Energy Facilities Contractors Group
Project Management Working Group

Chemistry and Metallurgy Research Building Replacement (CMRR) Project
Los Alamos National Laboratory (LANL)
Construction Experience

Rick Holmes, PMP
CMRR Project Manager

July 21, 2009
CMRR Mission Need Statement

“The CMR Replacement (CMRR) Project seeks to relocate and consolidate mission critical CMR Capabilities at LANL to ensure continuous support of NNSA stockpile stewardship and management strategic objectives; these capabilities are necessary to support the current and directed stockpile work and campaign activities at LANL beyond 2010”
CMRR Overall Project Structure

**CMRR Project**
- Baseline under Development:
  - CMR Laboratory Replacement Capability
  - Nuclear “Hazard Category 2” Facility
  - 22,500 Net Square Feet Lab Space
  - Special Nuclear Material storage (6M tons)
  - Special Facility Equipment
  - Robust “Security Category 1”
- Status: In design

**Radiological Lab Utility Office Building (RLUOB)**
- Facility Performance Baseline ($164M TPC):
  - 19,500 NSF radiological lab space (<8.4g 239 Pu equivalent)
  - Centralized utilities/services for all CMRR facility elements
  - Office space for 350 CMRR workers
  - Consolidated training facility
  - Facility incident command; emergency response capabilities
  - Status: Nearing Construction Finish

**Building Shell**
- RLUOB Equipment and Installation (REI)
- Operational equipment to complete functionality of RLUOB
  - Status: CD 2/3 Ready

**Equipment**
- Status: CD 0 approved

**Nuclear Facility**
- Two closely interrelated facilities in differing phases of development

**CMR:** NNSA commitment to Decontaminate and Decommission upon CMRR completion.
(Execution in the (2018 - 202X timeframe)
Consolidated Plutonium Complex

- CMRR Environmental Impact Statement (EIS) –Record of Decision (ROD) February 2004
- CD-1 (entire project) approved on May 2005

RLUOB
- Building Construction Completion September 2009

REI
- CD 2/3 proposed July 2009

Nuclear Facility
- In design, consistent with Dec 2008 ROD on Complex Transformation Supplemental Programmatic EIS
  - The NPR will address: “The nuclear weapons complex required for implementing the US national and military strategy, including any plans to modernize or modify the complex.”
People Based Safety: 11730 Total Observations

- At Risk Behaviors:
  - Job Factors, 32%
  - PPE, 28%
  - Work Environment, 30%
  - Body Mechanics, 3%
  - Tools/Equipment, 7%

- Behavior Observations:
  - Safe, 98%
  - At risk, 2%
RLUOB

Centralized Utilities Building

Secured “limited” access side

Atrium

Uncleared Side

Floors

Level 3 – Training
Level 2 – Office Space
Level 1 – Office Space
Radiological labs
Basement Utilities (below grade)

Over million man-hours worked with no lost time accident
Leadership in Energy and Environmental Design (LEED) – Certified “Silver” green building
Nuclear Quality Assurance (NQA-1)
Subcontractor Management - RLUOB

Summary of problem and initial issues:

- **Problem**
  - Subcontractor did not perform as awarded in respect to both schedule and cost

- **Issues**
  - Project awarded and in existence when transition took place. Subcontractor Technical Representative (STR) program did not exist until JAN 07
  - RLUOB design/build Subcontractor is primarily a labor broker and construction management coordinator with no design capability that has failed in the CM role particularly in management of design
  - Contractor had NO NQA-1 experience
  - Lack of dedicated LANL engineering & construction staff early in project (contract award through 2006)
  - Contractor performance from initial engineering release through completion of concrete placement significantly impacted subsequent work activities
  - Lack of contractor experience in the integration of subcontractor’s work sequence impacted work progress
  - Contract disputes between the contractor and design hindered timely resolution of field issues
Subcontractor Management - RLUOB

Project actions taken:

- Developed MOU (Fall 08) with subcontractor which has resulted in better coordination, safer work place, and greater certainty of outcome
  - Developed joint teams to address critical areas
  - LANS provided additional design support
  - Contract Change for on-site design agency support.

- LANS provided area superintendents which resulted in better coordination of field work, safer work environment and quicker identification of restraints. Established the plan for tomorrow and “huddle-up” coordination meeting approaches.

- LANS modified LDs which has resulted in continuing subcontractor support for LANS increased involvement in managing the work effort – incentivized schedule.

- LANS now manages the schedule and coordination of the subcontractor’s day to day activities

Building “dry-in” milestone established to enable indoor winter work
### RLUOB Weekly Activity – 07/05/09

#### Remaining Major Bulk Commodity

<table>
<thead>
<tr>
<th>Bulk Commodity</th>
<th>UOM</th>
<th>(Incl. Mezz.)</th>
<th>1st Floor</th>
<th>2nd Floor</th>
<th>3rd Floor</th>
<th>4th Floor</th>
<th>Site</th>
<th>Totals</th>
<th>Total Installed</th>
<th>Total To-Go</th>
<th>Unit Rate</th>
<th>Remain Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduit/Raceway</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>411,761</td>
<td>275,678</td>
<td>136,083</td>
<td>0.14/LF</td>
<td>19,052</td>
</tr>
<tr>
<td>Wire</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>361,411</td>
<td>236,792</td>
<td>124,619</td>
<td>0.014/LF</td>
<td>1,787</td>
</tr>
<tr>
<td>Cable</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>152,689</td>
<td>122,312</td>
<td>30,377</td>
<td>0.034/LF</td>
<td>1,048</td>
</tr>
<tr>
<td>Power Terminations</td>
<td>EA</td>
<td>610</td>
<td>516</td>
<td>571</td>
<td>325</td>
<td>36</td>
<td></td>
<td>2,293</td>
<td>1,845</td>
<td>1,676</td>
<td>0.285/EA</td>
<td>478</td>
</tr>
<tr>
<td>Lighting Fixtures</td>
<td>EA</td>
<td>12,000</td>
<td>8,450</td>
<td>7,150</td>
<td>5,500</td>
<td>5,000</td>
<td>2,000</td>
<td>40,100</td>
<td>36,728</td>
<td></td>
<td>0.34/LF</td>
<td>-</td>
</tr>
<tr>
<td>Fire Protection Pipe</td>
<td>LF</td>
<td>5,305</td>
<td>13,800</td>
<td>31,850</td>
<td>26,752</td>
<td>16,823</td>
<td>0</td>
<td>94,530</td>
<td>0</td>
<td>94,530</td>
<td>0.06/SF</td>
<td>2,848</td>
</tr>
<tr>
<td>Interior Drywall</td>
<td>SF</td>
<td>227,159</td>
<td>199,188</td>
<td>189,403</td>
<td>138,058</td>
<td>91,475</td>
<td>0</td>
<td>845,283</td>
<td>739,866</td>
<td>105,397</td>
<td>0.04/SF</td>
<td>4,324</td>
</tr>
<tr>
<td>Accoustic Ceilings</td>
<td>SF</td>
<td>55,754</td>
<td>38,364</td>
<td>31,850</td>
<td>94,118</td>
<td>0</td>
<td></td>
<td>94,118</td>
<td>6,500</td>
<td>87,618</td>
<td>0.09/SF</td>
<td>7,886</td>
</tr>
<tr>
<td>NDC</td>
<td>SF</td>
<td>36660</td>
<td>17160</td>
<td>14040</td>
<td>5460</td>
<td>4680</td>
<td>0</td>
<td>78,000</td>
<td>76,758</td>
<td>1,242</td>
<td>1.3/LF</td>
<td>1,615</td>
</tr>
<tr>
<td>Stairs</td>
<td>EA</td>
<td>64</td>
<td>93</td>
<td>171</td>
<td>119</td>
<td>52</td>
<td>0</td>
<td>499</td>
<td>23</td>
<td>476</td>
<td>5/EA</td>
<td>2,380</td>
</tr>
<tr>
<td>Doors</td>
<td>EA</td>
<td>55,754</td>
<td>38,364</td>
<td>31,850</td>
<td>94,118</td>
<td>0</td>
<td></td>
<td>94,118</td>
<td>6,500</td>
<td>87,618</td>
<td>0.09/SF</td>
<td>7,886</td>
</tr>
<tr>
<td>Piping</td>
<td>LF</td>
<td>195000</td>
<td>180000</td>
<td>165000</td>
<td>105000</td>
<td>105000</td>
<td>0</td>
<td>750,000</td>
<td>720,948</td>
<td>29,052</td>
<td>0.08/LB</td>
<td>2,324</td>
</tr>
<tr>
<td>Architectural Coatings</td>
<td>SF</td>
<td>845,283</td>
<td>0</td>
<td>845,283</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>845,283</td>
<td>0</td>
<td>0.007</td>
<td>5,917</td>
</tr>
<tr>
<td>Elevators</td>
<td>EA</td>
<td>68,000</td>
<td>200</td>
<td>67,800</td>
<td>200</td>
<td>0</td>
<td></td>
<td>1284</td>
<td>1,460</td>
<td></td>
<td>0.17258125</td>
<td>1,460</td>
</tr>
<tr>
<td>Mav Conduit</td>
<td>LF</td>
<td>30,000</td>
<td>22,410</td>
<td>7,590</td>
<td>30,000</td>
<td>30,000</td>
<td>0</td>
<td>22,410</td>
<td>22,410</td>
<td>0</td>
<td>0.1333</td>
<td>1,012</td>
</tr>
<tr>
<td>Mav Wire</td>
<td>LF</td>
<td>80,000</td>
<td>0</td>
<td>80,000</td>
<td>0</td>
<td>0</td>
<td></td>
<td>80,000</td>
<td>0</td>
<td>80,000</td>
<td>0.01875</td>
<td>1,500</td>
</tr>
<tr>
<td>ICS Conduit</td>
<td>LF</td>
<td>25,330</td>
<td>0</td>
<td>25,330</td>
<td>0</td>
<td>0</td>
<td></td>
<td>25,330</td>
<td>0</td>
<td>25,330</td>
<td>0.142</td>
<td>3,597</td>
</tr>
<tr>
<td>ICS Wire</td>
<td>LF</td>
<td>63,262</td>
<td>0</td>
<td>63,262</td>
<td>0</td>
<td>0</td>
<td></td>
<td>63,262</td>
<td>0</td>
<td>63,262</td>
<td>0.0075</td>
<td>474</td>
</tr>
</tbody>
</table>

**Total To Go Hrs:** 66,626
Remaining Major Bulk Commodity

Electrical Wire / Cable
(Linear Feet)

Forecast Nov 08
Cumulative Installed Elec Wire/Cable
Re-estimate (June 2009)
Revised Actuals

70% Complete

Based on a re-estimate of installed quantities,
RLUOB Construction
RLUOB Construction – Utility Systems
CMRR Quality Assurance Program Adequacy, Implementation, Effectiveness

• Requirements are flowed into all subcontract general/special terms and conditions, exhibits, specifications:
  – 10CFR830, Subpart A, Quality Assurance Requirements
  – ASME/NQA-1, 2000, Quality Assurance Requirements for Nuclear Facility Applications
  – DOE Order 414.1C, Quality Assurance Requirements
  – LANL SD 330.0, Quality Assurance Program

• One program for all project phases (RLUOB, REI, and NF) – maximize use of project documentation (Plans and Procedures) to integrate work efforts

• Implementation/Effectiveness Reviewed:
  – “The QA Implementation Plan is a well-written and technically robust document. It provides linkage between the Quality Assurance Plan and specific Project implementation procedures.”
  – “The Project utilizes a matrix to verify that all applicable QA requirements of 10CFR 830, Subpart A, DOE Order 414.1C, and ASME-NQA-1-2000 have been addressed.”
  – “The current LANS Integrated Project Team, key personnel are well-qualified, experienced and committed to improved management performance.”

RLUOB Equipment Installation (REI) Performance Baseline – What happens next

Scope

Work elements include:
- Radioactive liquid waste tie-in
- Fuel oil storage tank
- Laboratory Floor build out and laboratory equipment
- Furniture
- Telecommunication services
- Radiation Protection Health Physics Equipment
- Physical security features (sensor field panels, card readers, installation tie-in, etc.)
- Parking for occupants

Cost

- TEC w/contingency - $152.9M
- OPC w/contingency - $46.5M
- TPC $199.4M

Schedule

- Conditional Beneficial Occupancy (staff move-in) 1QFY12
- Final Facility Systems and Systems readiness achieved 3QFY13

- Contingency ($41.6M, 26%) summary – confidence level at 85%
Summary RLUOB & REI Timeline

CD-0 Entire Project – July 2002
CD-1 Entire Project – May 2005
CD-2/3 RLUOB – October 2005

CD 2/3
RLUOB/REI Facility
"Complete/Operational"
(CD-4 REI)

REI & Procurement (start)

REI Equipment Installation & Commissioning (start)

Security Systems Install

Office Telecommunications Procure and Install

Enclosure Fabrication, Equipment & Deliver

Enclosure and Equipment Install

Laboratory Build-out

RLUOB/REI Facility "Complete/Operational" (CD-4 REI)

FY09
RLUOB Construction Complete
(All systems for RLUOB Building functions complete And tested)

FY10
REI Equipment Installation & Commissioning (start)

FY11
Facility Conditional Beneficial Occupancy (Office move-in)

FY12
REI Equipment Installation (Finish)

FY13
Closing Comments/Questions

- CMRR is multiple projects within a single congressional data sheet
- Single team established to provide continuity and increasing maturity of program elements, i.e. quality and safety
- Strong relationship between FPD, Fed team, and project team – collocation of people increases communication and coordination
- Initial understanding of subcontractor’s performance risks and continued response to subcontractor’s performance necessary success