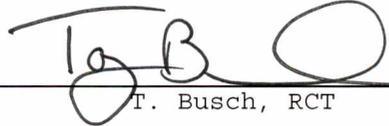


ACCELERATOR DIVISION ES&H PROCEDURE

ADSP-10-0201

RADIOACTIVE WASTE DISPOSAL PROCEDURE

RESPONSIBLE DEPARTMENT ES&H

PREPARED BY  DATE 9-18-13
T. Busch, RCT

PREPARED BY  DATE 9-18-13
AD RSO

REVIEWED BY:  DATE 9-18-13
EPO, ES&H Department

REVIEWED BY:  DATE 9-20-13
AD ES&H Department Head

APPROVED BY  DATE 9-24-13
Roger Dixon, AD Head

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1.0 APPLICABILITY

1.0.1 This procedure applies to all waste materials that have become activated or contaminated due to particle accelerator operation at Fermilab, including mixed wastes as defined by the Fermilab Low-Level Waste Certification Plan (LLWCP). This procedure does not apply to collection and disposal of devices that contain radioactive sources. Radioactive sources are inventoried items and are controlled by the ESH&Q Section. Activated items that are removed from the tunnel areas are not automatically considered waste. Waste is a term used for items that will not be reused or stored for future use. Any item that is not waste shall be surveyed, tagged, and stored in a proper manner. It also does not apply to the collection and disposal of hazardous, non-hazardous, or special wastes that are not radioactive. Refer to the Accelerator Division (AD) "Regulated Waste Management Procedures (ADSP-08-0202) or contact the Accelerator Division Environment, Safety, and Health (ES&H) Department for information regarding disposal of hazardous wastes, non-hazardous wastes, and special wastes.

1.0.2 The requirements of this procedure apply to all workers, including lab employees (regardless of their parent division or section), all contractors, all Time and Material (T & M) contractors, and all experimenters.

1.1 EXCEPTIONS AND CLARIFICATIONS ON RADIOACTIVE WASTE DISPOSAL REQUIREMENTS

1.1.1 Any questions regarding the radioactive waste policy and procedures should be referred to the responsible AD Department Head, AD Radioactive Waste Coordinator, or the AD RSO or designee.

1.1.2 Exceptions to this procedure may require approval of the AD RSO or designee. Requests for exceptions should be made to the AD RSO or designee.

2.0 PURPOSE OF THIS PROCEDURE

2.0.1 The purpose of this procedure is to provide instructions for the proper characterization and

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packaging of radioactive wastes and mixed wastes generated by Accelerator Division. These instructions are derived from the Fermilab Low-Level Waste Certification Plan (LLWCP). The characterization instructions are required to ensure that the radioactive waste generator properly identifies radioactive and mixed wastes. The packaging requirements given in this procedure are intended only for transfers of radioactive and mixed wastes from the Accelerator Division to the ESH&Q Section. The packaging requirements for the subsequent transportation and final disposal of radioactive or mixed wastes from the Fermilab ESH&Q Section to the disposal site are not provided in this procedure.

2.0.2 It is impractical to list all of the LLWCP requirements in this document. If it is anticipated that a waste may be generated that is either prohibited or does not fall into any category found within this document, contact the AD RSO or designee to determine proper disposal procedures.

2.0.3 If it is suspected that a waste is regulated (i.e. Hazardous), the Accelerator Division procedure on regulated waste (ADSP-08-0202) should be consulted.

3.0 RESPONSIBILITIES

3.1 WASTE GENERATORS

Anyone generating waste in a beam enclosure, or potentially radioactive waste outside a beam enclosure, is responsible for completely and accurately characterizing those waste materials prior to presenting them for disposal. This responsibility cannot be delegated or deferred. Individual divisions, sections, and Accelerator Division departments are responsible for implementing the Accelerator Division Radioactive Waste Procedure for work performed in the Accelerator Division.

3.2 DEPARTMENT HEADS

The AD department heads shall each:

- a. Ensure that all of their employees are trained radiological workers before generating radioactive waste.

- b. Take prompt corrective action upon notification of any waste procedure violations discovered in various audits and inspections.

3.3 AD RADIATION SAFETY GROUP

The AD Radiation Safety Group is responsible for:

- a. Coordinate issuing various radioactive waste containers.
- b. Coordinating radioactive waste pickups.
- c. Reviewing submitted paperwork for radioactive waste pickups.
- d. Performing periodic inspections of radioactive and mixed waste collection areas and report related waste procedure violations.

3.4 OPERATIONS DEPARTMENT DUTY ASSISTANT OR CREW CHIEF

The Operations Department Duty Assistant, Crew Chief, or person designated by the Crew Chief is responsible to ensure that persons who are allowed to access the beam enclosures have the proper training prior to issuing enclosure keys.

3.5 TASK MANAGERS AND SPONSORS

Task Managers or sponsors of personnel are responsible to provide instructions to persons they supervise that are sufficiently thorough to ensure that radioactive waste is generated in such a manner that the requirements of the procedure can be met.

4.0 TRAINING, QUALIFICATION, ACCESS REQUIREMENTS

4.1 PERSONS AUTHORIZED TO PERFORM THIS PROCEDURE

- 4.1.1 Only full time laboratory personnel who have successfully completed Fermilab Radiological Worker training, which includes radioactive waste training, are authorized to perform this procedure. Contractors, T & M contractors, and experimenters are allowed to add waste to a waste container, however only full time laboratory personnel are allowed to be container owners and submit paperwork for pickup.

4.1.2 Non-laboratory personnel and laboratory personnel who are not radiological worker trained may not work with radioactive materials.

4.2 RADIOACTIVE WASTE GENERATOR TRAINING

a. AD Radioactive Waste Generator Training is included in Fermilab Radiological Worker training.

b. The trainer presents an overview of this procedure.

c. The trainee at the end of the training session takes a comprehensive test over the entire course content.

c. The exam is graded, and the test results are reviewed with the trainee by the proctor. Upon completion of the exam review, the employee signs the acknowledgment portion of the exam stating that they have reviewed its content.

4.2.1 A person who does not pass the test is required to review the sections of the exam that showed the employee's understanding was weak. Following the review, the employee is to be retested or remediated as determined by the AD RSO.

4.2.2 Upon successful completion of the examination the trainee is considered to be a qualified radioactive waste generator.

4.2.3 Groups that generate large amounts of waste are encouraged to appoint a local radioactive waste coordinator. The local coordinator receives additional training from the AD radioactive waste coordinator to aid the group in disposal of large amounts of waste. The local coordinator is appointed by their supervisor and aids the AD radioactive waste coordinator in ensuring that all waste is properly characterized and packaged prior to pick-up.

4.3 ACCESS PROCEDURES AND QUALIFICATION PROCESS

All lab employees and contractors requiring access to beam enclosures must have current radiological worker training which includes radiological waste training.

4.3.1 Non-Accelerator Division personnel, T & M contractors, and contractors hired for specific

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tasks must receive task-specific instructions for the disposition of radiological waste from their task manager.

- 4.3.2 All employees are encouraged to meet with their department Radioactive Waste Coordinator to review local controls used for radwaste disposal within the department.

5.0 GENERAL REQUIREMENTS

- 5.1 Waste must be segregated at the generation site and thereafter to prevent the possibility of cross-contamination. All waste must be separated into the following regulatory classifications: non-radioactive and non-regulated, radioactive and non-regulated; non-radioactive and regulated; and radioactive and regulated.

- 5.2 Radioactive waste materials need to be promptly collected and characterized for disposal by the generator. If waste is generated in a controlled environment, (such as a room with lockable doors on it). The AD RSO or designee may approve a temporary work area that will allow for open radioactive materials bags and unlocked radioactive drums. These work areas must be locked or controlled in some manner during non-work hours, and the areas must be in active use during the work day. If the area is to be idle for a period of more than 3 consecutive days the waste must be locked in a radioactive materials drum, or the radioactive materials bag must be taped shut. On occasion wet rags or filters may be generated and placed in a radioactive materials bag. The AD RSO or designee may make a temporary exemption to allow the bag to remain open to enable the items to dry.

- 5.3 All wastes removed from the beam enclosures are to be surveyed for radioactivity by the personnel who removed the waste using friskers located at the tunnel exits.

- 5.4 The "Radioactive Waste Certification and Pickup Request Form" (Appendix 3) includes a statement that materials which are placed in radioactive waste containers have been checked for radioactivity, and have been determined to be radioactive. It is incumbent upon the radioactive waste generator to make this check.

5.5 The typical radiation emitted from dry, solid radioactive material may be detected with a frisker. Typical background count rates found with a frisker are about 30-to-50 counts per minute (cpm). Items are considered to be radioactive if they have counts rates of 50 cpm above background.

NOTE: If the background count rate is greater than 50 cpm, it may not be possible to determine that an item is radioactive. Suspect materials should be taken to an area where the background count rate is at or below 50 cpm.

5.6 Dry, solid materials that are not regulated (that is, not hazardous or special waste) and that are found to be non-radioactive with a frisker may be disposed of as ordinary trash or scrap.

5.7 A listing of common materials that may NOT be disposed of in dumpsters is included as Appendix 1. Non-radioactive special wastes and hazardous wastes are to be collected for disposal in a manner specified by the AD "Regulated Waste Management Procedure."

5.8 Radioactive material bags, radiation warning signs, and radioactive class tapes are not to be thrown away in normal trashcans or dumpsters. These items are to be reused, if possible, or collected as radioactive materials in radioactive waste drums or other suitable containers whether or not they are found to be radioactive.

5.9 It is required that individuals who generate waste certify that the waste contains no hazardous materials at the time of disposal. If the waste is radioactive and does contain hazardous materials, the instructions found in Section 6.6 of this procedure apply.

5.10 Liquids and absorbed liquids may be contaminated with tritium. Tritium is not detectable with the frisker. These materials are to be evaluated for radioactivity as discussed in Sections 6.2 and 6.3, respectively.

5.11 All radioactive waste containers are to be kept locked at all times when not in active use, so that waste characterization and control is maintained. 55-gallon drums are issued with a locking device, and if requested a padlock. The person to whom a container is issued may opt to

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use a lock of his/her own choosing instead of a lock issued by AD Radiation Safety.

- 5.12 During normal working hours, radioactive waste items shall promptly be taken to collection areas designated by the department head or his/her designee for characterization and disposal. Persons who are issued containers are generally available to open them for waste disposal during normal working hours.
- 5.13 During off-hours, persons who have access to radioactive waste containers are usually not available to open them. Many of the accesses for emergency repairs are performed after normal working hours and on weekends. Department Heads, task managers, group leaders, or supervisors are required to designate in advance the location (e.g., locked storage cabinet or locked room) where materials can be stored until proper radioactive waste disposal containers can be opened. A storage cabinet that has a common department padlock can be used for this purpose. When the material is placed in the cabinet, it is recommended that the radioactive waste generator sign the "Radioactive Waste Certification and Pickup Request Form." Instructions for completing this form are included on the form noted in Appendix 3. Later, during normal working hours, the drum owner can transfer the material from the locked storage cabinet to a radioactive waste container.
- 5.14 Radioactive wastes must be characterized as they are placed into waste containers. In addition, the "Radioactive Waste Certification and Pickup Request Form" must be filled out and signed immediately upon adding waste to the waste container. After radioactive wastes have been characterized and placed in a disposal container, the container must be either locked up or attended so that the characterization remains valid. Radioactive material bags should be taped shut with duct tape or an equivalent immediately after they have been filled. These bags should never be left standing open when unattended unless the area is designated as a temporary work area under Section 5.2, because the waste characterization could be compromised.
- 5.15 Radioactive items being transported to designated collection areas should either be labeled with class tape or be in radioactive material bags.

Radioactive materials shall not be stored or transported in bags used for normal trash.

5.16 Except as provided in Section 6.8, water and KPC 820N are the only approved cleaners, which may be used to clean radioactive materials.

6.0 SPECIFIC REQUIREMENTS WASTE

6.1 DRY RADIOACTIVE WASTE

6.1.1 No free liquids or absorbed liquids of any type are to be placed in 55-gallon radioactive drums designated for dry, solid waste. These drums are to be used for dry, solid radioactive waste only.

6.1.2 No hazardous materials such as lead or beryllium are to be disposed of in 55-gallon radioactive waste drums, unless there is prior authorization from the AD RSO or designee.

6.1.3 Care must be taken to ensure that characterization of dry, solid items for disposal is accurate and complete. For example, a printed circuit board or copper fittings that contain solder may also contain lead. Such items that are hazardous and radioactive need to be characterized as mixed waste as described in Section 6.6 of this procedure.

6.1.4 Compactable waste, such as shoe covers, gloves, other types of protective clothing, and dry rags or wipes, that has been found to be radioactive and that has not been exposed to regulated materials should be placed in drums designated for compactable radioactive waste. A large yellow plastic radioactive materials bag shall be used as a liner in the compactable radioactive waste 55-gallon drums.

6.1.5 Radioactive waste drums must remain indoors while in use and may not be stored outdoors. Fermilab steel boxes may be used and/or stored outdoors temporarily at locations designated by AD RSO or designee.

6.1.6 Non-compactable waste, such as contaminated lumber, structural steel, and beam pipe, is to be collected in 55-gallon drums, steel boxes, or on a pallet separate from compactable waste.

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6.1.7 Large quantities of materials such as radioactive cables may be collected in large steel boxes with lockable covers. Steel boxes must be kept locked when not in use. Arrangements to obtain large steel boxes should be made in advance with the AD RSO or designee.

NOTE: Unpackaged bulk items and materials collected in steel boxes shall not contain levels of removable contamination above the Fermilab release criteria. The release limits are 0.45 nCi/100 cm² (1000 dpm/100 cm²).

6.1.8 Radioactive contamination on external surfaces of all waste containers must be below 0.45 nCi/100 cm² (1000 dpm/100 cm²).

6.1.9 Arrangements should be made in advance for collecting non-compactable radioactive waste items that are too large for 55-gallon drums or large steel boxes, or that have external contamination above the 0.45 nCi/100 cm².

6.1.10 All dry, solid materials that are collected as radioactive waste must be surveyed to ensure that they are radioactive prior to placement in a waste disposal container.

6.1.11 The "Radioactive Waste Certification and Pickup Request Form" (Appendix 3) should be used to list the contents of containers as described in the attached instructions. The description of the waste needs to satisfy two criteria. They are:

a. The radioactive waste generator must understand the description so that, if asked to recall the material, the generator will know the material (for example, Kautzky valve).

b. The burial site must understand the description. The description "Kautzky Valve" has no meaning to the burial site operator. For the burial site operator, a proper description may be "valve, 49% stainless steel, 49% aluminum, 2% polypropylene." The percentage given for each component is to be by weight, not by volume.

6.1.12 Some components to be disposed of are sometimes coated with oils and greases. Some cleaning may be required with an approved cleaner such as KPC

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820N and rags to remove excessive quantities of greases or oils. These components may be disposed of as radioactive waste only if there are no visible traces of oil or grease. Rags used to clean these components need to be disposed of as outlined in Section 6.3 below

6.1.13 Many components installed in the tunnels have been cleaned with forbidden or hazardous solvents prior to installation or during maintenance activities over the years. These materials can be disposed of as radioactive waste if no obvious traces of the hazardous solvents are present.

6.1.14 Grit from sandblasters in which radioactive materials are cleaned is to be packaged in 5-gallon pails with lids. A sample of grit must be collected by the radioactive waste generator and submitted to AD Radiation Safety for analysis to determine the nature and quantity of radioactivity.

NOTE: Some types of sandblasting grit contain naturally-occurring radioactive materials.

NOTE: If sandblasting grits are used to clean radioactive materials, they are considered to be radioactive waste unless sampling proves them to be free of accelerator-produced isotopes. Small quantities (<55 gal) of grit blast material that is not radioactive beyond its natural content, may be discarded in dumpsters by special arrangement with the ESH&Q Section. Larger quantities must be handled as special waste.

6.2 LIQUID RADIOACTIVE WASTE

6.2.1 In general, water collected from LCW spills and from groundwater seepage on tunnel floors should be discarded in sumps. This water contains very small amounts of tritium that are below the levels permitted for surface water discharge.

NOTE: Tritium cannot be measured with any hand-held instruments available in Accelerator Division.

6.2.2 Water collected from floors near Radioactive Water (RAW) systems, or locations where RAW systems may have leaked such as the AP0 vault, may be radioactive since it may originate from a RAW system. This water must be collected under AD Radiation Safety supervision and guidance as

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radioactive waste in properly labeled and approved containers.

6.2.3 Unless otherwise permitted, oil or other liquids removed from vacuum pumps and from various devices, such as septa and separators that have been exposed in beam enclosures must be collected as radioactive waste. The liquids may contain tritium, which is not detectable with hand-held instruments. The liquids are to be collected in properly labeled and approved containers.

6.2.4 Liquids that have been exposed to primary or secondary beams have the potential for tritium and other additional radionuclides. A sample of the liquid must be collected and submitted by AD Radiation Safety for analysis to determine the nature and quantity of radioactivity prior to submission for disposal. The type of container used for collection of liquid radioactive wastes can be any of the following:

- a. 55-gallon radioactive waste drum
- b. 5-gallon carboy
- c. 250-ml to 2-liter polyethylene bottles

The type of container used should be appropriate for the quantity of waste generated. Large-volume generators, for example, persons who frequently change septa oil or vacuum pump oils should use 55-gallon radioactive waste drums. Small quantities of oil or water collected infrequently from systems that are known to be radioactive may be collected in 5-gallon carboys or smaller polyethylene bottles.

6.2.5 55-gallon drums are issued specifically for either water or oil. No water may be added to oil waste drums except for incidental water, which may be present in vacuum pumps due to operation of the pump.

6.2.6 Persons other than the waste generator must protect all liquid radioactive waste containers against unauthorized additions. 55-gallon liquid drums have locking devices available if necessary, however it is acceptable to fully tighten the drain plugs on the drum in a controlled working area. Smaller containers such as 5-gallon carboys or polyethylene bottles must be kept locked up in cabinets or in an equivalent manner so that the radioactive waste generator can assure that

unauthorized filling of a container is not possible.

- 6.2.7 A copy of the "Radioactive Waste Certification and Pickup Request Form" is to be filled out for each liquid radioactive waste container regardless of its type. The quantity and type of each liquid added to a waste container must be on the form. The person responsible for the container must ensure that all liquids added to it are acceptable for disposal as radioactive waste.
- 6.2.8 The tops of the drums must be kept free of water or oil. Spills of liquids on tops of drums during filling should be cleaned up immediately.
- 6.2.9 All liquid radioactive waste containers must be protected against damage. Drums and other containers need to be stored in such a manner that the potential for damage by vehicle and/or equipment movement is minimized.
- 6.2.10 In locations where large accumulations of radioactive liquid wastes are stored pending disposal or where the consequences of a spill of radioactive wastes would be significant, the use of secondary containers should be considered. For example, 55-gallon drums of radioactive liquid wastes stored near loading areas in high bays that could be knocked over or punctured by work activities in the proximity of the storage area are candidates for secondary containment. Secondary containers should be capable of holding approximately 150% of the primary container volume. The need for secondary containments will be determined by the AD RSO or designee on a case by case basis during draining and storing operations. .
- 6.2.11 Radioactive liquid wastes of different types should normally be segregated. Liquids such as oils, water, Fluorinert, and other materials should normally be disposed of in separate containers.
- 6.2.12 Mixed waste may inadvertently be generated if funnels used for hazardous material waste streams are used for radioactive waste streams. Funnels used for container filling must be labeled to indicate the waste stream for which they are intended. Funnels used for hazardous material waste streams may not be used for any radioactive waste stream. Conversely, funnels used for

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radioactive waste streams may not be used for any hazardous material waste streams.

6.3 ABSORBED LIQUID RADIOACTIVE WASTE

- 6.3.1 Rags and wipes collected from RAW system spills should be collected as radioactive, whether or not the frisker indicates they are radioactive, because of the potential presence of tritium.

NOTE: Tritium cannot be measured with any hand-held instruments available in Accelerator Division.

- 6.3.2 Rags and wipes used to clean up oil spills or to clean up oily parts of equipment exposed in beam enclosures are to be collected separately in yellow radioactive material bags. It is to be assumed that the rags are radioactive, unless a bulk sample of the material is determined to be non-radioactive as described in Section 6.2.4.

- 6.3.3 All radioactive material bags used to collect wet rags or wipes must be collected separately. That is, they are not to be placed into radioactive waste drums. A bag of waste containing absorbed liquids is considered to be a stand-alone package requiring a separate "Radioactive Waste Certification and Pickup Request Form." The type and name of the liquid must be included in the waste description. A package number must be generated for each bag as outlined in Appendix 3. A Material Safety Data Sheet (MSDS) for the absorbed liquid must be attached to the pickup request form.

- 6.3.4 For purposes of filling out the "Radioactive Waste Certification and Pickup Request Form" for absorbed liquid packages, a sample of the actual liquid that was absorbed shall be used whenever possible to determine the type and quantity of radioactive materials present in the package. The "Radioactive Waste Certification and Pickup Request Form" for the absorbed liquid package shall include a reference to the package number of the liquid sample. If a waste container of the liquid is not available, a sample of the absorbed liquid should be collected so that the type and quantity of radioactive materials may be determined for the package containing the absorbed liquid.

- 6.3.5 Potentially radioactive absorbed liquids of non-hazardous oils, KPC-820N and water may be

collected together in a single bag since none of the materials are considered to be hazardous waste.

6.4 SWEEPING COMPOUND

6.4.1 Sweeping compound used to clean beam enclosure floors may contain radioactive dust; metal grinding chips or filings; tie wraps; miscellaneous nuts, bolts, screws; and many other small parts. Sweeping compound must be collected in radioactive material bags. Sweeping compound or small miscellaneous parts may not be dumped loose into unlined 55-gallon radioactive waste drums, or steel boxes.

6.4.2 The description "Sweeping Compound" on the "Radioactive Waste Certification and Pickup Request Form" is an acceptable description for physical and chemical form of sweeping compound. The percentage of materials by weight mixed in with the sweeping compound must be included in the description as described in Section 6.1.13 or in the instructions on the form noted in Appendix 3.

6.5 VACUUM CLEANERS USED TO PICK UP RADIOACTIVE MATERIALS (RADVACS).

6.5.1 Dry solid radioactive materials collected in Radvacs are to be treated as radioactive waste. No radioactive waste containing liquids may be collected in a Radvac intended for dry material.

6.5.2 All persons who need to check out a Radvac shall have current Radiological Worker training prior to being issued a Radvac.

6.5.3 Radvacs will be issued by the ESH&Q Hazard Control Technology Team. The container owner for the Radvac is responsible for completing the top portion of the form when the Radvac is required to be emptied.

6.5.4 An entry shall be made on the "Radioactive Waste Certification and Pickup Request Form" and signed by the radioactive waste generator for each job in which waste is added to a Radvac.

6.6 MIXED WASTE

6.6.1 For the purposes of this policy, mixed wastes are those, which are both radioactive and contain hazardous materials as defined by the Fermilab

Low-Level Waste Certification Plan (LLWCP). A complete list of hazardous materials contains hundreds of different materials. Hazardous materials have the characteristics of being ignitable, corrosive, reactive, persistent, carcinogenic, or toxic. Some typical hazardous materials used at Fermilab are ethyl alcohol, freon, methanol, acetone, lead, and beryllium. Other materials considered to be mixed waste by the Fermilab Low-Level Waste Certification Plan (LLWCP) are acids, bases, salts (including NaCl or ordinary table salt), and certain synthetic oils.

- 6.6.2 Some oils normally used in the Accelerator Division, such as vacuum pump oils, are not hazardous and are not mixed waste when they become radioactive. They are to be disposed of as radioactive waste as outlined in Sections 6.2 and 6.3 above.
- 6.6.3 Complete information regarding the characterization of hazardous and special wastes may be found in the AD procedure ADSP-08-0202, "Regulated Waste Handling Procedure." Alternatively, contact the AD RSO or designee for further information regarding waste characterization.
- 6.6.4 Laboratory policy strongly discourages the generation of any mixed waste. New materials considered for use in areas where they may become activated or contaminated should be checked for hazardous characteristics prior to their use. If a hazardous material absolutely needs to be used in a way in which it will become activated or contaminated (i.e., no suitable alternative is available), the material may be used upon receipt of approval from the ESH&Q Section and the AD Division Head. Attachment 1, "Radiological Application of Hazardous Material," should be used to apply for approval for use of hazardous materials. The form will serve as a record of the approval and will be retained on file by the AD ES&H Department to aid in identification and eventual disposal of the material as a mixed waste, if necessary.
- 6.6.5 Mixed wastes must be labeled in accordance with this procedure for their radioactive properties. In addition, mixed wastes must be labeled in accordance with ADSP-08-0202, the Division procedure on regulated wastes.

6.6.6 Mixed wastes in storage awaiting pickup must be segregated from radioactive-only and hazardous-only wastes. The storage and accumulation requirements for regulated wastes found in ADSP-08-0202 also apply to mixed wastes on the basis of their hazardous properties.

6.7 PROHIBITED MATERIALS FOR USE ON RADIOACTIVE MATERIALS

6.7.1 Freon, methanol, acetone, or any other solvent of the type and nature as discussed in Section 6.6 above may not be used with radioactive materials and are forbidden for use in any beam line enclosures.

6.7.2 Chemicals, which are considered for use in beam enclosures or on radioactive materials, should be reviewed by the AD RSO or designee prior to use so that it can be determined if they are acceptable for burial in radioactive waste containers.

6.7.3 Appendix 2 contains a list of some common waste materials, which have been determined to be non-hazardous in the Fermilab Low-Level Waste Certification Plan (LLWCP). When these materials become radioactive, they are not considered mixed waste.

6.7.4 If there is no alternative to using a hazardous material, the use of the materials must be reviewed and approved by the ESH&Q Section and Accelerator Division Head prior to its use. The form described in Section 6.6.4 (Attachment 1) shall be used for this purpose.

6.8 USE OF HAZARDOUS SOLVENTS ON RADIOACTIVE MATERIALS

6.8.1 The use of hazardous solvents to clean radioactive materials is generally forbidden.

6.8.2 It is recognized that, in order to maintain high quality vacuum, it is sometimes necessary to clean vacuum parts with a hazardous solvent. If it becomes necessary to clean radioactive beam components with a hazardous material, the user of the solvent needs to ensure that a mixed waste will not be generated in the process.

6.8.3 Radioactive parts that are required to be cleaned with a hazardous solvent will need to be checked for loose surface contamination (wipe survey) by

solvent. If contamination is found, the part will need to be cleaned with a non-hazardous material such as KPC 820N or water. The resulting waste will need to be treated in accordance with Section 6.3 of this procedure. After the part has been decontaminated and has been shown to be free of radioactive contamination by wipe survey, the part may be cleaned with ethyl alcohol. Refer to Attachment 2 "Instructions for Determination that Ethanol May Be Used On Beam Enclosure Surfaces." Non-radioactive, solvent-laden rags or other wipers are to be collected for disposal as regulated waste in accordance with ADSP-08-0202, the Accelerator Division procedure for the disposal of regulated wastes.

6.9 WASTE PICKUP INSTRUCTIONS.

6.9.1 Upon receipt of a radioactive waste container, the owner must fill in their name, date, extension, container/package type, and container/package number must be filled in on the top half of the "Radioactive Waste Certification and Pickup Request Form" and the continuation sheets if applicable. The original form should either be retained with the drum or package or with the container owner until the waste is picked up. An entry shall be made on the "Radioactive Waste Certification and Pickup Request Form" and signed by the radioactive waste generator each time waste is added to the container. After radioactive waste containers are filled, the package owner will complete the "Radioactive Waste Certification and Pickup Request Form" in its entirety. The owner will then forward the completed form to the AD Radioactive Waste Coordinator to initiate a radioactive waste pickup. The AD Radioactive Waste Coordinator will review the form for completeness and make a copy. Then the AD Radioactive Waste Coordinator will forward the original to the ESH&Q Section for waste pickup. See the form noted in Appendix 3 for further information about completing the "Radioactive Waste Certification and Pickup Request Form."

6.9.2 All Containers or items submitted for waste pickup shall have a radioactive waste label attached prior to pick-up. The ESH&Q Section affixes these labels to drums and steel boxes upon delivery. Radioactive waste generators are responsible for affixing the label to other miscellaneous containers and bulk items. The label may be affixed to a 2 ~~CONTROLLED DOCUMENT~~ 75 inch manila tag

(available from the Fermilab stockroom) and tied to radioactive material bags and unpackaged bulk items or otherwise affixed to the waste. The labels may be obtained from the AD Radiation Safety Group.

- 6.9.3 Steel drums and boxes issued by the ESH&Q Section are delivered with a package number already assigned. For miscellaneous packages, the waste generator using the convention described in Appendix 3 shall assign the package/container number.
- 6.9.4 The generator is responsible for entering the contact dose rate on all packages prior to pick-up. The AD Radiation Safety Group will assist the generator with the container measurement upon request.
- 6.9.5 The flow chart included as Attachment 3 is intended to be used as a guide to determine how wastes are to be categorized for disposal.
- 6.9.6 The instructions provided above in 6.9.1 through 6.9.5 also apply to mixed waste except that the "Radioactive/Hazardous Mixed Waste Certification and Pickup Form," (HCTT Form 2) is to be used in lieu of Radiation Physics Form #31.

7.0 WASTE MINIMIZATION

7.0.1 Fermilab policy is to reduce or eliminate the generation of waste material presented for disposal or released to any environmental medium. The concept of waste minimization as applied to radioactive material focuses on reducing or eliminating the volume of radioactive and mixed waste sent for disposal, thus reducing the impact on the environment and the public, and also reducing disposal costs. Reducing or eliminating the generation of waste is given prime consideration in research, process design and plant operations. Additional information on waste minimization may be found in the Fermilab Environment, Safety, and Health Manual, Chapter 8022, "Waste Minimization and Pollution Prevention Awareness Plan."

7.0.2 Minimization of the generation of mixed waste is especially important, because all mixed waste is stored onsite and the storage space is limited.

7.0.3 Accelerator Division applies effort for waste minimization in the following ways:

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- a. After extended shutdowns and prior to permitting beam operation, a sweep down is done in all beam enclosures to minimize the activation of dust. This reduces the potential for generation of contamination areas within the beam enclosures. In addition, all unnecessary materials are removed from beam enclosures to preclude their activation.
- b. New materials are reviewed for their hazardous properties prior to use in beam enclosures to minimize the generation of mixed waste.

7.1 STAGING OR STORING RADIOACTIVE WASTE OUT OF DOORS

7.1.1 Accelerator Division Policy states that radioactive waste may not be stored out of doors without prior AD Radiation Safety Officer approval.

8.0 DISTRIBUTION

Please see the ESH&Q forms section on the ESH&Q website in order to ensure that you have the correct revision number, or contact the Accelerator Division Waste Coordinator

Attachment No. 1 - Radiological Application of Hazardous Material

Original to be kept on file by AD/ES&H Department

| |
|------------------|
| Date of Request: |
|------------------|

| | |
|--|-------------|
| Requester: (name/employee I.D. number) | Department: |
|--|-------------|

| |
|---|
| Material or Product Name: |
| System and Beam Enclosure Intended for Use: |
| MSDS I.D. number: |

| |
|---|
| State Efforts Taken to Find an Alternative: |
| |
| |
| |

AD Radiation Safety Officer/Date AD Waste Coordinator/Date

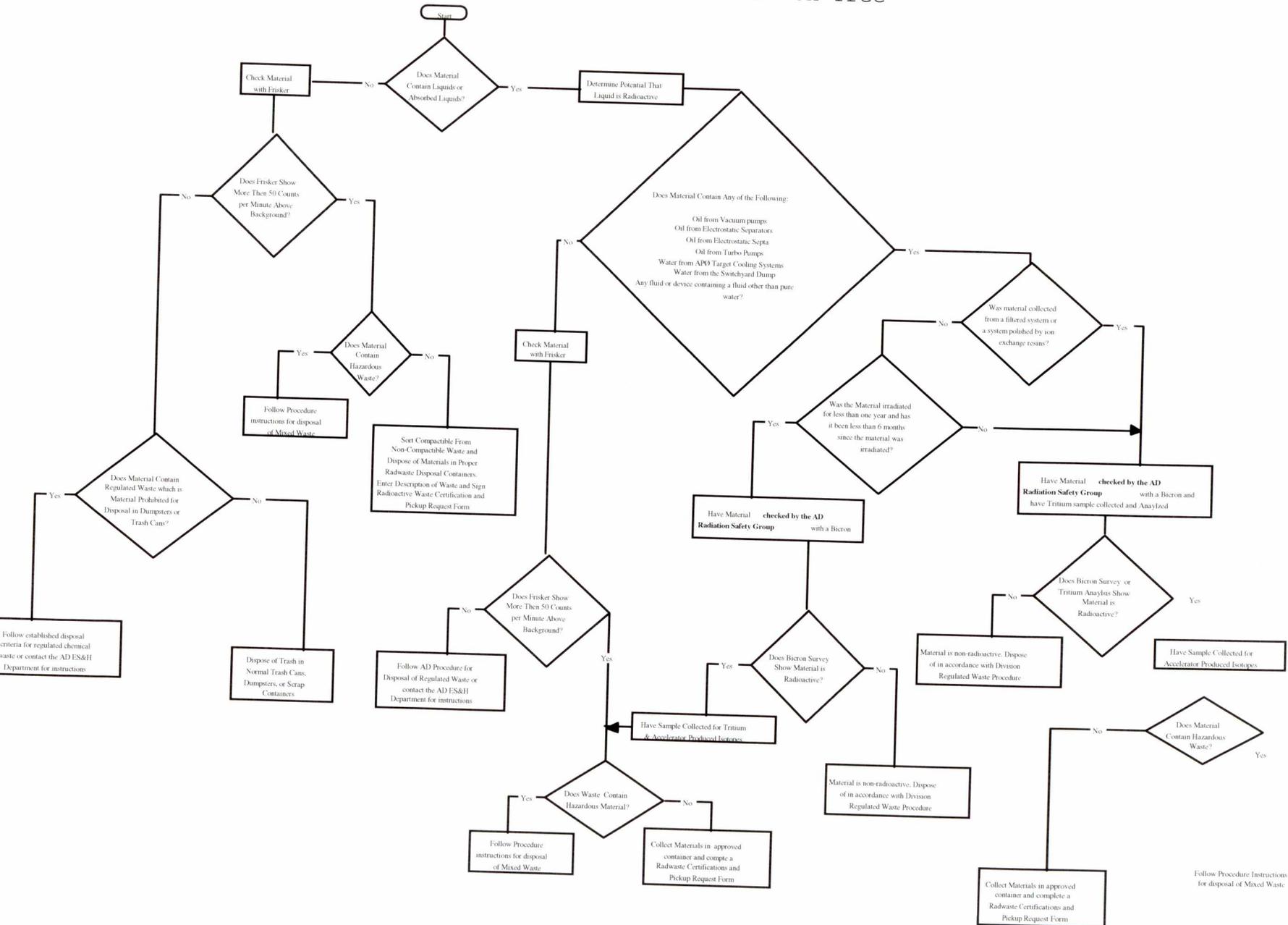
AD ESH&H Department Head/Date ESH&Q EP Head or Designee /Date

AD Division Head/Date ESH&Q Section Head or Designee/Date

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Radioactive Waste Disposal Decision Tree



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Attachment No. 2 - Instruction for Determination That Ethanol May Be Used on Beam
Enclosure Surfaces

Prior to using ethanol, surfaces should be free of dirt and grease or oil.

1. Use approved non-hazardous cleaner if necessary to pre-clean surfaces.
2. Wipers used for pre-cleaning may need to be collected separately as radioactive waste because of the presence of tritium.
3. A sample of these wipers is submitted to determine if grease is radioactive.
4. This is a long lead process which requires generator to retain waste for several months.

Prior to use of ethanol, wipe sample for radioactive contamination must be collected.

1. Use numbered wipers obtained from ES&H Department.
2. Use copy of ES&H Department form to record wipe data and results.
3. Save wipers from samples in wax paper or Glassine envelopes with form until bag of wipers is collected.

WIPE PROCEDURE

1. Hold wipe between thumb and fingers.
2. Apply reasonable pressure to wipe and collect material over 100 cm² area (about 4 square inches).
3. If less than 100 cm² area is available, wipe entire area.
4. Record location wipe was collected and the area of surface wiped in units of cm².
5. Place wipe in Glassine envelope and collect other wipers as necessary.
6. Take wipers to nearest frisker.

7. Record background reading of frisker on form.
8. Remove wipe from envelope and count with portable frisker.
9. Record gross counting rate from frisker.
10. Subtract background count rate from gross count rate and enter difference in column entitled "net count rate."
11. If net count rate is less than 50 cpm, proceed to use ethanol to clean surface.

APPENDIX 1 - MATERIALS PROHIBITED FOR DISPOSAL IN DUMPSTERS & TRASH CANS

Acids (e.g., lead acid batteries)

Alkalines

Asbestos

De-greasers (Freon)

Empty Drums

Epoxy Components (unreacted)

Ethylene Glycol (anti-freeze)

Flammable Liquid

Fluorescent light bulbs

Kimwipes with hazardous materials

Oils

Paints

PCB's

Pesticides

Printed circuit boards

Radiation Signs & Labels

Radioactive Materials

Sandblasting Sand and Grits (except <55 gal by special arrangement)

Scrap Metals (steel, aluminum, copper, wire, etc.)

Solvents (acetone, alcohol)

Toxic Metals (lead, mercury, beryllium)

All Liquids

Any other hazardous materials

APPENDIX 2 - LIST OF MATERIALS DETERMINED TO BE NON-HAZARDOUS WASTE

LeBold Heraeus HE 175

LeBold Heraeus HE 200

Octoil S

Octoil S

Alconox

Apiezon Sealant

Shell Diala AX

Welch Duo-Seal 1407K Vacuum Pump

RTemp Fluid

KPC 820N

622 White Grease

ADSP-10-0201

REV. 1

APPENDIX 3 RW Form #31 (12/2008)

Please see the ESH&Q forms section on the web in order to ensure that you have the correct revision number, or contact the Accelerator Division Waste Coordinator.

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APPENDIX 4 HCTT Form #2 (12/2008)

Please see the ESH&Q forms section on the web in order to ensure that you have the correct revision number, or contact the Accelerator Division Waste Coordinator.