REMR TECHNICAL NOTE EI-M-1.2

HANDLING AND DISPOSAL OF CONSTRUCTION RESIDUE

PURPOSE: To provide information that will help in the identification and disposal of potentially hazardous and toxic forms of construction residue. This information will also aid in the prevention of accidental releases of hazardous and toxic materials into the environment and of costly project delays as a result of regulatory requirements.

APPLICATION: The handling and disposal of construction residue for REMR activities at Corps projects should be an important, preplanned aspect of every construction activity. Practically all REMR activities, including construction, removal, excavation, and repair of concrete or metallic structures, may involve a potentially hazardous or toxic substance. When these materials are improperly handled, they may pose a threat to human health or the environment and may lead to lengthy litigation, project delays, and additional project costs. Most REMR activities will not involve large quantities of toxic materials; however, when improperly handled, even small quantities of a toxic substance may result in environmental damage or, at the very least, extensive regulatory consultation and public relations problems. With any construction activity, there is no substitute for a common-sense approach to planning, design, and execution of work involving toxic and hazardous substances. However, in some instances the maze of laws and regulations for handling and disposal of toxic and hazardous materials can defy common sense and can require extensive expenditures of time and money.

BACKGROUND: Environmental protection during construction often receives less attention than the predesigned safeguards required by the construction project until problems are experienced with a hazardous or toxic material. These problems could be the result of either an accidental release that endangers human health or the environment or a regulatory agency's required environmental audit.

Problem construction residues may result from a variety of activities. Examples of such residues include portable toilet chemicals, such as formaldehyde and aromatics, acidic washing compounds used on masonry, paints and coatings, solvents, chemicals for concrete repair, or even muddy storm-water runoff from a construction site (Ref a). Preexisting contamination is another possible source of problem residues at a construction site. Any time an excavation is planned, the possibility of prior improper disposal of hazardous waste on the site must be considered.

A variety of laws and supporting regulations affect the handling of hazardous materials and waste. These regulations include, but are not limited to, the Resource Conservation and Recovery Act (RCRA), Occupational Safety and Health Act (OSHA), the Clean Water Act (CWA), the Toxic Substances Control Act (TSCA), and the Clean Air Act (CAA). In addition to these Federal

requirements, most states may have similar laws and regulations. Army Regulation 200-1, Environmental Protection and Enhancement, may also affect handling of such materials.

The RCRA was intended to protect human and natural environment from contamination and degradation by hazardous substances (42 US Code (USC) 6901-6987; Public Law (PL) 94-580). REMR activities that use regulated hazardous substances or produce potentially hazardous wastes must comply with the RCRA (40 Code of Federal Regulations (CFR) 261). The determination that a waste is hazardous is based on the listing of the substance as regulated (40 CFR 261) or on the characteristics of the substance (Subpart C, 40 CFR 261.20-.24), that is, ignitability, reactivity, corrosivity, or toxicity (Ref b).

Protection of local air quality became a national priority with the CAA of 1970. The 1977 amendments to the CAA provided air quality protection through establishment of ambient air quality standards, industry emission standards, and a permit and enforcement system to enforce the standards (42 USC 7401--7626; PL 95-95 as amended). Section 309 of the CAA requires Environmental Protection Agency (EPA) or state review of all Federal construction and other major activities that result in air pollution. Corps construction, operation, and maintenance activities must comply with air pollution control requirements of federal, state, and local laws; and planning, design, and selection of specifications should consider pollution control (Ref b).

The discharge of wastewater, pollutants, or effluents into a stream, river, reservoir, or wetlands from REMR activities must not violate established water quality standards dictated by the CWA (33 USC 1251-1376; PL 92-500 as amended). Underwater procedures and repair and maintenance activities can introduce chemical substances, sediments, and debris into water bodies. Such discharges of pollutants are regulated by section 402 of the CWA, which established the National Pollutant Discharge Elimination System (NPDES), which can be administered by the states (Ref b).

The OSHA has established regulations designed to decrease accidents associated with the construction site and to protect personnel occupational health exposure. Specific regulations that may apply to the handling of hazardous materials and waste at REMR activities are covered in 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response. Right-to-know regulations, which require employers to inform employees of the hazards and proper handling procedures for hazardous materials, are covered in 29 CFR 1910.1200.

The TSCA is intended to control the testing, manufacture, and marketing of new toxic substances (15 USC 2601 et seq.). Regulated substances include such things as asbestos, polychlorinated biphenyls, chlorinated napthalenes, and various industrial compounds (40 CFR 704, 720, and 763). REMR use of regulated substances is exempted from EPA notification under the provisions for small quantities, for research and development, or for test marketing (40 CFR 720.36 and 720.38).

Army Regulation 200-1 presents requirements for the safe handling of hazardous materials and wastes to protect human health and the environment. Provisions of this AR are presented in EM 385-1-1 USAE Safety and Health Requirements Manual (Ref c). A major requirement of this EM is the development of an acceptable accident prevention program and job hazards analysis that "will

identify and evaluate the hazards and outline the proposed methods and techniques of accomplishing each phase in a safe manner." This analysis should be prepared by the prime contractor "prior to the start of a project or any major phase of work" and reviewed by designated government personnel (EM 385-1-1) (Ref c). The provisions of this AR and EM may be augmented by local supplements.

IDENTIFICATION OF PROBLEM RESIDUES: Depending on the size of a construction project and the types and quantities of potentially hazardous materials that must be handled during a construction project, a hazardous materials/waste manager may be required for the project. Most REMR projects would not require that a full-time employee be dedicated solely to manage hazardous materials during a construction project; however, one person or a part-time outside consultant should be made responsible for hazardous waste management and should be familiar with the complex waste storage, transportation, disposal, and records keeping requirements of the Resource Conservation and Recovery Act, the Occupational Safety and Health Act, and the Toxic Substances Control Act. The hazardous materials/waste manager should identify problem materials and waste; provide for their proper handling, transportation, storage, and disposal; keep construction management informed; and ensure that employees who handle hazardous materials are properly trained and that they use the correct procedures for handling and disposing of hazardous materials and wastes (Ref c).

The determination of when a hazardous material becomes a hazardous waste is another important job of the hazardous materials/waste manager. As the term applies to REMR activities, a hazardous material becomes a hazardous waste when it has served its intended purpose, is discarded, or is intended to be discarded (Ref d, 40 CFR 261.3). A waste may be determined to be hazardous, according to statutory criteria, if it poses a threat to human health and the environment when mismanaged (Ref d, RCRA Section 1004(5) (B)). Determining when a hazardous material becomes a hazardous waste can be an important issue because once that determination is made, RCRA regulations apply, and hazardous waste storage regulations, including facility requirements and time and quantity limits, must be followed to avoid regulatory problems. Hazardous materials must also be stored and handled in accordance with applicable regulations such as OSHA and right-to-know laws.

Sources of problem residues can come from many and varied aspects of construction projects. The following categories are not meant to be inclusive of all possible sources of hazardous wastes generated at construction projects but to indicate the variety of problem residue sources.

a. Lead-based paints. Because of toxicity, the use of lead has been banned in consumer products in recent years. However, exposure studies and long-term usage have shown that lead-based paints are very effective inhibitive primers for structural steel. Once in place on bridges, structural steel, or tank exteriors, lead-based paints present no health hazard.

   Lead-based paints may, however, become a hazardous waste problem when removed from existing structures. Classification of such materials as hazardous is based on the toxicity of the waste residue as determined by the EPA extraction procedure (EP) toxicity

test (Ref e). The EP test measures the extractable lead content of the waste residue. If the leachate lead content (not the total lead content) is above 5 ppm, the waste is considered hazardous and requires hazardous waste disposal under RCRA regulations.

Another possible source of hazardous waste from paint residues is partially filled containers and empty containers with paint residues. Whether these containers could be considered hazardous depends on the lead concentrations and the residue amounts.

b. Concrete repair. REMR activities that would require the repair of concrete structures may result in the generation of a hazardous waste. Various chemical agents used for the repair of concrete may be toxic materials. When these materials are accidentally spilled, used as coatings on concrete that is subsequently removed, or remain as surplus material after a repair is completed, they may be considered hazardous waste and may require proper handling and disposal under RCRA regulations. Hazardous chemical materials used in the repair of concrete structures may include epoxy coatings used for protection, skid resistance, and sealing of bridge decks; epoxies, polyurethanes, polyester, and other resins used in the in situ repair of concrete on locks and dams; coatings used for waterproofing, masonry, and concrete; or various admixtures used with concrete and mortar. Recent right-to-know laws require manufacturers to provide material safety data sheets (MSDS) with materials considered to be toxic or hazardous. If a material is received without an MSDS and any question exists as to its toxicity, an MSDS should be requested from the manufacturer. The MSDS should be kept on file and all applicable handling and disposal procedures understood and followed by all employees that come in contact with the materials. An example of an MSDS is provided in Figure 1.

c. Arsenic and old asbestos. Although the use of compounds of arsenic and asbestos has been curtailed in recent years, these materials were used widely in the past. REMR activities involving removal of coatings or insulation may generate residues containing these materials. Since arsenic was commonly used as a pigment, arsenic residues may exist in older buildings that may be scheduled for destruction, rehabilitation, or conversion to other uses. Problem residues or contact with workers could occur. A similar situation exists with asbestos, which was commonly used as insulation in buildings. Although asbestos residues do not have to be disposed of as a hazardous waste in a RCRA approved landfill, asbestos must be handled by properly trained personnel who use protective equipment, including respiratory protection. Asbestos must be packaged according to specifications; however, with the proper notification, asbestos can be disposed of in a sanitary landfill. The OSHA presents guidelines for the proper handling of asbestos in 29 CFR 1910.1001.

Arsenic was also commonly used in pesticides in the past and, therefore, may still exist in sediments washed down from agricultural land. During dewatering or dredging operations connected

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Material Safety Data Sheet

M Coat B Protective Gage Coating — May 26, 1982 — 11/14/72

SECTION I.

The material described on this form is manufactured or distributed by MEASUREMENTS GROUP. The information appearing herein has been carefully collected from the most reliable sources known to us, and is correct to the best of our knowledge and belief. Since it is not possible to obtain all desired data on many materials, portions of this form may be incomplete. As additional information becomes available, the forms are updated and released to those users who request them.

Since the data appearing on this form is primarily obtained from outside sources, we specifically disclaim any and all form of liability and/or responsibility for the use to which it may be put.

SECTION II. HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES & SOLVENTS	%	TLV (Units)	ALLOYS & METALLIC COATINGS	%	TLV (Units)
			BASE METAL		
			ALLOYS		
			METALLIC COATINGS		
MEK	84	200ppm	FILLER METAL PLUS COATING OR CORE FLUX		
			OTHERS		

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Synthetic Rubber	16	N/A

SECTION III. PHYSICAL DATA

BOILING POINT (°F)	≈ 170°F	SPECIFIC GRAVITY (H2O = 1)
VAPOR PRESSURE (mm Hg.) @ 68°F (20°C)	71.2	PERCENT VOLATILE BY VOLUME (%)
VAPOR DENSITY (Air = 1) @ 68°F (20°C)	.81	EVAPORATION RATE (= ____ %)
SOLUBILITY IN WATER	Insoluble	
APPEARANCE AND ODOR		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	≈ 30°F Tag Closed Cup	°F	°C	FLAMMABLE LIMITS	LEL	1.8%	UEL	11.5%

EXTINGUISHING MEDIA: CO2 or dry chemical

SPECIAL FIREFIGHTING PROCEDURES:

UNUSUAL FIRE AND EXPLOSION HAZARDS:

SECTION V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: 200 ppm in air

EFFECTS OF OVEREXPOSURE: Local skin irritation with narcosis induced by large respiratory ingestion.

EMERGENCY AND FIRST AID PROCEDURES: Remove from exposure, get medical aid.

SECTION VI. REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATIBILITY (Materials to avoid):

HAZARDOUS DECOMPOSITION PRODUCTS:

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wipe up with absorbent material, ventilate area.

WASTE DISPOSAL METHOD: Dispose of as flammable waste.

SECTION VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type):

VENTILATION	LOCAL EXHAUST: Adequate	SPECIAL
	MECHANICAL (General)	OTHER
PROTECTIVE GLOVES: Polyethylene		EYE PROTECTION: Goggles

OTHER PROTECTIVE EQUIPMENT:

SECTION IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep away from heat, sparks and open flame; avoid direct skin and eye contact and prolonged breathing of vapor.

OTHER PRECAUTIONS:

Figure 1. Material Safety Data Sheet

with repairs to locks and dams, workers may encounter arsenic-contaminated sediments, which would require proper handling and disposal.

d. Herbicides. The use of chemical herbicides may be required at some construction sites in the equipment storage or material laydown areas to kill vegetation that traps moisture which causes corrosion. As with other toxic chemicals, an MSDS explaining the safe handling, storage, and disposal procedures should be obtained for these chemicals. The MSDS should also detail the procedures to follow in the case of a spill or contact with persons using the herbicide. The people using the material should be trained in the proper use of the chemical and the equipment used to dispense the material. Partially filled and empty containers must be stored and disposed of properly. The quantities of the chemical being used and requiring disposal would determine whether RCRA regulations would apply. Guidelines for handling toxic chemicals are presented in OSHA 29 CFR 1910 subpart Z.

e. Construction site wastewaters. Wastewaters from a construction site may result from several sources, and discharges may be regulated by the CWA or even RCRA. Discharges may result from concrete batching and cleanup, small package sanitary wastewater treatment plants, portable toilet facilities, aquifer dewatering in deep excavations, pipe system hydro test flushing, and general site storm-water runoff. Whether a NPDES permit is required depends upon the quantity and quality of the wastewater generated at a construction activity. In unusual cases RCRA treatment or disposal regulations may be applicable.

f. Excavation of hazardous or unknown materials. Historical contamination of sites can cause history to repeat itself when toxic or hazardous materials are excavated. This situation may result during dredging operations required for lock and dam repairs if the sediments are in an environment that could have been contaminated by agricultural operations or urban industry. Although dredged materials are not considered to be waste materials that would require disposal under RCRA regulations, recently there have been instances in which dredged materials containing industrial contaminants have required special handling and disposal. The disposal of contaminated dredged materials is handled on a case-by-case basis.

Unknown contaminants have also been uncovered during excavation. Although the possibility is slight, more and more instances are occurring in which excavations in areas thought to be contamination free are uncovering drums of waste material or landfilled waste. Unfortunately, historical records of landfilled waste are poor. To compound the problem, typically, a closed landfill decades later appears to planners as an open, level parcel of land that may sell at a premium. Although there are engineering and construction practices that allow for the safe construction of a facility on an old landfill site, it should be remembered that landfilling practices in the past included the dumping of any and all waste

materials, which could include barrels of unknown and potentially hazardous waste.

MINIMIZATION OF PROBLEM RESIDUES: A waste segregation program is one technique that can greatly minimize the disposal requirements for hazardous waste during a construction project. A strategic location and easily identifiable containers for hazardous waste can greatly reduce the requirements for hazardous waste disposal. At one construction site gray containers were used to hold nonhazardous or salvage waste, while yellow drums labeled as hazardous waste were located in areas where hazardous waste might be generated (Ref a). The hazardous waste containers should also be segregated as to solid or liquid wastes to further reduce disposal cost. The person in charge of hazardous waste management for a construction project should also be aware of the possibilities of any incompatible wastes that might require disposal and should provide and label individual containers appropriately. The use of hazardous waste containers would also prevent the possibility of hazardous waste disposal with nonhazardous construction residue in a construction debris landfill. The installation and diligent use of a waste segregation program would not only minimize the generation of waste that would require hazardous waste disposal but would also prevent the possibility of lengthy litigation and disposal requirements that could occur if a debris landfill began leaking a hazardous leachate years after the construction project was completed.

Hazardous waste disposal requirements may also be minimized by simply not ordering more materials than are required to complete a project. Although at times it may be less expensive to order a 55-gal drum of a material than four 5-gal cans, any savings will quickly be lost, possibly many times over, if 30 gal of the material remain to be disposed of as a hazardous waste.

Another possibility to minimize problem residue production is the processing of waste streams. An example would be the use of silver recovery equipment to lower the toxicity of fluids used to X-ray welded joints. Also, surplus materials may be salvaged. Surplus amounts of old paints or other construction materials may be donated to construction union's apprenticeship training programs.

PREVENTION OF ENVIRONMENTAL RELEASE: Accidental releases of hazardous substances during their use can be minimized with the use of the right equipment and properly trained personnel. Hazardous materials should be handled, stored, and disposed of in accordance with procedures presented in the MSDS that accompanies the materials. Workers should be made aware of the potential hazards not only to themselves but also to the environment should spills occur. Although production rates may be slower when health and safety precautions are instituted, savings will be experienced in the long run if a release of a hazardous material can be prevented.

Secondary containment is required by RCRA regulations for containers used to store hazardous waste. Compliance with this regulation may require the construction of concrete pads and dikes to store drums of hazardous waste. Also, these areas may have to be cross diked if incompatible wastes are to be stored in the same holding area. Periodic inspections to check the integrity of the storage drums of hazardous waste are also required. Preconstruction planning to determine the layout and most accessible areas for hazardous waste storage should be used.

DISPOSAL AND REGULATORY PROCEDURES: There is no substitute for good records on the disposal of hazardous wastes. The use of permanent labeling and a hazardous waste storage area that will protect the integrity of the storage drums from the time of generation until they are disposed of can save considerable expense and prevent many regulatory problems. The disposal of drums of unknown waste can be very expensive and troublesome if sampling and analysis must be conducted prior to disposal operations. Also, overpacking leaking drums and cleaning up spills are expensive procedures that can be prevented with proper storage in a facility that protects the containers from adverse conditions such as rain and snow or standing water.

For contract construction projects, contract provisions can require contractors to be responsible for hazardous waste disposal. A consultant may be used to assist the contract administrator in writing pollution control clauses into bid packages. This written agreement will prevent vendors and subcontractors from claiming unanticipated expenses because they were unaware of pollution control requirements.

Hazardous wastes must be disposed of at licensed hazardous waste disposal sites. Licensed hazardous waste transporters must transport the waste and should be documented with a hazardous waste manifest. Because the regulations for the disposal of hazardous waste are continuously changing, assistance from EPA or the responsible state agency may be required and should be obtained. A good working relationship with Federal and state agencies involved with hazardous waste management is very beneficial. Problems that may arise with regulating, disposal, accidental releases, or the discovery of unknown and potentially hazardous materials can be solved more easily with good open relationships with the Federal or state agencies involved.

REFERENCES:

a. Hope, S. J. 1986 (Oct). "Constructing a Better Environment," Civil Engineering.

b. Henderson, J. E., and Peyman, L. D. 1986. "Applicability of Environmental Laws to REMR Activities," Technical Report REMR-EI-1, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

c. Headquarters, US Army Corps of Engineers. 1984 (Oct). "Safety and Health Requirements Manual," Engineer Manual 385-1-1, Washington, DC.

d. Greer, L. E. 1984. "Definition of Hazardous Waste," Hazardous Waste, Vol 1, No. 3.

e. US Environmental Protection Agency. 1986 (Nov). Test Methods for Evaluating Solid Waste, SW-846, 3d ed., Office of Solid Waste and Emergency Response, Washington, DC.