)
006.8.4	Information Technology Systems Engineering (refer to §C7.5.5)
006.8.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)
006.8.6	Customer Service and Science Support (refer to §C7.5.7)
006.8.7	Electronic Dissemination of Information Content (refer to §C7.5.8)
006.8.8	Technical Operations (refer to §C7.5.9)

006.8.1000	Subtotal (sum 006.8.1 through 006.8.8 plus all ODC's)	[redacted]
006.8.1001	Base Fee	
006.8.1002	Maximum Award Fee	
006.8.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.8.1000 through 006.8.1002)	
006.9	For the Period April 1, 2008 through March 31, 2009	
006.9.1	Reserved	
006.9.2	IT Management and Planning (refer to §C7.5.3)	
006.9.3	Technology Management (refer to §C7.5.4)	
006.9.4	Information Technology Systems Engineering (refer to §C7.5.5)	
006.9.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)	
006.9.6	Customer Service and Science Support (refer to §C7.5.7)	
006.9.7	Electronic Dissemination of Information Content (refer to §C7.5.8)	
006.9.8	Technical Operations (refer to §C7.5.9)	
006.9.1000	Subtotal (sum 006.9.1 through 006.9.8 plus all ODC's)	
006.9.1001	Base Fee	
006.9.1002	Maximum Award Fee	
006.9.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.9.1000 through 006.9.1002)	
006.10	For the Period April 1, 2009 through March 31, 2010	
006.10.1	Reserved	
006.10.2	IT Management and Planning (refer to §C7.5.3)	
006.10.3	Technology Management (refer to §C7.5.4)	
006.10.4	Information Technology Systems Engineering (refer to §C7.5.5)	
006.10.5	Information Technology Infrastructure and Operations Support (refer to §C7.5.6)	
006.10.6	Customer Service and Science Support (refer to §C7.5.7)	
006.10.7	Electronic Dissemination of Information Content (refer to §C7.5.8)	

006.10.8	Technical Operations (refer to §C7.5.9)
006.10.1000	Subtotal (sum 006.10.1 through 006.10.8 plus all ODC's)
006.10.1001	Base Fee
006.10.1002	Maximum Award Fee
006.10.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 006.10.1000 through 006.10.1002)
006.O.Cost	Total Estimated Cost for the Optional Period of Performance (sum 006.x.1000 where "x" equals 6 through 10)
006.O.BaseFee	Base Fee for the Optional Period of Performance (sum 006.x.1001 where "x" equals 6 through 10)
006.O.AwdFee	Maximum Award Fee for the Optional Period of Performance (sum 006.x.1002 where "x" equals 6 through 10)
006.O.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 006.x.2000 where "x" equals 6 through 10)
006.C.Cost	Total Estimated Cost for the Period April 1, 2000 through March 31, 2010 (sum 006.x.1000 where "x" equals 1 through 10)
006.C.BaseFee	Base Fee for the Period April 1, 2000 through March 31, 2010 (sum 006.x.1001 where "x" equals 1 through 10)
006.C.AwdFee	Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 006.x.1002 where "x" equals 1 through 10)
006.C.Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 006.x.2000 where "x" equals 1 through 10)
007	Total Estimated Cost (except where noted) for **Facilities Engineering and Construction** (refer to §C7.6)
	Initial Period of Performance (April 1, 2000 through March 31, 2005)
007.1	For the Period April 1, 2000 through March 31, 2001
007.1.1	Engineering (refer to §C7.6.2)
007.1.2	Construction (refer to §C7.6.3)
007.1.3	South Pole Redevelopment Project (refer to §C7.6.4)
007.1.1000	Subtotal (sum 007.1.1 through 007.1.3 plus all ODC's)

007.1.1001	Base Fee
007.1.1002	Maximum Award Fee
007.1.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.1.1000 through 007.1.1002)
007.2	For the Period April 1, 2001 through March 31, 2002
007.2.1	Engineering (refer to §C7.6.2)
007.2.2	Construction (refer to §C7.6.3)
007.2.3	South Pole Redevelopment Project (refer to §C7.6.4)
007.2.1000	Subtotal (sum 007.2.1 through 007.2.3 plus all ODC's)
007.2.1001	Base Fee
007.2.1002	Maximum Award Fee
007.2.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.2.1000 through 007.2.1002)
007.3	For the Period April 1, 2002 through March 31, 2003
007.3.1	Engineering (refer to §C7.6.2)
007.3.2	Construction (refer to §C7.6.3)
007.3.3	South Pole Redevelopment Project (refer to §C7.6.4)
007.3.1000	Subtotal (sum 007.3.1 through 007.3.3 plus all ODC's)
007.3.1001	Base Fee
007.3.1002	Maximum Award Fee
007.3.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.3.1000 through 007.3.1002)
007.4	For the Period April 1, 2003 through March 31, 2004
007.4.1	Engineering (refer to §C7.6.2)
007.4.2	Construction (refer to §C7.6.3)
007.4.3	South Pole Redevelopment Project (refer to §C7.6.4)
007.4.1000	Subtotal (sum 007.4.1 through 007.4.3 plus all ODC's)
007.4.1001	Base Fee
007.4.1002	Maximum Award Fee

007.4.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.4.1000 through 007.4.1002)
007.5	For the Period April 1, 2004 through March 31, 2005
007.5.1	Engineering (refer to §C7.6.2)
007.5.2	Construction (refer to §C7.6.3)
007.5.3	South Pole Redevelopment Project (refer to §C7.6.4)
007.5.1000	Subtotal (sum 007.5.1 through 007.5.3 plus all ODC's)
007.5.1001	Base Fee
007.5.1002	Maximum Award Fee
007.5.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.5.1000 through 007.5.1002)
007.1Cost	Total Estimated Cost for the Initial Period of Performance (sum 007.x.1000 where "x" equals 1 through 5)
007.1BaseFee	Base Fee for the Initial Period of Performance (sum 007.x.1001 where "x" equals 1 through 5)
007.1AwdFee	Maximum Award Fee for the Initial Period of Performance (sum 007.x.1002 where "x" equals 1 through 5)
007.1Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 007.x.2000 where "x" equals 1 through 5)
	Optional Period of Performance (April 1, 2005 through March 31, 2010)
007.6	For the Period April 1, 2005 through March 31, 2006
007.6.1	Engineering (refer to §C7.6.2)
007.6.2	Construction (refer to §C7.6.3)
007.6.1000	Subtotal (sum 007.6.1 through 007.6.2 plus all ODC's)
007.6.1001	Base Fee
007.6.1002	Maximum Award Fee
007.6.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.6.1000 through 007.6.1002)
007.7	For the Period April 1, 2006 through March 31, 2007
007.7.1	Engineering (refer to §C7.6.2)

007.7.2	Construction (refer to §C7.6.3)	[redacted]
007.7.1000	Subtotal (sum 007.7.1 through 007.7.2 plus all ODC's)	
007.7.1001	Base Fee	
007.7.1002	Maximum Award Fee	
007.7.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.7.1000 through 007.7.1002)	
007.8	For the Period April 1, 2007 through March 31, 2008	
007.8.1	Engineering (refer to §C7.6.2)	
007.8.2	Construction (refer to §C7.6.3)	
007.8.1000	Subtotal (sum 007.8.1 through 007.8.2 plus all ODC's)	
007.8.1001	Base Fee	
007.8.1002	Maximum Award Fee	
007.8.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.8.1000 through 007.8.1002)	
007.9	For the Period April 1, 2008 through March 31, 2009	
007.9.1	Engineering (refer to §C7.6.2)	
007.9.2	Construction (refer to §C7.6.3)	
007.9.1000	Subtotal (sum 007.9.1 through 007.9.2 plus all ODC's)	
007.9.1001	Base Fee	
007.9.1002	Maximum Award Fee	
007.9.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum 007.9.1000 through 007.9.1002)	
007.10	For the Period April 1, 2009 through March 31, 2010	
007.10.1	Engineering (refer to §C7.6.2)	
007.10.2	Construction (refer to §C7.6.3)	
007.10.1000	Subtotal (sum 007.10.1 through 007.10.2 plus all ODC's)	
007.10.1001	Base Fee	
007.10.1002	Maximum Award Fee	
007.10.2000	Total Estimated Cost Plus Base and Maximum Award Fee (sum	

	007.10.1000 through 007.10.1002)
007.O-Cost	Total Estimated Cost for the Optional Period of Performance (sum 007.x.1000 where "x" equals 6 through 10)
007.O-BaseFee	Base Fee for the Optional Period of Performance (sum 007.x.1001 where "x" equals 6 through 10)
007.O-AwdFee	Maximum Award Fee for the Optional Period of Performance (sum 007.x.1002 where "x" equals 6 through 10)
007.O-Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 007.x.2000 where "x" equals 6 through 10)
007.C-Cost	Total Estimated Cost for the Period April 1, 2000 through March 31, 2010 (sum 007.x.1000 where "x" equals 1 through 10)
007.C-BaseFee	Base Fee for the Period April 1, 2000 through March 31, 2010 (sum 007.x.1001 where "x" equals 1 through 10)
007.C-AwdFee	Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 007.x.1002 where "x" equals 1 through 10)
007.C-Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Period April 1, 2000 through March 31, 2010 (sum 007.x.2000 where "x" equals 1 through 10)
200.I-Cost	Total Estimated Cost for all CLINs for the Initial Period of Performance (sum 00x.I-Cost where "x" equals 1 through 7)
200.I-BaseFee	Base Fee for the Initial Period of Performance (sum 00x.I-BaseFee where "x" equals 1 through 7)
200.I-AwdFee	Maximum Award Fee for the Initial Period of Performance (sum 00x.I-AwdFee where "x" equals 1 through 7)
200.I-Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Initial Period of Performance (sum 00x.I-Total where "x" equals 1 through 7)
200.O-Cost	Total Estimated Cost for all CLINs for the Optional Period of Performance (sum 00x.O-Cost where "x" equals 1 through 7)
200.O-BaseFee	Base Fee for the Optional Period of Performance (sum 00x.O-BaseFee where "x" equals 1 through 7)
200.O-AwdFee	Maximum Award Fee for the Optional Period of Performance (sum 00x.O-AwdFee where "x" equals 1 through 7)
200.O-Total	Total Estimated Cost Plus Base and Maximum Award Fee for the Optional Period of Performance (sum 00x.O-Total where "x" equals 1 through 7)

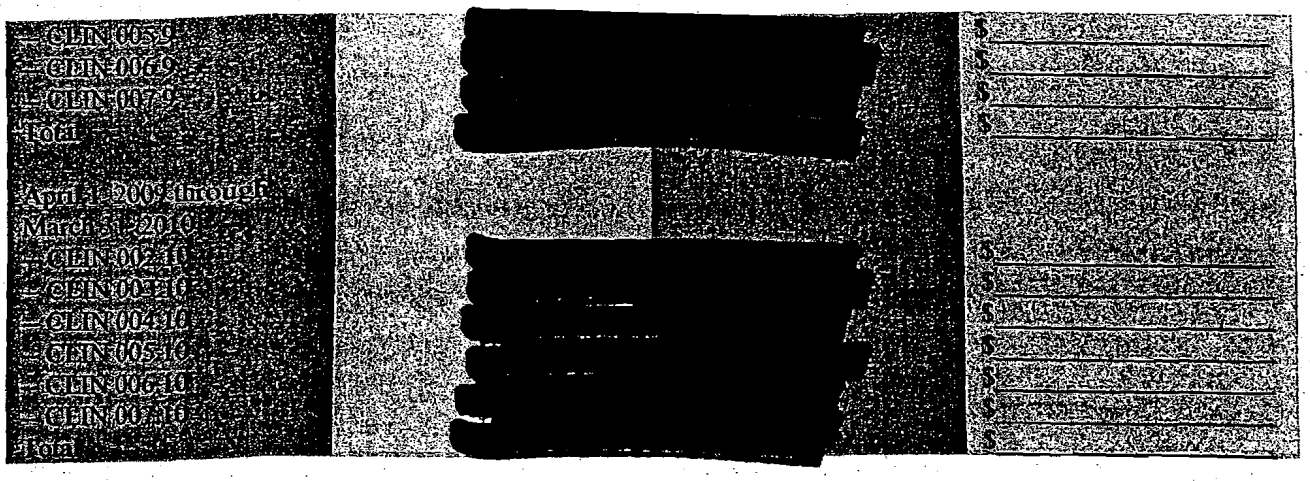
200.K-Cost	Total Estimated Cost for all CLINs for all Periods of Performance (sum 100.I-Cost and 100.O-Cost)	[redacted]
200.K-BaseFee	Base fee for all Periods of Performance (sum 100.I-BaseFee and 100.O-BaseFee)	[redacted]
200.K-AwdFee	Maximum Award Fee for all Periods of Performance (sum 100.I-AwdFee and 100.O-AwdFee)	[redacted]
200.K-Total	Total Estimated Cost Plus Base and Maximum Award Fee for all Periods of Performance (sum 100.I-Total and 100.O-Total)	[redacted]

B3. AWARD FEE SCHEDULE

The base fee, maximum award fee, and actual award fee for the performance of work (to be completed annually) including the optional period of performance are as follows:

PERIOD	BASE FEE	MAX AWARD FEE	AWARD FEE EARNED
April 1, 2000 through March 31, 2001	[redacted]	[redacted]	
CLIN 002.1			$
CLIN 003.1			$
CLIN 004.1			$
CLIN 005.1			$
CLIN 006.1			$
CLIN 007.1			$
Total			$
April 1, 2001 through March 31, 2002	[redacted]	[redacted]	
CLIN 002.2			$
CLIN 003.2			$
CLIN 004.2			$
CLIN 005.2			$
CLIN 006.2			$
CLIN 007.2			$
Total			$
April 1, 2002 through March 31, 2003	[redacted]	[redacted]	
CLIN 002.3			$
CLIN 003.3			$
CLIN 004.3			$
CLIN 005.3			$
CLIN 006.3			$
CLIN 007.3			$
Total			$

April 1, 2003 through March 31, 2004			
– CLIN 0024	[redacted]		$______
– CLIN 0034			$______
– CLIN 0044			$______
– CLIN 0054			$______
– CLIN 0064			$______
– CLIN 0074			$______
Total			$______
April 1, 2004 through March 31, 2005			
– CLIN 0025	[redacted]		$______
– CLIN 0035			$______
– CLIN 0045			$______
– CLIN 0055			$______
– CLIN 0065			$______
– CLIN 0075			$______
Total			$______
April 1, 2005 through March 31, 2006			
– CLIN 0026	[redacted]		$______
– CLIN 0036			$______
– CLIN 0046			$______
– CLIN 0056			$______
– CLIN 0066			$______
– CLIN 0076			$______
Total			$______
April 1, 2006 through March 31, 2007			
– CLIN 0027	[redacted]		$______
– CLIN 0037			$______
– CLIN 0047			$______
– CLIN 0057			$______
– CLIN 0067			$______
– CLIN 0077			$______
Total			$______
April 1, 2007 through March 31, 2008			
– CLIN 0028	[redacted]		$______
– CLIN 0038			$______
– CLIN 0048			$______
– CLIN 0058			$______
– CLIN 0068			$______
– CLIN 0078			$______
Total			$______
April 1, 2008 through March 31, 2009			
– CLIN 0029	[redacted]		$______
– CLIN 0039			$______
– CLIN 0049			$______



Actual amount for the Award Fee schedule will be fixed at the acceptance by the Foundation of the annual Program Plan (see Section F). The Contractor may bill and collect sixty-percent (60%) of the agreed upon award fee amount (hereinafter referred to as *Billable Fee*) in proportion to the cost incurred for a particular period.

B4. CONSIDERATION (COST-PLUS-AWARD-FEE SERVICES)

The costs of performance of this contract are defined as the necessary direct costs incurred during the period of performance of this contract, and an amount for indirect costs in accordance with the provisions of Section B4.2, *Indirect Costs*. Allowability of costs and cost allocation method shall be determined in accordance with Part 31 of the Federal Acquisition Regulations and the terms of this contract.

B4.1 Direct Costs

B4.1.1 Travel -- Including subsistence may be charged to this contract in accordance with Contractor's established policy subject to the limitations of FAR Subpart 31.205-46.

B4.1.2 Consultants -- Payment for the services of consultants shall not exceed $453 per day per consultant, nor exceed $13,590 to any individual in any twelve (12) month period without the prior written approval of the Contracting Officer. Requests by the Contractor for authorization to pay in excess of $453 per day or $13,590 total to any one individual shall contain the following information:

B4.1.2.1 A biographical sketch, including education and professional experience of the consultant;

B4.1.2.2 A description of the services the consultant will perform, the estimated level of effort, and period of performance;

B4.1.2.3 A schedule of previous rates paid to the consultant by the Contractor and/or other organizations for similar services for a like period;

B4.1.2.4 A determination the proposed not-to-exceed amount is fair and reasonable, including the basis for this determination.

B4.1.3 Equipment -- **For the purposes of this subsection only** equipment is defined as any item of property which has an acquisition cost greater than or equal to $2,500, and an expected service life of two years or more. Unless prior written permission of the cognizant NSF WBS Manager is obtained no costs may be charged to this contract for:

B4.1.3.1 Any item of general purpose equipment, including but not limited to: office furnishings, personnel computers or other information technology, reproduction or printing equipment, and motor vehicles.

B4.1.3.2 Any other item of equipment with an acquisition cost greater than or equal to $5,000.

B4.1.4 Leases – Unless prior written permission of the Contracting Officer is obtained no costs for leasing property may charged to this contract.

B4.1.5 Subcontracts – Consent to subcontract shall be obtained in accordance with the clause in this contract titled *Subcontracts Under Cost-Reimbursement and Letter Contracts*.

B4.1.6 Limitation on Costs Related to Legal and Similar Matters

B4.1.6.1 Definitions – As used in this subsection only, the following terms shall have the meaning set forth herein.

B4.1.6.1.1 *Costs* has the same meaning as set forth in FAR Subpart 31.205-47(a).

B4.1.6.1.2 *Damages* means any and all monetary compensation awarded to individuals, businesses and/or governments.

B4.1.6.1.3 *Proceeding* means any action, hearing, investigation, inquest or inquiry (whether conducted by a court, administrative agency, hearing officer, arbitrator, or any other person authorized by law) in which, pursuant to law, testimony can be compelled to be given. It also includes any means of alternate dispute resolution in which the Contractor is a participant.

B4.1.6.2 To the extent that certain costs related legal and other proceedings (including matters disposed of by compromise prior to judgement) are otherwise allowable per FAR Subpart 31, total costs (including costs for remedial actions) and damages (including, but not limited to payments of compensatory damages and back pay) charged to this contract shall be billed and reimbursed up to $250,000, after which the contractor shall share allowable, allocable costs on a 50/50 sharing arrangement with NSF on all such costs in excess of $250,000 up to $5,000,000. Any allocable, allowable and reasonable costs in excess of $5,000,000 will be billed by the contractor in full.

B4.1.6.3 This limitation shall not apply to those costs incurred as a result of compliance with specific terms and conditions of this contract or written instructions from the Contracting Officer.

B4.2 Indirect Costs

Pending modification(s) to this contract setting forth final indirect cost rate(s) in accordance with this contract's *Allowable Cost and Payment* clause the Contractor shall be provisionally reimbursed for indirect costs at following rates:

RATE TYPE	COST BASE	BILLABLE	CEILING
Overhead	Total Direct Labor Cost (Support cost which benefits entire Division. Defined in CASB Disclosure Statement, dated 1/1/99)	[as negotiated annually]	[redacted]
G&A	Total cost input except for material, subcontracts, interorganizational transfers, and G&A itself.	[as negotiated annually]	[redacted]
Fringe (salaried employees)	Salaries & Wages (not including performance or other prem. pay)	[redacted]	[not applicable]
Fringe (field employees)	Salaries & Wages (not including performance or other prem. pay)	[redacted]	[not applicable]

The final rate for reimbursement of indirect costs incurred during the period of performance of this contract shall be the Contractor's actual rate, but in no case shall the rate exceed the ceiling. With regard to the Overhead and G&A rates shown above, the contractor shall not charge or be reimbursed for indirect costs in excess of the aggregate indirect expense dollars derived by the application of the indirect cost ceiling rates (shown above) to the appropriate bases of application as described above. All indirect costs in excess of said amount(s) shall be borne by the contractor.

B5. CONTRACT FUNDING

Pursuant to the clause titled *Limitation of Funds* the total amount presently allotted to this contract for the performance of work is as follows:

ELEMENT	EXISTING	EARNED FEE ADJ	OPP-0000373	SUBTOTALS
Est. Cost	$ 0	$ 0	$[TBD]	$[TBD]
Billable Fee	$ 0	$ 0	$[TBD]	$[TBD]
Award & Base Fees	$ 0	$ 0	$[TBD]	$[TBD]
Total Allotted	$ 0	$ 0	$[TBD]	$[TBD]

It is estimated that these funds are sufficient for the performance of work through **[to be determined].**

B6. NOTICE REGARDING CONTRACTOR CONTRIBUTIONS TO THE USAP

At no additional cost to NSF, the Contractor shall undertake the following initiatives. The contractor shall report at least annually on the activities and actual funded amounts for any and all such contribution activities.

B6.1 Development of Raytheon partnership with the NSF

B6.2 Continual enhancement of support for USAP scientists

B6.3 Upgrade of quality of life at Antarctica stations

B6.4 Educational outreach – presentation of Antarctic science information to University and secondary school science programs.

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SECTION C – DESCRIPTION/SPECIFICATION/WORK STATEMENT

C1 SCOPE of WORK

For the consideration set forth in the section titled *Consideration (Cost-Plus-Award-Fee)*, the Contractor (independently and not as an agent of the Government) shall provide all labor, materials, facilities and equipment (unless otherwise authorized by the Contracting Officer) to provide science, operations and maintenance support for the United States Antarctic Program.

C2 INTRODUCTION

The United States Antarctic Program (USAP) is funded and managed by the National Science Foundation (NSF), an agency of the Executive Branch of the Federal Government. The NSF organization tasked with this responsibility is the Office of Polar Programs (OPP).

The USAP is the national program for scientific research and geopolitical presence in Antarctica, the world's seventh and southernmost continent. By Presidential direction (Presidential Memorandum 6646, 1982), the United States maintains an "active and influential presence in Antarctica designed to support the range of US Antarctic interests." This presence includes "the conduct of scientific activities in major disciplines; year round occupation of the South Pole and two coastal stations, and availability of related necessary logistics support."

In 1994, Presidential Decision Directive NSC-26 reaffirmed the 1982 memorandum and announced four policy objectives including protection of the Antarctic environment and conservation of living resources in the oceans surrounding Antarctica. These environmental responsibilities influence the course of all current and future USAP activities in Antarctica.

To accomplish the USAP mission NSF funds a diversified science program in all major disciplines, coordinates the resources of other government agencies providing operational support to the USAP; and acquires and manages commercial Contractors to support the science program and operate and maintain US facilities in Antarctica.

The annual USAP appropriation is in the range of $200 million. A separate request of $128 million to redevelop South Pole Station has been submitted to Congress, of which $70 million has been approved.

C3 BACKGROUND

C3.1 General

The USAP evolved from an expeditionary program begun by the United States prior to and during the worldwide International Geophysical Year (IGY) in 1957. With primary logistical and operational support provided by the US Navy, seven US stations - including a large support base at McMurdo Sound and a small research facility at the Geographic South Pole - were established in Antarctica. At the conclusion of the IGY, it was decided to maintain and expand the scientific program, keep several of the stations in operation indefinitely, and continue the US Navy's logistical support responsibility.

Beginning in the 1960s, a few science support functions were contracted to the private sector. In 1970, a National Security Memorandum shifted funding and management responsibility for the entire program to the NSF. During the 1970s and 1980s, Contractors assumed more support roles, including operation of South Pole Station, Palmer Station and a research vessel; program-wide construction tasking, information systems implementation, and major procurement responsibilities.

The shift to contractor support accelerated in the early 1990s with the Navy's phased and final withdrawal from the USAP, completed in 1998. Most functions performed by Naval Support Force Antarctica (NSFA) are now commercially provided. The exceptions are LC-130 aircraft operations (formerly provided by Navy squadron VXE-6) which are the responsibility of the Air National Guard, and USAP air traffic control and McMurdo meteorological services, now performed by the Space and Naval Warfare Systems Center (SPAWARS), a US Navy command, under interagency agreements with NSF.

Heavy airlift capability (C-5 and C-141) for the USAP is provided by the US Air Force Air Mobility Command, although a commercial alternative is being contemplated. Icebreaker support is and will continue to be provided by the Department of Transportation (US Coast Guard).

Today, the USAP is largely supported by commercial contractors. The scope and type of services to be provided by the Contractor acquired through this solicitation are described in Section C7, the statement of work. Supplemental information which further explains these services is provided in Section C3.2, below.

C3.2 Operational Background

C3.2.1 General Management (see Section C7.1)

C3.2.1.1 Program Management (see Section C7.1.1)

Contractor support of the USAP requires system-type operations management skills and sustained attention. Key management staff assigned by the Contractor must be full-time, year round employees with no collateral responsibilities for the duration of their assignment.

C3.2.1.2 Planning and Review (see Section C7.1.3)

Traditionally, the annual program plan has been constructed along functional lines that mirror the areas of management oversight responsibility within NSF/OPP. NSF/OPP has adopted an Activity Based Management (ABM) approach, with functional activities assigned to specific managers.

The budgetary authority for projects that often require many months of preparatory work may not be forthcoming until late in the Government fiscal year. Therefore, both the Contractor and NSF must contend with workload "peaks" which are sometimes difficult to manage, and where normally sequential tasks such as procurement, transportation and field work are compressed and overlap.

Long range planning is a desirable framework for the USAP's future; however, such plans are difficult to implement because of the constraints imposed by the Government appropriations process and revisions are inevitable. Contractor contributions to this process in the past have included suggestions for possible designs and estimates of the costs of a multi-year renovation of McMurdo Station.

Under the terms of the Antarctic Treaty, all signatory nations are required to provide an annual exchange of information related to their science and operational activities in Antarctica. NSF is responsible for ensuring that an accurate and timely report on US activities is developed for submittal by the Department of State to the other Treaty Parties.

C3.2.1.3 Medical Program Management (see Section C7.1.6)

Each clinic operated by the Contractor in Antarctica provides medical care comparable to an emergency care/ambulatory care facility in the US. Contractor clinical staff must be experienced in providing diagnosis and treatment of injuries and illnesses anticipated in the medically-screened USAP population, stabilization of patients for transport to tertiary care facilities off-continent if required (when such evacuation is available), and routine health and wellness care. For emergency care, the clinics approximate Level III Trauma facilities, as defined by the American College of Surgeons. For routine medical care, requirements are based on the needs of a relatively young (average age of 35 years), healthy population.

Since the medical clinics in Antarctica are physically isolated for months at a time, health care providers on-site need training not normally required elsewhere (for example, a wintering physician should be trained in basic dental procedures).

C3.2.1.3.1 Related Services

The Contractor provides other services which are traditionally performed by health care or clinic staff. Such services include a potable water quality management program to ensure drinking water at all stations, major field camps, and onboard the research vessels meets required standards. The Contractor also ensures that all cafeteria and food preparation operations, barber shop, and community hot tub/sauna areas meet appropriate standards for public health/sanitation (see Section C4).

C3.2.1.4 Quality Control (see Section C7.1.7)

Although the prominence and content of a QA/QC program within the overall Contractor organization are to be determined by the Contractor, NSF expects the program to be directed toward achieving the performance standards described in Section C9. QA/QC success will be defined as the Contractor's sustained ability to meet or exceed performance criteria, and to correct deficiencies before the USAP mission is negatively affected. More amorphous QA/QC initiatives, such as continual process reviews or corporate "culture" studies, are considered less important than the demonstrated ability to perform.

C3.2.1.5 Safety and Health (see Section C7.1.8)

USAP safety and health policies are comprehensive, encompassing industrial/occupational and laboratory/research work areas, underwater diving, aviation, marine/ship operations, hazardous materials/waste, radiation (ionizing and nonionizing), mountaineering/wilderness/cold weather survival, vehicular/heavy equipment operation, public health/sanitation, fire protection/security, and emergency response. The Contractor is expected to implement these policies according to its best management practices by emphasizing common sense and initiative without trivializing content.

C3.2.1.6 Environmental Protection (see Section C7.1.9)

NSF is responsible for conscientious stewardship of the Antarctic environment and for conducting science and support activities in ways that minimize or mitigate human impact on that environment. This responsibility derives from the Antarctic Treaty and is recognized in US law by the Antarctic Conservation Act (ACA) of 1978. The ACA was amended by the Antarctic Science, Tourism and Conservation Act of 1996 to incorporate the requirements of the Protocol on Environmental Protection to the Antarctic Treaty (see Section C4). All US Government activities in Antarctica must be conducted according to the ACA and its implementing regulations.

A master NSF waste management permit for all USAP activities is currently in place. The permit covers the required removal of all wastes from Antarctica (with the exception of sewage) for appropriate reuse, recycle or disposal. It also governs contingency and spill response planning; proper use, management and record keeping of all hazardous materials used and all wastes generated, including low level radioactive wastes and medical wastes; access for inspection; and an annual report documenting details of these activities.

It is the responsibility of the Federal official designated by NSF to review the adequacy of all environmental documentation and proposed mitigating measures provided by the Contractor before implementing any decision that may impact the Antarctic environment.

All activities related to Antarctic fauna and flora are also regulated (see Section C4, 45 CFR 670). Permits are required for the taking or disturbance of any native mammal or bird; for entry into designated protected areas; for the possession, transfer, or import into the US or any other country of native Antarctic plants, mammals or birds; or introduction of non-native species into Antarctica. NSF is the issuing authority for permits required by this regulation.

The current USAP waste management program achieves a recycling rate in excess of 60 percent. This percentage should be maintained, or improved, under the next contract.

C3.2.1.7 Technology Applications (see Section C7.1.10)

Technical investigations conducted by the Contractor may include new communications equipment and systems, new construction materials and methods, improved facility and equipment maintenance programs, remote sensing possibilities, new polar vehicles and transportation methods, improved cold weather clothing, and better instrumentation for engineering and/or scientific use.

An appropriate technical data base can be derived from the literature of Antarctic and Arctic engineering and research, attendance at trade shows and conferences, surveys of experienced polar scientists and operations staff, and trial use of products or materials in the polar environment.

Innovations which lead to less costly and more efficient operations at program offices and field sites are of particular value.

C3.2.2 Logistics (see Section C7.2)

Logistics means the Contractor management responsibility to move program participants to and from Antarctica; transport the supplies and equipment needed to operate the stations, camps and vessels; control inventories at the stations; and operate and maintain staging areas in California, New Zealand and Chile.

Logistics support is central to the success of the USAP. Everything required to sustain life in Antarctica must be imported while any planned activity on the continent or onboard a research vessel is totally dependent on a logistics network that spans, at its furthest reaches, over 10,000 miles.

C3.2.2.1 Logistics Management (see Section C7.2.1)

The skill mix and reporting relationships within the logistics organization as well as the interaction with other Contractor functions will depend on the Contractor's management approach. In general, however, the Contractor's logistics management personnel must take an active role in preseason planning, provide logistics guidance for Contractor operations, grantees and other USAP agencies; and provide NSF with the informed judgment and overall review needed to assess the effectiveness of USAP-wide logistics planning, transportation and inventory systems.

C3.2.2.2 Materials Management (see Sections C7.2.2 and C7.2.3)

Secure warehousing space at the stations is limited, and much of the inventory - particularly bulk commodities such as lumber and bottled gasses as well as some spare components like large tractor parts - is maintained outside on marked supply lines.

Over the years, inventory control at McMurdo, South Pole and Palmer stations has improved. Most of the inventory is carried on a computerized listing which is regularly updated throughout the year according to the demand for various line items. Some 114,000 line items are carried on the McMurdo inventory with similar types of supplies, proportionally adjusted for population and usage levels, maintained at South Pole (28,000 L/Is) and Palmer (26,000 L/Is).

Material and equipment inventories are controlled with bar coding, where possible, and by manual posting when bar coding cannot be used (dry air, outside temperatures and UV light sometimes render bar codes unreadable). Some of the inventory is linked to the MAPCON maintenance management program (see Sections C7.3.2.3.2.3 and C6.2.1) used at all of the stations. See Sections C7.6.2.1 and C7.5 for information on the computer programs used in inventory control.

C3.2.2.3 Travel Services (see Section C7.2.5)

Every year, over 2000 USAP participants travel to and from Antarctica through New Zealand or South America. Throughout the year, Contractor employees and other program participants also travel to other destinations on USAP business.

The Contractor manages commercial air travel, including ticket issue and distribution for its personnel, grantees and other USAP participants as directed by NSF. A ticket is not issued until a participant has received medical clearance. Once cleared, participant deployment and onward movement is tracked via the PTS program. Motel arrangements in New Zealand and changes to travel itineraries during the deployment/redeployment process are usually coordinated by the Christchurch office. Similar arrangements in South America are handled by the local agent.

C3.2.2.4 Port Hueneme Operations (see Section C7.2.6)

Port Hueneme, California, a deep water port approximately 60 miles north of Los Angeles, is the current domestic terminal for cargo shipped to and from Antarctica.

The Port Hueneme office and warehouse is located in Building 471 at the Naval Construction Battalion Center, Port Hueneme. NSF leases the building from the US Navy. The building contains 8,000 SF of office space and 22,000 SF of warehousing space adjacent to a pier and cargo staging areas.

The most active period at Port Hueneme parallels the Antarctic austral summer - September to March of each year, with a peak during the December-January timeframe when the annual resupply ship is loaded - but sustained operations are in progress year round. The busiest time of year for USAP logistics in general and Port Hueneme in particular coincides with the domestic and international holiday season. Transportation and vendor response delays are common during this period; therefore, the Contractor must plan procurement and transportation accordingly.

Cargo is staged and moved according to the Required on Site (ROS) date. ROS, the date an item is needed in Antarctica, sets the priority for shipment and is assigned by the requesting USAP party (Contractor, grantee or NSF or other government agency). While the burden to identify requirements in advance and budget the time needed to get the required item(s) to Antarctica is each requester's responsibility, the Contractor is responsible for ensuring that requesters are aware of critical dates and understand the different modes of transport including their respective costs and relative effectiveness. If a more expensive mode of transport such as commercial air is requested, the Contractor must obtain approval from NSF beforehand.

Port Hueneme is the domestic terminal manager for the Cargo Tracking System (CTS), a computer-based controls system that links the Antarctic stations with Contractor headquarters, Port Hueneme, and the New Zealand and Chile offices. CTS tracks cargo movement and provides the means to update and reconcile cargo operations on a daily basis. The system is GFE. Operation, maintenance and, as appropriate, upgrade of the system will be a continuing Contractor responsibility. See Sections C6.2.2.2, C3.2.3.2.3 and C7.5 for additional information on CTS.

C3.2.2.5 New Zealand Operations (see Section C7.2.7)

Christchurch, the largest city on the south island of New Zealand, is the point of departure and return for continental Antarctica and the staging area for program personnel and aircraft. The nearby harbor at Lyttleton provides port facilities for USAP research and cargo ships. Under a lease agreement with the Christchurch Airport Authority, the USAP maintains a complete administrative office and logistics support center at the International Antarctic Center (IAC) next to the airport as well as aviation support facilities and cargo staging areas on the airport grounds.

The most active period for the New Zealand office occurs between August and early March of each year. In mid-August, USAP participants begin transiting New Zealand for the WINFLY deployment. There is a steady increase through the month of October, the heaviest deployment period, followed by a more even but no less sustained flow of passengers through late January. In February, the transient population increases sharply as most program participants return from McMurdo at the end of the summer season.

The pace of activity during this period is governed by flight operations. Scheduled flights to and from Antarctica are often delayed or canceled because of weather conditions, aircraft maintenance or other problems. This causes unpredictable backlogs in passenger and cargo movement, and affects programs in Antarctica. Therefore, the New Zealand office has to make daily and often hourly adjustments to schedules while continuing to manage the movement of transients to, from and within New Zealand.

Another challenge is the popularity of New Zealand as a travel destination. The USAP operating season parallels the New Zealand summer tourist season; therefore, return airline bookings and motel reservations must be made as far in advance as possible yet often rebooked according to changes in USAP flight schedules. Motel reservations and rebookings are currently managed by a local subcontractor.

C3.2.2.5.1 Personnel Processing

In recent years, the Christchurch office has processed over 1800 arriving/departing program participants, more than 85 percent of whom transit New Zealand during the summer. The Personnel Tracking System (PTS) computer program tracks personnel movement during deployment and provides the means to update and reconcile each participant's location on an as required basis.

C3.2.2.5.2 Cargo Processing

Christchurch processes several categories of cargo bound for continental Antarctica: Kilo-Air (vessel cargo that arrives in Lyttleton monthly via commercial vessel and is staged for air shipment to McMurdo in the USAP air cargo yard at the airport), Air (air freight arriving in New Zealand via commercial or military air carrier and also staged for shipment in the air cargo yard), and locally procured cargo (parts, supplies and food purchased by the Christchurch office for air or vessel shipment to McMurdo).

Christchurch also manages some types of retrograde cargo returned from Antarctica ("repair and return" items, science samples, etc.), and the shipment of special containers or hazardous cargo (dewars, etc.).

C3.2.2.5.3 Extreme Cold Weather (ECW) Clothing

The Contractor manages the ECW warehouse. Responsibilities include storage, issue, cleaining, repair and, as needed, replacement of clothing. ECW packages vary according to the length of stay and the duties of an individual, but, in general, consist of poly, fleece and windproof field garments as well as insulated work clothing suitable for the polar environment.

C3.2.2.6 South America (see Section C7.2.8)

A 10,000 SF bonded facility is currently leased from the Punta Arenas Port Authority and operated by AGUNSA, a contracted local agent.

C3.2.3 Station and Ship Operations

C3.2.3.1 Overview

The USAP maintains three year-round stations in Antarctica and, under long-term charter, operates two icebreaking research vessels in the surrounding oceans. McMurdo Station was established in 1955, followed by Amundsen/Scott South Pole Station in 1957 and Palmer Station in 1965. Other year-round US stations have been constructed and operated in the past, but the three stations still in operation have proven the most important for scientific and geopolitical reasons. The icebreaking research vessels are the newest addition to the program, having been acquired in 1992 and 1997 respectively.

McMurdo is the main logistics center for the US continental program as well as the air support base for Amundsen/Scott South Pole Station and seasonal field camps. South Pole Station, located at the convergence of all national claims in Antarctica, supports a major science program, primarily in the disciplines of astronomy,

astrophysics, aeronomy and atmospheric chemistry. Palmer Station sustains the US land presence in the Antarctic Peninsula, a region of overlapping territorial claims, while the research vessels provide the USAP with modern oceanographic research platforms as well as year-round access to Palmer.

The Contractor operates and maintains the stations and charters the research vessels. Primary services such as power and water, food service, housing, transportation, medical services, fire protection and waste management are ongoing requirements at each station, differing only in scope and location. Other services, such as construction/renovation work and science support tasks, depend on the annual program plan jointly developed by NSF and the Contractor, and approved by NSF, each year.

C3.2.3.2 McMurdo Station

McMurdo Station, located at the tip of Hut Point Peninsula on Ross Island, is the largest US station in Antarctica. The early summer season population can peak at over 1100 people. The number of facilities at the station, the type and scope of activities, and the logistical support required to sustain operations are larger and more diverse than at any other US station. Three airfields adjacent to the station support air operations to and from New Zealand as well as the annual airlift required to maintain Amundsen/Scott South Pole Station, and establish and support summer field camps and/or other remote activities during the summer operating season. McMurdo is also the world's southernmost location accessible by ship. Winter Quarters Bay at the foot of the station complex provides a deep water port for cargo and tanker vessels which can reach the station in late summer, after access channels have been cleared by icebreakers.

Operations at McMurdo are divided between the two austral seasons. Summer (October - February) is the most active period, with an airlink maintained between New Zealand and McMurdo as well as McMurdo and South Pole Station, and ship operations from late December through late February. During the winter season (March - August), air and ship operations are suspended, the station population is significantly reduced (recent levels range from 125 to 150 people), and activities are restricted to the station complex and a few outlying facilities. In certain years, when funding is available, station renovation and construction tasks are accomplished during winter and the winter population is increased accordingly.

The transition from winter to summer operations is known as the WINFLY (winter fly-in) period. WINFLY begins in mid-August, when three USAF C-141 flights are made to McMurdo carrying a Contractor workforce (currently about 75 people) and science program participants to augment the winter staff. This workforce prepares the various airfields (which are closed during the winter) and helps prepare the station for full operations in October, when the first of the summer ("mainbody") flights arrive.

C3.2.3.2.1 McMurdo Station Management (see Section C7.3.1.1)

At least two NSF staff are assigned as NSF Representatives at McMurdo to monitor operations, coordinate overall program support, and oversee science activities on a rotating basis during the summer season. A Station Manager employed by NSF represents the Foundation at McMurdo year-round. NSF's guidance is normally limited to inherently governmental duties such as regulatory oversight, allocation of USAP resources, task development, program implementation and operational decisions concerning the various science projects. Adjustments to program priorities caused by weather or unforseen circumstances are developed by the Contractor and NSF Representatives.

The generally rapid pace of activities, the changing weather conditions, and the constraints imposed by the austral seasons require the ability to work effectively while contending with a number of diverse, sometimes unexpected and often frustrating operational problems.

C3.2.3.2.2 McMurdo Station Communications (see Section C7.3.1.2)

At McMurdo, the Contractor communications staff relays aviation and synoptic weather reports. Observations and weather forecasts transmitted in these reports are provided by SPAWARS, which also operates and maintains recording equipment; launches and tracks rawinsonde equipped balloons, and compiles and transmits weather data according to World Meteorological Organization standards under a separate agreement with NSF.

Specific HF, VHF, satellite and land line communications operation and maintenance duties are described in Section C7.3.2.2.

Additional information on specific radio and telecommunications tasks and equipment is provided in Sections C7.5.4 through C7.5.7.

C3.2.3.2.3 McMurdo Information Systems (see Sections C6 and C7.5)

At present, three primary PC-based IS programs are in program-wide use. Two of these programs help manage the movement of personnel and cargo while the third manages the preventive maintenance (PM) and corrective maintenance work for station facilities, utilities and vehicles. These programs are installed on the McMurdo LAN. Summary descriptions of the programs are provided below; information on systems configuration, hardware and software is provided in Section C7.5.

Personnel Tracking System (PTS) - PTS is the computer-based personnel tracking system that links McMurdo with Contractor headquarters, NSF, New Zealand, the other Antarctic stations, Port Hueneme, and other USAP support organizations. PTS provides personnel movement information during deployment and provides the means to update and reconcile each participant's location on an as-required basis. At McMurdo, it is used by the Contractor to identify personnel status within the program (personal data, travel dates, special requirements, etc.), manage personnel movement to and from Antarctica, and provide berthing assignments at the stations.

Cargo Tracking System (CTS) - CTS is the computer-based cargo tracking system that links McMurdo with Contractor headquarters, NSF, New Zealand, the other Antarctic stations and Port Hueneme. CTS tracks cargo movement and provides the means to update and reconcile cargo operations on a daily basis. At McMurdo, it is used primarily by the Movement Control Center.

MAPCON - MAPCON is the PC-based system that manages the preventive maintenance (PM) and work order/repair programs at the Antarctic stations. It records and tracks work order, PM and repair actions; maintains related parts and materials inventories, and triggers reorder actions when thresholds are reached; and tracks budget and labor estimates against actual performance. MAPCON is used by the Contractor's facilities, utilities and vehicle maintenance organizations, although it can be extended to other functions. The MAPCON database is extensive, and any upgrades to the system, or its replacement with a comparable system, must provide an interface to transfer the data intact.

C3.2.3.2.4 Station Primary Utilities (see Section C7.3.1.4)

C3.2.3.2.4.1 McMurdo Power Plant (see Section C7.3.1.4.1)

Electrical power for McMurdo Station is generated at Building 196, a two-story facility built in 1981. The single story area is open-bay, housing 1 each 800 KW, 3 each 850 KW and 2 each 900 KW diesel/electric generators. A partition separates the switchgear and office area from the engine room. The second story contains additional office space and storage areas. The power plant is staffed and operated on a 24/7 basis year-round.

Weekly power loads during the summer season range up to a peak average of 2 MW, although higher spikes may occur. Three generator units are normally on-line at one time and run through a 250 hour cycle. The power distribution system is overhead (power poles) or laid in cable trays networking the station buildings.

A waste heat recovery system was installed in the power plant in 1998. The recovered heat from the generators will be used initially by the water plant, with heat routing to other buildings planned for the future.

C3.2.3.2.4.2 McMurdo Water Plant (see Section C7.3.1.4.2)

The Water Plant, directly adjacent to the power plant (Building 198), processes salt water into fresh water using three 40,000 gallon-per-day (GPD), reverse osmosis (RO) desalinators. The building was constructed in 1981 and

the RO desalinators were installed in 1994 to replace older flash evaporators. The plant includes fresh water holding tanks and pumping equipment. Water distribution throughout the station is via heat-taped, insulated pipes running along the utility network linking the various station buildings. The quality of all generated and stored water is tested every 12 hours.

C3.2.3.2.4.3 Wastewater Discharge (see Section C7.3.1.4.3)

Graywater and blackwater from the station is discharged into the ocean through a network of heat-taped and insulated pipes. Laboratory waste is not included in the wastewater stream. The outfall is located 180 feet offshore. At present, sewage is treated by maceration and dilution before leaving the outfall. The pollutants in the discharge stream are monitored as part of the environmental program.

C3.2.3.2.5 Station Facilities and Ancillary Utilities (see Section C7.3.1.5)

McMurdo Station is a complex of close to 100 buildings, enclosing over 600,000 SF of heated and unheated space. These buildings range from Quonset Huts built in the late 1950s to the Crary Science and Engineering Center (CSEC; see Section C7.4.3), completed in 1995. Most buildings date from the 1960s and 1970s, and are pre-engineered, metal structures of the "Robertson" or "Butler" design. A few buildings, such as the "Chalet", NSF's administrative office, are custom wooden designs.

Buildings are heated by forced air, oil fired furnaces, and plumbed and wired according to the purpose each building serves. Large berthing areas, such as the 200 series dormitories, have considerable plumbing and relatively sophisticated HVAC systems while many workspaces have only the basic features needed to support shop production.

Most buildings are kept in service, i.e., open with utilities in operation, year-round; however, McMurdo's utilities systems are designed for winterization and, at the direction of NSF, the Contractor closes/reopens buildings when it is cost-effective to do so.

Despite the number of different buildings, McMurdo is a small complex. Almost every structure within the "town" is in easy walking distance, and people move between living and working areas with little effort.

There are two primary facilities and utilities work centers at McMurdo. Building 136 houses shop and inventory storage space for metalworking, plumbing and electrical trades. Each trade shop is equipped with standard tooling as well as sufficient floor and bench space for the type of fabrication/repair work required to maintain McMurdo's facilities and utilities components.

Building 191 (actually two connected buildings) houses a carpentry work center. This building has the larger floor space needed for small to medium sized construction projects and is equipped with the standard shop tools of the trade. Several smaller buildings near Building 191 are used for painting projects and material storage.

C3.2.3.2.6 Warehousing and Supply (see Section C7.3.1.6)

Station supplies are stored in dedicated warehouses, in work centers or on outside supply lines. The Contractor manages the following enclosed warehouses at McMurdo.

Bldg 120 - 7840 SF of heated space for computer equipment and food.
Bldg 121 - 7840 SF of heated space for electronic supplies and MWR.
Bldg 132 - 7840 SF of heated space for vehicle parts and supplies.
Bldg 136 - 14656 SF of heated space for plumbing, HVAC and electrical.
Bldg 140 - 10240 SF of heated space for office supplies and materials.
Bldg 141 - 7840 SF of heated space for fuels equipment and supplies.
Bldg 164 - 5100 SF of freezer space for frozen food.
Bldg 174 - 7840 SF of heated space for flammable supplies.
Bldg 176 - 7840 SF of unheated space for dry food storage.

Bldg 340 - 4000 SF of unheated space for SEH barrels, overpacks etc.
Bldg 341 - 4000 SF of unheated space for insulation products, etc.
Bldg 342 - 4000 SF of unheated space for paper products, detergents.

Major work centers such as the vehicle maintenance facility and crafts shops as well as science support centers such as the BFC and CSEC (see Sections C7.4.6.1.1 and C7.4.4.2) maintain tool, consumables and parts inventories in store rooms within the work center. These inventories are controlled by Contractor work center employees at each location during regular shift hours. Retail items (store inventories, beer, liquor and soda) are kept in locked, heated storerooms within or near the point of sale and are accessed only by authorized staff.

Large items and bulk containers are stored outside, often on platforms near the using work center. For example, some heavy vehicle parts are stored on pads near the vehicle maintenance center, while lumber and other building supplies are stored around and across the road from the carpentry shop. A dedicated storage pad for Milvans and sea containers is also maintained.

C3.2.3.2.7 Vehicles and Equipment (see Section C7.3.1.7)

Vehicles at McMurdo range from snowmobiles to large bulldozers. The inventory is divided into light, gasoline powered vehicles (snowmobiles, pickup trucks, small vans, lighter tracked personnel carriers); heavy, diesel powered vehicles and equipment (wheeled and tracked loaders, dozers and graders; snowblasts, cranes, fire engines, wheeled and tracked personnel carriers; and related equipment such as trailers, cargo sleds and tankers); mobile support equipment (compressors, portable generators, portable heaters, welders, drills), and aviation ground support equipment (GSE - oxygen carts, APUs, etc.)

Most units in the vehicle and equipment inventory date to the 1970s and 1980s. A few specialized polar machines (Caterpillar LGP D-8s) are 40 years old.

Vehicle and equipment maintenance and repair is based at the Vehicle Maintenance Facility (VMF, Building 143), a 20,800 SF, two-story structure erected in 1987. Nearly 10,000 SF of open bay space in the single story areas accommodate all types of rolling stock. Movable, ceiling mounted cranes and floor-based vehicle lifts provide heavy lifting capacity. The building also houses a machine shop, rebuild and fabrication areas, and over 6000 SF of controlled parts storage areas and office space. Service calls around town and to outlying areas are conducted with wrecker and/or service trucks equipped with welding, lubrication and general repair capabilities.

Double shifts at the VMF during the summer season are required to keep pace with 24 hour station operations including cargo and passenger movement, airfield support and access road maintenance.

Like most activities in Antarctica, VMF workloads can be driven by weather conditions and unexpected problems. Storms and other operational delays affect productivity and create unpredictable backlogs, while the limitations of the annual resupply cycle cannot guarantee ready parts availability for all breakdowns.

C3.2.3.2.8 Fuel Storage and Operation

McMurdo Station stores nearly 8 million gallons of fuel for aviation and ground requirements. A common aviation and ground equipment fuel (AN-8) is stored in 250,000 to 2.2 million gallon capacity steel tanks located around the station complex. Gasoline is stored in one of two tanks (the second is for emergency containment) near the vehicle fueling station. Fuel is delivered once each year, usually in mid-January, when a tanker arrives in Winter Quarters Bay. Fuel off-load from the tanker is an around-the-clock operation, normally requiring four days to complete.

Plans call for the replacement of many of the steel tanks at McMurdo with newer, more environmentally safe designs. The new tanks have larger capacity and better containment features than the existing tanks, and will be located in an area (the "Pass") where containment without environmental damage can be effected by constructing berms around each tank installation. Procurement and erection of these tanks will be in-progress at the time of contract award.

Fuel is distributed throughout the station complex either via a black steel pipe network or by fuel trucks. Remote buildings such as the transmitter building and VLF lab on Arrival Heights are also fueled by truck. A vehicle fueling station, dispensing gasoline and AN-8, is located across the road from Building 141. The fuel piping network is being upgraded to an all welded system. This upgrade should be finished by the time the new contract is awarded.

The fuel distribution system extends to Williams Field and the Annual Ice Runway during the summer season. Flexible fuel hose runs of up to 3 miles in length are placed on the sea ice and ice shelf and connected to the fuel tanks and pumps at the airfields. Fuel is also delivered in sled-mounted tankers pulled by tractors to outlying locations (Marble Point, Black Island) during re-supply traverses.

Fuels equipment includes a variety of mobile pumps, test equipment, tools, connectors, hoses and tanks. This equipment is housed in Building 141, the O&M center for the fuels department, and its use is controlled through the MAPCON program (see Sections C7.3.2.3.2.3, C6.2.1 and C7.5). Equipment is serviced and repaired in this building, which also includes office space for the workforce and controlled inventory space for spare parts and consumables.

In addition to operating and maintaining the various fuel systems, the Contractor staffs and maintains an emergency spill response capability (see Section C7.3.1.8.3).

C3.2.3.2.9 Terminal Operations

Terminal Operations at McMurdo Station manages cargo and passenger transportation. It is the continental branch of the program logistics function and the department most responsible for movement of material and people to, from and within continental Antarctica.

Terminal Operations is based at Building 140, the Movement Control Center (MCC) and central station supply operation for McMurdo Station. The building contains office space, a passenger reception and cargo staging areas, the McMurdo post office, and controlled inventory storage. Adjacent to the building is a large outside pad used as a pallet construction area and staging location for cargo.

The MCC may operate 24 hours a day during the summer to facilitate around-the-clock flight operations and local transportation schedules. The post office and controlled inventory areas are open during posted business hours.

C3.2.3.2.10 Airfield and Aviation Support (see Section C7.3.1.10)

One of the most time consuming and important tasks at McMurdo is construction, operation and maintenance of the three airfields that support the station, and are the base for intercontinental and intracontinental flight operations. The airfields, each with its own support and maintenance requirements, are described below. All personnel assigned to the airfields live at and commute from McMurdo Stations.

C3.2.3.2.10.1 Annual Ice Runway

This runway and related taxiways, parking lots and access roads are constructed on the annual sea ice of McMurdo Sound, normally within 3 miles of the station. Depending on ice conditions, the runway may be situated in approximately the same location each year. Construction begins in August and the facility is ready for flight operations by 1 October. The primary runway (300' x 10,000') and crosswind runway (220' x 8,000) support landings and takeoffs by heavy, wheeled jets, up to and including USAF C-5 transport aircraft. Ski/wheel landing gear aircraft (LC-130s) also operate from the ice runway to take advantage of the higher maximum takeoff weights before shifting to Williams Field later in the season (see Section C3.2.3.2.10.2).

Aircraft maintenance at the Ice Runway (and the other airfields) is limited to ground support and maintenance/repair tasks that can be performed outside, as no hangers are available. Scheduled depot level maintenance is performed in New Zealand.

Support structures at the Ice Runway include mobile, ski-mounted flight line and maintenance buildings, passenger terminals, power plants and other shelters. Aviation fuel is stored in sled-mounted steel tanks and is replenished by flexible fuel hose laid on the sea ice and connected to fuel storage and pumping systems at McMurdo.

The runway is in operation from early October until mid-December, by which time sea ice conditions deteriorate to the point that continued flight operations are impractical.

C3.2.3.2.10.2 Williams Field

This airfield is located on the Ross Ice Shelf, about 8 miles ESE of McMurdo. It is a snow runway (skiway) facility which supports ski-equipped aircraft (LC-130, Twin Otter) operations. The main skiway (250' x 10,000'), crosswind skiway (200' x 8,000') and parking areas are accessed by 6 miles of snow road from McMurdo.

Williams Field is a mobile complex. All buildings at the skiway (approximately 30), including dining and bath facilities, maintenance and flight line structures, and fuel tanks, are mounted on skids and can be moved as needed. Some of these facilities are relocated from the Ice Runway after it closes. Depending on annual ice conditions, a 6.5 mile snow/ice road provides a link between Williams Field and the Ice Runway when both airfields are in operation.

Williams Field supports ski-equipped flight operations and serves as a primary or alternate landing site for all ski-equipped aircraft. It cannot accommodate wheeled aircraft.

C3.2.3.2.10.3 Pegasus Field

This airfield is constructed on a permanent "blue ice" field about 9.4 miles SSW of Williams Field. It is normally placed in operation during WINFLY, closed when the Ice Runway opens, and then reopened from mid-January to the end of the summer season. The runway is 250' x 10,000'. Because it is farther away from McMurdo, access to and support of this airfield is more difficult than the other two. However, Pegasus allows wheeled aircraft operations (USAF C-141) during the WINFLY evolution and at the end of the season (February and even into early March), which reduces the number of LC-130 flights required to return the summer population to New Zealand.

C3.2.3.2.10.4 Field Camp Skiways

Several specialized, lightweight snow grooming devices have been developed for remote skiway construction. Field camp skiways are normally 250' x 10,000'.

C3.2.3.2.11 Housing Services

The Contractor is responsible for providing adequate housing/berthing at the US stations and camps for NSF staff, the Contractor workforce, science groups, military units and other NSF-approved program participants or visitors. This is a program-wide requirement; however, because of the size of the population, the early season population peaks and the number of transients throughout the austral summer, berthing at McMurdo is at a premium and housing management is a more complex task than at the other stations. NSF has also established a housing "cap" for the stations, and the Contractor must manage the influx and departure of personnel without exceeding the caps.

C3.2.3.2.12 Food Services

The Contractor's program-wide responsibilities include procurement of dry, frozen and fresh food; hiring of an appropriately skilled workforce, nutritional planning, food inventory control and rotation; and operation of food storage facilities, kitchens and dining halls in Antarctica. Employment requirements range from one cook assignments at field camps to the multi-shift cafeteria staff at McMurdo.

Food often assumes significant importance at isolated job-sites, and dining halls are principal social settings. The Contractor must understand the affect food has on morale and, within budgetary limitations, emphasize variety, tasteful preparation and dining hall ambiance as part of the food service function. All food service practices must meet USAP sanitation standards (see Section C4).

C3.2.3.2.13 Waste Operations

Most waste processing in Antarctica, for both hazardous and non-hazardous waste categories, occurs at McMurdo Station. In addition to the McMurdo community and the outlying airfields, McMurdo is the marshaling and processing center for wastes that are generated at other stations and on-board research vessels. This includes: all hazardous and non-hazardous wastes from South Pole Station as well as from remote field parties and camps; the hazardous and low-level radioactive wastes generated on-board the research vessels which are off-loaded when the vessels call at McMurdo; and hazardous and low-level radioactive wastes from Palmer Station which are transported to McMurdo by research vessel when cruise schedules allow.

Wastes from the distant stations, remote camps and research vessels are integrated into the McMurdo waste streams and properly processed for removal by the annual resupply vessel. Active processing of wastes at McMurdo ends when the wastes are loaded onto the annual resupply vessel. All wastes must be prepared for shipment consistent with regulatory requirements for transportation and acceptance at the designated port of entry.

In the course of operations, the Contractor is expected to identify means to reduce waste generation, quickly control any problems that may develop during the waste management process, and recommend reduction and/or corrective measures accordingly.

C3.2.3.2.14 Structural and Airfield Fire Services

McMurdo is the only US Antarctic station with a full-time, 24 hour fire department. The other stations organize fire response teams within the general workforce, with appropriate training provided before deployment.

Because the arid climate and often crowded living conditions in Antarctica pose a significant fire risk, the Contractor's fire-fighting response must be rapid and effective. Initial fire protection response should be within three minutes from the time of the initial alarm to the arrival of equipment at the site of a fire within the station proper, with provision for timely back-up support. Structural and airfield response must meet USAP policy guidelines. The Fire Department at McMurdo is the designated "first responder" for all emergency situations (fire, spills, natural disasters, aviation accidents, etc.)

Emergency preparedness (not including, at present, Search and Rescue - see Section C7.4.6.8) for the Antarctic stations is embodied in a plan that is undergoing review at NSF and may change prior to contract award. The Contractor will, however, retain a prominent role in the emergency preparedeness command structure.

C3.2.3.2.15 Retail, Recreational and Religious Services

C3.2.3.2.15.1 Clubs

The clubs are revenue producing and only minimal funds are appropriated for their operation. All inventory is paid for though sales and all profit is returned to an operating fund for improvements to the facilities or to defray the costs of community activities approved by NSF. Complete self sufficiency is the goal of the club operation, and the Contractor should apply its best efforts accordingly.

C3.2.3.2.15.2 Store

The store sells souvenirs, toiletries, sundries such as film and batteries, and limited amounts of clothing and specialty food. Like the clubs, the store is revenue producing and only minimal funds are appropriated for its operation: all inventory is paid for though sales and all profit is returned to a fund for other community equipment or activities approved by NSF. Complete self sufficiency is also the goal of the retail store operation, and the Contractor should apply its best efforts accordingly.

C3.2.3.2.15.3 Financial Services

The Contractor provides an Automated Teller Machine (ATM), maintains the machines and ensures that they are stocked with sufficient cash to meet the demand (heaviest use occurs before late summer season redeployment).

C3.2.3.2.15.4 Television and Radio

Television at McMurdo is provided via a satellite link with the Armed Forces Radio and Television (AFRTS). Commercial programs broadcast on AFRTS are transmitted via the Black Island communications site. The television station also broadcasts a local information channel which posts hours of operation for station services, provides a calendar of events, and regularly updates daily flight schedules. More information on the equipment and broadcast operations is provided in Section C7.5.

C3.2.3.2.15.5 Recreational Services

Recreational facilities at McMurdo include two exercise rooms (an aerobic gym in Building 78 and a weight room in Building 63), a full-sized basketball court and other team sports gym (Building 75), a 2-lane bowling alley (Building 63), a recreational equipment inventory (also in Building 63: cross country skis and other sports items are available for individual check out and use according to NSF approved recreational policies) and, when possible, space for local theatrical or musical productions.

Much of the recreational equipment is paid for through club and store profits, although recreational-related facilities improvements are included in the annual program plan as funding permits. Amenities such as televisions and video players for the dormitory lounges are considered to be part of the housing function, and are also budgeted when needed through the annual program plan.

C3.2.3.2.15.6 Religious Services

The Contractor minister arranges organized religious services, provides counseling and conducts various volunteer programs. Catholic Priests from New Zealand visit McMurdo on one month volunteer rotations during the summer to assist the Contractor minister under a program negotiated by the Contractor with the Roman Catholic Diocese of New Zealand.

C3.2.3.2.16 Clinic Operations

The McMurdo clinic includes examination areas, a six bed ward, controlled storage space, a small operating room, a dental office and administrative space. A diving recompression chamber is installed in a room adjoining the clinic and is operated by the Contractor (see Section C7.4.6.6.1). An ambulance is operated and staffed by the Fire Department under the medical direction of the clinic.

C3.2.3.2.17 Safety and Security

Crime is not a significant problem in Antarctica; however, incidents of vandalism, theft and physical assault have occurred at all of the stations. Such problems are often alcohol-related. The Contractor shall establish policies for appropriate employee conduct, enforce them consistently.

The US Criminal Code extends to Antarctica and the NSF Station Manager at McMurdo has limited authority as a Deputy Federal Marshal.

C3.2.3.2.18 Remote Sites

C3.2.3.2.18.1 Marble Point

Marble Point, on the continental coast of McMurdo Sound, is the location of a remote helicopter refueling station. It is roughly equidistant between McMurdo Station and the Dry Valley field camps. In January of each year, the Marble Point fuel tanks are refilled from a US Coast Guard icebreaker. This operation is coordinated by the Contractor staff at Marble Point.

The Marble Point camp is staffed by the Contractor during the summer and resupplied by surface traverse from McMurdo. This resupply activity is also a Contractor responsibility (see Section C7.3.1.7.8).

C3.2.3.2.18.2 Black Island

Black Island, some 40 air miles from McMurdo Station, is the major communications transmission and receiving site for the USAP. The facility houses antennas, relay and telecommunications switching equipment, the majority of which is designed to operate unattended under normal circumstances. Support structures include living areas, fuel tanks, wind generators, free-standing antennas, and the shells covering the large dish antennas. Black Island is accessed primarily by helicopter.

At present, the facility is staffed by the Contractor during the summer season and operates unattended during the winter (although long-term plans call for year-round unattended operation). If repairs or other maintenance is required during the winter, the site is reached via surface traverse from McMurdo.

C3.2.3.3 Amundsen/Scott South Pole Station (see Section C7.3.2)

The United States has maintained a year round presence at the Geographic South Pole since 1957. The original station was constructed during the 1956-57 austral summer, modified and expanded over the years, and replaced in 1975 by the present geodesic dome and arch complex after a construction effort that began in 1970. During the last five years, several major astronomical observatories have been constructed within a half mile of the main station complex, including a new Atmospheric Research Facility dedicated in 1998. These and other observatories are also in year round operation, and are supported by the main station (see Section C7.4.4)

The present station, limited by the original design and near the end of its useful life expectancy after 20 years of increasingly heavy use, is being upgraded to provide safe habitation until the phased transition to a replacement station begins during the 2001-2002 austral summer. Operation and upgrade of the present facility, ongoing support to the science program, and construction of the replacement station (see Section C7.6.4) are all contract requirements.

South Pole Station is supported entirely by LC-130 airlift from McMurdo Station.

Operations at the South Pole are also divided into summer and winter seasons. The summer season normally begins in late October and ends in mid-February. This period represents the effective flying season, i.e., temperatures are warm enough for routine aircraft operations. The station must be resupplied and refueled while the airlink is available, and any major outside construction or maintenance task must be completed or suspended before winter begins.

Winter extends from station closing until late October/early November, a period of about eight months. Because of the darkness and extreme cold, very little outdoors work is undertaken in winter. Except for HF radio and satellite communications, the station and its occupants are completely isolated from the rest of the world during this period.

Summer populations at the station have climbed over the last 10 years, and now average 200 people. The winter population ranges from 28 to 40 people. Roughly 30 percent of the population during each season are science program participants; the others are mostly Contractor employees. During summer, over 75 percent of the population is housed in an adjoining "summer camp" consisting of barracks-type "Jamesway" structures and modular sanitary facilities. During winter, residents live in the berthing areas inside the dome or in an elevated structure near one of the archways. This structure and an independent power plant and fuel supply also serve as the emergency station for the winter population.

The Contractor is responsible for operation and maintenance of the entire station.

C3.2.3.3.1 Station Management

The Contractor must provide day-to-day management flexibility and the informed response needed to adjust resources and schedules, recover from weather imposed delays; and accommodate a variety of minor and often frustrating operational problems related to the remote location, lack of outside support, aging infrastructure, and confined and overcrowded living conditions.

C3.2.3.3.2 Station Utilities

Station utilities include a diesel/electric power plant (3 each, 450 KW diesel/electric generators and associated controls and switchgear), distribution systems (electrical, glycol heating, water, and sewage networks housed in a corrugated steel culvert tunnel "utilidor" beneath the station), and specialized utilities such as a snow water well providing the station drinking water, direct burial electrical power runs to outlying buildings, uninterruptible power supplies, etc.

C3.2.3.3.3 Warehousing, Cargo and Supply

Controlled and heated inventory space at South Pole Station is extremely limited. With the exception of some store items, beer, liquor and soda; electronic parts, medical supplies and science equipment, almost all other inventory is stored on unheated shelves inside the archways or on long berm lines outside of the station. Some progress is being made in adding the berm inventory to a computerized inventory listing; however, until the new station with its designed storage space is completed, inventory control at South Pole will remain a labor intensive effort.

As the SPRP proceeds, cargo operations and related inventory functions at the station will increase in intensity and in scope.

C3.2.3.3.4 Vehicles and Equipment

Vehicle and equipment operations at the South Pole include snow removal and grooming, skiway preparation and maintenance, berm construction, cargo movement, waste management support, aircraft cargo operations, personnel transport (including a shuttle bus-type service), building refueling, construction support and varied assistance to the science programs.

Flight operations and, more recently, construction and maintenance programs are in progress 24 hours a day. Therefore, vehicles and equipment are in relatively constant use, and are central to the success of daily operations. The Contractor must provide the resources to keep the fleet in good condition.

C3.2.3.3.5 Fuel Operations

Fuel is off-loaded from LC-130 aircraft wing tanks and transferred to the storage tanks in the fuel arch. Once stored in the fuel arch, fuel is distributed to the station power plant and garage arch fueling station via an insulated pipe network. Fuel is transported to the summer camp, observatories and outside work areas by tractor and sled. The Contractor also provides an emergency spill response capability.

C3.2.3.3.6 Aviation Support

The South Pole airfield is a 250' x 14,000' skiway with associated taxiways and parking areas; perimeter, visibility and distance markers; and an "in use" warning light system for station residents. Ground support is typically provided to individual LC-130 aircraft landing and departing within the span of an hour (although 2-3 aircraft can be at the station simultaneously); however, Twin Otter and other aircraft sometimes remain overnight.

C3.2.3.3.7 Housing

Berthing at the station during the summer is very crowded and requirements change daily with the arrival and departure of occupants. At any one time during the summer, there is a requirement for 120-200 beds between the main station, summer camp and science quarters. The Contractor must manage the movement of personnel to and from the station without exceeding the designated population "cap".

C3.2.3.3.8 Waste Operations

As at McMurdo, domestic and industrial non-hazardous waste is segregated by waste stream category at the point of generation. Waste collection containers are located in work centers, at collection points within the dome and archways, and at outlying research and living facilities. Wastewater from the station is disposed of in undersnow outfalls. Hazardous wastes are staged at accumulation centers within the individual work centers while awaiting pickup and transportation to a central processing area.

The integrity of the USAP recycling program is maintained at South Pole Station, although processing of the various waste streams is directed toward air transportation to McMurdo Station. At McMurdo, South Pole-generated waste is integrated into the McMurdo waste streams and final processing is completed as described in Section C7.3.2.11.

C3.2.3.3.9 Fire and Safety

The Contractor fire response teams are usually drawn from the station workforce, principally the winter O&M staff, before deployment and receive formal training (normally a week long course) at a fire academy in the US. As needed, additional fire fighters are trained at the station to assist the core teams. Supplemental training and on-site fire safety inspections are provided by the McMurdo fire department.

Personal safety at the station (outside of industrial and workplace safety practices) is generally not a concern; however, as at McMurdo, the Contractor shall establish and enforce policies for employee conduct.

C3.2.3.3.10 Retail and Recreational Services

The South Pole store, club and recreational services are managed by the Contractor. Recreation facilities include a small gym with a hardwood floor, a weight room, pool table and library within the main station; and a weight room at the summer camp. Some sports equipment such as skis is available for check-out.

C3.2.3.3.11 Tourism

Over the last 10 years, non-governmental activity at the South Pole including commercial tourism has steadily increased. Outside groups visiting or transiting the Pole include skiers, tourists arriving via chartered aircraft, and even skydivers. USAP policies govern the station's interaction with private groups.

C3.2.3.4 Palmer Station

Palmer Station, located on Anvers Island off the coast of the Antarctic Peninsula, is the United States' land-based research presence in peninsular Antarctica. The original station was built in 1965 and replaced by the present complex in 1968. Being furthest north, Palmer has the mildest and most marine climate of the US stations.

Unlike the other US stations, Palmer can be accessed year-round. It is supported entirely by ship (the two USAP icebreaking research vessels, USCG icebreakers and, on occasion, other ships) from South America, which provides the means to rotate support staff and science personnel on a more frequent basis, and also eases the on-site inventory and compressed scheduling burden otherwise dictated by the austral seasons in Antarctica.

Palmer is the smallest US year-round station. The population averages 35 people during the summer, 20 during the winter, and the station cannot provide berthing for more than 43 people at any one time. Biological and atmospheric science programs are conducted at Palmer with a recent emphasis on ecological and UV monitoring. Observatories have been erected on several other islands near the main station for use by science parties and as emergency refuges.

The Antarctic Peninsula features more stations than any other part of Antarctica. Most Antarctic Treaty nations have at least one facility in the region and, because of the close proximity of various installations, national program resources are sometimes shared. The Peninsula is also a primary destination for the "adventure tourism" industry,

and tour ships call at Palmer Station many times each year. Such visits are closely managed by NSF so that the ongoing science program is not impeded.

There is no plan to enlarge Palmer, although a facilities renovation program is scheduled to begin in 1999. The Contractor is responsible for support, operation and maintenance of the entire station.

C3.2.3.4.1 Station Management

An NSF Representative is on-site for only a short time each summer. The Contractor, therefore, must be especially vigilant in implementing NSF policies at the station. As at South Pole Station, Contractor management is expected to be flexibile and capable of providing the informed response needed to adjust resources and schedules, recover from weather imposed delays; and accommodate a variety of minor and sometimes frustrating operational problems related to the remote location, limited outside support, aging infrastructure, and confined and overcrowded living conditions.

C3.2.3.4.2 Utilities and Facilities

Station power is provided by 2 each 250 KW diesel/electric generators and a backup 120 KW unit. Potable water is produced at a desalinization plant (primary reverse osmosis unit with a capacity of 3000 GPD, and backup RO units with a 1000 GPD capacity). Utilities distribution systems include electrical, glycol heating, water, and sewage networks. Power consumption at the station averages 300 KW with fresh water consumption of 1200 GPD. Sewage is macerated and discharged into the bay via a 160-220' outfall.

There are two primary buildings at Palmer. "Biolab", a 3-story, 8000 SF structure, houses the laboratory and attached aquarium (1st floor), kitchen, dining areas and office areas (2nd floor), and berthing (3rd floor). GWR, a 6000 SF structure, houses the garage and power plant, warehousing, additional berthing and recreation areas. Additional structures include the boathouse/dive locker, a crafts workshop, a seawater pumphouse, and several small science buildings and vaults.

C3.2.3.4.3 Cargo, Warehousing and Supply

Warehousing space at Palmer Station is very limited. Most station support inventory is maintained in a 2000 SF area within GWR, with electronic parts, medical supplies and science inventories kept in heated storage in the associated work spaces. Bulk items such as lumber and bottled gasses are stockpiled outside, or in the Milvans kept on station.

C3.2.3.4.4 Vehicles and Equipment

The station vehicle and equipment inventory includes two Skytrack boomed loaders, two Caterpillar wheeled loaders, a crane, four all terrain vehicles (ATV) and two snowmobiles. A fleet of twelve Zodiac inflatable boats powered by outboard motors are maintained in the Boathouse.

Vehicle and equipment operations at Palmer include ship off-load/on-load and cargo movement around the station, waste management support, construction support and varied assistance to the science programs. With the exception of ATVs and snowmobiles, vehicles are confined to the immediate station vicinity. During the summer, the Zodiacs are in daily use and the Contractor must ensure that they are safely maintained and suitably supplied for emergency conditions.

C3.2.3.4.5 Fuel Operations

Palmer maintains a large supply of Diesel Fuel Marine (DFM) and several hundred gallons of gasoline. Diesel fuel is off-loaded from the ships via hose, transferred to one of the main storage tanks on station (there are 2 steel tanks, each with 120,000 gallon capacity. Only one is in use at a time; the other serves as a back-up containment vessel) and distributed as needed to a day tank next to the power plant and a day tank next to the Biolab. Fuel is usually delivered twice each year in 70,000 gallon shipments. The Contractor also provides an emergency spill response capability.

C3.2.3.4.6 Aviation Support

Palmer does not maintain a groomed landing site; however, small aircraft (Twin Otters and others) have landed on a nearby glacier and ship-borne helicopters sometimes visit the station.

C3.2.3.4.7 Housing

Berthing at the station during the summer is very crowded, and requirements change every few weeks with the arrival and departure of the ships.

C3.2.3.4.8 Waste Operations

The integrity of the USAP recycling program is maintained at Palmer although processing of the various waste streams is directed toward vessel transport for disposal in Chile. As at McMurdo, the Contractor is responsible for segregating, packaging, and staging non-hazardous waste before loading on-board designated vessels as scheduled by NSF. Wastewater from the station is discharged into the sea via an off-shore outfall.

Hazardous and low-level radioactive wastes are separately processed from solid waste and are manifested for removal by vessel and disposal in the US. Active processing of wastes at Palmer ends when they are loaded onto a vessel destined for the US; therefore, waste documentation and packaging must be compliant with the same suite of US Federal and State regulations referenced in Section C4.

C3.2.3.4.9 Fire and Safety

The Contractor trains and organizes fire response teams according to the length of stay and duties of employees at the station. These teams are drawn from the O&M staff before deployment and each core team member receives formal training (normally a week long course) at a fire academy in the US. As needed, additional fire fighters are trained at the station to assist the core team. The Contractor also maintains station fire alarm and smoke detection systems. Fire brigade members shall meet NFPA and OSHA requirements (see Section C4) while personnel performing fire inspections or system checks shall possess NFPA credentials.

Personal safety at the station (outside of marine, industrial and workplace safety practices) is generally not a concern; however, as at McMurdo and South Pole, the Contractor shall establish and enforce policies for appropriate employee conduct.

C3.2.3.4.10 Retail and Recreational Services

The Palmer store and bar are revenue producing and no funds are appropriated for their operation. Recreation facilities include a weight room, a pool table and a library. Some sports equipment such as skis is available for check-out.

C3.2.3.4.11 Tourism

Tourism has a more sustained and generally larger influence at Palmer than at the other stations. Under an agreement between the USAP and the International Association of Antarctica Tour Operators (IAATO), tour groups can visit the station at certain times and according to certain "not-to-interfere" conditions. Sometimes an NSF Representative is on-site to manage these visits; at all other times senior on-site Contractor person conduct tours, and are expected to present the USAP in a professional and positive manner.

Tour ships operate safely and are generally a benign diversion; however, they are closely scheduled by NSF and the Contractor must deal with them according to established USAP policy (see Section C4).

C3.2.3.5 Research Vessels

C3.2.3.5.1 R/V *Nathaniel B. Palmer*

The *Palmer* conducts science cruises in the oceans surrounding Antarctica throughout the year. The ship, owned by Edison Chouest Offshore (ECO), is staffed by a ECO crew of 21. Depending on individual cruise objectives routes, the ship operates out one or more of the "Antarctic Gateway" ports: Punta Arenas, Chile; Lyttleton, New Zealand, Hobart, Australia and Cape Town, South Africa. The *Palmer* has berthing for over 30 science program participants and sufficient laboratory space and computer systems to support several oceanographic and/or other projects during any one cruise. A normal cruise lasts four to six weeks.

Operations onboard the *Palmer* must meet the standards designated in the USAP Safety and Health Manual.

C3.2.3.5.2 R/V *Laurence M. Gould*

Like the *Palmer*, the R/V *Gould* conducts science cruises in the oceans surrounding Antarctica throughout the year. Unlike the *Palmer*, *Gould* is designed to carry and load/unload container cargo so it can resupply Palmer Station and retrograde waste generated at the station. The ship is owned and operated by ECO, staffed by a crew of 15 and based at Punta Arenas. The *Gould* has berthing for 28 grantees and science support staff (including two, optional deck Government furnished mounted berthing vans that can accommodate an additional 10 passengers during transits to Palmer), over 1600 SF of laboratory space, and a networked computer system.

Operations onboard the *Gould* must also meet the standards designated in the USAP Safety and Health Manual.

C3.2.3.5.3 Communications and Computing

Each research vessel is equipped with a Local Area Network (based upon hybrid UTP copper, 10BASE-2 coaxial, and fiber cabling) and a network server, which presently runs a Novell operating system providing networked file and print services, e-mail and office automation applications.

Workstations are standard personal computers as well as multiple networked Silicon Graphics (IRIX O/S) workstations. Real time data acquisition is supported, with interfaces to on-board marine electronics suites including sonar, sounders, temperature, salinity, GPS position, and ship's navigation measurements and readings. Interfaces must also be supported to any grantee-supplied instrumentation. Automatic data logging is provided, which is script-driven and has mission-specific reconfiguration capabilities.

The vessels also have video capabilities as part of their computing-related functionality. The ship-board CATV systems use coaxial cable, modulators for connectivity to the data acquisition system (with scan converters), and interfaces with CCTV cameras to allow viewing of critical research mission and navigation data.

The *Gould* is equipped with an INMARSAT Standard-B ship earth station, including a high speed data link. This system is owned by NSF and maintained by the Contractor. The ship is also equipped with an INMARSAT Standard-A analog system which is owned by the ship's owner/operator. Science computing is connected to the NSF-owned Standard-B system, which provides telephone and ISDN dial telephone service from the COMSAT Southbury Coastal Earth Station to networked computing services in the United States. HF radio service is also available.

The *Palmer* is equipped in a similar fashion to the *Gould*. The current NSF-owned and operated INMARSAT system is a Mobile Telesystems Standard-A high speed ship earth terminal. This is planned for upgrade to Standard-B service. LAN connections are via a TCP/IP router and IP sessions are implemented via the 56k link with COMSAT's Santa Paula, CA earth station. The *Palmer* also has a INMARSAT Standard-C back-up unit for emergency communications.

C3.2.4 Science Support (see Section C7.4)

C3.2.4.1 Overview

Almost every USAP activity can be considered a form of science support, as science is the principal expression and product of the US presence in Antarctica. This emphasis is reflected in OPP's mission statement, which, broadly stated, is to promote and support excellence in scientific research in and about the Antarctic region in accordance with national policies and the mission of the National Science Foundation.

As defined in this solicitation, "science support", means the direct provision of planning, logistical, operational and technical support to the science projects funded by the NSF in Antarctica.

NSF dictates neither the content nor the course of science in Antarctica. Each year, NSF announces an open competition for proposals, and requests researchers to respond by predetermined deadlines (usually before 1 June of each year for funding and field work beginning at the earliest 12 months from the date of proposal submission) so that proposals can be reviewed for scientific content and feasibility of support. The scientific evaluation is accomplished by an independent peer review process that does not involve the Contractor. Proposals within NSF funding and charter limits are considered suitable for award, and are further evaluated by NSF and the Contractor to determine the scope and type of support required, both in Antarctica and the US. Awards are made based on scientific merit and according to the total science funding available for the fiscal year. On average, one of every three proposals submitted is funded.

After award, successful researchers enter the formal USAP grant support process which, depending on individual requirements, provides direct and sustained assistance throughout the life of the grant. Management of the process at NSF direction is one of the most important Contractor responsibilities.

C3.2.4.2 Management and Technical Personnel Qualifications

Although much of the support provided by the Contractor to science groups is generic, there is more emphasis on sophisticated analytical techniques and high technology instrumentation than in the past. Therefore, to provide effective support for complex projects, the Contractor will often need to acquire technical staff with skills equal to those required to support advanced research at major university laboratories. This requirement can be especially important for research vessel-based science.

C3.2.4.3 Science Support Process (see Section C7.4.3)

C3.2.4.3.1 ESP Database

Increasingly, NSF is relying on information technology/information services (IT/IS) to compile, maintain, update and generally improve the data bases needed to manage the science program. As part of NSF's open announcement for proposals, researchers unfamiliar with the USAP or polar science are made aware of the ESP (Electronic Support Planner) data base on the World Wide Web. The ESP web site is now under development. When complete, ESP will allow prospective grantees to acquire relatively detailed knowledge of USAP resources before deciding to proceed with a formal proposal, expedite the submission of their support requirements; and enable prompt communication between grantees, the Contractor and NSF

C3.2.4.3.2 Proposal Review

At the same time as proposals submitted by the scientific community are going through the peer review discussed in Section C7.4.1.1, NSF forwards copies of the proposals to the Contractor for an initial operational review. The Contractor is normally required to return a brief (one page) evaluation of the probable support each proposal will require to NSF by the end of August. NSF refers to these evaluations when reviewing proposals recommended for funding to determine if operational/logistical support is feasible before awards are made. Funding decisions are normally made between September and March of each year, and NSF notifies the Contractor as proposals are selected for award.

C3.2.4.3.3 User Committees and Meetings

User Committees are developed and supported by the Contractor. The committees represent research vessel users (ARVOC), South Pole Station users (SPUC), McMurdo Area users (MAUC), and the Palmer Area users (PAUC). Committee members are scientists who receive Contractor support, work in a particular area or onboard the vessels, and can represent scientists with similatr interests. Members are nominated by their respective research communities and selected by the Contractor. The committees meet at least annually.

User Committee meetings provide an opportunity for grantees, Contractor personnel and NSF to review the previous season, discuss grantee concerns and interests, and identify problems for resolution. These sessions also provide grantees with an opportunity to discuss issues such as the direction of future research and anticipated use of facilities, which enables the Contractor and NSF to begin constructing a framework for projected support requirements.

C3.2.4.3.4 Specialized Grantee Support

Grantee support may include supplying specialized research or other equipment and services as authorized by NSF.

C3.2.4.3.5 Field Activities

When the field season begins, science program participants deploy according to the approved plan. They are assisted in transit as required by Contractor personnel and, upon arrival at their principal work location or staging area (for example, a party of geologists going to the Transantarctic mountains stages at and is supported by McMurdo Station), are provided with general station or vessel support (berthing, food, transportation, cargo movement, etc.), Antarctic "field" indoctrination as needed (snowcraft and survival schools, safety and environmental training, aviation and vehicle use procedures, etc.), and grant-specific assistance (laboratory management services including office space, computer access and assistance, instrumentation support, field equipment issue, sample retrieval and storage, etc.). At the end of their field season, grantees participate in an "outbrief" with NSF and Contractor representatives to review the support provided by the program.

Grantees are also asked to complete a Contractor developed written questionnaire evaluating the effectiveness of the Contractor in providing the support authorized by NSF under the approved plan. The Contractor should periodically review the questionnaire format and revise/improve its content as science support requirements dictate.

C3.2.4.4 Antarctic Laboratories and Observatories (see Section C7.4.4)

The Contractor is responsible for management and oversight of all laboratories and observatories. This responsibility includes wiring (electrical and computing), plumbing, and permanent fixtures that are part of the research infrastructure. The Contractor is required to obtain NSF approval before structural changes are made to any USAP facility (see Section C7.6), and must ensure that grantees understand that they are not to make such changes on their own.

C3.2.4.4.1 Crary Science and Engineering Center

At McMurdo, the principal laboratory is the Crary Science and Engineering Center (CSEC). The CSEC was opened in 1995. It is a 46,500 SF structure with five work zone areas, designed to provide a flexible, working laboratory environment. A two-story core area is used for several purposes including IT support, office space and general staging areas; cold storage "environmental" rooms for ice cores, a library and a lecture hall. The laboratory space in the remaining areas was built with movable interior walls to allow each project to be given a work space that is appropriate to its needs. The laboratory space is used for a wide range of science activities in disciplines including biology, atmospherics sciences, and earth sciences. The CSEC houses wet and dry laboratories as well as an aquarium.

Although most heavily used by McMurdo based grantees, the CSEC supports research throughout Antarctica. Services such as analytical chemistry, cryogens and instrument calibration are provided to South Pole, and the research vessels, as requested. All scientists deploying from or returning to McMurdo are assigned office and/or laboratory space in the CSEC to facilitate individual staging, communications and research needs.

Almost all research activities in the CSEC are conducted during the austral summer. During the austral winter, activity in the CSEC is generally limited to inventory management and facilities maintenance and repair, although future years may include winter science programs.

C3.2.4.4.2 South Pole Station Laboratories and Observatories

Three observatories are in operation at the South Pole. Two, the Center for Astrophysics Research in Antarctica (CARA), and AMANDA (Antarctic Muon and Neutrino Detector Array), are located in the "Dark Sector", across the skiway. A third elevated science facility, the Atmospheric Research Observatory (ARO), is located upwind of the station in the Clean Air Sector.

Science grantees are the primary observatory users. Grantees establish project support requirements, define the instrumentation needed, and specify the observational and data acquisition activities to conduct their research. As the ongoing manager of the facilities, the Contractor must provide the continuity needed to meet changing project requirements, and facilitate the installation of new types of instrumentation in the laboratories and observatories and possibly at other remote sites.

The Contractor manages the facilities and is responsible for all consummables and bench stock as well as the acquisition and maintenance of instrumentation.

C3.2.4.4.3 Palmer Station Laboratory

The Palmer laboratory is a 1900 SF facility that supports marine and terrestrial ecology and ecosystem research. It includes indoor and outdoor aquariums. Other research instrumentation is housed in small buildings at or near the main station complex. The Contractor manages the facility and is responsible for all laboratory consummables and bench stock as well as the acquisition and maintenance of instrumentation.

C3.2.4.4.4 Scientific Information Services (see Section C7.4.5.1)

The conduct of science within the USAP relies heavily upon the availability of computing and communications resources to collect and organize data, analyze it, and transport it to other locations for archiving and/or further analytic work. This work is done in the context of a research, academic environment, which is distinct from that required for operational and business computing systems. The requirements for projects vary substantially, and the Contractor must be flexible enough to meet the full range of information needs. The primary source of information on the needs of the specific projects are their individual RSP's.

A description of the currently installed science support IT infrastucture is provided in Section C7.5. Generally, each grantee will have access to laboratory space and/or field capable IT/IS equipment in Antarctica. Station laboratory spaces are equipped with personal computers, network access to printing and remote communications resources. All laboratory buildings are fully wired for telecommunications and networked computing. Research vessels are similarly wired, and have communications systems on-board which can access remote sites for messaging and/or data transfer. Research parties working in remote setting are provided with field communications and computing equipment to supplement their own equipment as needed.

C3.2.4.4.5 Science Technicians

Most instruments operated by Contractor Science Technicians support long-term science projects that are directed by investigators at academic institutions. The Science Technicians receive guidance from the investigators, interact with them as required throughout the year, and record/transmit data as required for each project.

C3.2.4.4.6 Cryogenic Support Services

Currently, both liquid nitrogen and liquid helium are provided to the grantees by the Contractor. Contractor personnel also operate liquid nitrogen plants at McMurdo and South Pole.

USAP Cryogenic operations are sophisticated. Because the program stores liquid gases for extended periods and moves substantial volumes of the gases between generation sites and laboratories in Antarctica, the Contractor must provide the capability to manage the current process effectively, and look for ways to improve operational efficiency.

C3.2.4.4.7 South Pole Station Meteorology

On a year-round basis, Contractor Meteorologists and Meteorology Technicians assigned to South Pole Station provide weather forecasting services, operate and maintain recording equipment, launch balloon-borne Rawinsondes twice each day, and provide synoptic and hourly aviation weather reports as required by the SPAWARS office at McMurdo for flight operations.

C3.2.4.4.8 UV Monitoring Network

The UV Monitoring Network is a distributed set of high-resolution UV scanning spectroradiometers. Network sites include McMurdo, South Pole and Palmer stations, Antarctica; Ushuaia, Argentina; and, Barrow, Alaska.

C3.2.4.4.9 Automated Geophysical Observatories

AGOs are an efficient and effective means of conducting science in Antarctica; therefore, the network is likely to expand in the future. The Contractor will support this expansion and will be expected to suggest ways to maximize the utility of the AGO network as part of the overall science planning process.

C3.2.4.5 Field Support Services (see Section C7.4.6)

Contractor field support services vary in scope and duration according to the requirements of individual grants. During the course of a typical season, most grantees deploying to remote field sites are supported by McMurdo Station, which maintains a larger inventory of field equipment and provides a wider range of services than either South Pole or Palmer stations. Grantees at South Pole generally work at or near the station. Grantees at Palmer also work at or around the station, but routinely travel by boat to other locations. Some field parties deploy from the research vessels. On occasion, the USAP sponsors joint science programs with other nations which require field support from one or more of the US stations. At each station, it is the Contractor's responsibility to ensure that grantees are properly equipped, trained and assisted according to the requirements of each RSP.

C3.2.4.5.1 McMurdo-based Field Party Support

The field gear inventory at McMurdo has been developed to meet the conditions field parties encounter in Antarctica. Conditions range from dry cold and sustained wind on the interior of the continent to a wet, marine-like environment on the sea ice and at coastal locations. Each grantee is outfitted by the Contractor accordingly and receives training in equipment use as needed.

C3.2.4.5.2 Palmer or Research Vessel-based Field Party Support

The Contrctor manages the Punta Arenas warehouse inventory, issue equipment and supplies to grantees, provide instruction as needed, and clean and repair equipment when it is returned. As at McMurdo, inventories at Palmer and Punta Arenas are periodically evaluated and recommendations for improvement are submitted to NSF.

C3.2.4.5.3 McMurdo Mechanical Support

Equipment maintained by the Contractor at the Mechanical Equipment Center includes rock drills, ice augers and melters; and portable heaters, welders and generators. Vehicles maintained at the MEC include several models of snowmobiles and several types of tracked personnel carriers. Over 100 vehicles are in the science support fleet.

C3.2.4.5.4 Palmer or Research Vessel-based Mechanical Support

Field parties operating out of Palmer Station or from the research vessels, can draw mechanical support equipment from the limited inventory at Palmer. In most cases, however, such equipment is shipped to Palmer, either from the warehouse inventory at Punta Arenas or as a shipment from the US prestaged at the warehouse in advance of the grantees arrival. Mechanical equipment provided at Palmer Station includes Zodiac boats and assorted equipment deployed from the boats. Contractor personnel at Palmer maintain and repair mechanical equipment used by grantees operating out of the station.

C3.2.4.5.5 Science Construction or Fabrication

For some grant construction projects, modular or prefabricated construction in the US followed by assembly on-site at the station is preferred. Such options are reviewed by the Contractor, NSF and grantees during the planning process and, if selected, the Contractor is then responsible for design, procurement, transport and assembly of components.

C3.2.4.5.6 Field Camp Support

When included in the annual program plan, a large field camp is in operation for 2-3 months of each austral summer. Most are staged from McMurdo Station, although large, temporary camps have been built on the sea ice of the Antarctic Peninsula region. Contractor responsibilities include planning the camp with NSF and grantee user groups during the preseason, procuring any needed materials and equipment, staging construction materials for air transport to the site (about 2-3 weeks), building the camp (also 2-3 weeks), operating the camp (food service, mechanical and field support, waste management, administration, weather observation, etc.; usually, 5-8 weeks); and, if the camp will not operate in following seasons, dismantling structures and facilities and returning them to McMurdo.

Several research camps in the Dry Valley area of McMurdo Sound and on islands near Palmer Station are built on ice-free land; therefore, facilities at these sites can be maintained indefinitely without the annual reconstruction/dismantling often required for camps built on snow.

Recent field camps include the Downstream B Camp, a glaciological research site in the active ice stream area of west Antarctica; Siple Dome, a 100-person camp supporting deep drilling and aerogeomagnetic research, also in west Antarctica; Shackleton Glacier, a helicopter supported research camp in the Transantarctic mountains; and the Long Term Ecological Research (LTER) project, several long-term research camps in the Dry Valleys and near Palmer Station. Both the Downstream B and the Siple Dome camp included Contractor provided fixed-wing aircraft support.

During the next contract period, seasonal camps similar in size to Siple Dome will probably be built and operated in both west and east Antarctica. In addition, the USAP may conduct some extended surface traverses. These traverses may be multi-season events covering hundreds of miles and will require Contractor procurement as well as operational support of research activity during the traverses.

C3.2.4.5.7 Field Training

For grantee field parties, Contractor provided field training is conducted at two levels. The first level is a mandatory, generic course in safety and outdoor skills for all USAP participants venturing into a field setting. The second level is a custom course which addresses the requirements of an RSP and builds on the first level of instruction. Typically, the custom course focuses on the terrain a particular group will encounter, provides supplemental/advanced training in important skills and/or certain equipment, and can include a practice deployment to set up and test equipment over a several day period.

On occasion, grantees may require direct support and/or guidance during their field deployment. In these cases, Contractor field personnel with appropriate polar/mountaineering experience as well as the leadership ability to control field operations without interfering with research objectives, may accompany novice research parties into the field and establish a framework for safe and effective work.

The field training function at McMurdo is based at Building 138. Facilities include a classroom, equipment storage and office space.

C3.2.4.5.8 Fixed-Wing Utility Aircraft

These aircraft have the capability to transport small research parties to unprepared landing areas and can operate from remote fixed-bases, i.e., at field camps. They can also be equipped with the airborne research instrumentation used by several ongoing grants. Two to three of the aircraft (presently Twin-Otters) usually deploy each season.

C3.2.4.5.9 Helicopters

Helicopter services are provided through an NSF contract. Helicopter operations at McMurdo are conducted 24 hours per day from October through February of each year. Because of the constantly changing weather and other operational factors, flight schedules must be updated on a daily and often hourly basis.

When established, several helicopters may also operate from remote field camps. In late summer, helicopters from US Coast Guard icebreakers operate from McMurdo providing another aviation asset that, depending on availability, can be programmed into daily flight schedules. In future years, helicopters may also operate from the *Nathaniel B. Palmer*.

The Contractor is responsible for preparing the preliminary flight schedule for the season according to RSP requirements, coordinating changes during the field season, and for ensuring that grantees are properly equipped and briefed before traveling on helicopters.

C3.2.4.5.10 LC-130 Aircraft

LC-130s are relatively large, complex aircraft and economical, cost-effective use requires good planning. The Contractor is responsible for coordinating LC-130 operations with the Air National Guard and NSF. During the summer, the Contractor chairs a twice weekly Air Operations Planning Board (AOPB). The Contractor develops tasking and schedules for the aircraft as NSF's representative.

C3.2.4.5.11 Search and Rescue

Search and rescue response depends on the location and nature of the emergency, but the Contractor is required to develop a common procedural plan, including appropriate drills/training and "mass casualty" contingencies, for all stations and camps.

At Palmer Station, search and rescue planning includes provisions for marine SAR activities as well as rescues on land.

C3.2.4.6 Marine Science (see Section C7.4.7)

Marine science is performed from the R/V *Nathaniel B. Palmer*, a 6800 ton, 308-foot ABS Class A-2 icebreaking research vessel; and the R/V *Laurence M. Gould*, a 3400 ton, 230-foot ABS Class A-1 icebreaking research vessel. Both vessels are "floating laboratories", providing grantees with the facilities and equipment needed to conduct marine-based experimentation. Each vessel has the icebreaking capability to penetrate pack ice up to __ feet thick, enabling year-round access to Palmer and the independent ability to reach McMurdo Station during the summer. Only the *Gould*, however, has the cargo carrying capacity to resupply Palmer Station.

C3.2.4.6.1 R/V Nathaniel B. Palmer

The *Palmer* conducts science cruises in the oceans surrounding Antarctica throughout the year. Depending on individual cruise objectives routes, the ship operates out one or more of the "Antarctic Gateway" ports: Punta Arenas, Chile; Lyttleton, New Zealand, Hobart, Australia and Cape Town, South Africa. The *Palmer* has berthing for 39 grantees and science support staff, over 5500 SF of laboratory space, and a fully networked computer system.

Shipboard laboratories support biological oceanography, marine biology, chemical oceanography, physical oceanography, and marine geology and geophysics.

C3.2.4.6.2 R/V Laurence M. Gould

Like the R/V Palmer, the *Gould* conducts science cruises in the oceans surrounding Antarctica throughout the year. Unlike the *Palmer*, *Gould* is designed to carry and load/unload container cargo so it can resupply Palmer Station and retrograde waste generated at the station. The ship is based at Punta Arenas, Chile. The *Gould* has berthing for 28 grantees and science support staff, over 1600 SF of laboratory space, and a networked computer system.

C3.2.4.6.3 Research Vessel Staffing

The specific staff skills the Contractor provides to support the marine science program will vary from cruise to cruise, depending upon individual grantees and the types of science that they will conduct. The Contractor must be able to acquire the skills needed for each cruise, sometimes on short notice.

Shipboard equipment must operate properly during a cruise, as the ability to obtain spare parts or to remove a piece of equipment for servicing is limited once the vessel has sailed. Therefore, the Contractor is expected to have all of the proper equipment on hand, and completely checked out and calibrated prior to the actual cruise dates.

C3.2.4.6.4 Multibeam Operations

This system, installed on board the *Palmer*, uses echoing to produce ocean charts in real-time or near real-time. Multibeam operations are labor intensive - typically, three man-hours of effort are required to extract spurious data from each hour of system operation - however, the system provides invaluable support to many marine projects.

C3.2.4.7 Telecommunications Support (see Section C7.4.8)

Telecommunications support for grantees includes ensuring that they are able to communicate effectively with other USAP locations while they are in the field, and can reach their home institutions and other researchers off-continent with relative ease. Voice and data transmission and reception via telephone or radio links are Contractor responsibilities, and the Contractor must schedule communications according to the availability of links, which vary by station and camp.

Telecommunications links for the science program are required at the permanent US stations (links to and from global sites); remote field camps (links to and from McMurdo and to and from global sites); local field camps such as those in the Dry Valleys (to and from McMurdo station). The Contractor is responsible for the installation, operation and maintenance of systems at each location, and for providing equipment and training to grantees as required.

C3.2.4.7.1 Permanent Stations

At permanent stations in Antarctica, grantees have access to computer work-stations in their laboratories and at other station facilities. The work-stations are typically desk-top personal computers, from which grantees can access printers, network servers, their e-mail accounts and the World Wide Web for Internet connections to off-ice locations, including their home institutions. Off-ice voice communications include satellite telephone and fax lines from the stations. However, telecommunications access (especially to and from the South Pole) is not always real-time because satellites are above the horizon only for discrete blocks of time on any given day.

C3.2.4.7.2 Field Camps

Communications from/to USAP field camps to/from global locations depends on a line-of-sight contact. The INMARSAT Standard-C earth terminal is one such contact, and is presently used by the USAP for remote field camps in both continental and peninsular Antarctica. Data transmission is currently available only at modest transfer rates, and is relayed out through satellite (ATS-3, GOES-3) connections to destinations off-continent. Radio

communications can be patched to voice systems for connections overseas. Remote field camps communicate with other Antarctic stations via HF and VHF radios.

Field camps close to McMurdo Station, such as the Dry Valleys sites, communicate with the station by various means. Currently available systems include: UHF radiotelephones, HF manpack radios, and VHF land mobile base stations with hand-held units. An INMARSAT standard-C terminal provides POP3 e-mail service.

The research vessels communicate with Antarctic sites and global locations through INMARSAT Standard-B high speed data earth station connectivity. INMARSAT Standard-B systems are installed on each vessel.

C3.2.5 Information Technology and Communications Systems (see Section C7.5)

C3.2.5.1 Information Technology and Communications Infrastructure

The USAP's information infrastructure includes both communications and computing components, all of which are critical to the success of the USAP. This infrastructure consists of several major component types, including: interconnected and inter-operable telecommunications circuits and systems; radio communications systems; leased and public network common carrier services; computer networks; computer applications servers; end-user computing appliances; software applications; data; and, related technology (such as electronic SCADA control systems, video/CATV systems, satellite tracking/data acquisition systems, instrumentation, special power systems, etc.). The contractor must be able to provide innovative solutions to information and communications problems as they occur, while maintaining and upgrading this computing and telecommunications infrastructure.

C3.2.5.1.1 Information Technology Functions

USAP systematically uses Information Technology, consisting of communications and computing systems, in all of its operations. This includes science support, communications control, office administration, and supply and inventory functions. Computers range from desktop PCs to DEC MICROVAX units. Communications systems include telecommunications, radio communications, common carrier, satellite tracking and data acquisition and video/CATV systems. The contractor is responsible for all required system operations, maintenance and upgrades, including hardware and software, and systems capability.

The Contractor's primary Information Technology functions are:

1. Enterprise IT management and planning;
2. Technology management;
3. Research and systems engineering for development, testing, and evaluation purposes;
4. Information/business process applications development and implementation;
5. IT infrastructure deployment;
6. Technical operations;
7. Customer services, with an emphasis on IT support to USAP science activities;
8. Information dissemination.

C3.2.5.1.2 Infrastructure, Products and Services

The IT infrastructure, products, and services which are the responsibility of the Contractor fall into the following broad technical categories:

1. Telecommunications/radio communications;
2. Data communications and networks;
3. Computing systems;
4. Database and other software systems/applications;
5. General purpose and mission-unique electronic technology.

C3.2.5.2 Special Technology Management Studies and Reports

The contractor has the responsibility to perform a wide range of USAP technical IT management functions. In addition to on-going Systems Engineering, Systems Life Cycle Management, and Engineering Technical Support services, there are special technology management studies and reports which may be assigned by NSF. Among the Special Studies and Reports that are currently being considered for development by the contractor are the following:

C3.2.5.2.1 USAP Enterprise-wide Business Process Re-engineering

This effort will assess the specific areas in the USAP business processes and work flow to which information technology should be applied. The goal of the exercise is to use applied structure and formalism to determine the priority areas in which to make an investment in IT applications, so as to maximize Return On Investment (ROI) for IT funding. ROI is to be measured in terms of business productivity benefits to USAP operations, not as IT technology or IT cost savings measures. The completion of this effort will bring the USAP into compliance with the Clinger-Cohen Act of 1996 (also known as the Information Technology Management Reform Act).

C3.2.5.2.2 USAP Enterprise Information Architecture

This is a likely follow-on to the BPR study. The USAP needs to create a focused, strategically planned architecture for the use of information within the program. There is much discussion now about GPRA conformance, performance measurement, full cost accounting/charge-back, improvements in information dissemination to grantees/public, better grantee requirements planning, etc. All of these issues involve the collection, use, sharing, manipulation, and management of data, and is accomplished through the use of automated data processing systems, with underlying data base technologies. The net ROI on needed improvements to the USAP business process is critically dependent upon the effective design of the implementing technology. A formal systems architecture design, as opposed to a quasi-random evolution from piecemeal applications is mandatory. This concept is also in keeping with the Clinger-Cohen Act of 1996.

C3.2.5.2.3 USAP Information Security Plan

This is a necessary, Government directed, assessment which will bring NSF conduct of the USAP into conformance with OMB Circular A-130, Revision 3, and the Clinger-Cohen Act of 1996. It must be approached from the perspective of the Government's requirements, and a USAP enterprise viewpoint. This plan will ultimately provide guidance from NSF to all USAP contractor and supporting Government agencies regarding Information Security policy, procedures, and enforcement.

C3.2.5.2.4 IT Systems Life Cycle Management Plan

This is a core output to satisfy a strategic program objective. It is needed to gain control of the cost and operational disruptions caused by technology churn and the advancing age of current legacy systems. This type of planning is essential for developing and sustaining a credible, cost affordable Long Range Plan for IT. This will cross-cut on tactical performance measures and maintenance management issues. Annual or bi-annual updates for assuring sustaining maintenance of the plan are included in the requirement.

C3.2.5.2.5 USAP Management and Operational Information System Redesign

This is a special focus topic which will develop out of the Business Process Re-engineering, Information Architecture Planning, and Life Cycle Management activities. It deals specifically with the critical state of the main USAP database management information systems: PTS, CTS, and MAPCON. These systems are at the end of their useful lifetimes due to obsolete technology in the underlying database language, limitations in the capabilities of the database language, and the functional needs/requirements of the supported business processes (i.e., logistics, operations, etc.) outstripping the capabilities of the existing applications. More functionality, less sustaining support effort, and more security and longevity are needed for these critical applications. They cannot be discarded because of the key USAP work processes that they support. Because the database systems actually define the work flow and business processes that, in large part, define how the USAP will work, NSF will have a proactive role in the re-definition of these systems and an oversight role in the design of the replacement applications. New database systems

are now being developed that are structurally outside of the legacy database environment, but which will have a need to access/share/modify the legacy database records. This heightens the needs for a structured, integrated approach to the development of an Enterprise database management/data warehouse architecture to prevent stovepipes and fragmentation in information collection, processing and dissemination.

C3.2.5.3 Research and Innovation

C3.2.5.3.1 Communications Systems Innovation

For communications systems, the preference of the NSF and USAP is to utilize off-the-shelf communications components and software systems wherever they are available and adequate for the purposes to which they are to be applied. The contractor assists the USAP by maintaining a working knowledge of commercially available technologies and systems, through methodical research and an awareness of associated industry innovations. The contractor recommends those technologies that would be appropriate for use under the conditions of the program. As required, the contractor analyzes program requirements for new or upgraded components and systems and recommends to USAP the appropriate candidates for acquisition. This analysis and recommendation cycle will occur when existing systems need to be replaced, or new requirements for data and systems work lead to the need for systems to be purchased for the first time.

C3.2.5.3.2 Systems Engineering for Development, Testing and Evaluation

The need for the design and development of large numbers of elaborate database and software applications is expected to be limited. Most of the anticipated development effort in this area will involve the upgrade and/or replacement of major program support applications such as MAPCON (inventory tracking), PTS (personnel tracking), and CTS (cargo movement tracking).

C3.2.5.4 Systems Deployment, Implementation and Maintenance

The implementation of information technology systems for USAP is the responsibility of the contractor. The USAP IT Enterprise Long Range Implementation Plan (see C7.5.2.5.7), will provide the specific plan for the implementation of individual systems. It is anticipated that the implementation of some systems will span multiple years. The specific technology requirements and the skills and expertise required to conduct the implementation successfully will vary according to the nature of each system.

Descriptions of major systems implementation issues, by technical area, are given in the following paragraphs.

C3.2.5.4.1 Telecommunications/Radio Communications

For future communications systems development, the Contractor will provide hardware and software design (to the extent permitted by this contract), and installation and interfaces with local, intra-continental and inter-continental networks. The operation of communication systems in McMurdo is partially shared with NASA through interagency agreement. The Contractor must establish an effective working relationship with NASA and shall assume full responsibility for communications at all other scientific stations.

The current telecommunications and radio communications systems involve the contractor responsibilities described in the next paragraphs.

C3.2.5.4.1.1 Provision of End-to-End Satellite Telecommunications at McMurdo

In keeping with the USAP External Panel recommendations, and in order to provide a more effective and seamlessly integrated telecommunications services to McMurdo, the source of the satellite communications contract, and its associated CONUS tail circuits, is to be shifted from SPAWAR to the contractor.

C3.2.5.4.1.2 McMurdoTelecommunications/Telephone Central Office

Reserved

C3.2.5.4.1.3 Space Operations and Communications

Reserved

C3.2.5.4.1.4 24x7 Enterprise Network Operations Center

Reserved

C3.2.5.4.1.5 CONUS Applied Technology Development, I&T Center

Reserved

C3.2.5.4.2 Data Communications and Networks

The contractor will be expected to plan for communications and computing network upgrades and replacements based upon well-articulated life cycle predictions, and to take into account technical advances and budgetary limitations.

C3.2.5.4.3 Computing Systems

Computing systems used by USAP include those which are intended for both general and specialized purposes. A list of such systems currently used by USAP can be found in Section C6.

C3.2.5.4.4 Database and other Software Systems and Applications

The USAP has an on-going need for a range of database and other software systems and applications to support its work. The preference of NSF is to adopt commercially available and "industry standard" software wherever it is practical to do so and does not diminish the ability of the applications to deliver the required functionality to system users. General applications such as word-processing, spreadsheets, and personal-computer-based relational databases will be made available at computer workstations, either locally, or as installed on network servers. Other specialized applications, such as MAPCON, CTS and PTS (or their eventual replacement systems), that have been specifically developed for the USAP to address particular operational requirements, are maintained on designated workstations. Similarly, scientific applications that are used to support grantee work are installed and maintained on computers that are used by grantee and contractor personnel who work with them. These stations are found in the laboratories, on the research vessels, and in computing equipment deployed to field camps to support field work.

C3.2.5.5 Technical Operations and Support

C3.2.5.5.1 Telecommunications/Radio Communications

Telecommunications and radio communications systems for which the Contractor will have responsibility are presented in Section C6. Types of systems include: satellite communications, covering multi-channel digital voice and radio programming, private trunked lines and, public network links; telephony and switched voice communications; radio communications consisting of radio telephone, radio paging and other PCS technologies, local land/maritime mobile radio, short and long range HF radio for field, ship and inter-station communications, VHF land mobile radio, UHF radio composite voice transmission systems, etc.; and, radio antenna farms, radomes, dish antennas up to 13 meters, HF and microwave relay towers, repeaters, etc.

C3.2.5.5.2 Customer Services

Customer services are those activities where IT staff assist and support the work of other USAP program participants. These services include: direct interface support, such as customer equipment issue, customer training, customer mission planning support; operational functions, such as running the dispatch/communications center; and

value-added services such as radiotelephone patching or science field mission planning support. A further distinction can be made among the support of science activities (interfaces with grantees), the support of non-scientific IT efforts, including administrative tasks, and the dissemination of information within USAP and to a wider audience.

C3.2.5.5.3 Science Support

The conduct of science within the USAP relies heavily upon the availability of computing and communications resources to collect and organize data, analyze it, and transport it to other locations for archiving and/or further analytic work. The contractor is required to work closely with grantees to plan for their computing and communications needs. The contractor educates grantees on the standard computing and communications facilities and equipment that are available at Antarctic stations. The contractor also supplies grantees with hardware, software, specialized computing assistance, and hands-on installation, calibration, maintenance and operation of systems and equipment, according to grant needs and budgets.

A detailed description of the currently installed IT infrastructure which is meant for science support is given in Section C6. Generally, each grantee will have access to laboratory space and/or field equipment while their work is being done in Antarctica. Laboratory spaces are equipped with personal computers, with network access to printing and remote communications resources. All laboratory buildings are fully wired for telecommunications and networked computing. Research vessels are similarly wired, and have communications systems on-board that allow for access to remote sites for messaging and/or data transfer. Field parties are issued computing and communications equipment to supplement whatever they bring with them, in order to ensure that they have the facilities available to carry on their research.

The contractor is required to provide sufficient staff to support implementation, maintenance, operations and training activities involved with all communications and computing that is done in support of science. Specifically, this includes the use of contractor staff to conduct on-going scientific work, data collection, data analysis and data transmission for grantees who "leave behind" equipment to continue experimentation after they have left Antarctica. All such support is planned for and agreed to among the grantees, NSF and the contractor as part of the grant planning process. Staff assigned to science support functions should be familiar with university-based IT/IS requirements and standards, with a particular emphasis on the conduct of research and the analysis of data results.

C3.2.5.5.4 General Technical (Non-science) Support

General technical support, other than that associated with science support, includes installation, technical control and operation, maintenance and repair, and de-commissioning of computing and communications systems that are used for administrative and operational functions within the USAP. This includes all telephone, radio and computing systems linking contractor headquarters, staging centers, Antarctic stations, the research vessels, NSF offices, and other organizations affiliated with the USAP, both governmental and private sector. A complete listing of all systems under the care of the contractor is given in Section C6.

C3.2.5.6 Specific Tasking by Location

The tasked responsibilities of the contractor for Information Systems/Information Technology (IS/IT) and Communications functions will change by location and/or time of year. Port Hueneme functions are year-round. McMurdo has special requirements during the pre-summer season Winfly period. South Pole and Palmer stations share many of the tasks that are required at McMurdo, but on a smaller scale. In addition, these two stations have a set of tasks that are not common across all stations. The research vessels are generally self-sufficient with respect to IS/IT and communications, but support most of the basic functions present at the continental stations in some fashion. The specific tasks that are *currently* assigned to the contractor at each USAP location are detailed in Section C7.5.7.

C3.2.6 Facilities Engineering and Construction

C3.2.6.1 Engineering Services

Engineering services are provided to support the design, construction, maintenance, and operations of all facility related infrastructure at McMurdo, Palmer and South Pole Stations and Christchurch, NZ. Engineering provides designs services, project management, procurement support, and cost analyses as tasked by NSF for new construction, renovation projects, and budget planning for all activities of the support contractor (construction, fuels, facilities maintenance, utilities, runway operations, science support, etc.). These service include all standard engineering disciplines (architectural, mechanical, electrical, civil, and structural) plus support functions such as estimating, scheduling, drafting, field engineering, surveying, construction and vendor inspections, and document control. The types of engineering support range from small projects like designing new fire hydrants to moderate size projects such as remodeling the McMurdo Station dinning facility. Large projects such as the Crary Science and Engineering Center (CSEC)and SPRP will be designed by engineering firms contracted by NSF. The support contractor participates in review of outside designs as directed by NSF.

C3.2.6.2 Construction

Construction can be scheduled for the summer and winter seasons (or any combination thereof). In recent years, most McMurdo construction (even outside work) has been performed in winter, in part to ease the housing and general population burden during the summer. Because of the extreme cold, major outside construction at South Pole is usually limited to the summer although some exterior work can be completed in the twilight periods before and after the midwinter darkness. At Palmer, construction can be performed year-round, although ship schedules and on-site housing must be considered when planning large projects. It is the Contractor's responsibility to plan the course of approved projects according to the seasons, and to ensure that needed materials and equipment are properly staged in advance.

Projects can range from simple remodeling to complex multiple-year construction efforts such as the South Pole Redevelopment. As described in Section C7.6, major and minor design projects typically require formal design work, an assigned workforce, and detailed procurement and execution schedules. Smaller, level-of-effort tasks (less than $25,000) that require only basic design (sketches, etc.) such as basic remodeling, workspace improvements and field shelters can usually be accommodated within the station operational budgets. In general, the Contractor must plan and conduct construction work in such a way that the smallest possible crews are employed consistent with operational safety and trades skill requirements.

Field camp construction is considered a science support item, with the trades skills to build and take down field camps provided from the construction workforce.

Contractor construction crews share shop space with facilities O&M staff at McMurdo (Buildings 191 and 136) and at Palmer. At South Pole, a series of trades shops housed in Jamesway structures has been established over the last two years at the summer camp. These shops will be used by construction crews for the SPRP (see below) and other projects at the station.

C3.2.6.3 South Pole Station Redevelopment Project (SPRP)

The biggest USAP construction project during the next contract term is the South Pole Station Redevelopment Project (SPRP). The project involves the construction of a new station at the Geographic South Pole to replace the one now in use, is valued at over $150 million, and will be well underway when the contract begins. Project requirements are described below.

SPRP is a two-phase program. The first phase is the South Pole Safety and Environmental Upgrade (SPSE) to improve facilities at the present station and renovate several of the existing arches for future service as part of the new station. The second, and larger, phase is the South Pole Station Modernization (SPSM), which involves construction of a new, elevated station (replacing the dome and related buildings) adjacent to the renovated arches. The entire program is funded by separate Congressional appropriations of $25 million (SPSE, funded in total) and $128 million (SPSM; with $109 million funded to date).

In many respects, on-site construction is the easiest part of the project. Each summer, the equivalent of 150 dedicated cargo flights will carry SPRP construction materials to the South Pole. Over the eight year construction period (which began during the 1997-98 summer and is scheduled to end in 2005), 20 million pounds of construction

cargo will be shipped to the Pole. The Contractor must schedule this airlift according to the SPRP effort scheduled for each season. Therefore, procurement, transportation and the related logistical support required to stage construction materials and equipment at the South Pole in the order required and by the dates programmed in the schedule are among the most challenging requirements of the entire project.

At the time of contract award, elements of the SPSE (a new garage, new fuel tanks and new power plant arch) will be complete with components for the new power plant on-site. Construction of the power plant is scheduled to begin during the contract phase-in period with interior work continuing through the first austral winter of the new contract period. The Contractor will assume responsibility for the remaining SPSE work as well as the procurement, transportation and staging activities associated with construction of the replacement station. On-site construction of the SPSM phase will begin in earnest during the 2000-2001 austral summer.

When finished, the new station will feature approximately 95,000 SF of enclosed, heated space in two connected, elevated Pods (or buildings), and below-grade garage, power plant and warehouse archways. Each of the elevated station pods will contain three wings. The elevated station will connect to the power plant, cargo/warehousing and garage facilities constructed under the archways during the SPSE phase. The total unheated area will be about 40,000 SF. The Contractor will be responsible for transition from the old to the new station (including incremental moves within the overall SPSE and SPSM schedules) as construction phases are complete, and successful commissioning of the entire station.

C4 STANDARDS and REGULATIONS

This section cites, in subsection C4.3 below, in tabular form, by name, title and relevant passage, the currently identified set of federal codes and regulations, and industry codes to be followed by the Contractor. Preceding each citation is a designation of the application of the standard or regulation: "D" for Directive and "G" for Guidance. Definitions of how these designations are to be interpreted by the contractor in the performance of work are given in subsections C4.1 and C4.2 below.

Unless otherwise directed by the Contracting Officer, work shall be performed in accordance with the USAP Safety and Health Policy Manual. This manual incorporates a suite of directives pertaining to safety & health standards, regulations, and requirements which are not duplicated in the Table of Standards and Regulations Citations. Work shall also be performed in accordance with other standards and regulations as directed by the Contracting Officer from time-to-time.

C4.1 Directive.

Unless otherwise authorized by the Contracting Officer, work shall be performed in accordance with the Directives identified herein.

C4.2 Guidance.

Unless otherwise authorized by the Contracting Officer, work shall be performed to the performance levels and achieve the results specified by the Guidance identified herein. The Contractor is responsible for determining the work methods employed to achieve the performance levels and result required.

C4.3 Citations

The table of standards and regulations is provided as follows.

FEDERAL CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	Air Force Instructions on Explosive Safety	AFI 91-201	Entire Document
G	Packaging of Hazardous Material	AFJI 24-210	Entire Document
D	Preparing Hazardous Materials For Military Airlift	AFJMAN 24-204 (NAVSUP PUB 505)	Regulations to be followed when transporting hazardous cargo on military aircraft in the USAP.
G	Storage and Handling of Compressed Gases and Cylinders	AFR 67-12	Entire Document
G	Special Assignment Airlift (SAAM) Instructions	AFR 76-38 / OPNAVINST 4630.18E	Entire Document
G	Air Mobility Command Regulation	AMC Regulation 55-4, C-141B Configuration/Mission Planning	Guidelines for load planning C-141 Aircraft.
G	H4/H8 Commercial and Government Entity (CAGE) Codes	CAGE	Cross reference government (CAGE) codes to vendor
G	Automated Logistics Procurement System CD-FICHE	CD-FICHE	Material and/or Source of Supply identification, cross-reference for DOD Activity Address Codes
D	Resource Conservation and Recovery Act (RCRA)	40 CFR Part 261	Standards for the classification of RCRA regulated wastes which are returned to the United States for disposal.
D	Resource Conservation and Recovery Act (RCRA)	40 CFR Part 279	Standards for generator identification, importation of waste, manifesting, packaging, and labeling for wastes which are returned to the United States.
G	Clean Air Amendments of 1990 – Protection of Stratospheric Ozone	40 CFR Part 82	This part of the CAA regulates substances, practices, processes, and activities that may affect the stratospheric ozone layer.
G	Oil Pollution Act of 1990 (OPA-90)	40 CFR Part 112	Regulations governing spill prevention, contingency and countermeasures planning and response to spills in the U.S.
G	Wastewater discharge	40 CFR Parts 122-135	EPA guidelines for wastewater discharge in the U.S.
G	Clean Water Act – Guidelines Establishing Test Procedures for the Analysis of Pollutants	40 CFR Part 136	This part of the CWA establishes test procedures for the wastewater parameters or pollutants that have been identified as a concern by the NSF.
D	National Environmental Policy Act	40 CFR Parts 1500-1508	Procedures used to insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken.

FEDERAL CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
D	Antarctic Conservation Act (ACA) – Conservation of Fauna, Flora, and Ecosystems	45 CFR Part 670	Establishes regulations intended to conserve and protect the native mammals, birds, and plants.
D	Antarctic Conservation Act (ACA) – Waste Management	45 CFR Part 671	Establishes regulations controlling the use or release of designated pollutants or wastes in Antarctica.
D	Medical examinations and deployment qualifications	45 CFR Part 675	Requirements for medical examinations and criteria used to determine eligibility for deployment to Antarctica.
D	Regulations on operation of oceanographic research vessels	46 CFR Chapter 1, Subchapter U	U.S. Coast Guard regulations on operation of oceanographic research vessels.
G	Code of Federal Regulations	49 CFR	The group of Federal regulations governing all modes of hazardous material transportation. 49 CFR accepts use of international documents such as ICAO and IMDGC. It does not apply to military air shipments.
G	Specification 4L; Welded cylinders insulated	49 CFR Sect 178.57	Specifications for cryogenic dewars used in transportation within the United States.
G	Electronic Communications Privacy Act of 1986	Public Law 99-508	Entire document, as expressed in OMB Circular A-130, Revised
G	Information Technology Management Reform Act of 1996	Public Law 104-106	Entire document
D	Computer Security Act of 1987	Public Law 100-235	Entire document, as expressed in OMB Circular A-130, Revised
G	Federal Information Technology (Office of the President, Executive Order)	Executive Order 13011 (16 July 1996)	Entire document, as expressed in OMB Circular A-130, Revised
G	U.S. Department of Commerce, National Telecommunications and Information Administration	Manual of Regulations and Procedures for Federal Radio Frequency Management, Sept. 1995 and subsequent revisions	Pertains to conterminous U.S. states, Alaska, Hawaii, and US Pacific Trust Territories; application in the Antarctic is based upon NSF interpretation of regulations and procedures
G	Defense Automated Message Exchange Systems (DAMES)	DAMES	Transmitting and Receiving MILSTRIP requisition status
G	Defense Reutilization and Disposal Manual	DOD 4160.21M	Entire Document
G	Defense Transportation and Traffic Management Policy	DOD 4500.9-R-1	Entire Document

FEDERAL CITATIONS			
D or G	NAME	TITLE	RELEVANT PASSAGE
D	Management and Operation of Armed Forces Radio and Television Service (AFRTS); Armed Forces Radio and Television Service (AFRTS) Program Materials, as revised (Department of Defense, Office of the Assistant Secretary, Public Affairs)	DoD Instruction 5120.20-R, as revised; to include Appendix F	In compliance with NSF-Navy Media Center Memorandum of Agreement for broadcast video and radio service
G	Military Standard Transportation and Movement Procedures, (MILSTAMP), Volume I&II	DOD Regulation 4500.32-R, I&II	Transportation standards to be followed when using military logistics (SAAM, AMC, MSC, etc.) Most of the manual is relevant.
G	DOT Emergency Response Guidebook	DOT	Provides emergency response information that is required by most hazardous material transportation regulations.
G	An Analytical Framework for Capital Planning and Investment Control for Information Technology (General Services Administration, Associate Administrator, Policy, Planning and Evaluation)	http://www.itpolicy.gsa.gov/mke/caplan1.htm	Entire document
G	Executive Guide; Measuring Performance and Demonstrating Results of Information Technology Investments (General Accounting Office)	GAO/AIMD-98-89; March, 1998	Entire document
G	Business Process Reengineering Assessment Guide (General Accounting Office)	GAO/AIMD-10.1.15, Version 3, May, 1997	Entire document
D	Management of Federal Information Resources (Office of the President, Office of Management and Budget)	Circular A-130, Revised	Entire or selections of document, as directed
G	Capital Programming Guide, Version 1.0, July, 1997 (Office of Management and Budget)	OMB Circular A-11, Part 3 (Supplement to): Planning, Budgeting, and Acquisition of Capital Assets	Entire document
G	Evaluating Information Technology Investments, A Practical Guide, November, 1995 (Office of Management and Budget)	OMB http://www1.whitehouse.gov/WH/EOP/OMB/infotech/infotech.html	Entire document
G	Federal Acquisition, Recycling, and Waste Prevention	Executive Order 12873 of 1973	This order requires the Federal Government to use recycled and environmentally preferable products and services

FEDERAL CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	Regulations For the Safe Transport of Radioactive Materials	IAEA Pamphlet ST-1 (formerly No. 6)	Entire Document
G	Master Cross Reference Data (MCRD)	MCRD	Cross reference part numbers to National Stock Numbers (NSNs)
G	Management Interchangeable Substitute Data (MD/I&S)	MD/I&S	Browse for possible substitutes or interchangeable material
G	Medical Catalog (MEDCAT)	MEDCAT	Medical equipment resource
G	Container Inspection Handbook For Commercial & Intermodal Containers	MIL-HDBK-138A	Entire Document
G	Marking for Shipment and Stowage	MIL-STD-129	Entire Document
G	Desk Guide for Requisitioning and Issue Procedures (MILSTRIP), Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP)	P-409 MILSTRIP/MILSTRAP	Abbreviated version of P-437
G	Requisitioning and Issue Procedures (MILSTRIP), Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP)	P-437 Military Standard	Policies, procedures, forms, and formats for the Department Of Defense (DOD)Supply System
G	Military Specification for AN-8 Fuel	MIL-T-83133-D	Fuel Testing – AN-8 Aviation Grade Turbine Fuel
G	Military Guidelines for Aircraft Load Planning	NAVAIR 01-75GAA-9 Cargo Loading, Navy Models KC-130R, C130F, LC130F, LC130R, KC-130R, and KC-130T Aircraft	Guidelines for load planning LC-130 and C-130 Aircraft.
G	Naval Media Center Instruction	NAVBCSTSVCINST 3120.1	Specific Operations of AFRTS Navy Detachments
G	A Handbook of Radioactivity Measurements Procedures	NCRP Report No. 58	Guidelines for measurements of radiation and radioactivity
G	Developing Radiation Emergency Plans for Academic, Medical or Industrial Facilities	NCRP Report No. 111	Guidelines for development of a suitable radiation emergency preparedness response in an accident situation
G	Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Contamination	NCRP Report No. 112	Guidelines for use of survey equipment and calibration of same
G	Military Aircraft Loading Procedures (Technical Order)	TO 1C-5A-9 Loading Instructions Manual USAF Series, C-5A and C-5B Airplanes	Guidelines for load planning USAF C-5 Aircraft.

FEDERAL CITATIONS			
D or G	NAME	TITLE	RELEVANT PASSAGE
G	Military Aircraft Loading Procedures (Technical Order)	TO 1C-130A-9, Cargo Loading Manual, USAF series C-130A, RC-130A, C130B, C130D, C130E, C130H, HC-130H, HC-130N, C130P, LC-130H, MC-130H Airplanes, USCG Series HC-130B Airplanes	Guidelines for load planning C-130 Aircraft.
G	Military Airdrop Procedures (Technical Order)	TO 13C7/FM 10-500	Entire Document
G	Military Handbook, Electromagnetic Environment Considerations	MIL-HDBK-235,	As applicable
G	Military Handbook, Electromagnetic Compatibility Management Guide	MIL-HDBK-237A	As applicable
G	Military Handbook, Grounding, Bonding, and Shielding, Vol. 1 and Vol. 2	MIL-HDBK-419A	As applicable
G	Military Standard, Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety, August, 1987	MIL-STD-1310E	As applicable
G	Military Handbook, Systems Engineering/Configuration Management Life Cycle Application	MIL-HDBK-X499-3	As applicable
G	Military Handbook, Work Breakdown Structure	MIL-HDBK-881, 2 January 1998	As applicable
G	Information Resources Self-Review Process Guide	NASA Headquarters, Chief Information Officer, NASA Self-Assessment Redesign Team, March, 1996	As applicable
G	Customer Order Fulfillment Handbook	NASA/GSFC Code 500, Mission Operations and Data Systems Directorate, December, 1996	As applicable
D	Content Specification for Operations and Maintenance Manuals	NASA/GSFC, Code 534.4, Technical Information Section, Mission Operations and Data Systems Dir, Aug 1993 (Rev 1)	Entire document

FEDERAL CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	NASA Software Documentation Standard	NASA STD 2100-91	Entire document
G	"Technical Manual" *Electromagnetic Radiation Safety Hazards* (U) *Hazards to Personnel, Fuel and Other Flammable Material* (U), Vol. I, 5th Rev., December, 1979	NAVSEA OP 3565/NAVAIR 16-1-529/NAVELEX 0967-LP-624-6010	As applicable
G	Generally Accepted Principles and Practices for Securing Information Technology Systems	NIST Computer Security Special Publication, SP 800-14, June, 1996	Entire document
G	Telecommunications Security Guidelines for Telecommunications Management Network	NIST Computer Security Special Publication, SP 800-13, October, 1995	Entire document
D	Federal Building Grounding and Bonding Requirements for Telecommunications (National Institute of Standards and Technology, Department of Commerce)	FIPS Pub 195 (Federal Information Processing Standards), 15 August 1995	Entire document (equivalent to ANSI/EIA/TIA-607-94)
D	Federal Building Telecommunications Wiring Standard (National Institute of Standards and Technology, Department of Commerce)	FIPS Pub 174 (Federal Information Processing Standards)	Entire document (equivalent to ANSI/EIA/TIA-568-91, as revised)
D	Federal Building Standard for Telecommunications Pathways and Spaces (National Institute of Standards and Technology, Department of Commerce)	FIPS Pub 175 (Federal Information Processing Standards)	Entire document; exclusions and exceptions as directed by the Government (equivalent to ANSI/EIA/TIA-569-90, as revised to 569-A, etc.)
D	Administration Standard for the Telecommunications Infrastructure of Federal Buildings (National Institute of Standards and Technology, Department of Commerce)	FIPS Pub 187 (Federal Information Processing Standards)	Entire document; exclusions and exceptions as directed by the Government (equivalent to TIA/EIA-606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, as revised)
G	Telecommunications: Data Communication Systems and Services-User-Oriented Performance Parameters (National Institute of Standards and Technology, Department of Commerce)	FIPS Pub 144 (Federal Information Processing Standards)	Entire document; exclusions and exceptions as directed by the Government

FEDERAL CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	Antarctic Marine Living Resources Convention Act of 1984	16 USC 2431 et seq.	The Act implements the provisions of the international convention that is part of the Antarctic Treaty System. Makes it unlawful to harvest marine species in violation of the convention, and it provides for certain other activities.
G	The Act to Prevent Pollution from Ships (APPS) of 1980 and Annexes I, II, and V of the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 relating to MARPOL (73/78)	33 USC 1901 et seq. 33 CFR Part 154	Research and shipping vessel pollution prevention requirements within Antarctic Waters
D	Plant Quarantine Act & Federal Plant Pest Act	TBA	Quarantine process for importation of food waste into U.S.
G	Pollution Prevention Act of 1990 (PPA-90)	42 USC 13101-13109	Pollution prevention requirements
G	Hazardous Materials Shipment	49 USC 5101-5127	Classification, packaging, labeling, and manifesting of hazardous materials
G	Test Methods for Evaluating Solid Waste	USEPA SW-846	Analytical chemistry methods reference for testing solid waste.
G	Nuclear Regulatory Commission Regulations	10 CFR	10 CFR 20 through 10 CFR 150
G	Food Code, 1997 Recommendation of the US Public Health Service, Food and Drug Administration	N/A	All
G	Occupational Health and Safety Administration General Industry and Construction Standards	29 CFR	29 CFR 1900 through 29 CFR 1926

INTERNATIONAL CITATIONS			
		TITLE	**RELEVANT PASSAGE**
G	IATA (Int'l Air Transport Association)Dangerous Goods Regulations	Based on the ICAO Technical instructions which are in turn accepted by 49 CFR.	Airline regulations that govern the transport of hazardous materials on commercial aircraft.--Not the law but totally on line with the law.
G	ICAO (Int'l Civil Aviation Organization) Technical Instructions For The Safe Transport Of Dangerous Goods By Air	Accepted by the U.S. DOT (49 CFR) for use in the US.	The ICAO technical instructions govern the airlift of hazardous materials on civil aircraft. They are what the IATA regulations are based on. Most countries have accepted/adopted these instructions as law.
G	IMDGC International Maritime Dangerous Goods Code	Accepted by the U.S. DOT (49 CFR) for use in the US.	International regulations on transporting hazardous cargo by ocean vessel.
G	CCIR (International Telecommunication Union)	CCIR Recommendations	Technical and operating issues relating to telecommunications
G	CCITT (International Telecommunication Union)	CCITT Recommendations	Recommendations for telephone, radio, and network characteristics

INDUSTRY CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	Methods of testing performance of laboratory fume hoods	ANSI/ASHRAE 110-1985	Specific details of installation and testing of fume hoods
D	Preparation of Operating and Maintenance Documentation for Building Systems	ASHRAE Guideline 4-1993, ASHRAE document code 86804, published 1993	Entire document
G	American National Standards Institute/National Sanitation Foundation – Drinking Water Treatment Units, Health Effects	ANSI 53-1997	This industry standard insures that the operation of water production facilities does not compromise personnel health
G	American National Standards Institute/National Sanitation Foundation – Reverse Osmosis Drinking Water Systems	ANSI 58-1997	This industry standard insures that the operation of reverse osmosis systems does not compromise personnel health
G	American National Standards Institute/National Sanitation Foundation – Drinking Water Treatment Chemicals, Health Effects	ANSI 60-1997	This industry standard insures chemicals used in drinking water treatment systems do not compromise personnel health
G	Compressed Gas Cylinder Valves	ANSI B57.1	Standards for valving on gas cylinders used
G	American National Standards Institute/American Water Works Association – Standard for Soda Ash	ANSI B201-92	This industry standard insures that the soda ash used in the water treatment process does not compromise personnel safety
G	American National Standards Institute/American Water Works Association – Standard for Hypochlorites	ANSI B300	This industry standard insures that the hypochorites used in water treatment process does not compromise personnel safety
G	American National Standards Institute/American Water Works Association – Disinfection of Water Mains	ANSI C651-66	This industry standard provides detailed guidance on insuring water mains will not contaminate potable water supplies
G	American National Standards Institute/American Water Works Association – Disinfection of Water Storage Facilities	ANSI C652-86	This industry standard provides detailed guidance on insuring water storage tanks will not contaminate potable water supplies
G	American National Standards Institute/American Water Works Association – Water Treatment Plant	ANSI C653-87	This industry standard provides detailed guidance on insuring water treatment systems will not contaminate potable water
G	Practice for Occupational and Educational Eye and Face Protection	ANSI Z87.1-1989	Current standard for minimum eye and face protection
G	Standard for Practices for Respiratory Protection	ANSI Z88.2-1980	Details respiratory protection measure
G	Practice for Evacuated Reflective Insulation in Cryogenic Service	ANSI/ASTM C610-67	Maintenance of cryogenic vacuum insulating spaces using multilayer technologies

INDUSTRY CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	Evaluating Materials for Oxygen Service	ANSI/ASTM G63-80	Test methods of materials prior to placement in gaseous or LOX services
G	Private Branch Exchange(PBX) Switching Equipment for Voiceband Application, February, 1989	ANSI/TIA/EIA-464-B-96	Entire document as revised
G	Quality System Assessment	ANSI/EIA-670-97, June, 1997	Entire document
D	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz	ANSI/IEEE C95.1-1992	Entire document
G	U.S. adoption of ISO-9000	ANSI/ASQ-9000	Complete series and related standards: Q9001 – Quality Systems Model for quality assurance in design/development, production, installation, and servicing Q9003 – Quality Systems Model for quality assurance in final inspection and test
G	Standard for Software Quality Assurance Plans	ANSI/IEEE-730	Entire or portions of document, as recommended by the Government
G	Standards for Software Configuration Management Plans	ANSI/IEEE-828	Entire or portions of document, as recommended by the Government
G	Standards for Software Test Documentation	ANSI/IEEE-829	Entire or portions of document, as recommended by the Government
G	Guide to Software Requirements Specification	ANSI/IEEE-830	Entire or portions of document, as recommended by the Government
G	IEEE Standard Dictionary of Measures; Guide to Use of IEEE Standard Dictionary of Measures	ANSI/IEEE-982.1 ANSI/IEEE-982.2	Entire or portions of document, as recommended by the Government
G	Software Design Descriptions	ANSI/IEEE-1016	Entire or portions of document, as recommended by the Government
G	Standards for Software Reviews and Audits	ANSI/IEEE-1028	Entire or portions of document, as recommended by the Government
G	Guide to Software Configuration Management	ANSI/IEEE-1042	Entire or portions of document, as recommended by the Government

INDUSTRY CITATIONS			
D or G	NAME	TITLE	RELEVANT PASSAGE
D	INTELSAT Satellite Communications Organization	INTELSAT Earth Station Standards (IESS);	Group 1: Introductory, 101 Rev.41; Group 2: Antenna and RF Equipment Characteristics, 207 Rev. 2; Group 3: Modulation & Access Characteristics, 303 Rev. 4 , 309 Rev.5C; Group 4: Supplementary, 403 Rev. 4, 402 Rev.5, 401 Rev.4, 409 Rev. 3, 412 Rev.1, 412 Rev.2,
D	INTELSAT Satellite Communications Organization	Satellite System Operations Guide (SSOG);	All SSOG's as required by INTELSAT, to include as a minimum: 101 Companion Document Cross-Reference; 102 Glossary; 103 Operational Management; 104 Order Forms; 200 Earth Station Registration (Draft); 210 Earth Station Verification (Draft); 220 Type Approval (Draft); 300 Series Line-up Procedures: 309 QPSK/FDMA/IBS; 600 Transmission Plan (Draft)
G	Water quality	ASTM Volume 11.01, Section DH93-91, 1992	Establishing water quality criteria
G	American Society for Testing Materials	ASTM-D 5006	Checks for de-icing inhibitor in fuel
G	Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers	CGA C-7	Instructions on marking and labeling cylinders for proper identification
G	Cleaning Equipment for Oxygen Service	CGA G-4.1	Cleaning procedures for oxygen regulators in delivery, breathing and diving services
G	Commodity Specifications for Helium	CGA G-9.1	Specifications for helium grades
G	Safe Handling of Compressed Gases in Containers	CGA P-1	Methods for handling gas cylinder and storage in the workplace
G	Safe Practices Guide for Air Separation Plants	CGA P-8	Guidelines for precautionary measures in oxygen

INDUSTRY CITATIONS			
D or G	NAME	TITLE	RELEVANT PASSAGE
			enriched/deficient atmospheres
G	Safe Handling of Cryogenic Liquids	CGA P-12	Discusses safety aspects of handling cryogenic fluids in the lab
G	Compressed Gas Cylinder Valve Outlet and Inlet Connections	CGA V-1	Standardizes fitting for gas cylinders and gases
G	Standard cryogenic Liquid Transfer Connections	CGA V-6	Standardizes fitting for cryogenic lines and lances
D	Systems Engineering	EIA/IS-632 (Dec. 1994)	Entire document
D	Customer Owned Outside Plant Telecommunications Cabling Standard	TIA/EIA-758 (proposed)	Entire document as proposed
G	Guideline for Transitioning Configuration Management to an Automated Environment	EIA CMB7-2, April, 1991	Entire document
G	Configuration Control	EIA CMB6-4, July, 1991	Entire document
G	Standard for Information Technology-Software Life Cycle Processes-Software Development-Acquirer-Supplier Agreement	EIA J-STD-016, February, 1996	Entire document
G	Quality System Assessment	EIA JESD39-A, April, 1995	Entire document
G	EPA Clean Air Act	Clean Air Act Section 608	Air Quality
G	Software Verification and Validation Plans	IEEE-1059	Entire document
G	Standard for Software Quality Metrics Methodology	IEEE-1061	Entire document
G	Standard for Software Maintenance	IEEE-1219	Entire document
G	IEEE Trial-Use Standard for Application and Management of the Systems Engineering Process	IEEE 1220-1994	Entire document
G	Guidelines For Service Industries	ISO 9004-2,	Entire document
G	Guidelines for the Application of ISO 9001 to Development, Supply, and Maintenance of Software	ISO 9000-3, March, 1987	Entire document
G	Quality Management Guidelines for Configuration Management	ISO 10007	Entire document
G	Solas Convention of 1974; MARPOL 73/78	MARPOL 73/78 Regulation VII/1.4; Annex III 1(3)	Classification, packaging, labeling, and manifesting of hazardous materials for international shipment via vessel

INDUSTRY CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
G	Air quality testing procedures	Methods of Air Sampling and Analysis, 1989	Sampling and analytical laboratory procedures for air quality monitoring
D	A Systems Engineering Capability Maturity Model, Version 1.1 (Software Engineering Institute, Carnegie Mellon University)	Maturity Model SECMM-95-01, CMU/SEI-95-MM-003, November, 1995	Entire model, as documented and revised, with minimal compliance at Level 3 of the model
D	The Capability Maturity Model℠ for Software (CMM® or SW-CMM), Version 1.1 (Software Engineering Institute, Carnegie Mellon University)	Software Engineering Institute, CMU/SEI-93-TR-24, DTIC Number ADA263403, February 1993	Entire model, as documented and revised, with minimal compliance at Level 3 of the model
G	National Board of Boiler and Pressure Vessel Inspectors (NBIC)	NBIC Inspection Code	Heating Boilers
G	Family of National Fire Protection Association Code	Inclusive of NFPA 1, 12,12A, 13, 13R, 14, 17, 20, 22, 25, 31, 37, 45, 53, 70, 70B, 70E, 72, 80, 90A, 90B, 96, 99, 101, 105, 170, 221, 231, 750, 1963, 2001, 8501,	Fire Protection Code standards
G	Analytical chemistry procedures for evaluation of water and wastewater.	Standard Methods for the Evaluation of Water and Wastewater, 1992	Analytical chemistry methods reference
G	Family of Uniform Building Code	UBC All Sections	Building Code
G	Family of Uniform Fire Code	UFC All Sections	Building Code
G	Family of Uniform Mechanical Code	UMC All Sections	Building Code
G	Family of Uniform Plumbing Code	UPC All Sections	Building Code

OTHER CITATIONS			
D or G	**NAME**	**TITLE**	**RELEVANT PASSAGE**
D	Radio Frequency and Bandwidth Procedures	USAP Radio Frequency and Bandwidth Plan	Specifies radio frequencies and bandwidths to be observed in USAP Operations (SPAWAR Systems Center Charleston)
D	Dangerous Waste Management, State of Washington	WAC 173-303	Classification and management of hazardous wastes in Washington State.
D	Radioactive Waste Management, State of Washington	WAC 243-249	Classification of radioactive wastes for disposal in Washington State.
G	National Science Foundation Information Systems Policy Manual	Manual Number 7	As interpreted and directed by NSF for applicability to the U.S. Antarctic Program
D	National Science Foundation, Office of Polar Programs Systems Engineering Handbook	Systems Engineering Handbook, V1.0, August, 1998	Entire document, as directed
G	Procedures for requesting clearances for conduct of university oceanographic research in waters under foreign jurisdiction	University-National Oceanographic Laboratory System (UNOLS) Handbook for International Operations of U.S. Scientific Research Vessels	UNOLS procedures for requesting clearances for conduct of university oceanographic research in waters under foreign jurisdiction.
G	Safety Standards for U.S. University Oceanographic Research Vessels	UNOLS Research Vessel Safety Standards	UNOLS Safety Standards for U.S. University Oceanographic Research Vessels.

C5 FORMS, OTHER DOCUMENTS, and DEFINITIONS

Reserved for future use.

C6. SYSTEMS DESCRIPTION

This section provides a summary description of the major Information Technology Systems presently in place that support the USAP mission. The systems are categorized by the major configuration level of the USAP Information Technology technical architecture.

C6.1 Overview

The technical architecture for the USAP is categorized by five major technology categories and one category that represents key supporting facility infrastructure.

C6.2 Information Systems

Information systems is taken as discrete of interconnected software applications, such as management information or mission operations, that are supported by hardware and communications. These systems mainly have business process application that is enterprise-wide in scope.

C6.2.1 Maintenance and Inventory Management

The foundation for all USAP inventory control, inventory management, maintenance management and planning, and cost accounting is supported by the following software system:

Title or Name:	MAPCON™ (*Ma*intenance *P*lanning and *Con*trol)
Function:	Computerized Maintenance Management System
Origin:	DFM Systems Inc. 6000 Douglas Avenue, Suite 200 Des Moines, IA 50322 Tel. (515)331-3358 Fax (515)331-3373
Geographic Dispersion:	Contractor Headquarters, McMurdo Station, Palmer Station, South Pole Station
Technical Description:	Commercial off-the-shelf software system written in Revelation Technologies Inc. Advanced Revelation database language (V3.12), acquired in 1991 (MAPCON™ II). MS-DOS operating system based product. Extensively customized and extended to fit USAP operational and business processes and data management/utilization needs and to improve efficiency of commercial software design to meet performance requirements. Runs under Novell® Netware® network operating system, and under Microsoft Windows NT™ with special configurations. Customized database synchronization software and process for synchronization with remote/distributed databases. No longer supported by vendor due to extensive customization.
Functional Description:	Integrated enterprise operations processes for: inventory management and control, equipment records and description data, purchase requisition, preventative maintenance planning and execution of maintenance, work/task order management and tracking, labor and resource allocation, bill of materials issuance

Utilization: Inventory management at all stations; enterprise asset management; work order planning and labor resource management for all work centers; source for equipment preventative maintenance plans for all stations; emphasis on facility maintenance and construction management; purchase order generation (manual and automatic) for inventory restocking at all stations; automatic management of inventory restocking via cargo shipping; participating work functions: science field party outfitting/provisioning, vehicle maintenance, water and power utility plants, facilities maintenance, food service, construction, logistics, Information Technology

Unique Attributes:
1. MAPCON™ forms the core of a larger enterprise resource management information system, comprised of: MAPCON™, Power 1000 Purchasing System, Cargo Tracking System, and DELTEK finance and accounting system; information flows between these applications to support many USAP mission and Contractor operational and business processes
2. Additional linkages exist between MAPCON™ and engineering/construction cost estimation and project management systems (Timberline, Primavera) and are planned for science customer order processing (Electronic Support Planner)
3. MAPCON™ maintains data flow links with Power 1000 for purchase requisition and purchase order data.
4. MAPCON™ maintains data flow links with the BullsEye Specialty Store Point of Sale software application utilized at the Antarctic stations - BullsEye, 3838 North West 36 Street, Suite 203 Oklahoma City, OK 23112, Tel. (405) 943-5658

C6.2.2 Logistics

C6.2.2.1 Inventory

Refer to discussion for MAPCON™ in Sect. C6.2.1.

C6.2.2.2 Shipping

Title or Name: CTS (*C*argo *T*racking *S*ystem)

Function: Integrated management of logistics supply stream for tracking the movement of cargo in transit in the USAP shipping system and for managing transportation system (aircraft, vessel) load planning and documentation

Origin: Antarctic Support Associates
61 Inverness Drive East, Suite 300
Englewood, CO 80112
Tel. (303) 790-8606
Fax (303) 790-9130

Geographic Dispersion: Contractor Headquarters, Port Hueneme Logistics Center, International Antarctic Center (Christchurch, NZ), McMurdo Station, South Pole Station, Punta Arenas (Chile) contract logistics agent, Palmer Station

Technical Description: Custom software system written in Revelation Technologies Inc. Advanced Revelation database language (V3.12). MS-DOS operating system based product. Runs under Novell® Netware® network operating system, and under Microsoft Windows NT™ with special configurations. Interfaces to Intermec bar code readers/scanners.

Functional Description: Distributed database application that collects transportation and shipping data for cargo, specialized for the peculiarities of the USAP cargo system and its interface with the military shipping system. Shipping data is structured around USAP identification numbers for science projects, locality code numbers for Antarctic destinations (military nomenclature in origin), required on site (ROS) date, and military transportation control number (TCN). Synchronization required between shipping origin and destination.

Utilization: Management of forward and retrograde cargo between the U.S. and Antarctica via New Zealand and South America. Utilized extensively in Port Hueneme, CA, Christchurch, NZ, McMurdo Station, and South Pole Station.

Unique Attributes:
1. CTS functions as an integral component of a larger enterprise resource management information system, comprised of: MAPCON™, Power 1000 Purchasing System, CTS, and DELTEK finance and accounting system; information flows between these applications to support many USAP mission and Contractor operational and business
2. CTS is utilized for load management and tracking of USAP cargo aircraft and ocean vessels
3. CTS is utilized to manage special requirements for transportation, such as hazardous material shipping

C6.2.2.3 Deployment Process Management

Title or Name: PTS (*P*ersonnel *T*racking *S*ystem)

Function: Integrated management of travel, processing status, in-transit support for USAP program participants traveling to/from Antarctica

Origin: Antarctic Support Associates
61 Inverness Drive East, Suite 300
Englewood, CO 80112
Tel. (303) 790-8606
Fax (303) 790-9130

Geographic Dispersion: Contractor Headquarters, Port Hueneme Logistics Center, International Antarctic Center (Christchurch, NZ), McMurdo Station, South Pole Station, Punta Arenas (Chile) contract logistics agent, Palmer Station; Remote access required by NSF, SPAWAR Systems Center Charleston, 109th AW NYANG Schenectady

Technical Description: Custom software system written in Revelation Technologies Inc. Advanced Revelation database language (V3.12). MS-DOS operating system based product. Runs under Novell network operating system, and under Microsoft Windows NT™ with special configurations.

Functional Description: Distributed database application that collects information on personnel affiliated with the USAP for travel itinerary, transportation carrier, hotel preferences, clothing size, and medical processing status. Each USAP organization sponsoring personnel participating in the USAP provides data and data updates for changing conditions. Synchronization required between origin, intermediate way-points in the USAP system, and destination.

Utilization: Management of scheduling and processing of personnel arriving in Christchurch, NZ, and Punta Arenas, Chile, en route to/from Antarctica and research vessels; preparation for hotel, berthing, and work/support requirements for personnel arriving at way-points or Antarctic stations; manifest generation for USAP aircraft and vessels; record of personnel flux to Antarctica for mandated Antarctic Treaty System annual reporting; clothing outfitting data for heavy clothing issue in Christchurch; population/berthing management for South Pole Station

Unique Attributes:
1. PTS requires all USAP participants to enter data into the system in a timely manner and to keep records updated in order for system to provide value
2. PTS provides remote access for distributed participant organizations who do not have replicated copies of the database
3. PTS distributed databases are full peers, with all data replicated at each site
4. PTS distributed database synchronization has near real time processing demands to minimize latency and age of data in order for system to provide value
5. PTS provides Human Resources functions for the Contractor to support hiring, incentives management, and additional medical clearance and records management
6. Data collected in PTS has been designated a system of records under the designation of the Privacy Act of 1974.

C6.2.3 Administrative

C6.2.3.1 Finance

Title or Name: Finance System
Function: Finance, accounting, budgeting, contract reporting and cost control
Origin: Contractor provided
Geographic Dispersion: Contractor Headquarters
Technical Description: (*none*)
Functional Description: U.S. Government certified contract accounting system
Utilization: Corporate accounting, budget, and cost control; monthly contract financial reporting to NSF
Unique Attributes:
1. Provides data exchange interface with NSF Office of Polar Programs' Polar Operations Finance Management System (POFMS)

C6.2.3.2 Purchase Order Management

Title or Name: Purchasing System
Function: Purchase order generation and tracking, invoice management and accounts payable
Origin: Contractor provided
Geographic Dispersion: Contractor Headquarters, International Antarctic Center (Christchurch, NZ)
Technical Description: Database driven software system with external database access and sharing with Revelation Technologies Inc. Advanced Revelation database language (V3.12) products.
Functional Description: Contractor specific product for purchase requisition, purchase order, purchase tracking.
Utilization: Purchase order system for supporting USAP acquisitions in the U.S. and in New Zealand
Unique Attributes:
1. Accepts requisition data from MAPCON™ and issues purchase order and transportation data to MAPCON™
2. Accepts transportation data and receiving data from Port Hueneme, CA, logistics center and issues shipping documents and order data for interface to CTS

C6.2.4 Management and Public Information

Title or Name: WWW Intranet and Extranet Information Servers
Function: Integrated distribution outlet for program, operational, grantee, and public interest information for the USAP and for local Antarctic station sites

Origin:
1. Netscape®
World Headquarters
501 E. Middlefield Road,
Mountain View, CA 94043
Tel. (650) 254-1900
Fax (650) 528-4124

2. O'Reilly & Associates, Inc.
90 Sherman Street
Cambridge, MA 02140
Tel. (617) 354-5800
(800) 775-7731
Fax (617) 661-1116

Geographic Dispersion:
1. International Antarctic Center (Christchurch, NZ), Port Hueneme, CA
2. Contractor Headquarters, McMurdo Station, South Pole Station, Palmer Station

Technical Description:
1. Netscape® SuiteSpot Netscape® Enterprise Server 3.5 - Web information sharing for content management and network-based applications. Calendar, collaboration, directory, and messaging functions under consideration. Operates under Windows NT™
2. O'Reilly WebSite Professional™ Web server. Operates under Windows NT™

Functional Description: World Wide Web server

Utilization:
1. Central information dissemination for local stations and logistics sites (Intranet applications) and for external dissemination to the general public, operational program organizations, and distributed grantee customer base (Extranet).
2. Antarctic stations disseminate weather, local affairs, telephone directory, operational manuals, procedures, news, flight information, logistics information, etc.
3. Extranet site disseminates marine science program planning and vessel scheduling information, Science User Committee hot-links, transportation/logistics planning and schedule data for flight schedules, shipping dates, public outreach information and images, etc.

Unique Attributes: The Contractor corporate site doubles as the Contractor's company site and as a site for USAP program information.

C6.2.5 Planning and Order Entry

Title or Name: ESP (*E*lectronic *S*upport *P*lanner)

Function: Automation of grantee Support Information Package (SIP) via on-line Internet access and enhanced grantee access to program data for planning

Origin: Antarctic Support Associates
61 Inverness Drive East, Suite 300
Englewood, CO 80112
Tel. (303) 790-8606
Fax (303) 790-9130

Geographic Dispersion: Contractor Headquarters

Technical Description:
1. Server Side: Web accessible database, Sybase SQL Anywhere, linked to O'Reilly WebSite Professional
2. Client Side: Standard Java enabled Web browsers, Java routines for managing client-side data and forms

Functional Description: Enables grantees to electronically complete annual science support planning request forms using an on-line reference of resources. Enables grantees to make changes readily as plans change, while streamlining the delivery of the change data to the cognizant Contractor customer service representative. Facilitates the distribution, management, and integrity of grantee supplied data within the Contractor's science support process.

Utilization: Business process re-invention of standard annual science support resource and requirements gathering process done via paper forms processes – the Support Information Package. On-line access allows grantee greater flexibility in planning and changing and streamlines data assimilation and utilization by Contractor science support team. Long range design goal specifies creating an on-line planning environment with links to MAPCON™, CTS, and PTS databases, as well as a proposed Geographic Information System geospatial database of USAP field operations and science data.

Unique Attributes:
1. Client/server architecture
2. Under development as of 8/22/1998

C6.2.6 Engineering and Project Management

C6.2.6.1 Drafting

Title or Name: AutoCAD®

Function: Engineering drafting

Origin: Autodesk, Inc.
111 McInnis Parkway
San Rafael, California 94903
Tel. (415) 507-5000
Fax (415) 507-5100

Geographic Dispersion: Contractor Headquarters, McMurdo Station

Technical Description: Commercial off-the-shelf, industry standard computer design and drafting software; AutoCAD® R14; operates under Windows® 95 or Windows NT™

Functional Description: Computer aided architectural design and drafting software; additional capabilities for facilities management and survey

Utilization: Primary engineering design drafting system for all original design drawings and as-built drawings; supports architecture/engineering/construction and land survey applications; supports Antarctic stations facilities management, McMurdo aerodrome/runway development and operations, and station land-use planning

Unique Attributes:
1. USAP CAD drawing archives created in Sigma Design, Inc. ARRIS CAD; conversion of archive files to AutoCAD® R14 in progress
   Sigma Design International
   Operations Center
   5521 Jackson Street
   Alexandria, LA 71303
   Tel. (318) 449-9900
   Sales (888) 990-0900
   Fax (318) 449-9901
2. AutoCAD® Release 14 has built-in tools for publishing, sharing, and accessing information on the World Wide Web

C6.2.6.2 Project Scheduling and Planning

Title or Name: Primavera Project Planner® (P3®)

Function: Integrated project planning, management, and control for multiple projects

Origin: Primavera Systems, Inc.
Two Bala Plaza
Bala Cynwynd, PA 19004
Tel. (610) 667-8600
Fax (610) 660-5857

Geographic Dispersion: Contractor Headquarters, McMurdo Station

Technical Description: Commercial off-the-shelf software; operates under Windows® 95 or Windows NT™; OBDC compliant data base; SQL database access; support for Object Linking and Embedding (OLE); Electronic communications via VIM or MAPI-compliant mail systems

Functional Description: Controls large and complex projects; Manages multiple projects in a multi-user environment; Electronically integrates data from other corporate sources; Provides scheduling and resource leveling

Utilization: Supports all Antarctic station construction projects; used as a resource for planning and estimating

Unique Attributes:
1. Major resource used for South Pole Station Modernization project management
2. P3® is linked with MAPCON™ (station inventory for resources and labor allocation), Primavera Expedition®, and Timberline Precision Estimating™ to form an integrated project planning and estimation environment that bases planning and execution on existing resources and USAP-specific cost factors
3. P3® is designed to link and integrate with industry standard Enterprise Resource Planning (ERP) systems – SAP AG, Oracle, PeopleSoft, Baan Co., J.D. Edwards Co.

C6.2.6.3 Project Contract Management

Title or Name: Expedition

Function: Integrated project control, management, and administration

Origin: Primavera Systems, Inc.
Two Bala Plaza
Bala Cynwynd, PA 19004
Tel. (610) 667-8600
Fax (610) 660-5857

Geographic Dispersion: Contractor Headquarters

Technical Description: Commercial off-the-shelf software; operates under Windows® 95 or Windows NT™ or Novell® Netware®; OBDC compliant data base (Sybase Version 5.5.03); SQL database (SQL Anywhere™) access; support for Object Linking and Embedding (OLE); Publishes reports in Web ready format; Document distribution via electronic mail and mail list server

Functional Description: Multi-user, multi-project, and multi-site environment project control system; designed to link with Primavera P3®; Design review and submittal process support; change management process; multi-user groupware for project teams to work together in real-time

Utilization: Major resource used for South Pole Station Modernization project management

Unique Attributes:
1. Expedition® is linked with MAPCON™ (station inventory for resources and labor allocation), Primavera P3®, and Timberline Precision Estimating™ to form an integrated project planning and estimation environment that bases planning and execution on existing resources and USAP-specific cost factors

C6.2.6.4 Cost Estimation

Title or Name: Precision Estimating™, Extended Edition

Function: Construction cost estimation for commercial construction, design/build, home building, mechanical and specialty

Origin: Timberline Software Corporation
Post Office Box 728
Beaverton, OR 97075-0728
Fax (503) 526-7923

Geographic Dispersion: Contractor Headquarters

Technical Description: 32 bit application designed for Microsoft Windows® 95 and Windows NT™ and Novell® Netware® (Novell® 3.11 or higher); support for ODBC (Open Database Connectivity); Custom cost databases and interface to R.S. Means commercial cost databases; Export accounting/budget data; Links to AutoCAD® for automatic bill of material estimation; Integration link with P3® to convert estimated costs into time and resource plans

Functional Description: Supports conceptual estimation and hard bids for construction projects

Utilization: Supports USAP construction and facilities maintenance cost estimation; Estimation process supports "what-if" trade-off analysis for NSF capital planning and long range planning

Unique Attributes:

1. Custom USAP cost estimation databases have been generated with historical data to tailor R.S. Means and other industry standard estimating data and models to USAP unique/site specific conditions
2. Timberline Precision Estimating™ is linked with MAPCON™ (station inventory for resources and labor allocation), Primavera P3®, and Expedition® to form an integrated project planning and estimation environment that bases planning and execution on existing resources and USAP-specific cost factors

C6.2.7 Environmental Management

C6.2.7.1 Waste Generation Management

Title or Name: PowerLink - ExecuTrax

Function: Waste management for generators of waste requiring transportation and disposal for regulatory compliance

Origin: Wixel Environmental Software
7936 E. Arapahoe Ct.
Englewood, CO 80112
Tel. (303)796-0045
Fax (303)796-0043

Geographic Dispersion: Contractor Headquarters

Technical Description: Operates under Microsoft Windows® 95 and Windows NT™, network capable, module to print bar code labels

Functional Description: Waste Management; Lab Packing; Manifesting and Labeling; Cradle to Grave Tracking and Reporting; Bar Coding; Electronic Data Transfer

Utilization: Core automation of USAP waste management program for regulatory compliance; supports waste packaging and tracking in transport system for CONUS disposal

Unique Attributes:

C6.2.7.2 Waste Handling and Disposal Management

Title or Name: ServiceTrax - TraxTran

Function: Transportation management of hazardous and controlled waste for regulatory compliance

Origin: Wixel Environmental Software
7936 E. Arapahoe Ct.
Englewood, CO 80112
Tel. (303)796-0045
Fax (303)796-0043

Geographic Dispersion: McMurdo Station

Technical Description: Operates under Microsoft Windows® 95 and Windows NT™, network capable

Functional Description: Client Information Management; Inventory Tracking; Sampling and Analysis; Manifesting and Labeling; Lab Packing (in office or from the field); Receiving Feature's for Transfer Station's; Household Hazardous Waste

Utilization: Core automation of USAP waste management program for regulatory compliance; supports waste packaging and tracking in transport system for CONUS disposal

Unique Attributes:

C6.2.8 Science and Data Acquisition

C6.2.8.1 Geographic Information

Title or Name: ARC/INFO™

Function: Geographic Information System

Origin: Environmental Systems Research Institute, Inc. (ESRI)
380 New York Street
Redlands, CA 92373-8100
Tel. (909) 793-2853
Fax (909) 307-3025

Geographic Dispersion: Contractor Headquarters, McMurdo Station

Technical Description: Commercial off-the-shelf, open standards, client/server; Unix (Solaris, SUN O/S) version; Custom analysis and decision support applications development using standard development tools: Visual Basic, C++, PowerBuilder, Tcl/Tk, and Motif, or ARC/INFO™ build-in scripting language ARC Macro Language (AML); SQL tools work directly with industry standard RDBMS (INFORMIX, CA-OpenIngres, Oracle, Sybase SQL Server for SUN Unix version)

Functional Description: ARC/INFO™ integrates multiple data types with tabular DBMS data: vector, raster, photographs, scanned documents, satellite images, CAD drawings, and sound/video. Supports cartographic and image analysis/manipulation applications.

Utilization: Geospatial reference database of USAP program operational and scientific activities; Prototype application to inventory USAP fixed wing landing sites; Other applications targeted to support the science research community under consideration

Unique Attributes: Collaboration with U.S. Geological Survey for the development of cartographic and geodetic survey applications

C6.2.8.2 Marine Data Acquisition

Title or Name: R/V DAS (*R*esearch *V*essel *D*ata *A*cquisition *S*ystem)

Function: Marine research data acquisition, logging, and preprocessing

Origin: Antarctic Support Associates
61 Inverness Drive East, Suite 300
Englewood, CO 80112
Tel. (303) 790-8606
Fax (303) 790-9130

Geographic Dispersion: R/V NATHANIAL B. PALMER, R/V LAURENCE M. GOULD

Technical Description: Custom designed software for USAP application; written in C, Motif; interface to instruments via RS-232 data/control lines

1. R/V N.B. PALMER: hosted on Silicon Graphics Challenge-L dual processor computer
2. R/V L.M. GOULD: hosted on single processor Unix workstation

Functional Description: Real time data logging and archival data storage per cruise; distributed access via ship's LAN

Utilization:

1. Sole data logger for SeaBeam 2112 multi-beam bathemetric sonar aboard the R/V N.B. PALMER.
2. Logs R/V N.B. PALMER ship's instruments, navigational data, weather data, and grantee instrument data – Simrad sonar, SeaBeam 2112, GPS position, Bathy2000 sonar, OYO seismic data, IRIG time code data, Lacoste & Romberg gravimeter data, thermosalinograph data, other
3. Variant utilized on R/V L.M. GOULD for main data acquisition system for ship's and grantee instruments and navigational data

Unique Attributes:

1. The existing data acquisition system on board the R/V N.B. PALMER (*RT* DAS) is scheduled for replacement with R/V DAS in FY99. RT DAS is constructed in QNX for the real time instrument logging requirement and is combined with Novell® NetWare® for PC network file storage and sharing. RT DAS was developed by EG&G Marine.
2. Design includes the separate suite of software named R/V DAS Real Time Display System. This is a script driven, reconfigureable X-Windows user interface for access to R/V DAS data. Data is distributed via a shared memory server that received data via UDP datagrams broadcast on the ship's LAN from instrument and ship's sensors logging processes. The design provides for graphical user interface displays and allows for the user (grantee) to customize displays and data streams to suit individual experiment requirements. Adaptations for each research vessel (N.B. PALMER, L.M. GOULD). A development version exists at the Contractor Headquarters.

C6.2.8.3 Satellite Data Acquisition and Remote Sensing

C6.2.8.3.1 Satellite Data Acquisition

Title or Name: TeraScan ® Earth Remote Sensing System

Function: Real-time data reception and in-depth analysis polar orbiting and geostationary weather satellites

Origin: SeaSpace Corporation
9240 Trade Place, Suite 100
San Diego,CA 92126
Tel. (619) 578-4010
Fax (619) 578-3625

Geographic Dispersion: McMurdo Station, Palmer Station

Technical Description: Commercial off-the-shelf software and hardware system; Hardware includes 1.0 meter az/el tracking L-Band antenna and SUN SPARC workstations; networked on station LANs

Functional Description: Real time antenna tracking control, data ingest, Level 0 and Level 1 data product generation, and process scheduling; Data acquisition from NOAA TIROS-N, DMSP, FY and ORBIMAGE-2 (SeaStar; SeaWiFS ocean color scanner) satellites; Recovery of NOAA TIROS-N Data Collection System data; Data fusion with other locally derived data products

Utilization:
1. McMurdo: Satellite image data and recovery of automatic weather station data (via NOAA TIROS-N DCS) to support mission critical weather forecasting in McMurdo Station; Preparation of weather products to support pilot briefings in Christchurch, NZ; supports wildlife tracking for research projects in McMurdo region; general high resolution AVHRR (NOAA) and OLS (DMSP) image recovery and archive for science research use and archive in national data centers (National Snow and Ice Data Center, Boulder, CO); recovery of ORBIMAGE-2 ocean color data (local area coverage, real time coverage) for field science research support and contribution to NASA/GSFC archives
2. Palmer Station: Satellite image data for science research support for Long Term Ecological Research program in Antarctic Peninsula; Satellite image data for ice navigation forecasting (strategic, tactical) to support USAP research vessel operations and science missions; recovery of ORBIMAGE-2 ocean color data (local area coverage, real time coverage) for field science research support and contribution to NASA/GSFC archives

Unique Attributes: McMurdo has two separate systems, with varying capabilities. One system is fully capable of acquisition from NOAA and DMSP satellites, and one system is NOAA capable only. FY99 plans call for upgrading the capability of the second system.

C6.2.8.3.2 Satellite Data Image Processing and Analysis

Title or Name: TeraVision ® Earth Remote Sensing System

Function: Real-time data reception and in-depth analysis polar orbiting and geostationary weather satellites

Origin: SeaSpace Corporation
9240 Trade Place, Suite 100
San Diego,CA 92126
Tel. (619) 578-4010
Fax (619) 578-3625

Geographic Dispersion: Contractor Headquarters, International Antarctic Center (Christchurch, NZ), McMurdo Station, Palmer Station

Technical Description: Commercial off-the-shelf software; Operates on SUN Unix workstations

Functional Description: Visualization interface software developed by SeaSpace for viewing all forms of TeraScan® generated image and vector based products

Utilization:
1. McMurdo Station, Christchurch: Used to support weather forecasting and general science applications. File transfers of McMurdo TeraScan satellite data are processed in Christchurch for pilot briefings
2. Palmer Station and Contractor Headquarters: Used to support general science inquiries and to support image processing for ice navigation analysis and for selection of subsampled images for file transfer to USAP research vessels.

Unique Attributes:

C6.3 Communications and Transmission Systems

C6.3.1 Satellite Systems

C6.3.1.1 McMurdo Commercial Primary

Title or Name:	McMurdo Commercial Fixed Satellite Service - Primary
Function:	Primary telecommunications trunk
Service Location(s):	McMurdo Station
Satellite, Operator:	INTELSAT 702, International Telecommunications Satellite Organization
Common Carrier:	AT&T/Alascom
Services Supported:	PSTN telephony (business, public), facsimile, Internet, 2 x Switched56, private data circuit
Technical Description:	1. McMurdo teleport is Black Island 1, a 11 meter C-Band antenna; service is a T1 IBS carrier via global beam on INTELSAT satellite at 177° E in Pacific Ocean Region; McMurdo look angle of 3.2° for a direct hop to CONUS 2. CONUS teleport service via U.S. Electrodynamics at Brewster, WA; local exchange service via GTE, Wenachee, WA; fiber optic T1 backhaul to NASA Ames Research Center, Moutain View, CA; aggregate service via private TDM trunk using GDC TMS 2000 Megamux; PSTN telephone service via 16 kb/s ADPCM; facsimile service via 6.8 kb/s CELP
Functional Description:	Service provides 24x7 telecommunications service for McMurdo Station. Aggregate T1 carrier divided into fractions to support (approx.): 4 inbound business telephone lines, 20 outbound telephone lines divided between 10 business and 10 public; 680 kb/s Internet; 128 kb/s NASA NASCOM data circuit; 9.6 kb/s Air Force data circuit; 5 6.8 kb/s CELP facsimile circuits; 19.2 kb/s Automatic Teller Machine private IP network
Utilization:	Primary communications link with McMurdo Station
Unique Attributes:	1. Common carrier and satellite space segment is Government acquired via contract issued and administered by SPAWAR Systems Center Charleston for the NSF. 2. All earth station and telecom equipment in McMurdo Station is Government owned; maintenance, operations, and common carrier trouble resolution are provided by the USAP Prime Contractor 3. Long distance service and PIN administration is provided by the USAP Prime Contractor 4. Black Island able to see INTELSAT orbit slots at 174° E, 177° E, and 180° E without blockage

C6.3.1.2 McMurdo Commercial Secondary

Title or Name:	McMurdo Commercial Fixed Satellite Service - Secondary
Function:	CONUS back-up and New Zealand least cost route service
Service Location(s):	McMurdo Station
Satellite, Operator:	INTELSAT 802, International Telecommunications Satellite Organization
Common Carrier:	Telecom New Zealand
Services Supported:	Domestic New Zealand and International PSTN telephony (business, public), facsimile, and private data circuit

Technical Description:

1. McMurdo teleport is Ross Island 1, a 9 meter C-Band earth station owned by Telecom New Zealand; Telecom offers PSTN voice and leased data circuits via a sub-T1 reconfigurable IDR carrier via global beam on INTELSAT satellite at 174° E in Pacific Ocean Region; McMurdo look angle of 3.5° for a direct hop to New Zealand
2. New Zealand teleport is in Telecom's Warkworth, North Island, teleport complex in New Zealand; a 19.2 kb/s back-haul private data circuit terminates in the Telecom frame room at the International Antarctic Center in Christchurch
3. Telecom maintains a point of presence at the McMurdo Central Office for McMurdo-Scott Base PABX tie links; Scott Base PABX utilized in call routing and management

Functional Description: 32 kb/s ADPCM voice line service is provided; service includes direct inward dial into any McMurdo telephone extension; PIN, credit, and calling card outbound service provided with no distinction made between business and public service; a 19.2 kb/s private data circuit for point-to-point static route TCP/IP LAN-to-LAN links between the Christchurch International Antarctic Center (USAP LAN) and McMurdo is in place

Utilization:

1. Provides least cost calling between McMurdo and New Zealand, in particular the operations at the International Antarctic Center in Christchurch
2. Provides primary air traffic control voice communications between Auckland Center and McMurdo Center
3. Provides primary low latency e-mail, weather image file transfer, and mission operations data transfer (CTS, PTS) between McMurdo and the International Antarctic Center
4. Provides emergency back-up e-mail forwarding and PSTN telephone service between CONUS and McMurdo for outages on the primary CONUS-McMurdo Internet and telephone trunk links or space segment link

Unique Attributes:

1. INTELSAT orbit slot at 174° E is only known INTELSAT slot known visible directly from Hut Point Peninsula on Ross Island due to horizon blockage by Mt. Erebus
2. Consideration being given to upgrade the bandwidth of the private data circuit to 64 kb/s and to add voice over data capability

C6.3.1.3 GOES/U.S. Antarctic Program Satellite System

Title or Name: GOES/U.S. Antarctic Program Satellite System
Function: Primary high quality data communications
Service Location(s): South Pole Station
Satellite, Operator: GOES-3, National Science Foundation (to be assumed from NOAA/NESDIS)
Common Carrier: University of Miami Rosenstiel School of Marine and Atmospheric Science
Services Supported: Telecommand/control, Internet

Technical Description:
1. Service is via GOES-3 S/L-Band translator and global beam
2. South Pole teleport is Univ. of Miami designed 4.5 meter TVRO mesh (C-Band) reflector with custom S/L-Band feed and inclined tracking (actuator and controller); single thread ground station electronics integrated from commercial off-the-shelf components and satellite communications equipment
3. CONUS teleport located in town of Malabar, Brevard County, Florida, using 4.5 meter mesh reflector.
4. Asymmetric digital aggregate carrier operating with INTELSAT standard QPSK and rate ½ FEC for 256 kb/s CONUS-Pole and 192 kb/s Pole-CONUS links
5. Internet service access for the Malabar, FL, teleport is implemented via a T1 leased circuit to the University of Miami main campus.
6. Experimental PSTN service is provided via the Internet and a VocalTech voice-over-IP gateway provided by Carnegie-Mellon University.

Functional Description: Government provided satellite telecommunications link for South Pole Station. All aggregate carrier bandwidth is allocated to Internet service to support standard IP applications (remote Telnet log-on, ftp, e-mail, HTTP/Web access, multi-cast video teleconferencing, voice-over-IP telephony).

Utilization: Serves as the primary data communications link between South Pole Station and CONUS. The links supports scientific research and operational communications. The high quality of the link enables remote Telnet log-on sessions by scientists in CONUS to support tele-science remote operations. Typical data communications flows at present measure approximately 900 Mbytes/350 Mbytes (outbound from/inbound to South Pole) per week, as measured by router statistics.

Unique Attributes:
1. Greater than 12° inclination of GOES-3 geosynchronous orbit allows approximately 3.5° maximum elevation clearance at South Pole for a total visibility window of 6 hours.
2. NSF is in the process of acquiring control of GOES-3 from the Department of Commerce, NOAA/NESDIS, under a Memorandum of Agreement
3. NSF will have to operate GOES-3 communications on an unprotected, non-interference basis per Department of Commerce ruling (National Telecommunications and Information Administration)
4. NSF will have to maintain readiness to perform disposal maneuvers to prevent orbit debris, per U.S. national policy
5. Utilization has peaked over 1 Gbyte per week, despite high speed outbound data flow of up to 12 Gbytes per week via the TDRS F1 satellite Ku-Band link.
6. Experimental 19.2 kb/s portable service for the Siple Dome summer field camp will be attempted in FY99

C6.3.1.4 UHF Data Communications Link

Title or Name: Lincoln Experimental Satellite Link
Function: Primary data communications
Service Location(s): South Pole Station, Palmer Station
Satellite, Operator: LES-9, DOD/US Air Force (telecommand by MIT Lincoln Labs)
Common Carrier: University of Miami Rosenstiel School of Marine and Atmospheric Science
Services Supported: Internet

Technical Description:
1. Service is via non-tactical DOD UHF satellite communications plan and specially reserved 25 kHz channel assignments on the 500 kHz broadband translator and global beam
2. Ground station equipment at South Pole and Palmer Stations custom designed by the University of Miami, using approx. 12 dBi crossed-Yagi split transmit/receive antenna arrays
3. CONUS teleport service provided by the University of Miami Malabar, FL, GOES-3 teleport.
4. Usable digital bearer circuit bandwidths of 38.2 kb/s have been achieved with rate ½ FEC commercial satellite modems and a corrected BER varying between 10^{-5} or better, via consecutive channel assignments on the satellite

Functional Description: Government provided satellite telecommunications link for South Pole Station. All aggregate carrier bandwidth is allocated to Internet service to support standard IP applications (remote Telnet log-on, ftp, e-mail, HTTP/Web access, video teleconferencing).

Utilization:
1. Serves as co-primary data communications link between South Pole Station and CONUS. Fills time-of-day gap that is symmetric with GOES-3 coverage to minimize communications latency with the station. The links supports scientific research and operational communications. The link is of marginal quality for remote Telnet log-on sessions due to ionospheric propagation effects on the UHF carrier, and the main services supported are non-interactive services (SMTP e-mail, ftp, etc.). Typical data communications flows at present measure approximately 600 Mbytes/400 Mbytes (outbound from/inbound to South Pole) per week, as measured by router statistics.
2. Serves at the primary data communications link between Palmer Station and CONUS. Service is cost effective means to provide long period Internet access in lieu of comparatively high cost INMARSAT service for on-line, interactive Internet service. Palmer utilizes the link for both non-interactive and interactive applications.

Unique Attributes:
1. Greater than 14° inclination of LES-9 geosynchronous orbit allows approximately 5° maximum elevation clearance at South Pole for a total visibility window of 6-7 hours.
2. Service is shared with Palmer Station, with South Pole Station pre-empting Palmer Service. Palmer Station visibility ranges from below the horizon to about 24°. Service to Palmer is limited by multi-path reflections from the ocean water and sea ice surfaces below the line of sight path to the satellite.
3. Access requires monthly official requests issued by Commander Operation Deep Freeze. Access is subject to preemption, especially in time of national emergency (as was case during Operation Desert Storm).
4. USAP Prime Contractor maintains all Antarctic equipment.

C6.3.1.5 High Speed Data Communications

Title or Name: South Pole TDRSS Relay
Function: High speed, high quality unidirectional data communications and high bit-rate Internet data communications
Service Location(s): South Pole Station
Satellite, Operator: TDRS F1, NASA
Common Carrier: NASA Space Network - Tracking and Data Relay Satellite System

Services Supported:
1. TDRSS K-Band Single Access Return service @ 2 Mb/s (computer file transfer)
2. TDRSS S-Band Single Access Forward/Return service @ 1.024 Mb/s (Internet)

Technical Description:
1. NASA supplied dual 6 foot antenna system for South Pole Station using prototype NASA earth station design
2. Equipped for remote monitor and control via computer network, including remote control via the Internet
3. Uses NASA White Sands Complex for teleport function. Computer file server located at White Sands receives computer files transferred from an image machine at South Pole Station. NASA Internet connections at White Sands enable CONUS users to access White Sands file server and to establish real-time Internet access to South Pole.

Functional Description: Government provided high speed satellite communications service for South Pole Station

Utilization:
1. Provides only high speed data communications capability in existence for South Pole Station sufficient to meet winter data communications requirements for NSF astronomy and astrophysics projects. Since inauguration of high speed K-Band service in February, 1998, more than 270 Gbytes of scientific data has been transferred, which is less than the full compliment of data possible for transmission.
2. Provides only high speed, high quality Internet link in existence for South Pole Station sufficient to support any remote operations/tele-science application proposed by the South Pole science community. High quality Internet link also provides means to provide multiple high quality voice-over-IP telephone links without degradation from data communications traffic. Single channel IP-voice experimentation now in progress, via Carnegie-Mellon University volunteer gateway.

Unique Attributes:
1. Greater than 10° inclination of TDRS F1 geosynchronous orbit allows approximately 1.25° maximum elevation clearance at South Pole for a total visibility window of 4 hours.
2. NASA engineering evaluations have proven the feasibility of 50 Mb/s K-Band bandwidth, with a 10 Mb/s a likely low cost intermediate capability.
3. USAP Prime Contractor maintains Antarctic equipment for joint NSF-NASA collaboration.

C6.3.1.6 Wide Area Communications Service

Title or Name: Applications Technology Satellite Experimental Communications

Function: Voice, Simplex PSTN radio telephone patch, low bit rate data communications

Service Location(s): South Pole Station, Palmer Station, Deep Field (Antarctic interior)

Satellite, Operator: ATS-3, NASA (GSFC, LeRC)

Common Carrier: University of Miami Rosenstiel School of Marine and Atmospheric Science

Services Supported:
1. Point-to-point voice order-wire communications (South Pole, Palmer)
2. Simplex PSTN radio telephone autopatch (South Pole, Palmer, Deep Field)
3. Low bit rate (1200 bps) data communications (Deep Field)

Technical Description:
1. Service via aging NASA experimental communications satellite. Satellite uses bent-pipe VHF translator.
2. University of Miami provides telecommand and teleport service to NASA approved uses under contract to NASA.
3. Ground station design and equipment production by the University of Miami, with antenna using (approx.) 12 dBi crossed-Yagi split transmit/receive antenna array

Functional Description: Government provided satellite communications link

Utilization:
1. Palmer Station utilizes ATS-3 for least cost voice communications in lieu of INMARSAT. Principal source of morale communications for the station population.
2. South Pole Station utilizes ATS-3 as a principal source of morale communications in addition to amateur radio and TDRS F1 Internet-phone. ATS-3 is also the primary out-of-band order wire communications link between the University of Miami Malabar ground station and South Pole for coordinating and repairing GOES-3, LES-9, and TDRS F1 operations.
3. Seasonal deep field camps have utilized ATS-3 for voice and low bit rate data communications, with the University of Miami Malabar ground station providing store/forward file transfer and email access to the Internet and autopatch access to the PSTN.

Unique Attributes:
1. Greater than 14.8° inclination of ATS-3 geosynchronous orbit allows approximately 6.2° maximum elevation clearance at South Pole for a total visibility window of 7 hours.
2. Service is shared with Palmer Station, with South Pole Station pre-empting Palmer Service. Palmer Station visibility ranges from below the horizon to about 24°. Service is also scheduled with other authorized ATS-3 users world-wide.
3. ATS-3 supports simultaneous voice and data traffic via the satellite translator.
4. NASA advises that impending comparable global communications service via commercial Low/Medium Earth Orbit providers will render ATS-3 service unnecessary. Additionally, ATS-3 spectrum has been re-allocated to commercial providers. NASA anticipates ATS-3 decommissioning by the year 2000.

C6.3.1.7 Fixed/Mobile Satellite Service

Title or Name: Fixed/Mobile Satellite Service

Function: Maritime, fixed land, and mobile land communications

Service Location(s): R/V NATHANIAL B. PALMER, R/V LAURENCE M. GOULD, Palmer Station, Copa Cabana Field Camp, McMurdo Station

Satellite, Operator: INMARSAT (INMARSAT-3 F4 AOR-West at 54°W, INMARSAT-3 F3 POR at 178°E, other ocean regions dependent upon vessel cruise tracks), International Maritime Satellite Organization

Common Carrier: COMSAT

Services Supported:
1. Standard-B standard PSTN telephony, facsimile, Telex, data and High Speed Data
2. Standard-C C-Link electronic mail; GMDSS
3. Standard-A Telex

Technical Description:
1. The research vessels and Palmer Station utilize ABB NERA Standard-B ship earth stations with High Speed Data
2. McMurdo Station utilizes a MTI MCS-9000 Standard-A, located at Black Island (to establish line of sight at the POR orbit slot), with an oversized antenna (2 meters)
3. The Copa Cabana field camp and the R/V N.B. PALMER utilize Thrane-Thrane maritime portable Standard-C units
4. ISDN dial-up access is established at the COMSAT Southbury, CT, and Santa Paula, CA, INMARSAT Coastal Earth Stations for dial-up 64 kb/s High Speed Data transfer sessions with host computers located at Contractor Headquarters.

Functional Description: Standard commercial INMARSAT maritime and land communications service.

Utilization:
1. Primary voice and data communications from the research vessels. Adaptation of commercial multimedia content point-to-point, error corrected, compressed software for one-way digital broadcast by satellite (KenCast, Inc. Fazzt™) is used for high speed, high efficiency file and email transactions for ship-to-shore and shore-to-ship communications.
2. The vessels also utilize INMARSAT service for PSTN voice and facsimile service.
3. McMurdo Station uses a legacy INMARSAT Standard-A system as primary means for access to the global Telex network.
4. INMARSAT C-Link store/forward email gateway service to the Internet is used to support field camp electronic mail communications for the Copa Cabana camp in the Antarctic Peninsula.
5. A stand-by Standard-C unit is placed on the R/V N.B. PALMER to augment GMDSS emergency notification when the vessel is operating in high seas or in marginal INMARSAT footprint coverage regions. The omni-directional antenna coverage

Unique Attributes:
1. The ship owner also maintains INMARSAT terminals for mandated GMDSS requirements, but these terminals are not part of the USAP supported communications architecture

C6.3.2 Telephone Systems

Title or Name: Station Telephone System

Function: Local station switched voice telephone service; managed gateway for off-station calling via satellite

Service Location(s): McMurdo Station, South Pole Station, Palmer Station

Vendor(s): NEC America, Inc.
Corporate Networks Group
555 W. Walnut Hill Lane
Irving, Texas 75038
Tel. (972) 518-5000

Services Supported:
1. McMurdo: Local station switched voice; interface to Scott Base PABX; interface to OptaPhone rural radiotelephone system; call management of Alascom and Telecom NZ off-station satellite communications links; interconnection of distributed telephone service between main station, Crary Laboratory, and runway complexes
2. South Pole: Local station switched voice telephone service; interface to experimental voice-over-IP satellite link for off-station calling
3. Palmer Station: Local station switched voice telephone service; interface to INMARSAT off-station satellite communications

Technical Description:
1. McMurdo: Interconnection of three PABX systems using Common Channel Interoffice Signaling (CCIS)
   (a) Main PABX – NEC NEAX2400 IMS/MMG with triple redundant V.70 processor; three PIM stacks; total ports = _____; support for Dterm digital subscriber units and multiline phones
   (b) Crary Laboratory – NEC NEAX2400 SIM, with V.70 processor; total ports = 384
   (c) Mobile Runway Support Facility – NEC NEAX2400 SIM, with V.70 processor; total port capacity = 384; installed ports = _____
   (d) Williams Field – Channel bank, full T1 for 24 trunk circuits
2. South Pole: Main PABX – NEC NEAX2400 IMS/IMG, with V.70 processor; total ports = 384
3. Palmer Station: Key System – Electra Mark II; total port capacity =___ ; installed ports = _____

Functional Description: Older generation small business and hotel class private automatic branch exchange (PABX)

Utilization: Primary switched voice communications

Unique Attributes:

1. Palmer Station system to be installed in FY99 as a replacement for a Key System
2. McMurdo regional telephony is augmented with wireless UHF radiotelephone service provided by a single 6-channel (42 subscriber) OptaPhone Systems, Inc. OptaPhone 2000 First Access Network™ rural telephone system.
3. McMurdo and South Pole telephony is augmented by manual HF radiotelephone patch capability for long haul radio-phone system patching
4. The telephone trunking infrastructure at McMurdo utilizes Harris Farinon digital microwave trunk radios (8xT1 dual diversity Quadralink for McMurdo-Black Island trunk, 4xT1 LR4-900 for McMurdo-Mobile Runway Support Facility trunk, 4xT1 LR4-900 for McMurdo-Williams Field trunk)
5. The McMurdo-Black Island trunk circuit is implemented on two T1 spans with a pair of dual redundant AT&T Paradyne AccuLink AFN-740 TDM multiplexers

C6.3.3 Radio and Wireless Systems

C6.3.3.1 McMurdo Systems

Title or Name: McMurdo HF Radio System

Function: Regional and long haul voice and text/data communications from McMurdo station

Location:

1. *Transmitter Facility* – Bldg. 184 ("Transmitter Site"), McMurdo Station
2. *Receiving Site*:
   (a) Primary – Black Island Telecommunications Facility
   (b) Co-primary/Secondary – McMurdo Relay (MacRelay), Bldg. 165, McMurdo Station
3. *Radio Operations Center* – Field Operations Communications Center (FOCC) and McMurdo Relay, Bldg. 165, McMurdo Station
4. *Technical Control* – (MacRelay) Bldg. 165
5. *Remotes* – McMurdo Center (Bldg. 165), McMurdo Weather (Bldg. 165), NSF and Contractor administration (Bldg. 167 "Chalet"), Fixed Wing Operations (Bldg. 165), Contractor inland station operations (Bldg. 165)

Operational Schedule:

1. Austral Summer
   (a) Transmitter Facility – 24x7, 7 days per week
   (b) Radio Operations Center – FOCC and McMurdo Relay, 24x7, 7 days per week
2. Austral Winter
   (a) Transmitter Facility – 0800-1700, M-Sat.
   (b) Radio Operations Center – FOCC and McMurdo Relay; on-demand as-required; daily schedule for RTTY reception from McMurdo; special operations for medevac and WinFly flights

Technical Description:

1. *Transmitter Facility* – 10 Harris Corporation AN/FRT-83 HF radio transmitter units, 1 kW high power final amplifier; 10 kW manual antenna matrix; occasional use of TransWorld RT-7000 125 Watt base stations (back-ups; HF e-mail links); local technical control for change/tuning and antenna change frequency ; 2-30 MHz coverage; three rhombics and multiple conical monopoles (low band, high band, broadband); vertical doublets
2. *Receiving Site*:
   (a) Primary – Black Island Telecommunications Facility; 6 Sunaire remotely controlled receivers; two rhombics, one sloping VEE, one conical monipole, one log periodic curtain array
   (b) Secondary – MacRelay; 10 Harris Corporation Navy fleet standard R-2368 LF/MF/HF receivers; manual patching for TCI loop antenna array (located in hills above McMurdo); local conical monopole antenna;
3. *Radio Operations Center* – MacRelay, Bldg. 165; Harris Corp. R-2368 LF/MF/HF receivers (referenced above); stand-by TransWorld RT-7000 transceiver; Harris multi-tone modems for RTTY with South Pole and USCG icebreakers; Dovetron RTTY terminal unit for South Pole and USCG icebreakers; remote control unit for Black Island receivers; audio/keyline patching panels and electronic matrix; LAN attached computers; Navy Order Wire System HF RTTY control and transmission software and PC computer

Functional Description:

Long haul and regional HF radio communications for voice and data; services provided are:

1. Operator network control
2. Operator voice and text message center
3. Radiotelephone patch
4. Point-to-point radioteletype
5. Point-to-point, multi-point digital binary (electronic mail, file transfer gateway)

Utilization:

1. Search and Rescue
2. McMurdo Flight Information Region flight following (all operating locations of USAP aircraft)
3. Point-to-point operational communications with South Pole Station and regional field camps
4. Maritime communications with USCG icebreakers (voice, text, binary), cargo vessel, tanker, and tour ships
5. Field party communications (regional and long haul)
6. Manual weather observation relay from field camps, inland stations, and South Pole Station
7. Electronic mail relay between inland regional field camps and McMurdo LAN

Unique Attributes:

1. Recent transition from Navy to 109th AW ANG is resulting in configuration changes to HF remote access, to include access from ice runway complex
2. Pending initiatives to provide interim dedicated equipment for improvement to McMurdo Center flight following communications
3. Long term project run by SPAWAR Systems Center Charleston to modernize entire McMurdo HF radio communications infrastructure
4. Pending initiative to implement Harris Corp. HF email system (based on Microsoft Exchange Server™) for McMurdo-South Pole and McMurdo large regional field camp service as low operational cost alternative to IRIDIUM

Title or Name: McMurdo Land Mobile Radio System

Function: Local station and regional voice and paging communications for McMurdo Station

Location:
1. *Base Station Site* – Bldg. 184 ("T-Site"), McMurdo Station
2. *Repeaters* – helicopter deployable to mountain top sites as required; typical sites are Mt. Coats (Kukri Hills), western upper slope of Mt. Erebus, Mt. Newell (semi-permanent), Crater Hill (semi-permanent), Mt. Aurora (Black Island)
3. *Dispatch Centers* – Field Operations Communications Center (FOCC), Bldg. 165; Firehouse, Bldg. 182; McMurdo Center (MacCenter) Flight Information Region ATC Control, Bldg. 165; distributed mobile subscriber base stations, as required
4. *Paging* – Base station located at Bldg. 184; paging bridge located at Telephone Central Office (Bldg. 182)
5. *Subscriber Equipment* – ("Field Party Shop") Bldg. 165

Operational Schedule:
1. *Base Station Site* – 24x7, 365 days/year
2. *Repeaters* – austral summer season; initial deployment in early October; recall in late January; 24x7 continuous operation when deployed
3. *Dispatch Centers* – as follows:
   (a) Field Operations Communications Center: Austral Summer – 24x7, 7 days per week; Austral Winter – standby for on-demand, as-required operations
   (b) Firehouse – 24x7, 365 days/year
   (c) McMurdo Center – Austral Summer – 24x7, 7 days per week; Austral Winter and WinFly – as required to support any aircraft operations and Black Island traverses
4. *Paging* – 24x7, 365 days/year
5. *Subscriber Equipment* – ("Field Party Shop"); Austral Summer: 0730-1700 hours, M-Sat.; Austral Winter – 0800-1700 hours, M-F

Technical Description:
1. *Base Stations* – Comtination of 5 (total) Motorola VHF-FM MSF-5000 and MS(T)R-2000 base stations; remote wireline interface to Field Operations Control Center; separate paging transmitter; frequency plan of 139-148 MHz (Marine Mobile conducted in 156-157 MHz band via mobile units)
2. *Dispatch Centers* – as follows:
   (a) FOCC – Zetron 4010 mult-channel dispatch control console, TEAC voice recorders
   (b) Firehouse – legacy dispatch panel, dedicated to Crash/Fire network
   (c) MacCenter – stand-alone Motorola MX-300 mobile radios
3. *Paging* – Zetron paging bridge

Functional Description: Mobile voice communications with personnel on-foot, vehicles, and helicopters; Local and regional coverage

Utilization:
1. Search and Rescue
2. Helicopter flight following and helicopter operational/dispatch coordination
3. Regional science and operational field party communications
4. Industrial and operational communications in local McMurdo and ice shelf area (cargo operations, heavy equipment vehicle dispatch, shuttle bus dispatch)
5. Runway/air strip operational and emergency communications
6. Crash/fire emergency response
7. Medical emergency response
8. Fueling and vessel fuel off-load operations

Unique Attributes:
1. Band plan coordinated with Antarctica New Zealand
2. Work center stand-alone base stations/dispatch centers form as needed

C6.3.3.2 South Pole Systems

Title or Name: South Pole HF Radio System
Function: Long haul voice and text/data communications for South Pole Station
Location: Administrative/Communications Building
Operational Schedule:
(c) Austral Summer – 24x7, 7 days per week
(d) Austral Winter – on-demand as-required; daily schedule for RTTY transmission to McMurdo

Technical Description:
1. Radios – 3 ITT/MacKay HF-SSB 100 Watt transceivers with matching 1 kW linear amplifiers with remote control heads; 2 ICOM IC-735 HF-SSB transceivers; one 100 watt HF radio with 1 kW linear amplifier
2. Harris multi-tone modems and Kantronics KAM-Plus TNC for point-to-point radioteletype (RTTY) with McMurdo
3. Antennas – 2 rhombics, 1 long-wire sloping VEE, 2 conical monopoles, 3 beam amateur antennas

Functional Description: Main tactical, real-time communications service for South Pole Station, providing long haul communications for point-to-point (McMurdo) and regional communications for fixed, land mobile, and aeromobile

Utilization:
1. Main real-time, on-demand operational communications with McMurdo
2. Aircraft ground-air communications for aircraft in transit to/from South Pole and relay as required to assist McMurdo MacCenter when skip penalizes McMurdo and favors South Pole
3. Field party communications relay for McMurdo FOCC when skip penalizes McMurdo or for trans-polar cap long haul links into East Antarctica
4. Coordination with non-governmental operators (NGO), esp. aviation
5. Radioteletype (RTTY) transmission to McMurdo of meteorological synoptic and aviation forecast observations to meet real-time delivery latency requirements
6. Radiotelephone patch calls with McMurdo for operational coordination, science research, morale, and to gain access to international satellite/telephone service on-demand

Unique Attributes:
1. HF propagation favors South Pole Station for numerous operational scenarios resulting in South Pole Station providing an important link in operational communications focused on McMurdo that do not directly involve South Pole

C6.3.4 Broadcast and Video Systems

[information to be provided by solicitation amendment on or about 1 October 1998]

C6.4 Computing, Data Center, and Network Systems

C6.4.1 Wide Area Network

C6.4.1.1 McMurdo Connectivity

Title or Name: McMurdo Primary
Function: Main Internet trunk into McMurdo
Source, Destination: McMurdo Station Network Operations Center; NASA Ames Research Center
Intermediate Connections: Brewster, WA teleport; GTE Wenachee Exchange; US Sprint

Technical Description:	648 kb/s routed IP link; service via NASA Integrated Services Network (NISN); interconnection to the NISN NASA Internet main backbone at Ames Research Center; short hop to MAE-West via FIX-West – all co-located at NASA Ames; NISN provided and managed gateway router (Proteon) located at McMurdo
Functional Description:	Main Internet link to McMurdo Station from the CONUS Internet cloud via NASA Internet. NASA NISN provides 24x7 operations and coverage. NISN provides secondary domain name service.
Utilization:	Primary route for all Internet traffic bound for U.S. and the world.
Unique Attributes:	Presently operating within acceptable sustained and peak loading parameters, but concern over future growth as Internet enabled workflow, commerce, multi-media, etc. applications gain in deployment and global use

Title or Name:	McMurdo Secondary
Function:	Back-up Internet trunk into McMurdo
Source, Destination:	McMurdo Station Network Operations Center; International Antarctic Center, New Zealand
Intermediate Connections:	Telecom NZ Ross Is 1 teleport; Warkworth, NZ, teleport; domestic fiber optic backhaul from North Island to South Island
Technical Description:	19.2 kb/s static route IP link; service via Telecom NZ Skystream data service; router terminations are McMurdo main core router and Cisco 4000 at the USAP LAN in the International Antarctic Center
Functional Description:	Back-up Internet link to McMurdo Station from the CONUS Internet cloud intermediate host service in New Zealand (no dual homed routing implemented). Managed jointly by the International Antarctic Center LAN staff and McMurdo LAN staff.
Utilization:	Back-up route for e-mail traffic bound for U.S. and the world; Main pathway for weather office satellite image file transfers from McMurdo to USAP International Antarctic Center Christchurch weather office; main pathway for point-to-point email traffic between McMurdo and Christchurch
Unique Attributes:	Presently operating at or near saturation for sustained and peak loading parameters. Consideration being given to upgrade of link to 64 kb/s and the addition of voice over data capability for least cost routing of telephony for McMurdo – International Antarctic Center call traffic.

Title or Name:	McMurdo-Scott Base Primary
Function:	Local Metropolitan Area Network (MAN) Internet link between McMurdo and Scott Base
Source, Destination:	McMurdo Station Network Operations Center; Scott Base Telecom Room in Lab building
Intermediate Connections:	McMurdo Telco Central Office; Telecom NZ point of presence; USAP and Antarctica New Zealand interconnected copper cable plant
Technical Description:	64 kb/s routed IP link; route filtering in place to keep all Scott Base local and out of McMurdo off-station WAN links
Functional Description:	Sole direct IP link between McMurdo and Scott Base LANS.
Utilization:	Data pathway for U.S. Air Force Technical Applications Center (AFTAC) seismic monitor data that is received at Scott Base and routed to Kirkland AFB, NM, via Internet-to-public data network (Infonet); Data pathway for all local e-mail and file transfer service between McMurdo and Scott Base
Unique Attributes:	

C6.4.1.2 International Antarctic Center, Christchurch, NZ, Connectivity

Title or Name:	International Antarctic Center Primary
Function:	Main Internet trunk into USAP Christchurch operations
Source, Destination:	International Antarctic Center, Christchurch, NZ; Netways Communications Ltd. Domestic Internet service
Intermediate Connections:	International Internet gateway service via NZgate at Univ. of Waikato in Hamilton, North Island; ocean fiber backhaul to CONUS; U.S. Internet cloud interconnect at NASA Ames MAE-East
Technical Description:	128 kb/s routed IP link; service via metropolitan data network service and Netways (Telecom NZ networking subsidiary)
Functional Description:	Main Internet link to the International Antarctic Center (USAP LAN) from domestic New Zealand and CONUS Internet cloud via University of Waikato managed international gateway, Nzgate in Hamilton, North Island
Utilization:	Primary route for all Internet traffic bound for, domestic NZ, U.S. and the world.
Unique Attributes:	Recently resized.

C6.4.1.3 South Pole Station Connectivity

Title or Name:	South Pole Primary
Function:	Main Internet trunk into South Pole Station
Source, Destination:	South Pole Station gateway router; NISN NASA Internet
Intermediate Connections:	Univ. of Miami Malabar, FL, satellite teleport; Univ. of Miami main campus; Univ. of Miami link with NASA Internet at NASA Goddard Space Flight Center
Technical Description:	1. Satellite Links: (a) GOES-3: 192 kb/s to Florida; 256 kb/s from Florida (b) LES-9: 38.2 kb/s to/from Florida 2. Boundary Gateway Protocol (BGP) routing, with South Pole peering on NASA Internet; Miami provides pass-through 3. Cisco 4500 main router with peer connection to NASA TDRS F1 router (at South Pole) 4. Automatic link start when satellite rises
Functional Description:	Primary Internet links between South Pole and the U.S. Internet cloud
Utilization:	1. Real-time interactive and store/forward communications 2. Electronic mail, file transfer, video teleconferencing, HTTP Web access, special UDP applications by science community 3. Supports science remote operations, remote maintenance, data transfer 4. Supports operational electronic mail communications and operation data base file transfers 5. Supports remote administration and software distribution to station IT systems
Unique Attributes:	1. BGP routing scheme required extended and sophisticated inter-coordination between USAP Contractor, Univ. of Miami, and NASA NISN/NASA Internet 2. Routes subject to "route flapping" penalties in routing protocols due to episodic nature of satellite links and due to signal fades during satellite contact windows, requiring deliberate work-arounds 3. Network links configured to be transparent to general network user 4. Network configured to favor routing via TDRS F1 when the satellite is visible, including co-visibility times with GOES-3

Title or Name: South Pole Secondary
Function: Experimental high quality link, secondary service
Source, Destination: South Pole Station TDRSS Relay (SPTR), NASA NISN/NASA Internet
Intermediate Connections: NASA White Sands Complex, White Sands, NM
Technical Description:
1. Service via NASA TDRS F1 satellite S-Band Single Access Forward and Return service (SSAF/R)
2. Link rate of 1.024 Mb/s
3. Service provided via NASA designed, provided and USAP Contractor maintained ground station at South Pole (SPTR) with dedicated Cisco router
4. CONUS teleport service provided by NASA White Sands Complex and both TDRSS ground terminals, with spacecraft scheduling provided by NASA space communications network (Network Control Center)
5. NASA Internet interconnection via NASA supplied equpiment
6. Automatic link start when satellite rises

Functional Description: Provides proof-of-concept high speed, high quality Internet service
Utilization:
1. See commentary for South Pole Primary Link
2. Additional applications are for high quality voice-over-IP Internet phone service, large science file transfers (not carried on separate SPTR Ku-Band high speed file transfer service), high quality tele-science remote operations from CONUS experimenters, automatic data broadcasting from South Pole research instruments, high quality video teleconferencing via MBONE
3. Fills time gap between LES-9 and GOES-3 to increase daily connectivity

Unique Attributes:
1. See commentary for South Pole Primary Link

C6.4.1.4 Palmer Station Connectivity

Title or Name: Palmer Station Primary
Function: Sole Internet link into Palmer Station
Source, Destination: Palmer Station boundary gateway router; NISN NASA Internet
Intermediate Connections: Univ. of Miami Malabar, FL, satellite teleport; Univ. of Miami main campus; Univ. of Miami link with NASA Internet at NASA Goddard Space Flight Center
Technical Description:
1. Satellite Link – LES-9, 38.2 kb/s to/from Florida
2. Same design as South Pole Station for basic link; no additional interconnections
3. Routing is via interior route management by Univ. of Miami

Functional Description: Provides on-line connected Internet access
Utilization:
1. Real-time interactive and store/forward communications
2. Electronic mail, file transfer, video teleconferencing (CU-SeeMe), HTTP Web access
3. Supports science remote operations, remote maintenance, data transfer
4. Supports operational electronic mail communications and operation data base file transfers
5. Supports remote administration and software distribution to station IT systems

Unique Attributes:
1. No equivalent capability active via the station INMARSAT Standard-B High Speed Data earth station due to concern regarding recurring cost. On-line Internet connectivity is technically possible via ISDN dial-up to Contractor's home network or other ISP.

C6.4.1.5 Port Hueneme, CA, Logistics Center Connectivity

Title or Name: Port Hueneme Primary

Function:	Internal home-office/remote-office network link with Contractor headquarters
Source, Destination:	USAP logistics staging area, Construction Battalion Center, Port Hueneme, CA; Contractor corporate headquarters, Englewood, CO
Intermediate Connections:	None distinct from telecommunications carrier
Technical Description:	T1 Frame Relay
Functional Description:	LAN-to-LAN interconnection between Port Hueneme logistics office and Contractor corporate network
Utilization:	1. Electronic mail linkage of remote office with corporate mail system 2. File transfer 3. On-line access to mission operational logistics and management databases
Unique Attributes:	1. Present WAN link is a dual Switched56 scheduled for replacement in the 4th quarter of FY98. 2. Voice-over-data service to be implemented as lease cost routing to reduce recurring long distance telephone expenses between remote office and home office

C6.4.2 Local Area Network

C6.4.2.1 McMurdo Station

Title or Name:	McMurdo Metropolitan Area Network
Function:	McMurdo Campus and distributed facility network
Operations Center:	McMurdo Bldg. 165, co-located with data center
Service Locations:	Main station, Arrival Heights Laboratory, NASA McMurdo Ground Station antenna support building (Bldg. 71), Transmitter Facility (Bldg. 184), Mobile Runway Support Facility, Williams Field/Long Duration Balloon Facilty
Protocols:	TCP/IP, IPX, Appletalk
Network Management:	SUN Net Manager, Bay Networks Optivity
Backbone Architecture:	1. FDDI, dual ring core network; interconnects Network Operations Center (Bldg. 165), Crary Laboratory (Bldg. 1), Movement Control Center (Bldg. 140), and Telephone Central Office (Bldg. 182) 2. Multi-mode fiber optics 3. Bay Networks (Synoptics) 5000 and 3800 series hubs 4. Cisco 7000 core router 5. Cisco/Bay router modules for Bay hubs
Fringe Architecture:	1. 10BASE-T Ethernet 2. Bay Networks (Synoptics) 3300 hubs and 2800 concentrators 3. Multi-mode fiber optic interconnects and CAT5 UTP for interconnects and subscriber drops 4. Distribution – core station wide (no coverage to dormitories of buildings in 200 series numbering, some fringe areas remain unserviced) 5. Remote Access – Cisco Remote Access Server for 56 kb/s dial-up remote access for unconnected sites with telephone network access
Spur Architecture:	1. UTP outside plant copper HDSL T1 for Transmitter Facility (Bldg. 184) 2. UTP outside plant copper HDSL T1 for Arrival Heights Laboratory 3. UTP outside plant copper, T1 trunked microwave, HDSL T1 local distribution for Mobile Runway Support Facility service 4. 10BASE-FL fiber optic service to NASA McMurdo Ground Station antenna facility

Utilization:
1. Science research support
2. Mission operations
3. Distributed access to central mission operations databases (MAPCON™, PTS, CTS), office automation software, electronic mail, Internet service, and other data center services

Unique Attributes:

C6.4.2.2 South Pole Station

Title or Name: South Pole Station Campus Network
Function: South Pole core station and outlying facilities network
Operations Center: Science/Berthing Building
Service Locations: Core station (Dome buildings, arches, Sky Lab), Construction Camp, Elevated Dormitory, Atmospheric Research Observatory, Dark Sector Complex (AST/RO building, Martin A. Pomerantz Observatory, other structures)
Protocols: TCP/IP, IPX, Appletalk
Network Management:
Backbone Architecture:
1. Subnet structure via 2 Cisco 4000 routers (does not include the NASA SPTR Cisco 2500)
2. 10BASE-FL and 10BASE-T Ethernet backbone
3. Dark Sector Complex placed on separate subnet from main station subnetwork to enhance performance and reduce colisions
4. Multi-mode fiber optics and CAT5 UTP copper cable plant

Fringe Architecture:
1. Bay Networks (Synoptics) 3000 series hubs and 2800 series concentrators

Spur Architecture:
1. 10BASE-FL multi-mode link to Construction Camp and Elevated Dormitory
2. 10BASE-FL multi-mode link to Atmospheric Research Observatory
3. 10BASE-FL multi-mode link to AST/RO
4. 10BASE-FL multi-mode link to Pomerantz Observatory

Utilization:
1. Science research support
2. Mission operations
3. Distributed access to central mission operations databases (MAPCON™, PTS, CTS), office automation software, electronic mail, Internet service, and other data center services

Unique Attributes:

C6.4.2.3 Palmer Station

Title or Name: Palmer Station Campus Network
Function: Palmer Station core station
Operations Center: Biolab Building
Service Locations: Biolab Building, Gararge/Recreation Building, Science Building ("T-5")
Protocols: TCP/IP, IPX, Appletalk
Network Management:
Backbone Architecture:
1. Cisco 4000 gateway router
2. 10BASE-FL and 10BASE-T Ethernet backbone
3. Multi-mode fiber optics, CAT5 UTP copper, and legacy CAT1 UTP copper cable plant
4. 10BASE-FL inter building link between Biolab, Garage/Recreation, and Science/T-5.

Fringe Architecture:
1. Bay Networks (Synoptics) 3000 series hubs and 2800 series concentrators

Spur Architecture: None

Utilization:
1. Science research support
2. Mission operations
3. Distributed access to central mission operations databases (MAPCON™, PTS, CTS), office automation software, electronic mail, Internet service, and other data center services

Unique Attributes: CAT1 UTP copper cable plant scheduled for phase-out

C6.4.2.4 International Antarctic Center, Christchurch, NZ

Title or Name: International Antarctic Center Campus Network
Function: USAP network for International Antarctic Center
Operations Center: International Antarctic Center main building
Service Locations: International Antarctic Center ("Phase 1") USAP offices, Passenger Receiving Center (PRC), Clothing Distribution Center (CDC), Air Cargo Yard (ACY), Weather Office, Navy Hangar, USAF/ANG Hangar/Offices (Bldg. 52), Defense Contracting Management Command (DCMC) Offices (Air New Zealand overhaul hangar)
Protocols: TCP/IP, IPX
Network Management: Bay Networks Optivity and public domain network management
Backbone Architecture:
1. Cisco 4000 gateway router
2. 10BASE-FL and 10BASE-T Ethernet backbone
3. 100BASE-T local file/application server backbone
4. Multi-mode fiber optics and CAT5 UTP copper cable plant
5. 10BASE-FL links between main hub in International Antarctic Center and: USAF/ANG Hangar/Offices, Navy Hangar, Telecom NZ frame room, PRC, CDC, and ACY

Fringe Architecture:
1. Bay Networks (Synoptics) 3000 series hubs and 2800 series concentrators

Spur Architecture:
1. DCMC offices connected with Telecom NZ copper outside plant and Cisco IGS/Cisco 2509 router pair for a 128 kb/s link, with interconnect to Cisco 4000 main router

Utilization:
1. Mission operations
2. Distributed access to central mission operations databases (MAPCON™, PTS, CTS), office automation software, electronic mail, Internet service, and other data center services such as CD-ROM servers

Unique Attributes:

C6.4.2.5 Port Hueneme, CA, Logistics Center

Title or Name: Port Hueneme Logistics Center Network
Function: USAP network for Contractor logistics office
Operations Center: USAP Contractor packing/shipping warehouse
Service Locations: Main offices, packing/shipping warehouse; remote access to dock for vessel on/off-load
Protocols: TCP/IP, IPX
Network Management:
Backbone Architecture:
1. Cisco 2500 gateway router
2. ACC bridge for local inter-building link
3. 10BASE-FL and 10BASE-T Ethernet backbone
4. Multi-mode fiber optics and CAT5 UTP copper cable plant

Fringe Architecture:
1. Bay Networks (Synoptics) 2800 series concentrators and BayStack 102 hub, Dynastar Hub-16

Spur Architecture: none

Utilization:
1. Mission operations
2. Remote office access to central mission operations databases at Contractor home office (Power 1000, CTS), office automation software, electronic mail, Internet service, and other data center services

Unique Attributes:

C6.4.3 Data Center

C6.4.3.1 McMurdo Station

Title or Name: McMurdo Station Central LAN Data Center
Function: Central LAN services applications, file store, print, information servers, data communications
Operations Center: Building 165
Service Locations: McMurdo Metropolitan Area Network
Network O/S: Novell® Netware® 3.11
File/Application Servers:
1. 4 DEC Prioris-HX Netware® servers
2. 1 Compaq System Pro server
3. Storage Dimensions LAN store RAID array
4. CD-ROM tower/server

Email System:
1. SUN Internet Mail Manager server
2. Microsoft Outlook™ and Netscape® Communicator clients

Numbers of Seats Supported: [*information to be supplied*]
Workstation Types:
1. Unix – SUN SparcStation 2, 5, and 10; SUN Sparc ULTRA 2; SUN Sparc IPC; Silicon Graphics INDY™
2. Windows NT™

Desktop Computer Types: Intel Pentium, 80486, 80386, 80286, 8088
Unique Attributes:
1. Support to MacIntosh work stations for grantees
2. Legacy DaVinci DOS and Windows electronic mail system scheduled for phase out in FY99
3. Citrix WinFrame remote access
4. Linux utilized for applications and IP service

C6.4.3.2 South Pole Station

Title or Name: South Pole Station Central LAN Data Center
Function: Central LAN services applications, file store, print, information servers, data communications
Operations Center: Administrative/Communications Building
Service Locations: South Pole campus network
Network O/S: Novell® Netware® 3.11
File/Application Servers:
1. 1 DEC Prioris-HX Netware® servers
2. 1 HP Netserver Pentium

Email System:
1. Microsoft Exchange™ Server
2. MS Outlook™, Netscape® Communicator clients

Numbers of Seats Supported: [*information to be supplied*]
Workstation Types:
1. Unix – SUN SparcStation 5; SUN Sparc IPC
2. Windows NT™

Desktop Computer Types: Intel Pentium, 80486, 80386

Unique Attributes:
1. Support to MacIntosh work stations for grantees
2. Legacy DaVinci DOS and Windows electronic mail system scheduled for phase out in FY99
3. Citrix WinFrame remote access
4. Linux utilized for applications and IP service

C6.4.3.3 Palmer Station

Title or Name: Palmer Station Central LAN Data Center
Function: Central LAN services applications, file store, print, information servers, data communications
Operations Center: Biolab Building
Service Locations: Palmer Station network
Network O/S: Novell® Netware® 3.11
File/Application Servers:
1. 1 DEC Prioris-HX Netware® server
2. 1 HP Netserver Pentium
Email System:
3. Microsoft Exchange™ Server
4. MS Outlook™, Netscape® Communicator clients
Numbers of Seats Supported: [*information to be supplied*]
Workstation Types:
1. Unix – SUN SparcStation 2, and 10
2. Windows NT™
Desktop Computer Types: Intel Pentium, 80486, 80386
Unique Attributes:
1. Support to MacIntosh work stations for grantees
2. Legacy DaVinci DOS and Windows electronic mail system scheduled for phase out in FY99
3. Citrix WinFrame remote access
4. Linux utilized for applications and IP service

C6.4.3.4 International Antarctic Center, Christchurch, NZ

Title or Name: International Antarctic Center LAN Data Center
Function: USAP LAN services applications, file store, print, information servers, data communications, supports all USAP tenant activities
Operations Center: International Antarctic Center main USAP offices
Service Locations: USAP International Antarctic Center campus network
Network O/S: Novell® Netware® 3.12
File/Application Servers:
1. 4 Compaq ProSigma Pentium (2 ea. Novell®, NT™ servers)
2. CD-ROM tower/server
Email System:
1. Microsoft Exchange™ Server
2. MS Outlook™, Netscape® Communicator clients
Numbers of Seats Supported: [*information to be supplied*]
Workstation Types:
1. Windows NT™
Desktop Computer Types: Intel Pentium, 80486, 80386
Unique Attributes:
1. Support to MacIntosh work stations for grantees
2. Legacy DaVinci DOS and Windows electronic mail system scheduled for phase out in FY99
3. Citrix WinFrame remote access
4. Linux utilized for applications and IP service

C6.4.3.5 Port Hueneme, CA, Logistics Center

Title or Name:	Port Hueneme LAN Data Center
Function:	USAP remote office LAN services applications, file store, print, information servers, data communications
Operations Center:	USAP packing/shipping warehouse
Service Locations:	USAP offices, Port Hueneme warehouses
Network O/S:	Novell® Netware® 3.12
File/Application Servers:	1. 1 Dell PowerEdge (MS Exchange™ Server) 2. 1 Compaq Proliant 1500 3. 1 HP Netserver Pentium
Email System:	1. Microsoft Exchange™ Server 2. MS Outlook™, Netscape® Communicator clients
Numbers of Seats Supported:	[*information to be supplied*]
Workstation Types:	1. Unix – SUN SparcStation 2, 5, and 10; SUN Sparc ULTRA 2; SUN Sparc IPC; Silicon Graphics INDY™ 2. Windows NT™
Desktop Computer Types:	Pentium, 80486, 80386
Unique Attributes:	1. Legacy DaVinci DOS and Windows electronic mail system scheduled for phase out in FY99 2. Citrix WinFrame remote access

C6.5 Technical Support Infrastructure

C6.5.1 Black Island Telecommunications Facility

Refer to the reference document, *Black Island Telecommunications Facility Operational Readiness Review, McMurdo Station, Antarctica*, May 28, 1998, prepared by NASA Goddard Space Flight Center, Code 227, with contract support by AlliedSignal Technical Services Corporation, Columbia, MD.

C6.5.2 McMurdo Telephone Central Office

The McMurdo Telephone Central Office is located on the upper floor of Bldg. 182, the Firehouse. This facility occupies 4 rooms and supports the following functions:

1. Main PABX voice switch with expansion stacks and management workstation for McMurdo metropolitan area management of all three PABXs (via Common Channel Interoffice Signaling, CCIS)
2. Automatic call attendant for satellite in-bound lines
3. DC inverter/battery central office back-up power system
4. Copper outside plant main distribution frame
5. Main fiber optic cable hub and light guide terminations
6. Main TDM trunk multiplexing equipment for the direct satellite T1 link to the U.S.
7. Network management workstation for direct satellite T1 link and private network (telephony trunk)
8. Local T1 TDM multiplexing equipment for trunk lines to Black Island
9. An INMARSAT Standard-A earth station remote operations console
10. Monitor and control workstation for the Black Island Telecommunications Facility environmental and power control systems
11. RF paging bridge
12. Telecom NZ E1/T1 point of presence
13. NASA NISN Internet gateway router
14. Automatic Teller Machine IP gateway router
15. Workspace for telephone repair, wire & cable fabrication

C6.5.3 McMurdo Network Operations Center

The McMurdo Network Operations Center is located on the second floor of Building 165. This facility occupies a single enclosed room and supports the following functions:

1. Cisco 7000 core IP router
2. SUN Net Manager and Bay Networks Optivity network management station
3. Cisco remote access server
4. File servers
5. Back-up/restore tape archiving system
6. Bay Networks FDDI dual attach hub
7. Bay Networks 10BASE-T hubs
8. Fiber optic line drivers and interconnects for regional distribution of lines
9. UTP copper regional distribution for fringe network access
10. Applications servers for electronic mail
11. IP services for domain name service, dynamic host IP assignment, IP mail queue

C7 STATEMENT of WORK

C7.1 General Management

C7.1.1 Project Management

C7.1.1.1 Management Positions and Interfaces

The Contractor shall staff the project organization according to its best management practices and in a manner that provides logical, direct working interfaces with NSF staff. The responsibility, autonomy and specific duties to be assumed by individuals are at the Contractor's discretion; however, the Contractor shall designate management positions to direct the primary tasks described in Section C7.

C7.1.1.2 Other Positions

Other organizational positions shall be determined by the Contractor according to the type and volume of work described herein as well as that proposed in annual program plans. In general, however, the Contractor shall structure its workforce with only the employees and subcontractors needed to complete the annual program plan with the smallest possible on-site staff in Antarctica while operating according to USAP safety and environmental policies.

C7.1.2 Reserved

C7.1.3 Planning and Review

C7.1.3.1 Annual Program Plan Development

In early July of each year, the Contractor and NSF begin developing an annual program plan for the next Federal Government fiscal year plus one year (for example, development for the fiscal year 2000 program plan begins in July 1998). The program plan, prepared by the Contractor after initial discussions with NSF are complete, shall consist of two volumes: a program cost schedule and narrative volume, and a staffing schedule and narrative volume. These volumes shall detail the Contractor's staffing and work plans for the subject fiscal year according to budgeting assumptions and program priorities that are provided to the Contractor by NSF, and explain how the Contractor will complete each programmed task within the budget target for the task.

C7.1.3.2 Annual Program Plan Delivery and Discussions

The final draft version of the two volumes of the annual Program Plan for the upcoming fiscal year shall be delivered to NSF no later than 31 July of each year. Negotiations and revisions will follow, with the Contractor submitting a final program plan by 15 September. NSF will normally approve a program plan by 30 September.

C7.1.3.3 Annual Program Plan Coordination with Others

The Air National Guard, SPAWARS and other support organizations also contribute to the annual program plan. Working with NSF, the Contractor shall coordinate the involvement of these organizations in the planning process and, in the case of air operations, help develop detailed plans for the annual airlift schedule and aviation support.

C7.1.3.4 Long Range Planning

As part of its management responsibility, NSF develops long-range plans for the USAP. The Contractor shall assist NSF with the development of these plans. By 31 July of each year, coincident with submission of the annual program plan, the Contractor shall deliver to NSF a five (5) year long-range plan. The Contractor's long-range plan shall be consistent with and support NSF's long-range plan.

C7.1.3.5 Antarctic Treaty Information

The Contractor shall prepare draft sections of the annual Antarctic Treaty report based on the operational and administrative records maintained by the Contractor at NSF direction, and shall also compile the information prescribed under Articles III and VII(5) of the Antarctic Treaty (see Sections C3.2.1.6 and C4). Draft sections of the report are due at NSF by 15 April of each year.

C7.1.3.6 Management and Preventive Maintenance (PM) Manuals

Section C7 describe the services the Contractor shall provide as well as the GFP/GFE that the Contractor shall operate and maintain. The Contractor shall prepare management and PM manuals that address the tasks required by Section C7, and shall submit these manuals for NSF review and approval.

After contract award, NSF and the Contractor shall mutually determine the framework, primary content and development phases of the manuals. The Contractor shall then prepare written policies and procedures for the management and operation of McMurdo, South Pole, and Palmer Stations; major and minor field camps; the research vessels; and the gateway facility in Christchurch, New Zealand. Management policies described in the manuals shall be clear and relevant; while PM requirements or other procedural content shall be accurate, complete and easily cross referenced to the associated management policy(s). During the period the manuals are being developed, NSF and the Contractor shall meet periodically to review progress.

After acceptance by NSF, the manuals shall be reviewed annually by the Contractor and, as necessary, updated or revised to ensure accuracy and continued applicability. Updates/revisions shall be submitted to NSF for review and approval before being incorporated.

C7.1.4 Acquisition of Goods and Services

C7.1.4.1 General

The Contractor shall acquire goods and services required to complete the annual program plan. Any commercial procurement action shall meet applicable FAR requirements.

C7.1.4.2 Goods

The Contractor shall acquire a range of goods spanning common household items to large annual food inventories and a multi-million gallon fuel supply. Requests generated by the science groups (see Section C7.4.3.7) stations,

headquarters operations staff, and NSF shall be reviewed, researched, approved and, as required, transferred to purchase orders and issued for bid according to the FAR.

C7.1.4.3 Reserved

C7.1.4.4 Reserved

C7.1.5 Human Resources

The Contractor shall recruit, select and retain a full-time and seasonal workforce according to its management approach and annual program plan requirements. Contractor personnel shall be medically qualified as required for deployment to Antarctica (see Section C7.1.6.1), attend an appropriate Contractor developed orientation program (providing an overview of the USAP mission and policies), and receive training according to their primary job assignment, work location and supplemental duties as assigned.

The Contractor is responsible for the compensation and administration of all benefits for its employees according to applicable Federal employment laws and regulations. The Contractor shall implement and maintain non-discriminatory employment practices, and ensure an office and job-site work environment that is free of harassment for all employees.

C7.1.6 Medical Program Management

C7.1.6.1 Medical Screening

C7.1.6.1.1 General

NSF regulations require that all USAP participants deploying to Antarctica meet certain medical, dental and, for winter assignment, psychological standards (see Section C4, 45 CFR 675). The Contractor shall establish and operate a screening system by which the medical qualifications of all civilian participants are reviewed according to these standards, and a determination made whether each person is physically qualified ("PQd") or not physically qualified ("NPQd") for assignment in Antarctica. For candidates spending an austral winter in Antarctica, the Contractor shall provide a psychological assessment of each individual according to NSF guidelines.

C7.1.6.1.2 Screening Program Approval and Review

The Contractor shall submit its screening process to NSF for review and approval (including qualifications of the Contractor personnel making PQ/NPQ determinations since many of the determinations will involve medical judgment). Annually or at NSF direction, the Contractor shall review existing screening criteria for applicability to the USAP as well as consistency with current medical/dental practices, and recommend additions/deletions that will improve and expedite the clearance process.

C7.1.6.1.3 Application of Standards

The Contractor shall apply the clearance standards uniformly to all USAP participants, regardless of affiliation. NSF/OPP retains the responsibility for granting the final approval for personnel to travel to Antarctica, and may, at its discretion, issue waivers for individuals who are initially classified as NPQ by the Contractor's screening process.

C7.1.6.1.4 Screening Response Times

The medical status of each participant deploying to Antarctica is reviewed annually. Because over 2000 persons apply for clearance process annually - the majority during a 3-4 month period preceding the austral summer season - the Contractor shall implement a system which can provide a determination of PQ/NPQ status no more than 6 weeks after receiving the results of a participant's medical/dental examinations.

C7.1.6.2 Management of Antarctic Clinics

C7.1.6.2.1 General

The Contractor shall provide the management, qualified personnel and material resources necessary for year-round operation of medical clinics at the three US stations in Antarctica, and oversight of medical care rendered by emergency responders (Emergency Medical Technicians, etc.) employed by the Contractor and assigned to remote camps, field parties or ships.

The McMurdo Station clinic shall be staffed and operated to provide a full range of care equivalent to an emergency/ambulatory care facility in the United States (e.g., Level III trauma center), including appropriate care for situations pertinent to conditions in Antarctica (e.g., hyperbaric medicine, cold injuries). Clinics at South Pole and Palmer Stations shall be staffed to provide comparable care to smaller populations. Because the stations may be physically isolated from outside assistance for many months during the austral winter, clinic staff need to be able to deal with virtually all health or medical problems that occur in a relatively young, healthy, medically screened population. The Contractor clinical staff shall also interact with and, as approved by NSF, support other medical professionals (ANG Flight Surgeons, medical researchers participating in the annual science program, etc.). The Contractor shall provide essential medical care to all USAP participants in Antarctica including, if required, humanitarian care for non-USAP personnel.

C7.1.6.2.2 Public Health

The Contractor shall provide public health/sanitation oversight for food storage and preparation activities, barber shop and other community service activities, and periodic monitoring of potable water supplies. Oversight can be assigned to Contractor functions other than the clinic, if effective.

C7.1.6.2.3 Other Services

In addition to direct medical and public health services, the Contractor shall offer counseling/assistance services and wellness programs to help manage "quality of life" problems that may affect USAP participant performance or productivity in Antarctica.

C7.1.6.3 Medical Records Control

The Contractor shall maintain accurate and complete medical records of individuals, including screening records (using forms approved by NSF) and medical treatment records for any and all treatments received in Antarctica. Such records (including any electronic versions of the information contained on the medical forms) generated by the Contractor are NSF property, and are protected from inappropriate disclosure by the Privacy Act of 1974 (see Section C4). The Contractor shall maintain medical records in compliance with Privacy Act requirements and NSF policies. USAP medical screening records shall be maintained separate from any records management system the Contractor may develop for its own organizational needs.

C7.1.7 Quality Control

The Contractor shall establish and enforce a suitable Quality Assurance/Quality Control (QA/QC) program. The QA/QC program shall cover all aspects of Contractor performance, and can be an internal (corporate) program or one modeled on an established system (e.g., ISO 9001).

C7.1.8 Safety and Health Management

All Contractor operations in Antarctica shall be conducted according to the policies detailed in the USAP Safety and Health Policy Manual (see Attachment 1). The Contractor shall establish and implement an internal safety and health program covering its activities and employees in Antarctica that is consistent with those policies. Contractor activities conducted within the territorial United States shall be consistent with pertinent Federal and State

regulations, while similar activities in other countries (New Zealand, Chile, etc.) shall be consistent with host country and/or USAP policies, whichever are more stringent.

C7.1.9 Environmental Protection

Several USAP-wide environmental programs are managed by the Contractor at NSF's direction, and some Contractor activities require that the Contractor obtain and maintain specific environmental permits.

C7.1.9.1 Environmental Review of Planned Actions

The Contractor shall ensure that environmental reviews are conducted for all planned activities before they are implemented in Antarctica. Environmental review procedures consistent with the National Environmental Policy Act (NEPA, see Section C4) shall guide the Contractor in the preparation of the relevant environmental documents.

The Contractor shall, in close coordination with NSF, collect project engineering and cost data, assemble planning information, propose appropriate mitigating measures, and prepare draft environmental documentation. Contractor personnel preparing such information shall possess the background required for environmental impact assessment.

C7.1.9.2 Conservation of Antarctic Animals and Plants

The Contractor shall perform activities related to the conservation of Antarctic animals and plants. These include: entry into protected areas for maintenance of survival caches or for access to scientific equipment, and removal of animals on runways and piers. The Contractor shall apply for and obtain the permits governing these activities, and is responsible for meeting all permit conditions.

C7.1.9.3 Waste Management

The Contractor shall manage the collection and disposal of all waste generated by the USAP in Antarctica. All such activities, including the use or release of any designated pollutant or the release of any waste in Antarctica, require a master permit issued by NSF.

C7.1.9.3.1 Master Permit (see Section C4, 45 CFR 671)

An existing master permit covering all waste management activities in Antarctica is transferable to the Contractor with NSF's consent. The Contractor shall apply for and obtain the master permit, and is responsible for meeting all permit conditions, including submission of the "Annual Report for the USAP Master Permit".

C7.1.9.3.2 Waste Liability

NSF is the foreign generator of waste in Antarctica; however the Contractor shall be responsible for the correct handling, packaging, documentation, manifesting and disposal of waste under the NSF permit.

C7.1.9.3.3 Waste Removal from Antarctica and Disposal in the US

For wastes designated for removal from Antarctica and importation into the US, the Contractor shall coordinate with all necessary federal and state regulators, and meet the requirements of all applicable federal and state laws for final disposition of that waste. In particular, the Contractor shall ensure that an appropriately licensed broker receives waste returned to the US, and assumes liability as the waste generator at the port of reception.

C7.1.9.3.4 Waste Disposal in a Foreign Country

If wastes removed from Antarctica are to be disposed of in a foreign country, the Contractor shall ensure that the requirements of that country are met. Similarly, the Contractor shall ensure that support operations conducted in New Zealand, Chile and other foreign countries that generate waste meet the handling and disposal requirements of the host country.

C7.1.9.3.5 Organizational Capability

The Contractor shall provide the organizational capability to conduct waste management operations in compliance with USAP policies and other applicable regulations. Familiarity with the Pollution Prevention Act, the Solid Waste Disposal Act and the Resource Conservation and Recovery Act, the Toxic Substances Control Act; and the Comprehensive Environmental Response, Compensation and Liability Act is required (see Section C4).

C7.1.10 Technology Applications

C7.1.10.1 Technical Investigations

The Contractor shall conduct investigations, either on its own initiative or at NSF direction, to discover new and/or untried technologies that could benefit USAP operations. As requested by NSF, the Contractor shall develop and implement appropriate test and evaluation procedures for promising technologies, report the results of such tests to NSF, and recommend or discourage operational use accordingly.

C7.1.10.2 Technical Data Base

The Contractor shall acquire/sustain the technical knowledge to conduct informed and purposeful investigations, and shall maintain related documentation in an organized and easily accessible database.

C7.1.11 Media Programs and Publications

C7.1.11.1 General

As part of a general NSF public relations program that responds to the interest in the USAP and NSF expressed by media, schools, and public organizations, the Contractor shall work with NSF/OPP to develop and disseminate USAP-related publications. As requested by NSF, the Contractor may also coordinate speaking engagements on USAP activities. All Contractor developed publications and related activities for public dissemination of USAP information shall be cleared with NSF's Office of Legislative and Policy Analysis (OLPA) prior to distribution or presentation.

C7.1.11.2 Publications

The Contractor shall prepare, print and update several quality handbooks which are primary USAP references. The handbooks include the Personnel Manual, Field Manual and Science Support Summary. The first two are revised as needed while the third is an annual publication (see Section C.7.4.3.7). NSF may also request the preparation and printing of other booklets and brochures appropriate for public dissemination.

C7.1.11.3 Internal Media

The Contractor shall be responsible for "internal" media services as approved by NSF. These may include publication of a biweekly USAP newspaper, the *Antarctic Sun Times*; creation of informational videos, brochures and guide books; and press releases to employees' home town newspapers.

C7.2 Logistics

C7.2.1 Management

The Contractor shall provide the management skills and organization required to provide a high standard of logistical support for operations in Antarctica. The Contractor organization shall include an appropriate headquarters staff; local management and staff at the domestic terminal operation (currently Port Hueneme, California); the

Christchurch, New Zealand; and Punta Arenas, Chile offices; and field management and staff at the Antarctic stations.

C7.2.2 Electronic Management Controls

The Contractor shall apply electronic tracking and control to logistics management, particularly for the personnel and cargo movement functions. GFE IT systems that link the Antarctic stations with a Contractor headquarters facility, the Port Hueneme terminal and the Christchurch and Punta Arenas offices are currently operational. Operation, maintenance and, as appropriate, upgrade of the systems shall be a Contractor responsibility (see Section C6).

C7.2.3 Materials

The Contractor logistics organization shall establish material ordering and shipment deadlines, ensure that all USAP participants understand the logistics process; and control the movement, storage and issue of material.

Materials shall be acquired according to the operational requirements and budgetary allowances as approved by NSF in the annual program plan.

The Contractor shall be responsible for the storage, control, issue and restocking of supplies at the Antarctic stations.

C7.2.4 Reserved

C7.2.5 Travel Services

C7.2.5.1 General

The Contractor shall arrange transportation and associated travel services for its employees and, when requested and authorized by NSF, other USAP participants, for deployment to Antarctica as well as various conferences and other business-related travel approved by NSF.

C7.2.5.2 Commercial Air Travel

The Contractor shall provide all commercial airline ticketing, customs information and travel itineraries as required to fulfill the annual program plan as approved by NSF. The Contractor shall negotiate volume agreements with commercial air carriers and periodically review their value and effectiveness. US-owned carriers (and their international partners) shall be used except in those cases where US carriers or partners do not service a particular route or location.

C7.2.5.3 Lodging and Local Transportation

The Contractor shall provide all motel and, as required, local transportation arrangements for its employees and, when requested and authorized by NSF, other USAP participants on program business.

C7.2.5.4 Conferences and Meetings

The Contractor shall arrange travel, meeting and hotel facilities for the annual operations conference and a variety of smaller user and functional planning meetings as directed by NSF.

C7.2.6 Port Hueneme Terminal Operations

The Contractor shall staff, manage and operate a domestic cargo terminal (currently at Port Hueneme, California) in support of USAP operations in Antarctica. The Contractor shall receive, pack and ship cargo destined for Antarctica; coordinate the use of military and commercial air and sea carriers, manage retrograde cargo returned

from Antarctica, and ensure that hazardous/dangerous cargo is controlled according to national and international regulations.

C7.2.6.1 Cargo Processing

The Contractor shall manage reception, inspection, reconciliation, repackaging as needed, and documentation of cargo at Port Hueneme. Packing and crating for shipment shall be coordinated with the civil service operation next to the warehouse.

C7.2.6.2 Freight Carriers

The Contractor shall negotiate suitable volume agreements with commercial air, sea, truck and rail carriers, and shall periodically review the effectiveness of the agreements.

C7.2.6.3 Air Cargo Operations

The Contractor shall coordinate US Air Force C-141 and C-5 MAC Channel and chartered Special Assignment Airlift Mission (SAAM) flights, the regularly or specially scheduled military transports that support summer operations in Antarctica. The Contractor shall submit requests to the Air Force according to the annual program plan and develop USAP air cargo load plans to take advantage of allotted space. The Port Hueneme office shall also manage the use of commercial air transport as needed throughout the season for shipment of priority cargo from California to New Zealand and South America.

C7.2.6.4 Sealift Operations

The Contractor shall coordinate USAP sealift operations. This includes coordinating the loading of early season (June-September) commercial vessels to New Zealand, loading the annual resupply vessel for Antarctica in late December (a Military Sealift Command charter); and loading USCG icebreakers and USAP research vessels, either at Port Hueneme or other domestic ports (Houston, Seattle). The Contractor shall also manage the use of all USAP sea containers, and coordinate the shipment and protection of cargo with special requirements (frozen food, science samples, science equipment, etc.)

C7.2.6.5 Frozen Samples

The Contractor shall be responsible for the reception, storage and onward transportation of ice cores and other frozen science samples returned from Antarctica. Samples are to be received at Port Hueneme when the annual resupply vessel returns (or sometimes at other ports if returned via USCG icebreaker), kept in cold storage and shipped by reefer truck to their destination, usually an academic institution. The Contractor shall monitor, track and control the entire operation, from departure at McMurdo to arrival at the final destination.

C7.2.6.6 Hazardous Cargo Operations

The Contractor shall ensure that hazardous/dangerous cargo is properly documented, packaged and shipped according to applicable IATA and military regulations.

C7.2.6.7 Retrograde Cargo Operations

The Contractor shall handle reception, reconciliation and distribution of cargo received from the Antarctic stations. This responsibility includes assisting with the return of solid waste from Antarctica by identifying a suitable reception point in the US (currently Grays Harbor, Washington), negotiating terminal and stevedoring rates, and coordinating other assistance as needed. Milvans used to transport waste from Antarctica to Grays Harbor or other reception points shall be properly cleaned according to applicable regulations before being returned to Port Hueneme or other points-of-origin.

C7.2.7 New Zealand Operations

The Contractor shall manage, operate and staff a year-round support facility and staging area in Christchurch, New Zealand.

C7.2.7.1 Facilities

The USAP administrative offices, personnel processing, cargo staging and aviation support facilities at the International Antarctic Center (IAC) and Harewood Airport shall be operated by the Contractor under an existing lease agreement with the Christchurch Airport Authority. New Zealand's Antarctic program (Antarctica New Zealand) and the Italian Antarctic Program also maintain offices at the IAC, and the Contractor shall coordinate with these and other national programs as described in Section C7.2.7.4.

C7.2.7.2 Transient Personnel Processing

The Contractor shall process all USAP participants transiting New Zealand. Processing shall include meeting arriving passengers at the airport, arranging for motel accommodations in Christchurch, scheduling and providing extreme cold weather (ECW) clothing issue, coordinating any special requirements such as delicate or hazardous cargo, excess baggage, etc.; and tracking personnel movement to/from New Zealand through the personnel tracking system (PTS), the computer program which locates and tracks USAP participants throughout their deployment (see Section C7.5). Depending on flight schedules, the Contractor shall provide 24/7 service.

C7.2.7.3 Cargo Processing

The Contractor shall process all USAP cargo transiting New Zealand. Duties shall include reception, inspection, reconciliation, and repackaging and documentation of cargo as needed. Depending on flight schedules, the Contractor shall provide 24/7 service.

C7.2.7.4 Coordination with Other Antarctic Programs and IAC Tenants

By governmental agreement, the US and New Zealand Antarctic programs share some logistical support, and the Contractor shall coordinate flight and cargo support for the New Zealand program as required. Similarly, the Contractor shall provide support for Russian, French and other foreign nationals transiting New Zealand under the auspices of their own national programs when directed by NSF.

C7.2.7.5 Coordination with New Zealand Defence Forces (NZDF)

Under the terms of an NSF agreement with the NZDF, the Contractor is authorized "direct liaison" with several teams of NZDF personnel assigned cargo handling and passenger processing duties at the IAC and airport.

C7.2.7.6 Personnel Tracking System (PTS)

The Contractor shall operate the computer-based personnel tracking system that links Contractor headquarters with NSF, New Zealand, the Antarctic stations, Port Hueneme, and other USAP support organizations. The system is GFE. Operation, maintenance and, as appropriate, upgrade of the system will be a continuing Contractor responsibility (see Sections C6 and C7.5).

C7.2.7.7 Cargo Tracking System (CTS)

The Contractor shall operate the computer-based cargo tracking system that links Contractor headquarters with NSF, New Zealand, the Antarctic stations and Port Hueneme; and provides the means to update and reconcile cargo operations on a daily basis. The system is GFE. Operation, maintenance and, as appropriate, upgrade of the system shall be a continuing Contractor responsibility (see Sections C6 and C7.5).

C7.2.7.8 Air Operations

The Contractor shall closely coordinate summer flight operations to Antarctica with the Air National Guard (LC-130), US Air Force (C-141, C-5) and the Royal New Zealand Air Force (C-130). The Contractor's staff shall coordinate preflight activities as required and maintain daily liaison with the NSF Representative, Air National Guard and the USAF during the summer season. Duties shall include managing the IAC passenger terminal (scheduling passenger check-in and briefings, arranging for ground transportation and in-flight lunches); and ensuring that cargo is prepared for shipment, staged and forwarded as close to schedule as flying conditions allow. For return flights from Antarctica (or flights to Antarctica aborted while in the air), Contractor staff shall meet arriving passengers and process their return.

C7.2.7.9 Port Operations

The Contractor shall coordinate stevedoring support for the annual resupply vessel twice each year (January and February) at the Port of Lyttleton, arrange for surface shipment of other vessel cargo received throughout the year from Lyttleton to the airport where it is staged for air shipment to Antarctica; and coordinate ship husbanding and stevedoring services for the USAP icebreaking research vessels when at Lyttleton, normally several times each year.

C7.2.7.10 Procurement and Contracts

The Contractor shall manage local procurement for the USAP. This shall include purchase of fresh food for shipment to Antarctica, purchase of supplies and parts available in New Zealand or elsewhere in the Asia Pacific region for use in Antarctica or Christchurch; and acquisition of local contractors to provide services needed by the USAP in New Zealand.

The Contractor shall also administer legal representation for the USAP lease with the Airport Authority and manage a number of vehicle and equipment leases.

C7.2.7.11 Extreme Cold Weather (ECW) Clothing

The Contractor shall store, issue, maintain and replace the various items of clothing that constitute the USAP ECW package provided to each Antarctic-bound civilian and military participant.

The Contractor shall maintain this inventory, prepare clothing issue for each participant based on his/her personal information form, clean and repair clothing when returned, and keep stock at the correct levels. The Contractor shall periodically evaluate the clothing issue, research the market for and test new products, and recommend improvements as appropriate.

C7.2.7.12 Post Office

Under the policy guidance of the assigned Postmaster, a US Government employee, the Contractor shall operate the Armed Services Overseas US Post Office (APO) housed in the IAC.

C7.2.7.13 Other Support

The Contractor shall provide other support as needed. This shall include supporting the NSF Representative, New Zealand when assigned; assisting NSF-sponsored visitor groups, providing short-term office space and computer availability for transiting personnel, and arranging special events such as conferences and receptions.

C7.2.8 South America Operations

C7.2.8.1 Facilities

The Contractor shall operate and maintain a warehouse and clothing issue center at Punta Arenas, Chile in support of research vessel and Palmer Station operations. The location of the USAP support operation in South America may change during the contract term.

C7.2.8.2 Contractor Services

USAP participants deploying to Palmer Station or working onboard the research vessels shall be outfitted with a marine oriented ECW clothing issue maintained by the Contractor at the Punta Arenas warehouse.

The Contractor shall keep mail for the station and ships in bonded storage at the warehouse while awaiting onward transportation.

The Contractor shall arrange for ship husbanding services in Chile or elsewhere, procure fresh food and locally available supplies, and arrange for other services as needed.

C7.2.9 Logistics Management (CONUS)

The Contractor logistics organization shall provide the management skills and support necessary to conduct all of the logistics-related activities for the USAP. Beyond the activities at Port Hueneme, CA, in New Zealand, in South America, and at the Antarctic stations, the Contractor shall undertake all of the work needed to perform logistics functions either in the Continental US (CONUS), or on-site at the Antarctic stations.

The Contractor shall perform all necessary planning for USAP to include the movement of scientific and non-scientific materials, and personnel to and from Antarctica. This shall include considerations for staging of materials, movement of materials and personnel, coordination with NSF and scientific grantees, unloading of materials and transshipment and storage of materials at Antarctic stations. Except for items supplied by grantees for their own use, the Contractor shall arrange for the procurement of all required materials, including consumables, equipment, foodstuffs, building materials, tools and scientific instruments, and their movement to their destinations. The Contractor shall manage, operate and maintain GFE electronic tracking and control systems involved in personnel and cargo movement, and for inventory control. The Contractor shall plan for the proper handling of all hazardous materials that are to be transported to and from Antarctica by USAP. The Contractor shall be responsible for all Property Administration issues with respect to items owned by, leased to or used by the USAP.

C7.2.10 Antarctic Logistics Activities

The Contractor logistics organization shall provide the management skills and support necessary to conduct all of the logistics-related activities for the USAP at the Antarctic stations. The Contractor shall conduct activities in Antarctica that specific to those locations, and also other functions which because of the assignment of personnel or their proximity to issues which require real-time resolution are appropriate to be handled on the continent. The Contractor shall perform all unloading of materials and transshipment and storage of materials at Antarctic stations. The Contractor shall provide local management, operation and maintenance of GFE electronic tracking and control systems involved in personnel and cargo movement, and for inventory control. The Contractor shall plan for and conduct the handling of all hazardous materials that are transported into and out of Antarctica by USAP. The Contractor shall be responsible for all Property Administration issues with respect to items owned by, leased to or used by the USAP. This work is also referenced and discussed in Sections C7.3.1.9 "Terminal Operations" for McMurdo Station, C7.3.2.5 "Cargo, Warehousing and Supply" for South Pole Station, and C7.3.3.6 "Cargo, Warehousing and Supply" for Palmer Station.

C7.3 Station and Ship Operations

The Contractor shall operate three US stations in Antarctica (McMurdo Station, Amundsen/Scott South Pole Station and Palmer Station), construct and operate field camps in Antarctica when required as part of the annual program plan, and operate two research vessels the oceans surrounding Antarctica and elsewhere when directed by NSF.

C7.3.1 McMurdo Station

C7.3.1.1 Contractor Management

The Contractor shall provide the on-site management skills and resources sufficient to organize and direct the Contractor workforce, and coordinate daily operations with NSF, other support organizations (Air National Guard, SPAWARS, NASA, US Coast Guard, helicopter Contractor, etc.) and science groups.

C7.3.1.1.1 Management Interaction

Management interaction during the austral summer shall include various meetings between NSF, the Contractor and other support organizations - usually on a twice weekly basis - to plan air operations, review project status and resolve problems. The Contractor shall also prepare a weekly operational report for NSF in a mutually agreed format. The contractor shall attend/chair other meetings as requested by NSF to address specific agendas such as individual science project requirements, airfield closures, ship off-load, personnel redeployment, etc.The Contractor shall proactively participate , with NSF and other support organizations, in emergency preparedness planning, the conduct of mass casualty drills and training regimes, and in the management of the response to an actual emergency should such an event be declared.

During the austral winter, on-site Contractor management shall interact with the NSF Station Manager, and provide a written weekly report for satellite transmission to NSF and the Contractor's domestic office. The Contractor shall also participate in winter emergency planning, exercises, training, and response management.

C7.3.1.2 Communications and Meteorology

The Contractor shall manage and staff operational communications centers at the US Antarctic stations. At McMurdo, this function shall include a 24 hour/7 day radio communication watch (MAC OPS and MAC-Relay on HF, VHF and UHF circuits, including HF RTTY and, when visible, satellite links) maintained for air and ship operations, field party monitoring, conference calls and message traffic routing. As directed by NSF, some communications responsibilities shall be shared with SPAWARS (see Section C7.3.2.2.2) and NASA (see Section C7.5.4.1).

C7.3.1.2.1 Communications Control

The McMurdo communications center shall serve as "net control" for USAP operations in Antarctica. Contractor communications staff at McMurdo shall enforce accepted voice radio and message protocols program-wide (see Section C4).

C7.3.1.2.2 Flight Following

The Contractor shall provide 24 hour/7 day intercontinental and intracontinental flight following for all USAP aircraft during the flying season under applicable military and FAA regulations. SPAWARS, which provides ground control approach (GCA) and other air traffic control services for the USAP, shall provide reporting protocol guidance for the Contractor.

C7.3.1.2.3 Weather Reporting

The Contractor communications staff shall transmit daily aviation and synoptic weather reports provided by SPAWARS and, as required, relay and/or file reports provided by other USAP stations, camps and ships.

C7.3.1.2.4 Telephone System

The Contractor shall maintain and operate the McMurdo telephone system, including the off-continent satellite link (see Section C7.5.4.1).

C7.3.1.3 Information Systems Infrastructure

The Contractor shall operate, maintain and, as approved by NSF, upgrade the information technology and information systems (IT/IS) infrastructure at McMurdo. Current system capabilities, projected improvements and Contractor tasking are described in Sections C3.2.3.2.3, C6 and C7.5.

C7.3.1.4 Station Primary Utilities

C7.3.1.4.1 Power Plant

The Contractor shall operate, maintain and, as approved by NSF, upgrade the McMurdo diesel/electric power plant. Reliable electrical power meeting US domestic standards shall be provided on a 24 hour/7 day basis year-round.

C7.3.1.4.2 Water Plant

The Contractor shall operate, maintain and, as approved by NSF, upgrade the McMurdo water desalinization plant. Sufficient potable water to support normal domestic consumption by a population of 1100 people during the summer season and up to 200 during the winter season shall be provided on a 24 hour/7 day basis. Water quality shall meet the standards specified in Section C4.

C7.3.1.4.3 Wastewater Discharge

The Contractor shall monitor, maintain and, as approved by NSF, upgrade the wastewater discharge system. The Contractor shall monitor pollutants in the discharge stream as part of the station's environmental program, and periodic underwater inspections of the outfall area shall be made by a Contractor diver.

C7.3.1.5 Station Facilities and Ancillary Utilities

The Contractor shall maintain, operate and repair facilities and related utilities on a year-round basis. This is level-of-effort work that shall be budgeted as part of the Contractor's baseline staffing plan. Renovation, demolition and/or new construction of facilities shall be planned and budgeted as part of the annual program plan (see Section C7.6) and/or any long-range plan approved by NSF.

C7.3.1.5.1 MAPCON Management

The Contractor shall maintain buildings and utilities on a 24/7 basis year-round and apply the MAPCON system to facilities preventive maintenance (PM) and repair. MAPCON tasks include regular inspections of outdoor/indoors utilities, scheduled PMs, corrective actions, etc. (see Sections C6 and C7.5).

C7.3.1.5.2 Inspections

The Contractor shall regularly inspect all utilities, facilities and structures to ensure that they are intact, safe and suitable for the purposes for which they are being used.

C7.3.1.5.3 Service Call Response

The Contractor shall operate a service desk on a 24/7 basis year-round to receive and dispatch emergency and routine service calls (see Section C7.3.2.14). The Contractor shall respond to any utility/facility discrepancy as follows: Emergency: 30 minute response to control the problem with a permanent repair within 24 hours; Priority: 24 hour response with a permanent repair within 7 days; Routine: 48 hour response with a permanent repair within 14 days.

C7.3.1.5.4 Exterior PM and Repair

The Contractor shall provide daily monitoring of and undertake all required PM, repairs and upgrades to exterior plumbing, piping and power distribution systems; and all building features such as doors, loading docks, landings, stairways, ladders, skirts, windows, overhead doors, etc.

C7.3.1.5.5 Interior PM and Repair

The Contractor shall perform PM and repairs on all interior utilities and furnishings. These include electrical services, emergency lights, plumbing, alarm systems, refrigeration and HVAC systems, motor controls, office equipment, science equipment and instrumentation, galley equipment, laundry equipment, furniture, etc.

C7.3.1.5.6 Other

The Contractor shall make minor modifications and renovations to correct deficiencies in existing facilities and utilities as part of the normal inspection, PM and repair process.

C7.3.1.6 Warehousing and Supply Areas

The Contractor shall maintain, operate and control enclosed warehouse space and outside storage areas at McMurdo. Warehousing shall include segregation of heated and unheated areas, frozen food storage, storage of items such as flammables and explosives which are maintained according to industrial safety standards, items with retail value (store and club goods), and specialized requirements such as frozen or live scientific specimens. Key issue and personnel access shall be controlled by the Contractor.

C7.3.1.7 Vehicles and Equipment

The Contractor shall manage, operate and maintain a vehicle and equipment fleet. Responsibilities shall include operation of vehicles and equipment, operation and support of a vehicle maintenance facility (VMF); and maintenance and repair of light and heavy vehicles, heavy construction equipment, "science support" vehicles, and aviation ground support equipment.

C7.3.1.7.1 Vehicle and Equipment Maintenance

The Contractor shall provide vehicle and equipment maintenance and repair services on a double-shift basis during the summer season and on a single-shift basis during the winter. Contractor staff shall provide light vehicle and heavy equipment PM and repair, machine shop and welding service, and wrecker/service call response for stranded vehicles.

In general, the Contractor provides all levels of PM, repair and overhaul, although the emphasis shall be on PM and scheduled overhauls rather than "ongoing" repairs sufficient to keep vehicles in operation.

C7.3.1.7.2 Service Center and MAPCON Management

The contractor shall operate the VMF as a customer service center. A maintenance management department, which includes a service writer and the MAPCON computer-based work order and inventory control system, shall be staffed during each shift.

C7.3.1.7.3 Operator Licensing and Training

The Contractor shall provide operator training and licensing. All vehicle operators shall possess a valid US drivers license or equivalent, and shall receive instruction in vehicle operation and basic, cold weather maintenance. The Contractor shall determine and conduct higher levels of training for personnel operating tracked vehicles, construction heavy equipment or other specialized equipment.

C7.3.1.7.4 Vehicle Activation and Deactivation

The Contractor shall prepare vehicles for storage during winter, reactivate them for the summer and, when cost-effective, return vehicles to the US for overhaul and return to the station on the following year's vessel.

C7.3.1.7.5 Annual Fleet Review

The Contractor shall conduct an annual review of the condition of the vehicle fleet. The Contractor shall submit recommendations for standardization/upgrade, suggestions for improved contract service, and long-range performance forecasts to be used for fleet-wide replacement decisions.

C7.3.1.7.6 Science Program Vehicles and Equipment

The Contractor shall operate and maintain a dedicated mechanical equipment center (MEC) serving McMurdo-based and field science programs. The Contractor shall ensure the facility is appropriately staffed, and stocked with sufficient shop tools and inventory, to maintain and repair a light vehicle fleet (tracked personnel carriers and snowmobiles) and support equipment (drills, sleds, trailers, heaters, etc.) reserved for use by the science groups.

C7.3.1.7.7 Vehicle and Equipment Operations

The Contractor shall provide personnel with sufficient skills and experience to operate all classes of vehicles and equipment. Heaviest general use will be in the light vehicle fleet, with pickup trucks in nearly constant operation and wheeled vans providing 24 hour shuttle bus service between the station and the airfields. Heavy equipment such as snowblasts, graders and dozers will be engaged 24 hours in such tasks as snow removal and road maintenance, while heavy trucks and tractors will move cargo, fuel and trash, load/unload aircraft, transport passengers and support McMurdo-based science programs.

The Contractor shall ensure that heavy equipment in particular is operated safely and competently. Operator skills shall match equipment type and purpose, and the Contractor shall provide whatever supplemental training is needed to ensure effective performance in snowfield and permafrost environments.

C7.3.1.7.8 Remote Site Support

The Contractor shall support two remote sites, Marble Point and Black Island (see Section C7.3.1.18) by vehicle surface traverse. The Contractor shall prepare, configure and operate tractor and sled trains, and travel established routes (80-90 miles round trip to each location) to deliver bulk supplies and fuel to each site when required during the summer. During winter, traverses shall be made to Black Island if the communications equipment at the site malfunctions. The Contractor shall also coordinate support of these sites by helicopter.

C7.3.1.8 Fuel Storage and Operation

The Contractor shall manage, operate and maintain the station fuel storage and distribution system on a year-round basis.

C7.3.1.8.1 Fuel Receipt, Storage and Testing

The contractor shall operate and maintain an 8 million gallon tank farm and associated pumps and piping. Fuel shall be segregated and stored by type, and distributed throughout the station as required for normal operations. Accurate records of receipt, issue and usage shall be maintained at all times.

Each year, the Contractor shall direct the off-load of the annual fuel resupply vessel. Fuel shall be off-loaded as expeditiously as possible according to applicable safety and environmental protection procedures, transferred to the tanks, and stored and monitored for future use.

C7.3.1.8.2 Fuel Procurement

The Contractor shall identify bulk fuel vendors and procure the annual fuel supply for all US stations based on historical consumption patterns, expected future usage and safety reserve requirements. The Contractor shall negotiate agreements which provide "best value" for the Government in terms of current world prices, product quality and cost of transportation from the point of origin to Antarctica.

C7.3.1.8.3 Environmental Protection and Contingency Plans

The Contractor shall conduct fuel operations in a manner that minimizes the risk of accidental spills and leakage, and maintain an effective 24-hour spill response capability that includes trained response teams and appropriate equipment. The Contractor shall develop Spill Prevention Control and Countermeasures (SPCC) Plans following the format and criteria of 40 CFR part 112 as guidance. The Contractor shall also develop Oil Spill Response Contingency Plans, which accurately address conditions at and around the station and airfields, utilizing the criteria of 40 CFR Part 300 and the criteria of the Standing Committee on Antarctic Logistics and Operations (SCALOP) as guidance.

C7.3.1.8.4 Testing

The Contractor shall develop a program and schedule for testing the fuel supply and shall apply whatever controls are needed to maintain quality.

C7.3.1.8.5 Airfield Fuel Systems

The Contractor shall establish, operate and remove fuel systems at the McMurdo airfields according to the seasonal air operations schedules and the requirements of each airfield. The Contractor shall ensure that such systems are safely established, inspected and operated while in place, and that environmental controls are observed. Aviation fuel shall be stored, transferred, tested and pumped according to the standards cited in Section C4.

C7.3.1.8.6 Fuels Operation Center

The Contractor shall operate a storage, maintenance and repair facility for fuels equipment such as mobile pumps, test equipment, tools, connectors, hoses and tanks. The Contractor shall maintain an administrative office in this facility to manage fuels activities.

C7.3.1.8.7 Support to Other Sites

The McMurdo fuels department shall support South Pole Station and summer field camps as required, and shall coordinate the refueling of the Marble Point tank farm via USCG icebreaker. Support shall include technical guidance concerning the O&M of fuel systems, repair/calibration of fuels equipment as requested; and travel to the sites to set-up, inspect, and test fuel systems when necessary.

C7.3.1.9 Terminal Operations

The Contractor shall manage and operate cargo and passenger transportation under a combined terminal operations function at McMurdo Station.

C7.3.1.9.1 Movement Control Center

The Contractor shall manage and operate the Movement Control Center (MCC). The MCC houses the central supply and logistics operation for McMurdo Station including office space, a passenger reception and cargo staging areas, the McMurdo post office, and controlled inventory storage. The Contractor shall staff the MCC on a double shift schedule sufficient to support air and seas operations during the summer season, and on single shift schedule sufficient to manage supply operations during the winter.

C7.3.1.9.2 Scheduling

During the summer, the MCC shall publish and update air and sea operations schedules. The MCC shall post schedules and daily updates in Building 155 and on the McMurdo TV station flight operations channel. Updates shall be closely coordinated with the McMurdo operations center (MAC-OPS) as they change several times each day.

C7.3.1.9.3 Fixed-wing Aircraft Passengers

The MCC shall process all fixed-wing aircraft passengers traveling to and from McMurdo Station. This responsibility shall include preparing manifests, conducting pre-flight check-ins, arranging transportation to and from the airfields, and coordinating aircraft boarding/deplaning with flight crews.

C7.3.1.9.4 Cargo Operations

The Contractor shall manage and process all cargo received at McMurdo, transhipped to other locations, or prepared for shipment at McMurdo through the MCC. Task shall include: unloading/loading of aircraft; transporting cargo to and from the station; controlling security at the staging areas; distributing cargo throughout the station; constructing aircraft pallet loads and filling marine transportation vans; certifying hazardous and dangerous items for air shipment; documenting the contents of all cargo prepared for shipment; and tracking the movement of cargo to, from and within the continent.

C7.3.1.9.5 New Zealand Defence Forces Liaison

The Contractor is authorized "direct liaison" with the Royal New Zealand Defence Forces detachment assigned to air cargo operations during the summer season at McMurdo as part of a US/NZ inter-governmental agreement, and shall coordinate their work through the MCC.

C7.3.1.9.6 Cargo Tracking System

The MCC is the continental manager for the Cargo Tracking System (CTS), the GFE computer-based tracking system that links the Antarctic stations with Contractor headquarters, the Port Hueneme, CA terminal and the Christchurch, NZ office. The Contractor shall operate, maintain and, as appropriate, upgrade the system (see Section C6).

C7.3.1.9.7 Marine Terminal

The Contractor shall operate the marine terminal (ice pier) next to Winter Quarters Bay. Tasks shall include staging of retrograde cargo, control of pier activities, and direction of cargo ship off-load and on-load operations at the pier followed by the staging of cargo to be transhipped the following season or distribution of cargo to the various McMurdo work centers. The Contractor shall also coordinate support of the fuel tanker, USCG icebreakers and the research vessels as required.

C7.3.1.9.8 US Navy Cargo Handling Detachment

The Contractor is authorized "direct liaison" with a US Navy cargo handling detachment and shall coordinate their stevedoring work with Contractor activities during the ship off-load/on-load evolution.

C7.3.1.9.9 US Post Office

The Contractor is designated and authorized to act as the local Postmaster by the US Air Force, which controls the APO serving the USAP. The Contractor shall manage the post office in the MCC, handle all incoming and outgoing US Mail as well as local mail (guard mail) between the stations and camps, sell stamps and postal insurance, and provide secure, locked storage for all mail.

C7.3.1.9.10 Shuttle Bus Service

During the summer, the Contractor shall manage and operate a scheduled shuttle bus service (passenger vans and all-terrain bus) between McMurdo and the airfields, and provide an on-call taxi and baggage handling service for residents/passengers with heavy baggage, etc., within the McMurdo complex.

C7.3.1.10 Airfield and Aviation Support

The Contractor shall construct, operate, support and maintain three airfields adjacent to McMurdo Station. Each airfield has related, but distinct requirements.

C7.3.1.10.1 Annual Ice Runway

The Contractor shall construct, operate and maintain a wheeled aircraft runway on the annual sea ice of McMurdo Sound. Tasks shall include ice measurement and survey before construction, siting the runway and parking areas, removing snow from the ice surface and leveling the ice as necessary, marker installation, berm construction, positioning flight-line and support buildings and utilities hook-up, fuel system placement and containment, and access road preparation.

Maintenance shall include keeping the airfield and roads clear of snow accumulation, moving facilities as needed and managing daily infrastructure support. Depending on flight schedules and weather conditions, the Contractor shall support and operate the runway on a 24/7 basis.

C7.3.1.10.2 Williams Field

The Contractor shall construct, operate and maintain a snow airfield for ski equipped aircraft on the Ross Ice Shelf. Tasks shall include plowing, compacting and grooming the snow as necessary to create a level surface, marker and lighting installation, berm construction, building positioning and utilities hook-up, fuel system placement and containment, and access road construction (land/snow transition, compaction, leveling and, as required, elevation).

Maintenance shall include keeping the airfield and roads level and clear of snow drifting, moving facilities as needed and managing daily infrastructure support.

Depending on flight schedules and weather conditions, the Contractor shall support and operate Williams Field on a 24/7 basis.

C7.3.1.10.3 Long Duration Balloon Program

The Contractor shall support the Long Duration Balloon program, one of the USAP's ongoing atmospheric science projects, at Williams Field. Launches take place near the airfield, and Contractor personnel shall position the payload assembly and telemetry buildings, prepare the launch sites and then support balloon inflation and launch operations.

C7.3.1.10.4 Pegasus Field

The Contractor shall construct, operate and maintain a "blue ice" airfield for wheeled aircraft at another location on the Ross Ice Shelf. Construction tasks shall include chipping, pulverizing and leveling the ice surface, protecting the surface from thermal decay (providing a snow cover), marker installation, fuel facilities support, building positioning and access road development.

Maintenance requirements shall include renewing the runway surface snow cover as needed, infrastructure support and keeping the runway, staging areas and roads free of snow drifts.

Depending on flight schedules and weather conditions, the Contractor shall support and operate Pegasus Field on a 24/7 basis.

C7.3.1.10.5 Field Camp Skiways

As required, the Contractor shall construct and maintain skiways at field camps and remote AGO sites (see Section C7.4). Contractor personnel with appropriate skiway experience shall be sent to such locations as needed to establish prepared landing areas.

C7.3.1.10.6 Ground Support Equipment

The Contractor shall maintain, repair and, as authorized, operate aircraft ground support equipment (GSE). Such equipment shall include APUs, liquid oxygen carts, nitrogen carts, chemical toilet carts, hoists, scaffolding, etc., used for aircraft start-up and maintenance.

C7.3.1.11 Housing Services

The Contractor shall schedule, provide and maintain housing for all program personnel (NSF staff, the Contractor workforce, science groups, military units and other NSF-approved program participants or visitors) at McMurdo Station.

C7.3.1.11.1 Berthing Assignments and Controls

The Contractor shall manage all berthing areas to include assignment of rooms, key control and enforcement of NSF-approved policies governing building use and housekeeping. Contractor personnel shall regularly inspect housing areas to ensure appropriate standards of habitability, safety and cleanliness are being maintained.

C7.3.1.11.2 Janitorial Services and Change of Occupancy Cleaning

The Contractor shall provide and direct a janitorial staff of sufficient size to clean common use living spaces, bathrooms and administrative offices to the standards specified in Section C4. The janitorial staff shall provide change-of-occupancy room cleaning services throughout the season.

C7.3.1.11.3 Mail Boxes and Common Use Media

The Contractor shall distribute incoming mail to NSF, Contractor, military and grantee mail boxes; and distribute and maintain television sets and video players as authorized for each housing area.

C7.3.1.11.4 Furnishings Replacement

The Contractor shall periodically assess the condition of bedroom and common use area furnishings, and submit replacement/upgrade recommendations to NSF.

C7.3.1.11.5 Distinguished Visitors

At the direction of NSF, the Contractor shall arrange appropriate housing for the distinguished visitors that periodically visit the stations.

C7.3.1.12 Food Service

The Contractor shall provide food service at all US Antarctic stations and camps. At McMurdo, the Contractor shall staff and manage a complete kitchen and cafeteria-style dining hall in Building 155.

C7.3.1.12.1 Operating Hours and Locations

During the austral summer, the Contractor shall serve three full meals during normal work hours six days per week, a brunch and dinner on Sunday, and a midnight dinner meal for night shift workers seven days a week. The Contractor shall also staff a small kitchen and dining facility at Williams Field during the summer to feed the workforce maintaining the airfield and supporting flight operations.

C7.3.1.12.2 Procurement and Inventory

The Contractor shall procure commercial foodstuffs of at least institutional quality. Purchasing agreements shall take advantage of the purchasing power of the Federal Government and provide maximum value to the program. Except for limited shipments of fresh food purchased in New Zealand and shipped to McMurdo by air during the summer, the Contractor shall transport food to McMurdo entirely by vessel, and shall manage procurement so that vessel loading deadlines can be met each year.

Food inventories at the station shall be managed so that stock is rotated, variety and nutritional balance is maintained, and the reorder cycle keeps stocks at correct levels without significant shortages or overages.

C7.3.1.12.3 Food Service Staff

Food service personnel shall have the skills to provide quality, institutional food service, and be employed in sufficient numbers to meet all operating hour requirements, summer and winter.

C7.3.1.12.4 Nutrition and Sanitation

The Contractor shall provide comprehensive menu planning ensure appropriate nutritional content of all meals. The Contractor medical staff shall perform nutritional review as part of the planning process. The Contractor shall maintain food service sanitation and cleanliness according to the standards listed in Section C4.

C7.3.1.12.5 In-flight Meals and Meal Delivery

The Contractor food service staff shall prepare in-flight "bag lunch" type meals for intra- and intercontinental flights as requested by the MCC. The Contractor shall also provide a "hot meal" delivery service for locations such as the Ice Runway when required.

C7.3.1.13 Waste Operations

The Contractor shall segregate, collect, process and return waste generated at the Antarctic stations and camps to the domestic US according to the policies stated in Section C7.1.9. Contractor waste management activities shall comply with 45 CFR Part 671 (see Section C4).

C7.3.1.13.1 McMurdo Station Permit

As described in Section C7.1.9, the Contractor shall apply for and obtain a waste management and disposal permit that is issued by NSF. The Contractor's permit application shall include submission of detailed plans and procedures for the management of all USAP waste to include waste processing operations at McMurdo Station.

C7.3.1.13.2 Waste Segregation and Collection

Domestic and industrial non-hazardous waste shall be segregated by type into separate waste streams at the point of generation. Collection containers for each waste category shall be located in dormitories, laboratories, workcenters and other central areas as well as at the airfields when they are operational. Full waste containers shall be picked up by the Contractor and transported to the processing areas at McMurdo.

C7.3.1.13.3 Hazardous Waste Accumulation and Processing

The Contractor shall ensure hazardous wastes are collected in hazardous waste accumulation areas. Such areas are located at or near the site of generation, and the size of the area and the method of containment will vary depending on the volume and type of hazardous waste being generated. Hazardous wastes shall be transported from the accumulation areas to a fenced, controlled access, hazardous waste yard. Final processing of hazardous waste in preparation for presentation to the transportation system and removal from the continent shall take place within this yard.

C7.3.1.13.4 Waste Management Documentation and Control

The Contractor shall establish and maintain a computer-based system for the accurate logging and tracking of the documentation needed to control waste management from the point of generation through point of final disposition in the US. Documentation shall satisfy the regulatory requirements of Sections C4 and C5.

C7.3.1.13.5 Waste Classification, Packaging and Labeling

The Contractor shall classify, package, document and label all wastes before on-loading to the vessel. Classification, packaging, documentation and labeling shall be in accordance with RCRA as well as applicable regulations issued by USDA, DOT, IATA, the IMDG and individual state ecology and health departments (see Section C4).

C7.3.1.13.6 Contractor Ownership Responsibility

The Contractor shall assume responsibility for all waste from the time of its collection, through shipment off of the continent, and until its final disposition in the US, or at another off-continent location (see Section C5).

C7.3.1.13.7 Waste Management Orientation and Training

The Contractor shall present orientation briefings on the McMurdo Waste Management Program to USAP participants after arrival at McMurdo. Specialized, small group training shall also be presented by the Contractor to researchers who work with radioisotopes and generate controlled waste streams.

C7.3.1.14 Structural and Airfield Fire Services

The Contractor shall provide fire prevention and fire-fighting services at McMurdo and its airfields.

C7.3.1.14.1 McMurdo Fire Department

The Contractor shall provide 24 hour/7 day staffing and operation of the Firehouse (Building 182), including operation and maintenance of 3 fire trucks and an ambulance. The Contractor shall provide the staffing and skills needed for a three minute response (engine on scene) to any fire alarm received within the McMurdo Station complex.

C7.3.1.14.2 Emergency Response Desk

The Contractor shall staff and operate a response desk for medical emergencies, facilities/utilities/vehicle emergencies, and security problems on a 24/7 basis.

C7.3.1.14.3 Emergency Spill Response Services

The Contractor shall provide staffing and skills needed of first responders to fuel spills and other potentially hazardous accidents involving industrial substances.

C7.3.1.14.4 Mass Casualty and Catastrophic Damage Response Plans

The Contractor shall develop mass casualty and catastrophic damage response plans, and coordinate/conduct appropriate drills and readiness training.

C7.3.1.14.5 Fire Prevention/Detection Systems and Building Inspections

The Contractor shall conduct regular building inspections; and provide preventive maintenance, repair and testing of all fire alarms, smoke/heat detectors and extinguishers.

C7.3.1.14.6 Training

The Contractor shall provide fire protection and fire-fighting training for Contractor staff, science groups and other USAP participants as required.

C7.3.1.14.7 Airfield Services

Contractor responsibilities at the airfields shall include operation and maintenance of several "crash"-type fire vehicles, both wheeled and tracked, whenever flight operations are in progress and on "standby" status at all other times. Airfield crash/fire support at the airfields shall meet relevant DoD/Air Mobility Command regulations (see Section C4).

C7.3.1.14.8 Air Disaster Response Plan

The Contractor shall develop an air disaster response plan for both fixed-wing aircraft and helicopters. The response plan shall be reviewed on a regular basis with NSF, the ANG and the helicopter contractor. The Contractor shall coordinate and conduct crash safety drills at least once each season at all McMurdo airfields and helicopter landing sites.

C7.3.1.14.9 Contractor Personnel Qualifications

Structural firefighters, fire brigade members; command, administrative, maintenance, and training personnel; and airfield firefighters employed by the Contractor shall possess qualifications that meet National Fire Protection Association (NFPA) standards (see Section C4). Contractor fire fighting personnel involved in emergency response and hazardous materials spill mitigation shall possess qualifications consistent with NFPA 472.

C7.3.1.15 Retail, Recreational and Religious Services

The Contractor shall provide community service functions at McMurdo. Similar services, on a smaller scale, shall also be provided by the Contractor at the other stations. These functions are described below.

C7.3.1.15.1 Clubs

The Contractor shall operate and maintain three social centers (Buildings 76, 106 and 107) serving alcoholic and non-alcoholic beverages. Two of these facilities are bars (one allows smoking; the other is non-smoking) and the third is a coffeehouse that also serves wine. The Contractor shall manage the clubs; procure, store and restock inventories; recruit bartenders and other staff as needed (paid through the operating fund) from the population; and maintain financial records according to NSF approved accounting practices.

C7.3.1.15.2 Retail Store

The Contractor shall operate and maintain a retail store in Building 155. The Contractor shall manage the store; procure, store and restock inventories; recruit supplemental staff such as clerks (paid through the operating fund) from the population; and maintain financial records according to NSF approved accounting practices.

C7.3.1.15.3 Haircutting Services

The Contractor shall operate a small barber shop, equipped with two chairs and standard haircutting supplies, in Building 155.

C7.3.1.15.4 Library

The Contractor shall maintain a hardcover and paperback library in Building 155. The library shall be staffed on a volunteer basis.

C7.3.1.15.5 Financial Services

The Contractor shall provide a limited range of financial services, principally the management and operation of two Automated Teller Machines (ATM) installed in Building 155.

C7.3.1.15.6 Television and Radio

The Contractor shall manage a local television and radio service. The Contractor shall operate and maintain television equipment. Commercial channels transmitted via AFRTS shall be broadcast on a scheduled basis according to AFRTS regulations. Local information broadcasts (station hours of operation, flight schedules, station events, etc.) shall be accurate and promptly updated as required for daily operations

The FM radio station shall be staffed and operated by volunteers, with scheduling as well as equipment maintenance and repair managed by the Contractor.

C7.3.1.15.7 Recreational Services

The Contractor shall provide limited recreational services. Services shall include maintenance of exercise rooms/gyms and provision of check-out sports equipment. The Contractor shall also coordinate league play for team sports and organize certain annual "events" such as the Scott's Hut Race, holiday parties, etc.

The Contractor shall manage the recreational program in a safe, responsible manner according to NSF policies. New recreational equipment, services or facilities improvements, whether procured with club/store profits or appropriated funds, shall be reviewed with NSF before acquisition.

C7.3.1.15.8 Religious Services

The Contractor shall operate the Chapel of the Snows (Building 7), McMurdo's non-denominational house of worship, and staff the chapel with an ordained minister during the summer.

C7.3.1.16 Clinic Operations

The Contractor shall staff and operate a clinic (Building 142) as described in Section C7.1.6.2. The Contractor shall maintain appropriate medical and dental supply inventories in the clinic, ensure the correct operation and calibration of all medical equipment, and provide recommendations for equipment upgrade/replacement as technology improves. Support shall also be provided to Contractor medical staff at South Pole and Palmer Stations.

C7.3.1.16.1 Evacuation and Emergency Plans

The Contractor medical staff shall establish procedures for medical evacuations (medevacs) from field locations to McMurdo and from McMurdo to New Zealand, participate in the development of USAP emergency response plans, and coordinate mass casualty and similar exercises with the McMurdo fire department.

C7.3.1.17 Safety and Security

The Contractor shall establish procedures for the safety and security of government property as well as retail items and monetary assets. Procedures shall also be established for personal property security (dormitory room and locker key controls, for example), the control of US Mail, and security at the clubs and during community social events.

C7.3.1.18 Remote Sites

The Contractor shall operate and maintain several remote sites in the McMurdo Sound area that support operations at McMurdo Station as well as the summer science program.

C7.3.1.18.1 Marble Point Facility

During the summer, the Contractor shall staff and operate a modular camp and a 150,000 gallon capacity fuel tank complex at Marble Point. Contractor staff shall provide 24 hour/7 day refueling for helicopters as well as meteorological readings and direct weather observations for SPAWARS at McMurdo.

C7.3.1.18.2 Black Island

The Contractor shall staff, operate and maintain a communications transmission and receiving site at Black Island. The Contractor shall operate and maintain electronics and other communications equipment (including large dish antennas) housed at the facility as well as the support structures and related equipment. Specific tasks are listed in Section C7.5.

C7.3.2 Amundsen/Scott South Pole Station

The Contractor shall manage, operate and maintain South Pole Station. Tasks shall include management and O&M of all station facilities, support of the science program (see Section C4) and support of the South Pole Redevelopment Program (SPRP, see Section C6).

C7.3.2.1 Management Resources

The Contractor shall provide sufficient resources to direct and control all O&M, science support and construction activities, summer and winter. This includes the annual program planning effort, workforce skill mix and allocation, administrative reporting; enforcement of safety, health and environmental policies; and consultation with NSF/OPP when needed.

C7.3.2.2 Communications and Meteorology

The Contractor shall staff the station communications center on a 24/7 basis during the summer and on a daily schedule during the winter. Contractor communications shall maintain operational voice communications on HF, VHF and UHF circuits; and generates or relays message traffic on HF RTTY and, when visible, satellite links.

C7.3.2.2.1 Flight Following

The South Pole communications center shall provide intracontinental flight following for all USAP aircraft during the flying season. This is a 24 hour/7 day responsibility that shall be conducted under McMurdo net control.

C7.3.2.2.2 Meteorology and Weather Reporting

The Contractor shall provide daily flight following and synoptic weather reporting. The Contractor shall operate and maintain recording equipment, and launch and track rawinsonde equipped balloons twice daily. Weather data shall be compiled and transmitted to SPAWARS at McMurdo according to World Meteorological Organization standards year round.

C7.3.2.3 Information Systems Infrastructure

The Contractor shall maintain, operate and repair the following systems: HF and FM radio communications equipment; satellite voice, fax and modem links; and associated outside tower-mounted HF antennas and satellite dishes. The Contractor shall also maintain a LAN PC system that incorporates the PTS, CTS and MAPCON work control programs (see Sections C6 and C7.5). As at McMurdo, MAPCON shall be applied to PM and repair of station facilities, utilities and vehicles.

C7.3.2.4 Utilities and Facilities

The Contractor shall operate, maintain and repair all of the station's utilities and facilities. Utilities maintenance shall include O&M of a power plant, a water well and associated distribution systems. Facilities maintenance shall

include building air handling and plumbing systems, interior remodels, and exterior repairs (building vestibules, doorways and landings; arch doors, staircases and walkways, etc.).

C7.3.2.5 Cargo, Warehousing and Supply

The Contractor shall off-load, receive and distribute incoming cargo at the station; prepare, document, stage and on-loads all retrograde cargo; and manage the station inventories. Cargo reception and shipment shall be tracked through the CTS. During the summer, cargo operations shall be closely coordinated with McMurdo Station.

C7.3.2.6 Vehicles and Equipment

The Contractor shall maintain, repair and operate a fleet of tracked vehicles (bulldozers, loaders and personnel carriers), several wheeled vehicles (shuttle bus vans and pickup trucks) and mobile support equipment (cranes, heaters, sleds, snowplanes, pumps, etc.). The maintenance and repair effort shall be controlled through MAPCON.

C7.3.2.7 Fuel Operations

The Contractor shall receive, maintain and control station fuel inventories; and maintain and repair fuels equipment. The Contractor shall conduct fuel operations in a manner that minimizes the risk of spills and leakage, and maintain an effective spill response capability that includes trained response teams and appropriate equipment. The Contractor shall develop and maintain Spill Prevention Control and Countermeasures Plans, as well as Oil Spill Response Contingency Plans which accurately address conditions at and around the station.

C7.3.2.8 Aviation Support

The Contractor shall prepare and maintain a snow runway (skiway) for LC-130 and other ski-equipped aircraft; maintain and operate an associated "in-use" warning system; maintain and operate an aircraft fueling facility next to the taxiway; and support a TACAN navigational unit maintained by SPAWARS

C7.3.2.9 Housing

The Contractor shall manage housing (arriving/departing occupant berthing assignments, etc.), and provide janitorial (common area cleaning requirements and schedules) and laundry (bedsheets and other general laundry requirements) service.

C7.3.2.10 Food Service

The Contractor shall provide year-round scheduled food service (breakfast, lunch, and dinner six days per week; with a brunch and dinner served on Sunday). During the summer, a midnight dinner meal shall be served six days per week for night shift operations. Menus shall be suitable for the high altitude polar plateau environment.

The Contractor shall maintain and operate the kitchen, storage and dining areas; rotate food stock, and reorder food as needed to maintain sufficient inventory levels for a summer population of around 180 people and a winter population of 30-50.

C7.3.2.11 Waste Operations

The Contractor shall comply with NSF regulation 45 CFR Part 671 in the conduct of all waste management activities at South Pole Station. The Contractor shall apply for and obtain a waste permit that is issued by NSF (see Sections C7.1.9.3.1 and C7.3.1.13.1). The permit application shall include submission of detailed plans and procedures for the management of waste operations at the South Pole.

Hazardous wastes generated at South Pole Station shall be collected at their point of origin and moved to hazardous waste accumulation centers. Both non-hazardous and hazardous waste streams shall be processed for air

transportation to McMurdo Station and integrated into the McMurdo waste streams as discussed in Section C7.3.1.13.

C7.3.2.12 Fire and Safety

The Contractor shall train and organize fire response teams. These teams shall be formed from the Contractor workforce and shall receive whatever training the Contractor considers appropriate before deployment. The Contractor shall maintain all station fire alarm and smoke detection systems.

Fire brigade members shall meet NFPA and OSHA qualification criteria (see Section C4). Contractor personnel performing fire inspections or system checks shall possess required NFPA credentials.

The Contractor shall establish and enforce policies for appropriate employee conduct, and shall provide personal property security as required for station occupants.

C7.3.2.13 Clinic Operations

The Contractor shall staff and operate the station clinic (the "Biomed" facility) consistent with Section C7.1.6.2. The Contractor shall maintain medical equipment and keep medical inventories at appropriate levels.

C7.3.2.14 Retail and Recreational Services

The Contractor shall operate and maintain a small retail store and a bar at the station, and shall provide a limited range of recreational services The Contractor shall ensure that recreational activities are conducted in a safe and responsible fashion.

C7.3.2.15 Tourism

The Contractor shall interact with non-governmental (commercial or private citizen) groups or individuals visiting or transiting the South Pole according to established USAP policy (see Section C4).

C7.3.3 Palmer Station

The Contractor shall manage, operate and maintain Palmer Station. Tasks shall include management and O&M of all station facilities, support of the science program (see Section C7.4).

C7.3.3.1 Station Management

The Contractor shall provide sufficient resources to direct and control all O&M, science support and construction activities, summer and winter. This includes the annual program planning effort, workforce skill mix and allocation, administrative reporting; enforcement of safety, health and environmental policies; and consultation with NSF/OPP when needed.

C7.3.3.2 Communications

The Contractor shall staff and operate the station communications center from 7:30 AM to 9:30 PM 7 days/week during the summer and winter seasons. The Contractor shall maintain operational voice communications on HF, VHF and UHF circuits; and generate or relay message traffic on HF RTTY and, when visible, satellite links. The communications center shall be the control point for local boating trips and other field parties, monitoring their location and advising of weather conditions.

C7.3.3.3 Meteorology

The Contractor shall provide synoptic weather reporting as well as current weather reports for ship and small boat traffic. The Contractor shall operate and maintain recording equipment, and compile and transmit weather data according to World Meteorological Organization standards year round.

C7.3.3.4 Information Systems Infrastructure

The Contractor shall maintain, operate and repair the following systems: HF and FM radio communications equipment; satellite voice, fax and modem links; and associated outside tower-mounted HF antennas and satellite dishes. The Contractor shall also maintain a LAN PC system that incorporates the PTS, CTS and MAPCON work control programs (see Sections C6 and C7.5). As at McMurdo and South Pole, MAPCON shall be applied to PM and repair of station facilities, utilities and vehicles.

C7.3.3.5 Utilities and Facilities

The Contractor shall operate, maintain and repair the station power plant, water desalinization plant and associated distribution systems. Facilities maintenance tasks shall typically include building air handling and plumbing systems, interior remodels and exterior repairs, and maintenance and repair of the dock and other support structures. Utilities and facilities maintenance and repair shall be controlled through the MAPCON system.

C7.3.3.6 Cargo, Warehousing and Supply

The Contractor shall off-load, receive and distribute cargo received by ship at the station (principally from the *Laurence M. Gould*); prepare, document, stage and on-load all retrograde cargo (also mostly transported by the *Gould*); and manage the station inventories. Cargo reception and shipment shall be tracked through the CTS.

C7.3.3.7 Vehicles and Equipment

The Contractor shall maintain, repair and operate heavy equipment used for cargo movement, vehicles used for personnel transport on land and inflatable boats. The maintenance and repair effort shall be controlled through MAPCON.

C7.3.3.8 Fuel Operations

The Contractor shall receive, maintain and control station fuel inventories, and maintain related fuels equipment. The Contractor shall conduct fuel operations in a manner that minimizes the risk of spills and leakage, and maintain an effective spill response capability that includes appropriate equipment and trained response teams. The Contractor shall develop and maintain Spill Prevention Control and Countermeasures Plans, as well as Oil Spill Response Contingency Plans which accurately address conditions at and around the station.

C7.3.3.9 Housing

The Contractor shall manage housing (arriving/departing occupant berthing assignments, etc.), and provide janitorial (common area cleaning requirements and schedules) and laundry (bedsheets and other general laundry requirements) service.

C7.3.3.10 Food Service

The Contractor shall provide scheduled food service (breakfast, lunch, and dinner six days per week; with a brunch and dinner served on Sunday) year round. The Contractor shall maintain and operate the kitchen, storage and dining areas; rotate food stock, and reorder food as needed to maintain sufficient inventory levels for a summer population of around 35 people and a winter population of 20.

C7.3.3.11 Waste Operations

The Contractor shall comply with NSF regulation 45 CFR Part 671 in the conduct of all waste management activities at Palmer Station. The Contractor shall apply for and obtain a waste permit that is issued by NSF (see Sections C7.1.9 and C7.3.2.13).. The permit application shall include the submission of detailed plans and procedures for the management of waste operations at Palmer.

As at McMurdo and South Pole, domestic and industrial non-hazardous waste shall be segregated by waste stream at the point of generation. Waste containers shall be located in workcenters and at outside collection points.

Subject to the USAP research vessel schedules approved by NSF in the annual program plan, Palmer-generated hazardous and radioactive wastes may be transported to McMurdo Station by research vessel for integration into the McMurdo waste streams prior to final processing.

C7.3.3.12 Fire and Safety

The Contractor shall train and organize fire response teams. These teams shall be formed from the Contractor workforce and shall receive whatever training the Contractor considers appropriate before deployment. The Contractor shall maintain all station fire alarm and smoke detection systems.

Fire brigade members shall meet NFPA and OSHA qualification criteria (see Section C4). Contractor personnel performing fire inspections or system checks shall possess required NFPA credentials.

The Contractor shall establish and enforce policies for appropriate employee conduct, and shall provide personal property security as required for station occupants.

C7.3.3.13 Clinic Operations

The Contractor shall staff and operate the clinic consistent with Section C7.1.6.2. The Contractor shall maintain medical equipment and keep medical inventories at appropriate levels.

C7.3.3.14 Retail and Recreational Services

The Contractor shall operate and maintain a small retail store and a bar at the station, and shall provide a limited range of recreational services. The Contractor shall ensure that recreational activities are conducted in a safe and responsible fashion.

C7.3.3.15 Tourism

The Contractor shall interact with non-governmental (commercial tour groups or private citizens) entities visiting Palmer Station according to established USAP policy (see Section C4).

C7.3.4 Research Vessels

C7.3.4.1 Research Vessel Management

The Contractor shall acquire and manage an icebreaking research vessel, and an Antarctic supply and research vessel. At present, two such vessels are under long-term charter to the USAP. The newest vessel (acquired in January, 1998) is the R/V *Laurence M. Gould*, a 3400 ton research and cargo vessel. The second vessel (acquired in March, 1992) is the R/V *Nathaniel B. Palmer*, a 6800 ton research vessel. Both vessels are rated as icebreakers, although only the *Gould* has the cargo carrying capacity to resupply Palmer Station, and both are owned and operated by Edison Chouest Offshore (ECO), a Louisiana-based company.

C7.3.4.2 Current Vessel Charters

The vessels named in Section C7.3.5.1 are under long-term (10 year) charter to the USAP. The charters are Baltic Time Charters, written for the benefit of the Government, and both may be assumed and administered by the Contractor (although the Contractor can pursue alternate agreements).

C7.3.4.3 Current Vessel Operations

Edison Chouest shall crew the vessels, and provide berthing and food for all passengers on a *per diem* rate as established in the charters. The Contractor shall pay directly for the fuel and lubricants required to operate the vessels, as well as for the material costs of the shipboard science programs.

Annual cruise schedules, science support requirements and logistical support of Palmer station shall be developed by the Contractor and NSF as part of the annual program plan. After the plan is approved, the Contractor shall direct ECO accordingly, and shall ensure that cruise objectives are pursued to the best of the ships' capabilities consistent with maritime safety.

C7.3.4.4 Ship Husbandry and Maintenance

ECO shall manage husbandry tasks for the current vessels wherever they are based or make port. When developing the ship operating schedules as part of the annual program plan, the Contractor and ECO shall program regular and mandatory shipyard periods for the vessels that do not conflict with the science cruise schedule. All shipyard expenses (except any related to onboard scientific equipment owned by the government) shall be borne by ECO within the charters' day-rates.

C7.3.4.5 Communications and Computing

The Contractor shall provide computing functions aboard the research vessels, and work with the ships' crews to provide off-ship communications. Capabilities on each vessel shall reflect the needs of the science program, but will typically include a LAN and server, workstations, interfaces with marine electronics and grantee-supplied equipment, and video.

C7.3.4.5.1 Earth Stations

The Contractor shall operate and maintain NSF-owned INMARSAT earth stations onboard each vessel for satellite communications.

C7.3.4.6 Contractor Staffing

The Contractor shall provide the shipboard staffing required to support the science program planned for each cruise of the *Nathaniel B. Palmer* and the *Laurence M. Gould* (see Section C7.4.7), or other vessels.

C7.3.5 Station and Ship Operations Management

The Contractor shall provide the management skills and support resources necessary to support station and ship operations activities in the continental US (CONUS).

C7.4 Science Support

C7.4.1 Overview

The Contractor shall provide direct planning, logistical, operational and technical support to the science projects funded by the NSF in Antarctica. On average, the Contractor shall support from 150 to 170 science projects, with a total field complement of about 650 participants each year. The actual number of field participants depends on the annual program plan. The research projects vary, but will generally span marine science conducted from research vessels, land and sea ice based biology projects, a major astronomy effort at the South Pole; and glaciology, geophysics and geology field work at remote locations throughout Antarctica.

C7.4.2 Management and Technical Personnel Qualifications

The Contractor shall employ individuals with the background and education required to both understand and support effectively a multi-disciplinary, multi-year science program. The contractor's science support staff shall be familiar with academic research environments - including university laboratory management - and shall have the ability to support the type and scope of scientific research described in the Science Program Summary.

C7.4.3 Science Support Process Management

The Contractor shall provide year-round support to the USAP science program and shall manage a grant support process, including all relevant databases, at NSF direction.

C7.4.3.1 USAP Science Planning Information Database

The Contractor shall establish, maintain and, as requested by NSF, continue to develop an information database for science planning termed ESP (Electronic Support Planner). ESP shall provide the means for proposing researchers and USAP grantees to submit and access information on their support plans electronically. Access to ESP shall be via the Worldwide Web. The Contractor may be tasked with further development of ESP to enable remote access to information on USAP inventories, facilities and equipment available in Antarctica.

C7.4.3.2 NSF and Contractor Proposal Review

The Contractor shall provide operational and logistical reviews of grant proposals at the direction of NSF. Contractor evaluations shall be return to NSF by the end of August of each year for proposals being considered for field support one year later.

C7.4.3.3 Research Support Plan

The Contractor shall prepare a detailed logistical and operational support plan for each grant funded for the upcoming field season no later than one month before the project deploys. These plans shall be accessible through ESP. The Contractor shall solicit from each grant detailed information for the upcoming season using a Support Information Package (SIP) which shall be provided to each grant no later than early-March for return to the Contractor no later than early-May. The SIP shall incorporate documents describing the support process, a summary of the existing plan for the project as established at the time of funding, and a set of forms requesting a synopsis of a funded grant's objectives for the season and detailed support requirements (procurement, field equipment and field support, deployment and return dates, personal data of participants, etc.). The Contractor shall use this information, along with information obtained at planning meetings (see Section C7.4.3.4) and during other follow-up contacts as required, to prepare a Research Support Plan (RSP) for each project. While developing each RSP, the contractor shall inform NSF when/if a significant change in project scope seems likely and shall not proceed with a final plan until NSF approval is received. Final plans shall be prepared in the RSP format and submitted to the grant's Principal Investigator (PI) and NSF. The RSP shall be the final, approved science and associated support program for the upcoming season.

C7.4.3.4 Research Support Plan Meetings

As stated in Section C7.4.3.3, the Contractor shall review all SIP requirements and notify the appropriate NSF program managers of any significant changes in scope and/or unsupportable requests. As required to clarify such issues, the Contractor shall convene a series of meetings with grantees to discuss these and other support requirements, and finalize plans subject to NSF approval.

C7.4.3.5 Science Program Summary

The Contractor shall prepare and publish a Science Program Summary (SPS) for the season. The summary shall be a physical volume and shall also be available on a protected website. The SPS shall describe the science program to

be accomplished each season in general terms, and contain summaries of each grant's research objectives and field plan.

C7.4.3.6 User Group Meetings

The Contractor shall charter "user group" committees to advise the Contractor on science support operations at particular locations, i.e., McMurdo, South Pole, Palmer or on-board the research vessels. Committee members shall be scientists who receive Contractor support, work in a particular area or onboard the vessels, and can represent scientists with similar interests. Members are nominated by their respective research communities and shall be selected by the Contractor. The committees shall meet at least annually.

C7.4.3.7 Research Equipment

The Contractor shall provide the materials and capital equipment identified for acquisition within individual RSP's. The Contractor shall determine specifications and delivery requirements with grantees, arrange transportation and packaging (special containers, customs clearance, hazardous material documentation, etc.), and assist with set-up/installation/peripheral support of equipment at the stations.

C7.4.3.8 Field Season Activities

The Contractor shall provide support to grantees in Antarctica as approved in RSP's and the science program summary. Contractor services shall include specific, RFP-approved support such as field equipment outfitting, field training, transportation, laboratory support, cargo processing, etc.; and generic services at the stations or onboard the research vessels such as housing, food service, etc.

C7.4.4 Antarctic Laboratories and Observatories

The Contractor shall maintain, operate and provide qualified on-site staff to support research at the laboratories and observatories at the US Antarctic stations and on-board the research vessels. The contractor shall provide the skills and experience required to operate and maintain all equipment in each inventory, unless otherwise specified by the NSF. When beneficial to the USAP, maintenance resources may be provided through vendor agreements and/or subcontractors.

C7.4.4.1 System Documentation

The Contractor shall annually review, and update as required, USAP science support documentation that provides guidance to the science community. Documents produced by the Contractor shall include the USAP Field Manual, the USAP Guidelines for Conduct of Scientific Diving, and the Scientific Diving Manual.

The Contractor shall also develop websites to disseminate information to the science community that describes USAP facilities and can be used for planning scientific projects.

C7.4.4.2 Crary Science and Engineering Center

The Contractor shall manage and operate the Crary Science and Engineering Center (CSEC). Contractor staff shall include appropriate on-site management, technical support (IT/IS services, analytical chemistry, and instrumentation support with, as needed, specialized subcontractors or manufacturers' representatives providing calibration/installation services), inventory control and facilities maintenance positions.

The Contractor shall provide an Analytical Chemist and, as required, Analytic Technicians to provide analytical chemistry services in CSEC. These individuals shall be based at the CSEC during the austral summer where they shall maintain analytical equipment and provide analytic services for grants as defined in RSP's.

The CSEC shall be open and fully staffed by the Contractor on a 12 hour/6 day schedule. The Contractor shall have CSEC staff on-call on a 24/7 basis to accomodate grantee access to the laboratory and related support outside of normal working hours.

C7.4.4.3 Other McMurdo Sites

The Contractor shall support science at a number of other sites in the McMurdo station area. These ancillary laboratory and science facilities include: Arrival Heights, RADARSAT, GPS stations, Gravibase station, and the UV monitoring site. Specific Contractor duties shall vary by site.

C7.4.4.4 South Pole Station Laboratories and Observatories

At South Pole Station, the Contractor shall maintain instrumentation and facilities throughout the station complex. Principal facilities include the Skylab, a 4-story laboratory/observatory attached to the main station, and three large, elevated observatories one quarter to one half mile from the main station.

The South Pole observatories shall be staffed and managed by the Contractor. Management responsibilities shall include the logistical (local transportation and cargo movement, power and fuel, and facilities maintenance and construction) support needed to operate the observatories year round.

C7.4.4.5 Palmer Station Laboratory

At Palmer Station, the Contractor shall manage a laboratory supporting marine and ecological research. The Contractor shall provide on-site management, technical support (IT/IS services, instrumentation support), inventory control and facilities maintenance.

C7.4.5 Technical Support of the Science Program

C7.4.5.1 Scientific Information Services

C7.4.5.1.1 Planning and Acquisition

As part of the planning cycle described in Section C7.4.3, the Contractor shall work with grantees to define computing and communications requirements. Grantees shall be informed of the standard computing and communications facilities and equipment that are available at Antarctic stations, and the types of connectivity that they support. The Contractor shall supply grantees with hardware, software and individual computing assistance (including hands-on installation, calibration, maintenance and operation of systems and equipment) according to grant needs and budgets.

C7.4.5.1.2 Future Development

Based on work with grantees, and its own knowledge and investigation of current academic computing trends, the Contractor shall report to NSF on perceived future requirements for changes in the IT/IS infrastructure, and develop cost-benefit analyses of viable options.

C7.4.5.1.3 Contractor Staffing

The Contractor shall provide sufficient staff to implement, maintain and operate all science support-related communications and computing equipment. Contractor staff shall provide training for grantees and, according to RSP requirements, directly perform data collection, analysis and transmission for year-round projects that continue experimentation after grantees have left Antarctica (see Section C7.4.3.3).

C7.4.5.2 Science Technicians

Contractor Science Technicians shall operate, maintain and repair scientific data recording instrumentation at each of the stations.

At McMurdo, Contractor Science Technician(s) shall operate a year-round cosmic ray experiment housed in Building 84, VLF and other experiment instrumentation in the Arrival Heights Lab (Building 197) and, as assigned, other experiments.

At South Pole, Contractor Science Technician(s) shall operate year-round cosmic ray and VLF instrumentation, seismometers, aurora all-sky cameras and other experiments housed in the Skylab as well as related instruments housed in under snow vaults around the station. The Science Technicians shall also maintain the AASTO located in the dark sector and provide "as required" support to experiments housed in the Atmospheric Research Observatory.

At Palmer Station, Contractor Science Technician(s) shall operate year-round VLF and UV instrumentation, seismometers, satellite imaging instrumentation and other experiments as directed. The technician shall also participate in the World Meteorology Organization (WMO) meteorological data collection effort.

C7.4.5.3 Cryogenics Support Services

The Contractor shall procure, ship, store and provide cryogenic materials (liquefied gases) for science activities at McMurdo, South Pole and onboard the research vessels.

C7.4.5.4 Meteorology

At South Pole and Palmer stations, the Contractor shall make and report weather observations according to WMO standards. At South Pole Station, four (4) observations shall be made daily at six (6) hour intervals. During the summer at South Pole Station, around-the-clock hourly observations shall be taken and provided to McMurdo and inbound aircraft. The Contractor shall also operate and maintain all weather tracking equipment at South Pole and Palmer stations, and furnish other meteorological reports as required to the WMO. Although meteorological data is required primarily for operational reasons, it shall be made available to researchers as specified in the RSP.

C7.4.5.5 UV Monitoring Network

The Contractor shall manage subcontracted services for the development and maintenance of NSF's Polar UV Monitoring Network, and related data distribution. Contractor Science Technicians shall operate the instrumentation at the Antarctic stations.

C7.4.5.6 Automated Geophysical Observatories (AGO)

The Contractor shall operate and maintain the unmanned AGO network established at six remote sites on the continent. The Contractor shall manage the installation and testing of new instrumentation before units are deployed, plan the field deployment of new units, and service (change fuel supplies, repair equipment and add instrumentation) units already deployed. The Contractor shall coordinate this work with the PI's whose experiments are housed in the AGOs.

C7.4.6 Field Support Services

The Contractor shall provide a comprehensive range of field support services for USAP grantees. Services shall include field gear outfitting, field safety planning and training, vehicle and equipment maintenance and repair, diving and dive tending, construction and fabrication, and direct and indirect aviation support.

C7.4.6.1 Field Party Equipment Support

C7.4.6.1.1 McMurdo-based Field Party Support

The Contractor shall manage a field party outfitting and processing function at McMurdo. The Contractor shall maintain a complete inventory of camping, mountaineering and sledging equipment at the Berg Field Center (BFC, Building 160) along with an inventory of specialty food for field use stored next door (Building 73). The Contractor shall manage the inventory, issue equipment and supplies to grantees, provide instruction as needed, and clean and repair equipment when it is returned. The Contractor shall also reorder equipment/supplies as needed, periodically evaluate the effectiveness and adequacy of the inventory, and submit recommendations for improvement to NSF.

C7.4.6.1.2 Palmer or Research Vessel-based Field Party Support

The Contractor shall outfit field parties operating out of Palmer Station or from the research vessels with field clothing at the Punta Arenas warehouse. For parties working near Palmer Station, the Contractor shall normally provide field equipment at the station, while field equipment for parties deploying to other areas of the Peninsula shall generally be provided by the Contractor on an as-needed basis through Punta Arenas. For field work at sites other than Palmer Station, food shall be ordered in advance as part of a grant RSP.

C7.4.6.2 Mechanical and Vehicle Support

C7.4.6.2.1 McMurdo Mechanical Support

The Contractor shall operate and maintain a Mechanical Equipment Center (MEC, Building 58), reserved specifically for the types of equipment and vehicles used by science parties. The Contractor shall staff this work center, maintain and repair assigned equipment and vehicles, provide instruction in equipment/vehicle use to grantees, and order parts and supplies as needed to keep inventories at correct levels. The effectiveness of the vehicle/equipment inventory shall be periodically evaluated by the Contractor and recommendations for replacement/upgrade submitted to NSF.

C7.4.6.2.2 Peninsula Mechanical Support

The Contractor shall provide mechanical support to grantees based at Palmer Station or operating from the research vessels. Such support shall include inflatable boat and vehicle maintenance and repair as well as O&M of equipment deployed from the boats or research vessels.

C7.4.6.3 Science Construction and Fabrication

The Contractor shall provide construction services for science projects. At McMurdo and South Pole stations, support shall typically include field design and construction of finished or unfinished portable buildings to be used as permanent or temporary shelters; renovation of existing laboratory space, and miscellaneous construction ranging from containers for geological specimens (rock boxes) to tables, benches, etc., used at field camps. Construction services shall be arranged through the planning process; modifications or additions thereto after deployment shall be cleared through the NSF Representative. Similar services, although generally smaller in scale, shall be provided by the Contractor at Palmer Station.

C7.4.6.4 Field Camp Support

The Contractor shall plan, construct, operate and manage seasonal field camps (normally 4 each year, although the exact number will depend on the annual program plan) which support populations from 10 to over 100 people. These camps shall typically consist of portable "Jamesway" or similar structures providing workspace, berthing, dining and sanitary facilities built at snowfield locations on glaciers, the ice shelf or on the polar plateau. When required, aircraft - usually Twin Otter fixed-wing airplanes or helicopters - shall be based at these camps to support the research teams.

C7.4.6.5 Field Training

The Contractor shall provide field safety training for all USAP participants assigned to work at field locations.

C7.4.6.5.1 Program Development and Staff Qualifications

The Contractor shall develop and/or modify training programs to meet the needs of the annual program plan, and monitor their effectiveness. Contractor staff conducting this training shall have appropriate field and polar/mountaineering-type skills as well as the ability to teach.

C7.4.6.5.2 McMurdo and South Pole Field Training

Contractor provided field training at McMurdo shall consist of classroom instruction and video presentations followed by an exercise (usually overnight) at the outdoor "snowcraft survival" area located nearby on the Ross Ice Shelf. Other training shall include aviation safety, environmental protection, first aid and fire safety conducted by both field training staff and other Contractor functional departments at McMurdo.

Field training for South Pole Station personnel shall be conducted at McMurdo before departure or, if advantageous, McMurdo field safety staff can travel to South Pole to provide training on-site.

C7.4.6.5.3 Palmer and Research Vessel Field Training

Field training at Palmer shall be conducted at the station and include sea ice and boating procedures appropriate for the location. Marine safety and lifeboat instruction shall be provided for all passengers on the research vessels as part of the subcontract charters.

C7.4.6.6 Diving Services

The Contractor shall be responsible for the USAP Diving program, including research diving operations (and, as directed, dive tending) near the stations, at remote sites in the general area of operations, or from the research vessels.

C7.4.6.6.1 Dive Lockers and Recompression Chamber

The Contractor shall operate and maintain the McMurdo Dive Locker (housed in the CSEC) and the Recompression Chamber, housed at the Medical Clinic (Building 142). A smaller dive locker shall be maintained by the Contractor at Palmer Station.

C7.4.6.6.2 Diver Qualifications

Divers employed by the Contractor shall possess appropriate certifications, including those required to operate and maintain the McMurdo recompression chamber. The Contractor shall also provide applicable insurance.

C7.4.6.7 Aviation Planning and Support

The Contractor shall provide direct and indirect aviation support for the science program. Contractor planning support shall include review and analysis of the entire science program for each season to determine the most effective aviation support strategy. The Contractor shall coordinate with all grants and other USAP support agencies to develop an annual airlift plan for the science program. The plan shall be distributed to all users no later than 1 October for each field season.

C7.4.6.7.1 Utility Aircraft

The Contractor shall acquire utility aircraft, usually twin-engine Twin Otter airplanes designed for "bush" flying. The Contractor shall solicit, award and administer an appropriate subcontract (although other agreements or acquisition methods may be reviewed with NSF); manage the aircraft workload during the season, and provide ground support to the aircraft at the stations and camps.

It is anticipated that during most, but not all, field seasons, one Twin Otter will be configured to support aerogeophysical research conducted by the Support Office for Aerogeophysical Research (SOAR), based at the University of Texas.

C7.4.6.7.2 Helicopters

The Contractor shall coordinate all science helicopter and fixed-wing flight operations. During the summer, the Contractor shall maintain a scheduling office in the helicopter hanger (Building 129) to coordinate daily flight activities.

C7.4.6.7.3 LC-130 Aircraft

The Contractor shall plan and coordinate grantee fixed-wing LC-130 aircraft support requirements. Task shall include preparing the preliminary flight schedule and RSP cargo load plans with the ANG and NSF, ensuring that grantees are trained on LC-130 operations as part of their overall field training, and coordinating changes/updates to schedules and load plans during the field season.

During the summer, the Contractor shall maintain an air planning office in the McMurdo operations center (Building 165) to coordinate daily LC-130 flight activities and provide grantees with operational assistance prior to, during and after their field deployment.

C7.4.6.8 Search and Rescue

The Contractor shall plan and manage search and rescue capabilities for the USAP. The Contractor shall provide qualified staff for search and rescue thoughout the Antarctic continent with 24/7 coverage. A search and rescue plan which coordinates program aviation and medical assistance, and defines operational controls in emergencies, shall be developed by the Contractor and approved by NSF.

C7.4.7 Marine Science

C7.4.7.1 Marine Science Support Management

The Contractor shall provide overall support for marine science. The Contractor shall participate in preseason planning for each grant, procure general laboratory supplies and grant-specific equipment, provide onboard inventory management, operate and maintain shipboard equipment as required, and provide shipboard staffing sufficient to support the science programs planned for each vessel cruise.

C7.4.7.2 Research Vessel Staffing

The Contractor shall provide the shipboard staffing required to support the science program on each cruise of the *Nathaniel B. Palmer* and/or the *Laurence M. Gould.* Staffing shall typically consist of a Contractor coordinator/manager responsible for overall science support as well as for representing the Contractor when dealing with the ship's Captain. At least one Contractor employee on every cruise shall be qualified as an Emergency Medical Technician (EMT).

The Contractor coordinator/manager shall supervise other shipboard Contractor employees providing laboratory management (inventory control and work space allotment), instrumentation and equipment maintenance (installed sensors, benchtop equipment and over-the-side deployed equipment), IT/IS and other electronics-related services.

C7.4.7.3 Multibeam Operations

The Contractor shall provide, operate and maintain the seabeam system mounted on the *Palmer.* At present, the capability is subcontracted. If a subcontract is continued, the Contractor shall administer the subcontract and provide logistical, transportation and shipboard support to the subcontractor as required.

C7.4.8 Telecommunications Support

The Contractor shall procure, design, install, operate and maintain and, as approved by NSF, upgrade Antarctic communication systems (exclusive of those systems used in aircraft operations). This responsibility shall extend to telecommunications applied to the science program.

C7.5 Information Technology and Information Systems

C7.5.1 Overview and Scope

The Contractor shall provide infrastructure, products, and services for Information Technology, Information Systems, communications, and general electronic systems necessary for and beneficial to the support of the USAP mission. The Contractor shall be responsible for the complete life cycle of Information Technology applications: needs assessment, product and service specification, infrastructure development, service delivery, sustaining operations and maintenance, and evolution in response to changes and new requirements.

The span of responsibility shall apply to USAP enterprise-wide, non-Antarctic CONUS and OCONUS logistics centers, ocean operating areas, and Antarctic operating areas. The scope of application shall apply to field level, base level, and up though and including global reach.

The Contractor shall support the cross-section of USAP stakeholder and functional groups and their respective mission objectives with regard to Information Technology and Information Systems: science research; Command/Control operations; station operations; management and administration; logistics and transportation; health and safety; morale, welfare, and recreation; and, pubic outreach.

C7.5.2 General Guidance

Unless otherwise directed by the NSF, the Contractor shall perform all work identified in this subsection (C7.5) in accordance with the following subsections.

C7.5.2.1 Use of COTS, GOTS, and NDI Technology

The contractor shall use, wherever possible, technology which is not developed specifically for the USAP. Commercial off the shelf (COTS), government off the shelf (GOTS, i.e., non-developmental items supported by government integrated logistics management), and other non-developmental items (NDI) are always preferredThe Contractor shall implement sound "Make-Buy" evaluations and justify the need or benefits for developmental items. The Contractor shall utilize sound technical judgement and provide a defense of its approach via industry standard systems engineering processes such as project reviews, technical peer reviews, and critical design reviews. The Contractor shall not construe this as a constraint to prohibit custom development when such cases are warranted to provide best value, or are otherwise in the best interests of the Government.

C7.5.2.2 Technology Acquisition Planning

For large systems design and development activities, or in cases where the implementation cost or risk is substantial, the Contractor shall provide a written Technology Acquisition Assessment that describes the recommended approach for the procurement of the subject system. In this context, Acquisition is defined to mean the process used to obtain the system – in-house design and development, outsourced design, turn-key procurement, subsystem procurement and in-house integration, etc. The Contractor shall be required to defend its preferred acquisition means to the Government and to demonstrate why the proposed acquisition means is in the best interests of the Government. The Contractor shall incorporate this requirement for acquisition planning as a component of the annual Program Plan and for all project development/systems engineering work.

C7.5.2.3 Capital Planning

The Contractor shall assist NSF with the systematic review, evaluation, and selection of IT projects and major activities. The Contractor shall provide planning data per NSF direction for input to the NSF IT Capital Planning process. Such data shall be modeled according to Government Accounting Office and Office of Management and Budget guidelines. The Contractor shall conduct assessments based on NSF provided criteria and provide recommendations to NSF for project selection. This process shall include business case justification and economic cost/benefit analysis. These recommendations shall form the basis for project selection for incorporation into NSF long range planning for IT and shall also support short-term tactical project selection needs.

C7.5.2.4 IT Support to USAP Business Process Re-Engineering

The Contractor shall provide business process re-engineering services in support of strategic, long range, and tactical planning, to include: stakeholder reviews of USAP business processes; and definition and maintenance of activity models that map IT functions, products, and services to USAP mission operations, management, and customer support functions (with emphasis on identified mission critical and mission essential areas). The Contractor shall propose changes in business and/or operational processes and practices to address continuous improvement objectives, to include: improve throughput, lower USAP enterprise operating expense, and enable greater USAP mission effectiveness to support scientific research. The Contractor shall propose IT/IS solutions as a means to implement BPR recommendations in a manner conformant with guidance set forth in the Information Technology Management and Reform Act of 1996.

C7.5.2.5 Technology Insertion Planning

As the Government has a requirement for technology insertion planning, the Contractor shall implement a standing process to plan for the refreshment of existing, or implementation of new, technologies in the USAP technical architecture. The outcome from the Contractor's efforts of annual technology trends assessments (Section C7.5.4.2) shall support the insertion planning requirement. Recommendations for the insertion of a specific technology shall be consistent with the acquisition planning activity, and with the evolution and requirements of the planning series cited in Section C7.5 (USAP IT Strategic Plan, USAP IT Technical Architecture Plan, USAP IT Systems Life Cycle Management Plan, and the USAP IT Enterprise Long-Range Implementation Plan).

C7.5.3 IT/IS Management and Planning

C7.5.3.1 Integrated Product Team Management

The Contractor shall participate fully and openly within the teaming environment described in Section C3.xxx. The Contractor may be called upon to serve in the capacity as team leader, team principal, or team rank&file. All such activity is conducted under NSF guidelines and cognizance.

C7.5.3.2 Strategic and Long Range Planning

The Contractor shall provide strategic planning services, to include planning concepts such as cause-effect analysis, affinity analysis, and mission needs analysis. The Contractor shall assist NSF with the formulation, development, and modification of strategies for IT and with the alignment of IT deployment to meet NSF strategic goals for the USAP. The Contractor's support shall include, but not be limited to: meetings, technical reviews, SWOT (Strength, Weakness, Opportunity, Threats) assessments, technology forecasting, and customer/stakeholder requirements/needs gathering and analysis. The Contractor shall assist with the development of written planning documents by providing substantive content and authorship, subject to NSF review and approval.

C7.5.3.2.1 USAP IT Enterprise Strategic Plan

In conjuction with NSF, the Contractor shall develop and deliver a written, formal USAP IT Enterprise Strategic Plan within 24 months of contract award. The specific process, requirements, and content shall be developed in consultation with NSF and finalized no later than 30 months following contract award. The plan shall be updated by

the Contractor on a bi-annual basis following the initial delivery. The Contractor shall develop updates by means of the process outlined in the following subsection (Section C7.5.3.2.2).

C7.5.3.2.2 USAP IT Long Range Planning Support

As a component of sustaining strategic planning support, the Contractor shall host and facilitate an annual USAP IT long range planning workshop to be held either at the Contractor's headquarters or at NSF headquarters. The objective of the workshop is to define, establish, and sustain an Integrated Product Team consisting of a representative cross-section of USAP IT, science, and mission operations stakeholders to review existing strategy and long range plans and to provide an annual update to the USAP IT Long Range Plan, as defined in Section C7.5.3.5.7. The Contractor shall be responsible for agenda preparation, attendee coordination, preparation of presentation materials , minutes, proceedings, and action item tracking. The Contractor shall provide corporate strategic and long range planning services and techniques to plan and facilitate achieving the goals and objectives of the annual meeting.

C7.5.3.3 Annual IT Program Planning

Each contract year, the Contractor shall develop the annual Program Plan with input from appropriate sources, to include: IT strategic and long range plan objectives, near term operations requirements, annual operational needs, annual customer support requirements, NSF program management requirements, and results of annual planning meetings (see Section C7.5.3.4) to produce an annual IT operating plan and outyear forecast per Section C7.1. The outyear forecast shall be updated annually during the annual Program Plan preparation process and delivered concurrently with the final version of the annual Program Plan, per Section C7.1 Specific guidance for IT program plan development is provided in the following subsections.

C7.5.3.3.1 Program Plan Development Planning Meetings

The Contractor shall assign senior IT staff to attend a minimum of two Program Plan development meetings to be held at NSF headquarters at separate times during the annual Program Plan development cycle. The Contractor shall meet with cognizant NSF program management to review requirements, issues, plans, and trade-offs to assist the Contractor in the formulation of the FY+1 Program Plan.

C7.5.3.3.2 IT Program Plan Structure

The Contractor shall provide a product and service level description of activities sufficient for the Government to track Contractor effort cost and Other Direct Cost (equipment acquisition, material consumption, travel, training, etc.) to a level of detail that allows Government visibility to the major system, function, product, and service level. As directed by the NSF Contracting Officer, and subject to NSF review and comment, the Contractor shall define an Operations and Support cost model for major systems, functions, products, and services and provide and report a cost breakdown structure to capture these costs. The Contractor shall segregate self-contained projects into a separate and distinct breakdown structure element in order to preserve the identity of each project and to capture the total project costs. Costs shall be reported in the reporting interval specified in Section F regarding financial reporting.

C7.5.3.3.3 Antarctic IT Task Development

As a component of the annual Program Plan, the Contractor shall provide to NSF an itemized lists of specific, IT-related, management, planning, operation, maintenance, and sustaining engineering tasks to be performed at Antarctic and research vessel operating sites. A uniform Contractor provided format shall be used that provides the following minimum information for each task: unique identification number, mapping to Contractor work breakdown structure, geographic site location (e.g., Christchurch, McMurdo Station, Palmer Station, etc.), summary narrative of the objective, stakeholders in the task, projected start and completion dates, itemized list of related activities or tasks, skill categories of personnel required, and a minimum of one performance measure to be used at the conclusion of the task to evaluate the success of the task. The Contractor shall prepare the itemized task list as an

integrated document, but shall also prepare and submit appropriate supplemental narratives to place the planning information into the proper programmatic context. The Contractor shall deliver sections of the document under the following annual schedule: WinFly period tasks due to NSF no later than 15 July; Austral Summer period tasks due to NSF no later than 15 August; first draft Austral Winter period tasks due to NSF no later than 15 August; final Austral Winter period tasks due to NSF no later than 15 January. The Contractor shall use this task list as a common reference for all status/progress reports issued that address the Contractor's site activities.

C7.5.3.4 Planning Conferences and Meetings

C7.5.3.4.1 USAP Post Season Planning Conference

The Contractor shall provide representation and active participation in the annual USAP planning conference held in the Spring of each year. The Contractor shall provide factual information on the status and planning of projects, operations, logistics needs, and procedures to occur in the forthcoming Antarctic operating season. The Contractor shall provide emphasis in two distinct and separable topical areas: issues/activities of significance to the general USAP operational and science communities, and issues/activities of significance to the USAP Enterprise IT community. The Contractor shall formulate a concise development of management, planning, policy, or procedural issues that affect the Contractor's operations within the USAP and shall present an oral and written brief for group discussion and resolution. The Contractor shall provide oral and written briefs on lessons learned and current status from the Antarctic austral summer season and winter season just concluded. These briefs shall include recommendations for future activity that will bear significantly on USAP operations in the forthcoming Antarctic operating season. The Contractor shall participate in *ad hoc* planning sessions during the course of the conference as required.

C7.5.3.4.2 SPAWAR Systems Center Antarctica Conference

The Contractor shall provide representation and active participation in the annual command, control, and communications (C3) conference hosted and facilitated by SPAWAR Systems Center Charleston in Charleston, SC. The Contractor shall participate in technical discussion, planning, and review sessions that may be held as a part of the conference agenda. At the conference, the Contractor shall serve as the source of technical expertise and information for USAP IT systems performance, configuration, operation, and engineering issues.

C7.5.3.4.3 Integrated Product Team and Working Group Meetings

The Contractor shall participate as needed in Integrated Product Teams and/or working groups for C3 (and related IT) development, planning, and management issues.

C7.5.3.5 Special Plans and Studies

The Contractor shall provide the following specialized plans as specified below. These plans are required to contribute to the strategic planning process that the Contractor has been tasked to support.

C7.5.3.5.1 USAP Enterprise Business Process Re-Engineering Study

The Contractor stall perform an evaluation of current business processes and provide specific recommendations regarding specific actions to be taken to implement a sustainable Business Process Re-engineering (BPR) effort within the USAP. The prime focus of the report that results from the evaluation shall be to examine USAP business process in order to identify opportunities for IT to enable, improve, or otherwise benefit the effectiveness and efficiency of the USAP. The study shall focus on USAP processes and work flows for science support, mission operations, mission support, and enterprise management interaction (between the Contractor, NSF, and other USAP support organizations). The Contractor shall use industry recognized best-practices for the approach and conduct of the BPR study. The Contractor shall deliver a completed study report no later than 24 months following contract award for review and approval by NSF. Implementation of the study shall be managed under the annual Program Plan.

C7.5.3.5.2 USAP Information Architecture Study

Concurrently with the USAP Enterprise Business Process Re-Engineering Study, the Contractor shall conduct a study of the role of information as a tactical and strategic management and planning resource for the USAP. The focus of the study is to view information as a critical infrastructure resource, establish how/where/why information is needed or valuable to the conduct of the USAP, define information models at the enterprise level, and to recommend specific information management technical architectures (database languages, data mining tools, Enterprise Resource Planning tools, etc.) that will form a standard framework for all future USAP knowledge management efforts. The Contractor shall deliver a completed study report no later than 24 months following contract award for review and approval by NSF. Implementation of the study shall be managed under the annual Program Plan.

C7.5.3.5.3 USAP Mission Operations and Management Information Systems Redesign Study

The Contractor shall study the currently implemented USAP mission and management information systems, focusing on supportability issues, contemporary business functional needs, the relationship to a master USAP information architecture, and contemporary technology solutions. The goal of the study shall be to produce concrete recommendations and a plan of action to expeditiously and economically phase out the legacy applications with sustainable applications with a long life cycle which meet contemporary and perceived future business functionality requirements. Data migration from the legacy systems and historical data integrity shall be a prime consideration. The Contractor shall deliver a completed study report no later than 12 months following contract award for review and approval by NSF. Implementation of the study shall be managed under the annual Program Plan.

C7.5.3.5.4 USAP IT Systems Life Cycle Management Plan

The Contractor shall devise and implement a structured annual review of the mission readiness of all key IT systems installed throughout the USAP. The objective of the plan is to characterize key parameters of each system that provide an indication of mission readiness for a time span of 1-3 years. The plan shall be used for annual support management and long range planning for the systems and the functions supported by the systems. The plan shall incorporate such concepts as: operation and support cost (affordability), projected end-of-life (longevity), capacity, maintainability, availability, and reliability. Each system shall be graded for each year of the time span for readiness status (e.g., a rating such as GREEN - full readiness, YELLOW – marginal, or RED – critical). The Contractor shall provide a plan of action, milestones, schedules, and cost estimates to bring systems to full readiness. The Contractor shall utilize this plan and its associated planning process as a component of the Contractor's Maintenance Management Plan, as defined in Section C7.5.8.4. The Contractor shall deliver a completed plan no later than 14 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.3.5.5 USAP Information Security Plan

The Contractor shall develop a USAP Information Security Plan that shall be utilized by NSF as the Government's guidance and management plan for all USAP organizations and program participants. The Contractor shall conduct a risk and threat assessment, a review of industry and Government best practices, and a review of Government guidance (OMB Circular A-130, revised; Information Technology Management and Reform Act of 1996) as a component of plan development. The Contractor shall develop recommendations for NSF policy as a component of the task. The Contractor shall deliver a completed plan no later than 14 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.3.5.6 USAP Technical Architecture Plan

The Contractor shall devise and document a USAP Technical Architecture Plan for IT. The Contractor shall be responsible for the periodic update of the plan as technology and mission need changes dictate. The goal of the plan is to match technology applications and solutions to mission needs, and to do so in an integrated fashion. The

Contractor shall deliver a completed plan no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted no less frequently than on a bi-annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.3.5.7 USAP IT Enterprise Long-Range Implementation Plan

The Contractor shall develop and thereafter annually update a USAP IT Enterprise Long-Range Implementation Plan. This plan represents the confluence of all previous planning efforts identified in this solicitation. The Long-Range Implementation Plan shall incorporate strategic and tactical objectives, technical guidance provided by the Technical Architecture Plan, results of the Information Architecture and BPR studies, technology insertion planning, technology forecasts, and IT Capital Planning processes to distill a specific, concrete plan of action for a period of five years. The plan is expected to have a high degree of confidence in years 1-3. The plan shall consist of a structured presentation of specific project or activity line items with matching Fiscal Year funding projections. The structure shall incorporate the technical architecture framework. The Contractor shall deliver a completed plan no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.4 Technology Management

C7.5.4.1 Innovation

The Contractor shall provide continuous improvement support to the Government in the form of research, evaluation, design engineering, development, and implementation of innovations in techniques, processes, technologies, and means used to conceive, provide, sustain, and evolve Information Technology applications for the USAP. The Contractor shall recommend improvements in areas including, but not limited to: insertion of new technology, design changes, changes in installed technical infrastructure and systems, and implementation of new systems, to meet evolving mission needs, customer requirements, and technology overturn and obsolescence. Innovation support shall be applied to each major configuration outline element identified in Section C7.5.3.5.6 for the Technical Architecture Plan.

C7.5.4.2 Technology Trends Assessment

The Contractor shall provide a standing review and assessment process that evaluates trends in technology development, new products and services, and new applications for new and existing technology. This process shall be utilized by the Contractor to produce an annual Technology Trends Assessment Report that provides input to IT strategic, long range, and systems life cycle planning. The Contractor shall use this as an element of its innovation process. The Contractor shall issue an annual summary report of findings and recommendations to the NSF that describes the outcome of the prior year's assessment activities. The Contractor shall deliver a completed report no later than 14 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.4.3 Life Cycle Management and Technology Replenishment

The Contractor shall incorporate into the management o f technology the process of life cycle reveiws and the replacement of systems that support valid and continuing mission needs. This shall be performed congruent with the specification for the USAP IT Systems Life Cycle Management Plan of Section C7.5.3.5.4.The Contractor shall provide Life Cycle Management services, which shall involve: programmed periodic systems life cycle reviews and reports; systems operations and support cost assessments; systems sunset reviews and phase-out evaluations; systems integrated logistics support planning that covers training, repair parts allowance, sustaining vendor support, and other related issues; and, systems maintenance management plan development (with input from the Technical Operations functions).

C7.5.4.4 Sustaining Engineering

C7.5.4.4.1 Scope of Service

The Contractor shall provide Sustaining Engineering capabilities, including: as-built and systems documentation development and documentation maintenance; Field Change Order systems configuration control management; Field Discrepancy Report support to sustaining operations and maintenance activities; systems technical performance assessments and reports; analysis of tactical performance data; systems evolution (modification, partial replacement, etc.); field engineering support; on-site technical needs assessments; in-depth technical input to, and review of, the USAP IT Maintenance Management Plan, Section C7.5.8.4; and, customer technical support to grantees, and all other internal or external IT customers.

C7.5.4.4.2 USAP IT Configuration Management Plan

As a component of the Contractor's sustaining engineering support, the Contractor shall propose, develop, implement, and sustain a Configuration Management Plan for all major systems and subsystems. The purpose of this plan is to maintain the configuration integrity and fidelity of field installed systems and to effect an orderly, systematic evolution of changes necessary in response to changing mission needs or operational requirements. The Contractor shall maintain a library of accurate and up-to-date configuration management and technical data, to include such items as documentation updates, as-built drawings, and drawing updates with field and design changes. The Contractor shall make all configuration management data readily accessible to NSF program management staff via electronic means. The Contractor shall deliver a completed plan no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.5 Information Technology Systems Engineering

C7.5.5.1 Systems Engineering Services

The Contractor shall provide Systems Engineering services and cross-disciplinary subject matter and technical engineering expertise, which will include: technical consultation; requirements and needs assessment; project concept development; feasibility assessment; prototype and test-bed evaluations; project proposal development; project management, planning, and implementation; operational readiness reviews; and, transition from engineering development to full operational status.

At a minimum, the following technical discipline areas shall be provided in the Contractor's capability portfolio: software engineering (4GL software systems development; DBMS design; RAD - Rapid Applications Development - design; C language programming); communications engineering (radio, land mobile, microwave, satellite, telephony/common carrier, wireless technologies); data communications engineering (electronic mail systems engineering, WWW applications and server engineering, LAN architecture engineering, network management engineering, TCP/IP networking and applications, IP WAN engineering, common carrier transmission, private networks, multi-cast backbone and multi-media applications engineering); computer systems engineering (UNIX, Microsoft Windows NT™, Novell, LAN applications servers); hardware and software systems integration; SCADA control systems; renewable energy systems; electronics equipment packaging; and, environmental testing.

C7.5.5.2 Systems Engineering Process

The Contractor shall utilize industry accepted practices for systems engineering. The Contractor shall benchmark its process against the Software Engineering Institute Systems Engineering Capability Maturity Model, V1.1, and shall operate at a minimum compliance of Level 3. The Contractor's system engineering processes shall be established with guidance by ANSI/ASQ-9001 and EIA/IS-632 or equivalent standards. The Contractor shall utilize a process that scales appropriately to the level of risk, complexity, and cost of the activities supported by the process so that burdensome and costly paperwork, bureaucracy, and procedures are minimized without degradation to the integrity of the process or the value of the products produced.

C7.5.5.3 Systems Engineering Project Management

The Contractor shall utilize NSF provided guidance for systems engineering, to include the publication *United States Antarctic Program Systems Engineering Handbook*, as cited in Section C4.

C7.5.5.3.1 Project Planning Records

The Contractor shall maintain a database of engineering project planning that exists in the varying stages of the systems engineering life cycle, to include: proposal, feasibility, pre-definition, definition, capital planning, implementation, and test/acceptance. The Contractor shall use a standard and consistent format for all engineering plans. The Contractor shall make this information available to NSF as required and in formats suitable to NSF.

C7.5.5.3.2 Project Planning Collaboratory

The Contractor shall develop, provide, host, administer, and maintain a collaborative electronic project management Intranet system via the use of Internet accessible World-Wide Web technology, to include the following attributes: on-line access to engineering project documents, plans, schematics/drawings, meeting minutes, action items, discrepancy reports, schedules, and schematics; definition of unique project management environments that address all project activity for a specific project; on-line status tracking of action item status, per project; bulletin board postings of general project team interest; electronic mail list server and list management for project specific mailing; on-line multi-party collaborative editing of project documentation in development; and electronic chop and approval with digital signatures for project document and process approval. The Contractor shall maintain the currency of all on-line accessible information. This system shall serve as primary means for distributed Integrated Product Team project management for NSF and other participating organizations. The Contractor shall deliver completed Intranet collaboratory no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the Intranet, the Intranet shall be updated, utilized, and updated as required by the Contractor. Implementation of the Intranet collaboratory shall be managed under the annual Program Plan.

C7.5.5.4 Software Engineering Process

As specified in Section C7.5.2.1, the Contractor shall utilize non-developmental and commercial software products wherever possible. In cases where custom development is required or modification of generic software products to specific program needs is required, the Contractor shall follow a systematic and structured software engineering and development process.

The Contractor shall utilize generally accepted industry practices for software engineering. The Contractor shall benchmark its process against the Software Engineering Institute Capability Maturity Model for Software, V1.1, and shall operate at a minimum compliance of Level 3. At contract award, the Contractor shall provide to the Government a plan regarding the Contractor's approach to USAP software development and applications requirements. The Contractor's software engineering processes shall be established by taking guidance from ANSI/ASQ-9001 and EIA/IS-632 or equivalent standards. The Contractor shall utilize a process that scales appropriately to the level of risk, complexity, and cost of the activities supported by the process so that burdensome and costly paperwork, bureaucracy, and procedures are minimized without degradation to the integrity of the process or the value of the products produced.

C7.5.5.5 Engineering Technical Support

The Contractor shall provide Engineering Technical Support services, which will encompass: drafting and/or CAD development of electronic technology systems plans and schematics; technical writing; technical documentation development and maintenance (manuals, user guides, formal reports); development and maintenance of standards, references, and technical data specifications; electronic technology development and/or review, including bench-level instrumentation, prototype breadboard construction, testing, evaluation, and integration; instrumentation; grantee equipment interface development and testing; environmental testing; and readiness testing

C7.5.6 IT Infrastructure and Operations Support

C7.5.6.1 Current Requirements

The Contractor shall provide technical and operational support in the topical areas outlined below. The support shall consist of the provision of service, technical operations, sustaining maintenance, configuration management, sustaining engineering, integrated logistics support, and life cycle management. The Contractor shall furnish, install, test, operate, maintain, and decommission systems and services as required to meet USAP mission needs.

C7.5.6.1.1 Communications and Transmission Systems

The Contractor shall provide skilled and trained staff with industry recognized training, certification, or relevant experience in satellite communications, satellite earth station, telephony, and telecommunications. The contractor shall demonstrate the proficiency of its workforce, to include the following or equivalent: National Association of Radio and Telecommunications Engineers Telecommunications Certification and Endorsements for: Telephony Technology, Photonic Systems and Devices, and, Installation and Services.

C7.5.6.1.1.1 Satellite Systems

The Contractor shall support all tasks involved in the operation and maintenance of terrestrial earth stations for commercial fixed and mobile satellite service, terrestrial earth stations for experimental fixed satellite service, maritime ship earth stations, and low earth orbit satellite store/forward data communications ground terminal equipment. Support shall include the interface of the satellite systems with the premises, station/facility telecommunications infrastructure (wire/cable plant, switched voice network, LAN and data network), and satellite and terrestrial service provider networks for end-to-end service.

Current satellite systems used by USAP which shall be supported by the contractor include: McMurdo/Black Island 11 meter C-Band INTELSAT IBS satellite earth station complex,; INMARSAT land earth stations at McMurdo Station (Standard-A), Palmer Station (Standard-B), and field use (Standard-C); research vessel (PALMER, GOULD) INMARSAT Standard-B high speed ship earth stations; Service ARGOS emergency personal indicator rescue beacons (EPIRB); South Pole Station GOES-3 and TDRS F1 satellite earth stations; and, South Pole and Palmer Station LES-9 earth stations.

C7.5.6.1.1.1.1 Operations Requirements

The Contractor shall operate INTELSAT earth stations per INTELSAT Space Segment Operating Guide (SSOG) guidelines and in accordance with INTELSAT Earth Station Standards (IESS). The Contractor shall operate INMARSAT earth and ship terminals in accordance with INMARSAT guidelines and procedures. The Contractor shall operate LES-9 satellite earth stations in accordance with access terms and conditions specified by DoD per DoD monthly access authorizations or other direction obtained by the Commander Operation Deep Freeze. The Contractor shall operate GOES-3 earth stations in accordance with NSF guidance and as managed by the University of Miami, which currently serves as the satellite space segment operator.

C7.5.6.1.1.1.2 Exclusions

The Contractor support for satellite communications for the USAP shall not include tactical military satellite communications, which shall be provided by SPAWAR Systems Center Charleston or other DOD activity. The Contractor may be required to install, interface, or operate equipment provided for this purpose.

C7.5.6.1.1.2 Long Lines, Common Carrier Transmission, and Telecommunications Service

The Contractor shall provide and support the provision of common carrier transmission and telecommunications service to support USAP Antarctic stations, research vessels, and non-Antarctic logistics staging and operations centers. Support shall include circuit specification, installation, and management; billing and accounting management; USAP account management, to include charge back billing to individual USAP internal/external

customer accounts; waste, abuse, and security management; quality and performance monitoring; trouble reporting and fault resolution; addition of new service; tariff negotiation; and, volume traffic rate structures. The Contractor shall adapt telecommunications service to meet the evolving mission needs of the USAP.

The Contractor shall provide for the full range of telecommunications service, to include: switched voice service via the Public Switched Voice Network, packet switched and circuit switched data via public networks (e.g., ISDN, Frame Relay, Internet, Switched56), and leased private data circuits (e.g., T1, FT1). The Contractor shall provide for telecommunications feature services, to include: Telex, voice mail, facsimile service, paging, cellular and wireless PCS service, and 800 toll-free service.

C7.5.6.1.1.2.1 Quality of Service Requirements

The contractor shall provide consistently high levels of operational availability of telecommunications and telephone service. The contractor shall utilize professional telephone services and management to provide this service. The contractor shall ensure that the telecommunications functions have a qualified talent pool from which to draw to ensure skilled coverage for austral summer and austral winter operating periods of Antarctic stations.

C7.5.6.1.1.2.2 Campus Telephony and Transmission Networks

The Contractor shall provide the information infrastructure for the USAP, to include the installation, configuration, repair, management, and design of premises and campus/base cable plant and outside plant. The Contractor shall adhere to applicable industry standards as cited in Section C4 of this solicitation.

C7.5.6.1.1.2.2.1 Station/Base Level Service

The Contractor shall provide all station and base level telecommunications infrastructure and services for McMurdo, South Pole, and Palmer Stations. The Contractor shall provide telecommunications service and infrastructure where required for the logistics staging centers in Christchurch, New Zealand and Port Hueneme, California, and interface to existing Government furnished telecommunications resources where provided.

C7.5.6.1.1.2.2.2 Central Office Operations

The Contractor shall be responsible for the central office services and operations necessary for the support of switched voice service. The Contractor shall provide particular emphasis to the operations of the McMurdo Central Office, which has the complexity and mission criticality of a commercial grade central office of a small town in the U.S. The Contractor shall be responsible for a full range of central telecommunications service support at the Antarctic stations, to include: published subscriber directory, on-call trouble resolution, common carrier management, and subscriber services.

C7.5.6.1.1.2.2.3 Telecommunications Wire and Cable Plant

The Contractor shall be responsible for the copper and fiber optic wire and cable inside and outside telecommunications plants at all three Antarctic stations and research vessels. The Contractor shall be responsible for NSF provided inside and outside cable plant for the Christchurch, New Zealand, logistics facility in all cases where existing lease provisions with the facility owner do not provide the required infrastructure. The Contractor shall be responsible for the management and servicing of move, add, and change requirements needed to meet internal and external customer needs and changing USAP mission needs.

C7.5.6.1.1.2.2.4 Telecommunications Wire and Cable Plant Management System

The Contractor shall be responsible for the development, implementation, and sustained utilization of a wire, cable, and circuit management information system for all Antarctic stations and non-Antarctic logistics centers. This system shall be kept updated to reflect all moves, adds, and changes and to reflect existing and new service segments of the outside cable plant.

C7.5.6.1.1.2.2.5 Electronic Transmission Systems

The Contractor shall be responsible for the optical, electronic, and radio communications transmission systems that represent the transmission component of the station and base level transmission systems. Characteristic examples include: high speed digital subscriber line (HDSL) modems and distribution hubs, channel service units, data service units, digital channel banks, T1 and FT1 trunk multiplex equipment, digital telephony trunked microwave systems, multi-mode/single mode fiber optic transmission and receiver units.

C7.5.6.1.1.3 Radio and Wireless Communications

C7.5.6.1.1.3.1 General Requirements

The Contractor shall support terrestrial radio and wireless communications at all Antarctic stations and at the non-Antarctic logistics centers. The Contractor shall be responsible for the installation, operations, maintenance, and evolution of the installed systems.

C7.5.6.1.1.3.1.1 Service Exclusions

C7.5.6.1.1.3.1.1.1 Aeronautical Mobile Infrastructure

The Contractor support for the USAP radio and wireless communications infrastructure shall not include military and commercial aviation ground-to-air communications in the ITU AERONAUTICAL MOBILE bands, which shall be provided by SPAWAR Systems Center Charleston or other Government activity.

C7.5.6.1.1.3.1.1.2 Air Traffic Management Communications

The Contractor support for the USAP HF radio communications network control and operator services shall not include as a primary responsibility the function of providing air traffic control and official flight following ground-to-air communications. The primary responsiblity for this function is provided by SPAWAR Systems Center Charleston of other Government activity. The Contractor shall provide on-demand support to the official flight following ground-to-air communications as required and requested by the officially designated provider, to include the relay of aircraft communications via Contractor operated radio communications centers when direct communications between the aircraft and the officially designated provider's communications center is not possible. In such cases the Contractor shall perform all radio communications support per the operational procedures identified by the requesting party.

C7.5.6.1.1.3.1.2 Radio Frequency Spectrum Management Compliance

The Contractor shall abide by relevant national and international radio frequency spectrum management and operations regulations for all sites external to NSF managed Antarctic facilities. The Contractor shall abide by NSF specified radio frequency spectrum management and operations guidelines and policies for all Antarctic sites and facilities. The Contractor shall provide radio communications systems and operations in conformance with USAP radio frequency spectrum utilization, coordination, and management plans as administered by SPAWAR Systems Center Charleston by direction and approval of NSF.

C7.5.6.1.1.3.1.2.1 Electromagnetic Compatibility and Interference Control

The Contractor shall maintain on-site at Antarctic stations the technical capabilities to address the operational management of electromagnetic interference (EMI) and to assess electromagnetic compatibility (EMC) issues that arise during the course of seasonal and annual operations at Antarctic sites. Particular emphasis shall be given to McMurdo, South Pole, and Palmer Stations which have radio science based research that can be subject to harmful interference from operational communications, navigation, surveillance, industrial, and domestic sources. The contractor shall be capable of resolving EMI situations over a large span of spectrum, from ELF up through submillimeter microwave. Additionally, the contractor shall be responsible for EMI resolution at the NASA

McMurdo Ground Station for space data communications, which has particular spectrum management concerns in the L-Band, S-Band, and X-Band regions.

C7.5.6.1.1.3.1.2.2 Operational Integrity Requirements

The Contractor shall insure the operational integrity of communications systems under the direct control of the Contractor to ensure that performance is not degraded due to co-interference. The Contractor shall coordinate technically and operationally with other tenant organizations, such as SPAWAR Systems Center Charleston who has operational communications, navigation, and surveillance equipment, to ensure Contractor operated systems do not cause harmful interference and to ensure that tenant systems do not cause harmful interference to Contractor provided or operated systems.

C7.5.6.1.1.3.1.2.3 Coordination and Planning

The Contractor shall coordinate all RF spectrum related planning, systems design and development, field operations, grantee support, and field installations of emitting or susceptible equipment with the NSF designated USAP RF Spectrum Manager, provided by SPAWAR Systems Center Charleston. The Contractor shall modify planning as required to meet coordination and RF spectrum management requirements for the USAP as managed by the Spectrum Manager.

C7.5.6.1.1.3.1.3 Technical Qualifications

The Contractor shall demonstrate the proficiency of its staff via industry accepted certification, licensing, training, or equivalent professional experience such as that available from the National Association of Radio and Telecommunications Engineers, to include: Certified Electronics Technician and Telecommunications Certification (Ground-to-Ground Distribution Endorsement, VLF through EHF Radio Endorsement, EMI/EMC Certification).

C7.5.6.1.1.3.1.4 USAP Communications Plan

The Contractor shall develop, publish, and maintain a USAP Communications Plan. This plan shall incorporate tactical and strategic communications data, to include: procedures, operating frequencies, RF spectrum plans, guidelines, lines of authority, radio call signs, telephone numbers, AUTODIN/Defense Message System data, and official electronic mail addresses. The scope of the plan shall address USAP operational communications with an emphasis on command-control communications, inter-operations with forward deployed DoD elements, and tactical communications within the Antarctic operating region and is intended to be a summary level in-theater operating guide and reference. The Contractor shall prepare the plan with guidance from NSF and the Commander Operation Deep Freeze. The Contractor shall ensure that it has obtained stakeholder input from all USAP operational support organizations. In the report, the Contractor shall make recommendations to NSF for techniques, processes, and procedures. The NSF shall be the cognizant ownership authority and final approval authority for the plan. The initial plan shall be completed and delivered no later than 8 months following contract award. The plan shall be updated annually with a final draft presented to NSF for review in May of each year.

C7.5.6.1.1.3.2 HF Radio Communications

The Contractor shall provide regional and long haul HF radio communications, which includes both radio operator communications functions and the physical equipment. Refer to Section 0 for related changes anticipated in the HF radio communications infrastructure.

C7.5.6.1.1.3.2.1 Scope of Service

The Contractor shall support HF radio communications at all Antarctic stations and for the Christchurch, New Zealand, logistics center. The contractor shall support the following mission activities for long and short range HF radio communications services: flight following communications, flight services/operations communications, science field party and field camp operations and safety communications, search and rescue communications, tactical

operational communications with ocean vessels supporting the USAP, and USAP inter-station operational communications, and communications with international Antarctic operators and stations. Services provided shall include: simplex voice, remote patching, radiotelephone patching, computer-computer data communications, and radio teletype communications. Descriptions of HF communications service requirements may be found in the SPAWAR Systems Center Charleston document, *Mission Operational and Technical Requirements for the McMurdo Station HF Radio System.*

C7.5.6.1.1.3.2.2 Field Communications Provisioning

The Contractor shall provide, equip, outfit, and train field party and field camp operations personnel with deployable HF radio communications equipment. The Contractor shall provide on-site set-up of equipment at remote field camps as required. The Contractor shall maintain sufficient inventory of equipment to meet projected needs.

C7.5.6.1.1.3.2.3 International Antarctic Center HF Radio Requirements

The Contractor shall provid HF radio communications infrastructure, maintenance, and local distribution to support the Commander Operation Deep Freeze, 109th Air Wing ANG, and USAF Air Mobility Command Christchurch, New Zealand, operations as required. The Contractor shall provide the infrastructure in the form of a simple subscriber controlled system operating under outsourcing arrangements with local New Zealand radio communications providers or other such low cost, low effort means recommended by the Contractor. The Contractor shall utilize Government Furnished Equipment in the form of existing antennas sited on leased property in the vicinity of the Christchurch International Airport if the Government determines this to be in its best interests.

C7.5.6.1.1.3.2.4 Technical Control and Radio Center Operations

For the Antarctic stations, the Contractor shall provide technical control and radio center operations for net control, dispatch, message relay, safety monitoring, customer walk-up service, radiotelephone patch, and on-call back-up to official air traffic control flight following communications (provided by SPAWAR Systems Center Charleston).

C7.5.6.1.1.3.2.5 Research Vessel Communications

The research vessels operate under the Global Maritime Distress and Safety System (GMDSS) rules with primary communications provided as a responsibility of the ship operator. The Contractor shall provide secondary non-GMDSS HF radio communications equipment and operations, as required, specifically to support the science missions of the vessels.

C7.5.6.1.1.3.2.6 Operational Qualifications

The Contractor shall provide operating procedures, on-going training plans, and skilled staff versed with the unique skills required for HF radio communications. The Contractor shall provide continuing demonstrated proficiency to manage effective HF radio communications in the polar environment via annual lessons learned reviews of operating procedures and training. The Contractor shall demonstrate the proficiency of its staff via industry accepted certification, licensing, training, or equivalent professional experience, depending upon the skill and experience level required, to include: FCC General Radiotelephone Operator's License, FCC Marine Radio Operator Permit, and FCC Third Class Radiotelegraph Operator's Certificate.

C7.5.6.1.1.3.3 Land Mobile and Marine Mobile Communications

The Contractor shall provide regional VHF FM Land Mobile Radio (LMR) and VHF FM Marine Mobile (MM) radio communications for all Antarctic stations and the non-Antarctic logistics centers (as required). South Pole Station has no FM MM radio communications requirement.

C7.5.6.1.1.3.3.1 Scope of Service

The Contractor shall provide, maintain, and operate master base stations at dedicated communications sites with remote interfaces, small desk-top base stations, hand-held radios, and field deployable repeater transceivers.

C7.5.6.1.1.3.3.2 Field Communications Provisioning

The Contractor shall provide, equip, outfit, and train field party and station operations personnel with deployable or portable VHF radio communications equipment. The Contractor shall maintain sufficient inventory of equipment to meet projected needs.

C7.5.6.1.1.3.3.3 Vehicle Fleet Communications

The Contractor shall provide, install, and maintain land mobile radio equipment in the USAP light and heavy vehicle fleets located at all Antarctic stations. The primary requirment for this capability exists at McMurdo Station, with a small requirement existing at South Pole Station and an incidental requirement existing at Palmer Station. The primary requirement at Palmer Station exists for small boating maritime portable equipment.

C7.5.6.1.1.3.3.4 Remote Land Mobile Systems Requirements

The Contractor shall provide for annual mission support planning, deployment, repositioning, and continued development of semi-fixed, field deployable, and air-liftable "fly-away" repeater capablity used to support extended terrestrial communications between McMurdo Station communications centers and semi-mobile, fixed, and aeromobile (helicopter) subscribers located throughout the McMurdo Sound-Ross Island region and the Dry Valley system, typically within a radius of 200 miles from McMurdo Station. The Contractor shall include as a component of mission planning the resources to evaluate and compensate for terrain effects, shadowing, propagation, simulcast, and other debilitating effects on LMR operations.

C7.5.6.1.1.3.3.5 Radio Center Operations

The Contractor shall provide radio communications center operations and remote access to support: general dispatch, net control, vessel hailing, small boating operations, field party operations and management, helicopter dispatch, vehicle operations and dispatch, fueling operations management, search and rescue coordination, crash/fire dispatch and emergency coordination, safety monitoring, hazardous/spill response dispatch and coordination, medical emergency dispatch, and other radio communications operations as required to support routine and emergency operations.

C7.5.6.1.1.3.3.6 Operational Qualifications

The Contractor shall provide skilled and trained staff with public safety dispatch radio communications or military tactical communications experience or related industry recognized training, certification, or experience to provide radio communications operations for McMurdo Station. The Contractor shall review and implement operational procedures that conform to standard and best practices in the public safety communications industry as sanctioned by the Association of Public safety Communications Officers, International (APCO International). The Contractor's operations shall conform to NFPA Job Performance Standard 1061.

C7.5.6.1.1.3.4 Paging and General Wireless Communications

The Contractor shall provide commercial wireless paging and general personal communications service (PCS) services for the non-Antarctic logistics centers as required to support effective operations. Service shall include the issue, subscriber management, and repair of personal pagers. The Contractor shall maintain sufficient inventories of equipment to meet projected needs.

C7.5.6.1.1.3.4.1 McMurdo Paging Station Service

The Contractor shall provide and support McMurdo Station wireless paging infrastructure and operations for Antarctic stations. The Contractor shall enable interfaces to the paging system to include: interconnection to automated management systems that automatically trigger paging notification to summon maintenance personnel, interconnection to external telecommunications telephone access, and establishing/maintaining subcriber and subscriber page-group system configurations. The Contractor shall issue and manage subscriber paging equipment.

C7.5.6.1.1.3.4.2 Rural Telephony/Radio Telephone Communications

The Contractor shall provide and support wireless radio telephone systems and point-to-point links for the provision of station-level and international telephone access to remote areas and areas not serviced by the station base-level wireline infrastructure, as required.

C7.5.6.1.1.3.4.2.1 McMurdo Regional Service Requirements

The Contractor shall provide specific rural telephony service to the greater McMurdo area, McMurdo Sound region, and selected sites in the Dry Valleys region. McMurdo area and McMurdo Sound region communications can include, but shall not be limited to: McMurdo campus work-sites not connected to the McMurdo wire&cable plant, the runway/aerodrome complexes (Williams Field, Mobile Runway Support Facility/annual ice runway, Pegasus blue ice runway), Black Island Telecommunications Facility, Marble Point Facility, USCG icebreakers operating within range, field camps, and science huts ("fish huts") located on annual sea ice.

C7.5.6.1.1.3.4.2.2 Field Communications Provisioning

The Contractor shall provide, equip, outfit, and train field party and field camp operations personnel with deployable radio telephone equipment. The Contractor shall maintain sufficient inventories of equipment to meet projected needs. The Contractor shall furnish and install repeater equipment as required to reach subscriber sites beyond line of sight to McMurdo Station. The Contractor shall provide service support out to a minimum radius of 100 miles from McMurdo Station and shall extend or change service as required.

C7.5.6.1.1.3.5 Antenna Erection and Maintenance

The Contractor shall provide all of the resources required for the erection and maintenance of antennas at all stations and field camp sites, to include: maintain and repair towers, curtains, elements, and feed cable of all installed plant radio communications antennas (HF, VHF, and others). The Contractor shall perform routine electrical and mechanical tests, document findings, and repair as required. The Contractor shall provide a rapid call-out response to repair mission critical antenna systems.

C7.5.6.1.1.3.5.1 Space and Satellite Communications Systems Requirements

C7.5.6.1.1.3.5.1.1 Radomes and Enclosures

The Contractor shall provide all inspection, test, repair, and replacement of the satellite communications systems radomes located in Antarctica. The Contractor shall exercise particular care with the metal space frame radomes and implement a reliability centered predictive maintenance management plan to detect and prevent early damage. The Contractor shall support radome maintenance to include, but not limited to, the following: NASA McMurdo Ground Station, NASA McMurdo TDRSS Relay (Black Island), NSF Unattended Satellite Earth Station (Black Island), McMurdo NOAA/TIROS-N and DMSP earth stations, NASA McMurdo Automatic Interactive Launch System , and Palmer Station NOAA/TIROS-N/DMSP earth station..

C7.5.6.1.1.3.5.1.2 Antennas

The Contractor shall support erection and maintenance of satellite communications earth station antennas, to include: the NSF Unattended Satellite Earth Station; NASA Automatic Interactive Launch System (NAILS; McMurdo); NASA McMurdo TDRSS Relay; NOAA/DMSP satellite direct read-out remote sensing earth stations (McMurdo, Palmer Stations); GOES-3 satellite communications system (South Pole Station); and LES-9 and ATS-3 satellite communications systems (Palmer and South Pole Stations).

C7.5.6.1.1.3.5.2 HF Radio and Land Mobile Radio Requirements

The Contractor shall provide specific antenna support to include: the McMurdo Transmitter Site HF and VHF radio antenna farm; the Black Island Telecommunications Facility HF antenna farm; Palmer Station HF antennas; and South Pole Station HF antenna farm. The Contractor shall provide antenna maintenance for USAP installed antenna infrastructure.

C7.5.6.1.1.3.5.3 Science Support Services

The Contractor shall provide direct support to grantees for antenna tower installation and maintenance requirements, to include radio science research systems located at the McMurdo Station Arrival Heights Laboratory, Palmer Station VLF experiments, and other locations as required.

C7.5.6.1.1.4 Broadcast and Cable Systems

The Contractor shall provide radio and television service at Antarctic stations as a consequence of a Memorandum of Agreement (MOA) between the NSF and the U.S. Navy Media Center, who operates as an agent of the Armed Forces Information Service (AFIS). An additional agreement between the NSF and the U.S. Navy Motion Picture Service provides first run motion pictures on video cassette for the use of the US Antarctic Program. The MOA governs the conduct and operation of NSF and these guidelines and stipulations are pass-through requirements to the Contractor. The Contractor shall ensure fidelity in compliance with all terms and conditions stipulated by the supplying organizations. The Contractor shall provide a dedicated Station Manager to serve as the single point manager for all DoD provided broadcast and motion picture services.

C7.5.6.1.1.4.1 Broadcast Video and Radio Studio

The Contractor shall provide local redistribution operations for direct downlink satellite video feed from the AFIS Armed Forces Radio and Television (AFRTS) live satellite feeds recovered at McMurdo Station and Christchurch, New Zealand.

C7.5.6.1.1.4.1.1 General Operations Requirements

The Contractor shall operate, install, and maintain equipment provided by the Navy Media Center for the purpose of supporting US Antarctic Program radio and television broadcast services. This equipment is provided at no cost to the NSF under the terms of the MOA. The Contractor shall coordinate directly with the Navy Media Center for guidance on equipment management issues, and the Contractor shall keep NSF informed regarding moves, adds, changes, and general status.

C7.5.6.1.1.4.1.2 Public and Operations Information

The Contractor shall facilitate the production and dissemination of public information of general interest, station operations information, weather conditions, flight management information, and any other information source identified as valuable or beneficial to the conduct of daily affairs at the Antarctic stations and the Christchurch, New Zealand, logistics center. The Contractor shall provide electronic dissemination outlets on the cable and broadcast radio systems for this information, as appropriate.

C7.5.6.1.1.4.1.3 Christchurch, New Zealand, Operations Requirements

The scope of operations for the Christchurch service shall be limited to automatic feed of programming to be combined with locally generated program operations information. This information is rebroadcast on the local cable system.

C7.5.6.1.1.4.1.4 McMurdo Station Operations Requirements

The scope of operations for the McMurdo service shall include, but shall not be limited to: automatic feed of satellite multi-channel video and broadcast radio channels for rebroadcast on the local cable system; scheduled airing of first run motion pictures and AFRTS provided pre-packaged programming; operation of a general public information channel for station information; operation of specialty information outlets for station operations information, to include aircraft flight information and weather; and radio station operations for automatic rebroadcast of satellite audio programming feeds and volunteer live radio shows; routine equipment alignment and maintenance per NMC specification; inventory control of video and audio materials; enforcement of copyright infringement restrictions.

C7.5.6.1.1.4.2 Cable Television Distribution

The Contractor shall operate, maintain, manage, extend, and modernize the base cable television distribution systems located at the Antarctic stations and the Christchurch, New Zealand, logistics center. The scope of responsibility shall include, but shall not be limited to: Christchurch TVRO antenna system, McMurdo/Black Island antenna feed recovery and multi-channel UHF radio studio link transmission systems, Black Island telephone system studio link audio distribution system, studio systems, head end modulator systems, character/message generator systems, outside cable plant, premises cable plant/inside plant, premises active and passive distribution systems, subscriber cable outlets, and moves/adds/changes in service, both at the trunk distribution level and at the subscriber level.

C7.5.6.1.1.4.3 Audiovisual Production

The Contractor shall provide the means to create original audiovisual programming for the purpose of supporting official US Antarctic Program activities, to include: morale at Antarctic stations, documentation of activities and research for public affairs utilization, educational outreach and distance learning projects and initiatives, industrial training, and operational management. The Contractor shall utilize field production only where warranted. Characteristic activities include: documenting McMurdo Sunday Night Science Lectures for delayed rebroadcast on the McMurdo cable system, production of a limited number of 30 second news clips for electronic press release on USAP field research, production of stock footage for use by the Contractor or other production houses authorized by NSF, and production and annual update of industrial training videos for safety, waste management, and helicopter operations.

All audiovisual productions created by the Contractor shall be submitted to NSF editorial review and approval, unless otherwise directed by NSF.

C7.5.6.1.2 Computing, Data Center, and Network Systems

C7.5.6.1.2.1 General Requirements

The Contractor shall provide wide area networking infrastructure, station-level data centers, data network backbone infrastructure, science general computing equipment and applications software, office automation desk-top computing equipment and software, file/print services and peripherals, and related automatic data processing equipment associated with Local Area Network functions and services at all Antarctic stations, non-Antarctic logistics centers, and research vessels in support of US Antarctic Program activities.

C7.5.6.1.2.1.1 Scope of Support

The Contractor shall serve as the principle US Antarctic Program supplier of computing and data networking infrastructure. This shall include the provision and management of desk-top computers, general use office automation software, and specialty software intended for USAP mission support. The Contractor shall be responsible for the administration of NSF Information Resource Management directives pertaining to the US Antarctic Program, to include the definition and management of common operating environment standards for computing equipment and software.

C7.5.6.1.2.1.2 Information Security Requirements

The Contractor shall operate all computing, data center, and network systems in accordance with effective information security measures and NSF requirements. The Contractor shall develop and specify recommended measures to be utilized for delivery at contract award. The Contractor shall support the development of a formal information security plan as identified in Section C7.5.3.5.5.

C7.5.6.1.2.1.3 Operational Qualifications

The Contractor shall provide skilled and trained support with industry recognized training, certification, or relevant professional experience in network systems technical repair, LAN/WAN/data communications, LAN/WAN operations, and LAN/telephony local/inside wire/cable plant, to include: Building Industry Consulting Services International (BICSI) Telecommunications Association Communications Distribution Designer/LAN Specialist Certification; National Association of Radio and Telecommunications Engineers (NARTE) Telecommunications Certification, Networks (LAN/WAN) Endorsement, Telecommunications Certification Installation and Services; and Electronic Technicians Association Certified Network Systems Technician. The Contractor shall provide support with requisite vendor certifications for operations, applications management, or sustaining engineering for all high priority and mission essential software systems, such as: Novell operating systems, Microsoft server operating systems, and equivalent. The Contractor shall ensure that all field operations and maintenance personnel are properly trained and schooled on the equipment and software systems in use.

C7.5.6.1.2.2 Wide Area Networks

C7.5.6.1.2.2.1 Scope of Service

The Contractor shall be responsible for and provide the data communications necessary to interconnect the Antarctic stations, research vessels, non-Antarctic logistics centers, and any other designated USAP operational installation into a wide area data communications network. The contractor shall initially operate and maintain the present architecture utilized by the US Antarctic Program which consists of private network and public network links, per Section C7.5.6.1.1.2, to provide either direct Internet access or access to host computer systems with direct access to the Internet. The present wide area networking infrastructure is described in Section C6.

C7.5.6.1.2.2.2 Quality and Type of Service

The Contractor shall provide high availability service for the data communications networks and shall provide types or service as required to meet USAP mission needs and technical architecture development requirements. For the purposes of this solicitation, the combination of voice service with data communications via any number of recent and new technologies, such as voice-over-IP, voice-over-Frame Relay, or digital video, shall be included in the concept for the service provided.

C7.5.6.1.2.3 Campus and Local Area Networks

C7.5.6.1.2.3.1 Scope of Service

The Contractor shall provide all station and base Local Area Network infrastructure. This shall apply to all Antarctic stations, non-Antarctic logistics staging centers, and research vessels. The Contractor shall be responsible for the backbone infrastructure and fringe distribution systems for end-to-end transport service from the individual

subscriber service port to the central data center. The Contractor shall provide all manner of support, to include: preventative and corrective maintenance, operations, performance monitoring, trouble resolution, and performance tuning and improvement.

C7.5.6.1.2.3.2 Quality of Service Requirements

The Contractor shall provide high availability and low congestion LAN transport services to support data center and applications requirements.

C7.5.6.1.2.3.3 Operations Requirements

The Contractor support responsibilities shall include, but shall not be limted to: local administration requirements for TCP/IP networking, such as firewall management, domain name server management, IP number assignment, subnet partitioning and management, IP packet shaping, network router performance monitoring and performance statistics analysis, SNMP performance monitoring, central network center network management station monitoring and management, wire/cable and distribution management and installation, and subscriber service management. The Contractor shall provide for systems administration and configuration management, to include software/firmware maintenance and revision-level control for all computing platforms, remote access devices, data communications/transmission equipment, and network routing and switching equipment.

C7.5.6.1.2.4 Computing Systems

C7.5.6.1.2.4.1 Scope of Service

The Contractor shall provide, administer, and maintain desk-top computers and workstations required at Antarctic stations, non-Antarctic logistics centers, and research vessels. The Contractor shall serve as a principal source of supply for USAP desk-top computing needs, although other tenant organizations may elect to obtain computing equipment via other means. The Contractor shall provide all maintenance support at Antarctic stations for computing equipment. This requirement shall apply equally to grantee and operational service communities.

C7.5.6.1.2.4.2 Configuration Management Requirements

C7.5.6.1.2.4.2.1 Common Operating Environment Profile

The Contractor shall maintain and update a common operating environment for Antarctic stations and research vessels computing hardware and software profile that NSF issues as a configuration standard for all Contractor and tenant USAP logistics support organizations to utilize for IT/IS acquisitions performed either by the Contractor's central IT support group or by other organizations seeking central IT support at Antarctic stations and on research vessels.

C7.5.6.1.2.4.2.2 Desk-top Systems Management Requirements

The Contractor shall be responsible for inventory asset management for all Antarctic stations equipment that must be relocated between austral summer and austral winter seasons. The Contractor responsibilities include, but shall not be limited to: tracking functional ownership of specialty configuration computers, seasonal decommissioning of systems in buildings vacated and winterized, and management of warm-storage inventory. The Contractor shall be responsible for restoring from storage specific computers or computer configurations to customer base subscribers with specific equipment ownership or configuration requirements.

C7.5.6.1.2.4.3 Customer Support Requirements

C7.5.6.1.2.4.3.1 Technical Support

The Contractor shall provide on-call maintenance and configuration support for internal and external customers at all Antarctic stations, non-Antarctic logistics centers, and research vessels. The Contractor shall provide ancillary computing systems support, to include file storage and print service peripheral equipment as required to meet USAP internal and external customer requirements at these locations.

C7.5.6.1.2.4.3.2 Help Desk and Applications Support

The Contractor shall provide subscriber customer support services for internal and external customers, to include: call-center help desk support, on-call technical support to the subscriber's location, interface assistance of subscriber equipment to the local LAN environment and central LAN services, applications training for common general use software applications, and specialty training for mission unique software supplied/supported by the Contractor. The Contractor shall host and administer special applications software provided by internal and external customers that require operation in the data center environment.

C7.5.6.1.2.5 Network Data Centers

C7.5.6.1.2.5.1 Scope of Service

The Contractor shall provide all central site data center infrastructure and services at all Antarctic stations, non-Antarctic logistics centers, and research vessels. Characteristic data center infrastructure includes: file/data storage arrays and servers, distributed printers, CD-ROM towers, applications servers, network and applications management systems, common-use and specialty applications and network operations software, archive back/restore systems, network security systems, inventory management systems, help desk systems, electronic mail systems, mission operations database systems, remote access software systems, and computer anti-virus management systems.

C7.5.6.1.2.5.2 Operational Requirements

The Contractor shall be responsible for common data center operations functions, to include: email account registration and administration, LAN user account registration and administration, public file storage system administration and fault recovery, systems administration of mission operations software applications such as inventory management and computerized maintenance management databases, LAN directory management, LAN operating system configuration and administration, applications performance monitoring and fault recovery, and distributed file and print service administration.

C7.5.6.1.2.5.3 Quality of Service Requirements

The Contractor shall provide high availability network data center operations, applications software, and software systems. The Contractor shall ensure effective information security, physical security, and anti-virus measures are in effect.

C7.5.6.1.3 Command and Control, Navigation, and Surveillance Systems

The Contractor shall provide support to other tenant operations organizations for the operations and maintenance of command and control, navigation, and surveillance (CNS) systems. The Contractor shall provide telecommunications and radio communications services to support USAP CNS program activities, as required.

C7.5.6.1.3.1 Aeronautical Flight and Telecommunications Network

C7.5.6.1.3.1.1 Scope of Service

The Contractor shall provide access to the New Zealand Civil Aviation Authority's Aeronautical Flight Telecommunications Network (AFTN) to support the management of McMurdo air traffic control, flight following, and weather observation reporting functions provided by SPAWAR Systems Center Charleston. This capability is mission essential for USAP operations, and shall be the responsibility of the contractor.

C7.5.6.1.3.1.2 Telecommunications Support

The Contractor shall interface AFTN network services with USAP telecommunications and data networks for distribution to required operational sites within the International Antarctic Center (Christchurch, New Zealand), McMurdo Station, and other locations as required.

C7.5.6.1.3.1.3 Gateway Operations Support

The Contractor shall provide gateway computer operations at the Christchurch logistics center or via other equivalent access in New Zealand. The Contractor shall provide and manage the interconnecting telecommunications circuit that interfaces the Contractor managed equipment with the AFTN access node. At the present time, AFTN access is gained via the Christchurch International Airport, Ltd.

C7.5.6.1.3.1.4 Client and Gateway Software Support

The Contractor shall support the custom developed AFTN client and gateway software developed by the USAP to gain access to the New Zealand AFTN network. The Contractor shall serve as the custodian and maintainer of the software code. The Contractor shall be responsible for bug fixes, feature enhancements, and any other required software code changes, to apply both to the gateway and end-subscriber client software products. The Contractor shall maintain all software documentation.

C7.5.6.1.3.1.5 Quality of Service Requirement

The Contractor shall ensure a end-to-end high availability of the AFTN service.

C7.5.6.1.3.1.6 Operational Improvements Requirements

The Contractor shall investigate alternate means of providing equivalent or superior service that precludes the requirement for custom developed software.

C7.5.6.1.3.2 DoD Record Message Service

The Contractor shall provide data message center service for the McMurdo Station and Christchurch logistics center USAP operations. As part of this service, the contractor shall provide local receive dissemination and transmit injection of text message based communications with the DoD Automatic Defense Information Network (AUTODIN), a primary means for official communications for all forward deployed DoD activities supporting the USAP.

C7.5.6.1.3.2.1 Operational Requirements

C7.5.6.1.3.2.1.1 General

The Contractor shall provide message center service for interaction with the USAP central AUTODIN gateway provided by SPAWAR Systems Center Charleston in Charleston, SC. The Contractor shall support all client and distribution software in use, presently software produced by the U.S. Navy (Message Routing System, Message

Dissemination System, Message Text Formatter). The Contractor shall be responsible for all software operations, installation, maintenance, and update.

C7.5.6.1.3.2.1.2 Special

The Contractor shall be responsible for the installation, operations, and sustaining maintenance of 109th Airlift Wing Air National Guard provided firewall hardware/software and electronic mail systems intended to support sensitive-but-unclassified (SBU) communications via official record message traffic. The management and operation of this system shall require the close coordination between the Air National Guard, the Contractor, and SPAWAR Systems Center Charleston to ensure proper configuration and operations.

C7.5.6.1.3.2.2 Quality of Service Requirements

The Contractor shall provide message center operations to meet the performance requirements specifications of the DOD operational customer base, as coordinated by the Commander Operation Deep Freeze, unless otherwise directed by NSF, to include: hours of message center operations, cycle time of message handling, trouble/error notification, after-hours call-out and notification, and coordination with CONUS message centers.

C7.5.6.1.3.2.3 Future Requirements

The Contractor shall be responsible for supporting and assisting any future evolution of these message communications services to the Defense Message System. The Contractor shall provide all necessary engineering and operations support, to include IP network engineering, firewall engineering, electronic mail systems engineering and integration, and network management/operations.

C7.5.6.1.3.2.4 Tactical HF Radio Communications

C7.5.6.1.3.2.4.1 Scope of Service

The Contractor shall provide HF radio communications operations support for forward deployed DoD activities as required. Past operational support has included: relay of air traffic control and flight following communications between aircraft operating in the USAP managed airspace and the en route flight information region center run by SPAWAR Systems Center Charleston (MacCenter, McMurdo Station), radio teletype (RTTY) record message traffic communications relay for the US Coast Guard icebreakers operating in Antarctic waters; and, voice communications with Military Sealift Command and USCG icebreakers operating in Antarctic waters.

C7.5.6.1.3.2.4.2 Operational Requirements

C7.5.6.1.3.2.4.2.1 Maritime Support

The Contractor shall provide McMurdo Station message center service for store/forward message handling and for ship/shore and shore/ship relay HF radio transmission via data communications compatible with shipboard systems to support US Coast Guard icebreaker operations in Antarctic waters when propagation conditions for its direct HF service to Hawaii/California become impaired. Under these conditions, the Contractor shall support a diversion of record message traffic via the SPAWAR Systems Center Charleston AUTODIN gateway to/from McMurdo for end-to-end relay of communications with the icebreakers.

C7.5.6.1.3.2.4.2.2 Aviation Technical Services Support

The Contractor shall provide all routine HF radio communications infrastructure and operations in support of the SPAWAR Systems Center Charleston air traffic control and weather forecasting operations in McMurdo. Refer to Section 0 for planned modernization efforts, the role of the Contractor, and the relationship with SPAWAR Systems Center Charleston.

C7.5.6.1.3.2.4.2.3 South Pole Station Support for Aviation Communications

The Contractor shall provide support for South Pole Station HF communications relay for aviation communications as required, until such a time that improvements to the USAP communications architecture removes this necessity.

C7.5.6.1.3.2.4.2.4 Access Requirements

The Contractor shall provide and maintain remote access units to permit access to radio systems by DoD operational and work areas, as required. The Contractor shall provide this capabilty throughout the International Antarctic Center, to include all aircraft operationals spaces, and McMurdo Station as specified by the DoD customer base, unless otherwise notified by NSF.

C7.5.6.1.3.2.4.2.5 Other Support

The Contractor shall provide any other radio communication support to DoD activities supporting the USAP on an as required basis, subject to review and approval by NSF.

C7.5.6.1.4 Science, Data Acquisition, and Remote Sensing Systems

The Contractor shall provide and support special purpose and dedicated IT and IS systems and services for the USAP scientific research program and related activities.

C7.5.6.1.4.1 Marine Data Acquisition Systems

C7.5.6.1.4.1.1 Scope of Service

The Contractor shall provide the operations, maintenance, configuration, and management of the computer based data acquisition systems and data networks located on-board the research vessels supporting the USAP. These vessels have real-time data acquisition systems that interface to ship's standard marine electronics sensors and navigation equipment as well as to grantee supplied mission unique equipment. The Contractor shall provide configuration management and adaptation of the ships' systems to tailor the data acquisition scripts, hardware, and monitoring configuration to suit a particular cruise requirement. The Contractor shall coordinate with multiple grantees for optimal system configuration.

C7.5.6.1.4.1.2 Support Requirements

C7.5.6.1.4.1.2.1 Software Maintenance

As present systems on-board both vessels are unique custom designed systems, the Contractor shall provide all software maintenance to the code level, to include bug fixes and feature enhancements. The Contractor shall be provide on-board operations as required and shall provide user services to include training, data management, and mission planning.

C7.5.6.1.4.1.2.2 Sustaining Engineering and Development

The Contractor shall provide sustaining technical management and development of marine electronic data acquisition and management systems.

C7.5.6.1.4.1.2.3 Specialized Subsystems

The Contractor shall provide specialized operation and maintenance support for the NSF owned SeaBeam 2112 multibeam bathymetric swath sonar computing and software subsystems.

C7.5.6.1.4.2 Satellite Remote Sensing Systems

C7.5.6.1.4.2.1 Scope of Service

The Contractor shall support the USAP direct read-out satellite remote sensing data acquisition systems for recovery of low Earth orbit (LEO) satellite data from Earth exploration and remote sensing satellites. Products and systems supported shall include: Sea Space, Inc. Tera Scan satellite tracking and data acquisition systems located at McMurdo (2) for the recovery of NOAA Polar Operational Environmental Satellite (POES) data (AVHRR, DCS, etc.), DoD Defense Meteorological Satellite Program (DMSP) data (OLS, etc.), and Orbital Sciences ORBVIEW-2 ocean color data (SeaWiFS).

C7.5.6.1.4.2.2 Support Requirements

The Contractor provided satellite remote sensing systems support shall include: computer hardware maintenance, software support to internal and external customers, RF systems and electromechanical systems maintenance, vendor support contracts, and systems upgrades and modernization. The Contractor further provides support for: customer order desk, data manipulation, analysis, product generation, and product dissemination for the science research community requiring access to processed satellite imagery from all systems.

C7.5.6.1.4.2.2.1 Palmer Station

The Contractor shall provide for systems operations and data manipulation, to include tracking script management, orbit element maintenance, and image processing to support the Palmer Station Tera Scan system.

C7.5.6.1.4.2.2.2 McMurdo Station

The Contractor shall provide systems maintenance and management for external customers utilizing the two McMurdo Tera Scan systems for operational weather forecasting

C7.5.6.1.4.2.3 Future Systems

The Contractor shall support future satellite remote sensing requirements in the form of requirements definition, systems specification, systems or capability acquisition, sustaining operation and maintenance, and data handling and analysis on an as required basis.

C7.5.6.1.4.3 Autonomous Instrumentation Systems

C7.5.6.1.4.3.1 Scope of Service

The Contractor shall provide pre-deployment and on-going technical design and operations assistance to grantees who develop and deploy experimental research instrumentation intended to operate without direct physical interaction by the grantee. The contractor shall support remotely managed instrumentation techniques for instrumentation control via computer networks (e.g., Internet) and other telecommunications methods. The Contractor's assistance shall cover all technical disciplines necessary for the interface of grantee instrumentation to Antarctic station LAN, data communications, and/or telecommunications infrastructure.

C7.5.6.1.4.3.2 Support Requirements

The Contractor shall, as required, supply Antarctica on-site technical troubleshooting, repair, and instrumentation operations support per grantee instructions and guidance, to include: computer repair, software trouble diagnosis and bug fixes, operating system configuration and automated script troubleshooting, general electronics unit level and component level repair, software process monitoring, data extraction, data pre-processing, and data transmission.

C7.5.6.1.4.4 Data Management and Integration Systems

The Contractor shall support the development and implementation of specialized scientific data analysis and database systems. Support requirements shall vary depending upon peer recommendations from the USAP research community and upon NSF science research support initiatives. The Contractor shall provide capabilities to include: needs and requirements definition, systems analysis, design and implementation, operations, and customer order/support desk service. The Contractor shall provide operations capabilities to include: process operations, data entry, data processing and manipulation, applications and product generation, and new application development.

C7.5.6.1.5 Information and Dissemination Systems

C7.5.6.1.5.1 Scope of Service

The Contractor shall provide information systems to support USAP mission activities, to include applications relating to the following functions: administration, performance measures, work load data, mission operations, science research management, general management, inventory control, maintenance management, configuration control, engineering design, project management, and logistics management. The Contractor shall provide effective means for the dissemination and access to all information products and databases, to include means for unencumbered electronic remote access by the NSF to Contractor administered data centers and data repositories.

C7.5.6.1.5.2 General Support Requirements

C7.5.6.1.5.2.1 Techncial Support Requirements

The Contractor shall provide support for Government furnished and Contractor developed USAP mission information systems, to include: Antarctic station operations, user group management, discrepancy reporting, configuration/revision control, schema development, coding, code maintenance, database administration, application development, information transaction process management, distributed database management/synchronization, distributed and remote access by USAP user community organizations, data integrity monitoring, data quality assurance, user training, and documentation. The Contractor shall provide documentation products, to include: requirements definitions, software designs, software test plans and procedures, user guides, programmer references, and operations/administration guides.

C7.5.6.1.5.2.2 Modernization and Replacement Support

The Contractor shall provide replacement applications, as required, to include: adapting to changes in USAP mission needs, life cycle management, and implementation of BPR recommendations. The Contractor shall implement system replacement in conformance with requirements and recommendations set forth in the USAP IT planning series, to include: Strategic Plan, Information Architecture Plan, Capital Planning, and Long Range Plan.

C7.5.6.1.5.3 Records Management

C7.5.6.1.5.3.1 Data Integrity, Archive, and Disposal Requirements

The Contractor shall be responsible for the data integrity and fidelity of Contractor collected and managed Government Information. The Contractor shall maintain and enforce a records management, data archive, and disposal process, and the Contractor shall solicit and obtain prior approval from NSF before the disposal of any data records or other program information subject to the special clause entitled "Rights in Data" in Section I4 of this solicitation. This condition shall include electronic data repositories, data bases, and other electronic forms of data and information.

C7.5.6.1.5.3.2 Records Managment Guidelines

The Contractor shall manage all USAP records of data and information in accordance with guidance set forth to Federal agencies in OMB Circular A-130 (revised). This shall include specific attention to compliance with requirements of the Privacy Act of 1974.

C7.5.6.1.5.3.3 Data Records Management Plan

The Contractor shall provide a Data Records Management Plan that describes the processes and procedures used by the Contractor as a subset of the Contractor's Information Security Plan, Section C7.5.3.5.5. The Contractor shall deliver a completed plan no later than 12 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an bi-annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.6.1.5.4 Mission Operations Systems

C7.5.6.1.5.4.1 Scope of Servcice

The Contractor shall provide support for Government provided information systems as described in Sect. C6 of this solicitation, to include: Personnel Tracking System (PTS), Cargo Tracking System (CTS), functional and process specific Microsoft Access™ databases, Microsoft Excel™ spreadsheets, and other specialty applications as described in Section C6. The Contractor shall implement follow-on and/or replacement systems as required, per the USAP Mission Operations and Management Information Systems Redesign Study requirement of Section C7.5.3.5.3.

C7.5.6.1.5.4.2 Quality of Service Requirements

The Contractor shall insure data integrity, data fidelity and accuracy, functional integrity, and high availability of mission operation information systems.

C7.5.6.1.5.5 Maintenance Management Systems

C7.5.6.1.5.5.1 Scope of Service

The Contractor shall provide support for Government provided information systems as described in Section C6 of this solicitation, to include: Maintenance Planning and Control (MAPCON), functional and process specific Microsoft Access™ databases, Microsoft Excel™ spreadsheets, and other specialty applications as described in Sect. C6. The Contractor shall implement follow-on and/or replacement systems as required, per the USAP Mission Operations and Management Information Systems Redesign Study requirement of Section C7.5.3.5.3.

C7.5.6.1.5.5.2 Quality of Service Requirements

The Contractor shall insure data integrity, data fidelity and accuracy, functional integrity, and high availability of maintenance management information systems.

C7.5.6.1.5.6 Planning, Order-Entry, and Resource Management Systems

C7.5.6.1.5.6.1 Scope of Service

The Contractor shall provide support for Government provided information systems as described in Section C6 of this solicitation, to include: Maintenance Planning and Control (MAPCON; inventory management function, resource allocation function), Electronic Support Planner (ESP), functional and process specific Microsoft Access™ databases, Microsoft Excel™ spreadsheets, and other specialty applications as described in Section C6. The Contractor shall implement follow-on and/or replacement systems as required, per the USAP Mission Operations and

Management Information Systems Redesign Study requirement of Section C7.5.3.5.3 and/or the USAP Enterprise Business Process Re-Engineering Study requirement of Section C7.5.3.5.1.

C7.5.6.1.5.6.2 Quality of Service Requirements

The Contractor shall insure data integrity, data fidelity and accuracy, functional integrity, and high availability of planning, order-entry, and resource management information systems.

C7.5.6.1.5.7 Collaboration and WWW Enabled Systems

C7.5.6.1.5.7.1 Scope of Service

C7.5.6.1.5.7.1.1 Continental United States

In the continental United States, the Contractor shall provide World-Wide Web (WWW) host and authoring services for a centralized USAP affiliated Intranet, Extranet, and general public Internet applications. The Contractor shall provide hardware and software systems to support WWW applications for information dissemination and USAP program work-flow, to include: general public information on the USAP, general program operation information of interest to the grantee community, seasonal program operation and management information for transportation/cargo/logistics, station newsletters, discussion groups, digital photo galleries, and educational outreach materials. The Contractor shall utilize the WWW presence for gateways to Contractor provided on-line order/entry, project management, grant customer service, on-line database gateway, digital video, and other types of WWW enabled business processes that may be established to support USAP operations.

C7.5.6.1.5.7.1.2 Antarctic Stations and Non-antarctic Logistics Centers

The Contractor shall provide and administer WWW Intranet information management and dissemination systems located at all Antarctic stations and at the Christchurch logistics center for the purposes to include: local operation, public interest, scientific research, and management information. The Contractor shall be responsible for content generation and update and WWW applications deployment.

C7.5.6.1.5.7.2 Quality of Service and Policy Guidelines

The Contractor shall operate all WWW host sites in accordance with NSF guidelines and policies, to include: restrictions on use of Contractor and NSF logos, points of contact for Webmaster and email inquiries, type/kind/appropriateness of content, access restrictions, information update time cycles, style, and hyperlink restrictions to other sites. The Contractor shall address WWW host operations and administration in the Contractor's Information Security Plan.

C7.5.6.1.5.8 Electronic Mail Systems

C7.5.6.1.5.8.1 Scope of Service

The Contractor shall provide support for the Government provided electronic mail systems operating at Antarctic stations, non-Antarctic logistics centers, and research vessels as identified in Section C6. The Contractor shall provide USAP-wide enterprise electronic mail service, to include the interconnection and synchronization of Contractor provided electronic mail systems located at all Antarctic stations, major field camps, non-Antarctic logistics centers, research vessels, and Contractor operational headquarters housing USAP program support functions.

C7.5.6.1.5.8.2 Modernization and Replacement

The Contractor shall provide for any follow-on or replacement systems in accordance with the USAP planning cycle, to include: Strategic Plan, Technical Architecture Plan, Information Architecture Plan, and BPR Study.

C7.5.6.1.5.8.3 Interoperability Requirement

The Contractor shall ensure interoperability of Contractor provided electronic mail systems with electronic mail systems used by the Government for NSF agency level communications.

C7.5.6.1.5.8.4 Enterprise Directory Service

The Contractor shall provide for enterprise-wide directory service, to include on-line Internet searchable directory look-up for Contractor staff and USAP program participants located at non-Antarctic logistics support centers and Antarctic stations and field camps. The Contractor shall include general USAP personnel locator information, such as telephone, facsimile, office location, and mailing address location data in the directory service. The Contractor shall maintain all directory information to be current and accurate.

C7.5.6.1.5.8.5 Operational Support Requirements

The Contractor shall provide for enterprise-level and/or local level subscriber accounts and account management, and shall address effective means to manage the high flux of Antarctic station and research vessel account activity during the austral summer operating season.

C7.5.6.1.5.8.6 Quality of Service Requirement

The Contractor shall provide for high availability of all USAP electronic mail systems and related supporting and access infrastructure. The Contractor shall provide for performance monitoring of all enterprise electronic mail queues and processes to ensure high availability and reliability in mail transport services.

C7.5.6.1.5.9 Broadcast, Multi-Media Systems

The Contractor shall provide content creation and dissemination in a cross-section of media types suited for computer, cable television, and pre-recorded video applications, as required and directed by NSF.

The Contractor shall provide capabilities, products, and services as required for small scale audiovisual production and content, to include: raw and pre-production edited videotape suitable for airing on broadcast television; video camera, recording, and field editing; compressed digital video film clip and animation loops; Java scripted Web applications; streaming compressed digital audio and video clips and clip server; computer/video kiosk; and computer formatted and driven NTSC video feeds of text, graphical, or image information.

C7.5.6.1.5.10 Morale, Welfare, and Recreation Systems

The Contractor shall provide systems and support for systems supplied to support general welfare, morale, and recreation purposes. Examples of current requirements are contained in the following subsections.

C7.5.6.1.5.10.1 Automatic Teller Machine/Kiosk

The Contractor shall provide automatic banking and cash dispensing systems and associated service for general use at McMurdo Station. The Contractor shall provide maintenance, servicing, and network access management for these systems.

C7.5.6.1.5.10.2 Point of Sale

The Contractor shall provide computer hardware and software, installation, and operations support for electronic point of sale and associated inventory management systems for all Antarctic stations to support public sales and store functions.

C7.5.6.1.5.10.3 Audio-Visual

The Contractor shall provide audio-visual equipment, maintenance, and operations for all Antarctic stations and the Christchurch logistics center. The types and kinds of equipment shall include: television sets, video cassette recorder/players, public address/announcement systems, video projection equipment, and music/stereo equipment.

C7.5.6.1.6 Technical Support Infrastructure

C7.5.6.1.6.1 Scope of Support

The Contractor shall be responsible for maintaining, and providing where required, the physical facility infrastructure required to support IT/IS applications and operations. Telecommunications and data networking/data communications installations are designated by NSF as USAP mission critical, unless explicitly specified to the contrary. The Contractor shall ensure that all facilities and supporting infrastructure are properly maintained, repaired, and in good working order to facilitate high availability and reliability of the supported IT/IS systems and functions. Examples include: facility structures, facility environmental control systems, facility custodial service, facility fire suppression, and emergency and stand-by power systems. When required for critical mission support, the Contractor shall propose in a timely and expeditious manner any improvements, changes, alterations, or other similar recommendations for NSF review and approval.

C7.5.6.1.6.2 Black Island Telecommunications Facility

C7.5.6.1.6.2.1 Scope of Support

The contractor shall be fully responsible for the operation and maintenance of the Black Island Telecommunications Facility (BITF), which represents a unique, mission specific installation within the USAP. The BITF exists in an extremely remote and harsh environment with significant operational constraints, and the facility and related technical infrastructure and communications systems shall be managed by the contractor with particular care.

C7.5.6.1.6.2.2 Black Island Telecommunications Facility Management and Operations Plan

The Contractor shall develop, document, and implement a Black Island Telecommunications Facility Management and Operations Plan. The plan shall address, at a minimum: the process used for overall management; roles, responsibilities, and lines of authority within the Contractor's organization for those organizational elements supporting the BITF mission; the relationship of the Contractor's IT/IS operations group in the plan; performance measures for tactical operations, maintenance, operational availability, and mission success; a documentation specification and outline of supporting plans and documents; key processes and procedures; preventative and corrective maintenance doctrine; safety; and quality insurance processes. The Contractor shall deliver a completed plan no later than 14 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.5.6.1.6.3 Uninterruptable Power Systems

The Contractor shall be responsible for the installation, maintenance, repair, testing, and replacement of electronic uninterruptable power systems.

C7.5.6.1.6.4 Maintenance Shops and Test Equipment

The Contractor shall establish and sustain on-site maintenance shop capability at all Antarctic stations for the purposes necessary to support IT/IS functions. This shall include: equipment inspection, test, field deployment preparation, receiving/shipping, storage/moth ball preparation, line replaceable unit troubleshooting, component level repair, and field calibration/adjustment. Scaling of maintenance capability shall be commensurate with the level of field maintainable equipment present, maintenance doctrine adopted by the Contractor, and the type and kind of equipment supported. The Contractor shall utilize its Maintenance Management Plan, Section C7.5.8.4 to specify the scope, type, and kind of maintenance shop capability and test equipment.

C7.5.6.1.6.5 General Purpose and Mission-unique Electronic Repair and Maintenance

The Contractor shall provide general electronics bench repair and servicing for all Antarctic stations. The capability shall include: basic analog and digital electronics to the component level, chassis level repair of enclosures and instrumentation packaging, consumer grade electronics for audio-visual equipment, chassis level and board level replacement of computing equipment components, RF and microwave electronics, and other capability as required to meet on-site needs.

The Contractor shall maintain requisite levels of test equipment capability and calibration performance to ensure proper maintenance of supported systems.

The Contractor shall utilize its Maintenance Management Plan, Section C7.5.8.4 to specify the scope, type, and kind of test equipment and calibration requirements.

C.7.5.6.2. Future Requirements

C.7.5.6.2.1 McMurdo Station HF Radio Communications Modernization

The Contractor shall serve as an Integrated Product Team member for an engineering design and implementation team, to be led by SPAWAR Systems Center Charleston, for the modernization and re-development of the HF radio communications infrastructure in McMurdo Station. This effort is expected to progress to field implementation by the austral winter of calendar year 2000. SPAWAR will be the lead for the design-build engineering activity, and the Contractor shall provide technical peer review and design input as the operator of the completed system. Additionally, the Contractor shall provide technical design input and installation support for the relocation of non-HF radio communications systems under the Contractor's responsibility. The Contractor shall provide the facility design, engineering, and construction support (design-build) to house the modernized and relocated radio communications systems.

C.7.5.6.2.2 Satellite Telecommunications

The Contractor shall provide end-to-end satellite communications to all Antarctic stations. This includes the space segment, CONUS common carrier interconnects, CONUS private network management, and special-purpose tail circuits. The Contractor shall evaluate the best means of providing a combination of private-network and public-network infrastructure to establish an integrated USAP telecommunications infrastructure. This infrastructure shall combine the base-level telephone service/central office functions at each station with the long-haul satellite communications links outlined in the following subsections. The Contractor shall support the satellite communications based on the following proposed schedule:

C7.5.6.2.2.1 McMurdo Station Direct-CONUS Satellite Communications

The Contractor shall implement a replacement service for the present satellite communications service provided to McMurdo Station. The contractor shall assume the prime delivery of all satellite communications to McMurdo Station now provided by SPAWAR Systems Center to occur following the completion of the Contractor's Phase-In and Transition period(s), but no later than 3 years following contract award. The Contractor shall be responsible for

the development and implementation of all transition planning to allow for an uninterrupted and seamless continuation of telecommunications service to McMurdo Station.

The Contractor's support of satellite telecommunications shall include the re-engineering the service and technical infrastructure of the present service to take advantage of advances in satellite telecommunications service, bandwidth efficient techniques, architectural changes to better support service delivery and sustaining operations/maintenance, and additional bandwidth to meet service demand.

The Contractor shall deliver a completed system/service no later than 42 months following contract award for review and approval by NSF. Implementation of the completed system/service shall be managed under the annual Program Plan.

C7.5.6.2.2.2 Palmer Station Direct-CONUS Satellite Communications

NSF must implement a follow-on solution to LES-9 delivered services no later than calendar year 2003 such that a replacement can be phased-in and operational in time for a 2004 phase-out of LES-9. The Contractor shall implement a follow-on service within this time scale. The follow-on service shall include the combination of the Palmer Station service with a USAP-wide managed infrastructure, where appropriate. The follow-on service shall include support for the following media types, at a minimum: telephony, Internet, facsimile, and compressed video conferencing.

The Contractor shall deliver a completed system/service no later than 42 months following contract award for review and approval by NSF. Implementation of the completed system/service shall be managed under the annual Program Plan.

C7.5.6.2.2.2.1 South Pole Station Direct-CONUS Satellite Communications and Related Space Operations
NSF anticipates transitioning the telecommunications service provided by the present provider to the Contractor following the Phase-in and Transition period(s) of the Contractor and to occur no later than the 4th quarter of year 2002. In order to prevent risk to NSF operations from the non-protected, non-interference basis mode of operations, NSF intends to transfer the physical teleport/telecommand ground station to a new geographic setting far removed from potential conflicts.

The contractor shall provide all of theoperational support, equipment, and telecommunications services necessary to operate and maintain Telemetry, Command, and Teleport Operations and Services for LES-9/GOES-3 and any other special communications satellites utilized by the USAP.

The Contractor shall deliver a completed system/service no later than 42 months following contract award for review and approval by NSF. Implementation of the completed system/service shall be managed under the annual Program Plan.Wide Area Network Consolidation Study

The Contractor shall analyze the wide area data communications network architecture of the USAP for the delivery of Internet communications to the Antarctic stations and non-Antarctic logistics centers, to include the present combination of commercial and government Internet Service Providers used. The Contractor shall determine science, operational, and IT infrastructure requirements and recommend changes in topology, technology, or Internet service access methods to establish greater robustness, flexibility, integrated management, reliability, and capacity in the USAP wide area infrastructure. The addition of new IP delivered services, such as video teleconferencing, IP telephony, IP facsimile service, electronic commerce, streaming muli-media feeds, multi-cast, Internet radio, or other emergent services of benefit to the USAP and with high bandwidth or Quality of Service requirements shall be evaluated and factored into the assessment.

The Contractor shall deliver a completed study no later than 30 months following contract award for review and approval by NSF. Implementation of the study shall be managed under the annual Program Plan.

C7.5.6.2.3 Full-time (24x7) Enterprise Network Operations and Call Center
The Contractor shall support the global communications that must be provided 24 hours a day, 7 days a week to link the various Antarctic and non-Antarctic locations, work centers, and aboard the research vessels. The Contractor

shall operate a combined telecommunications/data network/customer support desk and network operations center in CONUS. The Contractor shall manage the global USAP enterprise data and telecommunications infrastructure to meet the requirements of an increasing set of customer service needs and demands (such as quicker fault resolution, greater circuit reliability, implementation of new service, etc.), and the need for an effective interface to the NASA telecomm networking environment for the NSF-NASA joint venture/mutual support/services already in place.

The Contractor shall propose a concept of operations, service structure, and technical architecture that is congruent with the eventual type, degree, and kind of integration defined for the various global satellite communications links described in Section 0.

The Contractor shall deliver a completed center no later than 36 months following contract award for review and approval by NSF. Implementation of the center shall be managed under the annual Program Plan.

C7.5.6.2.4 CONUS Applied Technology Development, I&T Center

The contractor shall provide a dedicated and flexible USAP "hands-on" technical capability located in CONUS by establishing an Applied Technology Development, Implementation and Testing Center. The center shall support the means to develop/test small-scale technical designs, prototypes, and one-of-a-kind products to meet science and operational needs that cannot be met, or are poorly met, by conventional, commercial off-the-shelf systems. The intended scope of this effort is targeted at applied mission support, not elaborate and costly R&D. Shore support of the R/V data acquisition systems and special-purpose, marine technology instrumentation shall also be supported. Pre-deployment technical readiness assessments, electromagnetic compatibility assessments, and environmental survival/operations assessments to facilitate grantee and IT systems deployment readiness shall be supported.

The Contractor shall deliver a completed center no later than 36 months following contract award for review and approval by NSF. Implementation of the center shall be managed under the annual Program Plan.

C7.5.6.2.5 Research Vessel Data Acquisition Systems

The Contractor shall analyze the present suite of marine data acquisition systems and propose a means to utilize COTS software systems to eliminate the need for extensive custom development, facilitate maintenance, reduce programmer administration labor, and enhance feature sets. The Contractor shall coordinate its research with the USAP Research Vessel science Oversight Committee for requirements and features. The Contractor shall deliver a completed study report no later than 36 months following contract award for review and approval by NSF. Implementation of the study shall be managed under the annual Program Plan.

C7.5.7 Customer Service and Science Support

C7.5.7.1 Customer and Supplier Interface

C7.5.7.1.1 Service Community Interaction

The Contractor shall interface with and provide support to both an internal and external customer base. The internal customer base consists of the NSF/OPP and the Contractor's internal business units providing direct USAP support. The primary external customer base consists of individual science grant holders, other US Government agencies with Antarctic-related mission activities (often in collaboration with NSF), and other US Government organizations supporting USAP logistics and operations (e.g., New York Air National Guard). The Contractor shall interact with the customer base in varying roles, and will frequently function in a capacity where technical and operational interaction with other US Government agencies or US Government contractors is required. The Contractor shall work collaboratively under such circumstances and seek guidance from NSF where necessary to resolve conflicts.

C7.5.7.1.2 Scope of Service

The Contractor shall serve as a single point supplier of IT products and services at Antarctic field and station locations. The Contractor shall establish and utilize commercial best practices for IT customer service delivery, to include customer satisfaction assessment, review of service and product quality and suitability, customer relations, order entry/order processing, and trouble identification and resolution. The Contractor shall provide uniform quality of service targeted at specific customer base needs for the two major customer base segments for USAP IT: (1) science research grant community and guest Government or international activities and (2) mission operations groups, both within the Contractor's corporate structure and provided by other USAP support organizations (e.g., SPAWAR Systems Center Charleston).

C7.5.7.1.3 USAP IT Customer Service Plan

The Contractor shall devise, develop, document, and implement a USAP IT Customer Service Plan. The plan content of this plan shall address the brokering and delivery of products and services, to include: accountability to NSF as the prime stakeholder, order fulfillment concepts, annual planning, front-line service processes, needs definition and negotiation processes, the role of systems engineering and development for new requirements, service values, standard and special IT products, and services provided to the external and internal customer base. The Contractor shall provide focused emphasis on the customer service process for the researcher/grantee as the primary external customer, to include a treatment of the brokering process required by NSF to ensure balanced and appropriate application of resources to grant requests, per Section C7.4. The Contractor shall include a strategic component to the plan to address processes to manage "common-good" and general infrastructure research/science support customer service needs. The Contractor shall deliver a completed plan no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan..

C7.5.7.2 General Technical Support

C7.5.7.2.1 Antarctic Support

The Contractor shall provide general technical support to external and internal customers, to include: on-call help desk, inventory issue, winter storage, configuration management, installation, technical control and operation, maintenance and repair, and de-commissioning of computing and communications systems that are used for administrative and operational functions within the USAP. This includes all telephone, radio and computing systems linking contractor headquarters, staging centers, Antarctic stations, the research vessels, NSF offices, and other organizations affiliated with the USAP, both governmental and private sector. A representative listing of systems under the care of the contractor is given in Section C6.

C7.5.7.2.2 Support Other Than In Antarctica

The Contractor shall provide technical support services to external and internal customers, to include: resource allocation planning, technical information on the operations and design of the USAP IT infrastructure, engineering design assistance, applications assistance, deployment and field planning for activities related to IT and similar technologies, participation in customer support working groups, and other similar support functions related to the general operations, delivery, and implementation of IT.

C7.5.7.3 Science Support Service

The Contractor shall provide support for implementation, maintenance, operations and training activities involved with all communications and computing that is done in support of science.

C7.5.6.1.7 General Assistance

The contractor shall work closely with grantees to plan for their computing and communications needs. The contractor shall educate grantees on the standard computing and communications facilities and equipment that are available at Antarctic stations. The contractor shall supply grantees with hardware, software, specialized computing assistance, and hands-on installation, calibration, maintenance and operation of systems and equipment, according to grant needs and budgets.

C7.5.6.1.8 Pre-deployment Science Mission Planning Support

The Contractor shall assist grantees with mission planning of the field component of the grantee's research program, especially in regards to the configuration of USAP provided telecommunications, radio communications, computer networking, and other special technical infrastructures. The Contractor shall work with the grantee to effect a best fit of existing infrastructure and to propose, design, and implement (with NSF approval) changes and additions to infrastructure.

C7.5.6.1.9 Field Technical Support

The Contractor shall provide Antarctica on-site, in-field technical assistance to grantees for the configuration or implementation of technical requirements and the provision of standard IT based services. The Contractor shall provide on-call, as-required technical support for ad hoc grantee field-support needs across the spectrum of IT systems and services supported by the Contractor.

C7.5.6.1.10 Experimental Apparatus Operations Support

The Contractor shall provide support to facilitate on-going scientific work, data collection, data analysis, and data transmission for grantees who "leave behind" equipment to continue experiment operation after they have left Antarctica. All such support shall be planned for and agreed to among the grantees, NSF, and the contractor as part of the grant planning process. Staff assigned to science support functions shall be familiar with university-research oriented IT/IS concepts, applications, processes, practices, techniques, and standards, with a particular emphasis on the application of IT/IS in support of experimental research, instrumentation development, and the analysis of data.

C7.5.6.2 Special Requirements

C7.5.6.2.1 Scope of Support

The Contractor shall provide customer service, systems engineering, and electronic maintenance support to non-grantee, non-USAP operational organizations at the direction of NSF. NSF establishes partnerships, collaborative agreements, and commitments with U.S. Government (civil, military) and international organizations that require technical and managerial support from the Contractor. A representative list of external support requirements is provided below. This list shall not be construed as exhaustive nor static.

The types and kinds of support provided by the Contractor shall include: systems engineering, design, field implementation, on-call maintenance, operations assistance, pre-deployment planning, deployment logistics, and technical reviews. The types and kinds of skill support provided by the Contractor shall include: Unix systems administration, LAN/WAN network engineering and operations, telecommunications engineering and operations, RF engineering, and general electronics (analog, digital).

C7.5.6.2.2 NASA Collaborative Activities

The Contractor shall provide planning, operational, and maintenance support, as required, to support the following NSF collaborations with NASA Goddard Space Flight Center and Wallops Flight Facility. NASA has the primary responsibility for on-site operations and maintenance, with Contractor augmentation where required and approved by NSF.

C7.5.6.2.2.1 McMurdo Ground Station

The McMurdo Ground Station (MGS) is a 10 meter, dual S/X-Band, 3-axis high dynamics satellite tracking and space data acquisition system, equipped for transmit and receive, with a Unix computer control system. The system supports the recovery of RADARSAT and ERS-2 synthetic aperture radar (SAR) imagery of Antarctica to support NSF and NASA funded science research. The system's excess capacity is used by NASA as a complement to the NASA ground stracking station Polar Network to support launch, early orbit, and sustaining telemetry/command/data dump operations of high inclination near-Earth satellites and launch vehicles.

C7.5.6.2.2.2 McMurdo TDRSS Relay System

The McMurdo TDRSS Relay System (MTRS) is a 7.2 Ku-Band meter satellite communications uplink, with an accompanying X-Band terrestrial link, located at the Black Island Telecommunications Facility. The system supports MGS high speed data transfers from the MGS to the U.S. via the NASA Tracking Data Relay Satellite System.

C7.5.6.2.2.3 NASA Automatic Interactive Launch System

The McMurdo NASA Automatic Interactive Launch Support System (NAILS) is a 6 foot S-Band az/el tracking and PC controlled automatic data acquisition system for TOMS-Earth Probe ozone data recovery, general launch and early orbit support of NASA launches, and telemetry data recovery of NOAA polar operational environmental satellites (NOAA/TIROS-N class). The NAILS system is undergoing integration into the MGS to provide a general rapid acquisition search tool for near-horizon acquisition of launch vehicles and satellites which have deviated significantly from predicted trajectories.

C7.5.6.2.2.4 South Pole TDRSS Relay

The South Pole TDRSS Relay (SPTR) is a 6 foot dual S/Ku-Band experimental satellite communications link provided by NASA for development of advanced communications between South Pole and the continental U.S. via the TDRS F1 satellite. The system utilizes automatic control via PC. The system provides very high speed one-way data dump capability from the South Pole LAN to a computer attached to the Internet and located in the U.S. The system also provides high speed, high quality direct Internet service for interconnection with the South Pole LAN in tandem with the service provided via the NSF operated LES-9/GOES-3 links.

C7.5.6.2.3 USAF Air Force Weather/NOAA NPOESS Collaborative Activities

NSF, USAF Air Force Weather Agency, NOAA National Polar Operational Environmental Satellite System (NPOESS) Joint Program Office, and NASA Goddard Space Flight Center will be evaluating options and interest on the part of the USAF and NOAA for the development, implementation, and operation of a 10 meter class satellite tracking and data acquisition system at McMurdo Station to meet National data recovery needs for the Defense Meteorological Satellite Program and NPOESS polar environmental/weather program. If approved, this may occur over the time period of 1999-2003. The Contractor shall provide all necessary engineering and technical assistance required by NSF during the concept development, evaluation, and eventual engineering, implementation, and operations phases.

The Contractor shall, if required, provide support to include: systems engineering, site planning, facilities design and construction, telecommunications planning, satellite telecommunications circuits.

C7.5.6.2.4 Air Force Technical Applications Center Test Ban Treaty Monitoring Program

NSF and the USAF Air Force Technical Applications Center (AFTAC) have established a Memorandum of Agreement for the operations and support of an AFTAC funded seismic sensor and autonomous hybrid power shelter located in Wright Valley, Antarctica, and an autonomous power/communications relay shelter located on Mt. Newall, Antarctica. NSF has received space and power rights for its exclusive use in the Mt. Newall shelter.

AFTAC will provide annual routine and preventative maintenance with AFTAC personnel. The Contractor shall support as required on-call sustaining operations and maintenance of the Wright Valley and Mt. Newall sites, to include: helicopter maintenance visits, wind turbine, diesel electric generator, and point-to-point digital radio communications links. The Contractor shall supply and maintain any radio or telecommunications equipment required by NSF to meet USAP mission operations needs in the event NSF elects to exercise space/power options.

C7.5.6.2.5 NOAA/NESDIS POESS SARSAT Program

The NSF provides host support to a small orbit determination beacon reference station located at McMurdo Station and provided by NOAA as part of the satellite orbit determination network needed for Search and Rescue by Satellite (SARSAT) orbit determination. NOAA provides all equipment and spares. The Contractor shall be responsible for low level of effort tasks such as: as-required status checks, systems tests, installation/de-installation, and shipping/receiving of equipment, all per NOAA direction.

C7.5.7 Content and Electronic Dissemination

The Contractor shall act as a primary interface with all external parties regarding the provision of information about on-going USAP activities. This includes assembling and disseminating information on grantee work, the grant process, and general facts about the operation of the program.

The contractor shall coordinate, develop, and disseminate information about USAP activities through multiple channels as described herein. The Contractor shall seek and obtain NSF approval for public and educational outreach activities that go beyond informal, low level of effort scope. Any outreach activity with the potential for significant public exposure shall be coordinated and pre-approved by NSF.

C7.5.7.1 Public and Educational Outreach

C7.5.7.1.1 Internet World Wide Web Infromation Server

The Contractor shall maintain and manage a USAP Internet Web-site on behalf of the NSF. The Web-site shall support NSF objectives for public and programmatic information dissemination and stakeholder community interaction. The specific contents on that site shall be determined in consultation with NSF, but the site itself shall be updated and operated by the Contractor.

C7.5.7.1.2 Public Outreach and Distance Learning Infrastructure

The Contractor shall supply technical infrastructure and provide operations support for NSF sponsored or approved electronic distance learning and public outreach activities, as directed by NSF.

C7.5.7.1.3 Public Outreach and Distance Learning Operations Support

The Contractor shall support pre-planned and ad hoc distance education initiatives and requests arising from general public educator inquiry and via formal NSF planning, as guided and directed by NSF, to include K-12 school and teacher support for: Cu-SeeMe or MBONE Internet video teleconference, electronic mail exchanges, digital photos, WWW homepage content contributions and Web host service, QuickTime™ movies, ISDN/SW56 video teleconferencing sessions, live video broadcast, video production, and telephone calls.

C7.5.7.2 USAP Program Information

C7.5.7.2.1 USAP World Wide Web Intranet/Extranet (Operations, Customer Support)

The Contractor shall develop and maintain a USAP Web-based Intranet and Extranet that is accessible via the Internet on behalf of the NSF. This site shall host program management, operations, project development and management, and other program operations data and information that must be shared between the Contractor and NSF staff, the Contractor and the USAP science research community, and among the various USAP support organizations. The Contractor shall provide content, data, and web site maintenance.

C7.5.7.2.2 Video Production

The Contractor shall provide the ability to create audiovisual productions, to include filming seasonal video footage and providing simple, in-field pre-production. The field production quality shall be sufficient for the material to be used to support seasonal distance educational activities and to serve as raw footage for video news releases as directed by the NSF. The Contractor shall support the production of local human interest video for station morale and welfare activities for McMurdo Station. The Contractor shall film, archive, and manage stock footage as directed by NSF to support industrial video and general public release material. All production quality shall be a minimum of near-broadcast quality and shall meet conventional broadcast industry standards for electronic news gathering quality for airing of field produced footage.

C7.5.8 Technical Operations

The Contractor shall provide support for the USAP IT/IS hardware and software infrastructure life cycle, from original requirements definition though implementation, sustaining operations and maintenance, evolution and refreshment, and phase-out and disposal. The Contractor shall maintain systems performance requirements for suitability, availability, dependability, reliability, maintainability, supportability, quality, and affordability to meet NSF required performance levels. The specific levels for system performance shall be set jointly by NSF/OPP and the Contractor and shall be routinely evaluated via quarterly and annual performance measures.

C7.5.8.1 Operations Management Documentation

The Contractor shall document all technical, management, operational techniques, and operation procedures for Information Technology and Information Systems. The Contractor shall also provide documentation pertaining to USAP IT Enterprise functions supported from the Contractor's headquarters, non-Antarctic site locations, and supported irrespective of geographic site location. The Contractor shall make all IT/IS documentation of this series available in electronic form and on-line searchable and retrievable from the Contractor provided WWW Intranet sites.

C7.5.8.2 USAP IT Standard Operating Procedures Manual

The Contractor shall provide a self-contained USAP IT Standard Operating Procedures Manual. This documentation series shall contribute to the IT/IS subset of the Station Management Manual series as specified in Section C7.1 and shall be developed, delivered, and updated per the schedule specified in that section with the additional requirement that the Contractor shall maintain a formal document revision control, verification, update, and publishing process and ensure that the documents are kept updated. The Contractor shall deliver a completed manual no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the manual, the manual shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the manual shall be managed under the annual Program Plan.

C7.5.8.3 User Training and Operations Documentation

The Contractor shall provide training curricula, material, qualified instructors, and training courses for contractor staff and USAP program participants, as required, to insure effective and proficient use of Contractor supplied or managed computer hardware and software provided for mission operations and general usage applications, with particular emphasis given to program-specific software applications. The Contractor shall provide standard user operating procedures, user applications manuals, and other necessary user-level documentation suited to the average knowledge and skill level of the rank & file USAP work force, to include grantees, internal customers, and external customers such as outside management and other support agencies.

C7.5.8.4 USAP IT Maintenance Management Plan

The Contractor shall provide and maintain a USAP IT Maintenance Management Plan. This plan shall document the Contractor's maintenance management processes, techniques, and doctrine for sustaining maintenance of USAP IT

systems (hardware and software), to include: systems integrated logistics support; preventative, predictive, and corrective maintenance procedures and processes; maintenance schedules; lessons learned capture processes; system performance metrics and target values; maintenance trend analysis and prediction processes; discrepancy reporting procedures and processes; sustaining engineering procedures and processes; maintenance quality assurance methods; and interaction with, and relationship to, the Configuration Management Plan and Life Cycle Management Plan. The Contractor shall deliver a completed plan no later than 18 months following contract award for review and approval by NSF. Following the intitial delivery of the plan, the plan shall be updated and re-submitted on an annual basis by the Contractor. Implementation of the plan shall be managed under the annual Program Plan.

C7.6 Facilities Engineering and Construction

C7.6.1 Scope

Engineering and Construction services provided by the Contractor will be determined annually as an element of the Program Plan. The Contractor shall provide facilities engineering and construction program-wide. This includes, but is not limited to: Station Primary Utilities, Station Facilities and Ancillary Utilities Fuel Storage and Operation, and Airfield and Aviation Support. Contractor responsibilities also include coordination with Architect & Engineer (A&E) firms selected by NSF for major construction, design/build of smaller projects, and planning, management and execution of all NSF-approved facilities renovation and new construction projects.

C7.6.2 Engineering

C7.6.2.1 Resources

The Contractor shall provide the resources to respond to NSF requests for major and minor design and engineering services. Contractor resources shall include engineers, drafters, estimators, schedulers and surveyors in the numbers and disciplines required for engineering and construction projects approved in the annual program plan. When stamped drawings or other certifications are required, the Contractor shall provide professional engineer (PE) services.

C7.6.2.2 AutoCad Design and As-built Drawings

The Contractor shall produce design and as-built drawings in the AutoCad formats and versions listed in Attachment 2.

C7.6.2.3 Scheduling and Estimating

The Contractor shall provide a scheduling and estimating capability sufficient to produce timely and accurate schedules and estimates for the types of projects listed in Attachment 3.

C7.6.2.4 Engineering Office

C7.6.2.4.1 The Contractor shall maintain a year-round engineering capability of sufficient size and technical proficiency to meet annual program requirements. During the austral summer, an office and field engineering staff shall be maintained at McMurdo Station (Building 175), with engineering personnel assigned to South Pole and Palmer Stations as required. A minimum of one Professional Engineer (PE) shall be assigned both summer and winter at McMurdo Station to monitor and maintain mechanical and electrical systems.

C7.6.2.4.2 Engineering services provided by the Contractor include, but are not limited to:

C7.6.2.4.2.1 Manage the engineering required for station facilities and utilities construction/renovation which are approved in the annual program plan; provide follow-on engineering support of facilities/systems O&M after construction/renovation is complete.

C7.6.2.4.2.2 Provide the on-site and home office surveying support for engineering and construction, including specialized O&M support such as measuring and monitoring temperature and thickness of the sea ice runway and ice roads at McMurdo; documenting roads, telephone poles and other existing conditions; runways and skiways; fuel piping systems; ice pier maintenance; placement of science experiments.

C7.6.2.4.2.3 Coordinate any design modifications, etc., with NSF and/or PACDIV; submit any proposed changes for approval beforehand.

C7.6.2.4.2.4 Maintain and update a technical library including O&M technical manuals, facilities descriptive books, and a submittal register of NSF-approved materials and finishes.

C7.6.2.4.2.5 Review construction drawings and specifications to assure compatibility with existing system components and spares, including manufacturers' ability to support their products in the future.

C7.6.2.4.2.6 Regularly inspect station facilities for damage and/or defects such as electrical and plumbing deficiencies or safety hazards; identify solutions and, as requested by NSF, prepare formal designs/estimates for correction/upgrade.

C7.6.2.4.2.7 Conduct pre-final inspections of new or renovated facilities prior to Government inspection/acceptance.

C7.6.2.4.2.8 Produce as-built drawings that accurately reflect new construction as well as renovations or modifications to existing buildings.

C7.6.2.4.2.9 Provide estimates and schedules for each project valued at $10,000 or greater. Material and labor (both engineering and field) costs shall be identified, and monthly status reports prepared to include progress and cost to complete for each project. A five year plan for all engineering and construction activities shall be prepared and maintained on an annual basis to include all three permanent Antarctic stations and Christchurch. Project description, including scope, estimates and schedules are to be prepared for all projects (both current and anticipated) in the five year plan.

C7.6.2.5 Industry Surveys

The Contractor shall periodically survey the engineering and construction industries with the purpose of identifying new design features, materials, construction methods, etc., that could be used to improve station infrastructures, reduce costs or otherwise benefit USAP operations.

C7.6.2.6 Long-range Plans and Design Criteria

To the greatest extent possible, NSF tries to develop long-range plans for the improvement of USAP infrastructure. Such plans depend on capital funds, which are often difficult to obtain as part of the annual USAP appropriation. Instead, the Contractor and NSF must work to conserve and maintain the existing infrastructure, and make incremental improvements each year. Of necessity, therefore, the Contractor must address the following restraints and concerns when planning improvements:

C7.6.2.6.1 Limit the physical size of stations and camps to keep utility and circulation requirements to a practical minimum.

C7.6.2.6.2 Consolidate like functions in the same operational areas.

C7.6.2.6.3 Group operational functions that require frequent or continual interface within the same facilities.

C7.6.2.6.4 Develop an annual construction program that ranks projects and completion dates by NSF priority.

C7.6.2.6.5 Plan physical layouts that keep energy, equipment and manpower demands to a practical minimum, and include utility systems that can be easily winterized and restarted.

C7.6.2.6.6 Develop an annual construction plan that does not adversely affect station, ship or aircraft operations.

C7.6.2.6.7 Ensure that construction projects comply with provisions of the Antarctic Treaty and all applicable health, safety and environmental standards.

C7.6.2.6.8 Develop a plan to remove outmoded, unsafe or otherwise substandard facilities as part of the annual construction program.

C7.6.2.7 Major Design

For major projects the Contractor shall coordinate with the A&E selected by NSF for the project. The Contractor shall coordinate with the A&E and NSF's engineering manager (NAVFAC PACDIV) at the start of the design process, actively participate in all constructability reviews, and provide value engineering recommendations as appropriate throughout the process.

C7.6.2.8 Minor Design

For minor projects the Contractor shall provide design and engineering as well as construction services. As required by the size and complexity of individual projects, the Contractor shall develop a design schedule, construction schedule and cost estimates; produce drawings and specifications that meet NSF requirements; schedule and conduct constructability reviews at the end of each design phase with NSF and any other participants; and incorporate value engineering criteria as appropriate to reduce installed costs.

C7.6.3 Construction

The Contractor shall maintain a year-round construction management and scheduling capability. All new construction as well as exterior/interior renovation of existing structures at USAP locations requires NSF approval. For major projects, multi-year construction schedules are to be maintained to project staffing and equipment requirements.

C7.6.3.1 Planning

NSF and the Contractor shall plan construction according to NSF determined priorities as part of the annual program plan process. The Contractor shall provide short-term and long-term recommendations for the order and timing of work, and shall develop operational plans to execute projects with the smallest possible crews consistent with safety and trades skill requirements. Logistical constraints and equipment resources are to be considered in all planning activities.

C7.6.3.2 Design Review

Contractor construction personnel shall actively participate in design review processes. Constructability and value engineering reviews are important to NSF, and the Contractor shall schedule and conduct such reviews for all projects, whether the design is the responsibility of an independent A&E or the Contractor's own design entity.

C7.6.3.3 Support of the Annual Science Program

The Contractor shall plan and execute construction in direct support of the annual scientific program (see Section C7.4.4). Tasks can range from construction of major, remote camps that may support up to 100 people, to construction or modification, often on short notice, of smaller structures such as fish huts or similar shelters. Such tasks can be assigned during the summer and winter seasons.

C7.6.4 South Pole Redevelopment Project

C7.6.4.1 Scope

The Contractor shall manage the South Pole Station Redevelopment Project (SPRP), a two phase program to improve facilities at the current station (Phase I, South Pole Safety and Environmental Upgrade, or SPSE) and construct a new, elevated station (Phase II, South Pole Station Modernization, or SPSM). The Contractor shall manage the entire project, including all related procurement and logistics support, "test build" requirements as directed by NSF, on-site construction, and ongoing coordination with the A&E and PACDIV.

C7.6.4.2 Reserved for Future Use

C7.6.4.3 Scheduling, Logistics and Construction Management

The Contractor shall assume responsibility for SPRP in the midst of a cost-loaded, multi-year construction schedule that involves some 2000 discretely managed activities. The Contractor shall provide the resources and skills to immediately and comprehensively address all ongoing and pending activities (procurement, logistics and construction), and shall provide such resources and skills as needed during the performance period to prepare master and annual construction schedules, prepare annual logistics plans, and develop and control SPRP budgets.

C7.6.4.4 Quality Control (QC) and Safety

The Contractor shall submit construction QC and safety plans for the SPRP within 60 working days of notice to proceed for review and approval by NSF. Approved QC and safety procedures shall be enforced by the Contractor at the job-site at all times.

C7.6.4.5 On-site Workforce

The Contractor shall maintain an on-site construction office and, during at least the first three years of the contract, shall manage an on-site workforce of approximately 80 construction workers during summer and a staff of about 25 working on interior projects during the winter. The Contractor shall manage this workforce prudently, acquiring and allotting only the trades skills and technical positions needed to keep the project on or ahead of schedule.

C7.6.4.6 On-site Inspection

The Contractor shall coordinate all required on-site construction phase and other inspections with on-site NAVFAC/PACDIV inspectors. The Contractor shall not proceed with subsequent phases of work or beyond designated "hold points" in the construction sequence until previous work has been accepted by NSF.

C8. RESERVED

C9. PEFORMANCE METRICS

The National Science Foundation, will use performance measurement as a significant factor in determining a portion of the contractor's fee. The currently accepted "Best Practice" approaches to performance measurement within the Federal government and across private industry highlight the utility of these methods in improving work products and increasing productivity.

Performance measurement and its results can be used for determining the rewards allocated to an organization or an individual. A performance measurement system is designed to provide intelligent information and guidance for decision-makers who can use it to link actual performance with positive rewards, compensation or recognition. The performance measurements are meant to be positive rewards, not punitive actions.

C9.1 USAP Performance Measurement

The USAP is a service-oriented program with special features and conditions including geographic remoteness and harsh operational conditions, high visibility within NSF, an established customer base, and special service (product) requirements for research grantees performing high level scientific experimentation. NSF is proposing eight elements for a USAP scorecard, each of which represents a USAP program goal area. These eight elements, three of which are general goals, and five which relate directly to USAP/PRSS goals, can be shown to encompass the total area of performance requirements for the contractor.

The eight elements of performance measurement areas are:

1. Business processes
2. Customer satisfaction
3. Innovation and process improvement
4. Operate the infrastructure effectively and efficiently
5. Apply modern technology to enable and support the research endeavor
6. Provide quality facilities to support the research enterprise
7. Integrate safety, health, and environmental stewardship into all activities
8. Maintain responsiveness to changing parameters or targets of opportunity

For the USAP, NSF has concluded that these eight performance elements can be applied across each of the major contract areas described in Section C7. NSF will to utilize this approach to determine a significant portion of the Contractor's award fee compensation.

The eight performance measurement goals listed above are designed to address different aspects of the set of activities assigned to the contractor by NSF in support of the USAP. The three general elements: business process, customer satisfaction and innovation and process improvement reflect NSF's requirement that the contractor continually work to raise the level of service provided to the program by reviewing and refining its approach to the work to be done. NSF requires that the contractor apply good management practices to the work done for USAP so as to improve business processes within the program, meet the expectations of program participants and search out and implement better ways to get the work done.

The USAP/PRSS has adopted a set of five goals by which program performance is to be measured. NSF has determined that these PRSS goals can be used to measure the performance of the contractor in support of USAP. Specific definitions of each of the five PRSS goals is given in the following sub-sections.

C9.1.2.1 PRSS Goal I: Operate USAP's infrastructure effectively and efficiently, with a commitment to long-term improvement

USAP "infrastructure" includes the facilities, utilities, vehicles and IT/IS systems installed and/or used at the USAP staging areas in California, New Zealand and South America; and at the US Antarctic stations and camps. The infrastructure varies by site and because of such factors as age, environment and original layout as well as financial constraints, effective and efficient operation of much of the infrastructure, particularly in Antarctica, is difficult.

Nevertheless, NSF believes that it is possible to objectively assess the Contractor's ability to operate and maintain the infrastructure at each site. "Effective" Contractor operation is defined as the Contractor's ability to master the working conditions at a site, marshal resources, and maintain safe and habitable infrastructure within the geographical constraints and historical legacies imposed by the site.

"Efficient" Contractor operation is defined as the Contractor's ability to organize and conduct work with the smallest possible workforce possessing the skills needed to operate the infrastructure at a seasonal or otherwise defined level each year, while providing the organizational response to acquire new or additional workforce skills according to supplemental requirements identified in the annual program plan.

"Commitment to long-term improvement" is defined as the Contractor's ability to operate and maintain infrastructure at the level defined in the annual program plan while implementing discrete improvements that, in aggregate and

over the course of several seasons, contribute directly or indirectly to NSF's long-term plans for the Antarctic stations. For example, ongoing repair or realignment of the McMurdo fuel distribution system in such a way that replacement/upgrade in the future is easier and/or less costly would be considered a "direct" contribution to the long-range plan for fuel storage and distribution; while Contractor introduction of new operating practices that result in less fuel consumption at the station might be considered an "indirect" contribution to the fuel storage and distribution long-range plan, but would be a "direct" contribution to the long-range plan to reduce the footprint in Antarctica. In other words, the Contractor's ability to apply long-term conceptualization to routine, tasks is a significant element of PRSS Goal I.

C9.1.2.2 PRSS Goal II: Apply modern technology to enable and support the research enterprise

For the purposes of the USAP, "modern technology" is defined as, 1) the current business technology used by US firms that is accepted industry-wide, 2) rapidly evolving, high technology fields such as information and remote sensing systems, and 3) new practices applied to processes such as science support, construction, facilities maintenance and transportation.

Application of modern technology is defined as the Contractor's ability to identify new methods, equipment, materials and practices (either on its own initiative or at NSF direction, see Section C7.1.10) that can be acquired at reasonable cost and directly benefit USAP activities, develop evaluation and testing programs, demonstrate the effectiveness of a new technology, and provide NSF with the information needed to make an informed decision as to whether a technology can and should be incorporated into the USAP.

C9.1.3 PRSS Goal III: Provide quality facilities to support the research enterprise

For the purposes of the USAP, "quality facilities" in Antarctica are defined as structures designed for scientific research at a particular station or camp that, within the confines of local geographic conditions and available funds for upgrade or replacement, provide a laboratory, observatory or other science-related environment that sustains research productivity in Antarctica.

NSF's definition of "quality" for research facilities necessarily varies by site. At McMurdo and South Pole Stations and onboard the research vessels, facilities now approach the level found at major universities while facilities at field camps are often rudimentary shelters. For comparative purposes, the CSEC at McMurdo and the CARA observatory at the South Pole are considered quality facilities for their respective sites. At a medium size field camp, a quality facility is a secure, heated shelter with a reasonably efficient work space configuration.

At all locations, however, research facilities must provide, 1) reliable and sufficient electrical power with conditioning as needed, 2) information and communications systems support that meets research support plan requirements, and 3) work and storage areas that provide adequate space and environmental conditioning for the primary research disciplines supported at a site.

Goal III success is dependent on the Contractor's success in meeting Goals I and II, which provide the generic infrastructure and technical improvements that make Goal III possible.

C9.1.4 PRSS Goal IV: Integrate Safety, Health and Environmental Stewardship into all activities

Safety, health and environmental (SEH) considerations influence all USAP activities in Antarctica. The SEH initiative that began eight years ago is now a mature part of the program and has evolved into the process requirements listed in Sections C7.1 and C7.3.

PRSS Goal IV affects Goals I-III and, at times, may supersede or compromise Contractor attempts to undertake or complete work that will help NSF achieve Goals I-III. Therefore, "integration" is defined as the Contractor's ability to recognize SEH elements early in the planning process or before an unscheduled activity begins, formulate practical recommendations that are neither burdensome nor cursory (but which address the relevant issue and comply with applicable laws), and implement approved recommendations. In almost all instances, there will be at least one safety, health and/or environmental element associated with each USAP activity.

C9.2 Performance Goals Matrix

WBS ⇓	*General Goals: Business Processes*	*General Goals: Customer Satisfaction*	*General Goals: Innovation & Process Improvement*	*PRSS Goal: Operate the infrastructure effectively and efficiently*	*PRSS Goal: Apply modern technology to enable and support the research endeavor*	*PRSS Goal: Provide quality facilities to support the research enterprise*	*PRSS Goal: Integrate Safety, Health & Environmental Stewardship into all Activities*	*PRSS Goal: Maintain Responsiveness to changing parameters or targets of opportunity*
General Management	1. Manage staff & sub-contractors to deliver agreed upon levels of services within budgeted $	2. Budgets, plans and reports delivered complete & on-time 3. Insures that the organization is responsive to client and customer needs	4. Quality assurance integrated across contract activities (QA/ QC programs) 5. Continuous improvement in organizational processes that reduce cost and improve productivity	6. Insure that the organization plans, budgets, and manages resources to achieve the PRSS goal	7. Provide management expertise that understands the research needs. 8. Encourages exploration of initiatives and ideas that may lead to efficiencies and productivity through the application of technology	9. Management leadership to ensure that planning processes incorporate on-going assessment of science facilities and research requirements.	10. Development and use of S-E-H plans, training & accountability measures. 11. Demonstrate integration of safety, health, environment stewardship into all activities 12. Waste management/ minimization concepts integrated across activities 13. Physical qualification process is efficient & effective 14. Permits & record-keeping meets regulatory and reporting compliance requirements	15. Maintain system flexibility to respond to: unanticipated events of interest to the research community; negative events; and, opportunities for systemic improvements to operations or the conduct of science.
Logistics	16. Schedules	18. Cargo and	19. Streamline	20. Personnel	22. Streamline	24. Coordinate	26. Safety	28. Ability to

	resources to meet movement requirements for all program cargo and passengers. 17. Minimize costs to meet program requirements.	passengers meet ROS dates (required on-site).	processes and/or identify alternate processes to improve service and/or reduce costs	and cargo movement is efficient and cost effective. 21. Maximize use of program capabilities	processes to improve service and reduce costs 23. Incorporate industry standards and technology where cost effective, to the logistics systems	on-site passenger and cargo support to reduce incidence of lost research time because of the unavailability of parts or materials 25. Provide facilities to enable efficient staging of materials and cargo to support research projects	record of personnel meets or exceeds industry standard. 27. Effective application of program standards for handling of waste materials generating in support of program activities.	react to external changes in activity schedules & maintain service levels 29.
Station & Ship Operations	30. Facilities are operated efficiently in accordance with commercial best practices	31. System reliability and/or services meet participant expectations and planned requirements.	32. Apply value engineering to processes to improve efficiency and/or reduce costs.	33. Infrastructure is maintained to operate at capacity. 34. Support equipment can sustain a high rate of availability. 35. Personnel are capable and experienced in providing support.	36. Equipment and facilities are replaced and/or maintained to industry averages and standards.	37. Ensure that facilities meet participant expectations and requirements. 38. Provide levels of maintenance consistent with industry and/or research lab standards. 39. Ability to anticipate equipment requirements within the budget cycle for major projects	40. Operational safety records meet industry standards 41. Operations meet program standards of waste minimization, management, and disposal 42. Hazardous materials are appropriately managed and disposed. 43. Personnel are cognizant of environmental concerns and program responsibilities.	44. Adapt to priority or budget shifts quickly & effectively 45. Ability to react to external changes in activity schedules & maintain service levels

Science Support	46. Effectively communicate program capabilities to grantees 47. Effectively plan grantee project support 48. Effective design and/or procurement of scientific equipment/facilities	49. Meet grantees expectations in planning and in meeting research activity goals 50. Space, equipment & support available & appropriate to meet science goals	51. Suggest & implement improvements in science support processes 52. Use of knowledge and expertise to more effectively support research	53. # & Ratio of projects, scientists & "observing days" to planned levels is high 54. Maximize science throughput within capabilities	55. Suggest & implement improvements in science support processes 56. Identify and recommend the acquisition of scientific instrumentation that will enhance grantee efforts 57. Incorporate best and proven technology in support of the scientific projects	58. Ensure that facilities provide the utilities, equipment and staff resources necessary to meet program plan goals 59. Ensure that equipment and instrumentation are available and calibrated when required and perform reliably. 60. Equipment and instrumentation are the "state of the art."	61. Operational safety records meet industry standards 62. Operations meet program standards of waste minimization, management, and disposal 63. Hazardous materials are appropriately managed and disposed. 64. Personnel are cognizant of environmental concerns and program responsibilities.	65. Adapt to priority or budget shifts quickly & effectively 66. Ability to react to external changes in activity schedules & maintain service levels
Info. Tech. & Info. Systems	67. Information technology & communications available, reliable & within budget. 68. Well planned system architecture	69. Systems and functions meet user needs & requirements	70. Maximize communciation throughput 71. Identify and/or incorporate alternate capabilities to meet unique Antarctic communication requirements	72. Maintain system reliability and availability to industry	73. Identify & develop new IT applications that increase information availability and accuracy and/or reduce required analysis time. 74. Planning for system upgrades: suitability, sustainability, component affordability.	75. IT and communicationss ystems and functionality meet user needs & requirements. 76. Processes in place to anticipate user requirements.	77. Determine opportunities to use information technology to improve S-E-H monitoring and reporting 78. Personnel are cognizant of environmental concerns and program responsibilities 79. System installations meet industry safety	80. Down-time is minimized & new systems up with-in schedule 81. Incorporate risk management principles into IT/IS activities

							standards	

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Facilities Engineering & Construction	82. Effective schedules and plans for projects 83. Constructio n & upgrades on-schedule and within budget 84. Application of value engineering principles to all projects	85. Impact of construction on "regular" activities is at a minimum 86. Project is completed with no corrective action required. 87. Effective contractor managment results in minimal NSF management oversight.	88. Improveme nts to facilities design/ construction processes as a consequence of proactive management processes (e.g. value engineering)	89. Preventive maintenance of facilities results in few emergency repair actions 90. Project planning and execution is conducted in accordance with industry standards.	91. Improveme nts to facilities design & construction processes (e.g. value engineering) that enhance the conduct of science	92. Construction & upgrades on-schedule & on budget to reduce negative impacts on scientific research activities. 93. Design and installations meet user specifications and requirements.	94. Operational safety records meet industry standards. 95. Operations meet program standards of waste minimization, management, and disposal. 96. Hazardous materials are appropriately managed and disposed. 97. Personnel are cognizant of environmental concerns and program responsibilities	98. Maintain schedules when transport, staff, weather, etc. variables impact on activities 99. Adapt to priority or budget shifts quickly & effectively 100.Ability to react to external changes in activity schedules & maintain service levels

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C9.3 Performance Metric and Data Requirements Matrix

See Attachment No. 3a.

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C10. PHASE-IN PLAN

C10.1 Scope and Schedule

NSF anticipates award of the contract resulting from this solicitation on or about 1 November 1999. The contractor will begin full performance on 1 April 2000.

The period from notice of award to the contract start date will be approximately 22 weeks; therefore, the Contractor will have sufficient time to mobilize a phase-in team and project office, coordinate with NSF and other USAP participants, learn about in-progress activities, provide the required staffing for South Pole, McMurdo and Palmer stations prior to the winter closing dates (see Section C10.3) and incrementally add resources as needed to assume all Section C.7 tasking on the contract start date.

The Contractor's phase-in plan shall be included with its proposal (see Section L7.5, Tab 8).

The phase-in plan shall be presented as a schedule in graphic format that shows the timing and sequence of mobilization tasks. The schedule shall be supplemented by sufficient narrative to explain how the overall phase-in effort will be managed, how specific tasks will be accomplished, and who will be responsible for task accomplishment.

The tasks and submittals described below shall be included in the schedule and narrative. As part of its evaluation (see Section M) NSF will assess the Contractor's ability to develop and manage a phase-in effort commensurate with contract responsibilities.

C10.2 Phase-in Team

Designate principal phase-in team members by name, position, start date and responsibilities. Define interfaces with NSF and other USAP participants (ANG, SPAWARS, etc.) and proposed coordination with the current Contractor. The role of proposed "key personnel" during phase-in shall be described (see Section L7.5, Tab 9).

C10.3 Antarctic Deployment, Interview Schedule and Winter Staffing

Provide a deployment schedule for the phase-in team to interview incumbent staff that have committed for winter assignments at the stations. Because the contract will begin after South Pole and McMurdo stations have closed for the winter, the Contractor must ensure that staffing commitments at these locations are decided before the contract start date. Assume that employment contracts for winter-over personnel will begin on April 1, 2000.

The Contractor shall schedule deployment for its representatives not before November 15, 1999 but no later than January 10, 2000.

The order of precedence for the Contractor's recruiting/staffing effort will be South Pole Station, followed by McMurdo Station. Palmer Station is accessible throughout the year; however, staffing of the station must be completed during the last vessel resupply prior to the start of the contract while the recruiting/staffing plan for research vessels assignments must accommodate the science cruise schedules. Similarly, provide a recruiting and staffing plan for the Port Hueneme, Christchurch and Punta Arenas offices.

C10.4 Medical Records Transfer, Custody and Control

Provide a medical records transfer, custody and control plan that meets Privacy Act requirements.

C10.5 Property Transfer and Custody

Provide a property transfer and custody plan that describes proposed actions to identify, account for and accept all GFP/GFE furnished under this contract.

C10.6 USAP Databases

If transfer of existing USAP databases to other hardware/software formats is proposed, explain how and when the proposed formats/systems and their capabilities will be demonstrated prior to effecting any transfer.

C10.7 Lease Assumption

Provide a plan to assume subcontracts (including real property leases), if such are to be assigned, and explain how transfers will be coordinated.

C10.8 Other Agreements

Provide a plan to initiate and/or conclude agreements which are important to the program or are otherwise part of the Contractor's mode of operations as accepted by NSF in the Contractor's proposal. These may include commercial air travel agreements, marine charters, subcontracts or other instruments that will affect the Contractor's ability to perform on the contract start date.

C10.9 USAP Permit Applications

Provide a plan and schedule to apply for and obtain all permits required for contract tasking.

C10.10 South Pole Redevelopment Project (SPRP)

Provide a plan to assume responsibility for all in-progress and pending activities directly relating to the SPRP. The plan shall address scheduling, procurement, material/equipment acceptance inspections, logistics, job-site quality control and safety, and any other tasks that the Contractor must be completely familiar with and able to control effectively on the contract start date.

C10.11 Program Plan Development

Provide a plan to acquire the knowledge and background needed to begin development of the Annual Program Plan (FY01) on 1 April 2000. Outline a schedule for submitting a completed plan to NSF by 31 July 2000.

C10.12 Innovations

If any innovations are proposed as part of the Contractor's conforming or any alternate proposal, provide a recommended implementation plan and schedule (innovations shall not be established until so directed by NSF).

C10.13 Post-Award Conference

At a mutually agreeable time the Contractor shall meet with NSF and other individuals as appropriate to review the phase-in plan and schedule of activities submitted with its proposal, and other contractual matters. Discussions at the meeting may result in changes to the timing and sequence of the Contractor's phase-in effort. Such changes shall be incorporated into a revised phase-in schedule, which shall be submitted for NSF review and approval within five (5) working days after the meeting.

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SECTION D – PACKAGING AND MARKING

D1. GENERAL

Unless otherwise specified, all items shall be packaged and packed in accordance with normal commercial practices. If magnetic media is involved, packaging shall be clearly marked identifying the contents as such and with a warning for protection against exposure to magnetic fields or temperature extremes.

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SECTION E – INSPECTION AND ACCEPTANCE

E1 NOTICE LISTING CLAUSES INCORPORATED BY REFERENCE

Federal Acquisition Regulation (48 CFR Chapter 1) Clauses

52.246-5	Inspection of Services -- Cost-Reimbursement	APR 1984
52.246-15	Certificate of Conformance	APR 1984

E2 EVALUATION AND ACCEPTANCE

Evaluation and acceptance of services delivered under this contract shall be performed by the Contracting Officer or other such person as may be designated elsewhere in this contract or in writing by the Contracting Officer.

E3 CONTRACTOR'S QUALITY ASSURANCE PROGRAM

The Contractor is required to develop and implement an effective quality management system covering all aspects of the contract activities and services (see Section C7.1). Although no specific format or approach is prescribed, the Contractor shall ennunciate a clear, unambiguous commitment to quality and continual quality improvement in its delivery of goods and services under this contract, and shall establish a program to monitor the effective implementation of this policy. Performance expectations should be consistent with those described in Section C9 and compatable with the overall USAP mission goals.

E4 STANDARDS FOR ACCEPTANCE

Unless otherwise authorized in writing by the Contracting Officer, all work performed and presented for acceptance shall be free from error.

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SECTION F – DELIVERIES OR PERFORMANCE

F1 PERIOD OF PERFORMANCE WITH OPTION PERIOD

This contract shall commence on November 1, 1999 and shall expire on March 31, 2005. Should the Government elect to exercise its option to extend the term of the contract, the term of the contract shall be extended by sixty (60) months, and shall expire on March 31, 2010.

52.217-9 OPTION TO EXTEND THE TERM OF THE CONTRACT. (MAR 1989)

a) The Government may extend the term of this contract by written notice to the Contractor not less than 180 days prior to the contract's expiration.
b) If the Government exercises this option, the extended contract shall be considered to include this option provision.
c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed 125 months.

F2 NOTICE LISTING CLAUSES INCORPORATED BY REFERENCE

Federal Acquisition Regulation (48 CFR Chapter 1) Clauses

52.242-15	Stop-Work Order Alternate I	APR 1984

F3 GOVERNMENT FURNISHED PROPERTY

F3.1 Ownership and Control

F3.1.1 The Government will retain full ownership and control of all property furnished by the Government. Government furnished property not consumed in performance shall be surrendered upon demand (i.e., during performance, or end of the period of performance).

F3.1.2 The Contractor shall execute receipt of property documents for any property furnished by the Government.

F3.2 Government Furnished Property/Equipment

Property furnished by the Government for use in the performance of work is identified as follows:

F3.2.1 Real Property (see Attachment 4)

F3.2.2 Capital equipment valued at $25,000 or greater (see Attachment 5)

F3.2.3 Equipment valued at $5,000 or greater (see Attachment 6)

F3.2.4 Other material and consumables as currently in USAP inventories as of the contract's effective date.

F4 GOVERNMENT FURNISHED OFFICE SPACE, FURNISHINGS, and SERVICES

F4.1 The Government will furnish, at no cost to the Contractor, the necessary office space, utilities, telephone service, general purpose office equipment, and office furniture for its personnel assigned to work under this contract at Government locations.

F4.2 The Government will furnish the following transportation services.

F4.2.1 Round trip air transportation for the Contractor's personnel between Christchurch, NZ and all Government sites in Antarctica.

F4.2.2 Transportation for cargo by air and surface vessel between designated worldwide locations and Government sites in Antarctica, and between Government sites in Antarctica as mutually agreed upon in the Program Plan. This includes, but is not limited to, the following:

F4.2.2.1 One surface vessel capable of carrying containerized cargo and other freight making port calls in Port Hueneme, CA, Port Lyttleton, NZ, and McMurdo Station, Antarctica.

F4.2.2.2 One surface vessel capable of carrying fuel from its acquisition point to McMurdo Station, Antarctica.

F4.2.3 One ice breaking vessel capable of opening and maintaining a shipping channel to McMurdo Station, Antarctica.

F4.2.4 Light and medium lift helicopter services for transportation of personnel and cargo within the general vicinity of McMurdo Station, Antarctica.

F4.2.5 Ski/wheel C-130 aircraft for transportation of personnel and cargo between Christchurch, NZ and McMurdo Station, Antarctica, between McMurdo Station and South Pole Station, and between other Antarctic stations and field camps.

F4.2.6 US Air Force C-5 and C-141 aircraft for transportation of personnel and cargo between Christchurch, NZ and McMurdo Station, Antarctica, and between the United States and Christchurch, NZ.

F5 PROGRAM PLAN and LONG-RANGE PLAN

F5.1 Work under this contract shall be performed in accordance with a Program Plan developed by the Contractor in consultation with NSF. Following discussions with the Contractor, the program plan shall be approved in writing by the Contracting Officer.

F5.2 Each Program Plan shall be prepared and submitted according to a Work Breakdown Structure format (as approved by NSF), funding levels, guidelines and other formats specified in accordance with this contract and in writing by NSF. The Contractor shall also provide supporting documentation as required.

F5.3 Program Plan periods are as follows:

	Period No.	Begins	Ends
F5.3.1	Phase-In	Nov 1, 1999	March 31, 2000
F5.3.2	One	October 1, 2001	September 30, 2001

F5.3.2	Two	October 1, 2001	September 30, 2002
F5.3.3	Three	October 1, 2002	September 30, 2003
F5.3.4	Four	October 1, 2003	September 30, 2004
F5.3.5	Five	October 1, 2004	September 30, 2005
F5.3.6	Six	October 1, 2005	September 30, 2006
F5.3.7	Seven	October 1, 2006	September 30, 2007
F5.3.8	Eight	October 1, 2007	September 30, 2008
F5.3.9	Nine	October 1, 2008	September 30, 2009
F5.3.10	Ten	October 1, 2009	September 30, 2010

F5.4 The Program Plan shall cover the period identified and shall address, but not be limited to, the following topics.

F5.4.1 Programmatic goals;

F5.4.2 Scheduled activities;

F5.4.3 Field activites;

F5.4.4 Staffing and organizational plans;

F5.4.5 Estimated costs; and

F5.4.6 Major planning activites.

F5.5 Program Plan changes proposed by the Contractor shall be described in consecutively numbered submissions in each program plan period, and submitted to the Contracting Officer for approval prior to their implementation. NSF approval will be by modification to the approved Program Plan signed by the Contracting Officer.

F5.6 The Contractor, unless otherwise prohibited by the Contracting Officer, may redistribute funds among the approved Work Breakdown Structure at the WBS x.x.x level in an amount not to exceed $250,000 without NSF approval. Such fund redistributions shall be reported in the following monthly report.

F5.7 NSF reserves the right to unilaterally modify the Program Plan. The Contractor shall be entitled to an equitable adjustment in the contract's estimated cost, fees, schedule and other contract terms and conditions as necessary.

F5.8 A five (5) year long-range plan shall be prepared and submitted to NSF annually at the time of the draft program plan submission. The long-range plan shall at a minimum address the topics included in the program plan and be consistent with and support the NSF Long-range Plan.

F6 TECHNCIAL and FINANCIAL REPORTING

F6.1 Quarterly Technical Report

The Contractor shall prepare and furnish copies of quarterly technical reports detailing for the preceding quarter: (a) the Contractor's success in meeting or exceeding the performance goals defined in Section C9, and other performance measurements that may be required by the Program Plan or in other correspondence from the Contracting Officer; (b) status of all major events and activities identified in this contract, the Program Plan, and other correspondence from the Contracting Officer; and (c) a summary of all work performed during the reporting period, including problems encountered,

future plans and actions required of the Government. In addition, each report will include a summary of all NSF approved changes to the Program Plan since the beginning of the fiscal year and detail any reprogramming of funds that have occurred since the beginning of the fiscal year, either as performed under Contractor's authority or as directed by NSF.

F6.2 Monthly Financial Report

A financial report shall be submitted electronically each month using the Polar Operations Financial Database templates and format (see Attachment 6a). This report shall provide budget and financial information for each area of the Contractor's WBS structure that is detailed in the annual program plan and agreed to by NSF and the Contractor.

F7. AFTER-OPERATIONS REPORT

The Contractor shall prepare and furnish copies of an annual after-operations report detailing for the preceding contract year (i.e., April through March of the following year): (a) the Contractor's success in meeting or exceeding the performance goals defined in Section C9, and other performance measurements that may be required by the Program Plan or in other correspondence from the Contracting Officer (including data required by this contract, the Program Plan, or other document to support the Contractor's performance claims); (b) status of all major events and activities identified in this contract, the Program Plan, and other correspondence from the Contracting Officer; and (c) a summary of all work performed during the reporting period, including problems encountered, future plans and actions required of the Government. In addition, each report will include a summary of all NSF approved changes to the Program Plan since the beginning of the fiscal year and detail any reprogramming of funds that have occurred since the beginning of the fiscal year, either as performed under Contractor's authority or as directed by NSF. This report will serve as the quarterly technical report in the quarter of the year in which it is due.

F8 MANAGEMENT MANUALS

Manuals describing the management, operation and maintenance of Antarctic stations (McMurdo, Amundsen-Scott South Pole, Palmer, Marble Point), field camps, research vessels, and the Christchurch, NZ gateway facility, as described in Section C7.1.3.6, shall be submitted for NSF review and approval within 24 months of the contract award date.

F9 ANNUAL REPORT for the USAP MASTER PERMIT

Pursuant to the NSF Waste Regulations (45 CFR Part 671), the Contractor shall submit an "Annual Report for the USAP Master Permit".

F10 SCHEDULE OF CONTRACT DELIVERABLES

F10.1 The following schedule identifies the deliverables required by this contract. Other deliverables may be required by the Program Plan or other written documentation. Reporting format shall be developed by the Contractor and approved by NSF.

F10.1.x	Item	No.	Date	Notes
F10.1.1	Draft Program Plan for Period One	12	July 31, 2000	(1)
F10.1.2	Final Program Plan for Period One	12	September 15, 2000	(1)
F10.1.3	Quarterly Technical & Monthly Financial Reports	12	January 15, 2000	(2) (3) (4)
F10.1.4	After Operations Report	12	April 30, 2001	(1)
F10.1.5	Long-Range Plan for Period Two through Six	12	July 31, 2000	(1)
F10.1.6	Management Manuals	12	November 1, 2001	(5)
F10.1.7	Annual Report for the USAP Master Permit	12	July 31, 2000	(1) (6)
F10.1.8	Property Inventories			(7)
F10.1.9	Draft USAP IT Enterprise Strategic Plan	4	24 mon after K award	
F10.1.10	Final USAP IT Enterprise Strategic Plan	4	30 mon after K award	(8)
F10.1.11	USAP Business Enterprise Strategic Plan	4	24 mon after K award	
F10.1.12	USAP Information Architecture Study	4	24 mon after K award	
F10.1.13	USAP Mission Oper & Mgmt Sys Re-design Study	4	12 mon after K award	
F10.1.14	USAP IT Sys Life Cycle Mgmt Plan	4	14 mon after K award	
F10.1.15	USAP Technology Architecture Plan	4	18 mon after K award	
F10.1.16	USAP IT Enterprise Long-Range Implementation Pl	4	18 mon after K award	(1) (2)
F10.1.17	Technology Trends Assessment	4	14 mon after K award	(1)

Note (1): Annually thereafter
Note (2): Technical Reports Quarterly thereafter except in the quarter the After-Operations report is due
Note (3): Financial Reports Monthly thereafter
Note (4): Financial Reports to be submitted electronically
Note (5): Reviewed and changes submitted annually
Note (6): To be submitted electronically and available on World Wide Web
Note (7): Per this contract's *Property Reporting* clause
Note (8): Bi-annually thereafter

F10.2 One copy of the Program Plan and deliverables shall be submitted to:

National Science Foundation
Division of Contracts, Policy, and Oversight
4201 Wilson Boulevard, Room 475
Arlington, VA 22230
ATTN: Contracting Officer

F10.3 Unless otherwise directed by the Contracting Officer, the remaining copies of the Program Plan and each deliverable shall be submitted to:

National Science Foundation
Office of Polar Programs
4201 Wilson Boulevard, Room 755
Arlington, VA 22230
ATTN: [to be determined]

F11 PROPERTY REPORTING

a. Definitions – As used in this Subsection F11 only:

1. **Accountable property** means any item of property acquired by capital lease, or with an acquisition cost of $2,500 or greater with a useful life of two years or more.

2. **Acquisition cost** means the sum of costs for design, labor, materials, transportation, and related indirect or overhead expenses (including the capitalized cost of any expansions, extensions, conversions, additions, alterations and improvements to property) as calculated in accordance with Federal Accounting Standards Advisory Board.Statement of Federal Financial Accounting Standards No. 6, titled "Accounting for Property, Plant, and Equipment."

3. **Acquisition date** means the Federal Government Fiscal Year that an item of property was accepted for use by the original contracting activity (either government or commercial).

4. **Capital lease** means leases of property with minimum lease payments of $2,500 or greater, the leased property has a useful life of two years or greater, the minimum lease payment is being reimbursed to the contractor as a direct cost, and the lease substantially transfers all the benefits and risks of ownership to NSF. Leases that meet one or more of the following criteria shall be considered to substantially transfer all the benefits and risks of ownership to NSF.

   (a) The lease transfers ownership of the property to the contractor at the end of the lease term.

   (b) The lease contains an option for the contractor to purchase or otherwise acquire the property at a bargain price.

   (c) The lease reserves the rights of NSF, the contractor or subcontractor at any tier to unilaterally assign the lease to NSF or another organization selected by NSF.

5. **Capitalized property** means any item of property acquired by capital lease with a minimum lease payment of $25,000 or greater or with an acquisition cost of $25,000 or greater, and a useful life of two years or more.

6. **Construction-in-Progress** means real property that is being constructed, but has not been accepted by NSF or is not otherwise ready for use.

7. **Minimum lease payment** means the sum of all payments required for the right to use property for a stated period. This includes but is not limited to:

   (a) The minimum rent required during the lease term.

   (b) Any payment(s) or guarantee(s) required at the end of the lease term, including: (i) any amount stated to purchase the leased property; (ii) any amount stated to make up any deficiency from a specified minimum; and (iii) any amount payable for failure to renew or extend the lease at the expiration of the lease term.

8. **Equipment** means all plant equipment, special test equipment, and special tooling as defined at FAR Subpart 45.101(a); and all agency-peculiar property as defined at FAR Subpart 45.301.

9. **Government property** has the same meaning as defined at FAR Subpart 45.101(a).

10. **Half-year convention** means a method of calculation that recognizes a half-year of depreciation for the year a property item is available for use as determined by its acquisition date, and the year following the end of its useful life.

11. **In-service date** means the month and year that NSF received title to an item of property.

12. **Material** has the same meaning as defined at FAR Subpart 45.301.

13. **Property** has the same meaning as defined at FAR Subpart 45.101(a).

14. **Real property** has the same meaning as defined at FAR Subpart 45.101(a).

b. Equipment

1. Prior to October 15 the Contractor shall submit to the Foundation the following reports for all equipment identified as Government property in the custody of the Contractor (including equipment assigned to subcontractors and grantees), and classified as either accountable property or capitalized property.

   (a) A complete inventory of equipment as of September 30 of the current year.

   (b) A complete inventory of equipment for which the contractor assumed custody during the period from October 1 of the previous year through September 30 of the current year.

   (c) A complete inventory of equipment for which the contractor was relieved of custody during the period from October 1 of the previous year through September 30 of the current year.

2. These reports shall, at a minimum, include the following data:

   (a) NSF Property Tag Number

   (b) Equipment Description

   (c) Make and/or Model

   (d) Manufacturer

   (e) Manufacturer's Serial Number

   (f) Purchase Order/Subcontract No., Government Transfer Order No. or added by physical inventory

   (g) Indicate if added by physical inventory or through Government Transfer Order

   (h) Acquisition Date

   (i) In-Service Date

   (j) Acquisition Cost or Minimum Lease Payment

   (k) Lease Term (if applicable)

   (l) Periodic Lease Payment (if applicable)

   (m) Lease Payment Period (if applicable)

   (n) Location (Geographic, or Vessel, Aircraft or Spacecraft Location)

   (o) Indicate if on Loan

   (p) Federal Supply Classification (FSC)

   (q) Annual Depreciation Expense

(r) Accumulated Depreciation

(s) Net Book Value

3. Equipment that is considered sensitive or hazardous and valued at less than $2,500 may be included in this inventory as a means of control.

4. The straight-line method of depreciation shall be used to calculate depreciation expenses. Useful life shall be established in accordance with Internal Revenue Service Depreciation Guidelines. A half-year convention for recognizing depreciation shall be employed. Changes in useful life or salvage value shall be treated prospectively, and accounted for in future periods. No changes shall be made to previously recorded depreciation.

5. These reports shall be segregated into two parts.

(a) Equipment identified as either accountable property or capitalized property except property acquired by capital lease.

(b) Equipment acquired by capital lease.

c. Real Property

1. Prior to October 15 the Contractor shall submit to the Foundation the following reports for all real property identified as Government property in the custody of the Contractor (including real property assigned to subcontractors and grantees), and classified as either accountable property or capitalized property.

(a) A complete inventory of real property as of September 30 of the current year.

(b) A complete inventory of real property for which the contractor assumed custody during the period from October 1 of the previous year through September 30 of the current year.

(c) A complete inventory of real property for which the contractor was relieved of custody during the period from October 1 of the previous year through September 30 of the current year.

2. These reports shall, at a minimum, include the following data:

(a) NSF Property Number

(b) Item Description

(c) Quantity

(d) Purchase Order/Subcontract No. or Government Transfer Order No.

(e) Indicate if acquired through Government Transfer Order

(f) Acquisition Date

(g) In-Service Date

(h) Gross Square Footage or Acreage

(i) Acquisition Cost or Minimum Lease Payment

(j) Lease Term (if applicable)

(k) Periodic Lease Payment (if applicable)

(l) Lease Payment Period (if applicable)

(m) Function

(n) Location

(o) Annual Depreciation Expense (capitalized property excluding land only)

(p) Accumulated Depreciation (capitalized property excluding land only)

(q) Net Book Value (capitalized property excluding land only)

3. The straight-line method of depreciation shall be used to calculate depreciation expenses. Useful life shall be established in accordance with Internal Revenue Service Depreciation Guidelines. A half-year convention for recognizing depreciation shall be employed. Changes in useful life or salvage value shall be treated prospectively, and accounted for in future periods. No changes shall be made to previously recorded depreciation.

4. These reports shall be segregated into two parts.

(a) Real property identified as either accountable property or capitalized property except property acquired by capital lease.

(b) Real Property acquired by capital lease.

d. Construction-in-Progress

1. Prior to October 15 the Contractor shall submit to the Foundation a report of all Construction-in-Process as of September 30 of the current year.

2. This report shall, at a minimum, include the following data:

(a) Identifying Project Number

(b) Project Description

(c) Project Location

(d) Acquisition Cost to Date (material cost to be calculated at the time materials are acquired and/or identified for use in the project)

e. NSF Form 1408

1. NSF Form 1408, titled "NSF Property in the Custody of Awardees," shall be completed and submitted to the Foundation prior to October 15 each year (notwithstanding the form's instructions). This report shall be complete as of September 30 of the current year.

2. An inventory of equipment classified as capitalized property shall be submitted with the completed NSF Form 1408 to support the dollar amount cited in column "f".

f. GSA Form 1166

1. GSA Form 1166, titled "Quarterly Report of Real Property Owned by or Leased to the United States," shall be completed and submitted to the Foundation prior to October 15 each year. This report shall be complete as of September 30 of the current year.

2. Notwithstanding the form's title, annual submission is required.

g. Standard Form 82 – Standard Form 82, titled "Agency Report of Motor Vehicle Data," shall be completed and submitted to the Foundation prior to October 15 each year. This report shall be complete as of September 30 of the current year.

h. Submission – All reports and inventories identified in this subsection shall be submitted as follows:

1. One set to:

National Science Foundation
Division of Administrative Services
4201 Wilson Boulevard, Room 295
Arlington, VA 22230
ATTN: Property Administrator

2. One set to:

National Science Foundation
Division of Financial Management
Accounting Operations Branch
4201 Wilson Boulevard, Room 575
Arlington, VA 22230
ATTN: Branch Chief

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SECTION G – CONTRACT ADMINISTRATION DATA

G1. CONTRACTS

G1.1 One conformed copy of the contract will be furnished to the Contractor.

G1.2 The Contractor shall maintain a copy of the contract and all modifications at its headquaters, and at significant work locations throughout the contract's term.

G1.3 The Contractor shall be responsible for reproduction and distribution of the contract and its modifications.

G2. RESERVED

G3. PAYMENT INFORMATION

Contract payments shall be on a letter of credit basis in accordance with procedures established by the National Science Foundation; Division of Financial Management; 4201 Wilson Boulevard, Room 575; Arlington, VA 22230.

Upon completion of the required work, the Contractor shall submit a completion invoice in compliance with the clause titled *Allowable Cost and Payment* incorporated by reference under Section I of this contract. This completion invoice shall be submitted promptly upon completion of the work, but no later than one year from the completion date of the contract. The Contractor shall submit the completion invoice to the Contracting Officer for approval.

G4. CONTRACTING OFFICER'S AUTHORITY

The Contracting Officer is the only person authorized to approve changes in any of the requirements under this contract. Notwithstanding any clause contained elsewhere in this contract, the said authority remains solely with the Contracting Officer.

In the event the Contractor effects any change at the direction of any person other than the Contracting Officer, including any change beyond the scope of authority given to the duly authorized Contracting Officer's Technical Representative identified in the contract, the change will be considered to have been made without authority and no adjustment will be made in the contract price to cover any increase in charges incurred as a result thereof. The Contracting Officer has the authority to perform any and all postaward functions in administering and enforcing this contract in accordance with its terms and conditions.

G5. COTR DESIGNATION AND AUTHORITY

The Contracting Officer has designated Dwight D. Fisher, Deputy Section Head, Office of Polar Programs, Polar Research Support Section (703/306-1032, ddfisher@nsf.gov) as the Contracting Officer's Technical Representative (COTR) under this contract.

The COTR is responsible for administering the performance of work under this contract. IN NO EVENT, however, will any understanding, agreement, modification, change order, or other matter deviating from the terms of this

contract be effective or binding upon the Government unless formalized by proper contractual documents executed by the Contracting Officer prior to completion of the contract.

The COTR may give technical direction to the Contractor which fills in details, requires pursuit of certain lines of inquiry, requires replanning of funds in the current Federal fiscal year within the approved Work Breakdown Structure in an amount not to exceed $1,000,000, or otherwise serves to facilitate the Contractor's compliance with the contract. To be valid, technical direction by the COTR: (1) must be issued in writing consistent with the general scope of work set forth in this contract; (2) may not constitute new assignment of work nor change the expressed terms, conditions or specifications of this contract; and (3) shall not constitute a basis for any increase in the contract estimated cost, or extension to the contract delivery schedule.

G6. NSF ABM MANAGERS DESIGNATION AND AUTHORITY

NSF ABM Managers are those individuals appointed by the COTR in writing to aid the COTR in fulfilling his/her responsibilities as described in this contract. The ABM Managers may give technical direction to the Contractor which fills in details, requires pursuit of certain lines of inquiry, requires replanning of funds within the approved Work Breakdown Structure to the extend the COTR deligates the authority granted to COTR by this contract to the individual WBS Managers, or otherwise serves to facilitate the Contractor's compliance with the contract. To be valid, technical direction by the COTR: (1) must be issued in writing consistent with the general scope of work set forth in this contract; (2) may not constitute new assignment of work nor change the expressed terms, conditions or specifications of this contract; and (3) shall not constitute a basis for any increase in the contract estimated cost, or extension to the contract delivery schedule. Should there be any conflict between technical direction given by the COTR and the NSF ABM Managers the COTR's direction shall control.

G7. AUTHORITY OF OTHER NSF PERSONNEL

Authority of other NSF personnel as appointed to perform various functions from time-to-time shall be provided in writing to the Contractor by the Contracting Officer.

G8. NSF PROPERTY OFFICER DESIGNATION AND AUTHORITY

The Contracting Officer hereby designates James D. Wilkins, Division of Administrative Services, Property and Records Section (703/306-1125 x2045, jdwilkin@nsf.gov) as the cognizant NSF Property Officer. The Property Officer may issue direction regarding the accountability of Government property (including its disposition). IN NO EVENT, however, will any understanding, agreement, modification, change order, or other matter deviating from the terms of this contract be effective or binding upon the Government unless formalized by proper contractual documents executed by the Contracting Officer prior to completion of the contract.

G9. NOTIFICATION OF CHANGES (ORAL OR WRITTEN)

In the event any Government technical direction is interpreted by the Contractor to fall within the clause of this Contract entitled "Changes", the Contractor shall not implement such direction, but shall notify the Contracting Officer in writing of such interpretation within ten (10) working days after the Contractor's receipt of such direction. Such notice shall include the reasons upon which the Contractor bases its belief that the technical direction falls within the purview of the "Changes" clause; and include the Contractor's best estimate as to the revision of the current estimated cost, fee, performance time, delivery schedules or any other contractual provision that would result from implementing the COTR's technical direction.

If, after reviewing the information presented by the Contractor, the Contracting Officer is of the opinion that such direction is within the purview of the "Changes" clause and considers such change desirable, a unilateral direction will be issued to the Contractor to proceed pursuant to the authority granted under that clause. If a determination is made that such direction is technical direction authorized by this schedule clause, the Contractor will be directed to proceed with the implementation of such technical direction.

In the event a determination is made that it is necessary to avoid a delay in performance of the Contract, the Contracting Officer may direct the Contractor to proceed with the implementation of the technical direction pending receipt of the information to be submitted by the Contractor. Should the Contracting Officer later determine that Change direction is appropriate, the written direction issued hereunder shall constitute the required Change direction.

Failure of the Contractor and the Contracting Officer to agree on whether Government direction is technical direction or a Change within the purview of the "Changes" clause shall be a dispute concerning a question of fact within the meaning of the Clause of the General Provision entitled, "Disputes."

G10. CONTRACTOR'S ON-SITE MANAGER(S)

For work performed at Port Hueneme, CA; Christchurch, NZ; McMurdo Station; Amundsen-Scott South Pole Station; Palmer Station; on board research and other vessels; and at other locations identified by NSF the Contractor shall designate an on-site manager, with full authority to receive instruction and act on the firm's behalf. This authority need not include the authority to bind the firm contractually. However, the individuals shall have knowledge of the duties and responsibilities of the Government personnel identified herein. These individuals may be *working managers*. In addition, unless otherwise authorized by the Government, the Contractor shall designate an alternate on-site manager to function in the place of the on-site manager in his/her absence. The on-site manager or his/her alternate shall be on site at all times when Contractor employees are performing work at the designated sites.

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H1. PERSONNEL SECURITY REQUIREMENTS

If required by NSF, each position under this contract will be assigned a position sensitivity level based upon the criteria in Chapter IX, National Science Foundation (NSF) Personnel Manual No. 14.

The position sensitivity level will be determined by the NSF personnel Security Officer.

For each position classified as sensitive, the Contractor shall be provided appropriate security investigation forms by the NSF Personnel Security Officer and shall be responsible for furnishing them to the employee occupying, or proposed to occupy, the position under this contract. The employee must complete the forms and deliver them in person within seven (7) days from the date the forms are furnished to the Contractor to:

National Science Foundation
Head, Personnel Processing Services Center
Division of Human Resource Management
Room 315
4201 Wilson Boulevard
Arlington, VA 22230

Failure to return the completed security investigation forms in person within seven (7) working days shall be cause for making a determination that the employee may not perform, or continue to perform in the case of contracts in effect at the date of issuance of this requirement, in any sensitive capacity under the contract, whether on-site of off-site. The employee may be eligible for reinstatement to the contract if the completed forms are submitted after the seven day period, at the discretion of the NSF Personnel Security Officer.

Cost for conducting the required personnel investigation will be paid by NSF. Investigations will be conducted in accordance with Office of Personnel Management minimum investigative requirements.

If an investigation report contains information which is deemed significant or derogatory, a determination will be made with regard to the Employee's eligibility to serve in the subject position by the NSF Personnel Security Officer, pending adjudication or other disposition of the case.

The Contractor is required to insert terms that conform substantially to the language of this clause, including this paragraph, in all subcontracts under this contract.

H2. KEY PERSONNEL

The personnel specified below are considered to be essential to the performance of work. Prior to diverting any of the specified individuals to other programs, the Contractor shall notify the Contracting Officer reasonable in advance and submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact of such substitution upon the program. No diversion shall be made by the Contractor without the written consent of the Contracting Officer.

Title	Individual	Percent of Labor Effort
Chief Executive	Thomas W. Yelvington	100%
Science Executive/Chief Scientist	Anthony Danks	100%
Operations Executive	Robert B Jagger	100%

Logistics Executive	Michael A. Embree	100%
Information Systems Executive	Leslie Ziegler	100%
South Pole Redevelopment Project Manager	Richard P. Hillman	100%
Facilities Engineering and Construction Executive	Rodney R. Gartner	100%
Operations Director	Richard T. Boehne	100%

H3. REPLACEMENT OF PERSONNEL – CONTRACTOR PERSONNEL CONDUCT

H3.1 The Contractor shall be responsible for the furnishing of personnel fully qualified to perform the services as provided for in this contract. As a designated representative of the Contractor, Contractor personnel are expected to perform and act in a professional manner at all times. The Contractor shall be fully responsible for the actions of Contractor employees during this contract's period of performance.

H3.2 Performace of contract services will involve work and/or residence on Government and other national Antarctic program facilities. Contractor employees are expected to follow the rules of conduct established by the manager of such facilities that apply to all (both Government and non-Government) personnel working or residing on such facilities.

H3.3 The Contractor's employees are an integral element of this project. As a team member, cooperation, within the scope of this contract, is essential to successful completion of work. Personnel who perform ineffectively, refuse to cooperate in the fulfillment of the project objectives, are unable or unwilling to adapt to living conditions, or whose general performance is unsatisfactory or otherwise disruptive, shall be replaced by the Contractor.

H3.4 If notified by the Contracting Officer of unsatisfactory performance by Contractor personnel an opportunity for corrective action may be afforded. When directed by the Contracting Officer, the Contractor agrees to replace unacceptable personnel within a mutually agreeable time period.

H4. CONSTRAINTS

Not withstanding any other provision of this contract, at any point in the conduct of this project where NSF approval is required, NSF will endeavor to notify the contractor within ten (10) working days of receipt of a contractor's request as to its approval or disapproval. Failure of NSF to respond within the ten working days shall NOT constitute approval.

H5. LIMITED USE OF DATA AND INFORMATION

Performance of this contract may require the Contractor to access data and information proprietary to a Government agency or Government Contractor and/or such a nature that its dissemination or use, other than in performance of this contract, would be adverse to the interest of the government and/or others.

Contractor and/or Contractor personnel shall not divulge or release data or information developed or obtained in performance of this contract, until made public by the Government, except to authorized Government personnel or upon written approval of the NSF Contracting Officer. The Contractor shall not use, disclose or reproduce proprietary data which bears a restrictive legend, other than as required in the performance of this contract. Nothing herein shall preclude the use of any data independently acquired by the Contractor without such limitations or prohibit an agreement at no cost to the Government between the Contractor and the data owner which provides for greater rights to the Contractor.

H6. TRANSITION

The Contractor may be replaced by a successor Contractor for the performance of requirements of a similar nature and scope as the requirements specified herein. The Contractor shall cooperate to effect an orderly and efficient transition to any such successor Contractor during a transition period to be specified by the Contracting Officer.

H7. RESERVED

H8. YEAR 2000 WARRANTY

H8.1 The Contractor warrants that each hardware, software, and firmware product delivered under this contract and listed below shall be able to accurately process date data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twenthieth and twenty-first centuries, including leap year calculations, when used in accordance with the product documentation provided by the Contractor, provided that all listed or unlisted products (e.g. hardware, software, firmware) used in combination with such listed product properly exchange date data with it. If the contract requires that specific listed products must perform as a system in accordance with the foregoing warrantly, then that warranty shall apply to those listed products as a system. The duration of this warranty and the remedies available to the Government for breach of this warranty shall be defined in, and subject to, the terms and limitations of the contractor's standard commercial warranty or warranties contained in this contract, provided that notwithstanding any provision to the contrary in such commercial warranties, the remedies available to the Government shall include repair or replacement of any listed product whose non-compliance is discovered and made known to the contractor in writing within ninety (90) days after acceptance. Nothing in this warranty shall be construed to limit any rights or remedies the Government may otherwise have under this contract with respect to defects other than Year 2000 performance.

H8.2 Actual products to be delivered and subject to this requirement shall be identified in the Program Plan.

H8.3 Any existing NSF systems affected by or to be used in conjunction with products to be delivered and subject to this requirement shall be identified in the Program Plan.

H8.4 This clause shall not be interpreted as requiring the Contractor to warrant any GFE provided by the Government.

H9. SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN

The Contractor has established and will maintain Subcontracting Plan in accordance with the Small Business and Small and Disadvantaged Business Concerns Subcontracting Plan which is attached (see Section J1) and made a material part of this contract. Standard Form 294 and Standard Form 295 shall be submitted to the Contracting Officer as instructed therein.

H10. RESERVED

H11. HOLIDAYS AND LEAVE

General administrative or holiday leave (as observed locally) may be granted by the NSF Director, by the Office of Personnel Management, by the Senior U.S. Representative in Antarctica, or other U.S. Government authority due to inclement weather or other compelling reason. At the direction of the granting authority any such leave will also apply to Contractor personnel assigned to a Government site. Should such administative or holiday leave fall on a normal work day, normal compensation will be paid to employees and charged to the contract, and (if circumstance requires) corresponding adjustments made in fringe benefit and other indirect cost rates.

H12. MEDICAL AND DENTAL QUALIFICATION OF CONTRACTOR PERSONNEL

Persons traveling to Antarctica under the auspices of the USAP are subject to medical evaluation to determine whether the individual is physically qualified for deployment to Antarctica (refer to 45 CFR 675). Medical and dental criteria (and for personnel anticipating to remain in Antarctica during the austral winter period, an assessment of psychological adaptability to isolation) are enumerated in the Medical Screening Guidelines for the United States Antarctic Program (1998). The Contractor shall ensure that all their personnel (including subcontractors) travelling to Antarctica have been determined to have met those criteria, or that a formal determination has been made to waive certain specific aspects of those medical requirements in individual cases. The Contractor may choose to impose additional medical criteria on their staff as a matter of corporate policy, but those criteria shall be considered independent of the USAP medical clearance process.

H13. INSURANCE REQUIREMENTS

(a) (1) Except as provided in subparagraph (2) immediately following, or in paragraph (h) of this clause (if the clause has a paragraph (h), the Contractor shall provide and maintain workers' compensation, employer's liability, comprehensive general liability (bodily injury), comprehensive automobile liability (bodily injury and property damage) insurance, and such other insurance as the Contracting Officer may require under this contract.

(2) The Contractor may, with the approval of the Contracting Officer, maintain a self-insurance program; provided that, with respect to workers' compensation, the Contractor is qualified pursuant to statutory authority.

(3) All insurance required by this paragraph shall be set forth in the provisions of this contract and be in a form and amount and for those periods as the Contracting Officer may require or approve and with insurers approved by the Contracting Officer.

(b) The Contractor agrees to submit for the Contracting Officer's approval, to the extent and in the manner required by the Contracting Officer, any other insurance that is maintained by the Contractor in connection with the performance of this contract and for which the Contractor seeks reimbursement.

(c) Except as provided in paragraph (h) of this clause (if the clause has a paragraph (h)), the Contractor shall be reimbursed

(1) For that portion (i) of the reasonable cost of insurance allocable to this contract and (ii) required or approved under this clause; and

(2) For certain liabilities (and expenses incidental to such liabilities) to third persons not compensated by insurance or otherwise. These liabilities must arise out of the performance of this contract, whether or not caused by the negligence of the Contractor or of the Contractor's agents, servants, or employees, and must be represented by final judgments or settlements approved in writing by the Government. These liabilities are for

(i) Loss of or damage to property (other than property owned, occupied, or used by the Contractor, rented to the Contractor, or in the care, custody, or control of the Contractor; or

(ii) Death or bodily injury.

(d) The Government's liability under paragraph (c) of this clause is subject to the "Limitation of Cost" or the "Limitation of Funds" clause of this contract.

(e) The Contractor shall not be reimbursed for liabilities (and expenses incidental to such liabilities)

(1) For which the Contractor is otherwise responsible under the express terms of any clause specified in the Schedule or elsewhere in the contract:

(2) For which the Contractor has failed to insure or to maintain insurance as required by the Contracting Officer; or

(3) That result from willful misconduct or lack of good faith on the part of any of the Contractor's directors, officers, managers, superintendents, or other representatives who have supervision or direction of

(i) All or substantially all of the Contractor's business;

(ii) All or substantially all of the Contractor's operations at any one plant or separate location in which this contract is being performed; or

(iii) A seperate or complete major industrial operation in connection with performance of this contract. A

(f) The provisions of paragraph (e) of this clause shall not restrict the right of the Contractor to be reimbursed for the cost of insurance maintained by the Contractor in connection with the performance of this contract, other than insurance required in accordance with this clause; provided, that such cost is allowable under the Allowable Cost and Payment clause of this contract.

(g) If any suit or action is filed or any claim is made against the Contractor, the cost and expense of which may be reimbursable to the Contractor under this contract, and the risk of which is then uninsured or is insured for less than the amount claimed, the Contractor shall

(1) Immediately notify the Contracting Officer and promptly furnish copies of all pertinent papers received.

(2) Authorize Government representatives to collaborate with counsel for the insurance carrier in settling or defending the claim when the amount of the liability claimed exceeds the amount of coverage; and

(3) Authorize Government representatives to settle or defend the claim and to represent the Contractor in or to take charge of any litigation, if required by the Government, when the liability is not insured or covered by bond. The Contractor may, at its own expense, be associated with the Government representatives in any such claim or litigation.

(h) The Contractor warrants that insurance coverage (currently in force) exists in the following areas and in amounts not less than those specified below:

Type Insurance	Per Person	Property	Coverage Per Accident
1. Comprehensive General Liability	$500,000	$500,000	$1,500,000
2. Automobile	$500,000	$500,000	$1,000,000

3. A supplemental umbrella policy for $5,000,000.

4. Workman's Compensation - As required by law at the job site.

The Comprehensive general and automobile liability policies shall contain a provision worded as follows:

"The insurance company waives any right of subrogation against the United States of America which may arise by reason of any payment under the policy."

The contractor shall file with the Contracting Officer prior to beginning performance under this contract, a certificate of insurance evidencing the above coverage.

The Contractor shall provide to the Contracting Officer within five (5) days after occurrence, notice of cancellation of or reductions below the above cited amounts of any insurance coverage related to this requirement.

The Contractor warrants that such insurance coverage for all subcontractors who will work at any of the sites of performance does or will exist before subcontractors begin performance.

H14. LIMITATION ON CONTRACTOR DESIGN-BUILD ACTIVITIES

Unless otherwise authorized by the Contracting Officer, the Contractor shall not perform design-build work on any single construction project with an estimated cost of $1,000,000 or greater.

H15. AWARD FEE EVALUATION CRITERIA

As an incentive to improve the quality and effectiveness of the work performed under the contract, the Contractor may earn award fee.

H15.1 Criteria

The primary criteria employed to evaluate the Contractor's performance are the performance metrics as identified in Section C9, and other metrics identified from time-to-time as included in the Program Plan or other correspondence from the Contracting Officer. The Contractor's performance as demonstrated by the data collected as required by this contract, the program plan or other correspondence from the Contracting Officer will be measured against the metrics identified in accordance with this contract.

The Contractor's performance as measured against the metrics may be supplemented by information received from USAP participants: including but not limited to NSF, the Air National Guard's 109th Airlift Wing and Detachment 13, SPAWAR Systems Center, NSF-hosted Distinguished Visitors, and NSF grantee personnel supported under this contract. In addition, input from the Office of Polar Program's Office Advisory Committee and its subcommittee,

the Committee of Visitors, may be sought. Preference will be given to written, thoughtful assessments (either solicited or unsolicited) of Contractor effort that bear directly on work performance.

H15.2 Procedure

H15.2.1 Following submission of the *After Operations Report* and any other materials the Contractor wishes to submit, a Performance Evaluation Committee (PEC), chaired by a staff member of the Polar Research Support Section, OPP, will convene annually to evaluate the Contractor's performance against the established award-fee evaluation criteria for the period April through March of the following year.

H15.2.2 Upon completion of the annual evaluation, the PEC Chairperson will submit the preliminary evaluation and percentage rating by CLIN to the Contractor. The Contractor may, within 15 days of receiving the evaluation, submit additional written information to the PEC Chairperson concerning the committee's findings. The Contractor may also, at its discretion, present additional information in an oral presentation at a mutually agreeable date.

H15.2.3 The PEC will then consider the additional information presented by the Contractor, revise its evaluation (if necessary), and present the evaluation to the Award-Fee Board.

H15.2.4 The Award-Fee Board, consisting of a Chairperson and at least two additional members, will consider the PEC's evaluation. The Award-Fee board may accept the evaluation as submitted, or modify the report and/or the percentage ratings as described in writing.

H15.2.5 The Award-Fee Board Chairperson presents the PEC's evaluation and the Board's modifications to the Director, Office of Polar Programs for his/her written recommendations for the final award-fee percentage ratings.

H15.2.6 The Director, Office of Polar Programs presents his/her written recommendation for final award fee percentage ratings to the Contracting Officer. The Contracting Officer presents the PEC's evaluation, and subsequent recommendations by the Award-Fee Board and the Director, Office of Polar Programs to the Contractor. The Contractor may, within 15 days of receipt, submit rebuttal information to the Contracting Officer if it disagrees with the evaluation as presented.

H15.2.7 After receiving the rebuttal information (if any), the Contracting Officer determines the amount of award-fee for the period evaluated, and advises the Contractor of the award-fee percentages and the award-fee amount. The award-fee amount is calculated by multiplying the award-fee percentages by the maximum award-fee amount per CLIN. The sum of the products for each CLIN constitute the total award fee amount. The Contracting Officer's award-fee determination is not subject to the Disputes article of this contract.

H16. AWARD OF CONTRACT TO U.S. FIRMS AND CITIZENS ONLY

The resulting contract from this solicitation shall be made only to a U.S. firm. Any teaming through subcontracting must be between U.S. firms. U.S. firm is defined as an organization which is incorporated and located within the United States of America. Additionally, all personnel performing work being reimbursed to the contractor as a direct cost, or by the contractor to its affiliates, consultants, or subcontractors as a direct cost under any subagreement, must be U.S. citizens or permanent residents.

The exceptions to the above are subcontracts for: (i) aircraft operations; (ii) host country activities in New Zealand, Chile, Argentina, and other countries from which the USAP operates from time-to-time; and (iii) specialized maintenance, testing and calibration services.

H17. ASSIGNMENT OF SUBCONTRACTS

All subcontracts awarded by the Contractor for which the cost of the subcontract is being reimbursed to the Contractor as a direct cost (regardless of subcontract type, or property and/or services being acquired) shall reserve NSF's rights to unilaterally assign the subcontract for administration to the Foundation or any other organization selected by NSF.

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I1. FAR CLAUSES INCORPORATED BY REFERENCE

52.252-2 CLAUSES INCORPORATED BY REFERENCE (JUN 1988)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

NOTICE LISTING CLAUSES INCORPORTATED BY REFERENCE

Federal Acquisition Regulation (48 CFR Chapter 1) Clauses

52.202-1	DEFINITIONS	OCT 1995
52.203-3	GRATUITIES	APR 1984
52.203-5	COVENANT AGAINST CONTINGENT FEES	APR 1984
52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT	JUL 1995
52.203-7	ANTI-KICKBACK PROCEDURES	JUL 1995
52.203-8	CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY	JAN 1997
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	JAN 1997
52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	JUN 1997
52.204-4	PRINTING/COPYING DOUBLE-SIDED ON RECYCLED PAPER	JUN 1996
52.208-8	HELIUM REQUIREMENT FORECAST AND REQUIRED SOURCES FOR HELIUM	JUN 1997
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT	JUL 1995
52.211-5	MATERIAL REQUIREMENT	OCT 1997
52.215-2	AUDIT AND RECORDS--NEGOTIATION	AUG 1996
52.215-8	ORDER OF PRECEDENCE – UNIFORM CONTRACT FORMAT	OCT 1997
52.215-11	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA	OCT 1997
52.215-12	SUBCONTRACTOR COST OR PRICING DATA	OCT 1997

52.215-13	SUBCONTRACTOR COST OR PRICING DATA -- MODIFICATIONS	OCT 1997
52.215-14	INTEGRITY OF UNIT PRICES -- ALTERNATE I (OCT 1997)	OCT 1997
52.215-15	TERMINATION OF DEFINED BENEFIT PENSION PLANS	OCT 1997
52.215-18	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS	OCT 1997
52.215-19	NOTIFICATION OF OWNERSHIP CHANGES	OCT 1997
52.216-7	ALLOWABLE COST AND PAYMENT	APR 1998
52.219-8	UTILIZATION OF SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED BUSINESS CONCERNS	JAN 1999
52.219-9	SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN - ALTERNATE II (MAR 1996)	JAN 1999
52.222-1	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES	FEB 1997
52.222-3	CONVICT LABOR	AUG 1996
52.222-20	WALSH-HEALY PUBLIC CONTRACTS ACT	DEC 1996
52.222-26	EQUAL OPPORTUNITY	APR 1984
52.222-28	EQUAL OPPORTUNITY PREAWARD CLEARANCE OF SUBCONTRACTS	APR 1984
52.222-29	NOTIFCATION OF VISA DENIAL	APR 1984
52.222-35	AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS	APR 1998
52.222-36	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES	JUN 1998
52.222-37	EMPLOYMENT REPORTS ON DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA	APR 1998
52.223-2	CLEAN AIR AND WATER	APR 1984
52.223-6	DRUG-FREE WORKPLACE	JAN 1997
52.223-14	TOXIC CHEMICAL RELEASE REPORTING	OCT 1996
52.224-1	PRIVACY ACT NOTIFICATION	APR 1984
52.224-2	PRIVACY ACT	APR 1984
52.225-10	DUTY-FREE ENTRY	APR 1984

52.225-11	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES	AUG 1998
52.227-1	AUTHORIZATION AND CONSENT	JUL 1995
52.227-3	PATENT INDEMNITY	APR 1994
52.230-2	COST ACCOUNTING STANDARDS	APR 1998
52.230-6	ADMINISTRATION OF COST ACCOUNTING STANDARDS	APR 1996
52.232-9	LIMITATION ON WITHHOLDING OF PAYMENTS	APR 1984
52.232-17	INTEREST	JUN 1996
52.232-22	LIMITATION OF FUNDS	APR 1984
52.232-23	ASSIGNMENT OF CLAIMS	JAN 1986
52.232-25	PROMPT PAYMENT	JUN 1997
52.232-33	MANDATORY INFORMATION FOR ELECTRONIC FUNDS TRANSFER PAYMENT	AUG 1996
52.233-1	DISPUTES -- ALTERNATE I (DEC 1991)	OCT 1995
52.233-3	PROTEST AFTER AWARD -- ALTERNATE I (JUN 1985)	AUG 1996
52.236-5	MATERIAL AND WORKMANSHIP	APR 1984
52.236-7	PERMITS AND RESPONSIBILITIES	NOV 1991
52.236-25	REQUIREMENT FOR REGISTRATION OF DESIGNERS	APR 1984
52.237-2	PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT, AND VEGETATION	APR 1984
52.239-1	PRIVACY OR SECURITY SAFEGUARDS	AUG 1996
52.242-1	NOTICE OF INTENT TO DISALLOW COSTS	APR 1984
52.242-3	PENALTIES FOR UNALLOWABLE COSTS	OCT 1995
52.242-4	CERTIFICATION OF FINAL INDIRECT COSTS	JAN 1997
52.242-13	BANKRUPTCY	JUL 1995
52.243-2	CHANGES--COST REIMBURSEMENT -- ALTERNATE II (APR 1984)	AUG 1987
52.244-2	SUBCONTRACTS -- ALTERNATE II (AUG 1998)	AUG 1998
52.244-5	COMPETITION IN SUBCONTRACTING	DEC 1996

52.244-6	SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS	APR 1998
52.245-5	GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS)	JAN 1986
52.245-19	GOVERNMENT PROPERTY FURNISHED "AS IS."	APR 1984
52.246-25	LIMITATION OF LIABILITY – SERVICES	FEB 1997
52.247-63	PREFERENCE FOR U.S.-FLAG AIR CARRIERS	JAN 1997
52.247-64	PREFERENCE FOR PRIVATELY-OWNED U.S.-FLAGGED COMMERCIAL VESSELS	JUN 1997
52.247-67	SUBMISSION OF COMMERCIAL TRANPORTATION BILLS TO THE GENERAL SERVICES ADMINISTRATION FOR AUDIT	JUN 1997
52.248-1	VALUE ENGINEERING	MAR 1989
52.249-6	TERMINATION (COST-REIMBURSEMENT)	SEP 1996
52.249-14	EXCUSABLE DELAYS	APR 1984
52.251-1	GOVERNMENT SUPPLY SOURCES	APR 1984
52.251-2	INTERAGENCY FLEET MANAGEMENT SYSTEM VEHICLES AND RELATED SERVICES	JAN 1991
52.253-1	COMPUTER GENERATED FORMS	JAN 1991

I2. FAR CLAUSES INCORPORATED IN FULL TEXT

52.222-2 PAYMENT FOR OVERTIME PREMIUMS (JUL 1990)

(a) The use of overtime is authorized under this contract if the overtime premium does not exceed * ZERO or the overtime premium is paid for work--

(1) Necessary to cope with emergencies such as those resulting from accidents, natural disasters, breakdowns of production equipment, or occasional production bottlenecks of a sporadic nature;

(2) By indirect-labor employees such as those performing duties in connection with administration, protection, transportation, maintenance, standby plant protection, operation of utilities, or accounting;

(3) To perform tests, industrial processes, laboratory procedures, loading or unloading of transportation conveyances, and operations in flight or afloat that are continuous in nature and cannot reasonably be interrupted or completed otherwise; or

(4) That will result in lower overall costs to the Government.

(b) Any request for estimated overtime premiums that exceeds the amount specified above shall

include all estimated overtime for contract completion and shall--

(1) Identify the work unit; e.g., department or section in which the requested overtime will be used, together with present workload, staffing, and other data of the affected unit sufficient to permit the Contracting Officer to evaluate the necessity for the overtime;

(2) Demonstrate the effect that denial of the request will have on the contract delivery or performance schedule;

(3) Identify the extent to which approval of overtime would affect the performance or payments in connection with other Government contracts, together with identification of each affected contract; and

(4) Provide reasons why the required work cannot be performed by using multishift operations or by employing additional personnel.

* Insert either "zero" or the dollar amount agreed to during negotiations. The inserted figure does not apply to the exceptions in subparagraph (a)(1) through (a)(4) of the clause.

(End of clause)

52.229-8 TAXES--FOREIGN COST-REIMBURSEMENT CONTRACTS (MAR 1990)

(a) Any tax or duty from which the United States Government is exempt by agreement with the Government of New Zealand, Chile, Argentina or other governments with which the United States makes an agreement with, or from which the Contractor or any subcontractor under this contract is exempt under the laws of New Zealand, Chile, Argentina or other governments, shall not constitute an allowable cost under this contract.

(b) If the Contractor or subcontractor under this contract obtains a foreign tax credit that reduces its Federal income tax liability under the United States Internal Revenue Code (Title 26, U.S. Code) because of the payment of any tax or duty that was reimbursed under this contract, the amount of the reduction shall be paid or credited at the time of such offset to the Government of the United States as the Contracting Officer directs.

(End of clause)

52.237-7 INDEMNIFICATION AND MEDICAL LIABILITY INSURANCE (JAN 1997)

(a) It is expressly agreed and understood that this is a nonpersonal services contract, as defined in Federal Acquisition Regulation (FAR) 37.101, under which the professional services rendered by the Contractor are rendered in its capacity as an independent contractor. The Government may evaluate the quality of professional and administrative services provided, but retains no control over professional aspects of the services rendered, including by example, the Contractor's professional medical judgment, diagnosis, or specific medical treatments. The Contractor shall be solely liable for and expressly agrees to indemnify the Government with respect to any liability producing acts or omissions by it or by its employees or agents. The Contractor shall maintain during the term of this contract liability insurance issued by a responsible insurance carrier of not less than the following amount(s) per specialty per occurrence: $1,000,000 per occurrence.

(b) An apparently successful offeror, upon request by the Contracting Officer, shall furnish prior to contract award evidence of its insurability concerning the medical liability insurance required by paragraph (a) of this clause.

(c) Liability insurance may be on either an occurrences basis or on a claims-made basis. If the policy is on a claims-made basis, an extended reporting endorsement (tail) for a period of not less than 3

years after the end of the contract term must also be provided.

(d) Evidence of insurance documenting the required coverage for each health care provider who will perform under this contract shall be provided to the Contracting Officer prior to the commencement of services under this contract. If the insurance is on a claims-made basis and evidence of an extended reporting endorsement is not provided prior to the commencement of services, evidence of such endorsement shall be provided to the Contracting Officer prior to the expiration of this contract. Final payment under this contract shall be withheld until evidence of the extended reporting endorsement is provided to the Contracting Officer.

(e) The policies evidencing required insurance shall also contain an endorsement to the effect that any cancellation or material change adversely affecting the Government's interest shall not be effective until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer. If, during the performance period of the contract the Contractor changes insurance providers, the Contractor must provide evidence that the Government will be indemnified to the limits specified in paragraph (a) of this clause, for the entire period of the contract, either under the new policy, or a combination of old and new policies.

(f) The Contractor shall insert the substance of this clause, including this paragraph (f), in all subcontracts under this contract for health care services and shall require such subcontractors to provide evidence of and maintain insurance in accordance with paragraph (a) of this clause. At least 5 days before the commencement of work by any subcontractor, the Contractor shall furnish to the Contracting Officer evidence of such insurance.

(End of clause)

I3. NSFAR CLAUSE INCORPORATED IN FULL TEXT

Rights in Data (APR 84)

(a) Subject Data

(i) The term "Subject Data" as used herein includes writings, information stored in any form, sound recordings, computer programs, pictorial reproductions, drawings, or other graphic representations and works of any similar nature which are first generated, produced or composed in the performance of this contract, whether delivered or not under this contract.

(ii) All Subject Data shall be the sole property of the Foundation. The Contractor shall not publish, reproduce, distribute or otherwise make disposition of such Subject Data in whole or in part or in any manner or form, or authorize others to do so without the prior written consent of the Contracting Officer or until such time as the Government may have released such Subject Data to the public.

(b) Other Data

(i) The term "Other Data" as defined herein includes writings, information stored in any form, sound recordings, computer programs, pictorial reproductions, drawings, or other graphic representations and works of any similar nature, not generated, produced, or composed for the first time in the performance of this contract, whether or not copyrighted, which are delivered under this contract.

(ii) The Government may duplicate, use and disclose in any manner and for any purpose whatsoever, and have others so do, all or any part of the Other Data delivered by the Contractor to the Government under this contract except as provided by subparagraph (b)(ii)(A) below.

(A) Material Covered by Copyright. The Contractor agrees to and does hereby grant to the Government, and to its officers, agents, and employees acting within the scope of their official duties, a royalty-free, non-exclusive and irrevocable license, throughout the world for Government purposes to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others to do so, all Other Data now or hereafter covered by copyright. No such copyrighted matter shall be included in Other Data furnished hereunder without the written permission of the copyright owner for the Government to use such copyrighted matter in the manner described in this subparagraph (b)(ii)(A).

(c) The terms "Subject Data" and "Other Data" as defined herein do not include financial reports, cost analyses and similar information incidental to contract administration.

(d) The Contractor shall report to the Government promptly and in reasonable written detail each notice or claim of copyright infringement received by the Contractor with respect to any technical data delivered hereunder.

(End of Clause)

SECTION J – LIST OF ATTACHMENTS

J1. LISTING OF ATTACHMENTS

These documents are attached in the following sections and are made a part of this contract:

No.	Description	Date	No. of Pages	Section
1.	*USAP Safety and Health Manual* **[to be provided by contract modification]**			§C7.1.8
2.	AutoCad Versions and Formats **[to be provided by contract modification]**			§C7.6.2.2
3.	Types of Projects **[to be provided by contract modification]**			§C7.6.2.3
3a.	Performance Metric and Data Requirements Matrix	None	25	§C9.3
4.	Real Property Listing	30 Sep 98	8	§F3.2.1
5.	Capital Equipment Greater Than or Equal to $25,000	19 Oct 98	56	§F3.2.2
6.	Capital Equipment With Acquisition Cost Greater Than $5,000	19 Oct 98	197	§F3.2.3
6a.	Polar Operations Financial Database Templates	N/A	2	§F6.2
7.	Small Business and Small and Disadvantaged Business Subcontracting Plan			§H9

Attachment 3a – Performance Metric and Data Requirements Matrix

GENERAL MANAGEMENT							
Metric Index	**Measurement Area**	**NSF Goal No.**	**Metric**	**First Year Performance Target**	**Data Requirements**	**Calculations**	**Wt % ***
1	Business Processes	1	Actual Costs vs. Budgeted Costs by Primary Expense Element	5 % Budget Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	$\frac{(BC - AC) \times 100}{BC}$	
2	Business Processes	1	Vendor On-time Delivery	95 %	TRDD = Total Required Delivery Dates MDD = Missed Delivery Dates	$\frac{(TRDD - MDD) \times 100}{TRDD}$	
3	Business Processes	1	Purchasing Discounts Realized	95 %	DDA = Discount Dollars Available DDR = Discounts Dollars Realized	$100 - \frac{(DDA - DDR) \times 100}{DDA}$	
4	Business Processes	1	Priority Freight Cost as % of Total Freight Costs	5 %	TFC = Total Freight Cost PFC = Priority Freight Cost	$\frac{(TFC - PFC) \times 100}{TFC}$	
5	Customer Satisfaction	2	On-time Data Deliverables	99 %	TDS = Total Data Submittals DDS = Delinquent Data Submittals	$\frac{(TDS - DDS) \times 100}{TDS}$	
6	Customer Satisfaction	2	Acceptable Data Deliverables	98 %	TDS = Total Data Submittals UDS = Unacceptable Data Submittals	$\frac{(TDS - UDS) \times 100}{TDS}$	
	Customer Satisfaction	2	OPM value for Goal No. 2	98 %	DDS% = Delinquent data percent UDS% = Unacceptable data percent	$\frac{DDS\% + UDS\%}{2}$	
7	Customer Satisfaction	3	Responsiveness to Client and Customer Needs	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
8	Customer Satisfaction	3	Customer Satisfaction with Issue Resolution	98 %	TIR = Total Issues Raised INR = Issues Not Resolved	$\frac{(TIR - INR) \times 100}{TIR}$	
9	Innovation & Process Improvement	4	ISO 9001 Compliance	95 %	QEC= Quality Elements Audited INC = Internal Audit Incidents of Non-compliance	$\frac{(QEC - INC) \times 100}{QCE}$	
10	Innovation & Process Improvement	5	Oregon Productivity Model – Performance to Primary WBS Element: - Reduced cost - Process Improvement	Current overall performance score > Previous overall performance score (monthly basis)	CP = Change % for OPM scores for WBS area OPMs (excludes this Gen. Mgt. OPM) N = Number of areas included in measurement (Currently 6)	$\frac{\Sigma (CP)}{N}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

GENERAL MANAGEMENT							
Metric Index	**Measurement Area**	**NSF Goal No.**	**Metric**	**First Year Performance Target**	**Data Requirements**	**Calculations**	**Wt % ***
11	Innovation & Process Improvement	5	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	$\frac{(ROI - COIM) \times 100}{ROI}$	
12	Infrastructure Operation	6	Project Earned Value (Critical Ratio)	0.9	BCWS = Budgeted Cost Work Scheduled BCWP = Budgeted Cost Work Performed ACWP = Actual Cost Work Performed	$\frac{BCWP}{BCWS} \times \frac{BCWP}{ACWP}$	
13	Modern Technology Application	7	Management understanding of research needs.	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
14	Modern Technology Application	8	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Technology Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	$\frac{(ROI - COIM) \times 100}{ROI}$	
15	Quality Facilities	9	Management Attention to Science Facilities and Research Requirements.	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
16	SH&E Stewardship	10	OSHA Incidence Rate	1.5	LWD = Lost Work Days NHW = Number of Hours Worked	$\frac{LWD \times 200{,}000\ Hrs}{NHW}$	
17	SH&E Stewardship	10	OSHA Severity Rate	0.5	NLWD = Number of Lost Work Days NLWDC = Lost Work Day Cases	$\frac{NLWD}{NLWDC}$	
	SH&E Stewardship	10	OPM value for Goal No. 10	1.0	LWD% = Lost Work Days percent NLWD% = Number of Lost Work Days percent	$\frac{LWD\% + NLWD\%}{2}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix)

GENERAL MANAGEMENT							
Metric Index	**Measurement Area**	**NSF Goal No.**	**Metric**	**First Year Performance Target**	**Data Requirements**	**Calculations**	**Wt % ***
18	SH&E Stewardship	10	Productive Labor Available	97 %	MPLH = Maximum Productive Labor Hours LHL = Labor Hour Lost	(MPLH – LHL) x 100 MPLH	
19	SH&E Stewardship	11	ISO 9001 Compliance	95 %	QEC= Quality Elements Audited INC = Internal Audit Incidents of Non-compliance	(QEC - INC) x 100 QEC	
20	SH&E Stewardship	12	Waste Reduction improvement	5 %	WRU = Waste Reduction Units TWU = Total Waste Units	WRU x 100 TWU	
21	SH&E Stewardship	13	Physical Qualifications (PQ) Accuracy	99 %	TPQS = Total PQ Screening DPQS = Deficient PQ Screening	(TPQS - DPQS) x 100 TPQS	
22	SH&E Stewardship	14	Permit Compliance	100 %	TPR = Total Permits Required INC = Incidence of Permit non-Compliance	(TPR - INC) x 100 TPR	
23	Customer Satisfaction	14	On-time SH&E Data Deliverables	99 %	TDS = Total Data Submittals DDS = Delinquent Data Submittals	(TDS - DDS) x 100 TDS	
24	Customer Satisfaction	14	Acceptable SH&E Data Deliverables	98 %	TDS = Total Data Submittals UDS = Unacceptable Data Submittals	(TDS - UDS) x 100 TDS	
	Customer Satisfaction	14	OPM value for Goal No. 14	98 %	DDS% = Delinquent data percent UDS% = Unacceptable data percent	DDS% + UDS% 2	
25	Responsive-ness	15	Management Flexibility and Responsiveness Research Community Needs	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

HUMAN RESOURCES							
Metric Index	**Measurement Area**	**NSF Goal No.**	**Metric**	**First Year Performance Target**	**Data Requirements**	**Calculations**	**Wt % ***
26	Business Processes	101	Responsive Recruiting (average job vacancy days)	45 Days	TJVD = Total Job Vacancy Days TJV = Total Jobs Vacant	TJVD / TJV	
27	Business Processes	101	On-time Employee Evaluations	95 %	EED = Employee Evaluations Due EEL = Employee Evaluations Late	(EED - EEL) x 100 / EED	
28	Business Processes	101	Employee Performance Evaluations	3(> 2 (Meets Requirements)	D = Does Not Meet Requirements (0) M = Meets Most Requirements (1) A = Meets Requirements (2) C = Consistently Exceeds Requirements (3) E = Far Exceeds Requirements (4)	(D Evaluations x 0 + M Evaluations x 1 + A Evaluations x 2 + C Evaluations x 3 + E Evaluations x 4) / Total Evaluations	
29	Customer Satisfaction	102	Key Employee Attrition	5 %	KE = Key Employee p/yr. NR = No. Replaced p/yr.	(KE - NR) x 100 / KE	
30	Customer Satisfaction	102	Management Employee Attrition	5 %	ME = Management Employee p/yr. NR = No. Replaced p/yr.	(ME - NR) x 100 / ME	
31	Customer Satisfaction	102	Professional/Technical Employee Attrition	10 %	PT = Professional/Technical Employee p/yr. NR = No. Replaced p/yr	(PT - NR) x 100 / PT	
32	Customer Satisfaction	102	Trade/Service Employee Attrition	25%	TS = Trade/Service Employee p/yr NR = No. Replaced p/yr.	(TS - NR) x 100 / TS	
	Customer Satisfaction	102	OPM value for Goal No. 102	8.75 %	KE% = Key Employee Attrition Rate ME% = Management Employee Attrition Rate PT% = Prof./Tech Attrition Rate TS% = Trades Employee Attrition Rate	((KE%x15) + (ME%x10) + (PT%x10) + TS%x5)) / 40	
33	Innovation & Process Improvement	103	Allowable Absence Used vs. Total Allowable Absence	80 %	ADA = Allowable Days Authorized ADT = Allowable Days Taken	ADT x 100 / ADA	
34	Innovation & Process Improvement	103	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Human Resources Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 / ROI	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

HUMAN RESOURCES							
Metric Index	**Measurement Area**	**NSF Goal No.**	**Metric**	**First Year Performance Target**	**Data Requirements**	**Calculations**	**Wt % ***
35	Infrastructure Operation	104	Training scheduling completion	90 % Training is successfully completed on schedule	TSS = Total Students Scheduled STNC = Student Training Not Complete STU = Student Training Unsuccessful	$\frac{(TSS - STNC - STU) \times 100}{TSS}$	
36	Modern Technology Application	105	Distance Learning	50 % Training Achieved through Distance Learning Technology	TTC = Total Training Courses Completed DLCC = Distance Learning Courses Completed	$\frac{DLCC \times 100}{TTC}$	
37	Modern Technology Application	105	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Human Resources Technology Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	$\frac{(ROI - COIM) \times 100}{ROI}$	
38	Quality Facilities	106	Multi-media Training Programs and Facilities are Responsive to Research Support Needs	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
39	SH&E Stewardship	107	Physical Qualifications (PQ)	99 %	TPQS = Total PQ Screening DPQS = Deficient PQ Screening	$\frac{(TPQS - DPQS) \times 100}{TPQS}$	
40	Responsive-ness	108	Workforce Expansion/Contraction	90 % Target Staffing/Skill Mix	TSS = Target Staffing/Skill Mix SSV = Staffing/Skill Mix Variances SSD = Staffing/Skill Mix Deviations	$\frac{(TSS - SSV - SSD) \times 100}{TSS}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

SCIENCE							
Metric Index	**Measurement Area**	**NSF Goal No.**	**Metric**	**First Year Performance Target**	**Data Requirements**	**Calculations**	**Wt % ***
41	Business Processes	46	Customer perception of communications of capabilities to grantees. (10 questions)	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
42	Business Processes	47	Actual Costs vs. Budgeted Costs by Project	5 % Cost reduction	BC = Budgeted Cost per Expense Element AC = Actual Cost per Expense Element	$\frac{(BC - AC) \times 100}{BC}$	
43	Business Processes	47	Actual Schedule vs. Planned Schedule	5 % Schedule improvement	PS = Planned Schedule (Days) AS = Actual Schedule (Days)	$\frac{(PS - AS) \times 100}{PS}$	
	Business Processes	47	OPM value for Goal No. 47	5 %	AC% = Actual Cost percent AS% = Actual Schedule percent	$\frac{AC\% + AS\%}{2}$	
44	Business Processes	48	Customer perception of our planning and meeting activity Goal No's. (10 questions)	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
45	Customer Satisfaction	49	Project Goal Achievement	96 %	TPG = Total Project Goal No's GNM = Goal No's Not Met GPM = Goal No's Partially Met	$\frac{(TPG - GNM - (GPM \times W1)) \times 100}{TPG}$ (Where W1 is weighting factor based on percent of specific Goal No's achievement)	
46	Customer Satisfaction	50	Space Availability	100 %	SR = Space Required SP = Space Provided	$100 - \frac{(SR - SP) \times 100}{SR}$	
47	Customer Satisfaction	50	Equipment Items Availability	100 %	EIR = Equipment Items Required EIP = Equipment Items Provided	$100 - \frac{(EIR - EIP) \times 100}{EIR}$	
48	Customer Satisfaction	50	Support Availability	100 %	STR = Support Tasks Required STP = Support Tasks Provided	$100 - \frac{(STR - STP) \times 100}{STR}$	
	Customer Satisfaction	50	OPM value for Goal No. 50	97 %	SP% = Space percent EIP% = Equipment Items percent STP% = Support Tasks percent	$\frac{SP\% + EIP\% + STP\%}{3}$	
49	Innovation & Process Improvement	51	Cycle Time improvement for innovation and Process Changes	5 % improvement	PCTB = Process Cycle Time Baseline PCT = Process Cycle Time	$\frac{(PCTB - PCT) \times 100}{PCTB}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

SCIENCE							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
50	Innovation & Process Improvement	51	Cycle Cost improvement for Innovations and Process Changes	5 %	PCCB = Process Cycle Cost Baseline PCC = Process Cycle Cost	(PCCB – PCTC) x 100 PCCB	
	Innovation & Process Improvement	51	OPM value for Goal No. 51	5 % Improvement	PCT% = Process Cycle Time percent PCC% = Process Cycle Cost percent	PCT% + PCC% 2	
51	Innovation & Process Improvement	52	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
52	Infrastructure Operation	53	Ratio of actual projects to planned projects	90 %	NPP = Number of planned projects NAP = Number of actual Projects	100 – (NPP – NAP) x 100 NPP	
53	Infrastructure Operation	53	Ratio of actual "observing days" to planned days	90 %	NPD = Number of planned observing days NAD = Number of actual observing days	100 – (NPD – NAD) x 100 NPD	
	Infrastructure Operation	53	OPM value for Goal No. 53	90 %	NAP% = Number of planned projects percent NAD% = Number of planned days percent	NAP% + NAD% 2	
54	Infrastructure Operation	54	Equipment Availability	97 %	EHA = Equipment Hours Available. TEHA = Total Equipment Hours	100 – (TEHA - EHA) x 100 TEHA	
55	Infrastructure Operation	54	Staff availability	97 %	SLHR = Staffing Labor Hours Required SLHP = Staffing Labor Hours Provided	100 – (SLHR –SLHP) x 100 SLHR	
56	Infrastructure Operation	54	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	(PFD – PSD) x 100 AFD - PSD	
	Infrastructure Operation	54	OPM value for Goal No. 54	96 %	SL% = Staffing Labor percent EA% = Equipment Availability percent APD% = Actual Project Duration percent	SL% + EA% + APD% 3	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

SCIENCE							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
57	Modern Technology Insertion	55	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Science Technology Improvements	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
58	Modern Technology Insertion	56	Recommended instrumentation items vs. NSF approved for acquisition	50 %	IIR = Instrumentation Items Recommended IIAA = Instrumentation Items Approved for Acquisition	100 – (IIR – IIAA) x 100 IIR (Normalized to number of recommendations and value of individual recommendations)	
59	Modern Technology Insertion	57	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Science Technology Incorporation	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
60	Quality Facilities	58	Equipment Availability	95 %	EHA = Equipment Hours Available. TEHA = Total Equipment Hours	100 – (TEHA - EHA) x 100 TEHA	
61	Quality Facilities	58	Staff availability	97 %	SLHR = Staffing Labor Hours Required SLHP = Staffing Labor Hours Provided	100 – (SLHR –SLHP) x 100 SLHR	
	Quality Facilities	58	OPM value for Goal No. 58	96 %	SL% = Staffing Labor percent EA% = Equipment Availability percent	SL% + EA% 2	
62	Quality Facilities	59	Equipment available & calibrated when needed	95 %	EIR = Equipment/Instrumentation Required EINA = Equipment/Instrumentation Not Available EIANC = Equipment/Instrumentation Available but Not Calibrated	(EIR – IENA – (EIANC x W1)) x 100)/ 100 (W1 = weighting factor for equipment not calibrated but usable)	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

SCIENCE							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
63	Quality Facilities	60	Customer evaluation of our Performance Value Added Program effectiveness of ensuring State of the Art equipment, facilities, and processes.	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
64	SH&E Stewardship	61	OSHA Incidence Rate	1.5	LWD = Lost Work Days NHW = Number of Hours Worked	$\frac{\text{LWD x 200,000 Hrs}}{\text{NHW}}$	
65	SH&E Stewardship	61	OSHA Severity Rate	0.5	NLWD = Number of Lost Work Days NLWDC = Number of Lost Work Day Cases	$\frac{\text{NLWD}}{\text{NLWDC}}$	
	SH&E Stewardship	61	OPM value for Goal No. 61	1.0	LWD% = Lost Work Days percent NLWD% = Number of Lost Work Days percent	$\frac{\text{LWD\% + NLWD\%}}{2}$	
66	SH&E Stewardship	62	Waste Reduction improvement	5 %	WRU = Waste Reduction Units TWU = Total Waste Units	$\frac{\text{WRU x 100}}{\text{TWU}}$	
67	SH&E Stewardship	63	Hazardous Materials Levels reduction (HAZMIN Program)	20 %	HMILB – Hazardous Material Inventory Level Baseline HMIL – Hazardous Material Inventory Level	$\frac{\text{(HMILB – HMIL) x100}}{\text{HMILB}}$	
68	SH&E Stewardship	63	MSDS Access/Accuracy Compliance	99 %	MSDS = Number of Required MSDS MSDSAD = Number of MSDS Audit Discrepancies	$\frac{\text{(MSDS – MSDSAD) x 100}}{\text{MSDS}}$	
69	SH&E Stewardship	64	ISO 14000 Compliance	95 %	EEC= Environmental Elements Audited INC = Internal Audit Incidents of Non-compliance	$\frac{\text{(EEC - INC) x 100}}{\text{QEC}}$	
70	Responsive-ness	65	Schedule Variance from Plan improvement	10 %	ISH = Initial Scheduled Hours SAH = Schedule Amendment Hours (Δ) AH = Actual Hours	$\frac{\text{(SAH - (AH – ISH) x 100}}{\text{SAH}}$	
71	Responsive-ness	65	Cost Variance from Plan	10 %	ISC = Initial Scheduled Cost SAC = Schedule Amendment Cost (Δ) AC = Actual Costs	$\frac{\text{(SAC - (AC – ISC)) x 100}}{\text{SAC}}$	
	Responsive-ness	65	OPM value for Goal No. 65	10 %	AH% = Actual Hours percent AC% = Actual Cost percent	$\frac{\text{AH\% + AC\%}}{2}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

SCIENCE							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
72	Responsive-ness	66	Actual Costs vs. Budgeted Costs by Station & Ship Project	5 %	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	$\frac{(BC - AC) \times 100}{BC}$	
73	Responsive-ness	66	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	$\frac{(PFD - PSD) \times 100}{AFD - PSD}$	
	Responsive-ness	66	OPM value for Goal No. 66	5 %	AC% = Actual Cost percent APD% = Project Duration percent	$\frac{AC\% + PD\%}{2}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

LOGISTICS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
74	Business Processes	16	Adequacy of Transport Schedules – Cargo (Air)	98 %	IROS = Items Required on Site IDL = Items Delivered Late due to scheduling	(IROS - IDL) x 100 IROS	
75	Business Processes	16	Adequacy of Transport Schedules – Cargo (Ocean-going)	98 %	IROS = Items Required on Site IDL – Items Delivered Late due to scheduling	(IROS - IDL) x 100 IROS	
76	Business Processes	16	Adequacy of Transport Schedules – Personnel (Air)	98 %	PROS = Personnel Required on Site PAL = Personnel Arriving Late due scheduling	(PROS - PAL) x 100 PROS	
	Business Processes	16	OPM value for Goal No. 16	98 %	IROSA% = Items by Air percent IROSO% = Items by sea percent PROS% = Personnel arrival percent	IROSA% + IROSO% + PROS% 3	
77	Business Processes	17	Logistics Cost Control improvement	10 %	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 BC	
78	Customer Satisfaction	18	ROS Cargo Delivery (Air) Performance	98 %	IROSA = Items Required on Site IDL = Items Delivered Late due to delivery	(IROSA - IDL) x 100 IROSA	
79	Customer Satisfaction	18	ROS Cargo Delivery (Ocean-going) Performance	98 %	IROSO = Items Required on Site IDL = Items Delivered Late due to delivery	(IROSO - IDL) x 100 IROSO	
80	Customer Satisfaction	18	ROS Personnel Transportation Performance	98 %	PROS = Personnel Required on Site PAL = Personnel Arriving Late due to delivery	(PROS - PAL) x 100 PROS	
	Customer Satisfaction	18	OPM value for Goal No. 18	98 %	IROSA% = Items by Air percent IROSO% = Items by sea percent PROS% = Personnel arrival percent	IROSA% + IROSO% + PROS% 3	
81	Innovation & Process Improvement	19	Cycle Time Improvement for Innovations and Process Changes	5 %	PCTB = Process Cycle Time Baseline PCT = Process Cycle Time	(PCTB – PCT) x 100 PCTB	
82	Innovation & Process Improvement	19	Cycle Cost Improvement for Innovations and Process Changes	5 %	PCCB = Process Cycle Cost Baseline PCC = Process Cycle Cost	(PCCB – PCTC) x 100 PCCB	
	Innovation & Process Improvement	19	OPM value for Goal No. 19	5 %	PCT% = Process Cycle Time percent PCC% = Process Cycle Cost percent	PCT% + PCC% 2	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

LOGISTICS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
83	Innovation & Process Improvement	19	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
84	Infrastructure Operation	20	Travel Cost Control Improvement	5 % Cost Reduction	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 BC	
85	Infrastructure Operation	20	Ocean-going Cargo Cost Control improvement	5 % Cost Reduction	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	BC - AC) x 100 BC	
86	Infrastructure Operation	20	Air Cargo Cost Control improvement	5 % Cost Reduction	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 BC	
	Infrastructure Operation	20	OPM value for Goal No. 20	5 %	TCC% = Travel Cost percent OCCC% = Ocean Cargo Cost percent ACCC% = Air Cargo percent	TCC% + OCCC% + ACCC% 3	
87	Infrastructure Operation	21	Expendable Inventory Accuracy (by site)	95 %	LIC = Line Items Counted IC = Incorrect Counts	(LIC - IC) x 100 LIC	
88	Infrastructure Operation	21	Shelf Life Control	99 %	SLI = Shelf Life Items SLID = Shelf Life Item Deteriorated	(SLI - SLD) x 100 SLI	
	Infrastructure Operation	21	OPM value for Goal No. 21	97 %	LIC% = Line Items percent SLI% = Shelf Life percent	LIC% + SLI% 2	
89	Modern Technology Application	22	Process Cycle Time improvement as the Result of Technology Insertion	5 %	PCTB = Process Cycle Time Baseline PCT = Process Cycle Time	(PCTB – PCT) x 100 PCTB	
90	Modern Technology Application	22	Process Cycle Cost improvement as the Result of Technology Insertion	5 %	PCCB = Process Cycle Cost Baseline PCC = Process Cycle Cost	(PCCB – PCTC) x 100 PCCB	
	Modern Technology Application	22	OPM value for Goal No. 22	5 %	PCT% = Process Cycle Time percent PCC% = Process Cycle Cost percent	PCT% + PCC% 2	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

LOGISTICS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
91	Modern Technology Application	23	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Technology Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
92	Quality Facilities	24	Material Readiness (by site)	95 %	TR = Total Requisitions PI = Partial Issues SO = Stock Outs	(TR – PI - SO) x 100 TR	
93	Quality Facilities	25	Material Availability (by research project)	97 %	LIR = Line Items Required LIPA = Line Items Partially Available LINA = Line Items Not Available	(LIR – LIPA - LINA) x 100 LIR	
94	SH&E Stewardship	26	OSHA Incidence Rate	1.5	LWD = Lost Work Days NHW = Number of Hours Worked	LWD x 200,000 Hrs NHW	
95	SH&E Stewardship	26	OSHA Severity Rate	0.5	NLWD = Number of Lost Work Days NLWDC = Number of Lost Work Day Cases	NLWD NLWDC	
	SH&E Stewardship	26	OPM value for Goal No. 26	1.0	LWD% = Lost Work Days percent NLWD% = Number of Lost Work Days percent	LWD% + NLWD% 2	
96	SH&E Stewardship	27	ISO 9001 Compliance	95 %	QEC= Quality Elements Audited INC = Internal Audit Incidents of Non-compliance	(QEC - INC) x 100 QEC	
97	Responsive-ness	28	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	(PFD – PSD) x 100 AFD - PSD	
98	Responsive-ness	29	Residual Inventory Reduction Through Vendor Credits/Sales	20 %	RIBV = Residual Inventory Book Value RISCV = Residual Inventory Sales/Credit Value	RISCV x 100 RIBV	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

STATION & SHIP OPERATIONS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculation	Wt % *
99	Business Processes	30	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	(PFD – PSD) x 100 AFD - PSD	
100	Business Processes	30	Actual Costs vs. Budgeted Costs by Project	5 % Cost Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 BC	
101	Business Processes	30	Actual Schedule vs. Planned Schedule	5 % Schedule Underrun	PS = Planned Schedule (Days) AS = Actual Schedule (Days)	(PS - AS) x 100 PS	
	Business Processes	30	OPM value for Goal No. 30	5 %	AC % = Actual Cost percent AS % = Actual Schedule percent	AC % + AS% 2	
102	Customer Satisfaction	31	% APP tasks completed on time.	98 %	TC = Tasks Completed on time. TT = Total tasks in each APP	100 - (TT – TC) x 100 TT	
103	Customer Satisfaction	31	% Availability of equipment requested in APP	98 %	ER = Equipment Requests met on time. TER = Total equipment requests	100 – (TER – ER) x 100 TER	
	Customer Satisfaction	31	OPM value for Goal No. 31	98 %	TC % = Tasks Completed percent ER % = Equipment Requests percent	TC% + ER% 2	
104	Innovation & Process Improvement	32	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Operations Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
105	Innovation & Process Improvement	32	Cycle Time improvement For Innovations and Process Changes	5 %	PCTB = Process Cycle Time Baseline PCT = Process Cycle Time	(PCTB – PCT) x 100 PCTB	
106	Innovation & Process Improvement	32	Cycle Cost improvement for Innovations and Process Changes	5 %	PCCB = Process Cycle Cost Baseline PCC = Process Cycle Cost	(PCCB – PCTC) x 100 PCCB	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

STATION & SHIP OPERATIONS							
Metric Index.	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculation	Wt % *
107	Infrastructure Operation	33	Power plant operational readiness	95 %	MPPC = Maximum Power Plant Capacity (KW) CPPC = Current Power Production Capability (KW)	100 - (MPPC - CPPC) x 100 MPPC	
108	Infrastructure Operation	33	Water plant operational readiness	95 %	MWPC = Maximum Water Plant Capacity (GPD) CWPC = Current Water Production Capability (GPD)	100 - (MWPC - CWPC) x 100 MWPC	
	Infrastructure Operation	33	OPM value for Goal No. 33	95 %	CPPC% = Power Plant Capacity percent CWPC% = Water Plant Capacity percent	CPPC% + CWPC% 2	
109	Infrastructure Operation	34	Operational availability	98 %	OEHR = Operational Equipment Hours Required OEHP = Operational Equipment Hours Provided	100 - (OEHR - OEHP) x 100 OEHR	
110	Infrastructure Operation	35	Mean Time to Repair (MTTR) improvement	10 %	CMTP = Corrective Maintenance Tasks Performed $MTTR_{avg}$ = Average Mean Time to Repair for tasks included in this metric set ATTR = Actual Time to Repair	$MTTR_{avg}$ - Σ(ATTR/CMTP) x 100 $MTTR_{avg}$	
	Infrastructure Operation	35	Preventive Maintenance Performance to Schedule	< 5 %	PMSC = PM Scheduled Completion Date PMAC = PM Actual Completion Date NPM = Number PM Tasks Performed	Σ (PMAC – PMSC) NPM	
111	Infrastructure Operation	35	Employee Performance Evaluations	3 (>2 Meets Requirements)	D = Does Not Meet Requirements (0) M = Meets Most Requirements (1) A = Meets Requirements (2) C = Consistently Exceeds Requirements (3) E = Far Exceeds Requirements (4)	(D Evaluations x 0 + M Evaluations x 1 + A Evaluations x 2 + C Evaluations x 3 + E Evaluations x 4) Total Evaluations	
112	Modern Technology Insertion	36	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for Operations Technology Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

STATION & SHIP OPERATIONS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculation	Wt % *
113	Quality Facilities	37	NSF ABM and post season grantee evaluations	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
114	Quality Facilities	38	ISO 9001 Process Compliance	95 %	MAP = Maintenance Activities Performed (Audited) CMA = Compliant Maintenance Activities (Audited)	CMA x 100 / MAP	
115	Quality Facilities	39	Equipment Requirements Planning Efficiency	97 %	PED = Planned Equipment Demand AED = Actual Equipment Demand	(PED - AED) x 100 / PED	
116	SH&E Stewardship	40	OSHA Incidence Rate	1.5	LWD = Lost Work Days NHW = Number of Hours Worked	LWD x 200,000 Hrs / NHW	
117	SH&E Stewardship	40	OSHA Severity Rate	0.5	NLWD = Number of Lost Work Days NLWDC = Number of Lost Work Day Cases	NLWD / NLWDC	
	SH&E Stewardship	40	OPM value for Goal No. 40	1.0	LWD% = Lost Work Days percent NLWD% = Number of Lost Work Days percent	LWD% + NLWD% / 2	
118	SH&E Stewardship	41	Recycling rate improvement – Based on 60 % baseline specified in RFP.	10 %	CRCY = Current Recycles in lbs. TRCY = Total recycles baseline in lbs.	(TRCY- CRCY) x 100 / TRCY	
119	SH&E Stewardship	41	Waste Reduction improvement	5 %	WRU = Waste Reduction Units TWU = Total Waste Units Baseline	WRU x 100 / TWU	
	SH&E Stewardship	41	OPM value for Goal No. 41	7 %	RCY% = Recycles percent WRU% = Waste Reduction percent	RCY% + WRU% / 2	
120	SH&E Stewardship	42	MSDS Access/Accuracy Compliance	99 %	MSDS = Number of Required MSDS MSDSAD = Number of MSDS Audit Discrepancies	(MSDS – MSDSAD) x 100 / MSDS	
121	SH&E Stewardship	42	Hazardous Materials Levels reduction (HAZMIN Program)	20 %	HMILB – Hazardous Material Inventory Level Baseline HMIL – Hazardous Material Inventory Level	(HMILB – HMIL) x100 / HMILB	
122	SH&E Stewardship	43	ISO 9001 Compliance	95 %	QEC= Quality Elements Audited INC = Internal Audit Incidents of Non-compliance	(QEC - INC) x 100 / QEC	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

STATION & SHIP OPERATIONS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculation	Wt % *
123	Responsive-ness	44	Maximum Variance from Revised Cost	10 %	ISH = Initial Scheduled Hours SAH = Schedule Amendment Hours (Δ) AH = Actual Hours	$\frac{(SAH - (AH - ISH)) \times 100}{SAH}$	
124	Responsive-ness	44	Maximum Variance from Revised Cost	10 %	ISC = Initial Scheduled Cost SAC = Schedule Amendment Cost (Δ) AC = Actual Costs	$\frac{(SAC - (AC - ISC)) \times 100}{SAC}$	
	Responsive-ness	44	OPM value for Goal No. 44	10 %	AH% = Actual Cost percent AC% = Actual Schedule percent	$\frac{AH\% + AC\%}{2}$	
125	Responsive-ness	45	Actual Costs vs. Budgeted Costs by Station & Ship Project	5 % Cost Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	$\frac{(BC - AC) \times 100}{BC}$	
126	Responsive-ness	45	Planned Project Duration vs. Actual Project Duration based on Planned Start date	5 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	$\frac{(PFD - PSD) \times 100}{AFD - PSD}$	
	Responsive-ness	45	OPM value for Goal No. 45	5 %	AC% = Actual Cost percent AFD% = Schedule Duration percent	$\frac{AC\% + AFD\%}{2}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

INFO TECH & INFO SYSTEMS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
127	Business Processes	67	Actual Costs vs. Budgeted Costs by Project	5 % Cost Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 BC	
128	Business Processes	68	IT Architecture Well Planned	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
129	Customer Satisfaction	69	Customer Perception	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
130	Innovation & Process Improvement	70	File/Message Transfer Time improvement	15 %	BFTT = Baseline File Transfer Time CFTT = Current File Transfer Time	(BFTT – CFTT) x 100 BFTT	
131	Innovation & Process Improvement	71	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for IT Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
132	Infrastructure Operation	72	Operational availability	98 %	OEHR = Operational Equipment Hours Required OEHP = Operational Equipment Hours Provided	100 - (OEHR - OEHP) x 100 OEHR	
133	Infrastructure Operation	72	System Availability	97 %	SHR – System Hours Required SHA – System Hours Available	100 – (SHR – SHA) x 100 SHR	
	Infrastructure Operation	72	OPM value for Goal No. 72	97 %	EA% = Equipment Available percent HA % = Hours Available percent	EA % + HA% 2	
134	Modern Technology Insertion	73	Bit Error Rate improvement (Or other circuit quality measurement TBD)	10 %	BER = Bit Error Rate Measurement BBER = Baseline Bit Error Rate Value NBER = Number of Bit Error Rate Measurements	Σ (BER - BBER) X 100 NBER	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

INFO TECH & INFO SYSTEMS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
135	Modern Technology Insertion	73	Analysis Time improvement (Measuring standard analysis processes)	10 %	BAT = Baseline Analysis Time CAT = Current Analysis Time	(BAT – CAT) x 100 BAT	
136	Modern Technology Insertion	73	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for IT Technology Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
137	Modern Technology Insertion	74	Suitability Survey	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
138	Modern Technology Insertion	74	Material Readiness	95 %	TR = Total Requisitions PI = Partial Issues SO = Stock Outs	(TR – PI – SO) x 100 TR	
139	Quality Facilities	75	User Need And Requirements Satisfaction	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
140	Quality Facilities	76	User requirements	98 %	NUR = Number of User Requirements NUUR = Number of Unanticipated User Requirements	100 - (NUR – NUUR) x 100 NUR	
141	SH&E Stewardship	77	User Survey on Effectiveness of Determining Opportunities	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
142	SH&E Stewardship	78	ISO 14000 Compliance	95 %	EEC= Environmental Elements Audited INC = Internal Audit Incidents of Non-compliance	(EEC - INC) x 100 QEC	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

INFO TECH & INFO SYSTEMS							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
143	SH&E Stewardship	79	Audits of Safety Regulations Compliance	95 %	NMAJD = Number of Major Audit Discrepancies NMIND = Number of Minor Audit Discrepancies NAA = Number of Measurement Areas Audited	((NMAJD x 10) + NMIND) x 100 / NAA	
144	Responsive-ness	80	Maximum System Downtime	10 % (Based on 30 minute baseline)	UDT = Unscheduled Down Time Duration in Minutes NUDT = Number of Unscheduled Down Times in Reporting Period	(30 Min - Σ (UDT)/NUDT) x 100 / 30 Min	
145	Responsive-ness	80	Schedule Variance from Plan improvement	5 %	NSPD = New System Plan Days NSAD = New System Actual Days	(NSPD – NSAD) x 100 / NSPD	
146	Responsive-ness	81	IT Processes and Projects in Risk Management Program	100 %	NITP = Number of IT Processes NNITP = Number of New IT Projects NITPP = Number of IT Processes and New Projects Formally Evaluated in Risk Management Program	(100 – ((NITP + NNITP) - NITPP) x 100) / (NITP + NNITP)	
147	Responsive-ness	81	Actual Costs vs. Budgeted Costs by IT Project	5 % Cost Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 / BC	
148	Responsive-ness	81	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	(PFD – PSD) x 100 / AFD - PSD	
	Responsive-ness	81	OPM value for Goal No. 81	5 %	AC % = Actual Cost percent AS % = Schedule Duration percent	AC % + AS% / 2	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

FACILITIES ENGINEERING & CONSTRUCTION							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
149	Business Processes	82	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	$\frac{(PFD - PSD) \times 100}{AFD - PSD}$	
150	Business Processes	83	Actual Costs vs. Budgeted Costs by Project	5 % Cost Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	$\frac{(BC - AC) \times 100}{BC}$	
151	Business Processes	83	Actual Schedule vs. Planned Schedule	5 % Schedule Underrun	PS = Planned Schedule (Days) AS = Actual Schedule (Days)	$\frac{(PS - AS) \times 100}{PS}$	
	Business Processes	83	OPM value for Goal No. 83	5 %	AC % = Actual Cost percent AS % = Actual Schedule percent	$\frac{AC\% + AS\%}{2}$	
152	Business Processes	84	Application of value engineering principles to all projects. (Metrics for this survey/self evaluation are from our Performance Value Added Program which tracks innovations, process improvement, and technology insertion by WBS element.)	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
153	Customer Satisfaction	85	Construction Induced Impacted Labor Hours	< 10 %	TPLR = Total Productive Labor Hours (Regular Activities) TCLR = Total Construction Labor Hours CIDLR = Construction Induced Downtime Labor Hours	$\frac{(TPLR - TCLR - CIDLR) \times 100}{TPLR - TCLR}$	
154	Customer Satisfaction	86	Corrective action labor hours vs. project labor hours	< 5 %	PLH = Project Labor Hours CALH = Corrective Action Labor Hours	$100 - \frac{(PLH - CALH) \times 100}{CALH}$	
155	Customer Satisfaction	87	NSF Management Oversight required	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
156	Innovation & Process Improvement	88	Cycle Time improvement for Innovations and Process Changes	5 %	PCTB = Process Cycle Time Baseline PCT = Process Cycle Time	$\frac{(PCTB - PCT) \times 100}{PCTB}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

FACILITIES ENGINEERING & CONSTRUCTION							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
157	Innovation & Process Improvement	88	Cycle Cost improvement for Innovations and Process Changes	5 %	PCCB = Process Cycle Cost Baseline PCC = Process Cycle Cost	(PCCB – PCTC) x 100 PCCB	
	Innovation & Process Improvement	88	OPM value for Goal No. 88	5 %	PCT% = Process Cycle Time percent PCC% = Process Cycle Cost percent	PCT% + PCC% 2	
158	Innovation & Process Improvement	88	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for FE Innovation and PI Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
159	Infrastructure Operation	89	Emergency Action labor hours vs. Preventive Maintenance labor hours	95 %	PMLH = Project Labor Hours EALH = Corrective Action Labor Hours	(PMLH – EALH) x 100 PMLH	
160	Infrastructure Operation	90	Trade Labor Productivity improvement	10 %	TLP = Trade Labor Productivity ISTLP = Industry Standard Trade Labor Productivity	(ISTLP – TLP) x 100 ISTLP	
161	Modern Technology Application	91	Performance Value Added Program (A formal performance improvement, technology insertion, innovation suggestion program to encourage employee exploration of performance gains)	5 % Positive Return on Investment (ROI) for FE Technology Investments	COIM = Cost of Implementation & Maintenance ROI = Return on Investment Factors: ROI (reduced staffing value, material cost reduction value, etc.) vs. COI (Acquisition, migration, life-cycle, residual value, etc.)	(ROI – COIM) x 100 ROI	
162	Quality Facilities	92	Actual Costs vs. Budgeted Costs by Project	5 %	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	(BC - AC) x 100 BC	
163	Quality Facilities	92	Actual Schedule vs. Planned Schedule	5 %	PS = Planned Schedule (Days) AS = Actual Schedule (Days)	(PS - AS) x 100 PS	
	Quality Facilities	92	OPM value for Goal No. 92	5 %	AC % = Actual Cost percent AS % = Actual Schedule percent	AC % + AS% 2	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

FACILITIES ENGINEERING & CONSTRUCTION							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
164	Quality Facilities	93	Meeting User Specifications and Requirements	40 (10 questions, 5 answers = Max 50 score)	RSCSS = Raytheon Standard Customer Satisfaction Survey. Scores for each question: 1-Below, 3 – Meets, to 5 – Exceeds.	Σ (RSCSS)	
165	SH&E Stewardship	94	OSHA Incidence Rate	1.5	LWD = Lost Work Days NHW = Number of Hours Worked	$\frac{\text{LWD x 200,000 Hrs}}{\text{NHW}}$	
166	SH&E Stewardship	94	OSHA Severity Rate	0.5	NLWD = Number of Lost Work Days NLWDC = Number of Lost Work Day Cases	$\frac{\text{NLWD}}{\text{NLWDC}}$	
	SH&E Stewardship	94	OPM value for Goal No. 94	1.0	LWD% = Lost Work Days percent NLWD% = Number of Lost Work Days percent	$\frac{\text{LWD\% + NLWD\%}}{2}$	
167	SH&E Stewardship	95	Waste Reduction improvement	5 %	WRU = Waste Reduction Units TWU = Total Waste Units	$\frac{\text{WRU x 100}}{\text{TWU}}$	
168	SH&E Stewardship	96	Hazardous Materials Levels Reduction (HAZMIN Program)	20 %	HMILB – Hazardous Material Inventory Level Baseline HMIL – Hazardous Material Inventory Level	$\frac{\text{(HMILB – HMIL) x100}}{\text{HMILB}}$	
169	SH&E Stewardship	96	MSDS Compliance	99 %	MSDS = Number of Required MSDS MSDSAD = Number of MSDS Audit Discrepancies	$\frac{\text{(MSDS – MSDSAD) x 100}}{\text{MSDS}}$	
170	SH&E Stewardship	97	ISO 14000 Compliance	95 %	EEC= Environmental Elements Audited INC = Internal Audit Incidents of Non-compliance	$\frac{\text{(EEC - INC) x 100}}{\text{QEC}}$	
171	Responsive-ness	98	Planned Project Duration vs. Actual Project Duration based on Planned Start date	95 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	$\frac{\text{((PSD – PFD) x 100}}{\text{PSD - AFD}}$	
172	Responsive-ness	99	Cost Variance from Plan Maximum Variance from Revised Cost	10 %	ISC = Initial Scheduled Cost SAC = Schedule Amendment Cost (Δ) AC = Actual Costs	$\frac{\text{(SAC - (AC – ISC)) x 100}}{\text{SAC}}$	
173	Responsive-ness	99	Maximum Variance from Revised Schedule	10 %	ISH = Initial Scheduled Hours SAH = Schedule Amendment Hours (Δ) AH = Actual Hours	$\frac{\text{(SAH - (AH – ISH) x 100}}{\text{SAH}}$	
	Responsive-ness	99	OPM value for Goal No. 99	10 %	AH% = Actual Cost percent AC% = Actual Schedule percent	$\frac{\text{AH\% + AC\%}}{2}$	

**Actual Weights to be Negotiated With Annual Program Plan*

Attachment 3a – Performance Metric and Data Requirements Matrix

FACILITIES ENGINEERING & CONSTRUCTION							
Metric Index	Measurement Area	NSF Goal No.	Metric	First Year Performance Target	Data Requirements	Calculations	Wt % *
174	Responsive-ness	100	Actual Costs vs. Budgeted Costs by Station & Ship Project	5 % Cost Underrun	AC = Actual Cost per Expense Element BC = Budgeted Cost per Expense Element	$\frac{(BC - AC) \times 100}{BC}$	
175	Responsive-ness	100	Planned Project Duration vs. Actual Project Duration based on Planned Start date	5 %	PSD = Planned Start Date PFD = Planned Finished Date AFD = Actual Finished Date	$\frac{(PFD - PSD) \times 100}{AFD - PSD}$	
	Responsive-ness	100	OPM value for Goal No. 100	5 %	AC% = Actual Cost percent PD% = Project Duration percent	$\frac{AC\% + PD\%}{2}$	

**Actual Weights to be Negotiated With Annual Program Plan*

EXHIBIT 6

RSC Group/Division Name: Raytheon Systems Co./ Raytheon Polar Services Company

Date: September 24, 1999 Contract/RFP No: NSF RFP No. OPP 98001

Plan No: _____ RSC Ref. No.: _____

Modification No.: _____

INDIVIDUAL SUBCONTRACTING GOALS UNDER MASTER SUBCONTRACTING PLAN RSCMSP97- 98
APPROVED FOR USE DURING FISCAL YEAR 1998 BY DEFENSE CORPORATE EXECUTIVE: HERBERT W. HOMER, DCMC-RAYTHEON FOR THE UTILIZATION OF:

- **Small Business Concerns**
- **Small Disadvantaged Business Concerns**
- **Small Women Owned Business Concerns**
- **Historically Black Colleges, Universities and Minority Institutions**

Submitted By:	RAYTHEON SYSTEMS COMPANY
Group	Raytheon Polar Services Company
Address	8614 Westwood Center Drive, Suite 410
City, State	Vienna, VA 22182
Plan Administrator:	Ms. Benita Fortner
Title	RSC Liaison Officer
Location	1100 Wilson Blvd, Arlington, VA 22209-3978
Telephone	310-847-2312
Socioeconomic Programs Administrator:	
Name	Dea Mendonca, SBLO
Location	4400 Forbes Blvd, Lanham, MD 20706
Telephone	301-794-5179
Contract Administrator:	Mr. Terry Mason
Title	Contract Administrator
Location	8614 Westwood Center Drive, Vienna, VA 22182
Telephone	703-714-1577
Principal Contracting Officer:	William A. Bryant

Agency	National Science Foundation (NSF)
Address	CPO - Contracts Branch, Section II 4201 Wilson Blvd, Suite 475 Arlington, VA 22230
Telephone	703-306-1242
Administrative Contracting Officer	TBD
Agency	
Address	
Telephone	

RSC Group/Division Name: Raytheon Systems Co./ Raytheon Polar Services Company

Date: September 24, 1999 Contract/RFP No: NSF RFP No. OPP 98001

Plan No: _____ RSC Ref. No.: _____

Modification No.: _____

1. CONTRACT INFORMATION

Contract/RFP No.	NSF RFP No. OPP 98001
Description	To provide operational and logistics support to the Antarctic Program
Period of Performance	October 1, 1999 - March 31, 2000 (Phase-In Period) April 1, 2000 - March 31, 2005 (5 Yr Base Period) and April 1, 2005 - March 31, 2010 (5 Yr Option Period)
Effective Date of Contract	October 1, 1999
Change No. _____ Date:	_____

2. VALUES

Total Current Contract Value	$ 1,122,578,563	100 %
Planned Subcontract Dollars	$ 667,794,763	59.5%
Domestic Subcontract Dollars	$ 667,794,763	59.5%

3. GOALS

For the purpose of this individual subcontracting plan, the following separate percentage goals are hereby expressed in terms of a percentage of the total planned domestic subcontract dollars. The goal for small disadvantaged concerns includes consideration of Historically Black Colleges and Universities and Minority Institutions in a composite SDBs, HBCUs, and MIs Goal, and while stated separately as a percentage of planned subcontract dollars, is included in the goal for small business concerns owned and operated by Woman or Women, if required as part of this subcontracting plan will be stated separately; but, will be included in the goal for small business concerns and constitutes a subset thereof. These planned subcontract dollars include all first tier subcontracts to be awarded in the performance of this contract but unless specifically and separately stated as stand-alone items do not include the cost of any products or services normally allocated as indirect or overhead.

The Raytheon Systems Company hereby commits to continue applying it organized and proven resources in carrying out the government's socioeconomic program objectives and hereby agrees to strive for achievement of the following goals:

RSC Group/Division Name: Raytheon Systems Co./Raytheon Polar Services Company

Date: September 24, 1999 Contract/RFP No: NSF RFP No. OPP 98001

Plan No: _____ RSC Ref. No.: _____

3. a) Individual Goals

PLANNED SUBCONTRACT BASE:	AMOUNT	PERCENT
1. Total Dollars	$ 667,794,763	100%
2. To Large Business	$ 300,507,643	45%
3. To Small Business	$ 367,287,120	55%

SMALL BUSINESS SUBSETS:	AMOUNT	PERCENT OF ITEM 3 TOTAL
4. Disadvantaged	$ 36,728,712	5.5%
5. HBCUs/MIs	$ 0	0%
6. Woman-Owned	$ 50,084,607	7.5%
7. Non-disadvantaged	$ 280,473,801	42.0%

Justification is required for items 4 & 5 when combined percentages are less than 5%. If item 5 is zero a brief explanation is required.

HBCU/MIs do not traditionally supply commericial products, goods and services which comprise a large portion of the subcontracting opportunities for this effort. For example, the ship charter is already established with Edison Chouest Offshore for $152 million.

4. MODIFICATIONS

Upon receipt of a modification to this contract exceeding the $500,000 threshold. ($1,000,000 for construction), Raytheon Systems Company will promptly negotiate applicable revisions to the appropriate subcontract goal reflecting these changes. The following paragraph applies only to contract modifications in excess of the threshold.

Change number _____ dated _____ increases (decreases) the previous contract value by _____ to a new total contract value of _____

This change impacts the planned subcontract elements as follows

RSC Group/Division Name: Raytheon Systems Co./Raytheon Polar Services Company

Date: September 24, 1999 Contract/RFP No: NSF RFP No. OPP 98001

Plan No: _____ RSC Ref. No.: _____

4. MODIFICATIONS (continued)

PLANNED SUBCONTRACT BASE:	FROM		TO	
1. Total Dollars	$_____	____ %	$_____	____ %
2. To Large Business	$_____	____ %	$_____	____ %
3. To Small Business	$_____	____ %	$_____	____ %
SMALL BUSINESS SUBSETS:				
4. Disadvantaged	$_____	____ %	$_____	____ %
5. HBCUs/MIs	$_____	____ %	$_____	____ %
6. Woman-Owned	$_____	____ %	$_____	____ %
7. Non-Disadvantaged	$_____	____ %	$_____	____ %

5. TECHNICAL ASSISTANCE TO SDB CONCERNS

In addition to those actions described in the Annual Subcontracting Plan format in paragraph 3 "Basis for Setting Goals"; paragraph 4 "Source Identification"; paragraph 8 "Implementing Actions to Develop Participation"; and paragraph 11 "Record keeping and Outreach Effort", the following specific efforts will be undertaken to aid SDB concerns receive an opportunity to participate in the performance of this contract as subcontractors and to aid in the achievement of the above stated SDB goal:

Raytheon will continue to participate in Small Business Outreach opportunities such as trade fairs to search for SDBs and other small businesses in an effort to qualify them as subcontractors under this and any ongoing contract effort.

6. PRINCIPAL PRODUCTS AND SERVICE AREAS

Appendix I attached hereto contains a description of the principal supply and service areas scheduled to be subcontracted and identification of those areas anticipated to be subcontracted to small business concerns, small business concerns owned and operated by socially and economically disadvantaged individuals and large business concerns.

7. PLAN ADMINISTRATOR

Responsibility for the implementation and administration of this subcontracting plan is vested in the responsible Plan Administrator whose name appears on the cover sheet. Raytheon Systems Company reserves the right to substitute another qualified individual as Plan

Administrator should the need arise. The duties of the Plan Administrator shall include but not be limited to the following:

RSC Group/Division Name: Raytheon Systems Co./ Raytheon Polar Services Company

Date: September 24, 1999 Contract/RFP No: NSF RFP No. OPP 98001

Plan No: _____ RSC Ref. No.: _____

7. PLAN ADMINISTRATOR (continued)

a) Prepare small business subcontracting plans which include percentage goals, a description of efforts facilitating SB and SDB participation, assurances that subcontracts contain flow-down provisions, agreement to submit reports and a recitation of records maintained including small business source lists.

b) Require all Materiel organizations designated to perform work under the Company contract to provide total estimated procurement dollars to be let via assist work authorizations including the estimated amount targeted for large, small and small disadvantaged business concerns.

c) Structure percentage goals for inclusion in the subcontracting plan using identifiable subcontract materials in the development of such goals, communicate such goals to procurement personnel and require supporting Groups and Divisions to maintain records of solicitations and awards and to submit performance reports against established goals so that information may be fed back to the government.

d). Assure Materiel contract briefs disclose terms and conditions of the Company contract concerning small business plans including provisions for incentive award fees and reporting requirements and make certain that such briefs are distributed to all performing organizations.

e) Make sure during Make-or-Buy Board meetings that SB and SDB capabilities are adequately considered and that such firms are listed as potential sources on the make-or-buy plan.

f) Review bills of material to determine economic ordering quantities suitable for procurement from SB and SDB and examine program work breakdown structures to determine alternative ways in which material and services may be acquired from SB and SDB concerns.

g) Coordinate with Group/Divisional SPAs prior to subcontract plan submission to develop listings of prospective SB and SDB bidders that are capable of performing work for known procurements and set time periods for bidding and delivery schedules to enable them to compete.

h) Advocate SB and SDB interests during Procurement Review Committee meetings to ensure that small firms are equitably considered during the source selection process. Maintain and evaluate records of small disadvantaged business and HBCU/MI solicitation responses to assist in determining ability to compete.

i) Bring to Materiel, Contracts and Program Management's attention any matter that could impair accomplishment of actions specified in subcontracting plans which might adversely affect the Company contracts.

RSC Group/Division Name: Raytheon Systems Co./ Raytheon Polar Services Company

Date: September 24, 1999 Contract/RFP No: NSF RFP No. OPP 98001

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APPENDIX I

PRINCIPAL PRODUCTS AND SERVICE AREAS BY BUSINESS SIZE CATEGORIES

Raytheon Systems Company , relative to the above Contract/RFP, anticipates procurement of the following listed products and services from the following categories of business concerns:

PRODUCT/SERVICE		ALL SMALL BUSINESS CONCERNS				
				DISADVANTAGED		
	LARGE	SB	WOB	SDB	HBCU	MI
1. Operational and Logistics Support Services	X	X	X	X		
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

NOTE: USE A CONTINUATION SHEET FOR ITEMS OVER TEN

Legend:

SB = Small Business SDB = Small Disadvantaged Business MI = Minority Institution

WOB = Women-Owned Business HBCU = Historically Black College or University