Spectrometer Solenoid: Plans to Fix Magnet 2

Spectrometer Solenoid Review

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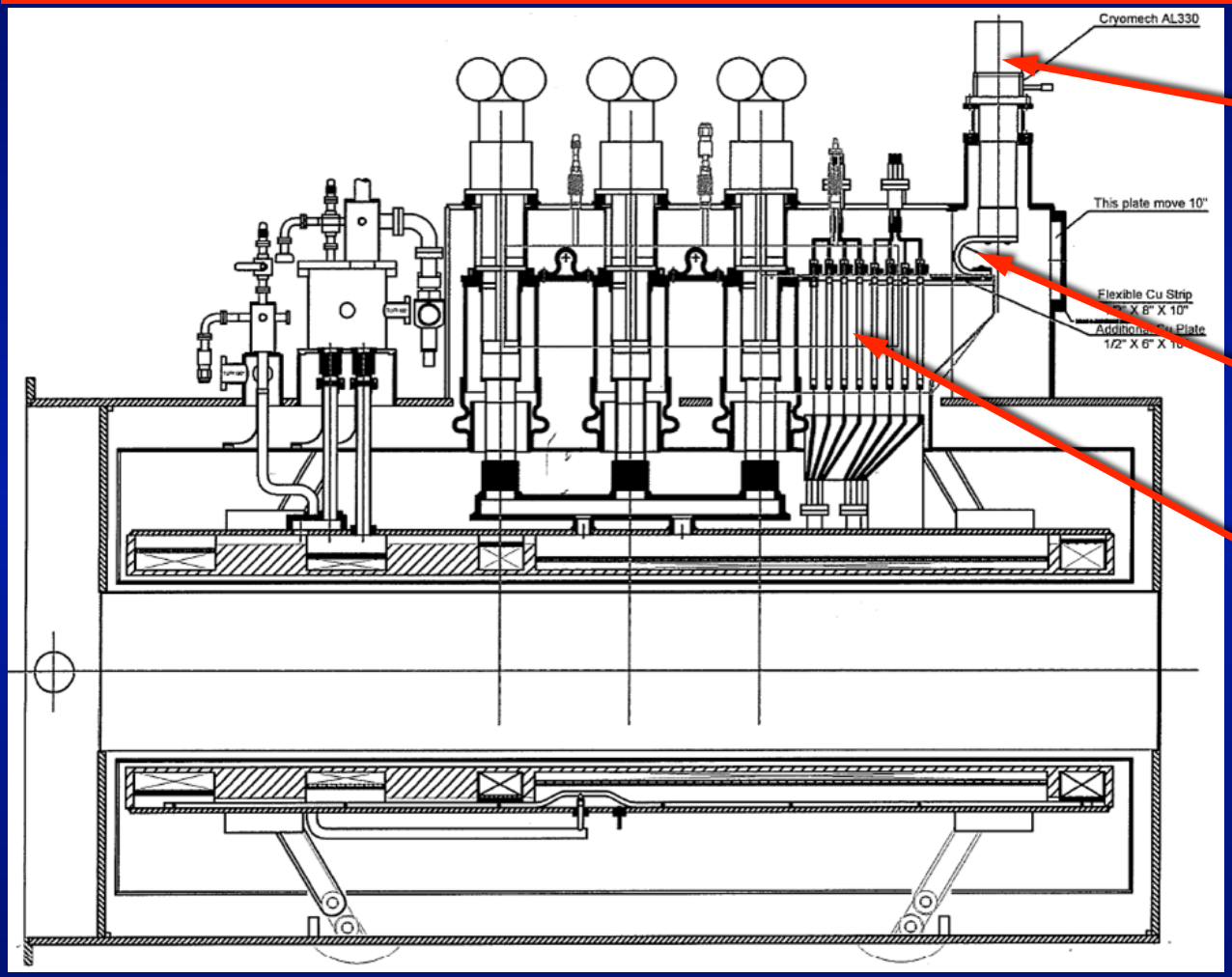
Topics

- Proposed magnet fix
- Modified magnet geometry
- Other system improvements
- Fallback plans
- Schedule overview

Magnet 2 Added Cryocooler



Single-stage cooler

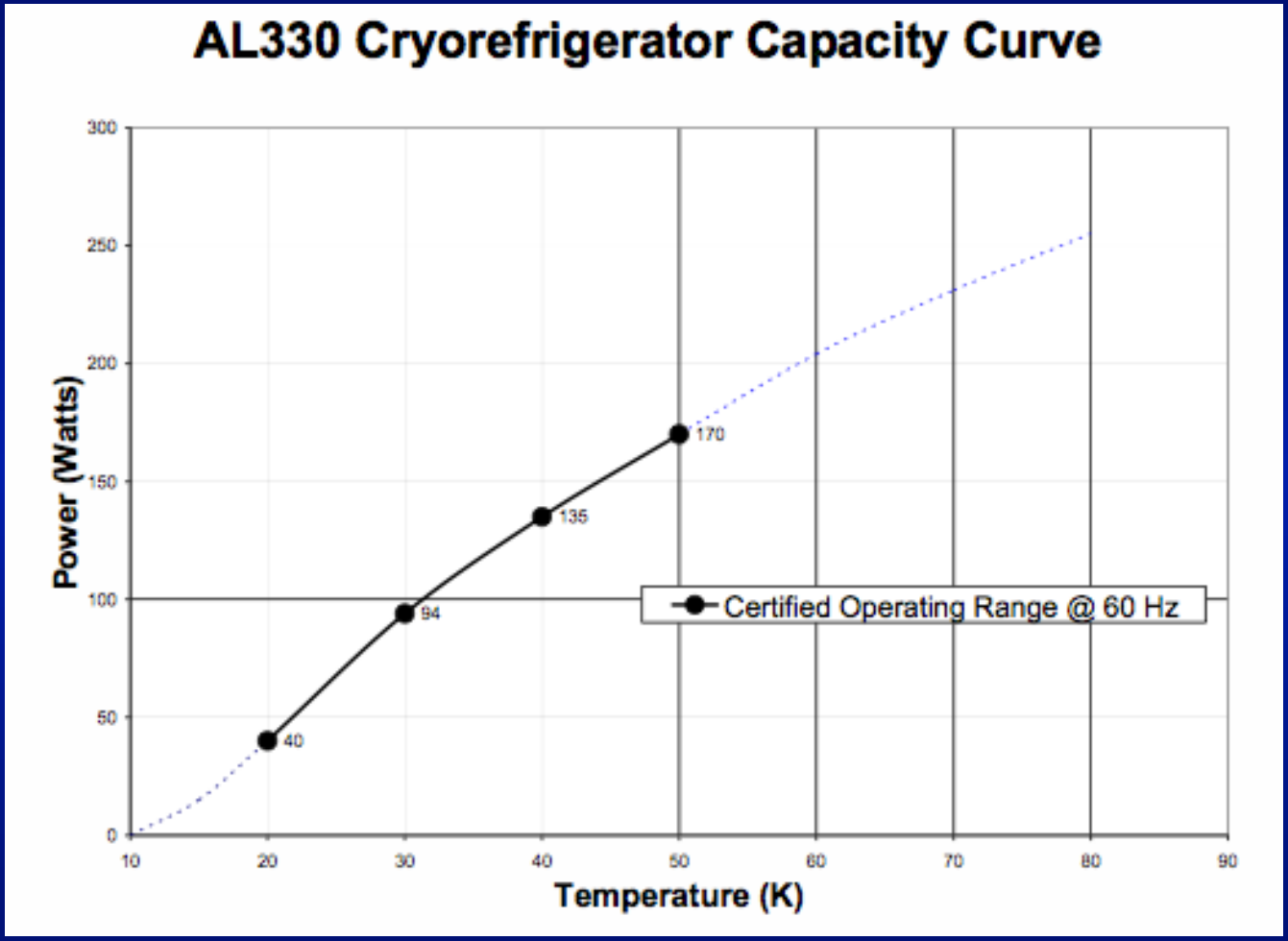
Thermal link

HTS leads

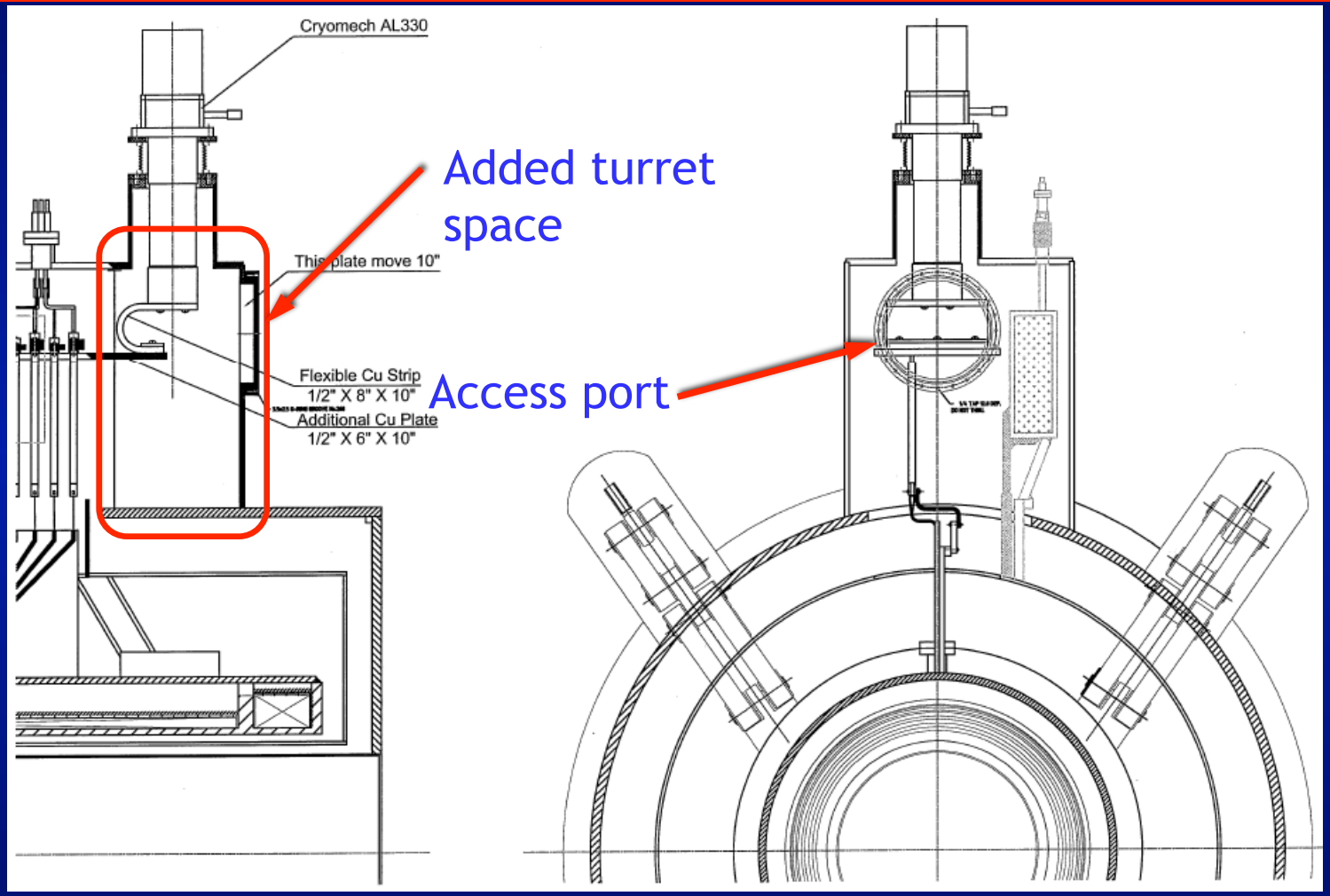
Added Single Stage Cooler

- A modification to Magnet 2 has been proposed which adds a single stage cryocooler to provide additional cooling to the HTS leads and won't require magnet disassembly
- The plan to add a single-stage Cryomech AL330 cooler (arrived 11/13/09) provides 170 W at 55 K and requires modifications only in the "turret" area
- The added cooling power should lower the upper HTS lead temperature sufficiently to train to full current
- The new cooler could remove enough heat to permit the other 3 two-stage coolers to maintain the cold mass LHe level (i.e. closed system)

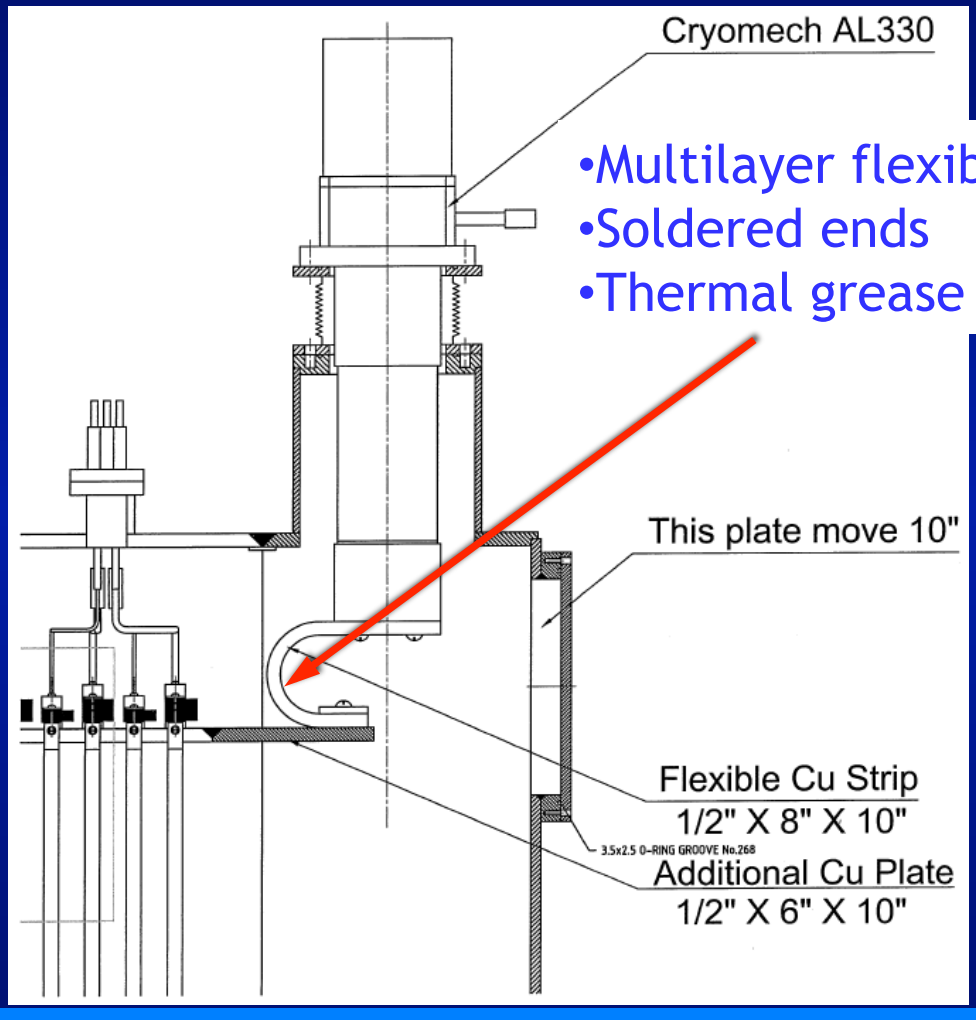
Cryomech AL330 Performance



Modification Details

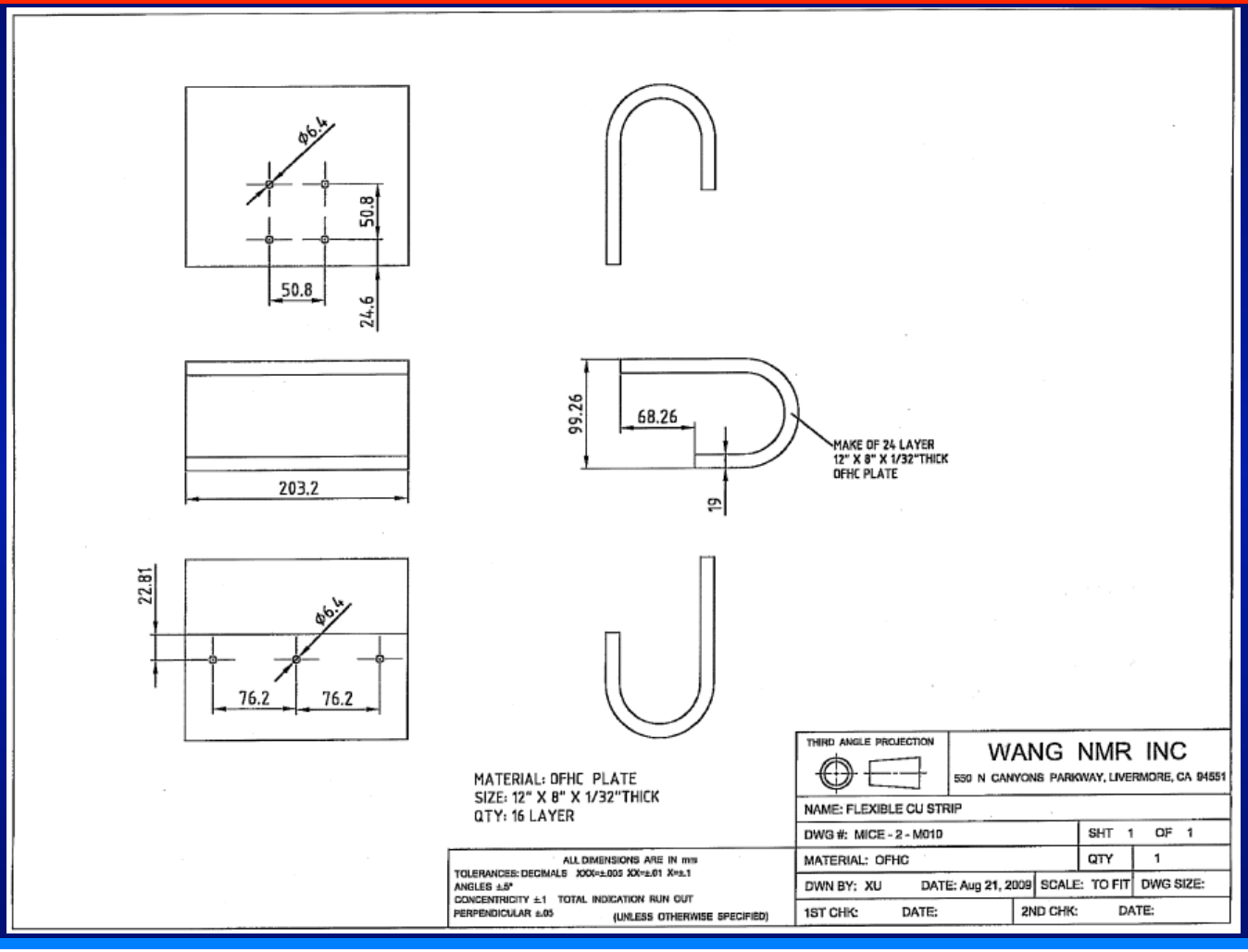


Modification Details



- Multilayer flexible Cu link
- Soldered ends
- Thermal grease in joints

Cooler Conduction Link



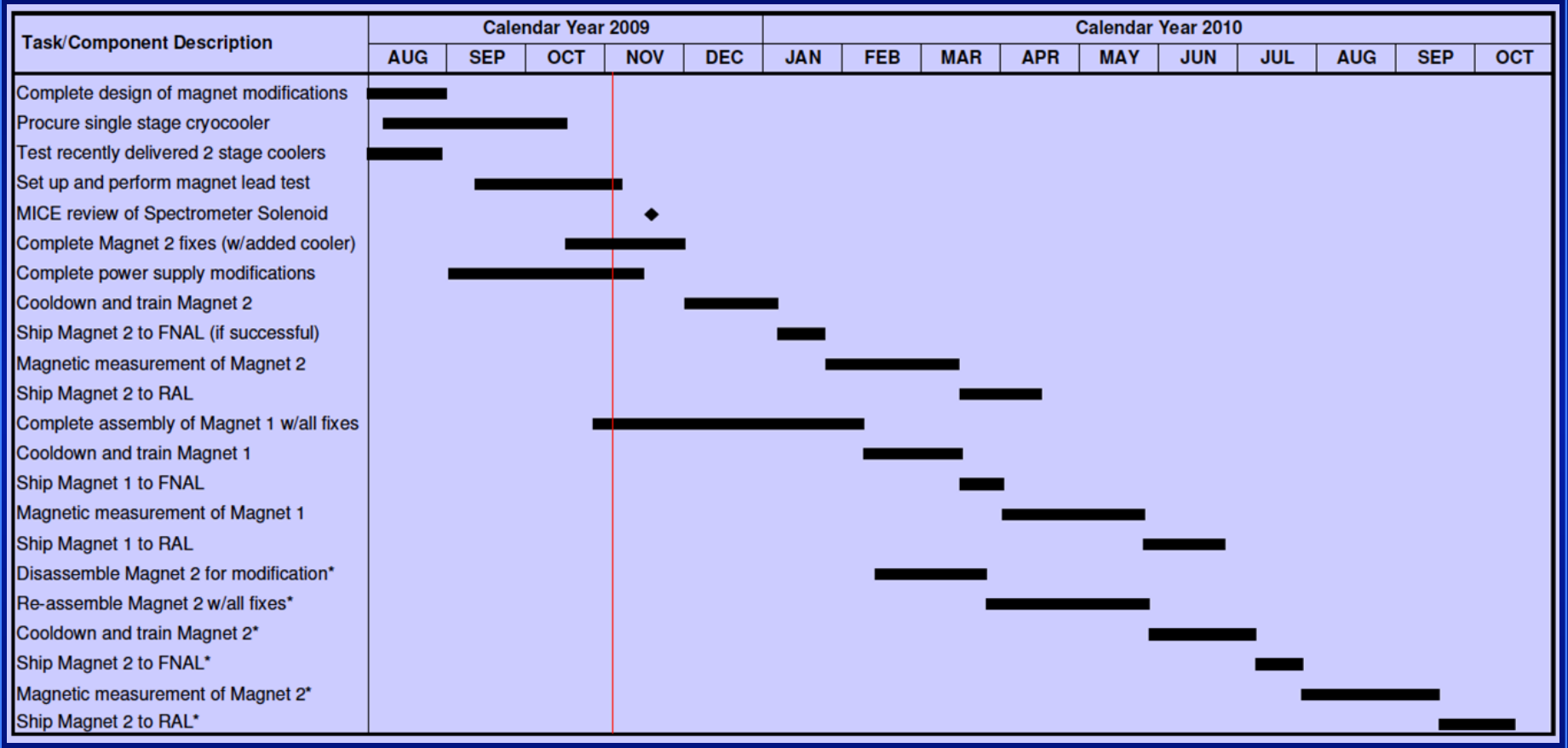
Thermal Calculations and Measurements

- The thermal model of the magnet is being used to better understand the cooling mechanisms and heat loads
- Preliminary calculations indicate the upper HTS leads temperature will be <70K during operation
- The temperature drop across the thermal link between the single stage cooler and the 1st stage copper plate is expected to be ~10 K
- An off line magnet lead test is being carried out by Wang NMR to measure all relevant temperatures and voltages during operation

Magnet 2 Fallback Scenario

- If the addition of a single-stage cooler to Magnet 2 does not result in a closed system, there are two options:
  - i) Accept the thermal properties as is and top up the magnet with external cryogens as needed
  - ii) Disassemble and modify the magnet to improve the shield connections and to accommodate a fourth two-stage cooler (in addition to the single-stage cooler)
- The 2nd option will add 3 to 6 months to the delivery of the 2nd magnet to RAL and will create additional risks of damage or assembly errors in the repair process
- For these reasons, the first option is preferred

Schedule Overview



* These step are only required if the initial modifications to Magnet 2 are unsuccessful