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ENVIRONMENT SAFETY & HEALTH

Sandia National Laboratories Building 1090 Laboratory Modifications

SAND REPORT: SAND2019-XXXX

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Radiation Protection Sample Diagnostics

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ASP

RRMC 2019

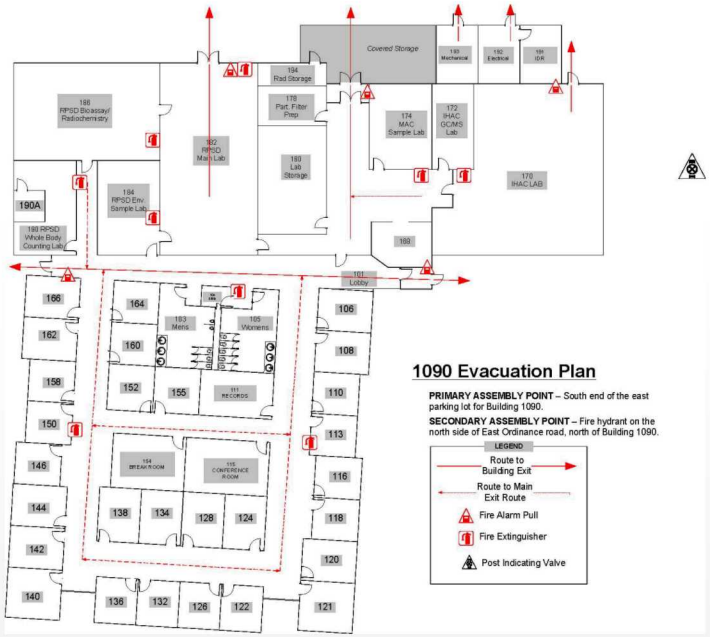
Radiation Protection Sample Diagnostics

Mission: Laboratory Analysis Services in Support of Worker Safety and Health

- Liquid Scintillation Counting
- Gas Proportional Counting
- Gamma spectroscopy
- Whole Body Counting
- Alpha spectroscopy
- ICP-MS, ICP-OES
- Flame Atomic Absorption
- Sample preparation facilities

Building Design & Modification History

- Rush to re-locate to new facility (2004)
- Design and build—same contractor
- No prior experience with lab construction
  - Undersized, stainless steel ductwork.
  - Positive air pressure differential from lab spaces to office spaces.
  - Emergency evac plan—traffic flow toward the hazard.
- Energy audit (2009)—High power consumption due to undersized ductwork
  - New variable frequency drive installed to serve exhaust fans.
  - New stainless steel ductwork installed (correct size).
  - Energy use significantly reduced.



Building Design & Modification History

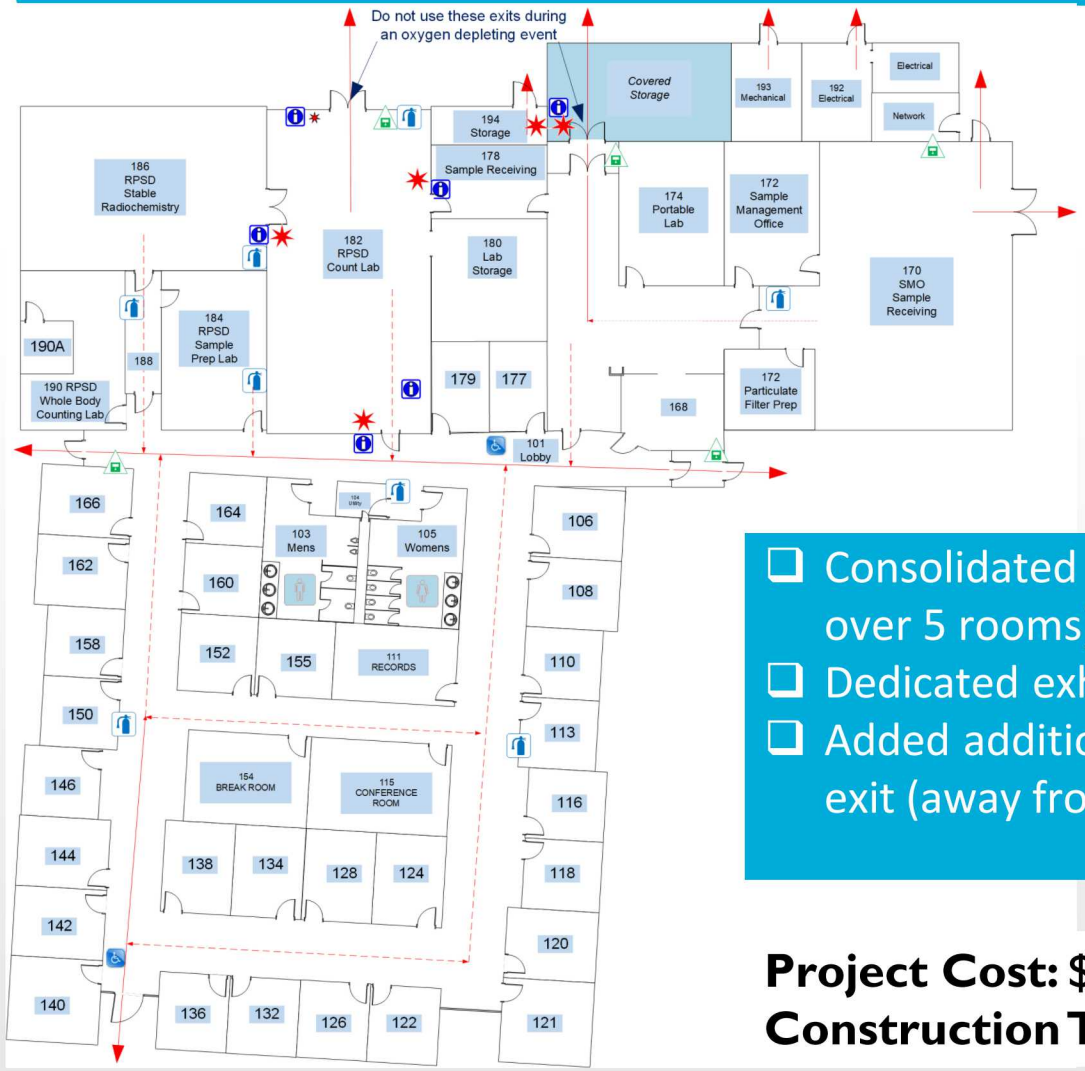
- Extended power outages (2012)
  - Ventilation shuts down while acid digestions in process.
  - No emergency lighting in lab spaces.
- Stainless steel ductwork incompatible with acid digestions
  - Condensate collects in hoods.
    - Insufficient air flow.
  - Sub-optimal hood design.
  - Corrosion of control valves—leakage into ceiling spaces.

Laboratory Facility Upgrades

Goals:

- Replace corroded ductwork with PermaShield Pipe (PSP) fluoropolymer coated ductwork.
- Install new acid-compatible hoods.
- Provide backup power and lighting.
- Improve lab work flow/traffic patterns and evac routes.
- Re-purpose some under-utilized lab spaces.

Upgraded Facility



- ❑ Consolidated 7 fume hoods (spread out over 5 rooms) to 3 fume hoods in 1 room
- ❑ Dedicated exhaust fan for acid digestions
- ❑ Added additional emergency evacuation exit (away from potential lab hazards)

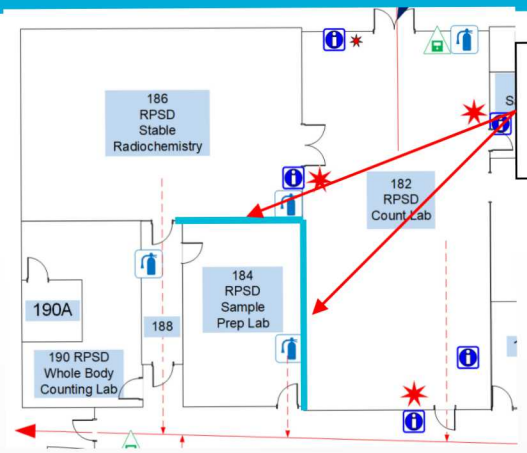
Project Cost: $845K
Construction Timeline: 4 months

Post-Construction Issue: Inadequate Air Flow

- Identified from newly installed differential air pressure monitors.

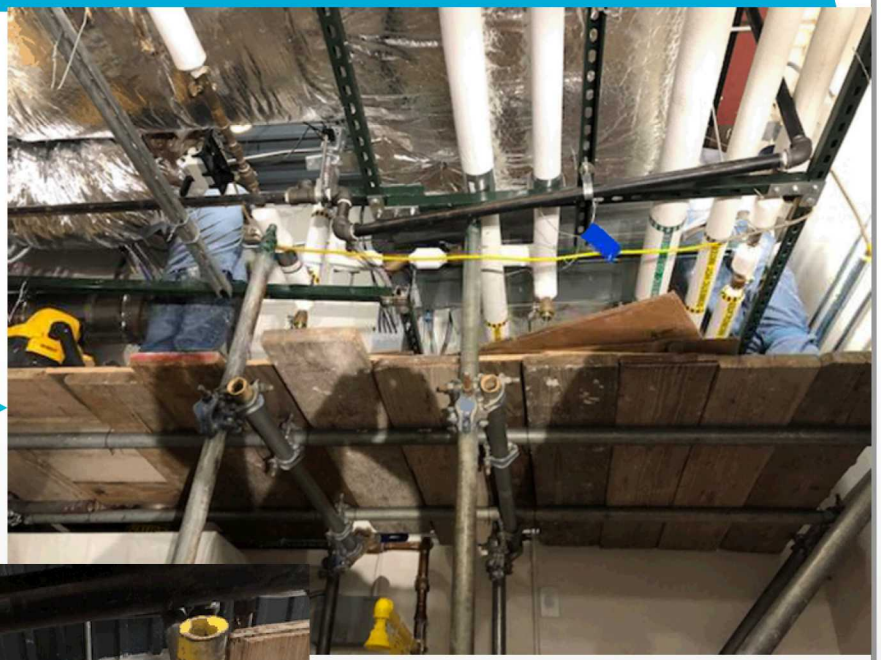
- Positive pressure from lab space to office space during windy conditions.

New Project to Extend Walls to Roof Deck



Wall Extension Project—In Progress

Custom scaffolding over hoods

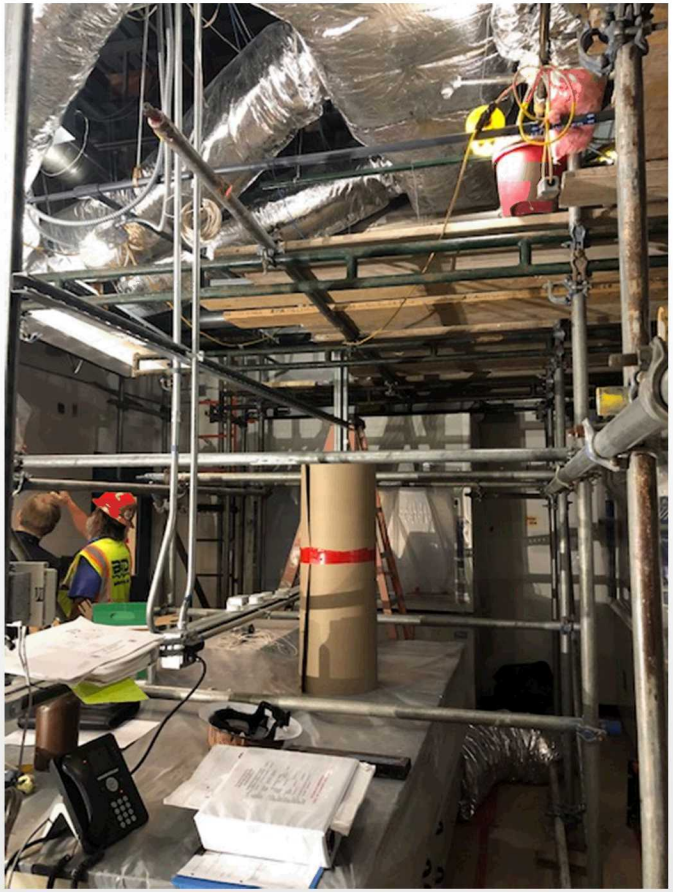


Old ceiling line

Finished wall extended to roof deck

Wall Extension—Finished Product

Before



After

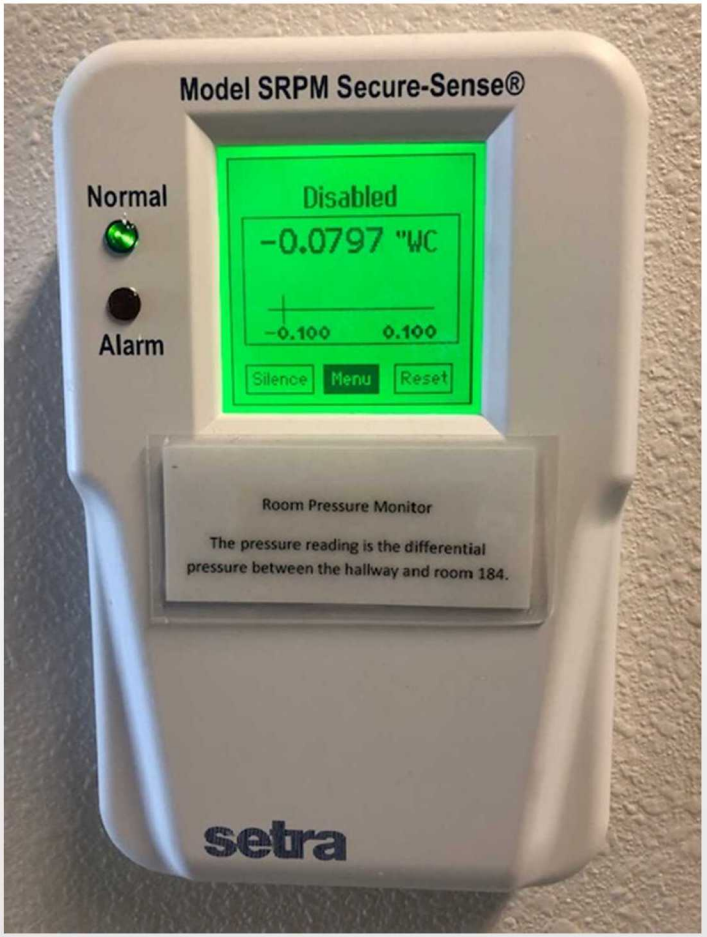
Project Cost: $154K

Construction Timeline: 3 months

Big Improvement to Differential Air Pressure

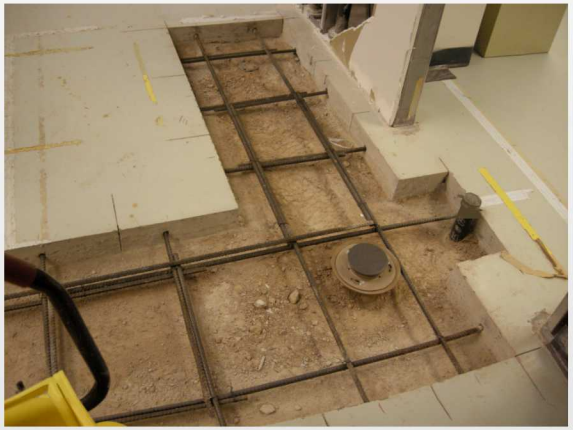
Before

After



Issues Encountered During Recent Building Mods

- Underestimated personnel resources needed to support the project
  - One lab POC to interface with designers and construction contractors.
  - Many competing routine and non-routine laboratory operations and projects.
- Unforeseen hazards/issues
  - Mice in the ceilings
  - Removal of flooring—increased background in adjacent lab count room
- How to work around existing hoods
  - Special scaffolding required



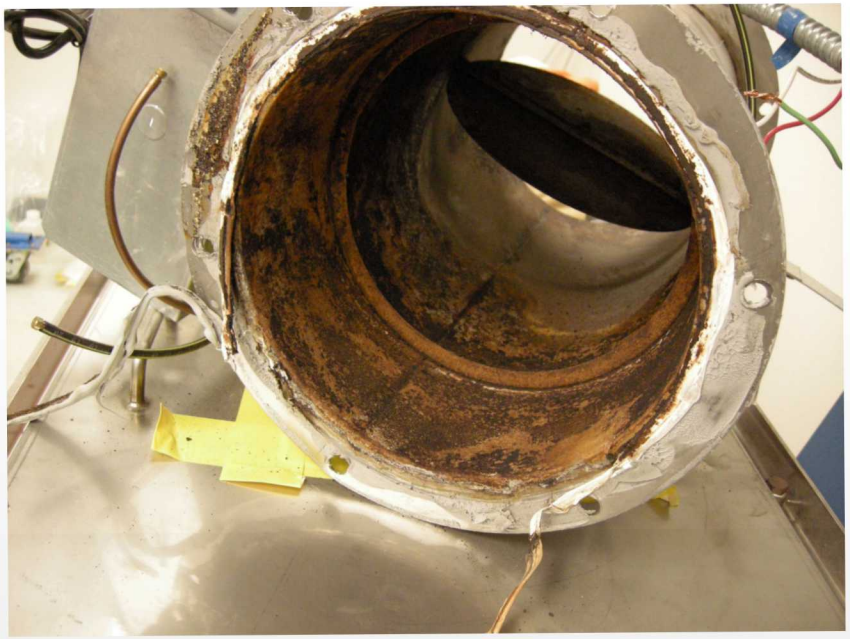
Lessons Learned

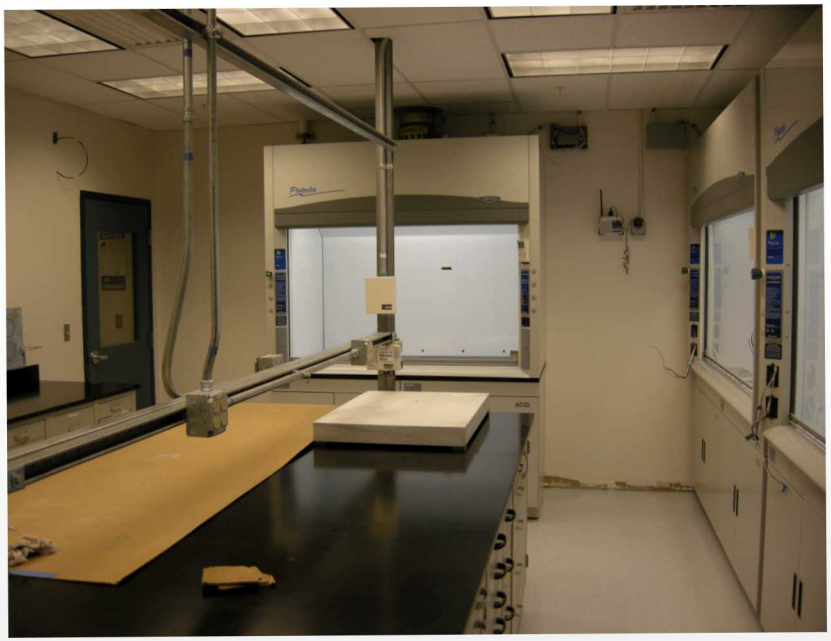
- ❑ Insist on a design firm with experience in designing analytical lab spaces.
- ❑ Consider independent review of design plans by consultant.
- ❑ Match hoods and ducting materials to be compatible with chemical and radiological needs.
- ❑ Consider emergency lighting & backup power options.
- ❑ Involve Radiation Protection and Industrial Hygiene professionals early in design and work planning process.
- ❑ Need frequent update meetings during construction phase to plan around lab operations.

Lessons Learned

- ❑ Consider emergency evacuation routes and options.
- ❑ Plan for how doorways are going to used
  - Large openings for equipment movement
- ❑ Evaluate need for windows on doors and door type (i.e. crash bars).
- ❑ Evaluate the need for differential pressure monitors in critical areas.
- ❑ Consider an independent post-construction evaluation.
- ❑ Need plan for storing construction designs, documents, plans, photos for future reference.

Questions?





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