NIEHS
National Institute of Environmental Health Sciences

Problems with Oxford/Varian 2.2K 800/63 Magnet: Extended Warranties & Maintenance Contracts

Eugene DeRose
NMR Laboratory Manager
National Institute of Environmental Health Sciences/ITSS Contractor

U.S. Department of Health and Human Services
National Institutes of Health
National Institute of Environmental Health Sciences

NIEHS
National Institute of Environmental Health Sciences

Introduction

- Cost and technical details
- Problems with our 800 MHz magnet
- Ongoing INOVA 600 console problems
- Extended warranty and maintenance contracts

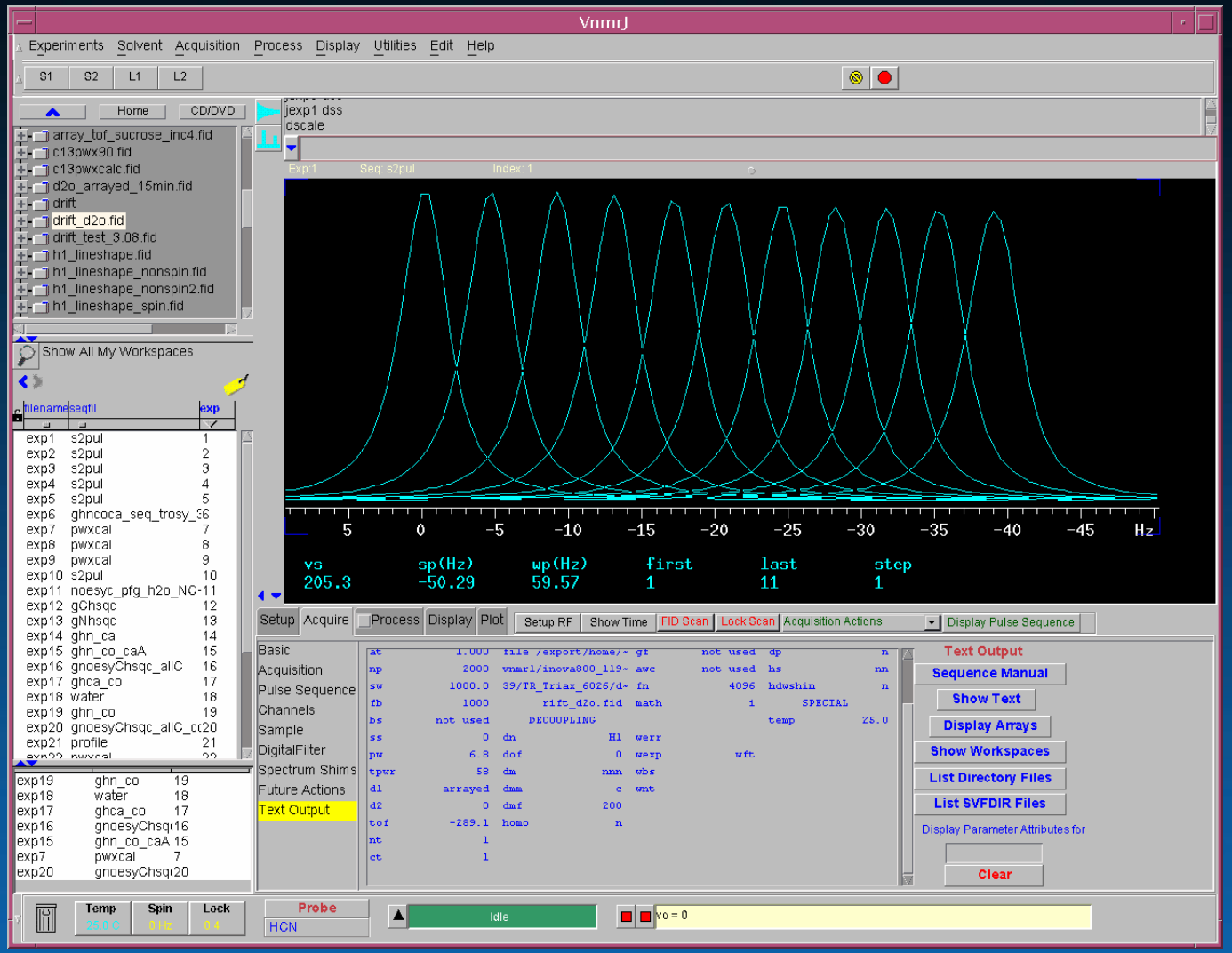
NIEHS
National Institute of Environmental Health Sciences

Cost and technical details

- Varian INOVA 800: total system cost ~2 million dollars.
- Full console & magnet maintenance contract > $50K
- The Oxford 800 MHz/18.8 Tesla 63mm bore magnet operates at 2.2°K and a current level of 151 amps.
- At 4.2°K, the magnet is energized to 121 amps, corresponding to 640 MHz. The temperature is lowered to 2.2K by pumping on the liquid helium, and the magnet current is increased to 151 amps, corresponding to 800 MHz.
- Drift spec <= 8 Hz/hour
- Does the higher current level, requiring operation at 2.2K, make these pumped magnets more susceptible to failure? How robust are the newer 54mm 4.2°K 800 magnets? What about 900 MHz magnets and above?

Problems with our 800 MHz magnet

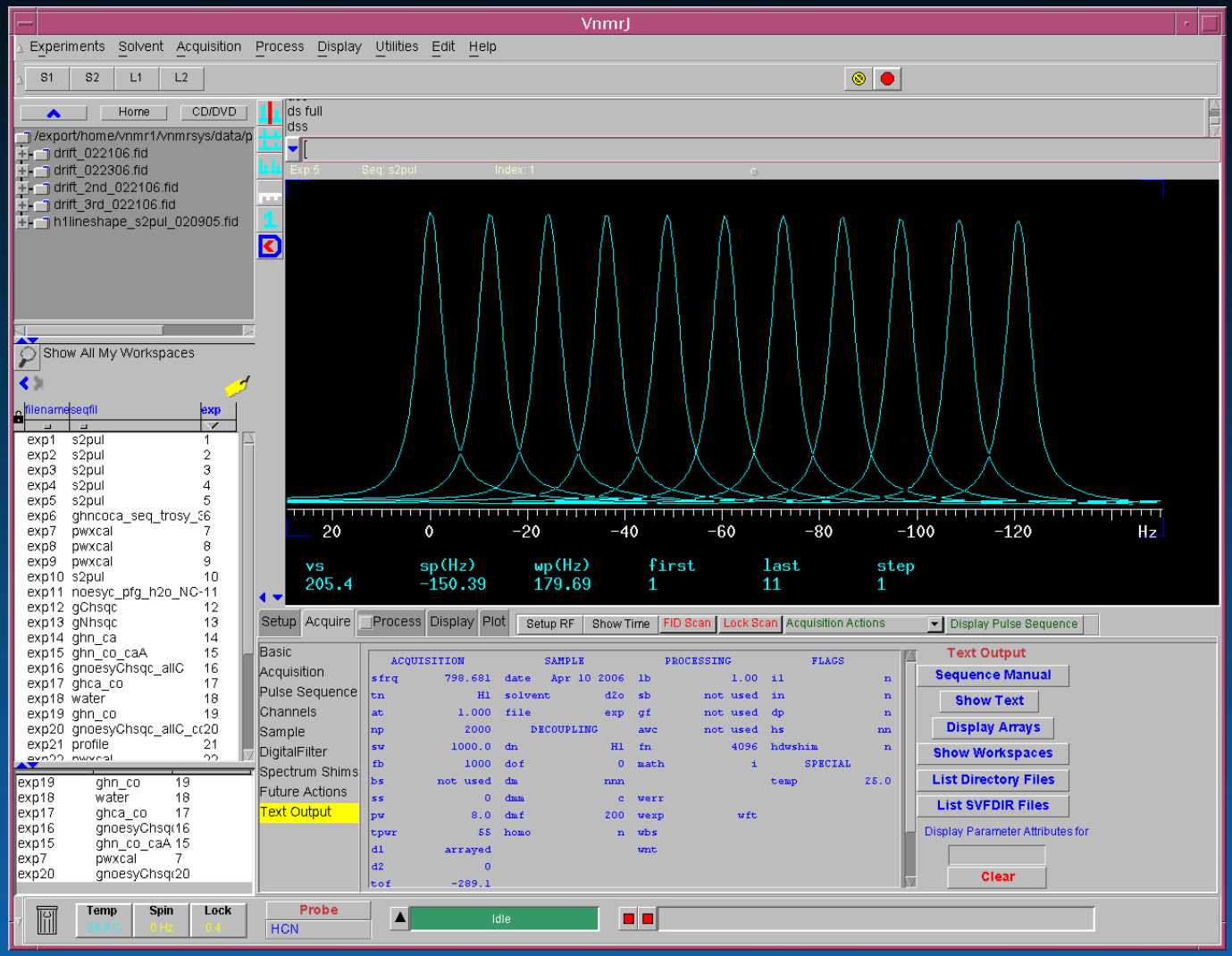
- Initial drift test. One spectrum/hour ⟶ drift < 4 Hz/hour



NIEHS
National Institute of Environmental Health Sciences

Problems with our 800 MHz magnet

- Recent drift test: one spectrum/minute ⟶ drift > 12 Hz/minute



NIEHS National Institute of Environmental Health Sciences

NIEHS
National Institute of Environmental Health Sciences

Problems with our 800 magnet

- High drift problem developed ~6-7 months after the 1 year warranty period expired.
- Neither vendor accepted any responsibility for the problem.
- Oxford
  - Option 1: ~$11K to catch the field and bring the current back to 800 MHz (now at ~798 MHz).
  - Option 2: ~$38K additional to warm up and reenergize magnet
  - Option 3: Send magnet back to Oxford for repair? Cost?

NIEHS
National Institute of Environmental Health Sciences

Ongoing INOVA 600 console problems

- Perpetual VME bus problems
- “Number of points acquired is not equal to np” or some variation
  - Problem first occurred during warranty period.
  - To correct problem, replaced DSP, ADC, Data to Memory, and CPU boards; install latest VNMR and Solaris patches; set dsp=‘n’. Problem always returns.
  - Last week a new error appeared that also interrupts an ongoing acquisition: “Maximum transients accumulated”
- These VME bus problems were never fully addressed during the 1 year warranty period.
- Will upgrading to RH/VNMRJ PC host computer cure these problems?

NIEHS
National Institute of Environmental Health Sciences

Warranty and maintenance contracts

- Is a 1 year warranty adequate to cover the risk of owning a 2 million dollar system?
- Typical home warranties are 3 years; 6 – 10 years for major structural components. A magnet is the major component of an NMR spectrometer, equivalent to the foundation or the framing of a house. I got a 3 year warranty on my used car!
- Recommend vendors extend warranties on higher field magnets to 3 years. They should be willing to stand by all their magnets for 3 years.
- In lieu of extended warranty, recommend purchasing a full warranty on 800 MHz and higher field spectrometers. If you can't afford the maintenance contract, you can't afford the cost of repairing the system.