BROOKHAVEN NATIONAL LABORATORY

BNL Static Magnetic Fields Exposure Form

Part A: Source Hazard Assessment Record

I. Source Identification

Department: NSLS	Building: 725, 729	Room or Area (location of source): Corridor outside LINAC

Identifier/ Name of Source:
Klystron assembly permanent magnets

Status of Source Usage (check all that apply):
[X] In use on frequent basis [ ] Planned use in the near future [ ] Possible future use [ ] No planned use
[ ] Intermittent use [ ] One-time use [ ] Other:

Check or Describe Use or Process:
☐ Accelerator magnets
☐ Beam transport magnet
☐ Detector magnets
☐ Super-conducting coils
[ ] Other (specify):
☐ Nuclear Magnetic Resonance
☐ Magnetic Resonance Imaging
☐ Medical device
☐ Electron microscope
☐ Magnetometers
☐ Ion pumps
☒ Permanent magnet
☐ Electromagnet lifting device
☐ Tool Chuck/clamp

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)	(G)
Cardiac Pacemaker & Ferromagnetic Objects*			0.5	5
Whole Body (Torso or Head)	60	600	2,000 (2 T)	20,000
Extremities (Limbs)	600	6,000	5,000 (5 T)	50,000

*Ferromagnetic Objects (Ceiling), including medical implants and prostheses, may be affected by fields. Additional evaluation is required.

** TWA-8 = $(B_1 t_1 + B_2 t_2 + \ldots. + B_n t_n) / 480$ 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): 1000 Gauss at contact (extremities)

III. Exposure Hazard Evaluation: Indicate worker exposure potential on the OMC Job Assessment Form or OMC Static Magnetic Field Questionnaire form.

Flux Density

1a. ☐ 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. ☒ Flux Density ≥ 0.5 mT (5 Gauss). Access to > 5G for individuals with medical electronic devices or ferromagnetic implants/prostheses* is not permitted.
2a. ☐ Flux Density ≥ 60 mT (600 Gauss) - Whole Body. No potential to exceed the 8 hours TWA.
2b. ☐ Flux Density ≥ 60 mT (600 Gauss) - Whole body. Potential to exceed the 8 hours TWA. Controls must be used.
3a. ☐ Flux Density ≥ 600 mT (6000 Gauss) - Limbs. No potential to exceed the 8 hours TWA.
3b. ☐ Flux Density ≥ 600 mT (6000 Gauss) - Limbs. Potential to exceed the 8 hours TWA. Controls must be used.
4a. ☐ Flux Density ≥ 2T (ceiling) - Whole Body. No potential to exceed the BNL ceiling.
4b. ☐ Flux Density ≥ 2T (ceiling) - Whole Body. Potential to exceed the BNL ceiling. Controls must be used.
5a. ☐ Flux Density ≥ 5T (ceiling) - Limbs. No potential to exceed the BNL ceiling.
5b. ☐ 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):

Incidental extremity contact with magnets during maintenance or repair. At > 3", the magnetic field drops below 600 Gauss, so there is no opportunity for whole body exposure above limits.

In the corridor, the exposure level is > 5 Gauss, so no entry for those with medical electronic implants or ferromagnetic implants.

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

For maintenance – 1/yr, for repair ~ 2/yr for a few days each

For walking through corridor (12.5 Gauss) – daily

IV. Precautions / Engineering & Administrative Controls

Precautions During Use (check all that apply):

- ☒ Signs
- ☐ Lights
- ☐ Barriers
- ☐ Restricted access
- ☐ Rotation of workers
- ☐ Working when de-energized
- ☒ Use of nonferromagnetic tools
- ☐ 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:

All Users, visitors and tours are informed of magnetic fields in the corridor via the Visitor/Escort form, and/or User Safety Training. People with medical electronic implants or ferromagnetic implants are asked to use a different entrance. Employees and long-term residents are evaluated by the Occupational Medical Clinic.

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 ≥ 5G)	☒ yes	☐ no
	☐ yes	☐ no

V. Initial Assessment

Completed by: L. Stiegler	**Date: 10/20/08**
Reviewed by ES&H Coordinator: L. Stiegler	**Date: 10/20/08**

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.