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UCRL-CONF-215224

Project Management Actions Demolition of a Research Facility Building 431

W. L. Collins

September 9, 2005

Project Management Actions, Demolition of a Research Facility
Monterey, CA, United States
September 12, 2005 through September 15, 2005

Project Management Actions
Demolition of a Research Facility
Building 431

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Tri-Laboratory Engineering Conference
September 12-15, 2005

UCRL-ABS-

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Overview

- Facility disposition in support of strategic objectives
- Space Action Team (SAT) concepts and tools for D&D
- Mission need and goals
- Scope
- Management systems
- Acquisition strategy
- Cost and funding
- Schedule
- Risk management
- Environment, Safety & Health
- Field execution
- Summary

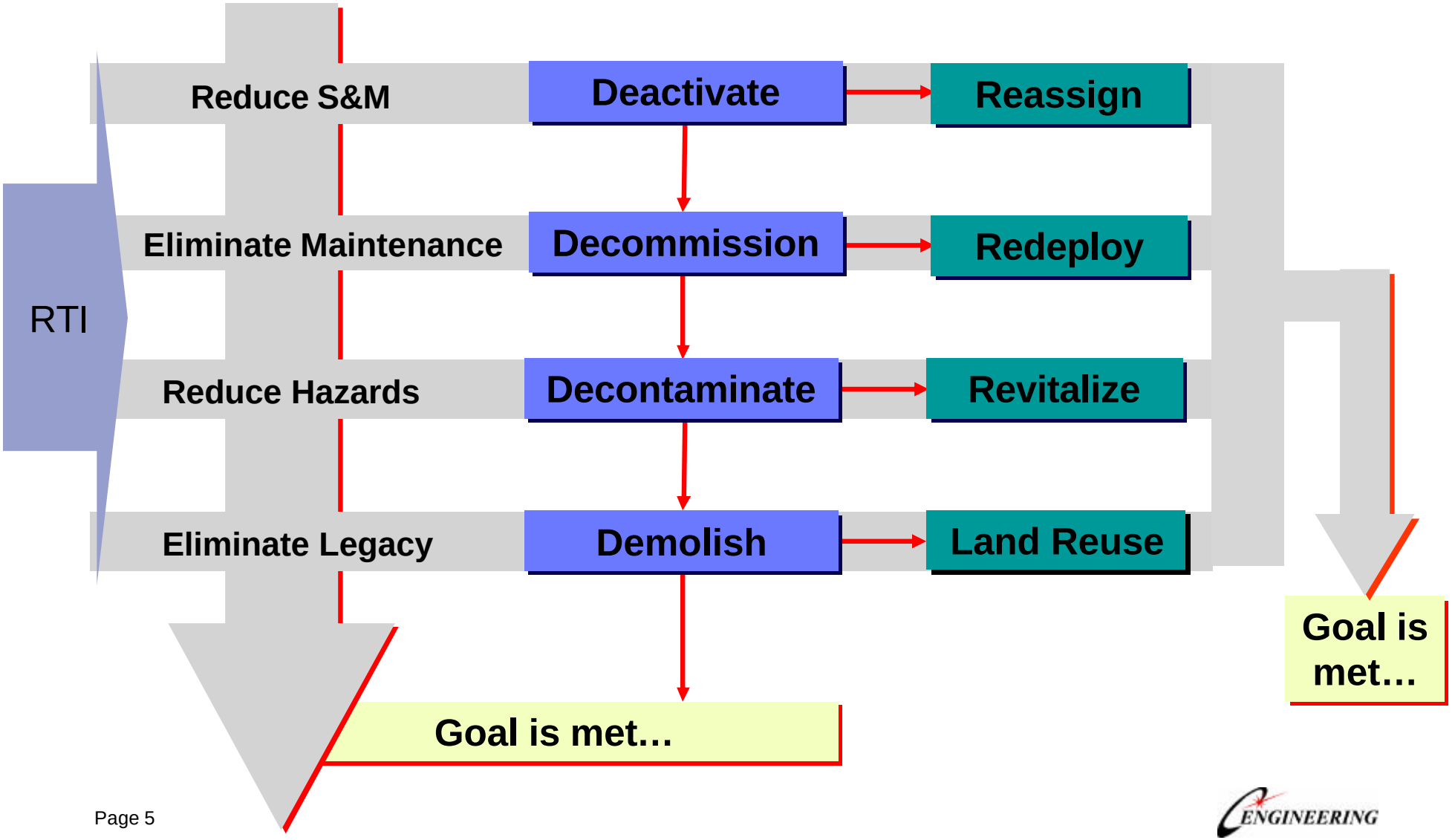

• Constructed early 50's
• Materials Test Accelerator program
• Mirror Fusion Testing Facility
• ETA-II, a non-nuclear facility, will remain operational

Facility disposition in support of strategic objectives

LLNL Operates One Integrated Program Responsible for both Institutional Surveillance & Maintenance and D&D

1. **Provide facility management for buildings that are surplus or excess to Program needs.**
   - **Manage the process to transition facilities from an operating condition into an inactive status**
2. **Plan and execute facility disposition in support of strategic objectives.**
   - **The Space Action Team (SAT) is an integrated multi-disciplinary, multi-directorate, cross-trained team with diverse talents and skills dedicated to execute facility projects**
3. **This integrated Facility and Disposition Management approach increases flexibility and value**
   - **Supports programs through relief of unneeded facilities**
   - **Provides flexibility in establishing project priorities**
   - **Utilizes S&M as a precursor to disposition**
   - **Establishes a balance to institutionally optimize utilization of surplus facilities**
   - **Schedule is maintained on discovery of previously unknown/ undocumented contaminants**
   - **Risk reduction**

The Laboratory's flexible approach to manage its disposition program begins with the end in mind



The Decommissioning basic D&D Elements

Decommissioning: An activity - The actions taken at the end of the life (or function) of a building to retire it from (or re-deploy back into) service with adequate regard for the health and safety of workers, the public, and protection of the environment.

Deactivation: An action - process of placing a building in a safe and stable condition by removing accessible hazardous and radioactive materials to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public, and the environment.

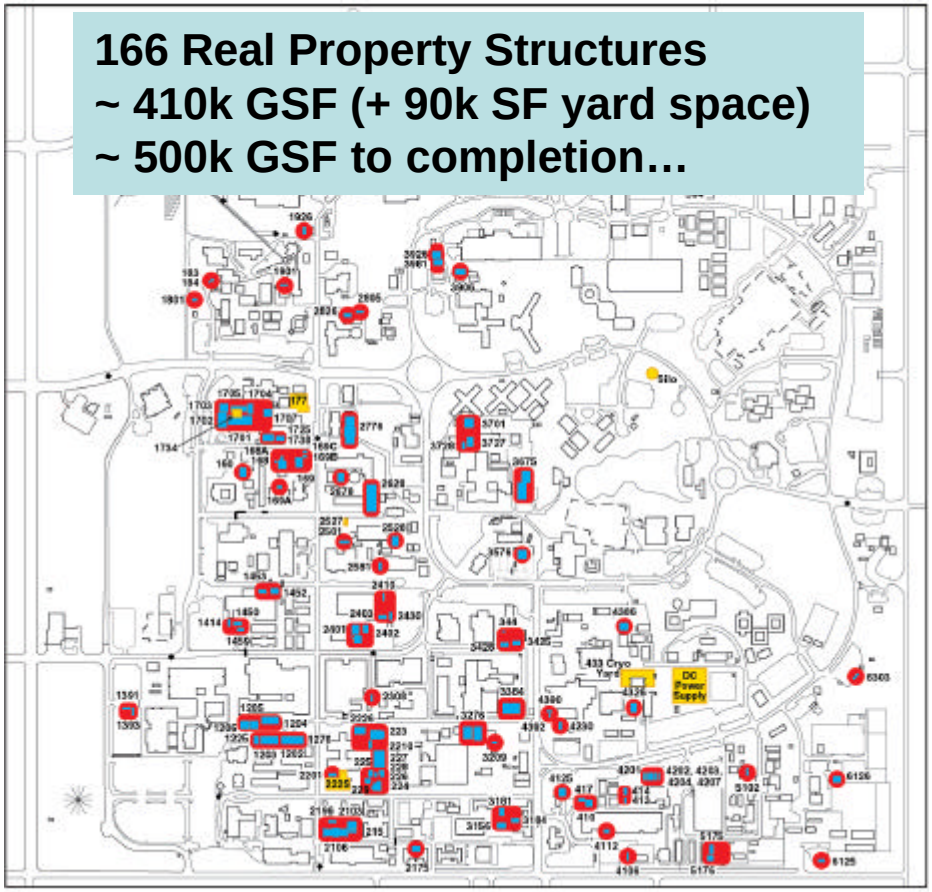
Decontamination: An action - The removal or reduction of residual radioactive and hazardous materials by mechanical, chemical, or other techniques to achieve a stated objective or end condition.

Demolition: An action - The removal of any structure, system, or component during the decommissioning phase.

Disposition: A goal - viewpoint, outlook, attitude, future,

Stabilizing & Removing Excess/Surplus Facilities is a Key Element to Strategic Facility Planning

166 Real Property Structures
~ 410k GSF (+ 90k SF yard space)
~ 500k GSF to completion…



Institution "owns" 11 buildings, ~350K SF excess/surplus space.

- **Single program responsibility supports "Dual Purpose" planning**
- **Provides a framework for decision making and priority setting**
- **Supports "End Point Planning" starting at initiation of transfer**
- **B431 is a good example of this efficiency**

Recycle stats:
Concrete – 22,000 Tons
Metal – 2,400 Tons
Freon – 1,300 lbs
Wood – 180 CY

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Space Action Team (SAT) concepts and tools for D&D

- **Standard project management principals**
  - **Scope and requirements**
  - **WBS and dictionary**
  - **Deliverables & Milestones**
  - **Resource loaded schedule and budget**
  - **Change control**
  - **Reviews**
  - **Integrated Project Team**
    - **ETA, Security, UTEL, Computer Facility, Archive Facility, ES&H Team, Plant Eng.**
  - **System engineering approach**
- **Environment, Safety & Health**
  - **Concerns are similar to development projects plus hidden energy sources, hazardous materials and structural instability**
  - **OSHA, BAAQMD, ISMS, Subcontractor H&S Plans**

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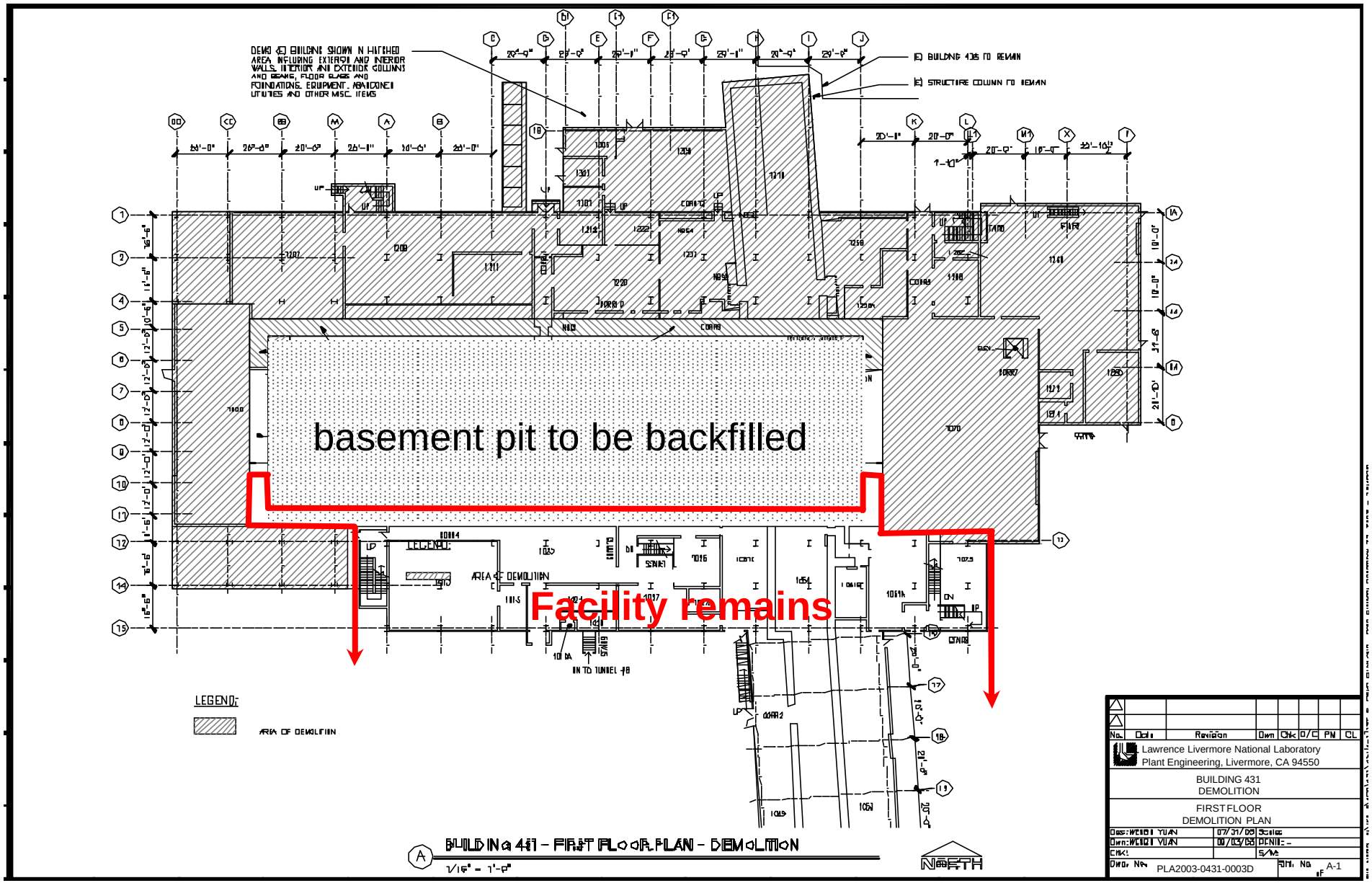

basement pit to be backfilled
Facility remains
LEGEND:
AREA OF DEMOLITION
BUILDING 431 - FIRST FLOOR PLAN - DEMOLITION
1/16" = 1'-0"
NORTH
Lawrence Livermore National Laboratory
Plant Engineering, Livermore, CA 94550
BUILDING 431
DEMOLITION
FIRST FLOOR
DEMOLITION PLAN
PLA2003-0431-0003D
A-1

Project Execution Plan

1. Mission Need and Project Goals
2. Technical Scope
3. Management Systems, Controls, and Planning
4. Acquisition Strategy
5. Stakeholder involvement
6. Cost Estimates and Funding
7. Risk and Contingency Management
8. Schedule
9. Environment, Safety, and Health

Mission Need and Project Goals

Mission Need

1. Supports NNSA Infrastructure Plan goal to “demolish excess facilities as early as possible”
2. Square footage banked allows continued application of advanced science and nuclear technology to the Nation’s defense
3. Helps in maintaining and enhancing the safety, security, and reliability of the weapons stockpile

Project Goals

1. Eliminate 93,763 (+/- 5%) gross square feet of excess facility space
2. Eliminate $4.3 million maintenance backlog
3. Eliminate $841K annual Surveillance & Maintenance costs
4. Improve security of LLNL’s Superblock area

Technical scope

- Isolation and reroute of utilities to minimize neighborhood impact
  - Temporary re-routing of 13.8 KV circuit and removal inside pit
  - Replace transformer and re-route main feeders to ETA
  - Reroute low voltage circuits feeding B439 and piping to B432
- Remove concrete shield block (70,000 lbs) Depleted Uranium target wall
- Abate Asbestos Containing Material (e.g., exterior siding, flooring, lead paint, thermal system insulation, etc.)
- Remove and dispose of interior and exterior equipment
- Demolish steel structure – 100’ hibay roof, 50T crane, 4 story structure
- Demolish North concrete shield wall and foundation to grade level
- Backfill pit
- Rebuild and weatherproof South roof and siding in areas affected by the project demo

Technical scope (cont.)

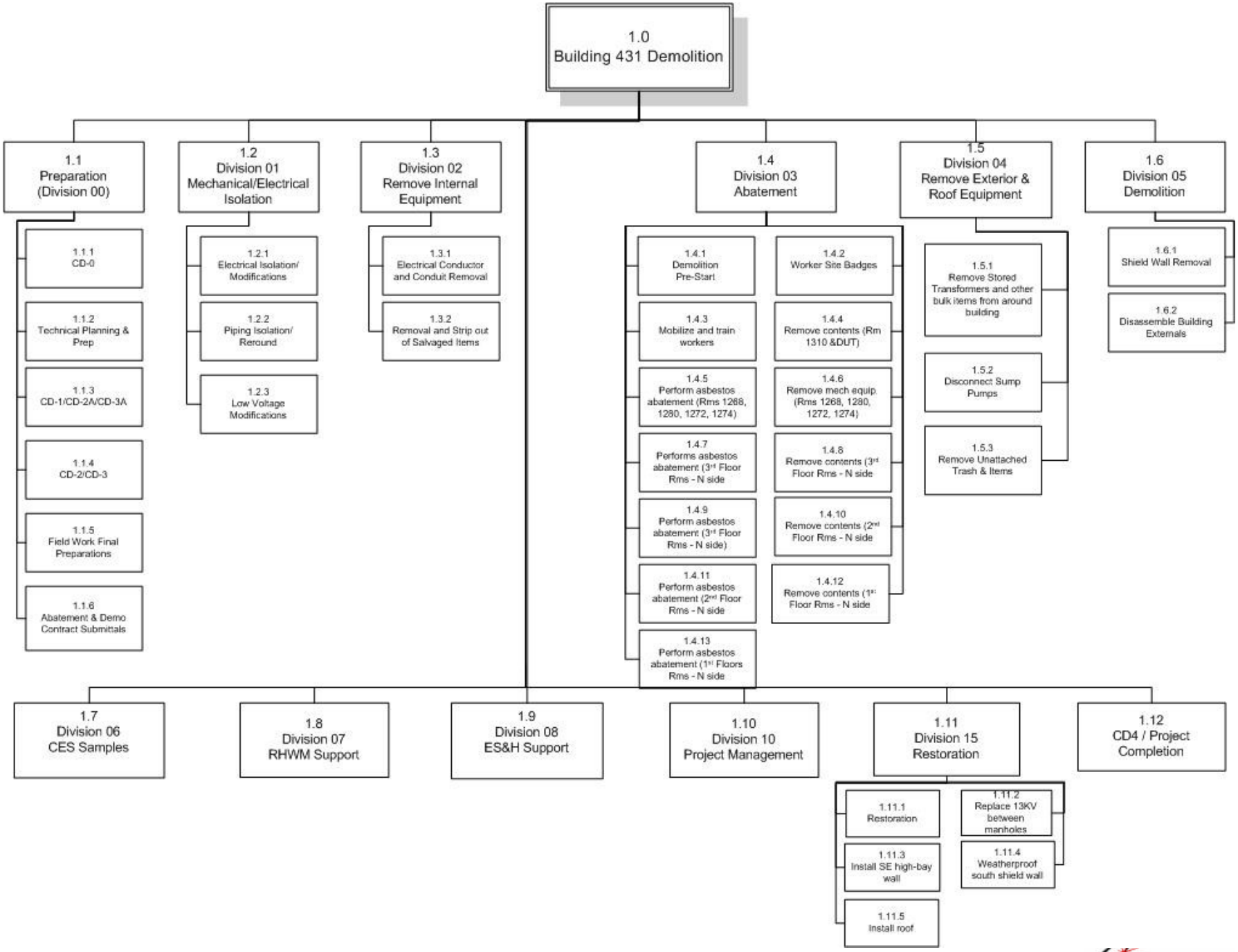
- Three alternatives were evaluated as part of the critical decision process:
  - Demolition as described above with the inclusion of the ETA II wing
  - Reuse of the facility rather than demolition at this time
  - Indefinitely deferring demolition
- SAT utilizes various review processes throughout the life of a project to ensure that conflicting objectives do not arise. They include:
  - LLNL Design Process
  - LLNL Environmental, Safety, and Health Manual
  - SAT Operational Safety Plan and Procedures
  - SAT Activity Level Quality Assurance Plan

Management systems, controls and planning

- **Once Authorized, the Integrated Project Team plans, manages and controls the project using a tailored approach of DOE Order 413.3 and the Project Management Manual, DOE M413.3-1.**
- **The LLNL Space Action Team has management responsibility for the day-to-day work execution**
- **Implementing documents**
  - **NNSA FIRP(1) Program Execution Plan**
  - **LLNL FIRP Program Management Plan**
  - **LLNL ISMS Implementation Plan**
  - **Building 431 Project Execution Plan**
- **Special project reviews**
  - **Independent Project Review at Critical Decision 0**
  - **External Independent Review at Critical Decision 1/2/3**
  - **Value Engineering "Red Team" led by a certified Project Management Professional (PMP)**
- **Resource loaded schedule used to track work scheduled and performed, and compared to actual costs to establish monthly earned value**
- **Monthly schedule and cost performance is tracked at Division Level (WBS Level 2) and reported externally to NNSA at Level 1**

CD - 0 Mission Need – Plan & Prep
CD - 1 Alternative Selection – "DEMOLITION"
CD - 2 Performance Baseline - "TPC $12M, Completion Nov. 2006"
CD - 3 Begin Field Demolition Activities
CD - 4 Project Completion and Closeout

(1) FIRP – Facilities & Infrastructure Recapitalization Program (managed with NNSA's "what and how" philosophy and the DOE Order 413.3, Program and Project Management for the Acquisition of Capital Assets).



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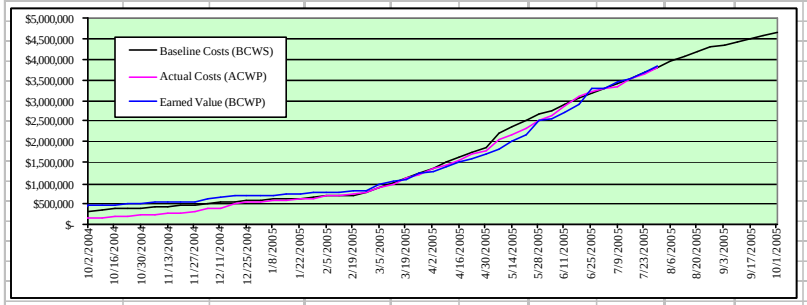
Project monthly performance reporting

Building 431

Data Thru	ACWP ($k)	BCWS ($k)	BCWP ($k)	CV ($k)	CV (%)	CPI	SV ($k)	SV (%)	SPI
7/30/2005	3,812	3,821	3,830	18	0.48%	1.005	9	0.25%	1.002
6/25/2005	3,218	3,183	3,284	66	2.01%	1.020	101	3.18%	1.032



Project Start: 8/4/03 | Project End: 7/21/06
Act. Proj. Start: 8/4/03 | Act. Proj. End:

Authorized Funding to Date ($k):	$ 8256
Project Budget w/ Contingency ($k):	$ 12038
Project Budget w/o Contingency ($k):	$ 9361
Estimate to Complete (ETC) ($k):	$ 5531
Remaining Budget ($k):	$ 8226
Variance at Completion ($k):	$ 2695
Contingency Budget ($k):	$ 2677
Contingency Remaining ($k):	$ 2677

Variance CPI/SPI Color Key	
	<.85
	.85-.90
	>.90

Cost Variance Detail: **1.00**

Cost variance satisfactory. Value represents slightly lower than expected costs for preparation and procurement activities.

Cost Variance Recovery Plan:

None required.

Schedule Variance Detail: **1.00**

Schedule variance satisfactory. Two week late finish of utility deactivation and late start of demolition contractor offset by CES sampling approximately $80k ahead of plan.

Schedule variance satisfactory. Two week late finish of utility deactivation and late start of demolition contractor offset by CES sampling approximately $80k ahead of plan.

Schedule Variance Recovery Plan:

None required.

Highlights and Lowlights

- LO/GSE utility deactivation contractor substantially complete at 96%; life safety systems and punchlist remaining in Aug and temp power removal in Sep.
- ETA major electrical outage for refeed of power successfully completed; ETA equipment back on-line.
- Continued site support activities: sampling of concrete for recycle and oil for waste disposal.
- Completed review of demolition subcontract (Evans Brothers Inc.) submitals; resubmit some items in response to comments.
- Abatement/Demo NTP granted July 21; EBI/Bayview mobilized July 28 and began abatement preparations.
- Abatement activities were started in July on removal of Galbestos siding. [Abatement Start Milestone]
- Two transforms with PCB oil need processed as hazardous waste; other oil needs pumped by approved waste hauler.
- Superblock security camera installation complete and cameras deactivated and removed from B431.
- NNSA granted approval for 48 property items to be disposed by the demo subcontractor; tags have been removed.
- Specs and procurement package for roof/wall restoration being delayed to review high construction estimate and evaluate alternate go-forward plan; no impact on critical path.
- Perspective of Roof Restoration completed.
- B431 SCR (describing two segments) has been signed by the AB group and PAT ADFM, then submitted to LSO for formal review.
- Developed Critical Lift Plan for removal of Depleted Uranium Shield Block. Final approval expected in September to execute work.

Safety Minute

- Deactivation of all mechanical and electrical systems complete (except Life Safety) in preparation for demo.
- Some final color coding still needs worked by H&ST and Construction Inspector.

Key Milestones

Utility Deactivation Start	Jan-05	✓
Award Demolition Contract Start	May-05	✓
Abatement Start	Jul-05	✓
Demolition Start	Sep-05	
CD-4 Project Complete	Nov-06	

Overall Summary

- Completed ETA shutdown, installation of new transformer/switchgear and restart of electrical systems.
- Demolition subcontractor mobilized and abatement activities started.

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NNSA Livermore Site Office (LSO) oversight

- Annual LLNL Appraisal
- Semi-Annual FIRP & RTBF [???] Reviews by HQ
- Quarterly Line Item Project Briefings to NA-10/NA-11
- Monthly Joint LSO/LLNL Project Briefings
- Weekly Project Progress Meetings by LSO PDs
- Weekly Project Site Walkthroughs by LSO PDs
- LSO Senior Management Conduct Periodic Operational Awareness Reviews
- LSO Maintenance Manager Conducts Periodic Site Inspections to Confirm LLNL Maintenance Implementation Plan

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Acquisition Strategy

- The acquisition strategy finalized after CD-0 and submitted per DOE M 413.3-1
- The acquisition strategy is a combination of LLNL staff and competitive fixed-price procurements awarded by the University of California. Assumptions:
  - LLNL staff handles preparatory work, sampling, hazardous waste disposal, ES&H oversight and PM
  - LLNL Labor-only contractor (Davis-Bacon) performs utility isolation and re-routing
  - Design-demolition ("Design / Unbuild") subcontract awarded hazards abatement, demolition, backfill, and site grading. Experience & safety record essential.
  - Design-build subcontract will be awarded for weatherproofing and repair/rebuild of the remaining roofing and siding.
- Detailed demolition specifications and detailed utility deactivation drawings and procedures prepared
- Design-demo subcontract strategy resulted in 4 different demolition approaches – best value bid uses method not originally considered
- Best value evaluation: license & certifications, security, vibration, traffic, salvage value, schedule, safety history (ERR & TRR), shield wall demo, similar projects, references and price.

Stakeholder involvement

- ETA-II, a non-nuclear facility, will remain operational and continue experiments
- Computations server facility and Archive records management facility B439
- High voltage routing through existing building
- Machine shop services facility B432
- Operational Security Plan due to the proximity to high security area
  - Vehicle and personnel access
  - Staging of material and equipment
  - Restrictions on crane size, placement, accessibility and relocation
  - Security related work stoppages may impact the project
- ES&H Teams
- Representative personnel are on the project review team

Cost estimate and funding

- The estimated cost range for the project ($9.5M to $12.0M) based on:
  - Subject matter expert input
  - Parametric estimates from similar projects
  - Order of magnitude quantities
- A detailed estimate was prepared once the final alternative was selected and authorization received to progress to the next critical decision.
- The high range case was estimated assuming the following:
  - ETA II sustains no operational shutdowns during D&D
  - Siding and Steel require disassembly due to ACM
  - Saw cut & rig out North shield wall, leave South shield wall
  - Conservative design of roof structure over remaining wing section requires partial ACM abatement on remaining structure
- Costs for the low range case were estimated assuming the following:
  - ETA II operations curtailed during D&D
  - Siding and Steel require disassembly due to ACM
  - Aggressive demolition used on North shield wall, leave South shield wall
  - Simpler design of new roof structure without ACM abatement on remaining structure

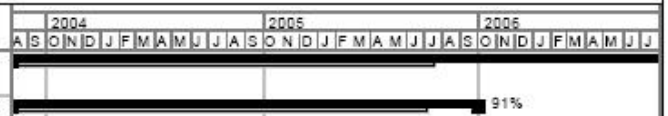
Cost Estimates

WBS ELEMENT	Low Range ($K)	High Range ($K)	Current Baseline ($K)
1.1 Preparation	50	50	671
1.2 Mech./Elect. Isolation	1,442	1,442	2,401
1.3 Remove Internal Equipment	55	55	40
1.4 Abatement	750	985	195
1.5 Remove External Equipment	28	28	154
1.6 Demolition	2,416	3,961	2,527
1.7 CES Samples	50	50	253
1.8 WMD Support	112	112	111
1.9 ES&H Support	339	339	568
1.10 Project Management	807	807	941
1.11 Restoration	950	950	1,022
1.12 CD4/Project Completion			40
Contingency (30%)	2,100	2,633	2,677
Escalation	420	527	438
ESTIMATED TOTAL PROJECT COST	$9,500	$12,000	$12,038

High Level Schedule

BUILDING 431 DEMOLITION AND RESTORATION PROJECT

ID	WBS	Task Name	% Complete	BCWP	BCWS	Baseline Cost
1	1	Building 431 Project	48%	$3,631,499.93	$4,189,772.06	$9,361,233.31
2	1.1	Divison 00 - Preparation	91%	$635,969.73	$668,610.56	$670,579.31
152	1.2	Division 01 - Mechanical/Electrical Isolation	60%	$1,804,291.84	$2,249,389.62	$2,401,059.00
176	1.3	Division 02 - Remove Internal Equipment	0%	$0.00	$13,636.36	$40,000.00
180	1.4	Division 03 - Abatement	0%	$0.00	$36,340.81	$195,000.00
185	1.5	Division 04 - Remove Exterior & Roof Equipme	23%	$41,689.74	$60,550.65	$154,000.00
194	1.6	Division 05 - Demolition	0%	$108,000.00	$143,356.48	$2,526,988.00
212	1.7	Division 06 - CES Samples	98%	$248,114.00	$121,819.58	$253,214.00
215	1.8	Division 07 - RHWM Support	51%	$34,579.08	$40,767.77	$110,700.00
218	1.9	Division 08 - ES&H Support	51%	$248,989.71	$274,952.25	$568,329.00
221	1.10	Division 10 - Project Management	51%	$404,049.32	$447,742.46	$941,475.00
224	1.11	Division 15 - Restoration	0%	$0.00	$0.00	$1,022,327.00
230	1.12	CD4/Project Completion	0%	$0.00	$0.00	$39,562.00
233	1.13	Project Escalation	24%	$105,816.51	$132,605.50	$436,000.00



Project: B-431 DDSun 8/21/05 Project
Date: Sun 8/21/05

Critical
Critical Split
Critical Progress
Task
Split
Task Progress
Baseline
Baseline Split
Baseline Milestone
Milestone
Summary Progress
Summary
Project Summary
External Tasks
External Milestone
Deadline

Page 1

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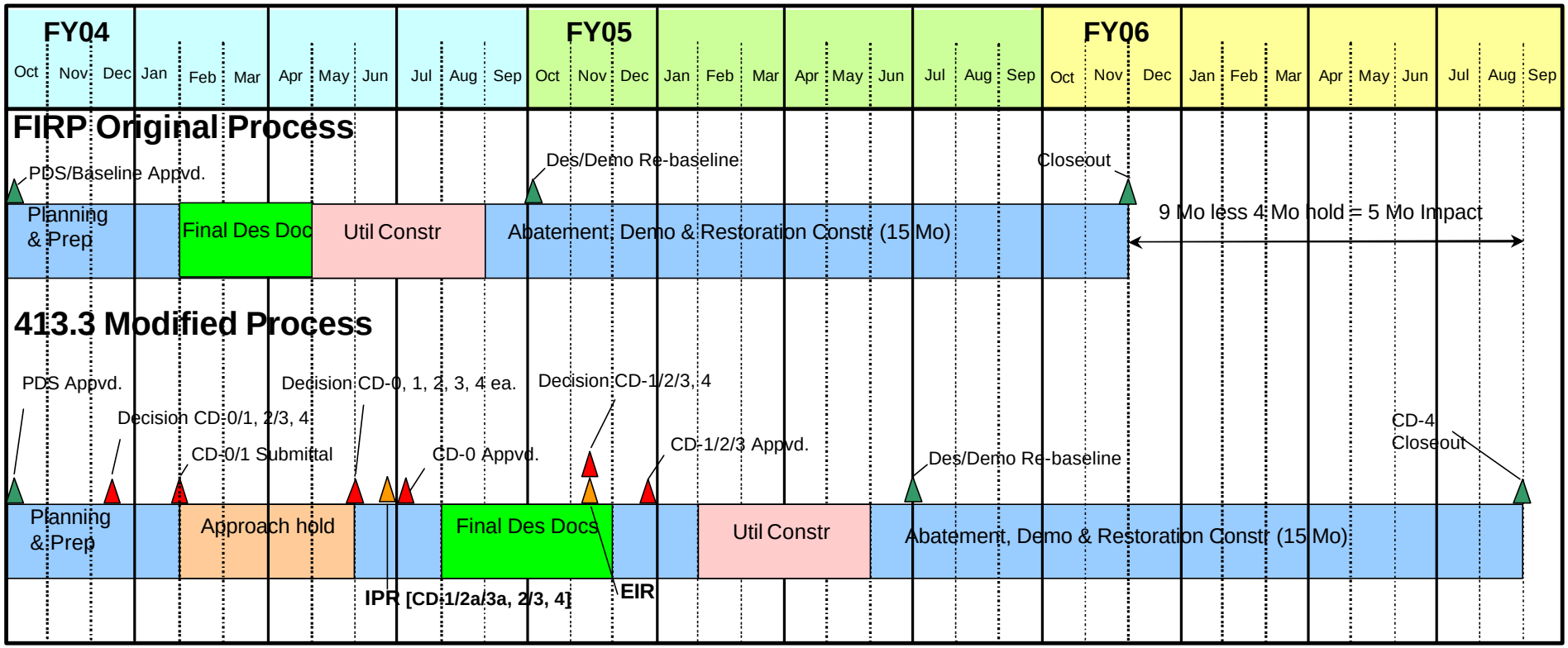
FIRP Disposition Process vs DOE M 413.3-3 Graded Approach



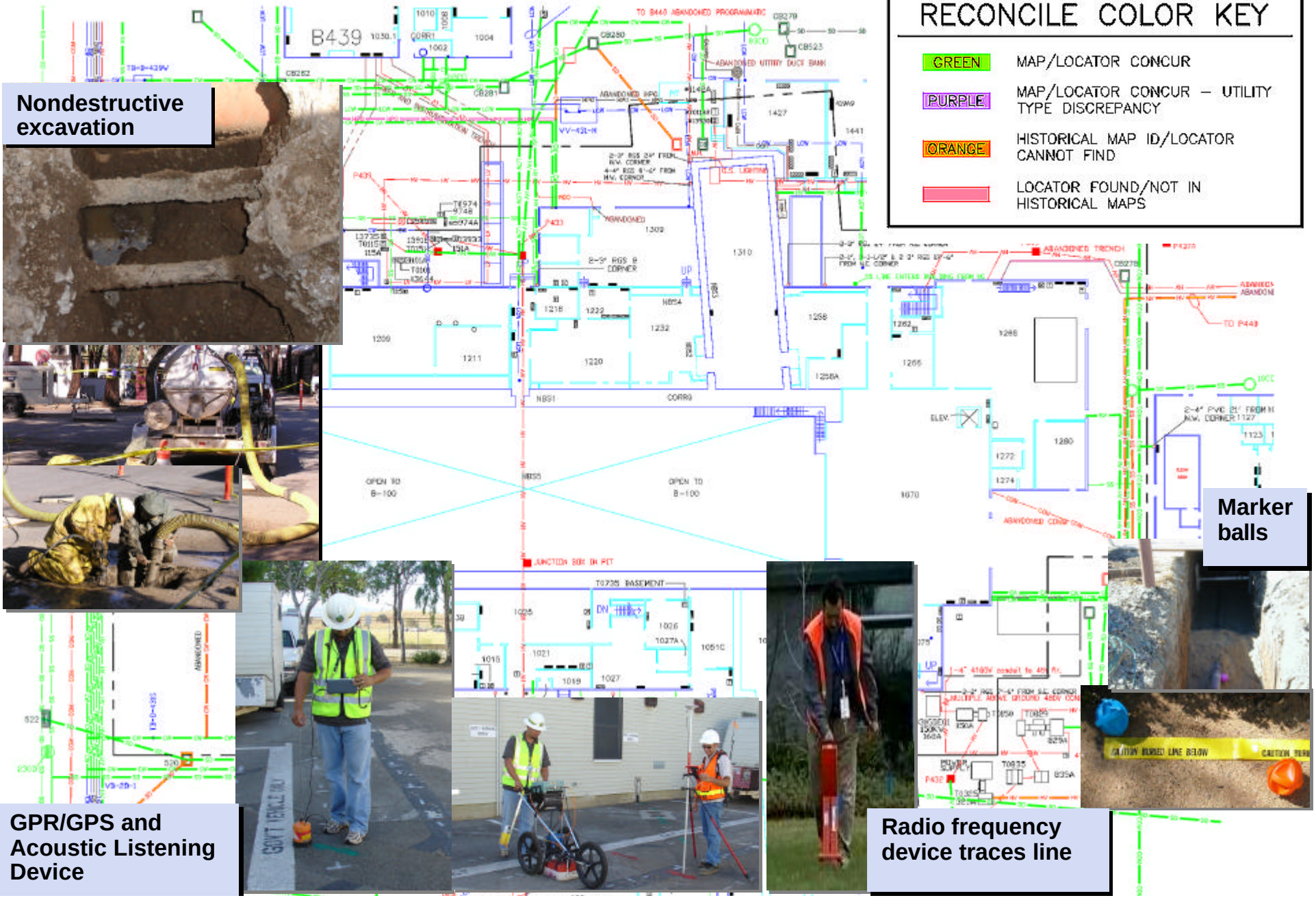
Risk and Contingency Management

- **Risk Management Plan developed, risk assessment completed and a risk mitigation strategy prepared.**
- **The activities with the highest risks are Electrical & Mechanical Isolation, shield wall removal and Renovation.**
- **The high risk factors include:**
  - **Encountering stored energy**
  - **ETA II sensitivity to vibration**
  - **Difficulty with demolition of the shield wall due to its size**
  - **Schedule uncertainty due to uniqueness of shield wall demolition, potential weather delays, and impacts to nearby operational facilities from the required outages**

Environmental, Safety and Health

- Environmental, Safety and Health incorporated into the planning
- Historical operational background reviews and surveys to determine likely hazards and contamination levels
- NEPA review performed and the project granted a categorically exclusion
- NHPA review performed and the building determined to be of no historical significance to the State of California.
- Confirmatory sampling performed for ACM in order to better bound the scope of abatement
- Integrated Safety Management System – DOE Seven Guiding Principles and Five Core Functions
  - Integrated Worksheet (IWS) defining scope, hazards, controls, training and authorizing the work
  - Subcontractor Site specific Health & Safety Plan and Corporate Injury & Illness Prevention Program

Utility safety is best served by integrating historical information and active measurements



LLNL Space Action Team - Color Coding Best Practice

Problem: Decommissioning systems potentially containing stored energy (gas, power, etc) or other contaminants is a communication challenge. Tracking materials from sample through resolution, protective of workers and the environment requires constant verification and documentation to properly control from decommissioning through release.

Solution: SAT utilizes a color code to identify the status of all Structures, Sub-systems, and Components (SSCs) during decommissioning through disposition.

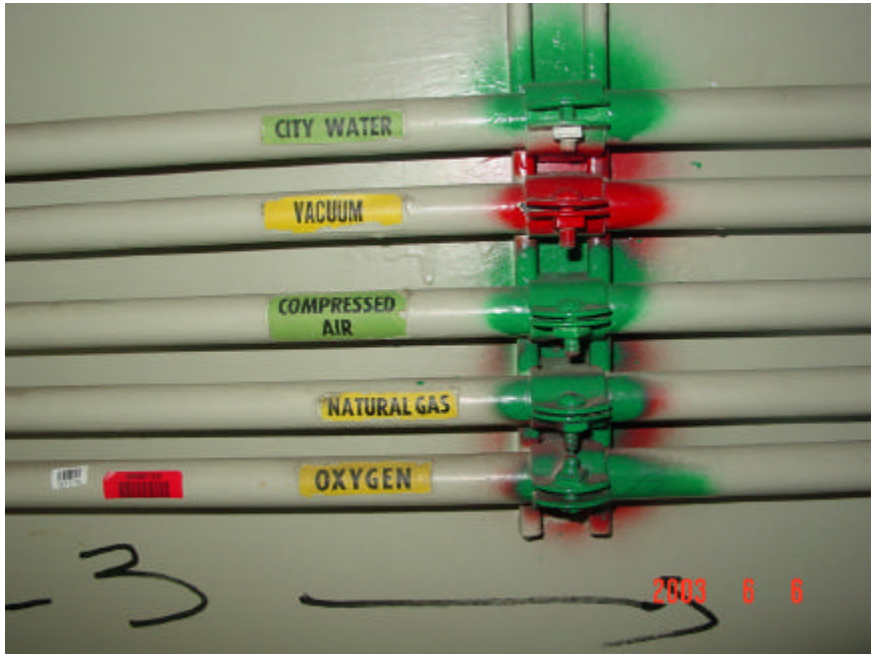
Green: Free release no issue.

Red: Applied when a known hazard exists on or inside a SSC.

Yellow: Applied to SSCs denoting caution.

Blue: Applied indicating controlled disposal to the Municipal Landfill

Black: Editorials and instructions



Field Execution

- **Completed**
  - **Deactivation and reroute of utilities**
  - **Interior abatement**
  - **Start of demolition**

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Field Execution

- **Working**
  - — **Abatement of Galbestos siding**
  - — **Structural demo**
  - — **Specs for Restoration design-build**

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Project Plan Summary

- **The Demolition of B431 is required to achieve the mission of LLNL and the NNSA FIRP objectives by:**
  1. **Supporting the NNSA Infrastructure Plan goal to "demolish excess facilities as early as possible"**
  2. **Banking square footage that allows continued application of advanced science and nuclear technology to the Nation's defense**
  3. **Helping maintain and enhance the safety, security, and reliability of the weapons stockpile**
- **A significant effort has been put into the demolition concept in order to ensure that it is well thought out and represents best-value to the government for the money**

The integrated project team is executing the scope

in accordance with DOE and LLNL requirements.