

FY23

Cooling and Heating Asset Management Program Pre-Bid Site Visits

Program Overview

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October 17-20, 2022

Lawrence Livermore National Laboratory



The Program for Today's Meeting

- Welcome
- Agenda
 - Orientation to the conference facility
 - Sponsors and leadership
 - CHAMP Program Introduction
 - Scope of Work – Projects, Design, Construction
 - Contract Development and Structure
 - Site Visits
 - Request for Proposal Process
- Example Project Tour at LLNL
 - B170 DDC system replacement
- Visit Sandia National Laboratory – California, 1:00 – 3:30 pm
- Travel to Las Vegas for NNSS site visit

Key Points for Today's Discussion

- **Alignment** – This program answers DOE's need
- **Collaboration** – a cost-effective program to address NNSA needs
- **Enterprise Data Analysis** – demonstration of a growing need for AMPs
- **AMP Delivery** – an efficient, flexible, and scalable program
- **Proven History of Success** – this program follows the Roof Asset Management Program (RAMP) and Facilities and Infrastructure Recapitalization Program (FIRP)
- **FY17-22 Projects (first contract)** – program growth has exceeded expectations
- **Program Development** – 2023 will launch the new subcontract

Outcomes of Today's Meeting

- Kick-off the Cooling and Heating Asset Management Program bidders' site visits
- Visit representative NNSA sites and representative projects, meet participating site representatives
- Receive feedback regarding the program and the bid process

Thank you for your participation and your support of the CHAMP process!

Pre- Bid Site Visit Agenda

The proposed agenda for each site visit will include:

- Meet site representatives
- Overview site ES&H and access requirements
- Walk through example proposed pilot projects
- Discuss project system design requirements and constraints
- Sites will describe temporary system requirements and issues
- Walk existing system interfaces
- Tour construction access, lay-down areas, interfaces
- Discuss system commissioning and turn-over

Cooling and Heating Asset Management Program

What is CHAMP?

CHAMP is an easily accessible, responsive, cost-effective vehicle for executing design and construction services.

CHAMP is an Asset Management Program initiated by NA-915 to develop and implement improvements in the condition of critical infrastructure systems, procurement processes and timeliness, and project delivery.

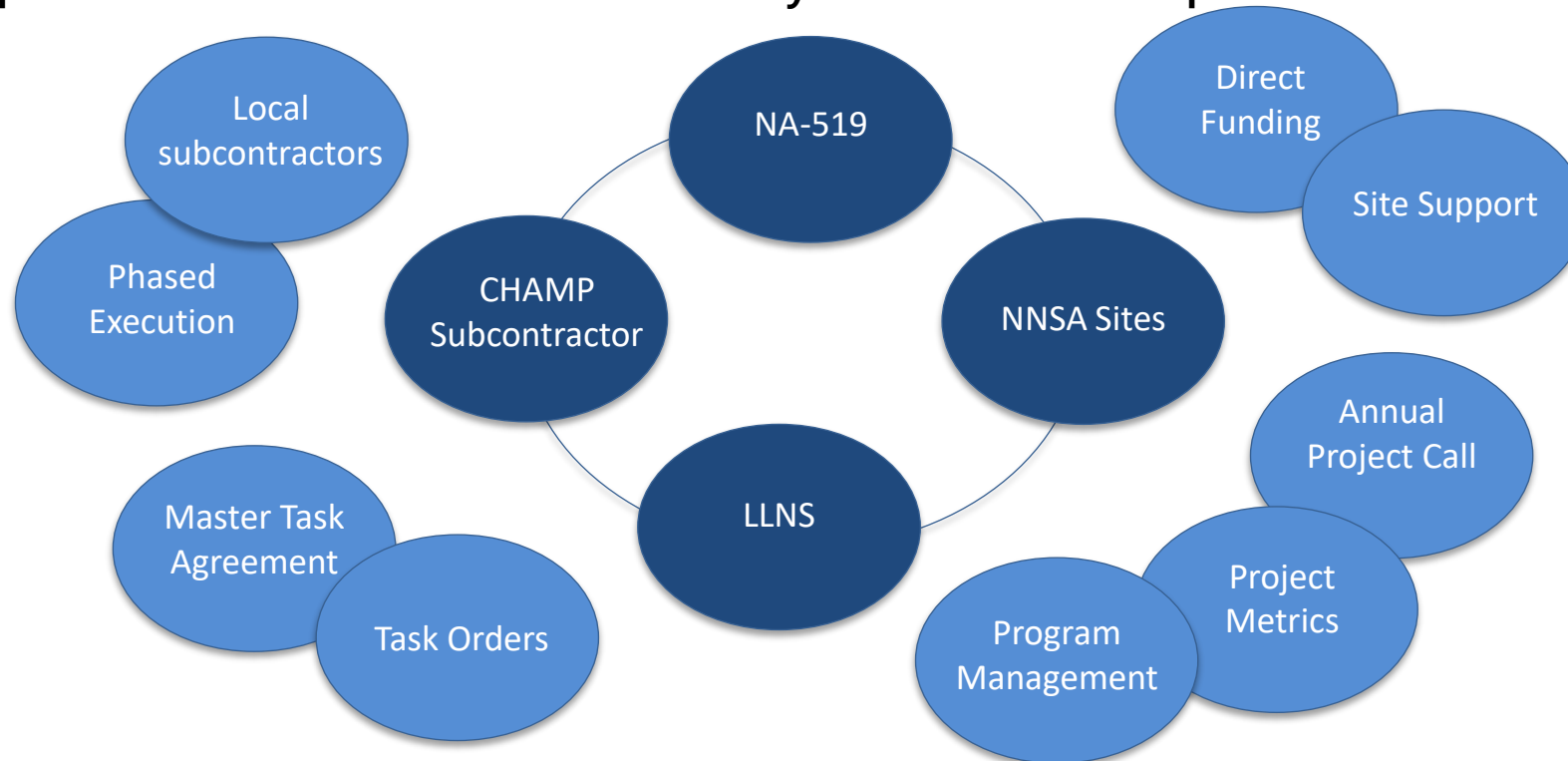
CHAMP is a program developed by LLNS for NNSA NA-915. CHAMP uses a complex-wide agreement held and administered by LLNS for the replacement and modernization of heating, ventilation, and air-conditioning systems.

CHAMP uses a master task agreement with a design-build subcontractor to execute assessments, designs, and construction through task orders.

Cooling and Heating Asset Management Program

Key Program Elements

CHAMP is a partnership between NNSA and NNSA sites to work with a single complex-wide subcontractor to efficiently execute HVAC replacements.



NNSA selected LLNS to manage the complex-wide asset management program and contract for heating, ventilation, and air-conditioning systems.

Scope of Work Overview

Program

Projects include design engineering, construction estimating, construction management services and procurement of construction services to be executed by local subcontractors

Engineering

Design engineering will include validation of proposal scope; development of construction documents; selection, sizing, and procurement of equipment, and energy modelling of systems

Estimating

Estimating will include validation of proposal scope estimate at initiation of design and provision of an independent cost estimate and schedule on design completion

Construction

Construction will include construction management and safety oversight services, procurement and supervision of construction subcontracts execution

Contributing Factors for Success

Frequent, planned communication – project teams, stakeholders and customers, program managers meet weekly on each project, the enterprise team meets weekly, and the LLNS team meets weekly with NNSA/LFO

Teamwork - site project and program managers, Federal Project Director, and LLNS SCM contract analysts, resource managers, G2 analysts, AEC subcontractor all working together to deliver projects to sites

Easy entry and quick response – by design, encourages site participation

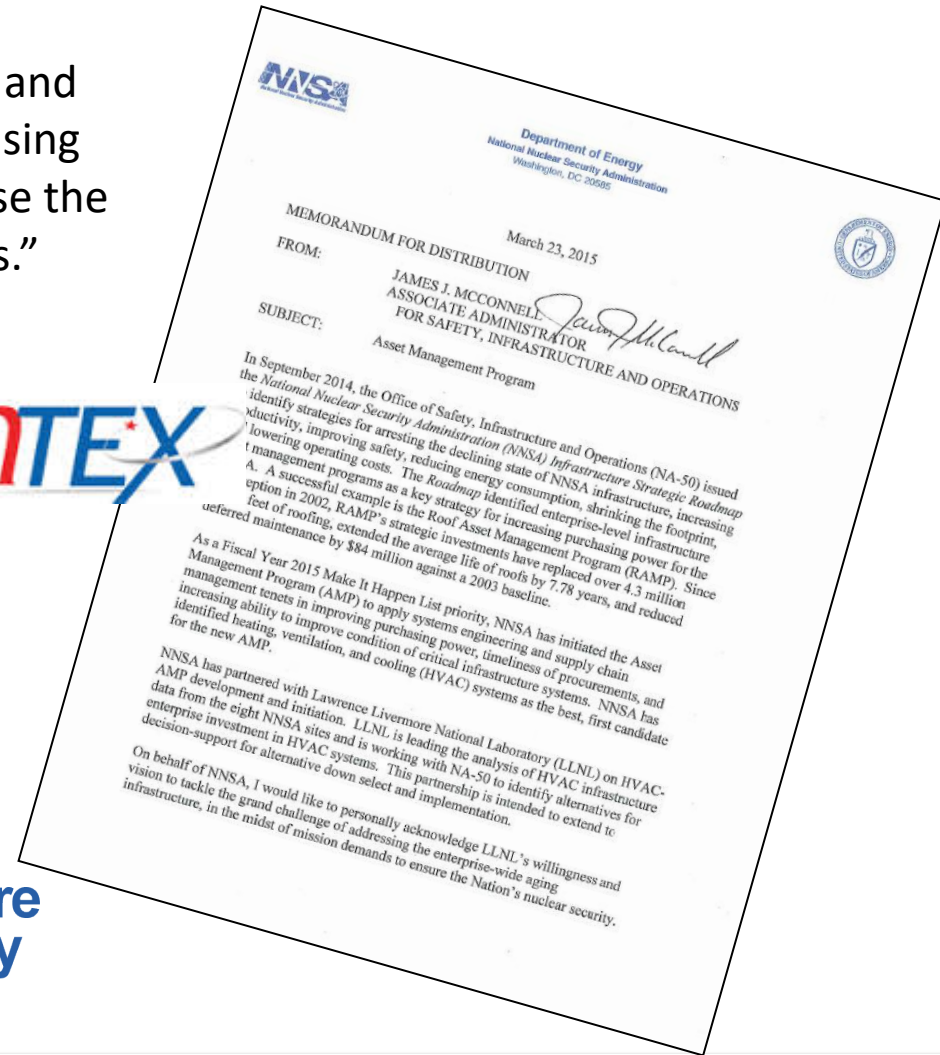
Focus on execution (methods, schedule, interfaces, outages) beginning in Assessment phase

Consistent tools for managing the project process (Assessment, Design, Execution) and program **and** **Consistent product** delivered at each phase, **customized** to project and site needs



The NNSA initiated the Asset Management Program in anticipation of DOE's Asset Management Plan

“AMP programs will apply systems engineering and supply change management to improve purchasing power, timeliness of procurements, and increase the ability to improve critical infrastructure systems.”

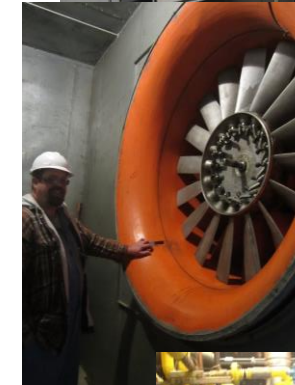


Program Objectives

- Conduct a disciplined, efficient, flexible NNSA-enterprise program to identify systems that require repair, replacement, and modernization to support breakthrough science
- Design and construct repairs and replacements that meet NNSA's most pressing needs in support of mission infrastructure
- Reduce deferred maintenance
- Implement sustainability measures and provide measurement and verification tools to demonstrate return on program investments.

The NNSA CHAMP program delivers:

- **Flexible project selection process**
 - Addresses the deferred maintenance mortgage
 - Priorities mission critical needs and complex systems engineering issues
 - Modernization focus on critical science and technology mission
 - Partners with sites for prioritization and site support teams
 - Advances sustainable energy technology solutions
 - NA-915 drives program mission
- **Streamlined acquisition process**
 - Focuses on efficiency and flexibility in contract award and task awards
 - Master task agreement with task orders ensures streamlined access to work performance
 - Process can be extended to any AMP
 - Subcontractor access to GSA and SCMC pricing
 - Site support teams responsible for 10 CFR 851 implementation



CHAMP Program Projects

Program projects will include the range of projects that concern the DOE NNSA complex:

- Chilled water and heating hot water system replacements (wet-side systems)
 - Water- and air-cooled chillers
 - Boilers and heating hot water systems
 - Associated valving, piping and pump systems
- Air-handling replacements (dry-side systems)
 - Air-handlers
 - Packaged air-conditioning units, including refrigerant replacement projects
 - Duct distribution and terminal unit systems
 - Associated valving, piping, and pump systems
- Controls systems modernization, including equipment metering and trending
- Collateral design and construction scope to support the primary HVAC work

Example: CHAMP Annual Plan FY22 Plan and Scope of Work

Action	Plan
5-year IPL in place for all sites	Complete
Assessments	Execute 12 assessments
Project design	Execute 10 design packages
LANL TA22-0093 – LANL Recap (LANL HE Enterprise)	Complete construction; expected January 30, 2022
Construction – Complete FY21-funded projects	NNSS 06-332; NNSS 23-710; LLNL B170; SNL NM 6585; SN NM 960 In progress
Construction – FY22-funded projects, as funding permits	Award 5 projects

Cooling and Heating Asset Management Program

NNSA Sites Propose an Annual Integrated Project List

Project proposals address CHAMP selection factors, site prioritization, risk factors, sustainability, conceptual cost estimate, and G2 and BUILDER input.

The image shows a stack of project proposal forms. The top form is titled "Attachment A Project Proposal Form NNSA CHAMP Project Proposal". It is part of the "DOE NNSA Cooling and Heating Asset Management Program (CHAMP) Program Management Plan" dated "April 15, 2017". The form includes several sections:

- Project Title:** Enter a descriptive title that includes the site, the building, and the system.
- Project Description:** Briefly describe the project, what the project will provide and/or repair and the programmatic impact that the project will have. Describe how the project fits into the participating site's strategic plan. In other words, describe the 1) Issue, 2) Impact to mission, and 3) Scope. For the impact, be as quantitative as possible describing effects to productivity, schedules, costs, safety, and other factors which characterize the impact of the system.
- Site Prioritization Rank:** The participating site will provide a rank order for all projects submitted. This project is rank number ___ of ___ projects proposed.
- Asset Real Property Value (RPV):** Enter the RPV for the asset in which the proposed project will be sited.
- Asset Name / Asset ID:** Enter each asset that the project applies to (Property Name and Property ID from FIMS spreadsheet). Add as many as appropriate.
- Activity Type:** Select type:
 - Minor Construction
 - Modernization
 - Replacement in Kind

 The form is labeled "Page 49 of 65" at the bottom right.

AMP Delivery

Project proposals will be assessed on weighted factors and will include a strategy for project verification

Project Proposals

=

Site Prioritization (MDI+CAS)

Modernization

Regulatory Requirement

Sustainability/ Energy ROI

Deferred Maintenance Reduction (DM)

Measurement + Verification (M&V)

- Similar to the Recapitalization project proposal process, projects will be ranked on factors weighted each year prior to the proposal process.
- Measurement and Verification required for all requirement for all projects.
- Measurement capability will be installed including energy instrumentation, trending, and reporting (ASHRAE 189.1, Section 7).

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UCMWP.ppt - Author - Meeting, Date

FY22-27 CHAMP

Five-Year Integrated Project List

Projects for execution through FY24 must be in G2 planning module by February 15, 2022.

FY Assessment	FY Execution	Site	Facility	Estimate \$	Project/Activity Description	G2
FY22	FY24	LLNL	16-0411	5,000,000	HVAC	8170
FY21	FY24	LLNL	OS291	6,000,000	Cooling Tower	137
FY22	FY24	LLNL	B490	4,000,000	Airhandlers ACU18-20	3060
FY23	FY24	NNSS	23-752	2,000,000	HVAC Replacement	6724
FY23	FY24	NNSS	23-156/23-158	2,000,000	Replace Evaporative Coolers with CHW units	7771
FY23	FY24	NNSS	23-1010	3,000,000	Replacement of entire HVAC system	7772
FY22	FY24	Pantex	12-121	5,000,000	Chiller	
FY22	FY24	SNL-NM	823	2,000,000	Chillers and pumps	
FY22	FY24	SNL-CA	C929	2,000,000	Airhandler and controls	
FY23	FY24	Y-12	9720-94	1,500,000		

Five-year IPL: 100 projects = \$300M estimated execution

FY24 TPC (CHAMP Funding) = \$32.5M

Implementation of NA-915 PMP:

CHAMP-funded projects: direct-funded, like-for-like maintenance replacements, operating.

Projects designated as capital through site funding determinations are funded through Recapitalization.

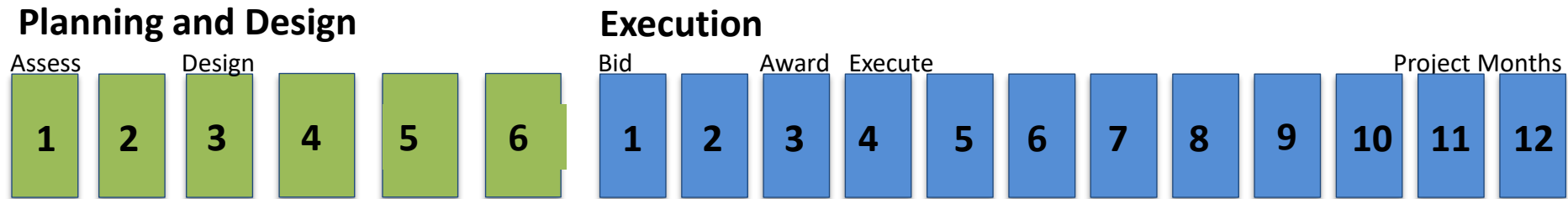
Sites can fund projects performed through CHAMP using indirect and Recap funding transferred to LLNL through the IEWO or SPP processes.

FY22 CHAMP Program Schedule

FY22 CHAMP Program Schedule				FY22													FY23			
Phase	WBS	Project	Current Status	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	
				Management	50.5.2.1	LLNL Team	CHAMP													
	50.5.2.2	Burns and McDonnell	AE PMTO																	
Assessments	50.5.2.2	LLNL B490 ACU18-20 Replacements	Proposal																	
	50.5.2.2	LLNL B391 DDC and VAV Box Replacements	Proposal																	
	50.5.2.2	LLNL B827E Boiler Replacements	Proposal																	
	50.5.2.2	NNSS 23-701/23-117 HVAC Replacement	Proposal																	
	50.5.2.2	NNSS 23-118/23-132/23-700 Replacement	Proposal																	
	50.5.2.2	SNL NM 905 CHW System Replacement	Proposal																	
	50.5.2.2	SNL NM 905 Cooling Tower System Replacement	Proposal																	
	50.5.2.2	SNL CA C929 Airhandler Replacement	Proposal																	
	50.5.2.2	Pantex 12-121 Chillers Replacement	Proposal																	
	50.5.2.2	Pantex 12-118 HVAC Filtration	Proposal																	
	50.5.2.2	SRS	Proposal																	
	50.5.2.2	Y-12 9201-3 AC-0047/0048/0049	Proposal																	
	Indirect	Y-12 AHU and Kathabar Replacements	Proposal																	
Design	50.5.2.2	SNL NM 905 Chiller Replacement	Assessment																	
	50.5.2.2	SNL CA C914 and C916 Boiler Replacements	Assessment																	
	50.5.2.2	NNSS 23-118 HVAC Replacements	Assessment																	
	50.5.2.2	SNL NM Bldg 6650 Chiller Replacement	Assessment																	
	50.5.2.2	SNL NM Bldg 6593 Chiller Replacement	Proposal																	
	50.5.2.2	NNSS 23-701/23-117 HVAC Replacement	Proposal																	
	50.5.2.2	NNSS 23-118/23-132/23-700 Replacement	Proposal																	
	50.5.2.2	LLNL B432 HVAC Replacement	In Progress																	
	50.5.2.2	LANL TA16-410 HVAC Replacement	Assessment																	
	50.5.2.2	Pantex 12-121 Chillers Replacement	Proposal																	
	Recap	LLNL B132N Variable Air Control Replacement	Assessment																	
	50.5.2.2	SRS Bldg 247H HVAC R-22/ Bldg 248H CRAC Rep	In Progress																	
Execution	50.5.2.4.5.2	Pantex 12-86 Chiller Replacement	Bids Received	Execution																
	50.5.2.4.6.5	SNL CA 912 Air Handling Units Replacement	Bids Received			Execution														
	50.5.2.4.7.3	SRS Bldg 247H HVAC R-22/ Bldg 248H CRAC Rep	Design				Bidding			Execution										
	50.5.2.4.2.5	LLNL B695 DDC Replacements (deferred B696 d	Bids Received			Execution														
	50.5.2.4.4.7	NNSS 23-701/23-117 HVAC Replacement	Proposal					Bidding			Execution									
	50.3.207	LANL TA22-0093 HVAC Replacement (Recap)	In Progress	In Progress																
	50.5.2.4.4.6	NNSS Bldg 06-332 HVAC Replacement	In Progress	In Progress																
	50.5.2.4.4.5	NNSS Bldg 23-710 HVAC Replacement	In Progress	In Progress																
	50.5.2.4.2.4	LLNL B170 DDC and Chiller Replacement	In Progress	In Progress																
	50.5.2.4.6.5	SNL NM 6585 Chillers Replacement	In Progress	In Progress																
	50.5.2.4.6.6	SNL NM 960 Boilers Replacement	In Progress	In Progress																
	50.5.2.4.8.2	Y-12 9737 AHU301/302 Replacement	Suspended				Execution													

FY23 execution bidding, design projects and assessments planned to start Q3 FY22.

CHAMP program cadence focuses on scope, schedule, and budget with Assessments through Execution



Assessment POP = 2 months

Develop project criteria with site representatives
 Review and gather site-provided drawings and building information
 Inspect site conditions
 Develop engineering approach
 Produce conceptual drawings and calculations
 Develop preliminary cost estimate and schedule

Design POP = 4 months

Review prior assessment and site information
 Inspect site conditions
 Develop design drawings, calculations, and equipment selection
 Develop project estimate and construction schedule
 Conduct project reviews.

Construction POP 6 -12 months, scope dependent

Competitively bid construction among local bidders
 Provide competitive bids and reconciliation to LLNS
 Subcontract build effort
 Construction-manage lower-tier subcontractors
 Commission and turn-over project to site
 Deliver close-out project documentation to site
 Provide warranty administration services for 1 year post construction

Schedules and estimates and site integration begin during the earliest CHAMP work

Cooling and Heating Asset Management Program Project Task Orders Provide Subcontract Project Scope

- Task orders under an existing Master Task Agreement provide easy, quick access to design and construction capability for all NNSA sites
- One task order used per phase: Assessment – Design – Construction (includes bidding)
- Scope, schedule and budget (estimates) established at each phase

Cooling and Heating Asset Management Program
A-E Task Order: Assessment
Project: 2017 – LLNL – 003 B321A ACU-36

1.05 GOVERNMENT-FURNISHED EQUIPMENT

1.05	Government-Furnished Equipment	Coordinate with Participating Site
	Government-Furnished Materials	Coordinate with Participating Site

1.06 SUBCONTRACTOR-PROVIDED EQUIPMENT

1.06	Subcontractor-Purchased Equipment	Submit manufacturer subpart 3.05, "Dem Manufacturer certifi 00, subpart 3.06, "C Spare parts are req 1.08, "Spare Parts a
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1.07 PARTICIPATING SITE SPECIFIC CONDITIONS

1.07	Survey Data	Horizontal and vert section (1:30/60)
	Lock-out / Tag-out (LOTO)	The Participating Site Subcontractor is ne
	Electrical Power Service	Power is not avail with CHAMP Specie Power is available w 120 / 208 V 480 / 277 V
	Required Permits/Approvals	Soil Excavation, Con Concrete Penetratio Roof Access Blum Permit Building Permit Equipment Drain Pe Low Voltage Outage Participating Site A demotion
	Construction Management Space	Space is available to safety manager, inc connections. If no,
	Laydown Space	Space is available fo loading for convec

Cooling and Heating Asset Management Program
A-E Task Order: Assessment
Project: 2017 – LLNL – 003 B321A ACU-36

Structural – Wind Design	Ultimate Design Nominal Design Wind Exposure
Structural Design Loads	ASCE/SEI 7-101
Post-Installation Anchors	Only anchors at Council – Evalua
Mechanical HVAC Outdoor Design Temperatures	Summer: Dry/W Winter: Dry Bul For Location: 4
Mechanical HVAC Indoor Design Temperatures and Relative Humidity	Office/Summer Office/Winter: Lab: 69°F(21.1°) Relative Humidit Telecommunic Mechanical/Ele
Site Condenser Water (Low Conductivity Water)	Supply Temper Return Temper
Building Envelope	California Code
Available chilled water	45°F CHW/55
Available heating hot water	165°F HW/22
Occupancy	ASHRAE Stande
Infiltration	Use 1.5 cfm of without window
Ventilation Rates	Office/Confere Laboratorie: 4
Noise Criteria	Office/Confere Laboratorie: 4
Heating and Cooling Loads	As determined

1.04 DRAWING LIST

The A-E shall field verify all existing co

- Reference Drawings
Drawings listed below are for
- Construction Drawings
Drawings listed below are for

Drawing Number	Drawing
PLZ87-321-0006DC	Building

Cooling and Heating Asset Management Program
A-E Task Order: Assessment
Project: 2017 – LLNL – 003 B321A ACU-36

1.02 DESCRIPTION OF WORK

A. Introduction

Building 321A, a multiple-purpose primarily as a machine shop with Existing air-handling systems 322 Building 321A high bay. Each sy with chilled water and heating h Chilled water and heating hot wa from 13,360 cfm/20 hp (ACU-37) heating capacity vary with each Controls (ALC) system and variat potential.

B. Scope

ACU-37 through ACU-42 are eac with heating and chilled water to 15 or better) filters, and an Auto provide room temperature cont hours, no humidity control requi included in this scope. System a ductwork.

C. Subcontractor Tasks

- Visit the project location to interface with Site facilities st summary of findings and rec
- Develop an assessment plan Provide labor, materials, eq documents (unless otherwis ACU-37 through ACU-42 in
 - Replacement of the exist ductwork modifications existing building structu
 - Replace existing ductw lining; provide alternate
 - Replace the control syst system as needed. Veri new air-handling units;
 - Include air-balancing se

Cooling and Heating Asset Management Program
A-E Task Order: Assessment
Project: 2017 – LLNL – 003 B321A ACU-36

PART 1 - SCOPE OF WORK

1.01 GENERAL WORK SCOPE

Provide personnel, materials, and serv construction management services as of Work, Special Provisions, and Partic

1.01	Engineering Assessment	Preliminary enginee (See Statement of W HVAC Services, and
	Title II Services	Preliminary (50%) d Procurement & Con
	Title III Services	Final (90%) design C Construction for HV
	Project Management	All construction sup Procurement & Con
	Estimating	Project administrat & Construction for
	Construction Management	Construction manag Architectural/Engin
	Program Management	Program administrat Procurement & Con

Project and Site	Participating Site	Project
	Lawrence Liver	Building 322

Period of Performance	Completion
	Complete th

Cooling and Heating Asset Management Program
A-E Task Order: Assessment
Statement of Work
LLNL Building 321A ACU-36 through -42 Replacements
Revision 0



Rev 0: May 26, 2017

Approvals:

Tom Orr
NNSA NA-522 Cooling and Heating Asset Management Program
Program Manager

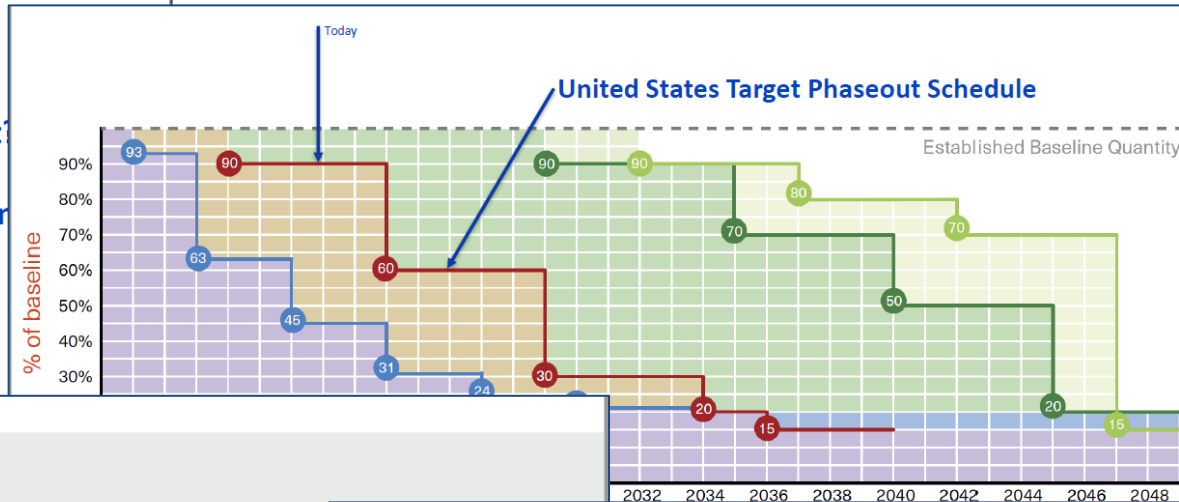
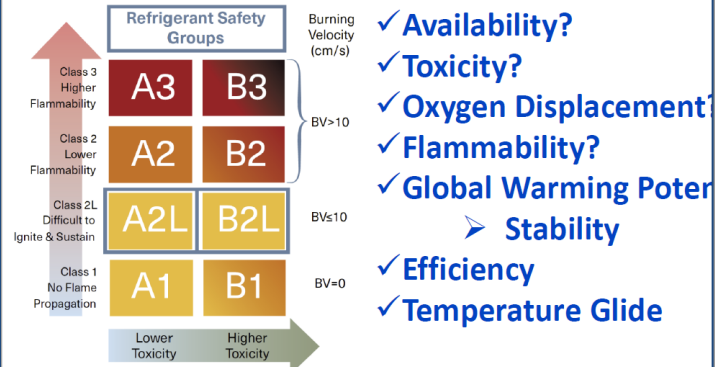
Tony Sy
NNSA Livermore Field Office
Federal Project Director

Barb Quivey
LLNL Cooling and Heating Asset Management Program
Program Manager

CHAMP drives implementation of climate change regulations through innovative equipment replacement

REFRIGERANT AVAILABILITY: Factors



Refrigerant Choices

This table compares various properties of both current and next-generation refrigerants. The efficiencies and capacity changes shown are based on the theoretical properties of the refrigerant alone, with all design variables held constant for objective comparison.

		Past		Transitional				Lower GWP			
		Low Pressure			Medium Pressure				High		
		R-123	R-1233zd	R-514A	R-134a	R-513A	R-1234ze	R-1234yf	R-22	R-410A	R-466A
Flammability	ASHRAE Class	1	1	1	1	2L	2L	1	1	1	
Toxicity ¹	ASHRAE Class	Higher (B)	Lower (A)	Higher (B)	Lower (A)	Lower (A)	Lower (A)	Lower (A)	Lower (A)	Lower (A)	
	OEL	50	800	320	1000	650	800	500	1000	1000	
Efficiency (COP)		8.95	8.85	8.91	8.47	8.28	8.45	8.17	8.48	7.99	8.14
Capacity Change		baseline	~35% gain	~5% loss	baseline	similar	~25% loss	~5% loss		baseline	~1% loss
GWP ²		79	1	2	1300	573	1	1	1760	1924	703
Atmospheric Life		1.3 years	26 days	22 days	13.4 years	5.9 years	16 days	11 days	11.9 years	17 years	5.6 years

¹None of the refrigerants shown in the table are considered "toxic" or "highly toxic" as defined by the IFC, UFC, NFPA 1 or OSHA regulations.
²GWP values reported are per the Fifth Assessment Report (AR5) of the IPCC (Intergovernmental Panel on Climate Change).

TRANE Job Name: G&M - Pantex Chillers Unit Tag: RTAF-150T
 Prepared For: Quantity: 1

Unit Overview

Chiller Model	RTAF air-cooled screw chiller
Unit Nominal Tonnage	150 nominal tons
Unit efficiency	High efficiency
Refrigeration Capacity	116.8 tons
Cooling Efficiency	8.326 EER (Btu/W-h)
IPLV,JP	16.55 EER (Btu/W-h)
NPLV,JP	14.96 EER (Btu/W-h)
Unit Voltage	460.V/60.Hz/3 phase
Refrigerant Type	Refrigerant charge R-513A
Agency Listing	UL listed
Pressure Vessel Code	ASME pressure vessel code
ASHRAE 90.1 Compliance	ASHRAE 90.1 - all versions up to 2016
Model Number	RTAF150EUAHXUA1N21X3NW NCCV1CAPBX'XAA1X'X'

Evaporator Information

Evaporator Application	Standard cooling
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Completed Execution SNL NM C962 Cooling Tower Replacement



Construction in progress; existing unit on left, new replacement on right.



New cooling towers(1500-tons) installed.

Completed Execution

B131-HB HVAC Replacement

Support Defense Program's capabilities for weapons modernization programs



Existing
RCHC-05 and ADE-01



New
RCHC-05 and ADE-01

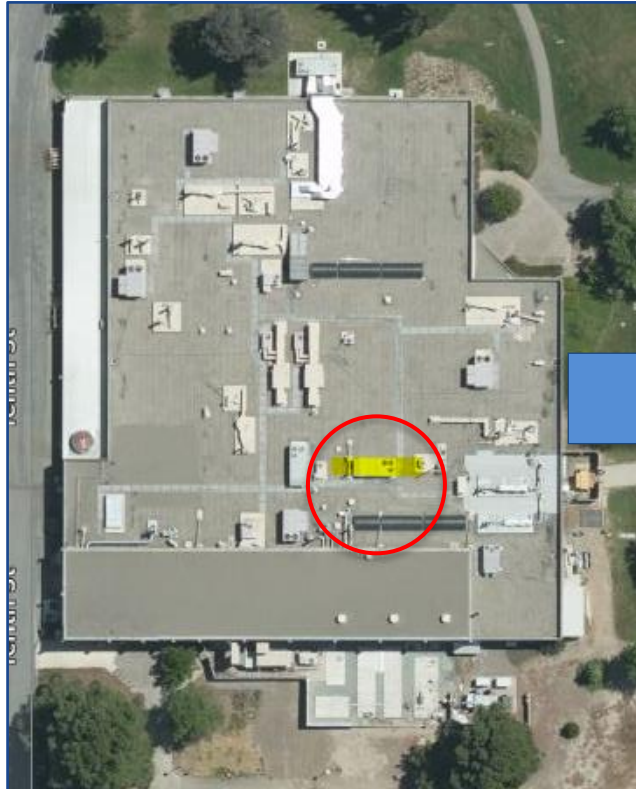


New
ACU-68 and ACU-01

Completed Execution

B298 ACU-08 Replacement

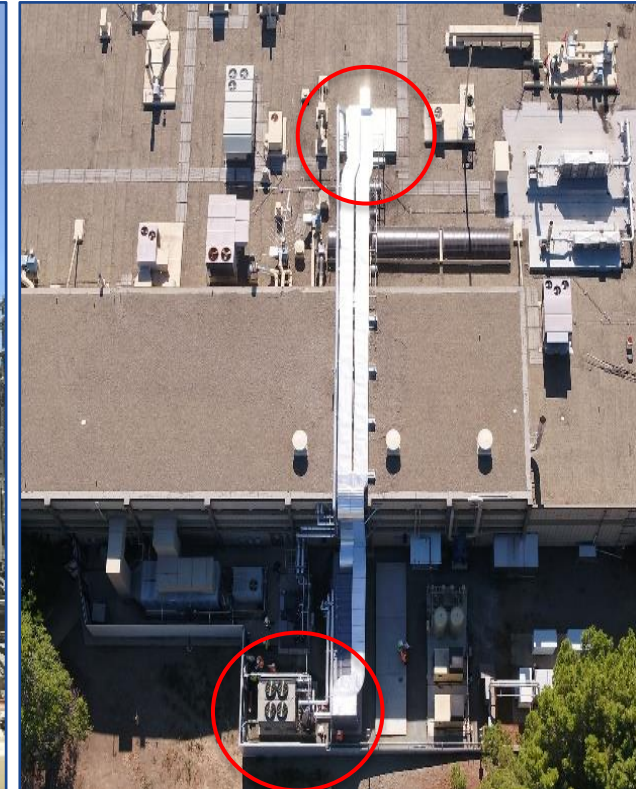
Supports NIF&Photon Science Target Fabrication



Existing failed rooftop ACU-08



New ACU-08 installed at ground level



New ACU-08, ductwork, chiller, and boiler

Completed Execution

B322 HVAC Replacement

Supports NNSA Enterprise Materials Processing



Added evaporative cooling, replaced ductwork, motor control center, and control system.

Completed Execution

LLNL B490 ACU16/17

HVAC replacement in support of NIF&PS Optics Processing



Annual CHAMP Champion award recognizes significant contributions to the CHAMP program

RECOGNITION OF

EXCELLENCE

PROUDLY PRESENTED TO

Sandia National Laboratory

ON BEHALF OF THE COOLING AND HEATING ASSET MANAGEMENT PROGRAM

For providing a supportive and efficient environment during a challenging year
for C962 Cooling Tower Replacement construction

James L. Winter	Digitally signed by James L. Winter Date: 2021.01.28 18:03:28 -05'00'	January 27, 2021	Tony Sy	Digitally signed by Tony Sy Date: 2021.01.28 15:11:10 -08'00'	January 27, 2021
Signature		Date	Signature		Date
	Jim Winter NA-522 AMP Program Manager			Tony Sy Livermore Field Office	





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B170 DDC Controls and Chiller Replacement

SCOPE

- One (1) New Chiller
- Four (4) Chilled Water Pumps
- One (1) Chiller Room Exhaust Fan
- Temporary Chiller (rental)
- DDC Controls for the following:
 - Chiller / Pumps
 - Boilers / Pumps
 - 5 ACU's
 - 78 Terminal Boxes
 - 3 Hot Water Reheat Coils
 - 10 Exhaust Fan Controls
 - 2 Ductless Split heat Pumps
 - 1 Computer Alarm Panel
 - BacNet Communications

B170 DDC Controls and Chiller Replacement

Photos (Before)

Existing McQuay Chiller being replaced



B170 DDC Controls and Chiller Replacement

Photos (Before)

Rooftop Pumps being replaced



B170 DDC Controls and Chiller Replacement

During Photos (July 2021)

Temporary Cooling for Data Center
(During shutdown of ACU-4 & 5)
OceanAire 5-Ton Portable Air Conditioners



Replace VAV (Variable Air Volume) terminal unit control valves, RHC (Reheat Coil) controllers, and room thermostat:



Temporary Chiller



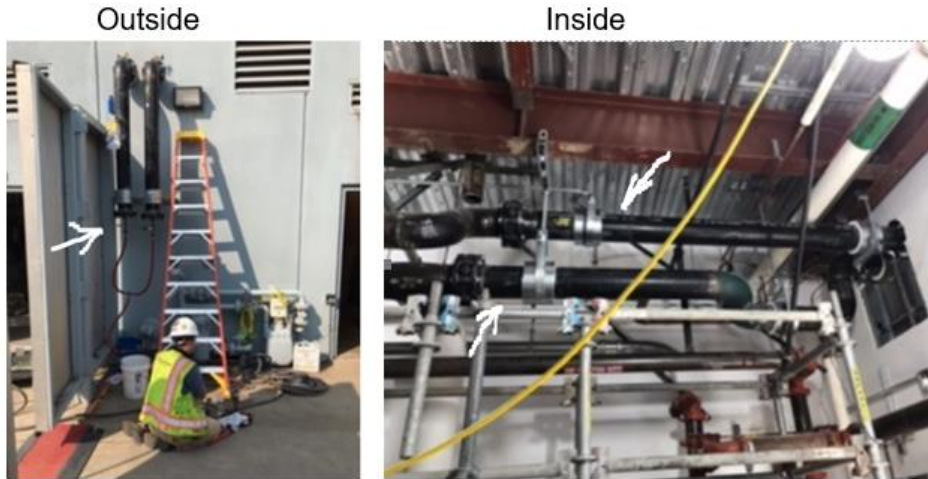
Mechanical Room



B170 DDC Controls and Chiller Replacement

During Photos (August 2021)

Hydrotest configuration



Old Chiller disconnected for removal



Temporary Chiller startup



New Trane Chiller received



B170 DDC Controls and Chiller Replacement

During Photos (September 2021)

Old Chiller disconnected for removal



New Chiller



Temporary Chiller



New Pumps



B170 DDC Controls and Chiller Replacement

During Photos (October Start-up New Trane Chiller)

