DESIGN AND INSTALLATION OF A DEPARTMENTAL NMR FACILITY

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REASONS FOR NEW NMR FACILITY

- Centre for Higher ORder Structure Elucidation (CHORSE) CFI grant awarded to UBC Chemistry Dept (2002)
- Award included two new nmr spectrometers ordered (April 03)
- BC Provincial order (June 03) required seismic upgrade to two wings of chemistry… this meant moving all research & departmental nmrs (13 systems)
- This forced a need to find a new location for dept nmr facility (six spectrometers 200-500MHz)

NEW NMR FACILITY PROPOSAL

- Site for only four high resolution nmr spectrometers found

  AV300 with 5mm QNP-z C13,F19,P31,H1

  AV400 with 5mm BBI-z

  AV400 with 5mm ATM BBO-z

  AV600 with 5mm TCi **CRYOPROBE**

Critical Site Location Details

- Room for four magnets
- 12’ ceiling height
- No floor vibrations (at least in 0-20Hz range)
- No magnetic fields nearby
- Away from large moving metal objects

Critical Site Location Details

- Visit by Bruker site planning engineer
- Floor loading certified by structural engineer
- AV600 magnet weighs 3800lbs full of cryogens
- Unusual 4th floor location presented problems

4TH FLOOR B460 INORGANIC LAB CHOSEN FOR SITE

Critical Site Location Details

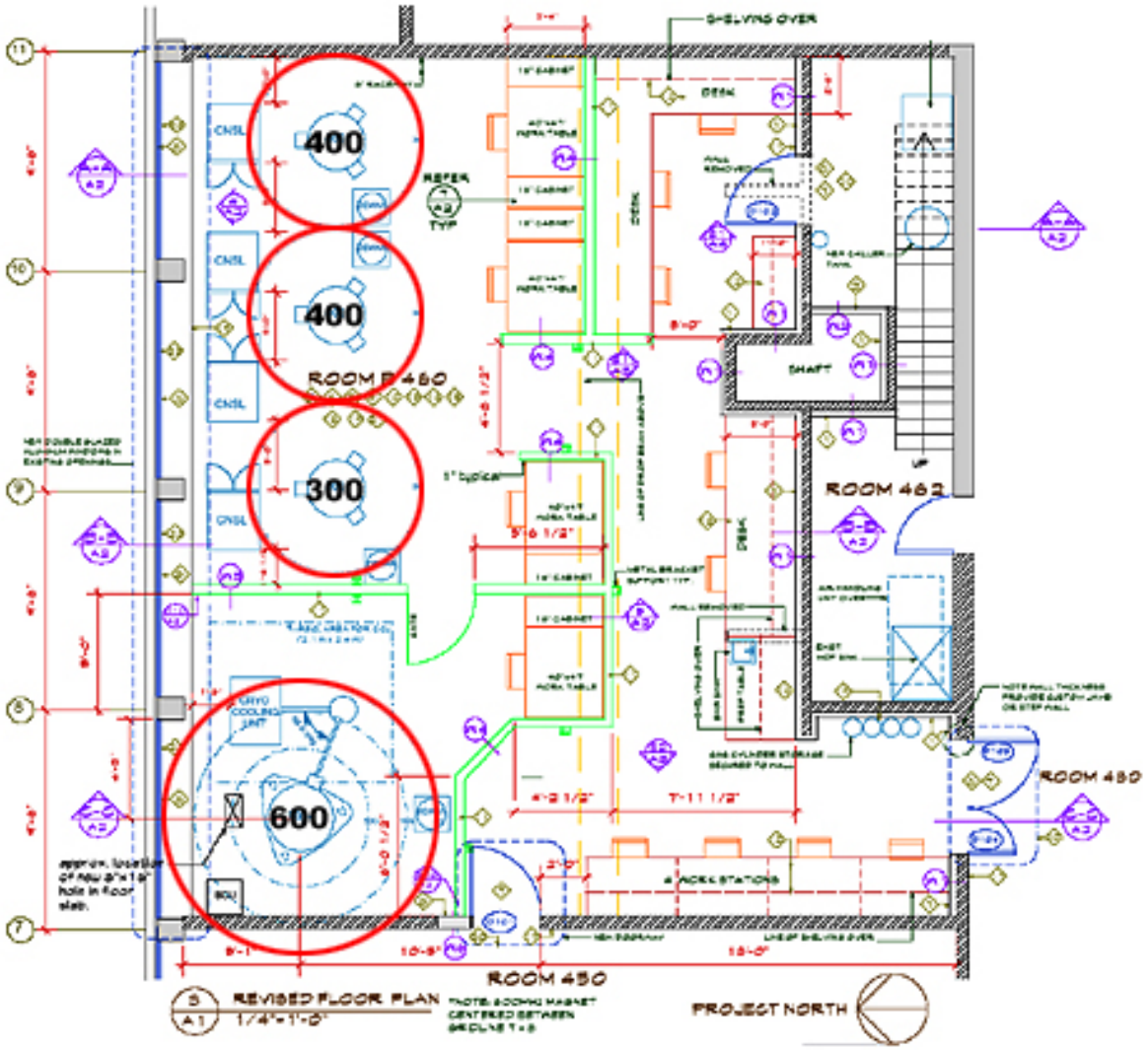
- AV600 with cryoprobe dictated much of the siting details.
- The shielded 600 magnet still has a horizontal 5 gauss line 1.8 meters from its centre.
- 600's vertical 5 gauss line is more of a problem! Extends almost 3 meters above and below centre.

Critical Site Location Details

- 600 magnet had to be sited above 3rd floor area where no movement would occur.

- Used same area below to house 1. noisy Helium compressor 2. its noisy associated water chiller and 3. the noisy compressed air dryer

NMR LAB DESIGN LAYOUT (A1)



RENOVATION of B460

- A/C requirements for 600 with cryoprobe was again the “tail that wagged the dog”!! Since Bruker recommends +/- 1^{o} F !!!
- A/C was major cost in renovation
- BTU’s??? Heat load on nmr lab? With 4 systems operating??
- Need to split air handler in half to fit into mech. Rm.B462 increased cost!
- Air compressor installed on roof (needs dryer)

RENOVATION of B460

½ OF A/C AIR HANDLER

ON LEFT

HEAT EXCHANGE
RESERVOIR ON RIGHT

RENOVATION of B460

RENOVATION of B460

AIR COMPRESSOR

MAGNET DELIVERY

- Elevator can’t accommodate 600 magnet which weighs 3000lbs crated.
- Delivered by crane to 4th floor thru window
- Extra moving costs $3K?
- Tricky for riggers to move since magnet can’t be tipped or jarred.
- UBC Insured magnet move (extra premium costs?)

MAGNET DELIVERY

Riggers & Thomas Buser (Bruker engineer) built platform to receive magnet crates

MAGNET DELIVERY

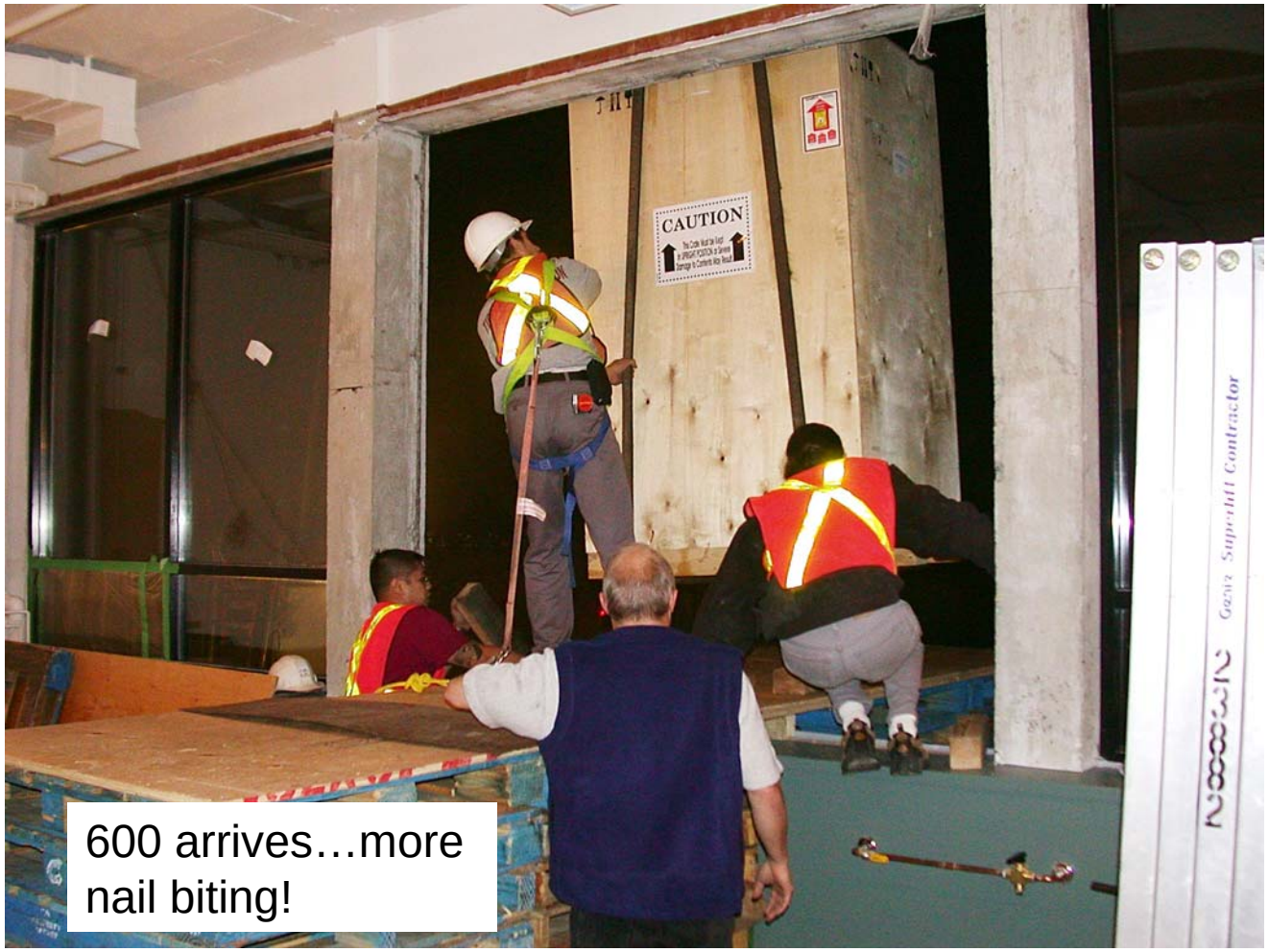
MAGNET DELIVERY

400 magnet moved first ‘for practice’

MAGNET DELIVERY

two 500 lb rated Genie's used to lower 400 magnet to floor after pallets removed…scary part!!

MAGNET DELIVERY



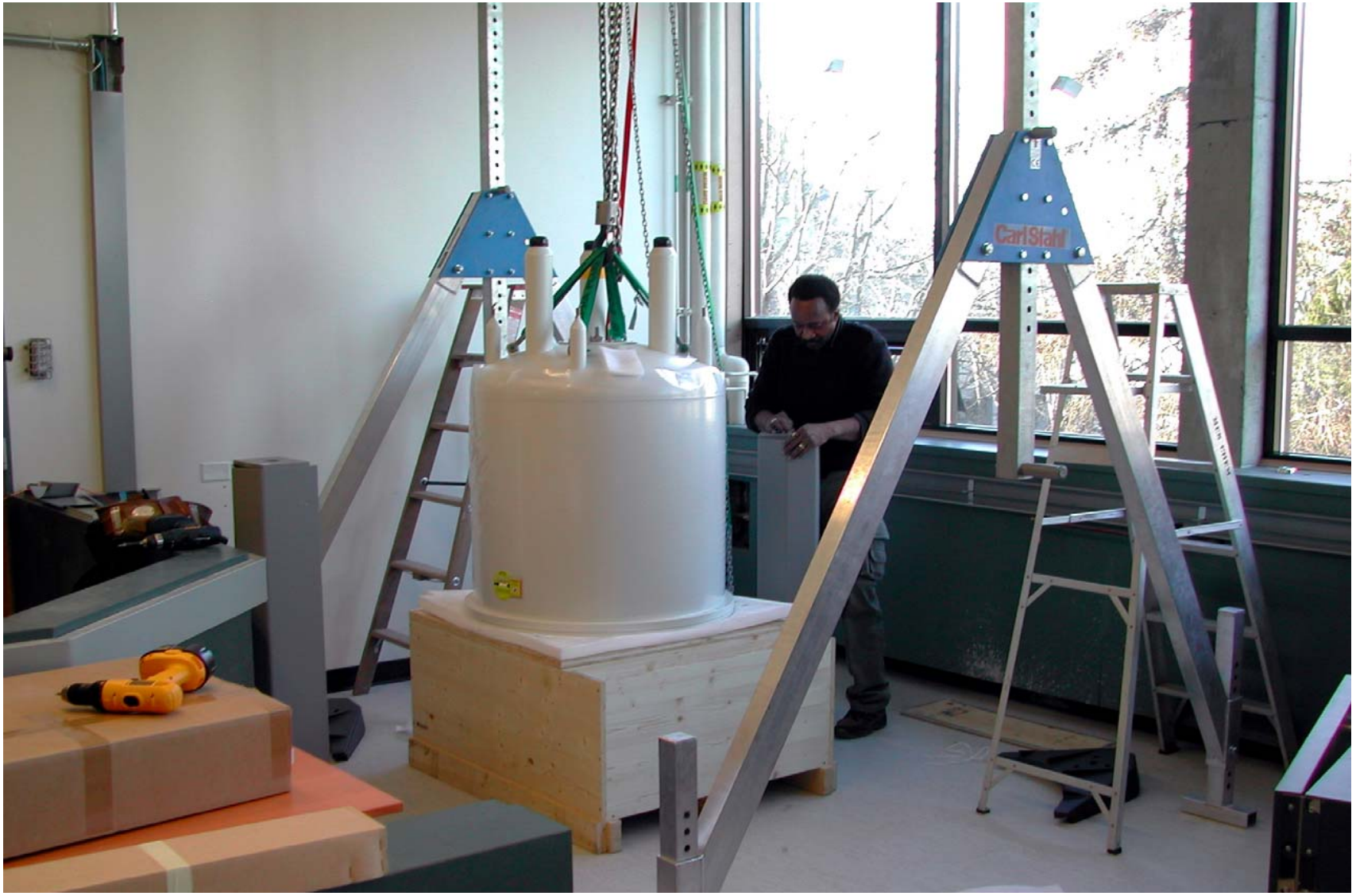
600 arrives…more nail biting!

RENO 95% DONE

MAGNET INSTALLATION

- JAN04 INSTALLATION BEGINS
- NEED A-FRAME WITH HOIST… 11ft CLEARANCE TO LIFT MAGNET AND PLACE LEGS ON
- NEED 3 TON PALLATE JACK
- DUST FREE ROOM
- UNCRATE 600 AND PUMPDOWN
- UNCRATE 400 AND PUMPDOWN
- COOL DOWNS REQUIRED 1250L LHe @$8/L

With help of a large A-Frame hoist, Ken Barclay (Bruker engineer) adds legs to 600

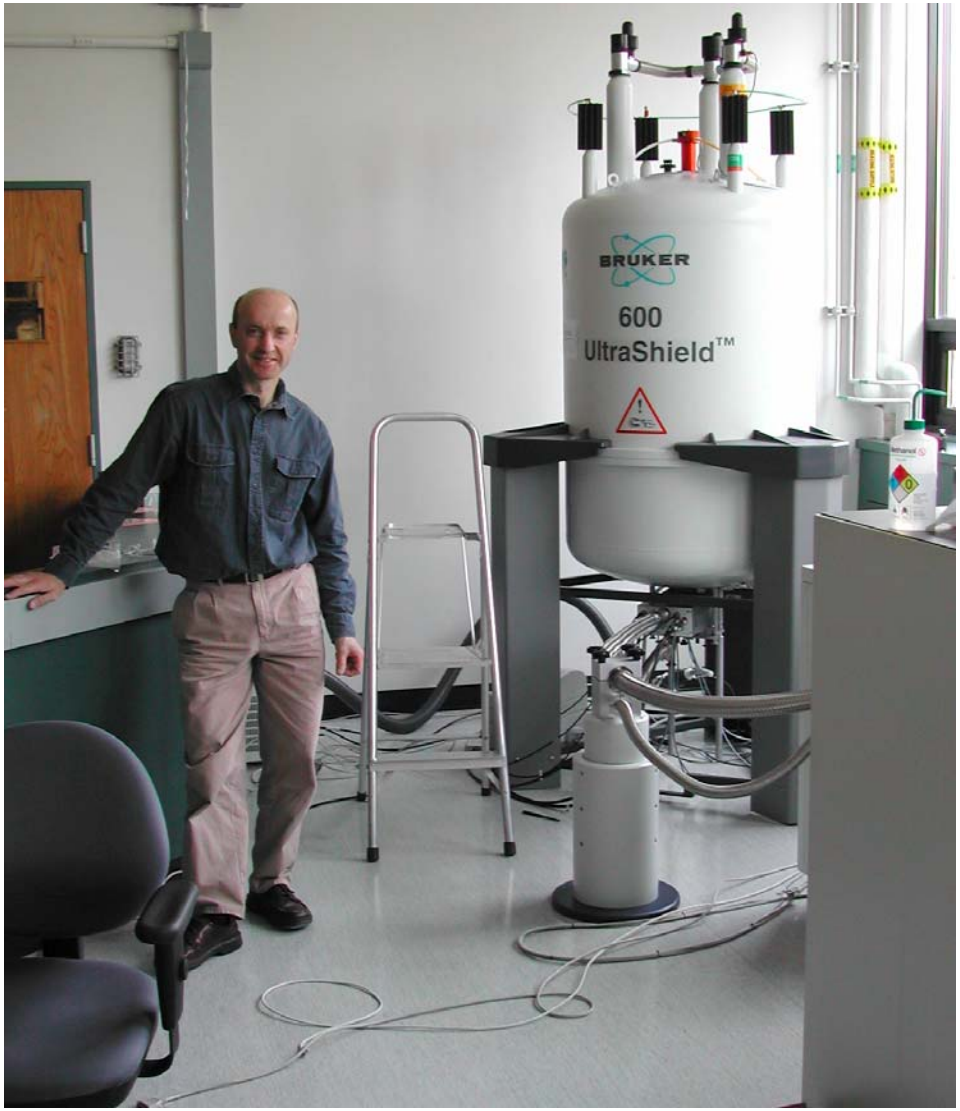


NEW AV400 ADDED TO OTHER END OF ROOM

MOVED OLD AV300/400 FROM D140 TO B460

MOVING AV300

AV600 cryoprobe installed



Bruker TCi cryoprobe in 600

- 1H coil at 11K preamps at 77K S/N=6000/1
- 13C coil at ?K preamps at 77K S/N=700/1
- 15N coil ?K prean

FINISHED NMR FACILITY