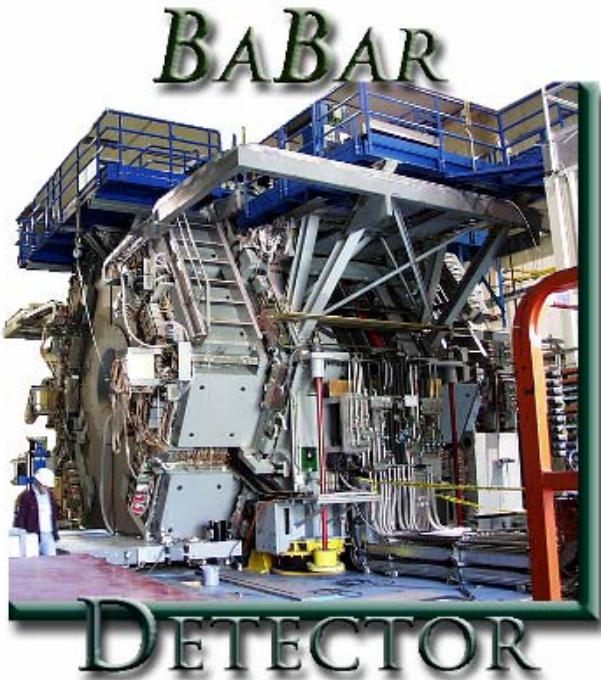
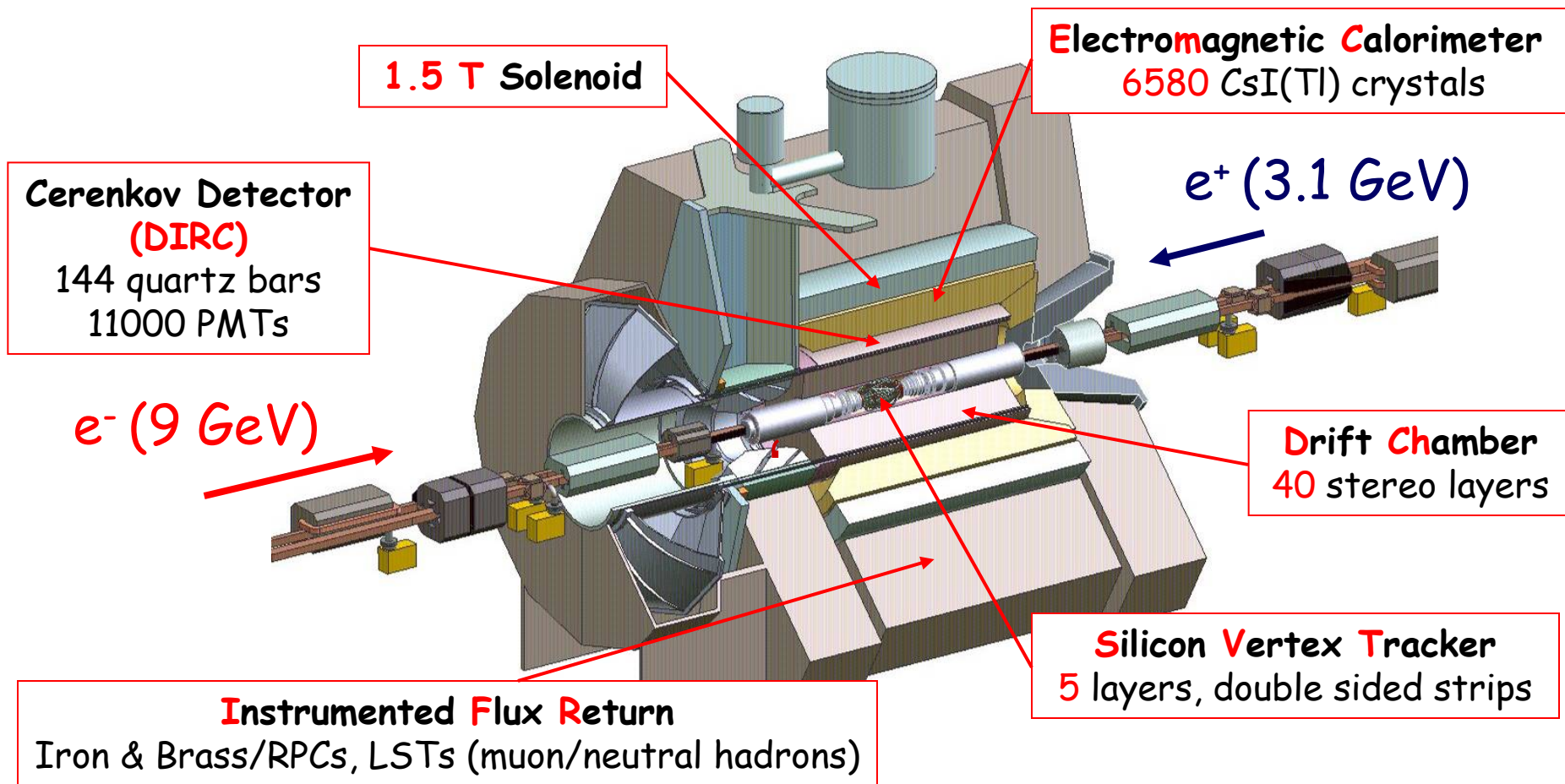


BaBar Material Disposition Planning



- Disposition flow charts
 - Laying out the onion layers; temporary and longer term storage
 - The measured radiation environment
- Detector components
 - Easily retrieved components, non-US funding
 - Components with high re-use potential and value
 - Components with lesser value worth holding
 - Components from outside the accelerator housing
 - Structures from inside the accelerator housing
- Storage: Metals Suspension material

BaBar Detector



The Core of the Problem

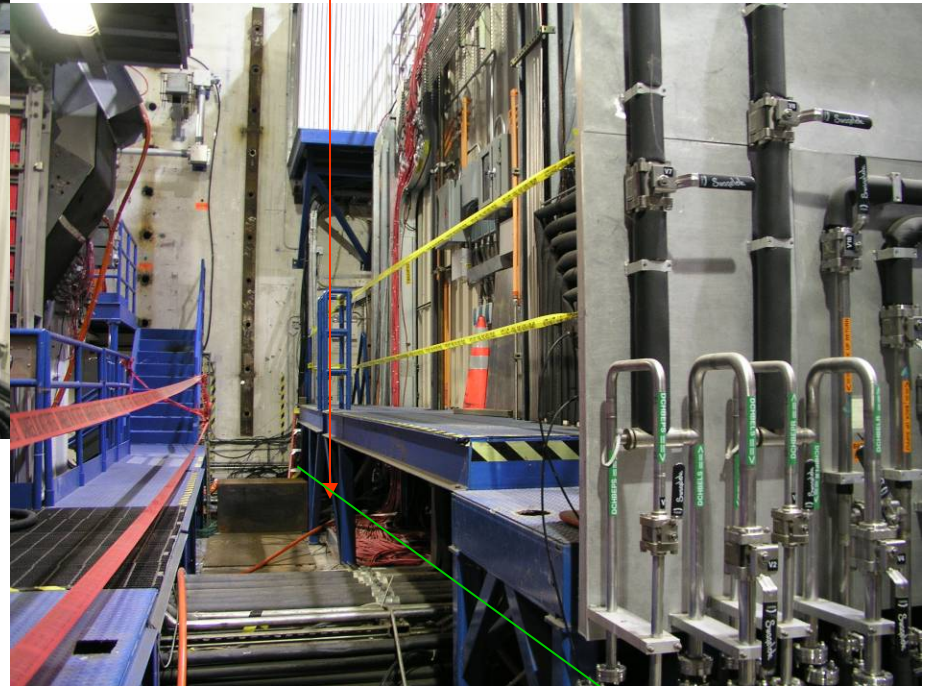
BaBar Detector



Shield wall removed

Platforms, cables, racks,
electronics, conduit, etc.

The Border



'But, then there is all the rest'

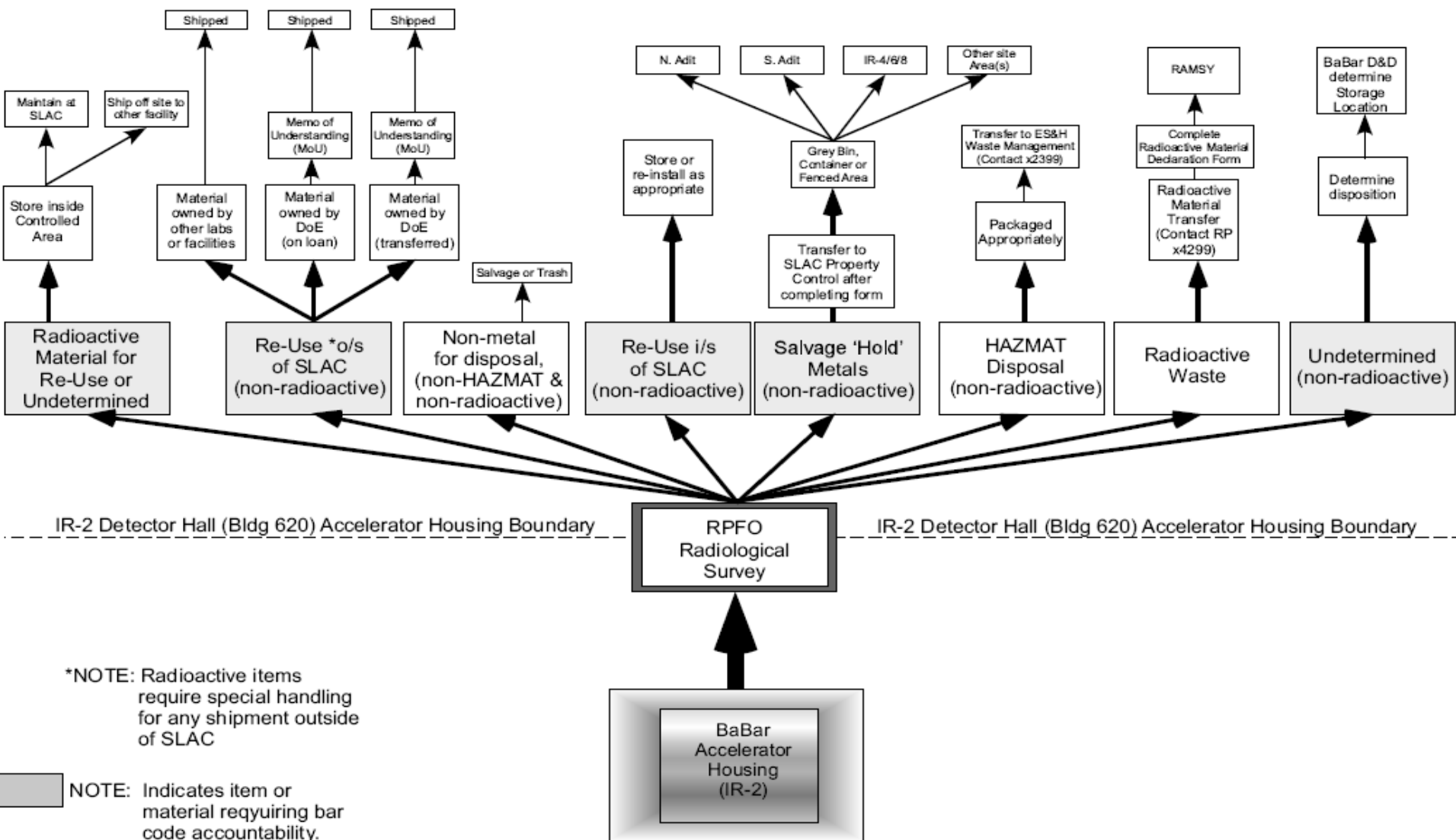
Materials Disposition Flow Charts

- Meetings to discuss materials disposition were begun last July.
- Attendees included representatives from BaBar, PPA Safety, Radiation Physics, Environmental Protection, Waste Management, Property Control, Salvage.
- Developed flow charts in discussions that covered the likely futures for the various components of the detector.

Materials Disposition Flow Charts

- Process development complicated by the **Metals Suspension**:
 - Require two charts, one to handle materials that came from the Accelerator Housing (ie, Radiation Area), and those that came from outside the Concrete Shield Wall.
 - The line demarcating Inside vs Outside is drawn at the outside edge of the Shield Wall.
 - Many services pass through the Shield Wall: cables and pipes.
 - Line of demarcation transferred to the materials (eg, double ring of tape to indicate in/out boundary on a cable).
- Most of the effort focused on the flow chart for materials from inside the Accelerator Housing
 - You will see this chart used extensively in presentations tomorrow morning. A first look:

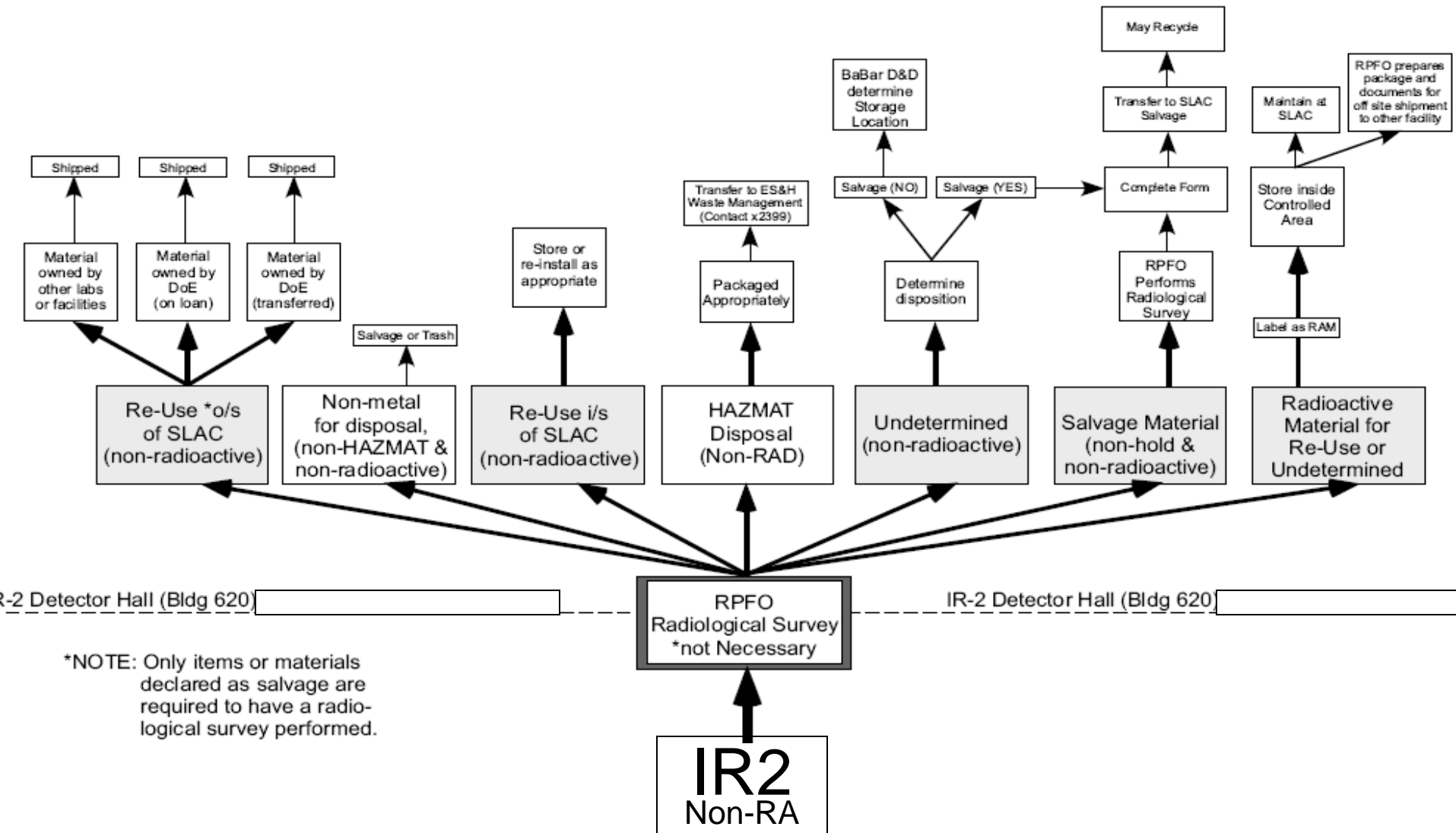
Radiological Survey and Release/Hold for BaBar D&D Materials Removed From Accelerator Housing



Materials Disposition Flow Charts

- Disassembly work inside the Accelerator Housing began with the sign-off of the Safety Plan this month.
 - Power for the end door drive mechanisms, dependent on detector power which flowed through the Electronics Hut that was cut off in preparation for the move of the EH, was re-established from local sources. This process produced our first material removed from the accelerator housing.
 - Disassembly of platforms and removal of the Muon Shield Wall will provide a continued test of this materials distribution flow chart in the coming weeks.
- We expect that the flow charts may evolve as our experience increases.
 - A flow chart for materials from outside the Accelerator Housing (Radiation Area), though still inside the IR2 RCA (ie, Bldg 620) follows in the next transparency:

Disposition of BaBar D&D Materials Removed From IR-2 RCA and Never Located Inside Accelerator Housing



*NOTE: Only items or materials declared as salvage are required to have a radiological survey performed.

Storage Areas

- IR2 Containers: for storage of electronics components before final disposition. Both hold/non-hold: labeled for contents, bar-code affixed.
- IR12 Hall: storage/disassembly of high value items.
- CEH: temporary storage of large steel items.
- SLAC N Adit: temporary storage of mid sized service items.
- SLAC N Adit Outside Fenced Area: storage of platforms and stairways that have been in the accelerator housing.
- IR8 Hall: storage of smaller items (eg, crystal storage hut). Currently, not for Hold Materials.
- IR8 Outside Fenced Area: storage, not for Hold Materials
- Sector 12 Fenced Area: pen formed by shield wall blocks. Not yet constructed; may not be needed.
- Storage Building (PEP): long term storage of bulk steel and structures, assuming Metals Suspension Exemption fails. Not yet build of planned.
- Bar codes for identification, clear labeling, and database control are critical for success in keeping straight the history of materials.

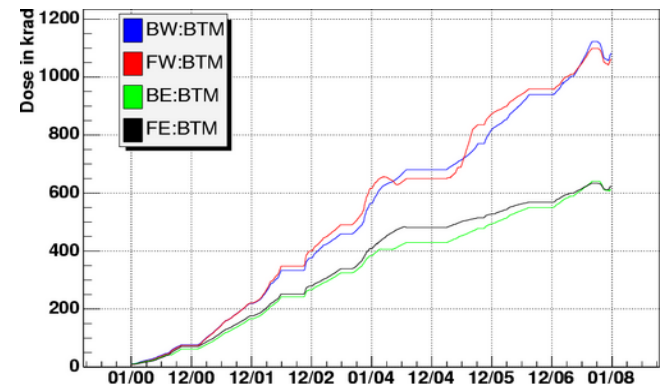
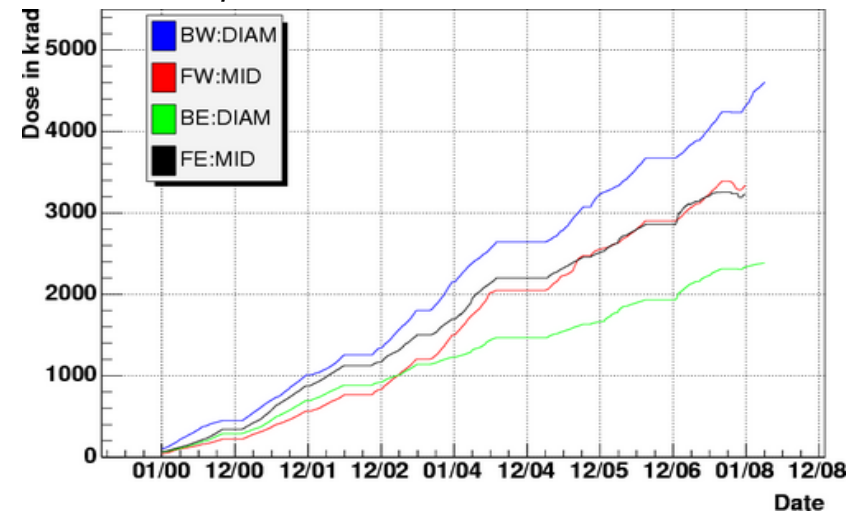
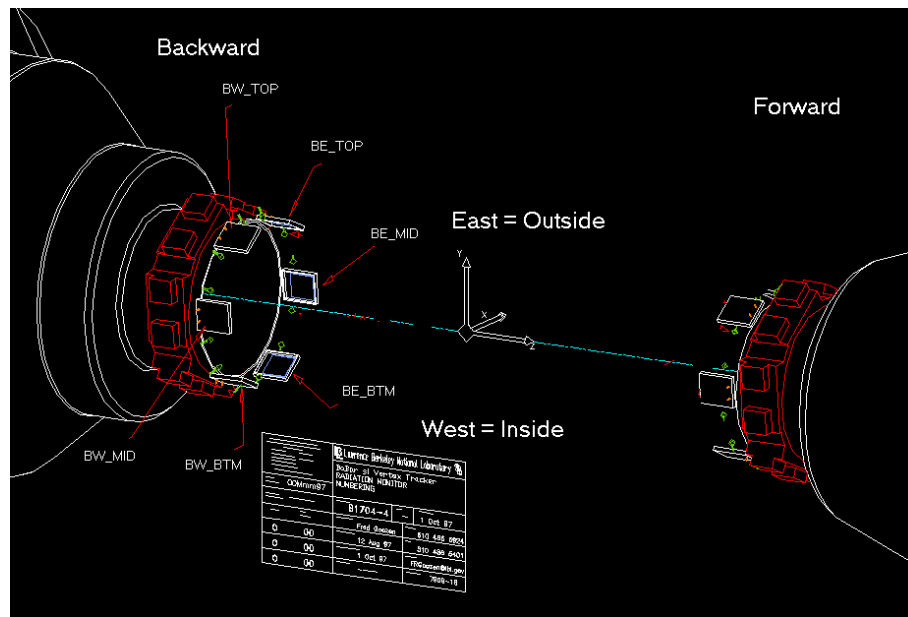
Storage Areas



Radiation Environment

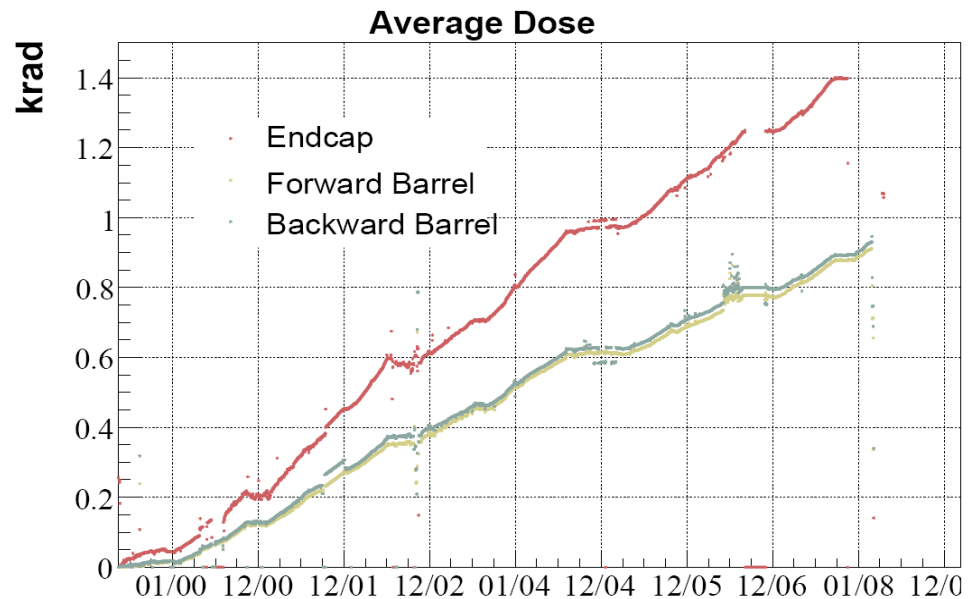
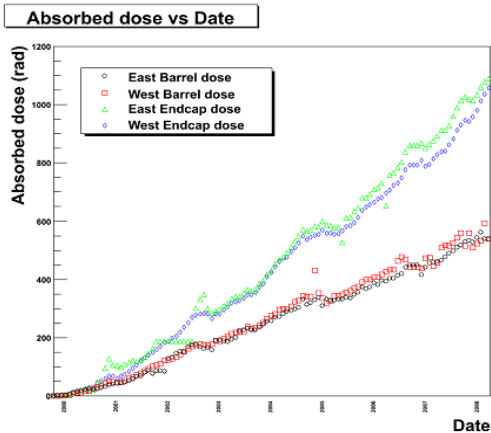
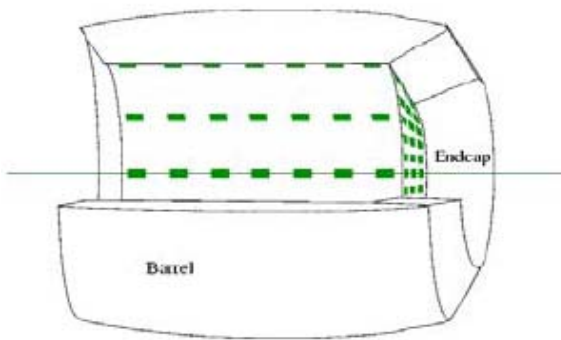
- BaBar detector systems each were concerned about their radiation environment. For the SVT, a series of PIN diodes were arrayed at key points around the detector, and instantaneous and integrated doses measured.

Dose max ~5 Mrad



Radiation Environment

- For the EMC, an array of radFETs covered the inner surface of the Barrel and Endcap to keep track of the integrated dose to the crystals. There are 56 arrayed in 8 rows in phi in the Barrel, and 60 in front of the Endcap in three rings.



Worst case EC ~2krad

Radiation Environment

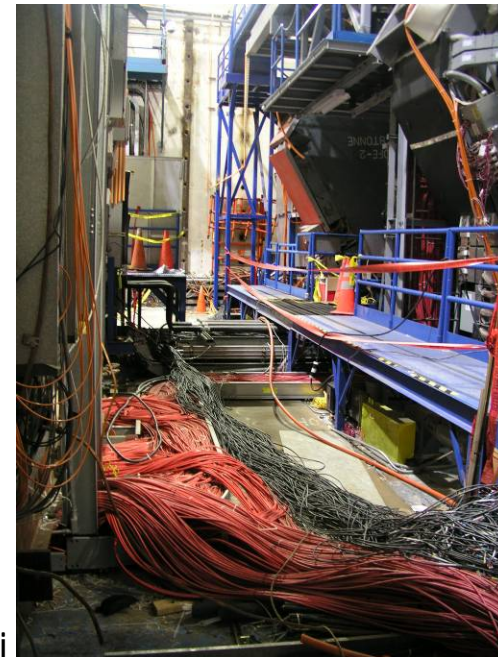
- The Radiation Physics team proposes to obtain an exemption from the Metals Suspension using simulation to predict the expected dose, and new measurements of materials after they are removed from the Accelerator Housing as verification.
- These measurements from the BaBar data-taking phase provide a point of reference for the Radiation Physics team's simulations.
- The expectation is that there will be very little activated material encountered in the BaBar disassembly, perhaps at most components from inside the support tube.

Collaborator Owned Materials

In the period between the formal declaration that the data-taking phase of the experiment was over (October 2008), and the transfer of ownership to DOE, the Collaborators can retrieve at their cost items they contributed to the detector, as described in detail in David's talk earlier today. Some of the collaborators have chosen to do this.

- SVT: HV system components; spare cables and power supplies; test stand components. The intention here is to be able to perform the final set of off beampipe characterization. (Italy)
- DCH: Gas system from gas shack; test equipment. (France)
- DIRC: Front-end crates and electronics; HV supplies; test bench equipment; calibration system; spares. (France)
- EMC: Light pulser system modules and crates. (Germany) Few spare crystals (Germany, UK).
- IFR: LST LV & HV cables; LST front end electronics; RPC avalanche mode electronics & DAQ crates and modules, as well as a few streamer mode front end electronics modules.
- Trig: several trigger boards for display purpose (UK).

There is a substantial amount of 'hold material' in this set that would have required special handling

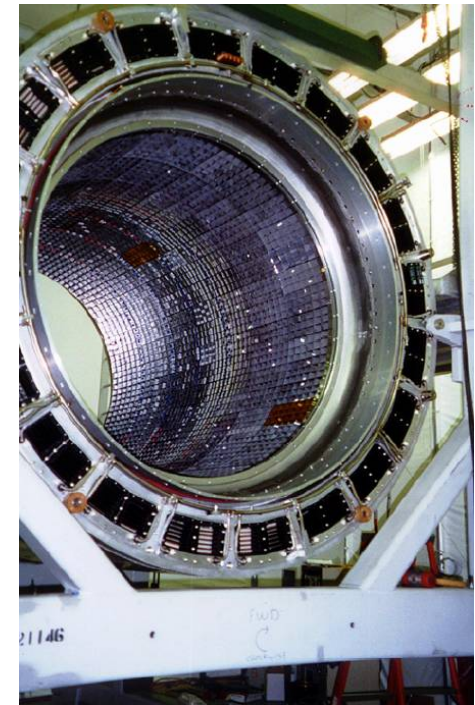


Components of High Re-use Potential

- Magnet: store coil in cryostat, ancillary equipment (dump resistor, valve box, etc) in IR12 for the long term. [SuperB reuse].
- Calorimeter: best used in current structure. [SuperB reuse].
 - If no reuse, disassemble to crystals and store the crystals, but reuse value is diminished.
 - If no reuse for individual crystals, scrap. It is unlikely that crystal vendors would buy the crystals, but they are interested in them as a raw material source (salt value).
 - The aluminum structure would also have to be stored [Hold Material].



TO_300 Valve Box Assembly 12/12/97



Components of High Re-use Potential

- DIRC [SuperB reuse]
 - Store bar boxes in container in Research Yard.
 - Support structure to be stored in IR12. Disassemble if no re-use. Store pieces for the long term [Hold Material]

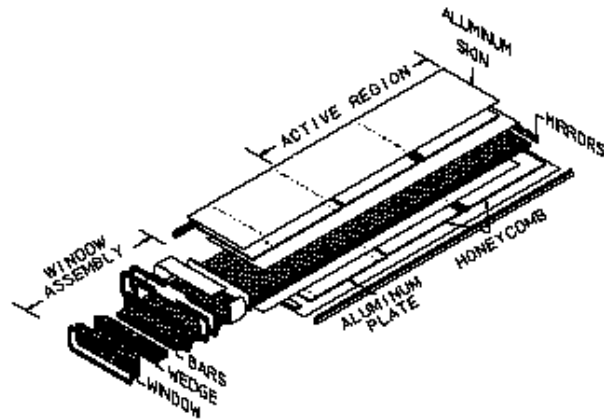


Figure 50. Schematics of the DIRC bar box assembly.

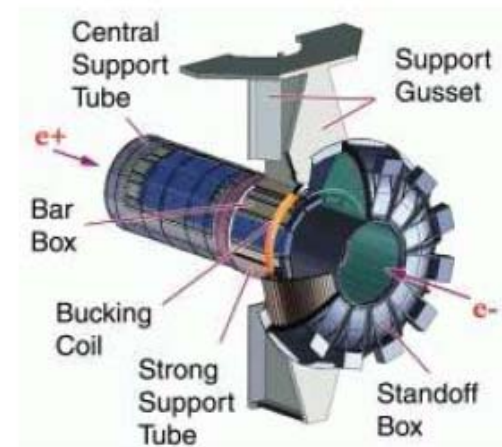
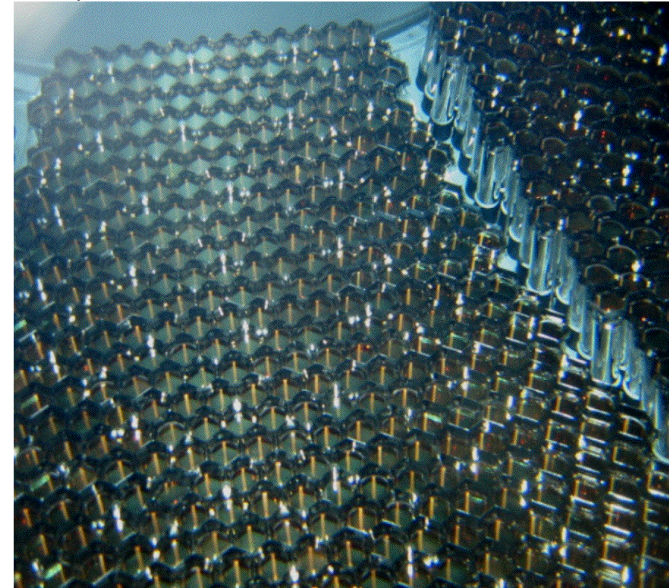


Figure 49. Exploded view of the DIRC mechanical support structure. The steel magnetic shield is not shown.

Components of Lesser Value

- There are two classes here: components with lesser value that are easily stored which have some reuse value; electronics crates, power supplies, etc. Examples:
 - LST modules. Easily stored (containers). Storage boxes will be bar-coded and labeled as to source. The wires and Cu ground planes constitute the metal.
 - Phototubes. Store after breakdown of the SOB. Potential use in low rates experiments. Storage boxes will be bar-coded and labeled as to source. [requests from PPA, LBNL]
 - Electronics crates (VME), power supplies (HV). Bar code and label as to source individually. Have ready re-use in the laboratory environment. BaBar specific electronics boards will be surveyed and packed for temporary storage; if no reuse identified, they will be disposed of.

Sector 5 and portion of sector 6

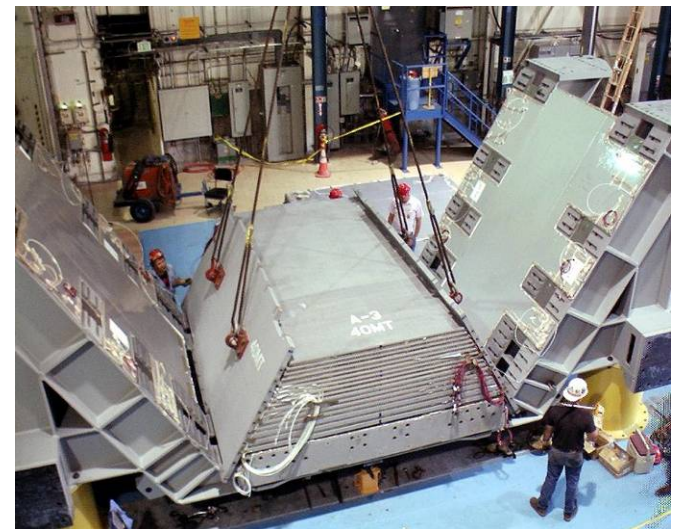
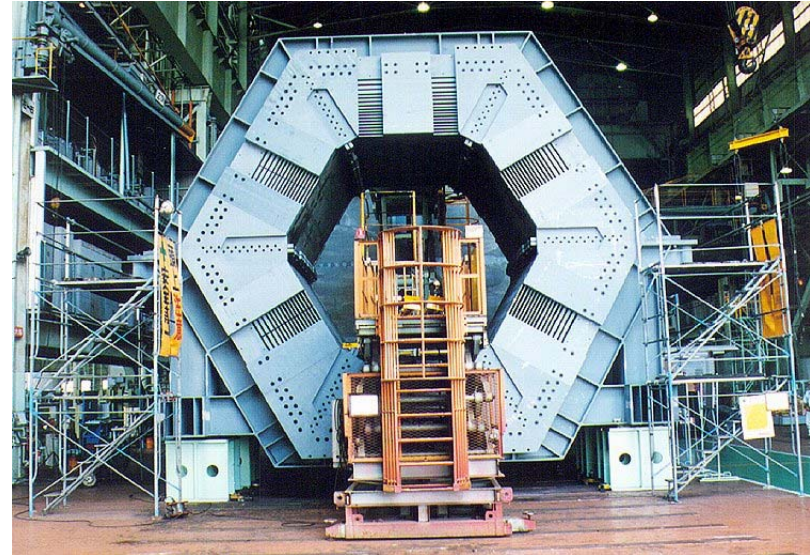


Components From Outside the RA

- These are composed of the contents of the Electronics Hut and services from the floor of IR2 outside the EH (including cable segments from outside the shield wall), as well as the remaining contents of the Gas Shack. All these items will be surveyed before leaving IR2. Bar code tags will be affixed equipment.
 - Electronic Hut: reuse as compute farm structure. Remains in IR2.
 - Electronics: Power supplies (HV, LV) and VME crates have unrestricted reuse. Store electronics in the short term till it is certain there is no reuse, at which point, discard (salvage).
 - Chillers: Commercial units are easily reused on site, or may have a SuperB reuse.
 - DIRC purification system: Mothball for potential reuse.
 - Free Release items with no reuse (readout fibers, etc.).

Structures from Inside the RA

- The magnet flux return is composed of thick slabs of steel and large support girders and slabs that are classic Metals Suspension components for bulk activation.
 - The steel is not expected to be activated.
 - Reuse of some or all of the steel is not unlikely if SuperB proves to be viable. Components of the steel such as the inner barrel sextants may not be a good match for the new detector and may need to be retained. Cut into plates, bar-coded, stenciled and labeled, these could find reuse on site as shielding material.



Storage: Metals Suspension Material

- To understand liability if reuse expectations fail and no exemption to the Metals Suspension is obtained, it is best to consider the space required to store the components of disassembled BaBar.
 - The magnet in its cryostat and ancillary equipment will continue to be stored in IR12.
 - The EMC crystals are stored in a modest-sized dry crystal hut in IR12. This is expected to be the size of a 20 ft shipping container and is included in the Jim's project cost estimate.
 - The DIRC bars are stored in their container. This is a 20 ft container.
 - The disassembled EMC, DIRC and flux return structures are stored in the same building as the PEP-II components. The incremental area needed is developed on the next transparency.

Storage: Metals Suspension Material

- Incremental area:
 - EMC: split barrel support cylinder into two parts. Store each on the floor with cylinder axis vertical. Store support plate for endcap flat with remaining barrel and endcap parts atop it. Aisle space (assume ~25%) for access brings this to: 400 sq ft.
 - DIRC: store cylindrical structures with axis vertical: strong support tube, SOB, central support tube. Store gusset and wings flat. DIRC magnetic shield D structure stacked. Area needed: 500 sq ft.
 - Barrel Sextants: split into two blocks each for transport. These will need to be lifted in via crane or large capacity fork lift since up to ~40T. Store sextant restacked. Store gap filler plates, corner blocks, etc, stacked 4 deep. 1700 sq ft.
 - End Door Steel: feet stacked two deep. Each door flat. Auxiliary steel stacked 4 deep. Plug parts in stands. 2000 sq ft.
 - Detector frame: belt beams stacked three deep. Stands. 1000 sq ft.
 - Total Area: ~5600 sq ft.
- Incremental building cost at \$200/sq ft ~ \$1.12M
 - Labor for move: 6 people (engineer, safety, riggers, workers) ~ 1 month: \$.09M
 - Total incremental cost with 50% contingency: \$1.8M

Summary

- Schemes have been developed for the treatment of the detector components as they are removed from BaBar and IR2
 - Storage areas have been set up.
- The radiation environment of two BaBar subsystems has been presented. An exemption from the Metals Suspension will be sought.
- In the worst case, where there is no significant reuse, and assuming failure to obtain a Metals Suspension exemption, space required in a minimal building has been estimated.
 - If anticipated reuse occurs, the material left for salvage could be quite minimal.