

**BROOKHAVEN NATIONAL LABORATORY
PROCESS ASSESSMENT FORM**

I. General Information

Process ID:	AGS-11-SSO	PEP ID# 11	
Process Name:	Staff Shop Operations		
Process Flow Diagrams:	AGS-11-SSO-01 , AGS-11-SSO-02 , AGS-11-SSO-03/04 , AGS-11-SSO-05/06 , AGS-11-SSO-07		
Process Description:	<p>The process includes the Staff Shop Operations located in various buildings at BNL at the Alternating Gradient Synchrotron (AGS) portion of the accelerator complex and managed by the Collider-Accelerator Department. The staff shops support the fabrication and maintenance of equipment, supplies and components used throughout the department. These shops consist of various machines used for the small-scale fabrication, assembly, maintenance, repair, and cleaning of metal and fiberglass equipment and parts. The machines utilized in the Staff Shops include milling machines, lathes, drill presses, band saws, grinders, shears, sanders, punches, breaks, benders, grit blasters and parts cleaners. Magnet refurbishment work is also conducted in Building 922, where worn or damaged magnet components are repaired or replaced. This operation involves soldering, metal cleaning, silver plating, coil maintenance, and cooling water hose and fitting repair.</p> <p>Section II and the above-referenced Process Flow Diagrams provide more detail on the Staff Shop Operations.</p> <p>The environmental aspects associated with staff shop operations are industrial waste, hazardous waste, radioactive waste, and non-radioactive air emissions.</p>		
Dept./Div.:	Collider-Accelerator Department (C-AD)		
Dept. Code:	AD		
Building(s):	905, 911, 912, 922, 923, 925, 975, 919, 919A, 919B, and 1005S		
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II. Detailed Process Descriptions and Waste Determination

The Staff Shop Operations and Magnet Refurbishing Operations associated with the AGS portion of the accelerator complex managed by the Collider-Accelerator Department at Brookhaven National Laboratory (BNL) have been grouped into seven processes for purposes of this evaluation. Process Flow Diagram AGS-011-SSO-01, -02, -03&04, -05/06, and -07, provided in Attachment 1, graphically depicts the process inputs and outputs of these operations.

The AGS is utilized to produce high-energy protons, polarized protons and heavy ions for use in various experiments developed to study the fundamental characteristics of matter. The AGS facility is composed of a 1/2-mile circumference accelerator ring, a smaller booster ring and a linear accelerator (linac). Past upgrades to the system have included linking the facility to the Tandem Van de Graaff accelerator and the Relativistic Heavy Ion Collider (RHIC), which have enhanced the research capabilities of the facility.

This process assessment covers eleven staff shops within the AGS portion of the complex, located in Buildings 911, 912, 922, 923, 925, 975, 919, 919A, 919B, 905, and 1005S. The staff shops are used for the fabrication, assembly, maintenance, repair, and cleaning of metal and fiberglass equipment and parts associated with the overall Collider-Accelerator complex. These staff shops contain various metalworking machines, including milling machines, lathes, drill presses, band saws, grinders, sanders, punches, polishers, benders, shears and parts washers. 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.

The staff shops have been grouped together on one process diagram due to the similarity of inputs and outputs, as well as scale of operations. The operation of the staff shops is similar with regard to chemical usage and waste generation. Chemicals utilized by all Departments at BNL are tracked using the Chemical Management System (CMS). Chemicals are stored within metal flammable storage cabinets. The chemical inventory of smaller staff shops (Bldg. 911, 912, 923, 925, 919, 919A 919B, and 1005S) is significantly less than the chemical inventory of the larger shops (Bldg. 922, 975, and 905). Waste generated in the staff shops is typically transferred to Environmental and Waste Management Services Division (EWMSD), as industrial, hazardous or radioactive waste, or is recycled or is 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.

Additionally, the magnet refurbishment work conducted in Building 922, is covered in this evaluation. This operation involves soldering, coil maintenance, and cooling water hose and fitting repair on worn or damaged magnets. Building 922 also houses a small bench top metal plating operation that is occasionally used to plate electrical components.

Regulatory Determination of Process Outputs

1.0 Staff Shops

Building 922 Staff Shop

The Mechanical Service Group (rear of the building) and the Power Supply Construction Group (front of the building) share building 922. Most of the machines are located in the north portion of the building. The machines located in this shop include 2 milling machines, 2 lathes, 3 drill presses, 2 band saws, 1 table saw, 1 grinder, 1 belt sander, various sheet metal machines (bender, brake, punch) and a sand blaster. Exact numbers of particular machines may change over time. Many types of metal, including brass, steel, stainless steel, aluminum and copper parts are machined within this shop. Additionally non-metallic materials, such as G-10 and micarta are periodically machined. On occasion, lead is machined. A standard operating procedure has been developed for lead machining and all wastes are segregated.

On most machines, coolant is sprayed on the parts and machine tools during operation utilizing refillable plastic squirt bottles. Two band saws located in the center of the building have coolant reservoir systems integral to the machines to prevent the tools from overheating. The coolant is Hangsterfer S-500 water-soluble cutting oil. The coolant reservoirs are periodically topped off on an as needed basis. Staff could not recall ever changing the lubricant in the machines with reservoirs. Lubricants are also applied to the metal parts during machining and are used for machine operation and maintenance. Some of the coolant and lubricant vaporizes during use and they are released to ambient air.

Paper rags and cleaners (typically LPS Presolve) are used to wipe the parts clean following machining. Periodically, ethanol and acetone are used to wipe down parts. Oily rags and dry solvent rags and wipes are collected and disposed of as industrial waste. Empty cleaner and lubricant containers are discarded in a can labeled 'Aerosol Cans' for recycling by C-AD. The container is stored in a Satellite Accumulation Area (SAA), located on the east wall of the building. The SAA is a fenced cage that is maintained locked. Waste pump oils and lubricants are also accumulated there. Containers in the SAA sit upon a secondary containment pallet. Metal chips are removed from the machines and floor using a shop-vac and are disposed in the scrap metal can. Metal pieces and cut-offs are collected and placed in the scrap metal can. The scrap metal cans are removed periodically and are surveyed for radioactivity. If releasable, they are added to the scrap metal dumpsters labeled "Clean Metal." If radioactive they are managed as radioactive waste. Floor sweepings are disposed to the trash.

Several of the machines in the rear of the building are connected to a vacuum exhaust system that collects particulate and fumes. Rigid ducts permanently connect some machines, while some are connected as needed with flexible ducts. The flexible duct connecting the bead blaster to the exhaust plenum was repaired and in good condition. The exhaust system is connected to a cyclone/baghouse type dust collector located outside behind the building. This air emission source is permitted by the New York State Department of Environmental Conservation (NYSDEC) as emission point identification number 72200 3491 92201 W I. The dust collector is a two-stage system that collects particulate in two 55-gallon drums. The drums are labeled "922". Staff does not recall ever disposing of the drums, and stated that Plant Engineering was responsible for them. A condition of the permit issued for this operation requires the baghouse

filters to be inspected on a quarterly basis and for records of said inspections to be maintained. Pursuant to 6NYCRR Part 200.7, operators of emission control devices are required to keep the devices in a good state of maintenance and repair. Plant Engineering is responsible for inspection and maintenance of this system quarterly and maintains the inspection records.

Oxyacetylene welding and silver brazing are also conducted in this shop. Slag from welding operations is collected with scrap metal and subject to radiological survey before disposal. There is little waste generation from silver brazing operations and it is done infrequently. Copper bus bars may be replaced as part of the refurbishment of AGS magnets. The electrical contact end of the new copper bus bars must be plated with silver before magnet reassembly. The refurbishment of AGS magnets and plating of copper bus bars are performed within Building 922. Before plating, the bus bars are cleaned with AC-500 (a phosphoric acid cleaner) and rinsed with water. Subsequently, an activator solution is wiped on the surface of the part with a swab. Next, the end of the copper bus bar is placed within a plastic tray that is placed on top of the closed AC-500 tank in order to utilize the ventilation hood over the tank. The contact end of the copper bus bar is plated with silver. After plating, the bus bar is rinsed with water utilizing the self-contained, recirculating rinse water tank and then air-dried. Excess plating solution (if any), blotter paper, post-activator rinse water and the post-plating rinse water are disposed of as hazardous waste due to the silver present within the waste. C-A personnel estimate that approximately 12 magnet bus bars are plated each year. Metal parts are cleaned following brazing operations in a dip tank filled with AC-500, a dilute phosphoric acid cleaner. The metal cleaning process is evaluated in section 3.0 and 4.0 below and the plating process is evaluated in section 7.0.

Building 905 Staff Shop

The Collider Mechanical Group operates in the east end of building 905. The machines located in this shop include 1 milling machine, 1 lathe, 2 drill presses, 2 band saws, 3 grinders, 1 belt sander, various sheet metal machines (bender, brake, punch), a cold saw, Hydraulic press, and a sand blaster. Exact numbers of particular machines may change over time. Many types of metal, including brass, steel, stainless steel, aluminum and copper parts are machined within this shop. Additionally non-metallic materials, such as G-10, delran and nylon, and micarta are periodically machined.

As in 922, coolant is sprayed on the parts and machine tools during operation utilizing refillable plastic squirt bottles. The lathe has a coolant reservoir system to prevent the tools from overheating. The coolants used are MicroSol 185 and Rustlick WS-5050 and both are water-soluble cutting oil. The coolant reservoirs are periodically topped off on an as needed basis. The reservoirs are rarely drained. Lubricants are also applied to the metal parts during machining and are used for machine operation and maintenance. Some of the coolant and lubricant vaporizes during use and they are released to ambient air.

Paper rags and cleaners (typically LPS Presolve) are used to wipe the parts clean following machining. Periodically, alcohol, ethanol and acetone may be used to wipe down parts. Oily rags and dry solvent rags and wipes are collected and disposed of as industrial waste. Empty cleaner and lubricant containers are discarded in a can labeled 'Aerosol Cans' for recycling by C-AD. The container is stored Magnet Division 90 Day area. Metal chips are removed from the machines and floor and are disposed in the scrap metal can. Metal pieces and cut-offs are

collected and placed in the scrap metal can. The scrap metal cans are removed periodically and added to the scrap metal dumpsters labeled "Clean Metal." Floor sweepings are disposed to the trash.

Oxyacetylene welding and brazing are also conducted in this shop. Slag from welding operations is collected with scrap metal. There is little waste generation from brazing operations. As part of the shop operation a sand blaster is in the area to clean parts. The sand blast cabinet is connected to a small vacuum exhaust to capture the metal and sand debris from this operation. Occasionally material has to be plated and a non-electrical process using Cool Amp is performed. Paper rags are used to wipe the plating on to the required area. Upon completion of the operation, the rags are discarded into a container and disposed of as hazardous waste.

Building 912 Staff Shop

The staff shop in 912, located in the East Experimental Area (EEA) supports the experimental program conducted there. There are currently 6 drill presses, 2 bandsaws, a break, 3 shears, 2 grinders, a polisher, a lathe, a small press, a punch, and 4 sanders. Exact numbers of particular machines may change over time. This shop is infrequently used at the current time and is very clean. Many types of materials are machined in the shop, including stainless steel, carbon steel, aluminum, G-10 and micarta. The cut-off saw has a coolant reservoir, and uses Hangsterfers S-500 water-soluble cutting fluid. The oil has not been changed, but rather is topped off as needed. On other machines, coolant is squirted onto machined parts from plastic squirt bottles. The 6-inch sander has a portable dust collector attached. Staff could not recall ever emptying the dust collector. When disposed, this material is sampled and analyzed for radioactivity and heavy metals. Oily rags are collected in a covered rags container and are commingled with the Vacuum Lab rags, which are sent to EWMSD as industrial waste. Metal chips and scrap are disposed to the 'Clean Metal' dumpster located outside which is sent for recycling. There was a small carpenters shop located in a caged area directly behind the machining area, consisting of a table saw and handtools. Additionally, there is a welding and metal plate cutting area located by the overhead door, located east of the machine shop. Slag generated by welding and cutting is surveyed and disposed as low-level radioactive waste to EWMSD or is used as void-space filler in radioactive waste packages at AGS.

Building 919 (g-2) Staff Shop

The staff shop in 919, supported the g-2 experimental program conducted there. This program is not currently funded and the machine shop is currently idle. There are currently 2 drill presses, a bandsaw, 2 metal breaks, a sander, a lathe and a milling machine. Exact numbers of particular machines may change over time.

Building 919A Staff Shop

The staff shop in 919A, supports the C-AD cryogenics operations. There are currently 2 milling machines, a lathe, a drill press, 2 bandsaws, a break, 2 grinders, 2 hydraulic presses, a sandblaster and a sander. Exact numbers of particular machines may change over time. The materials machined in this area are, brass, carbon steel, stainless steel, and aluminum. Oxyacetylene welding and brazing are also conducted in this shop. Slag from welding

operations is collected with scrap metal. There is little waste generation from brazing operations. As part of the shop operation a sand blaster is in the area to clean parts. The sand blast cabinet is connected to a small vacuum exhaust to capture the metal and sand debris from this operation. Parts are wiped clean using alcohols and acetone, LPS, and Presolve. Other materials are stored here for periodic use, including tapping fluids, spray paint cans, epoxies, fluxes, etc. Oily rags and wipes are collected in a satellite accumulation area (SAA) and are disposed as industrial wastes. Metal chips are added to the clean metal dumpster for recycling. Empty aerosol cans are collected for recycling.

Building 923 Staff Shop

The staff shop in 923, supports the operations of the C-AD Survey Group. There are currently 2 lathes, a milling machine, 2 drill presses, a bandsaw, a break, a grinder, and a sander. Exact numbers of particular machines may change over time. The materials machined in this area are, brass, carbon steel, stainless steel, aluminum, G-10, micarta and delran. None of the machines contains a coolant reservoir and coolant is squirted onto machined parts from plastic squirt bottles. The following lubricants are used in the shop: Molly Dee taping fluid, Tapomatic, Kool Mist and Tri-Cool. LPS and Pre-Solve are used to clean up excess oil residue on parts. Paper rags are used and disposed of as industrial waste.

Building 925 Staff Shop

The staff shop in Building 925 is operated by the Collider-Accelerator RF Group and supports mechanical assembly and fabrication needs of the group. The shop consists of a milling machine, sander, grinder, bandsaw, lath, a drill press and some sheet metal working tools (bender, brake, shear and punch). Exact numbers of particular machines may change over time. The milling machine has a coolant reservoir, but it is not used. Instead, water-soluble machine coolant (blasocut) is squirted onto parts from plastic bottles. A dust collector system is located in the back corner of the shop, and provides vacuum exhaust to several of the machines by means of portable ducts. It is used mainly for jobs involving G-10, PVC and micarta. The bag is emptied as needed and disposed to the construction waste dumpster located outside the building. Ethyl alcohol and other aerosol cleaners (LPS Zero-Tri) are used to wipe parts clean. Empty cans are collected for recycling. Oily rags are collected in an oily waste can and are transferred to EWMSD as industrial wastes. Some soldering and brazing is performed in this shop. Tin/lead and silver solders are used. Solder dross and tailing are collected in a small metal cup and melted. This material can be sent to Central Shops for recycling.

Building 975 and 919B Staff Shops

The staff shop in Building 975 is managed by the Beam Components and Instrumentation Group. The shop supports projects at RHIC, AGS, the Experimental Floor and Tandem. The machine shop is situated in the north end of the building, and is a radiological 'Clean Area'. There are 3 lathes, 3 Bridgeport milling machines, 4 drill presses, a band saw, 4 sanders, 3 grinders and various sheet metal machines (benders, break, and punch). Exact numbers of particular machines may change over time. One of the sanders is connected to a portable dust collector, which is emptied periodically, at which point it is surveyed by HP and disposed as construction waste. None of the machines has coolant reservoirs; rather coolant is applied with plastic squirt bottles. The coolant used is Cimstar 60LF. Parts are wiped clean using alcohols and acetone, which are stored in a large yellow flammable cabinet in the shop. Numerous other materials are stored here for periodic use, including tapping fluids, spray paint cans, epoxies, fluxes, etc. A full inventory is posted on the cabinet and is tracked in the Chemical Management System (CMS). Oily rags and wipes are collected in a satellite accumulation area (SAA) in an adjacent building (919B) and are disposed as industrial wastes. Metal chips are vacuumed up and are surveyed and added to the clean metal dumpster for recycling. Empty aerosol cans are collected in the SAA for recycling.

Building 919B, located directly behind Bldg. 975 also has a small machining area, consisting of a drill press, a grinder and a sander. Activated metals that require work are machined in this building. There is standing Radiation Work Permit (RWP) that covers this work. There is also a 'Hydro-Hone' located in this area. This equipment uses a slurry of aluminum oxide and distilled water to hone ceramic parts. An exhaust blower exhausts the unit through the side of the building. A filter precedes the blower and requires changing periodically. It is disposed to the trash. A self-contained sand blaster located in 919B (no permit required) uses glass beads to clean small non-activated components before painting or other finishing. It is only used on an occasional basis. Wastes (used beads) will be sampled for metals prior to disposal.

Building 1005S Staff Shop

The staff shop in Building 1005S is managed by the RHIC Cryogenics Group. The shop supports cryogenic operations at RHIC. The machine shop is situated in the east end of the building, and is a radiological 'Clean Area'. There are 3 lathes, 2 Bridgeport milling machines, 2 drill presses, 3 band saws, a sander, 3 grinders, a Hydraulic and a sandblaster. Exact numbers of particular machines may change over time. Two of the machines have coolant reservoirs and the others apply coolant locally on the parts with plastic squirt bottles. The coolant used is ValCool Turntech Blue. Parts are wiped clean using alcohols and acetone, LPS, Presolve, and CRC Hydroforce. Other materials are stored here for periodic use, including tapping fluids, spray paint cans, epoxies, fluxes, etc. Oily rags and wipes are collected in a satellite accumulation area (SAA) and are disposed as industrial wastes. Metal chips are added to the clean metal dumpster for recycling. Empty aerosol cans are collected for recycling.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
1.1	Spent coolant from machines with coolant reservoirs.	Waste has not been disposed yet.	Prior to disposal, coolant is sampled and analyzed for radiological contamination and metals. Dispose through EWMSD based on results of analysis.	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	Oily rags are collected and discarded to EWMSD as industrial waste in all shops	None

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
1.4	<p>Dust and particulate from dust collectors</p> <p>Bldg. 922: Cyclone and baghouse drums</p> <p>Bldg. 925: Fiberglass dust</p> <p>Bldg. 911 and 975: Sander dust</p>	<p>Bldg. 922: Waste has been discarded to EWMSD as mixed waste. Bldg. 911 waste to be discarded as low level radioactive waste</p> <p>Bldg. 925: Waste is mainly fiberglass, non-hazardous solid waste/process knowledge</p> <p>Bldg. 975: Metal dust and grit is non-hazardous solid waste/process knowledge</p>	<p>922: Dispose of waste through EWMSD as mixed waste.</p> <p>Bldg. 911, Waste is disposed as low-level radioactive waste.</p> <p>Bldg. 925 & 975 are sampled prior to disposal and discarded as construction debris or as radioactive waste depending on results of sample analysis.</p>	None
1.5	Empty aerosol and other metal containers	Non-hazardous solid waste as determined by process knowledge	Waste is collected for recycling in all shops.	None.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
1.6	Non-radioactive metal chips, pieces and broken or worn tools	Non-hazardous solid waste as determined by process knowledge	Waste is placed in 'Clean Metal' bin for off-site recycling	None
1.7	Radioactive metal chips and metal pieces.	Radioactive solid waste as determined by survey.	Waste is disposed of as low-level radioactive waste through EWMSD.	None
1.8	VOC fugitive emission from solvent cleaning	Non-regulated air emission	Released to ambient air	None
1.9	Bldg. 919B: Spent beads from bead blaster	Non-hazardous solid waste as determined by process knowledge	Prior to disposal, beads are sampled and analyzed for radiological contamination and metals. Dispose through EWMSD based on results of analysis.	None

2.0 Magnet Refurbishing

C-A beam line magnets refurbishing work is conducted in Building 922. (See also [AGS-002-EBC](#), "Experimental Beamline Construction/Disassembly Operations," for a discussion of magnet-related waste.) Magnet refurbishment primarily involves soldering, coil maintenance, and cooling water hose and hose fitting replacement. Any worn or broken magnet coils, wiring or cooling manifolds are removed from the magnets and replaced with new parts or parts from storage.

When the hoses, which carry magnet cooling-water, become damaged or worn, the damaged section is removed and replaced. Since primary loop cooling water contains radioactive material, the damaged hose is surveyed for radioactivity and disposed of in the regular trash or as low-level radioactive waste, depending on the survey results.

Brass hose fittings and copper tubing may also need to be replaced. Brass fittings are used to make the connections between the reinforced rubber hoses and the cooling system manifolds or couplings on the equipment. Due to secondary radiation produced in the vicinity of the beam, fittings and tubing are often radioactive and go through the same survey procedure as all C-A-C-A-OPM 14.7

related waste. If in good condition, fittings are stored for future use. If unusable, activated fittings are discarded as mixed waste due to the lead content of brass. Non-radioactive fittings and tubing are discarded with scrap metal for off-site recycling.

Magnet electrical connections are repaired using silver solder. All scraps of solder are used; waste is generally not generated during soldering operations. Coil maintenance may be required if the epoxy coating has been damaged. This involves the application of additional epoxy as filler, followed by wrapping by kapton tape. This operation does not generate any waste material.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
2.1	Copper tubing, other discarded metal components	Non-hazardous, potentially radioactive / based on rad survey	To scrap metal recycle or low-level rad waste, depending on survey results	None
2.2	Brass fittings	Hazardous or potentially mixed waste / based on rad survey	Discarded as hazardous or mixed waste, depending on survey results	None
2.3	Discarded hose	Non-hazardous, potentially radioactive / based on rad survey	Disposed of in regular trash or as low-level rad waste, depending on survey results	None
2.4	Spent oily rags	Non-hazardous solid waste potentially radioactive / based on rad survey	Oily rags are collected and discarded to EWMSD as industrial waste or as low-level rad waste, depending on survey results	None
2.5	Empty aerosol and other metal containers	Non-hazardous solid waste as determined by process knowledge	Waste is collected for recycling in all shops.	None

Building 922 Metal Cleaning Operations

3.0 Metal Cleaning – Building 922

Metal parts are cleaned before silver plating and silver soldering, and then after silver soldering to remove any remaining flux. General metals parts cleaning may also be performed utilizing the metal cleaning tank. The metal cleaning tank within Building 922 consists of a 50-gallon covered, rectangular metal, dip tank that contains 30-35 gallons of AC-500, a phosphoric acid cleaning solution. The AC-500 tank is within a secondary containment area. Metal parts are submerged within the tank and left for a period of time depending on the level of cleaning required. A hood over the AC-500 tank exhausts vapors from the cleaning tank to the outside air. Immediately adjacent to the AC-500 cleaning tank and within the same secondary containment area is a 100-gallon covered, rectangular metal, dip tank that contains rinse water. The rinse water tank, designed by C-A personnel, is a self-contained unit consisting of a sink which slopes and drains to the dip tank, a sliding cover which allows the tank to be utilized for rinse water storage or for dipping parts and the dip tank itself. Rinse water is re-circulated from the dip tank, through a particulate filter and into the sink, which extends the use of the water. There is no discharge to the sanitary sewer system from the rinse water sink/tank. Spent AC-500 and rinse water is combined, neutralized using sodium hydroxide and then tested for radiological parameters and metals. The waste is typically disposed of as non-radioactive, hazardous waste due to elevated metals concentrations. The rinse water filter is surveyed for radioactivity and is assumed hazardous based on process knowledge. C-A personnel estimate approximately 2 drums of waste cleaning solution and rinse water is disposed of every 2 years. The rinse water filter is disposed of at the same time as the waste cleaning solution and rinse water.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
	Vapors from AC-500 tank	Non-hazardous/non-radioactive vapors as determined by process knowledge	Vapors are discharged via hood to outside air	None
	Spent AC-500 and rinse water	Hazardous/non-radioactive liquid waste as determined by radiological/metals testing	Waste is transferred to the HWMF for disposal as hazardous waste	None

4.0 Rinsing – Building 922

Metal parts are rinsed with water after cleaning (1.0) utilizing a 100-gallon covered, rectangular metal, dip tank containing water. The dip tank is part of a self-contained, recirculating rinsing unit, which consists of a metal sink, which slopes toward the dip tank. A sliding metal cover over the dip tank allows the tank to be used for dipping metal parts or for rinse water storage. Water within the tank is pumped through a particulate filter and then discharges into the sink. The sink/dip tank unit was designed by C-A personnel. Approximately once every two years, the rinse water is removed from the tank and combined with the spent AC-500 cleaning solution (1.0) for disposal. The water filter is replaced at the same time the cleaning solution and rinse water are replaced and is surveyed for radioactivity prior to disposal. The rinse water tank/sink system has been in use for approximately 2 to 3 years and the filter has been replaced only once. The spent water filter was disposed of as non-radioactive, hazardous waste, based on the radioactivity survey and process knowledge. The filter was assumed to be hazardous due to the elevated metals concentrations in the spent AC-500 cleaning solution and rinse water.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
4.1	Spent AC-500 and rinse water	Hazardous/non-radioactive liquid waste as determined by radiological/metals testing	Waste is transferred to the HWMF for disposal as hazardous waste	None
4.2	Spent water filters	Hazardous/non-radioactive solid waste as determined by process knowledge/radioactivity survey	Waste is transferred to the HWMF for disposal as hazardous waste	None

Building 919B Metal Cleaning Operations

5.0 Metal Cleaning – Building 919B

Metal cleaning operations within Building 919B consist of a 25-gallon covered, rectangular plastic, dip tank that contains approximately 10-15 gallons of AC-500 cleaning solution. The AC-500 tank is mounted within a wheeled metal cart. Immediately adjacent to the AC-500 cleaning tank is a sink, which discharges to the sanitary sewer system. However, this sink is only used to hold the plastic trays, which are utilized to contain rinse water. The metal part is cleaned by submerging in the AC-500 cleaning tank and then rinsed with water over a plastic tray, which has been placed within the sink. C-A personnel place a stopper over the sink drain during rinsing to prevent liquids from discharging to the sanitary sewer system. The plastic tray collects the rinse water, which is then transferred to a 5-gallon carboy. When full, the contents

of the carboy are transferred to a dedicated 55-gallon drum for AC-500 cleaning solution and rinse water, located within the Building 919B satellite accumulation area. The AC-500 solution is changed approximately once every year and transferred to the dedicated 55-gallon drum located within the satellite accumulation area. C-A personnel estimate that the drum is filled once every 1 to 2 years. Prior to disposal, the drum contents are neutralized using sodium hydroxide and tested for radiological parameters and metals. The waste AC-500 and rinse water is typically disposed of as non-radioactive hazardous waste, due to elevated metals concentrations. The drummed AC-500 cleaning solution and rinse water is transferred directly from the satellite accumulation area to the HWMF for appropriate disposal.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
	Vapors from AC-500 tank	Non-hazardous/non-radioactive vapors as determined by process knowledge	Vapors are discharged to ambient room air	None
	Spent AC-500 and rinse water	Hazardous/non-radioactive liquid waste as determined by radiological/metals testing	Waste is transferred to the HWMF for disposal as hazardous waste	None

6.0 Rinsing – Building 919B

Metal parts are rinsed after cleaning (3.0) utilizing distilled water. Rinsing is performed in a sink which discharges to the sanitary sewer system and which are immediately adjacent to the AC-500 cleaning tank. However, this sink is only used to hold the plastic trays, which are utilized to contain the rinse water. C-A personnel place a stopper over the sink drain during rinsing to prevent liquids from discharging to the sanitary sewer system. The metal part to be rinsed is placed within a plastic tray and rinsed with distilled water. The tray contains the rinse water. When rinsing is complete, metal part is removed and the tray contents are dispensed into a 5-gallon carboy which is then transferred to the dedicated 55-gallon drum for AC-500 cleaning solution (3.0) and rinse water, located within the Building 919B satellite accumulation area. The drum of combined waste AC-500 from metal cleaning (3.0) and rinse water is neutralized, tested for radiological parameters and metals and typically transferred to the HWMF for disposal as non-radioactive hazardous waste. Distilled water is supplied in a 5-gallon plastic bag, which is packaged in a cardboard container. Empty bags are discarded in the regular trash while the cardboard is stored with other cardboard generated in the building to be picked-up for recycling.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
6.1	Spent AC-500 and rinse water	Hazardous/non-radioactive liquid waste as determined by radiological/metals testing	Waste is transferred to the HWMF for disposal as hazardous waste	None
6.2	Empty plastic distilled water bags	Non-hazardous/non-radioactive liquid waste as determined by process / knowledge radiological screening	Waste is discarded in the regular trash	None
6.3	Cardboard containers	Non-hazardous/non-radioactive liquid waste as determined by process / knowledge radiological screening	Waste is picked-up for recycling	None

7.0 Plating Operations - Building 922

The electrical contact ends of new, refurbished or repaired copper bus bars are electroplated with silver within Building 922. Before plating, the bus bars are cleaned with AC-500 (a phosphoric acid cleaner) as described in the PAF for C-A Metal Cleaning Operations. The bus bar is then rinsed using water from the dip tank located adjacent to the AC-500 cleaning tank. The surface of the part to be plated is coated with an activator solution utilizing a swab. This swab is reusable and discarded as regular trash when spent. Next, the end of the copper bus bar is placed within a plastic tray to contain any excess plating solution. The plastic tray is placed on top of the closed AC-500 tank in order to utilize the ventilation hood over the tank. The contact end of the copper bus bar is plated with silver. Electroplating is accomplished by connecting the part and the plating paddle to opposite battery terminals, applying a silver solution (Silver Coatalyte No. 316) on the paddle and spreading the solution over the entire surface of the area to be plated. Excess plating solution, if any, is collected in the plastic tray. Vapors from plating are exhausted to the outdoor air via the ventilation hood.

Following plating, the bus-bar and plastic tray are rinsed with water utilizing the self-contained, recirculating rinse water tank/sink located adjacent to the AC-500 cleaning tank. Empty Silver

Coatalyte containers are also rinsed in this rinse water tank and then discarded in the regular trash. Following the rinse, the plastic tray and the plated magnet bus bars are then either air-dried or wiped with rags. Any spent rags generated are discarded in the regular trash. C-A personnel estimate that approximately 12 magnet bus bars are plated each year.

All waste generated within Building 922 is surveyed for radioactivity prior to being removed from the building. As described in the PAF for C-A Metal Cleaning Operations, combined waste AC-500 cleaning solution and rinse water are neutralized, tested for radiological parameters and metals and then typically transferred to the HWMF for disposal as non-radioactive, hazardous waste. Approximately 2 drums of waste AC-500 and rinse water are disposed of every 2 years.

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
	Vapors from plating solution	Non-hazardous/non-radioactive vapors as determined by process knowledge	Vapors are discharged via a hood to outside air	None
	Spent rinse water	Hazardous/non-radioactive liquid waste as determined by radiological/metals testing	Waste is transferred to the HWMF for disposal as hazardous waste	None
	Rinsed empty Silver Coatalyte and activator containers, spent swabs, rags and distilled water plastic bag	Non-hazardous/non-radioactive waste as determined by process knowledge/radioactivity survey	Waste is discarded in the regular trash	None

III. Waste Minimization, Opportunity for Pollution Prevention

During the initial effort of baselining, the Collider-Accelerator Department processes for Pollution Prevention and Waste Minimization Opportunities each waste, effluent and emission was evaluated 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. Further identification of Pollution Prevention and Waste Minimization Opportunities will be made during an annual assessment of C-A processes. If any Pollution Prevention and Waste

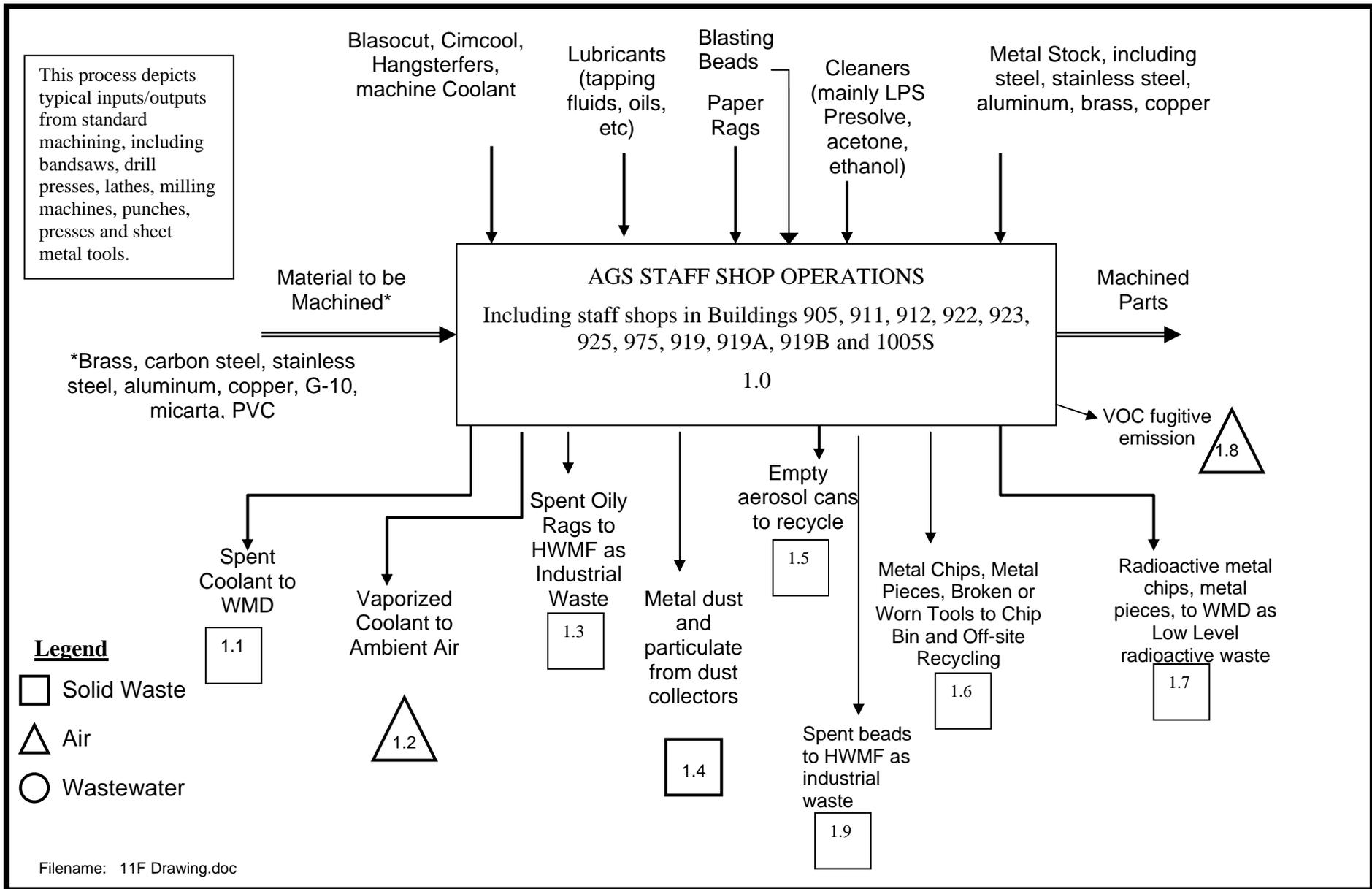
Minimization Opportunities are identified, they will be forwarded to the Environmental Compliance Representative for action and implementation, as appropriate.

IV. Assessment Prevention and Control

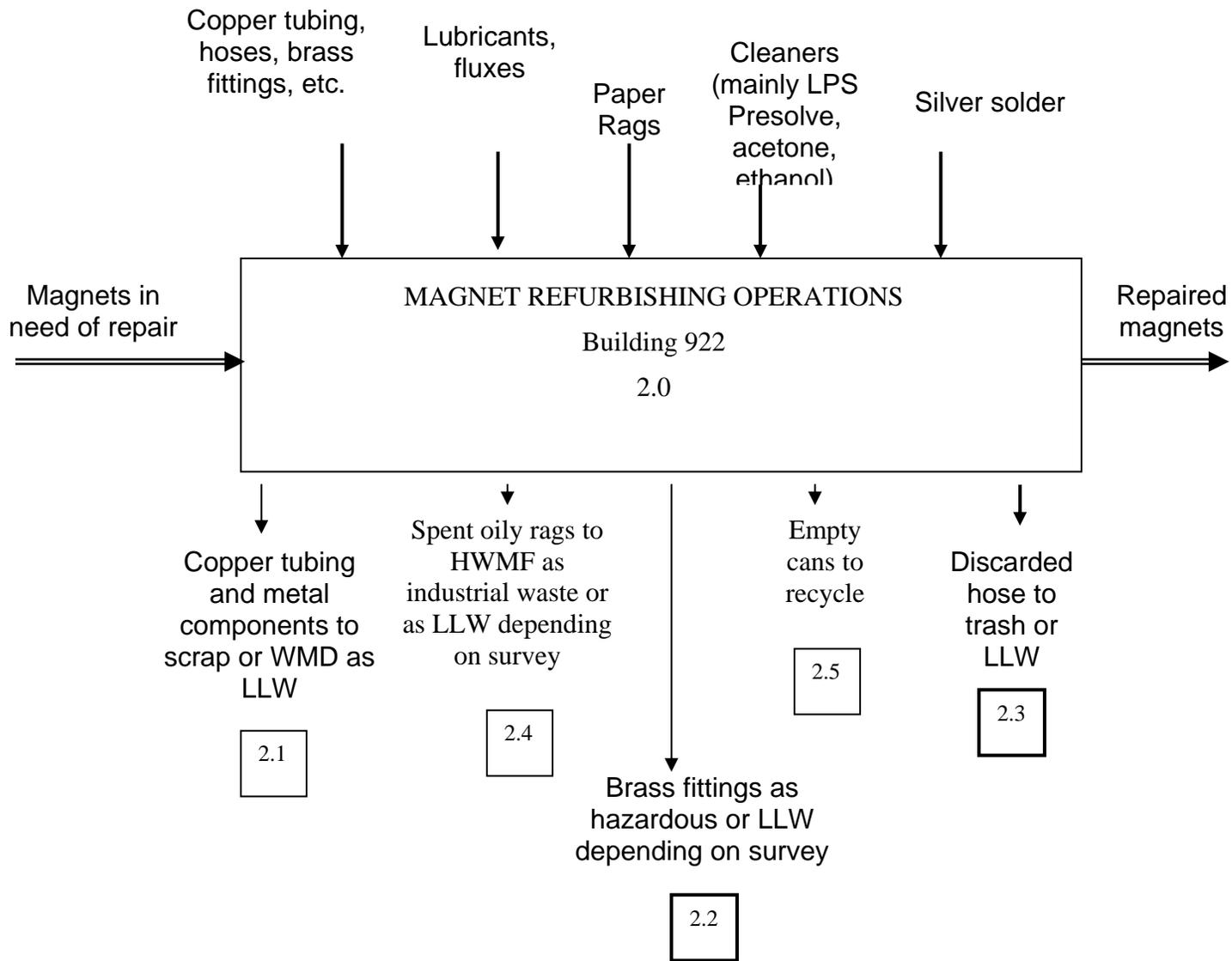
During the initial effort of baselining the Collider-Accelerator Department Assessment, Prevention, and Control (APC) Measures operations, experiments, and waste that have the potential for equipment malfunction, deterioration, or operator error, and discharges or emissions that may cause or lead to 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 were documented in this section of the original process evaluation. If new assessment, prevention, or control measures are identified during the annual assessment of the C-A process, they will be incorporated into the C-AD/SMD objectives and targets as applicable.

ATTACHMENT 1

PROCESS FLOW DIAGRAMS



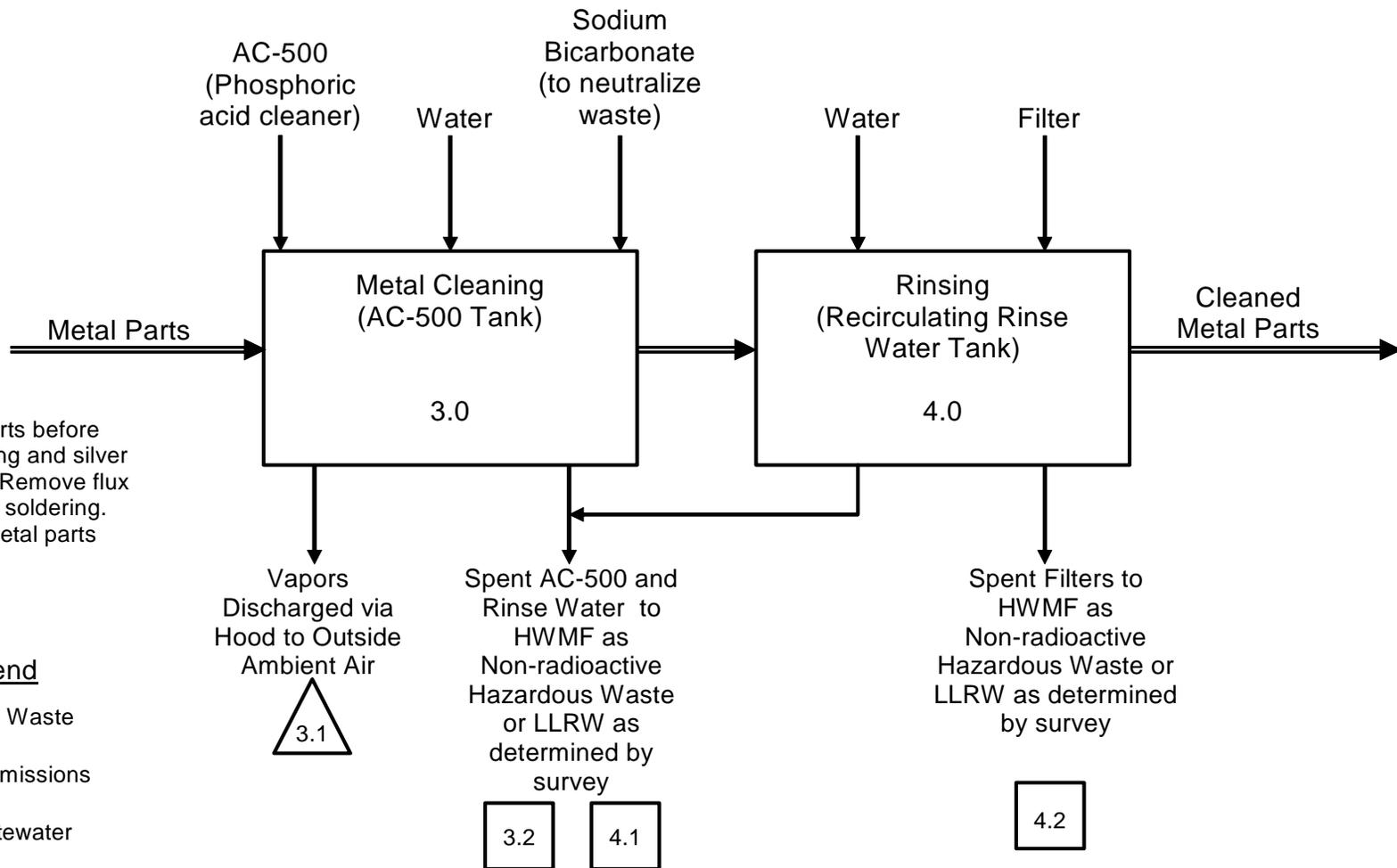
BROOKHAVEN NATIONAL LABORATORY
 PROCESS EVALUATION PROJECT
AGS Staff Shop Operations
Process Flow Diagram AGS-011-SS0-01



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BROOKHAVEN NATIONAL LABORATORY
PROCESS EVALUATION PROJECT

**AGS Magnet Refurbishing Operations
Process Flow Diagram AGS-011-SS0-02**



* Clean parts before silver plating and silver soldering. Remove flux after silver soldering. General metal parts cleaning.

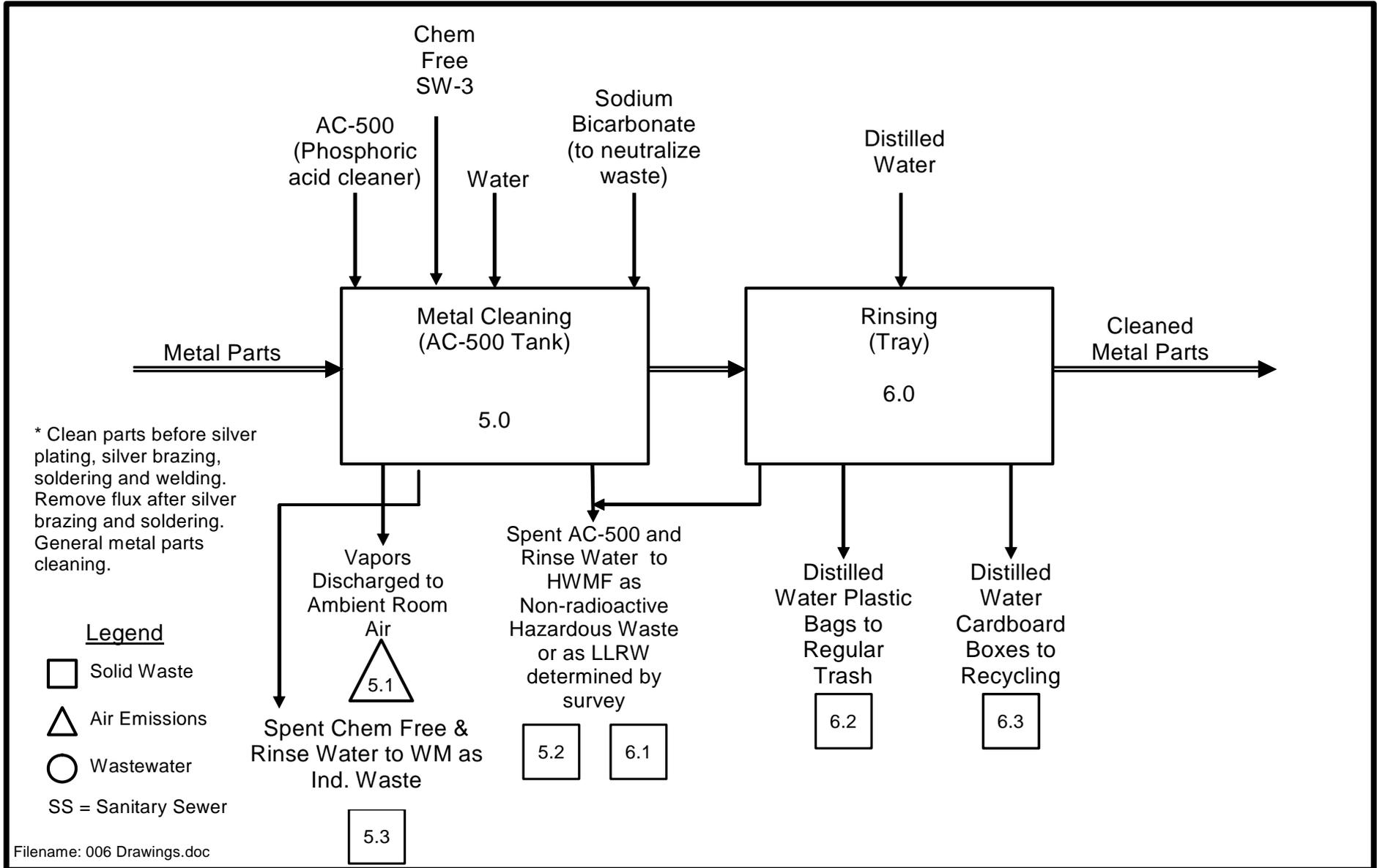
- Legend
- Solid Waste
 - △ Air Emissions
 - Wastewater
 - SS = Sanitary Sewer

Filename: 006 Drawings.doc

BROOKHAVEN NATIONAL LABORATORY
PROCESS ASSESSMENT PROGRAM

**Alternating Gradient Synchrotron – Metal Cleaning Operations
Process Flow Diagram – Building 922**

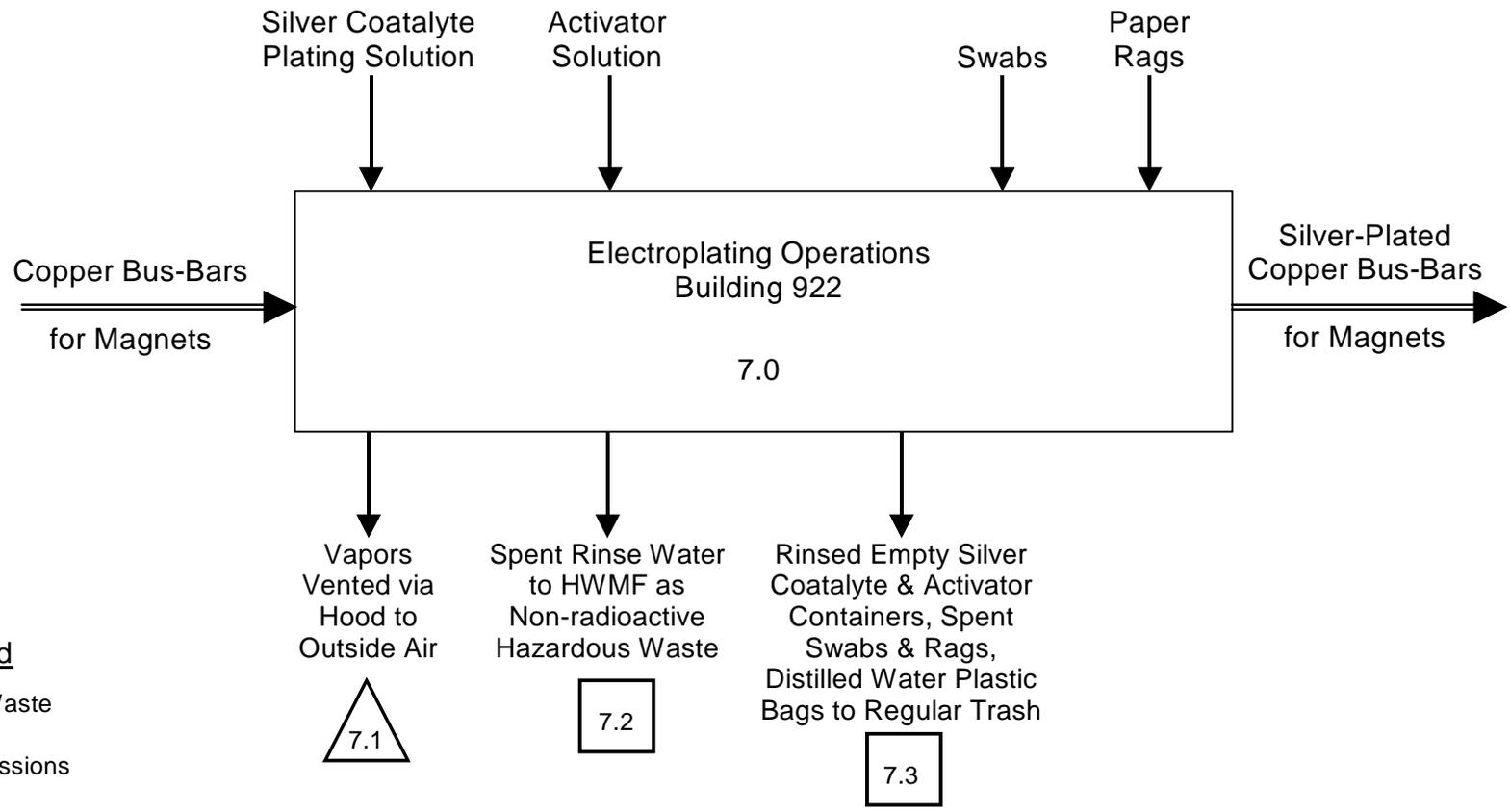
AGS-011-SSO-03 & 04



BROOKHAVEN NATIONAL LABORATORY
PROCESS ASSESSMENT PROGRAM

**Alternating Gradient Synchrotron – Metal Cleaning Operations
Process Flow Diagram – Building 919B**

AGS-011-SSO-05 & 06



- Legend
- Solid Waste
 - △ Air Emissions
 - Wastewater
 - SS = Sanitary Sewer

Filename: 006 Drawings.doc

BROOKHAVEN NATIONAL LABORATORY
PROCESS ASSESSMENT PROGRAM

**Alternating Gradient Synchrotron – Plating Operations
Process Flow Diagram – Building 922**

AGS-011-SSO-07