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Title:	~~High Performance Sustainable Buildings~~ HPSB Re-commissioning at LANL (RCx)
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Abstract:

Retro-commissioning (RCx) provides the opportunity to go beyond the standardized maintenance and energy management procedures that appear as facility documentation; RCx provides a systematic approach for discovering and resolving chronic building concerns. Typical issues that are uncovered during the RCx process pivot around ineffective building control systems, poor monitoring of energy consumption, repetitive repairs, and inadequate maintenance.

Lessons learned in RCx demonstrate that there are many low-cost/no-cost repairs and adjustments that can be implemented to restore building performance, occupant comfort and energy optimization.

HPSB Re-Commissioning (RCx) at LANL

TA 03-1411 Occupational Medical Building

The HPSB (High Performance Sustainable Buildings) program at LANL has targeted 5 buildings for re-commissioning in FY2011.

The goal of the program is to reduce energy consumption and qualify for LEED rating.

With existing buildings, the key to achieve LEED certification is with optimizing facility operation and maintenance through re-commissioning.

TA 03-1411 Occupational Medical Building

The five buildings selected for the HPSB program in FY2011 are:

- *03-1411 Occupational Medical Building*
- *03-1409 Security Systems Support Facility*
- *03-1400 NSSB*
- *60-0175 Communication Ops Building*
- *63-0111 Office Building*

TA 03-1411 Occupational Medical Building

TA 03-1411 Occupational Medical Building

Original construction: 2003

Type: Single story medical facility

Size: 14,250 ft^2

HVAC: (1) 55 ton air handling unit
DX cooling, hot water heating

Rated: 22,000 cfm supply
18,800 cfm exhaust

TA 03-1411 Occupational Medical Building

With existing buildings, the most effective energy reduction measures are achieved with lighting and HVAC operational improvements.

Re-lamping, de-lamping, occupancy controls and *daylight* analysis activities were performed under a separate part of the HPSB program.

The bulk of the remaining energy saving opportunities are based on the re-commissioning role in operation and control of the HVAC and air distribution system.

TA 03-1411 Occupational Medical Building

Major components of the 03-1411 HVAC system include:

- TRANE Air Handling Unit
  - Supply and Exhaust fan VFDs
  - Economizer w/Fresh Air Damper
- Steam/water heat exchanger
- 34 VAV Terminals each with:
  - Individual thermostatic control
  - Damper regulated air volume
  - Hot water reheat with 3-way valve

TA 03-1411 Occupational Medical Building

AHU evaluation was conducted by performing system shutdown and entering each compartment to review components.

Random VAV terminals were located by removing ceiling panels and using system drawings as a guideline.

Thermostats were verified using a calibrated temperature sensor.

Airflow volumes were measured using a flow hood at supply and return air diffusers.

TA 03-1411 Occupational Medical Building

AHU Concerns

Exhaust Fan Mounting

Not secured at base – ineffective discharge through "relief air" louvers

Damper Actuator and Linkage

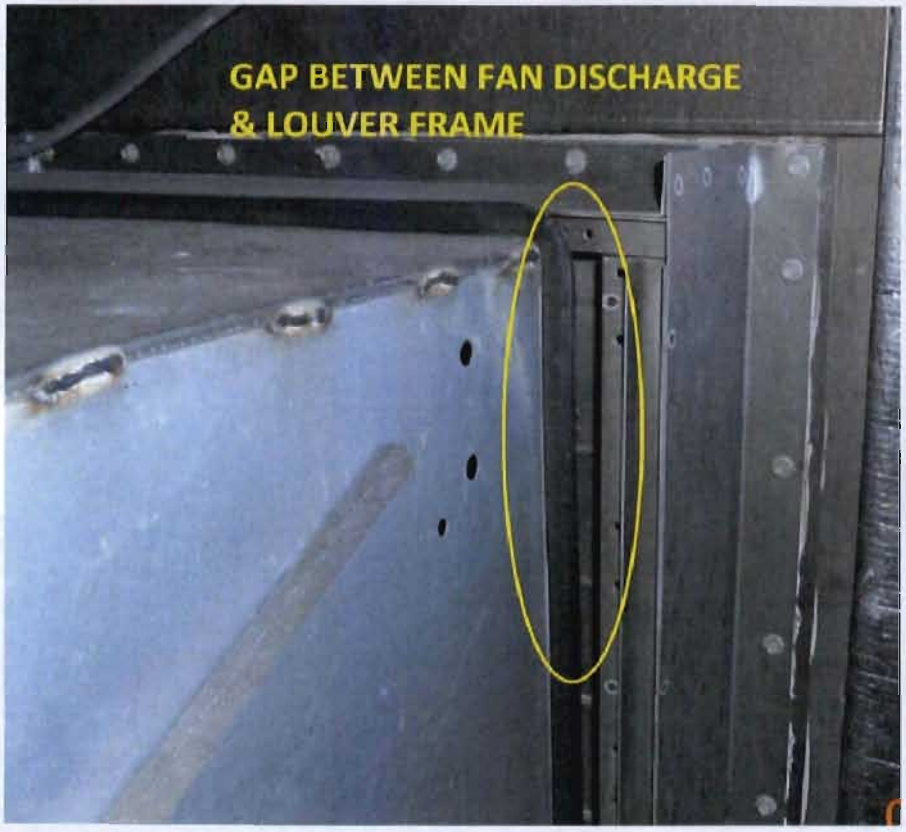
Poor stroke adjustment and alignment

Filters

Automatic alarm reset doesn't get response

Installation method

TA 03-1411 Occupational Medical Building



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Control System Concerns

- Limited interface between TRANE control package and Building Automation System
- System remains in "Occupied" mode 24/7
  - No night / weekend setback
- Redundant sensors do not have equal values

TA 03-1411 Occupational Medical Building

System Air Balance Concerns

- Inappropriate supply diffusers used for high-bay ceiling
- Common return air plenum results in uncontrolled airflow and poor distribution
- Total supply air volume averages 20% lower than design

TA 03-1411 Occupational Medical Building

In addition to concerns with the facility HVAC, the following building issues were revealed:

No access to exhaust fans on roof

Double doors at entry vestibules not working

Excessively chilled supply air (45°F) results in drips and condensate stains on ceiling tiles

TA 03-1411 Occupational Medical Building

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Follow-up Activities Include

- Mechanical repairs for air handler
- System communication and controls re-work
- Change supply and return air diffusers, as required
- Access fans on roof and repair as required
- Re-balance airflow distribution, validate upgraded sequence of operations
- Repair/replace entry vestibule automatic doors
- Develop O&M hand-over manual