

**BROOKHAVEN NATIONAL LABORATORY
PROCESS ASSESSMENT FORM**

I. General Information

Process ID:	AM-524-SSO	PEP ID# 524		
Process Name:	Staff Shop Operations			
Process Flow Diagrams:	AM-524-SSO-01 through 03			
Process Description:	The process includes the Staff Shop Operations located in various buildings at BNL and managed by the Superconducting Magnet Division to support the fabrication of superconducting magnets and other components. These shops consist of various machines used for the small-scale fabrication, assembly, maintenance and repair of metal and fiberglass equipment and parts. The machines utilized in the Staff Shops include milling machines, lathes, drill presses, band saws, grinders, shears and sanders. Section II and the above-referenced Process Flow Diagrams provide more detail on the Staff Shop Operations.			
Dept./Div.:	Superconducting Magnet			
Dept. Code:	AM			
Building(s):	902, 903 (Rooms 1A and 1D), 924			
Room(s):	Various			
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Prepared by:	M. VanEssendelft	Reviewed by:	J. Durnan	

II. Detailed Process Descriptions and Waste Determination

Superconducting magnets are designed to bend and focus ion beams used in accelerator/collider projects at BNL and other laboratories. Superconducting Magnet Division (SMD) designs, fabricates, tests and repairs superconducting magnets. The magnets are cooled to 4.6°K (and lower) using either liquid helium or supercritical helium gas. At cryogenic temperature, the magnets acquire superconducting properties, thereby greatly reducing the amount of electricity that must be supplied to generate the magnetic field.

Process Flow Diagrams [AM-524-SSO-01 through 03](#), provided in Attachment 1, graphically depict the process inputs and outputs for the Staff Shop Operations. They have been organized into three major processing units, identified as 1.0 through 3.0. These diagrams were developed to support fabrication and assembly operations associated with the Relativistic Heavy Ion Collider (RHIC). The processes and controls are still in use and continue to be applicable.

Superconducting Magnet Division maintains staff shops located in Buildings 902, 903 (Rooms 1A and 1D) and 924, for the small-scale fabrication, assembly, maintenance and repair of metal and fiberglass equipment and parts associated with division projects. These staff shops contain various metalworking machines, including milling machines, lathes, drill presses, band saws, grinders, sanders and shears. The type and quantity of equipment within each shop varies, as does the frequency of use, however the function and operation of these shops is similar. Very limited machining operations currently are performed in Buildings 903 and 924, and the level is not expected to increase under current workloads.

The staff shops have been organized into three units based on similarity of inputs and outputs, as well as scale of operation. The three units consist of the large metal shop located in Building 903 Room 1A, the fiberglass shop located in Building 903 Room 1D and the remaining small staff shops.

The large staff shop located in Building 903 Room 1A consists of approximately 35 metalworking machines and a small degreasing tank. Also located in Building 903 is the staff shop in Room 1D that is dedicated to fiberglass work only. The fiberglass staff shop is the only shop of its kind at BNL and is often utilized by CSD personnel for non-SMD work. The remaining shops are much smaller (approximately 2 to 12 machines), utilized on a less frequent basis and located in specific buildings to support mechanical assembly and maintenance operations

Note: Due to low production schedule, the shop in Building 903 that was staffed by workers from the laboratory's Central Shop Division (CSD) is currently used by SMD personnel.

Complete lists of chemicals utilized by the Superconducting Magnet Division are tracked using the BNL [Chemical Management System](#) (CMS). Current lists of chemical assigned to the Division can be found using the BNL CMS web site. Not all of the chemicals listed in the CMS list or located in SMD Buildings are used on a regular basis. When projects are completed, the chemicals used for that particular project typically remain in storage cabinets at the building for possible use in the future. Waste generated in the staff shops is typically recycled or discarded in the trash. The quantity of waste generated is small and difficult to estimate as it is often combined with the waste from the associated mechanical assembly and maintenance operations.

Regulatory Determination of Process Outputs

1.0 Large Metal Shop

The large metal shop is located in Building 903 Room 1A. The machines located in this shop include milling machines, lathes, drill presses, band saws, grinders and sanders. Brass, steel, stainless steel,

aluminum and copper parts are machined within this shop. During machining operations coolant is either sprayed on the parts and machine tools utilizing refillable plastic spray bottles or the machines have coolant reservoir systems that recirculate the coolant to prevent the tools from overheating. Some of the coolant vaporizes during use and is released to ambient air. Spent coolant collected in the machine reservoirs is periodically transferred to Central Shops Division, Building 495 for recycling. The Central Shops Division also supplies fresh coolant as needed. Some lubricants applied to the metal parts during machining and are also used for machine operation and maintenance. Paper rags and cleaners (typically LPS Presolve) are used to wipe the parts clean following machining. There are containers specifically for oily rags throughout the shop and for rags soaked with oil from spill cleanup or maintenance operations. The containers are labeled to ensure segregation and separate disposal, the spent damp oily rags from wiping parts are currently discarded in the regular trash. Empty cleaner and lubricant containers are discarded in the regular trash. Metal chips are removed from the machines and floor using a shop vac and/or floor sweeper. The contents of the shop vacs and floor sweepers are deposited in the appropriate chip bin for recycling by an off-site vendor, along with other metal scrap and broken and worn tools. To support shop equipment, some basic gas welding operations are performed. A self-contained degreasing unit is available. The degreaser agent is volatile, however no additional respiratory protection is required since good ventilation is maintained in the area and the degreaser is used infrequently. When not in use, the unit is kept covered to reduce the amount of degreaser that is vaporized. Used degreaser would be disposed of as hazardous waste to the Hazardous Waste Management Facility (HWMF).

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
1.1	Spent coolant	Non-hazardous liquid waste as determined by process knowledge	Waste is drummed and sent to Building 495 for on-site recycling	None
1.2	Vaporized coolant	Non-hazardous vapors as determined by process knowledge	Waste is discharged to ambient air	None
1.3	Spent oily rags	Non-hazardous solid waste as determined by process knowledge	Spent oily rags to HWMF as Industrial Waste	None
1.5	Empty containers	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	None

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
1.6	Metal chips and broken or worn tools	Non-hazardous solid waste as determined by process knowledge	Waste is placed in chip bin for off-site recycling	None
1.7	Vaporized degreaser	Vapor concentration < TLV due to use, location and adequate ambient ventilation as determined by process knowledge	Waste is discharged to ambient air	None
1.8	Spent degreaser	Hazardous liquid waste as determined by process knowledge	Waste is disposed of as hazardous to HWMF	None

2.0 Fiberglass Shop

The fiberglass shop is located in Building 903 Room 1D. The machines located in this shop include band saws, lathes, and milling machines that are used in the fabrication of fiberglass parts only. On occasion, fiberglass coated with copper or aluminum is machined in this shop. Lubricants are applied to these coated parts during machining and are used for machine operation and maintenance. Coolant is not utilized during normal machining in the fiberglass shop. Paper rags and cleaners are used to wipe the parts clean following machining and the spent rags are discarded in the regular trash (identical to 1.3). Empty containers are discarded in the regular trash (identical to 1.5).

Scrap fiberglass is also discarded in the regular trash. All of the machines in the fiberglass shop are connected to a vacuum exhaust system that removes vapors and fiberglass dust from the room through ducts into a dedicated cyclone/baghouse located outside the building. Fiberglass dust from the cyclone/baghouse is collected in plastic lined drums and when full, the bagged dust is discarded in the regular trash. The exhaust has been categorized as trivial sources under the laboratory's NYSDEC Title V permit. Logbooks are maintained to record the estimated emissions from this and other processes. Posting at these points list evaluated activities. BNL Central Shop ensures proper maintenance is performed on the system (i.e., baghouse filters inspected).

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action
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				Required
2.1	Spent rags	Non-hazardous solid waste as determined by process knowledge	Spent rags to normal trash	None
2.2	Empty containers	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	None
2.3	Scrap fiberglass	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	None
2.4	Fiberglass dust and spent filter bags	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	None
2.5	Fine dust and vapors	Non-hazardous permitted emission as determined by process knowledge	Fine dust (that not controlled by the baghouse filters) and vapors are released to outside air	Issue an ILR to Plant Engineering Maintenance Management for inspection and repair (as needed) of the fiberglass exhaust system.

3.0 Small Staff Shops

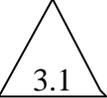
The small staff shops are located in Buildings 902A and 924. These shops are primarily used to support the assembly, maintenance and repair of metal equipment and parts. The fabrication of metal or fiberglass parts is typically performed in the large staff shop and fiberglass shop located in Building 903 or the CSD shops. Materials machined at the small staff shops include brass, carbon steel, stainless steel, aluminum and copper.

The staff shop in Building 902 supports division's magnet mechanical assembly operations and consists of 4 drill presses, 1 band saw, 1 shear, and 1 milling machine and 3 lathes. 2 belt sanders and 2 bench grinders are located in Room 11 in Building 902A. They are used primarily to de-bur metal edges, grind soft metals (aluminum, copper, brass) and to sharpen tools. A central dust collector is used to

exhaust machined material directly to outside atmosphere. The exhaust has been categorized as trivial sources under the laboratory's NYSDEC Title V permit. Logbooks are maintained to record the estimated emissions from this and other processes. Posting at these points list evaluated activities. The shop in Building 924 support division's magnet mechanical assembly operations and consists of 1 drill press, 1 band saw, 1 milling machine, one lathe, a belt sander and small bench grinder.

Note: 2 belt sanders, a band saw and a drill press are located in Room 16B in Building 902A. They are used primarily on G10. The central dust collector that was used to exhaust machined material into a collection assembly is no longer in service. Use of equipment requires either the Building Manager or ESH Coordinator's permission (Caution sign posted).

The operation of the small staff shops is similar to the operation of the large staff shop and fiberglass shop. Coolant, when used, is typically applied using refillable plastic spray bottles. Only one or two machines were observed with integral coolant systems. Some of the coolant vaporizes during use and is released to ambient air (identical to 1.2). Lubricants are applied to the metal parts during machining and are used for machine operation and maintenance. Paper rags and cleaners are used to wipe the parts clean following machining. Although some of the shops had containers specifically for oily rags indicating segregation and separate disposal, spent damp oily rags are typically discarded in the regular trash (identical to 1.3). Empty containers are discarded in the regular trash (identical to 1.5). Metal chips are typically removed from the machines and floor using a shop vac. Scrap metal, metal chips, shop vac contents and broken and worn tools are for the most part deposited in the appropriate chip bin for recycling by an off-site vendor (identical to 1.6).

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
	Vaporized coolant	Non-hazardous vapors as determined by process knowledge	Waste is discharged to ambient air	None
	Spent oily rags	Non-hazardous solid waste as determined by process knowledge	Spent oily rags to HWMF as Industrial Waste	None
	Empty containers	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	None

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
3.4	Metal chips and broken or worn tools	Non-hazardous solid waste as determined by process knowledge	Waste is placed in chip bin for off-site recycling. Small shops discard some chips to trash.	Collect all metal chips for recycling or sample and analyze chips for chromium if disposed in trash.
3.5	Smoke eater filters, metal chips, broken and worn tools and aluminum-coated mylar	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	Determine which shops machine stainless steel and evaluate if quantity warrants analysis of smoke eater filters or metal fines

III. Waste Minimization, Opportunity for Pollution Prevention

Staff Shop operations associated with SMD programs undergo a safety review by the ES&H Coordinator prior to implementation. Evaluation for waste minimization and environmental compliance are included in this review as well as during the Engineering Design Review Process (for new programs) and/or the [Work Planning and Control Process](#) (ES&H Standard 1.3.6). The evaluation of waste minimization opportunities is most effective during the planning stages of an experiment or operation. In addition, all anticipated waste streams from an experiment or operation should be evaluated for environmental compliance prior to implementation to ensure that the appropriate waste management procedures and facilities are in place.

During the initial effort of evaluating SMD's processes for Pollution Prevention and Waste Minimization Opportunities, each waste, effluent, and emission was examined to determine if there were opportunities to reduce either the volume or toxicity of the waste stream. Consideration was given to substitute raw materials with less toxic or less hazardous materials, process changes, reuse or recycling of materials and/or wastes, and other initiatives. These actions were documented in this section of the original process evaluation. Action taken on each of the Pollution Prevention and Waste Minimization items identified can be found in the Environmental Services Division's PEP Database. Further identification of Pollution Prevention and Waste Minimization Opportunities will be made during annual assessments of the SMD processes. If any Pollution Prevention and Waste Minimization Opportunities are identified, they will be forwarded to the Environmental Services Division for tracking through the PEP Database.

IV. Assessment Prevention and Control

During the initial effort of evaluating SMD's Assessment, Prevention, and Control (APC) Measures, operations, experiments and waste that have the potential for equipment malfunction, deterioration or operator error, and discharges or emissions that may cause or lead to releases of hazardous waste or pollutants to the environment or that potentially pose a threat to human health or the environment were described. A thorough assessment of these operations was made to determine: if engineering controls were needed to control hazards; where documented standard operating procedures needed to be developed; where routine, objective, self-inspections by department supervision and trained staff needed to be conducted and documented; and where any other vulnerability needed to be further evaluated. These actions are documented in this section of the original process evaluation. Action taken on each of the Assessment, Prevention and Control Measures is documented in the Environmental Services Division's PEP Database. Further identification of Assessment, Prevention and Control Measures will be made during annual assessments of SMD processes. If any Assessment, Prevention and Control Measures are identified, they will be forwarded to the Environmental Services Division for tracking through the PEP Database.

ATTACHMENT 1

PROCESS FLOW DIAGRAMS
AM-524-SSO-01 through 03