

Part A: Source Hazard Assessment Record

| I. Source Identification | | | |
|---|---|---|-------------|
| Department: NLSL | Building: 535C, 725, 729 | Room or Area (location of source): Vacuum Lab, beam lines, storage areas | |
| Identifier/ Name of Source: Ion pumps | | | |
| Status of Source Usage (check all that apply): <input checked="" type="checkbox"/> In use on frequent basis <input type="checkbox"/> Planned use in the near future <input type="checkbox"/> Possible future use <input type="checkbox"/> No planned use <input type="checkbox"/> Intermittent use <input type="checkbox"/> One-time use <input type="checkbox"/> Other: | | | |
| Check or Describe Use or Process: | <input type="checkbox"/> Nuclear Magnetic Resonance | <input checked="" type="checkbox"/> Ion pumps | |
| <input type="checkbox"/> Accelerator magnets | <input type="checkbox"/> Magnetic Resonance Imaging | <input type="checkbox"/> Permanent magnet | |
| <input type="checkbox"/> Beam transport magnet | <input type="checkbox"/> Medical device | <input type="checkbox"/> Electromagnet lifting device | |
| <input type="checkbox"/> Detector magnets | <input type="checkbox"/> Electron microscope | <input type="checkbox"/> Tool Chuck/clamp | |
| <input type="checkbox"/> Super-conducting coils | <input type="checkbox"/> Magnetometers | | |
| <input type="checkbox"/> Other (specify): | | | |
| II. Exposure Summary [Complete Part B: Field Strength Measurement Record or attach documentation from manufacturer] | | | |
| Target Body Area | BNL Exposure Limits** | | |
| | TWA-8 | | Ceiling |
| | (mT) | (G) | (mT) |
| Cardiac Pacemaker & Ferromagnetic Objects* | | | 0.5 |
| Whole Body (Torso or Head) | 60 | 600 | 2,000 (2 T) |
| Extremities (Limbs) | 600 | 6,000 | 5,000 (5 T) |
| *Ferromagnetic Objects (Ceiling), including medical implants and prostheses, may be affected by fields. Additional evaluation is required. | | | |
| ** TWA-8 = (B ₁ t ₁ + B ₂ t ₂ + ... + B _n t _n) / 480 minutes (See Exhibit BNL Static Magnetic Field Exposure Limits for details.) B = Flux Density [mT] t = time of exposure [minutes] | | | |
| Maximum Exposure Potential surveyed applicable to worker exposure (mT): Up to 60 mT contact, less than 0.5 mT at 10" | | | |
| III. Exposure Hazard Evaluation: Indicate worker exposure potential on the OMC Job Assessment Form or OMC Static Magnetic Field Questionnaire form. | | | |
| Flux Density | | | |
| 1a. <input type="checkbox"/> Flux Density ≥ 0.5 mT (5 Gauss). No potential for individuals with medical electronic devices or ferromagnetic implants/prostheses* to be exposed above 0.5 mT (5 Gauss). | | | |
| 1b. <input checked="" type="checkbox"/> Flux Density ≥ 0.5 mT (5 Gauss). Access to > 5G for individuals with medical electronic devices or ferromagnetic implants/prostheses* is not permitted. | | | |
| 2a. <input type="checkbox"/> Flux Density ≥ 60 mT (600 Gauss) - Whole Body. No potential to exceed the 8 hours TWA. | | | |
| 2b. <input type="checkbox"/> Flux Density ≥ 60 mT (600 Gauss) - Whole body. Potential to exceed the 8 hours TWA. Controls must be used. | | | |
| 3a. <input type="checkbox"/> Flux Density ≥ 600 mT (6000 Gauss) - Limbs. No potential to exceed the 8 hours TWA. | | | |
| 3b. <input type="checkbox"/> Flux Density ≥ 600 mT (6000 Gauss) - Limbs. Potential to exceed the 8 hours TWA. Controls must be used. | | | |
| 4a. <input type="checkbox"/> Flux Density ≥ 2T (ceiling) - Whole Body. No potential to exceed the BNL ceiling. | | | |
| 4b. <input type="checkbox"/> Flux Density ≥ 2T (ceiling) - Whole Body. Potential to exceed the BNL ceiling. Controls must be used. | | | |
| 5a. <input type="checkbox"/> Flux Density ≥ 5T (ceiling) - Limbs. No potential to exceed the BNL ceiling. | | | |
| 5b. <input type="checkbox"/> Flux Density ≥ 5T (ceiling) - Limbs. Potential to exceed the BNL ceiling. Controls must be used. | | | |
| * Medical electronic devices include cardiac pacemakers, electronic inner ear prostheses, and insulin pumps. Ferromagnetic implants/ prostheses include aneurysm clips, replacement hips. | | | |

4. **Describe job/task and potential for employee exposures** (e.g., type of work performed around source, method of control, time spent in fields [hours/day] and method of determining exposure):

Vacuum Group: handle ion pumps, install and remove them from the rings and beam lines, ship them to vendors for repairs, conduct in-house replacements of worn parts. There is little direct handling of the ion pump magnets. This same group also assists the RF Group with klystron waveguide assemblies. Based on work patterns and measured magnetic fields, no one in this group exceeds any of the magnetic field limits or ceilings.

Scientists and beam line mechanical groups may work near ion pumps on beam lines. The 0.5 mT field ranges from 4 to 10 inches from pumps. Ion pumps are labeled with warning signs. No personnel with medical electronic or ferromagnetic implants allowed within 12 inches.

5. **Frequency of exposure** (e.g., # days per year or month, # tests per year, in continuous use, etc.):

Once/month for a few hours for vacuum group

Once/month for a few minutes for scientists and beam line groups.

IV. Precautions / Engineering & Administrative Controls

Precautions During Use (check all that apply):

- | | |
|---|--|
| <input checked="" type="checkbox"/> Signs | <input type="checkbox"/> Lights |
| <input type="checkbox"/> Barriers | <input type="checkbox"/> Restricted access |
| <input type="checkbox"/> Rotation of workers | <input type="checkbox"/> Working when de-energized |
| <input checked="" type="checkbox"/> Use of nonferromagnetic tools | |
| <input type="checkbox"/> Physical indicator of fringe fields (e.g., use of string with paper clips or equivalent) | |

Other:

Written Documentation:

- Experimental Review ([Work Planning and Control for Experiments and Operations](#) Subject Area)
 Work Planning and Control ([Work Planning and Control for Experiments and Operations](#) Subject Area)
 Written SOP (describe):

Other kinds of workers who may require information/written documentation/training to enter this area:

Checklist:

Employee training: Static Magnetic Fields Web Course Dept/Division-Specific Training

Supervisors training: Static Magnetic Fields Web Course Dept/Division-Specific Training

Training required to be linked to Job Training Analysis for affected workers: yes no

Worker evaluation required by OMC (all workers exposed to $\geq 5G$) yes no

yes no

V. Initial Assessment

Completed by: L. Stiegler

Date: 10/30/08

Reviewed by ES&H Coordinator: L. Stiegler

Date: 10/30/08

Forward the original form to the Static Magnetic Fields Subject Matter Expert, copies to your ES&H Coordinator and Safety & Health Representative. Retain a copy in your files. Update and resubmit the assessment when changes occur.