



Building 911A  
P.O. Box 5000  
Upton, NY 11973-5000  
Phone 516 5636  
Fax 516 344-5676  
cirm@bnl.gov

managed by Brookhaven Science Associates  
for the U.S. Department of Energy

*date:* November 22, 2005  
*to:* Distribution  
*subject:* Safety Walk  
*from:* P. Cirnigliaro

On October 10, 2005 a Safety Walk of the beryllium beam pipe removal at RHIC was performed. Vacuum Group personnel performed the job. The work involved removing three beryllium pipes from the PHOBOS experimental area. Each pipe was approximately 10 centimeters in diameter and 4 meters in length.

Safety Walk Attendees:

P.Cirnigliaro (C-A ESHQ)  
C. DeLaPara (C-A Vacuum Group)  
S. Gill (C-A Vacuum Group Supervisor)  
R. Todd (C-A Vacuum Group)

Positive Observations:

- Use of PPE, including impervious gloves when handling beryllium.
- Use of engineering controls (glove bags) to minimize personal exposure to beryllium.
- Enhanced Work Planning, the job was well planned with documented procedures.
- Personnel were very knowledgeable of the beam line construction and disassembly processes.
- All materials that contained or came in contact with beryllium were well controlled and analyzed for beryllium contamination.

Negative Observations:

None

Enc. Memo of November 15, 2005 to R. Karol, Beryllium Beam Pipe Removal at RHIC.

Distribution: Safety Walk Attendees

R. Karol  
E. Lessard  
H.C. Hseuh

*date:* November 15, 2005  
*to:* R. Karol  
*subject:* Beryllium Beam Pipe Removal at RHIC  
*from:* P. Cernigliaro

On October 10, 2005 the beryllium beam pipe located at the 10 o'clock PHOBOS IR at RHIC were removed. CAD Vacuum Group personnel performed the work. This work involved the removal of three beryllium beam pipes. Each pipe is approximately 4m in length, epoxy coated on the outside surface. The pipes were held together with flanges, copper or aluminum seals and bolts. The bolts were nickel-plated. The only exposed beryllium was at the edge of the flanges that would come in contact with the seals. To minimize worker exposure to beryllium the flanges were enclosed in disposable plastic glove bags. The bolts were removed in these glove bags and the beryllium surfaces wiped down with alcohol-saturated wipes. All materials removed from the glove bag were segregated into separate plastic bags i.e.: the bolts. Other items such as wrenches, seals, were wiped clean with the alcohol wipes and then swiped for laboratory analysis for beryllium. These items were held in storage until the results of the laboratory analysis could be used for determination of the disposition of these items. Included in these wipe surveys were the flange end of the beam pipes. All wipes came back from laboratory analysis with the beryllium content below the DOE surface release criteria for the general public (0.2ug/100cm<sup>2</sup>).

Personnel air sampling was performed on all workers during this project. The exposure to beryllium to all personnel was below the DOE action level of 0.02 ug/m<sup>3</sup>. Workers when handling the beam pipes were wearing impervious gloves (latex) to prevent skin exposure. It was noted that upon close inspection of the epoxy coating on the outside of the beryllium beam pipes indicated no degradation.

The removed beryllium beam pipes were blanked off using stainless steel hardware and stainless steel flanges that would allow the beam pipes to be evacuated and then filled with nitrogen to maintain the integrity of the interior beam pipe surface. The exhaust of the vacuum pump was connected to a filtering device. The filter was analyzed for beryllium content. The level of beryllium detected on this filter was below 0.02 ug/m<sup>3</sup>.

The beryllium beam pipes were inserted into stainless steel pipes for protection, and then placed in a specially constructed and labeled wooden box for storage. The pipes are to be stored in building 974. Health Physic checked all materials removed from the PHOBOS IR for activation. These materials were determined not to be activated.

Hazard assessment from the measurement data, for the disassembly process of the beam line, indicates that the potential for air borne or dermal beryllium exposure to personnel was minimal. The use of engineering controls for this work allowed the workers to proceed with little impact on the ability to perform the work efficiently but provide an additional barrier to potential beryllium exposure.

Enc: Personnel Exposure Monitoring Report, C-A 2005-10-10  
5 day Employee Notification Report  
Memos to workers and supervisor 10-19-05  
Chain of Custody Form of 3-08-05

Air Sampling Survey Forms, 1010-10-10-05-Be-1, 1010-10-10-05-Be-2, 1010-10-10-05-Be-3,  
1010-10-10-05-Be-4.

Surface Contamination Sampling Form

Beam Pipe Smear Location

Laboratory Analysis – Smear Samples

Laboratory Analysis – Air Samples

TWA Calculations for Employee Exposure

Photographs of work area in PHOBOS

EWP SS2005-160

Cc: C. DeLaPara

S. Gill

H.C.Hseuh

R. Selvey

R. Todd

Ralph Wilson, SHSD records custodian

**1. Work requester fills out this section.**

Standing Work Permit

Requester: Steve Gill	Date: 10/7/05	Ext.: 4627	Dept/Div/Group: C-A / Vacuum
Other Contact person (if different from requester): Rob Todd		Ext.: 2131	
Work Control Coordinator: Steve Gill	Start Date: 10/10/05	Est. End Date: 10/15/05	
Brief Description of Work: REMOVE BERYLLIUM BEAM PIPE, INSTALL NEW STAINLESS BEAM PIPE AND BAKEOUT SECTOR			
Building: RHIC	Room: PHOBOS	Equipment:	Service Provider: vacuum

**2. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis**

<b>ES&amp;H ANALYSIS</b>			
<b>Radiation Concerns</b>		<input type="checkbox"/> None	<input checked="" type="checkbox"/> Activation
		<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination
		<input type="checkbox"/> Radiation	
<input type="checkbox"/> Other			
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group		<input type="checkbox"/> Fissionable materials involved, notify Laboratory Criticality Officer	
<b>Radiation Generating Devices:</b>		<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges
		<input type="checkbox"/> Soil Density Gauges	<input type="checkbox"/> X-ray Equipment
<b>Safety Concerns</b>			
<input type="checkbox"/> None		<input type="checkbox"/> Ergonomics	<input type="checkbox"/> Transport of Haz/Rad Material
<input type="checkbox"/> Confined Space*		<input type="checkbox"/> Explosives	<input type="checkbox"/> Lead*
<input type="checkbox"/> Corrosive		<input type="checkbox"/> Flammable	<input type="checkbox"/> Magnetic Field*
<input type="checkbox"/> Asbestos*		<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Fumes/Mist/Dust*
<input type="checkbox"/> Beryllium*		<input type="checkbox"/> Electrical	<input type="checkbox"/> Heat/Cold Stress
<input type="checkbox"/> Biohazard*		<input type="checkbox"/> Elevated Work*	<input type="checkbox"/> Hydraulic
<input type="checkbox"/> Chemicals*		<input type="checkbox"/> Excavation	<input type="checkbox"/> Lasers*
		<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Vacuum
		<input type="checkbox"/> Penetrating Fire Walls	<input type="checkbox"/> Pressurized Systems
		<input type="checkbox"/> Material Handling	<input type="checkbox"/> Rigging/Critical Lift
		<input type="checkbox"/> Noise*	<input type="checkbox"/> Toxic Materials*
		<input type="checkbox"/> Oxygen Deficiency*	<input type="checkbox"/> Other
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
<b>Environmental Concerns</b>			
<input type="checkbox"/> None		<input type="checkbox"/> Work impacts Environmental Permit No.	
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)		<input type="checkbox"/> Land Use Institutional Controls	<input type="checkbox"/> Soil Activation/contamination
<input type="checkbox"/> Chemical or Rad Material Storage or Use		<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean
<input type="checkbox"/> Cesspools (UIC)		<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous
<input type="checkbox"/> High water/power consumption		<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial
Waste disposition by: Joel Scott		<input type="checkbox"/> Waste-Mixed	<input type="checkbox"/> Waste-Radioactive
		<input type="checkbox"/> Waste-Regulated Medical	<input type="checkbox"/> Underground Duct/Piping
		<input type="checkbox"/> Other	
<b>Pollution Prevention (P2)/Waste Minimization Opportunity:</b>			
		<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
<b>FACILITY CONCERNS</b>			
<input checked="" type="checkbox"/> None		<input type="checkbox"/> Potential to Cause a False Alarm	
<input type="checkbox"/> Access/Egress Limitations		<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Impacts Facility Use Agreement
		<input type="checkbox"/> Temperature Change	<input type="checkbox"/> Other
<input type="checkbox"/> Configuration Control		<input type="checkbox"/> Maintenance Work on Ventilation Systems	<input type="checkbox"/> Utility Interruptions
<b>WORK CONTROLS</b>			
<b>Work Practices</b>			
<input type="checkbox"/> None		<input type="checkbox"/> Exhaust Ventilation	<input type="checkbox"/> Lockout/Tagout
<input type="checkbox"/> Back-up Person/Watch		<input type="checkbox"/> HP Coverage	<input checked="" type="checkbox"/> Posting/Warning Signs
<input checked="" type="checkbox"/> Barricades		<input checked="" type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection
		<input type="checkbox"/> Spill Containment	<input type="checkbox"/> Security (see Instruction Sheet)
		<input type="checkbox"/> Time Limitation	<input type="checkbox"/> Other
		<input type="checkbox"/> Warning Alarm (i.e. "high level")	
<b>Personal Protective Equipment</b>			
<input type="checkbox"/> None		<input type="checkbox"/> Ear Plugs	<input checked="" type="checkbox"/> Gloves
<input type="checkbox"/> Coveralls		<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Lab Coat
<input type="checkbox"/> Disposable Clothing		<input type="checkbox"/> Face Shield	<input type="checkbox"/> Respirator
		<input type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers
		<input type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Other GLOVE BAGS
<b>Permits Required (Permits must be valid when job is scheduled.)</b>			
<input checked="" type="checkbox"/> None		<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems
<input type="checkbox"/> Concrete/Masonry Penetration		<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No
<input type="checkbox"/> Confined Space Entry		<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other
<b>Dosimetry/Monitoring</b>			
<input type="checkbox"/> None		<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor
<input type="checkbox"/> Air Effluent		<input type="checkbox"/> Noise Survey/Dosimeter	<input checked="" type="checkbox"/> TLD
<input type="checkbox"/> Ground Water		<input type="checkbox"/> O <sub>2</sub> /Combustible Gas	<input type="checkbox"/> Self-reading Pencil Dosimeter
<input type="checkbox"/> Liquid Effluent		<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Self-reading Digital Dosimeter
		<input checked="" type="checkbox"/> Sorbent Tube/Filter Pump	<input type="checkbox"/> Waste Characterization
			<input type="checkbox"/> Other
<b>Training Requirements (List specific training requirements)</b>			
TQ-BERYLLIUM1 C-A ACCESS RW-1			
<b>Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:</b>		<b>If using the permit when all hazard ratings are low, only the following need to sign: ( Although allowed, there is no need to use back of form)</b>	
<b>ES&amp;H Risk Level:</b>	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High
<b>Complexity Level:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High
<b>Work Coordination:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High
		WCC:	Date:
		Service Provider:	Date:
		Authorization to start	Date:
		/Departmental Sup/WCC/Designee/	

**3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)**

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed):

SEE ATTACHED STEP-BY-STEP PROCEDURE

Special Working Conditions Required:  
SEE BERYLLIUM USE & SPILL CLEAN-UP DOCUMENT  
*Notify H&E prior to start of work.*

Operational Limits Imposed:

Post Work Testing Required: 1 H SAMPLES

Job Safety Analysis Required:  Yes  No      Walkdown Required:  Yes  No

Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.

Title	Name (print)	Signature	Life #	Date
Primary Reviewer	JOEL SCOTT	<i>[Signature]</i>	13179	10/7/05
ES&H Professional	PETER CIRNIGLIARO	<i>[Signature]</i>	21868	10/7/05
Other	PAUL BERGH	<i>[Signature]</i>	19773	10/7/05
Other	RAY KAROL	<i>[Signature]</i>	15065	10/7/05
Work Control Coordinator	STEVE GILL	<i>[Signature]</i>	15656	10/7/05
Service Provider	<i>Bald Ngr</i> R. ZAHARATOS	<i>[Signature]</i>	9727	10/7/05

Review Done:  in series  team

**4. Job site personnel fill out this section.**

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).

Job Supervisor: *STEVE GILL*      Contractor Supervisor:

Workers:	Life#:	Workers:	Life#:
<i>Robert Triller</i>	18710		
<i>Thomas McKeown</i>	19931		
<i>Ronnie...</i>	15805		

Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.

**5. Departmental Job Supervisor, Work Control Coordinator/Designee**

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)

Name: Steve Gill      Signature: *[Signature]*      Life#: 15656      Date: 10/7/05

**6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required.**  Yes  No

Post Job Review (Fill in names of reviewers)

Name:	Signature:	Life#:	Date:

**7. Worker provides feedback.**

Worker Feedback (use attached sheets as necessary)

a) WCM/WCC: Is any feedback required?  Yes  No

b) Workers: Are there better methods or safer ways to perform this job in the future?  Yes  No

**8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)**

Name: Steve Gill      Signature: *[Signature]*      Life#: 15656      Date: 10/12/05

Comments: *JOB WENT AS EXPECTED - VERY WELL*  
*See IH Report 10-12-05 @*

**ALL WORKERS ARE REQUIRED TO TAKE WEB COURSE:**

Beryllium Use at BNL (TQ-Beryllium1)

**In preparation of removing the beryllium beam pipes we will need to:**

1. rope off the immediate area where work will take place.
2. transport wooden crate marked: CAUTION BERYLLIUM and stainless tubes from 820 to 10:00 area.
3. have at least 2 beam pipe stands ready
4. 4 glove bags with wipes / wrenches / plastic bag for hardware
5. 3 – 4.625" flanges w/nupro valves attached / 3 blank flanges
6. 6 – 4.625" quad ring gaskets and stainless steel hardware, including washers
7. LN2 dewar and heat ring for backfill
8. special filter (supplied by Peter Cimigliaro) for hot LN2 backfill
9. air sampling equipment (supplied by Peter Cimigliaro)
10. plastic gloves, cotton gloves, extra bags and wipes
11. styrofoam packing for beam pipe transport

**Pipe Removal Procedure:**

1. close sector valves, disconnect power cable to valve
2. perform LO/TO on ion pumps & gauges
3. mechanical survey of detectors (F.Karl)
4. HP survey / smears
5. Phobos folks remove detectors from around beam pipe (smear first?)
6. vent sector w/LN2
7. secure glove bag around flange with masking tape. Have wipes, wrenches & plastic bag (for hardware) inside glove bag
8. remove beryllium nuts & bolts from flanges & place in bags
9. wipe tools and place in 2<sup>nd</sup> plastic bag
10. wipe outside and inside of flange
11. wipe outside and inside of beam pipe
12. seal bags
13. remove glove bag
14. remove bag with tools & bag with hardware from glove bag
15. dispose of glove bag in Be waste
16. wipe beam pipe ends again & dispose of wipes in Be waste
17. IH take swipes of beam pipe
18. carefully place beryllium beam pipe on pipe stands
19. attach 4.625" flanges w/quad ring gaskets & s.s. hardware to pipe ends.
20. attach special filter to turbo & pump down then close valve
21. remove filter from turbo and disconnect turbo from beam pipe
22. backfill beam pipe with LN2 boil-off and close valves
23. place beryllium beam pipe in stainless tubes
24. place beryllium beam pipe in marked wood crate & transport to 974

## Beryllium Use & Spill Clean-up

### Routine Articles/Parts Handling

Handling parts and articles made of >0.1% beryllium does not typically result in exposure to hazardous levels of airborne dust.

- For high-beryllium contents parts (>2%): Wear gloves such as disposable latex, Nitrile, or PVC to eliminate the potential for surface dust or oxides to be ingested. Gloves also help prevent cuts and scrapes by beryllium parts, which can ulcer.
- For copper/beryllium alloys ( $\leq 2\%$ ): Under normal conditions, these alloys do not oxidize or produce surface particulates and are safe to handle without gloves.

### Spill Clean up

#### Personal Protective Equipment (PPE)

- Gloves: Nitrile, PVC, Natural rubber, and Polyethylene disposal gloves all provide adequate resistance to penetration by beryllium dusts. Thicker gloves such as neoprene or natural rubber should be used when handling sharp objects. Cotton or leather gloves, with a disposable glove underneath, may also be used for protection against cuts and punctures.
- Suits: Paper, Tyvek®, Klean-guard® or Saranex®, or similar coated suits provide adequate resistance to penetration by beryllium dusts. Body PPE should provide coverage of exposed personal clothing. Clothing contaminated with beryllium may not be taken home.
- Shoe covering: Rubbers, PVC, polyethylene, and Tyvek shoe coverings all provide adequate resistance to penetration by beryllium dusts. Foot PPE should provide coverage of exposed personal shoes. Shoes contaminated with beryllium may not be taken home or leave the spill site.
- Eye: Safety glasses with side shields are the minimum eye protection. A full-face respirator also provides adequate resistance to penetration by beryllium dusts.
- Respirator: When there is potential for activities that will create airborne dust in excess of the action level ( $0.2 \text{ ug/m}^3$ ), a respirator is required. Acceptable respirators are as follows:
  - Half-face Air purifying respirator (APR) with HEPA filter for concentrations up to  $2 \text{ ug/m}^3$
  - Full-face APR with HEPA Filter for concentrations up to  $10 \text{ ug/m}^3$
  - Full-face Powered APR with HEPA Filter for concentrations up to  $200 \text{ ug/m}^3$

#### Clean-up Techniques

- Pick up sharp objects with tongs. (Beryllium cuts cause more severe injury than typical sharps).
- Wet wipe appropriate surfaces (typically with ethanol).

- Use a HEPA vacuum. (Do not use a non-HEPA filtered vacuum). Vacuum cleaners should be dedicated to beryllium to prevent mixed wastes and should be labeled "Beryllium."

**Area and Personnel Sampling**

- In areas where beryllium has been spilled or articles such as accelerator windows have been broken surfaces must be sampled to determine compliance with DOE's workplace housekeeping and general public release criteria. Contact the Facility Support Representative.
- Air sampling for breathing zone exposure of clean-up worker is to be done, when available.

# Analysis Results

**Liberty Mutual Insurance Group  
Commercial Professional Services  
Industrial Hygiene Laboratory / 01C1**

Date: Friday, October 14, 2005

71 Frankland Road  
Hopkinton, Ma. 01748  
(800) 230-6263 FAX: (508) 435-3575

Ralph D. Wilson  
Brookhaven National Laboratories  
William Floyd Parkway, Bldg 120  
PO Box 5000  
Upton, NY 11973

Survey Date: 10/10/2005  
Date Received: 10/13/2005  
Customer PO:  
Project ID: LM-03-172  
Project Number: 1010  
Project Name:  
Project Location:

Collector: Ralph Wilson

Sample Set: 0510226

LM Sample No.	Sample No.	Analyte	Sampling Time (min.)	Sampling Rate (liters/min)	Volume (liters)	Results
0510226-001	1010-101005-Be-05	Beryllium				0.0082 mg/sq ft
0510226-002	1010-101005-Be-06	Beryllium				0.0017 mg/sq ft
0510226-003	1010-101005-Be-07	Beryllium				0.0087 mg/sq ft
0510226-004	1010-101005-Be-08	Beryllium				0.0013 mg/sq ft
0510226-005	1010-101005-Be-09	Beryllium				0.00064 mg/sq ft
0510226-006	1010-101005-Be-10	Beryllium				0.0096 mg/sq ft
0510226-007	1010-101005-Be-11	Beryllium				0.00058 mg/sq ft
0510226-008	1010-101005-Be-12	Beryllium				0.0043 mg/sq ft
0510226-009	1010-101005-Be-13	Beryllium				0.0013 mg/sq ft
0510226-010	1010-101005-Be-14	Beryllium				0.0033 mg/sq ft
0510226-011	1010-101005-Be-15	Beryllium				0.0089 mg/sq ft
0510226-012	1010-101005-Be-16	Beryllium				0.0015 mg/sq ft
0510226-013	1010-101005-Be-17	Beryllium				<0.000082 mg/sq ft
0510226-014	1010-101005-Be-18	Beryllium				<0.000082 mg/sq ft
0510226-015	1010-101005-Be-19	Beryllium				0.00021 mg/sq ft
0510226-016	1010-101005-Be-20	Beryllium				0.0034 mg/sq ft
0510226-017	1010-101005-Be-21	Beryllium				<0.0000090 mg/sample
0510226-018	1010-101005-Be-22	Beryllium				<0.0000090 mg/sample

Beryllium	Wipe	0.0090 ug/sample	OSHA ID-121	No	ICP	Yes	14-Oct-05
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\* Modify: A "Yes" indicates a minor modification in the Method.

LM Sample No.	Sample No.	Analyte	Sampling Time (min.)	Sampling Rate (liters/min)	Volume (liters)	Results
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Lab  
Comments

Calcium, copper, iron, nickel and zinc were also found in some wipe samples.

Analyzed by: *[Signature]*

Peer Reviewed by: *[Signature]*

Approved By: *Isabel Y. Patricia*

Analysis results of swipe samples taken Oct. 10, 2005 at RHIC –IR – 10.

Project ID: LM-03-172

Project Number: 1010

Sample Set: 0510226

LM Sample No.	Sample No.	Analyte	Results mg/ft <sup>2</sup>	Results ug/100 cm <sup>2</sup>
0510226-001	1010-101005-Be-05	Be	0.0082	0.0088
0510226-002	1010-101005-Be-05	Be	0.0017	0.0018
0510226-003	1010-101005-Be-05	Be	0.0087	0.0094
0510226-004	1010-101005-Be-05	Be	0.0013	0.0014
0510226-005	1010-101005-Be-05	Be	0.00064	0.0007
0510226-006	1010-101005-Be-05	Be	0.0096	0.0103
0510226-007	1010-101005-Be-05	Be	0.00058	0.0006
0510226-008	1010-101005-Be-05	Be	0.0043	0.0046
0510226-009	1010-101005-Be-05	Be	0.0013	0.0014
0510226-010	1010-101005-Be-05	Be	0.0033	0.0036
0510226-011	1010-101005-Be-05	Be	0.0089	0.0096
0510226-012	1010-101005-Be-05	Be	0.0015	0.0016
0510226-013	1010-101005-Be-05	Be	<0.0000082	0
0510226-014	1010-101005-Be-05	Be	<0.0000082	0
0510226-015	1010-101005-Be-05	Be	0.00021	0.0002
0510226-016	1010-101005-Be-05	Be	0.0034	0.0037
0510226-017	1010-101005-Be-05	Be (blank)	<0.0000090 mg/sample	0
0510226-015	1010-101005-Be-05	Be (blank)	<0.0000090 mg/sample	0

Analyte:

<input type="checkbox"/>	LEAD
<input checked="" type="checkbox"/>	BERYLLIUM
<input type="checkbox"/>	CADMIUM
<input type="checkbox"/>	Other:

DEPT: CAD

BUILDING: 1010 RHIC

LOCATION NAME, ROOM NUMBER & DESCRIPTION: PHOBOS Beam Pipe

Sample Media:

<input checked="" type="checkbox"/>	Ghost Wipe™
<input type="checkbox"/>	Cotton Gauze
<input type="checkbox"/>	Filter Paper
<input type="checkbox"/>	Type & Size:
<input type="checkbox"/>	Other:

Solvent:

<input type="checkbox"/>	Pre-Moistened
<input type="checkbox"/>	Distilled Water
<input type="checkbox"/>	Hexane
<input type="checkbox"/>	Iso-Propanol
<input type="checkbox"/>	Other:

Surface Area Measurement:

<input type="checkbox"/>	Template
<input checked="" type="checkbox"/>	Measured Area
<input type="checkbox"/>	Estimated Area
<input type="checkbox"/>	Other:

REASON FOR SAMPLING:

Area Characterization

Pre-Remediation

Post Remediation

Other: Beam Pipe Removal

Sample Identification

Sample Number				Sample Location	Surface Type <small>Metal / Plastic / Glass / Painted Wood / Wood / Painted Concrete / Concrete</small>	Surface Area
Bldg#	MMDDYY	Analyte Symbol	Sample #			
1010	101005	Be	5	Flange 1 1-SW-1	Metal Be	1 ft <sup>2</sup> 100 cm <sup>2</sup>
1010	101005	Be	6	Flange 1 1-SW-2	Metal epoxy coat	1 ft <sup>2</sup> 100 cm <sup>2</sup>
1010	101005	Be	7	Flange 2 2-SW1	Metal Be	1 ft <sup>2</sup> 100 cm <sup>2</sup>
1010	101005	Be	8	Flange 2 2-SW2	Metal epoxy coat	1 ft <sup>2</sup> 100 cm <sup>2</sup>

Additional Samples next page 2 Pages

Total Number of Samples: 16

SAMPLE DATE: 10-10-05

SAMPLES TAKEN BY: (Print Name and Signature)  
Peter Cirrignaro Peter Cirrignaro

RELINQUISHED TO SHSD IH LAB BY: (SIGNATURE): P. Cirrignaro DATE / TIME: 10/10/05 16 30

RECEIVED BY SHSD IH LAB EMPLOYEE (SIGNATURE): [Signature] DATE / TIME: 10-10-05/1649

Sample Number				Sample Location	Surface Type <small>Metal / Plastic / Glass / Painted Wood / Wood / Painted Concrete / Concrete</small>	Surface Area
Bldg#	MMDDYY	Analyte Symbol	Sample #			
1010	10/10/05	Be	9	Flange 2 2-SW-3	<del>Painted Concrete</del> Metal Be	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	10	Flange 2 2-SW-4	Metal epoxy coated	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	11	Flange 3 4-SW-1	Metal Be	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	12	Flange 3 4-SW-2	Metal epoxy coat	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	13	Flange 3 4-SW-3	Metal Be	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	14	Flange 3 4-SW-4	Metal epoxy coat	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	15	Flange 4 3-SW-1	Metal bare Be	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	16	Flange 4 3-SW-2	Metal epoxy coat	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	17	Bellows 1 SW1	Metal S.S.	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____
1010	10/10/05	Be	18	Bellow 2 SW2	Metal S.S.	1 ft <sup>2</sup> 100 cm <sup>2</sup> other: _____

SAMPLE DATE: 10/10/05

SAMPLES TAKEN BY: (Print Name and Signature)  
P. Cirigliano P. [Signature]

RELINQUISHED TO SHSD IH LAB BY: (SIGNATURE): P. [Signature] DATE / TIME: 10/10/05 16:30

RECEIVED BY SHSD IH LAB EMPLOYEE (SIGNATURE): [Signature] DATE / TIME: 10/10/05 16:49

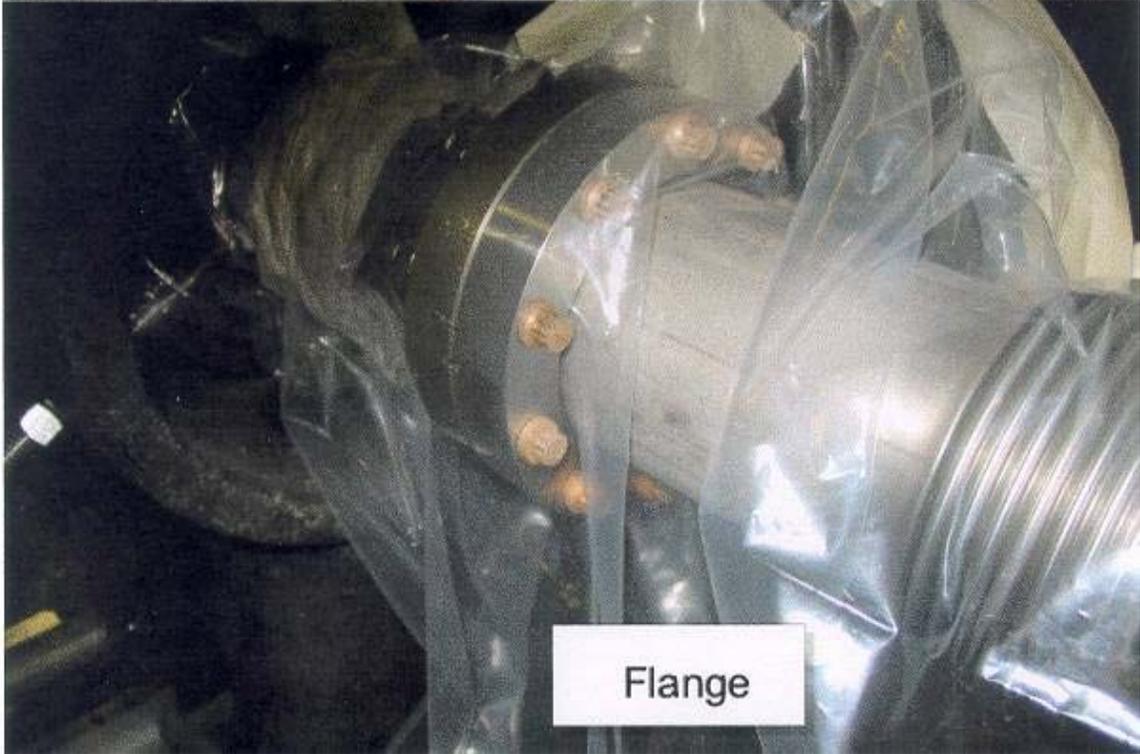
Sample Number				Sample Location	Surface Type <small>Metal / Plastic / Glass / Painted Wood / Wood / Painted Concrete / Concrete</small>	Surface Area
Bldg#	MMDDYY	Sample #	Analyte Symbol			
1010	101005	19	Be	WRENCHES USED IN GLOVE BAGS AFTER CLEAN	Metal	<del>1 ft<sup>2</sup></del> <del>100 cm<sup>2</sup></del> other: 50 cm <sup>2</sup>
1010	101005	20	Be	VACUUM SEALS (4) USED IN BEAM PIPE AFTER CLEAN	Metal	<del>1 ft<sup>2</sup></del> <del>100 cm<sup>2</sup></del> other: 30 cm <sup>2</sup>
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____
						___ 1 ft <sup>2</sup> ___ 100 cm <sup>2</sup> other: _____

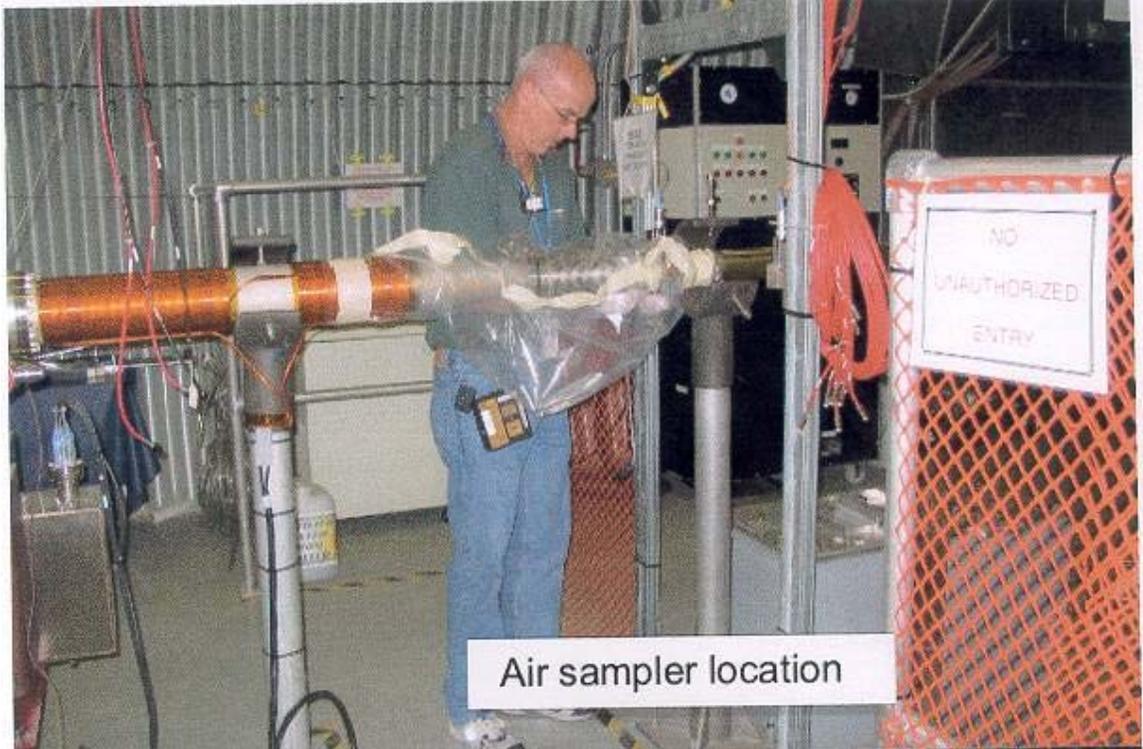
SAMPLE DATE: 10/10/05

SAMPLES TAKEN BY: (Print Name and Signature)  
P. CIRNIGLIARO

RELINQUISHED TO SHSD IH LAB BY: (SIGNATURE): *[Signature]* DATE / TIME: 10/10/05 1 16 30

RECEIVED BY SHSD IH LAB EMPLOYEE (SIGNATURE): *[Signature]* DATE / TIME: 10/10/05 1 16 40





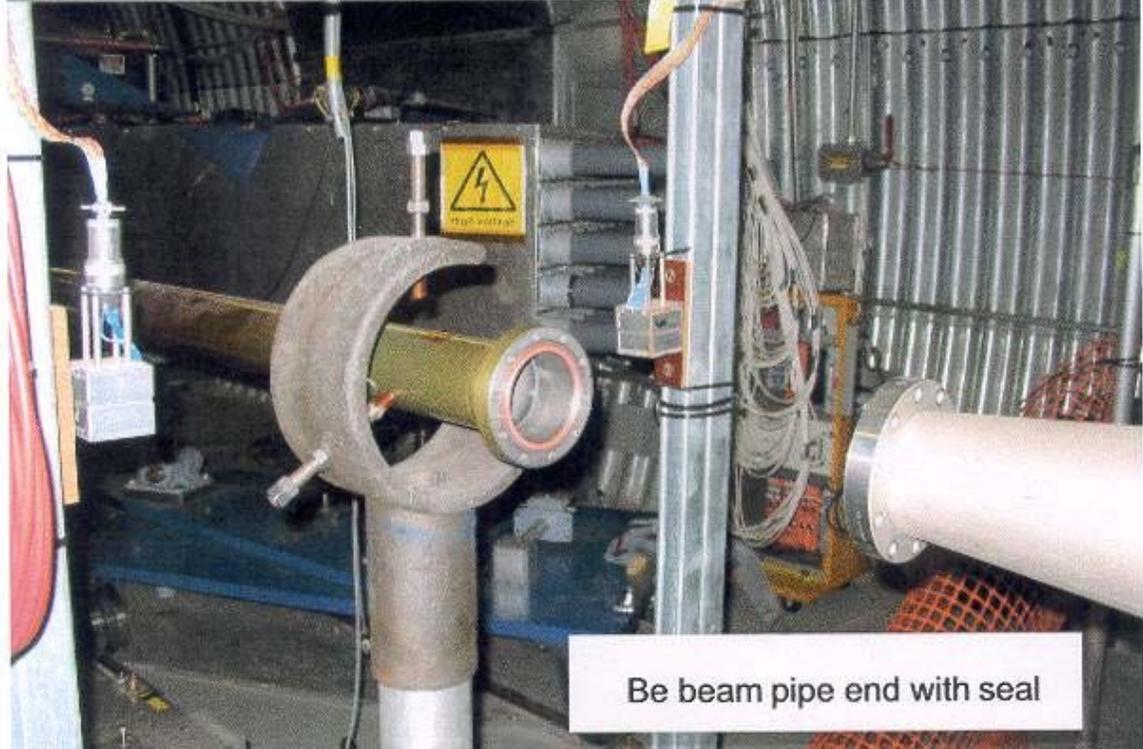
Air sampler location



Air sampler location



Vacuum Pump Sample Filter



Be beam pipe end with seal



SS bellows



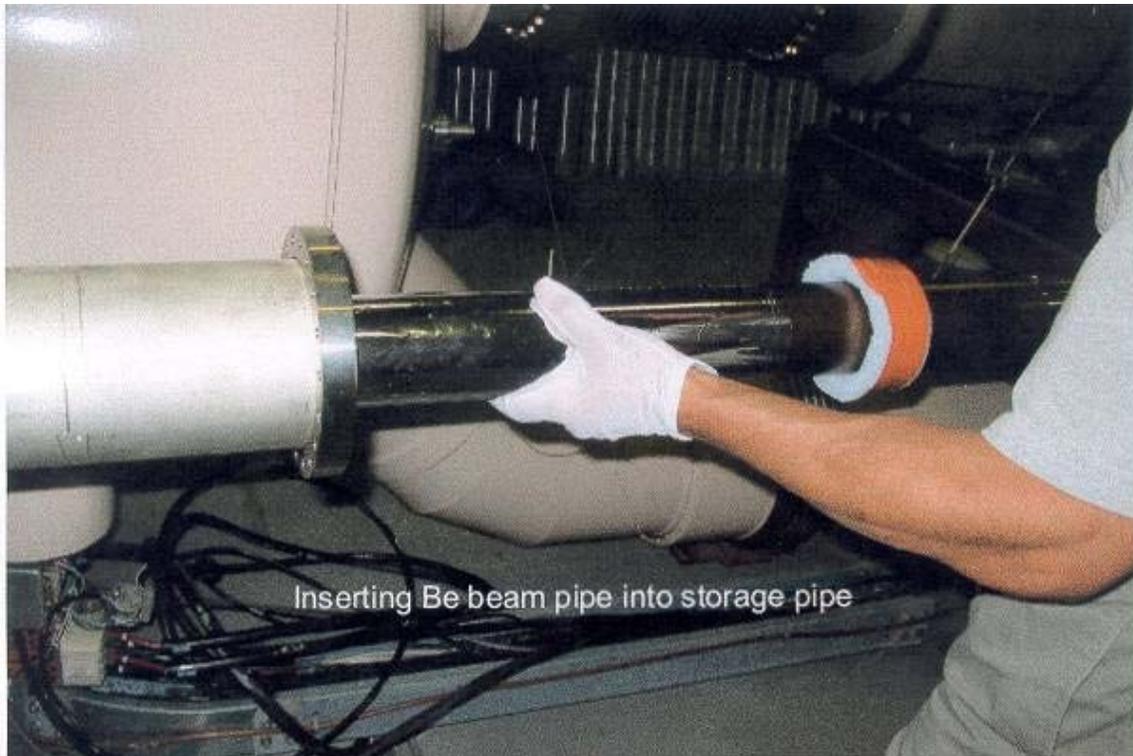
Be pipe with blank off flange, ready for storage.



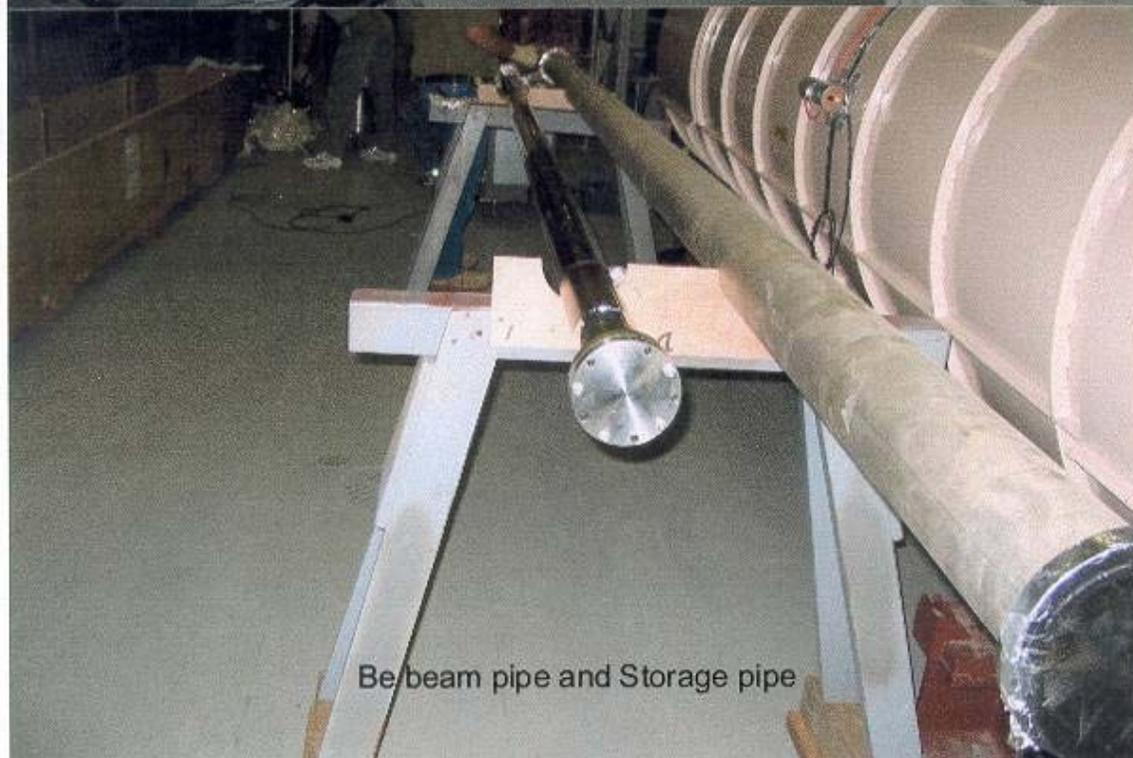
N2 gas fitting on flange



N2 filling of Be beam pipe



Inserting Be beam pipe into storage pipe



Be beam pipe and Storage pipe



Be pipe inserted into protective storage pipe





Box label