

SUMMARY OF PCP-TREATED WOOD WASTE MANAGEMENT AT ARMY INSTALLATIONS

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13. ABSTRACT This report summarizes the findings of a survey that was conducted to determine the extent and magnitude of problems associated with the disposal of PCP-treated wood waste at Army installations. Practices being used to reduce the cost associated with disposal of PCP-treated wood waste are also summarized. There is considerable variation among Army installations regarding the handling of PCP-treated wood. At most installations, the PCP-treated wood waste is either shredded and composted for use as mulch on the installation or it is disposed of in a sanitary landfill at a cost of around \$30 per ton. However, some installations are paying up to \$500 per ton to dispose of the wood as hazardous waste. Most installations have little PCP in their wood-waste streams while others have enough PCP in the wood waste to garner a hazardous waste classification. According to the Code of Federal Regulations (CFR), if the concentration of PCP in the wood-waste stream exceeds 100 mg/l (using the Toxicity Characteristic Leaching Procedure) then the wood is considered a hazardous waste and subject to hazardous waste regulations. The disparity in the cost of wood disposal appears to be associated with the level of PCP in the wood waste and not the differences in local or state regulations.				
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Summary of PCP-Treated Wood Waste Management at Army Installations

Abstract:

In the past, pentachlorophenol (PCP) was used primarily by the Army to preserve the wood used for making ammunition boxes and pallets. PCP-treated wood is no longer being procured by the Department of Defense, however, existing stocks of the wood are significant. This report summarizes the findings of a survey that was conducted to determine the extent and magnitude of problems associated with the disposal of PCP-treated wood waste at Army installations. Practices being used by installations to reduce the cost associated with the disposal of PCP-treated wood are also summarized.

There is considerable variation among Army installations regarding the handling of PCP-treated wood. At most installations, the PCP-treated wood waste is either shredded and composted for use as mulch on the installation or it is disposed of in a sanitary landfill at a cost of around \$30 per ton. However, some installations are paying up to \$500 per ton to dispose of the wood as a hazardous waste. Most installations apparently have little PCP in their wood-waste stream while others have enough PCP in the wood waste for it to garner a hazardous waste classification. According to the Code of Federal Regulations (CFR), if the concentration of PCP in the wood-waste stream exceeds 100 mg/l (using the Toxicity Characteristic Leaching Procedure - TCLP) then the wood is considered a hazardous waste and must be either disposed of in a hazardous waste landfill or incinerated. The disparity in the cost of wood disposal appears to be associated with the level of PCP in the wood waste stream and not the differences in local or state regulations.

None of the installations were having problems disposing of or recycling their wood waste, however, two sites were paying the high fee associated with hazardous waste disposal. One site was stockpiling material until they could find a new waste contractor. Apparently the incinerator they had been using had recently shut down. A third site was having difficulty obtaining adequate analytical service for characterizing the wood waste.

Regulatory Issues:

PCP-treated wood is not a listed hazardous waste under federal regulations. It, however, can be considered a hazardous waste if it exhibits the characteristic of toxicity. The toxicity characteristic is based on the TCLP. Any waste whose extract using the TCLP has a concentration of pentachlorophenol that is equal to or greater than 100g/L is considered a hazardous waste and subject to RCRA regulations (40 CFR 261). Although states must follow federal regulations they are allowed to have more stringent regulations.

The U.S. Army Environmental Hygiene Agency, now the U.S. Army Center for Health Promotion and Preventive Medicine, published a technical guidance document in 1991 that describes the health risks associated with the handling of PCP-treated wood, the recommended personal protective equipment, and disposal methods (USAEHA, 1991). This document has not been updated, however, its recommendations are still valid. The disposal options for PCP-treated wood given in this document are as follows:

- If considered a hazardous waste, the material must be treated and disposed of in a RCRA (Subtitle C) landfill or incinerated by a facility permitted by the appropriate State or local air pollution control agency. Before being landfilled the waste must be encapsulated or treated and the level of PCP using TCLP must be below 7.4 mg/L. Likewise the residue remaining after incineration must meet the treatment standard of 7.4 mg/L set forth in 40 CFR Part 268: Land Disposal Restrictions before being land disposed.
- If the material does not meet the hazardous criteria then it should be placed in a sanitary (Subtitle D) landfill. A construction and debris (C&D) or rubble landfill should not be used to dispose of PCP-treated wood because these do not meet the criteria established in 40 CFRs 241: Guidelines for Land Disposal of Solid Waste and 257: Criteria for Classification of Solid Waste Disposal Facilities and Practices.
- PCP-treated wood material can be recycled or resold under the following restrictions:
 - ◆ Use PCP-treated materials outdoors or for soil containers for plants.
 - ◆ Do not use PCP-treated material for making furniture, burning in fireplaces, for storage inside human dwellings, for growing food items, or for woodworking in a home setting.

From discussion with Greg Cliffel of DRMS it was learned that ammunition boxes are the only PCP-treated items that are sold. All other wood contaminated with PCP is landfilled.

Summary of PCP-Treated Wood Handling Survey

Table 1 lists the 22 installations contacted regarding PCP-treated wood disposal. Two other individuals not affiliated with a single installation are also listed in Table 1. Appendix A shows a copy of the guidelines used in questioning POCs. Appendix B summarizes the information from each installation obtained in the telephone survey.

Installations contacted were in one of three commands, Army Materiel Command, Forces Command, or Training and Doctrine Command. Installations involved in training such as Fort Jackson and Fort Sill apparently have no significant amounts of PCP-treated wood in their waste streams. These installations are probably receiving ammunition in wooden

containers that are preserved with more environmentally-friendly compounds now being used by the Army, such as, copper naphthenate, zinc naphthenate, or copper-8-quinolinolate.

Many POCs merely stated that they are having no problems dealing with PCP-treated wood waste. It can be concluded that their installations are not handling wood with high enough levels of PCP to warrant a hazardous waste classification. These installations are disposing of wood waste in sanitary landfills at a cost of \$25 to \$31/ton.

Table 1
Installations contacted

Installation	State
Fort Benning	GA
Fort Jackson	SC
Fort McClellan	AL
Fort Sill	OK
Fort Bliss	TX
Blue Grass Facility	KY
Sierra Army Depot	CA
Fort Wingate	NM
Letterkenny Army Depot	PA
Lone Star AAP	TX
Radford AAP	VA
Kansas AAP	KS
Holston AAP	TN
Yuma Proving Ground	AZ
Redstone Arsenal	AL
Rock Island Arsenal	IL
Rocky Mountain Arsenal	CO
Badger AAP	WI
Fort Monmouth	NJ
Red River Army Depot	TX
Picatunny Arsenal	NJ
Seneca Army Depot	NY
TRADOC Headquarters	VA
DRMS Operations East	OH

Many installations are chipping and composting their wood waste for mulch. In most states this practice is allowed provided that the PCP levels are low enough to be considered non-hazardous. Florida has clean soil restrictions that would probably prohibit this practice (Robert Anthony, 1999).

The only sites that are dealing with significant quantities of PCP-treated wood are those involved in demilitarization of ammunition packed years ago in PCP-treated wooden containers. In a study conducted by the Electric Power Research Institute it was concluded that PCP-treated wood would not be classified as a hazardous waste (EPRI, 1995). That is, a TCLP extract from typical PCP-treated wood has a PCP concentration below 100 mg/L. Installations that are disposing of PCP-treated wood as a hazardous waste must be handling wood treated with unusually high levels of PCP. If the wood receives a hazardous waste classification it must be stored and handled as a RCRA waste.

The disposal of the PCP-treated wood should not be a problem for installations. DRMO routinely handles this type of waste through hazardous waste contractors. The cost for the disposal may be considered excessive by some environmental managers, however, the site paying the highest cost for disposing of PCP-contaminated wood (Red River Army Depot) paid only \$28,313 in 1998 for disposing of the wood as a hazardous waste.

Sierra Army Depot developed the price comparison for disposal of PCP-treated wood shown in Table 2. Their cost per ton of \$160 to \$220 for sanitary landfill is high compared to sanitary landfill costs in other parts of the country. The \$160 to \$220 cost is more typical of a RCRA landfill. Some installations in this survey paid as little as \$25 per ton for disposal in a sanitary landfill. Also, their cost for the approved furnace could be decreased by around a factor of three by shredding or chipping the pallets or boxes to reduce their volume.

Table 2
Cost Comparison of PCP-Treated Wood Disposal Options

Disposal Option		
Sanitary Landfill	Approved Furnace	CWP Incinerator
\$160 to \$220 per ton	\$15 to \$70 per cubic yard	\$2,000 per ton
\$6.40 to \$8.80 per pallet ¹	\$3.75 to \$17.50 per pallet ²	\$80 per pallet ¹
\$0.72 to \$0.99 per box ³	\$0.56 to \$2.59 per box ⁴	\$8.97 per box ³

1 Pallets weigh 80 pounds each and 25 weigh a ton.

2 Pallets are 40" x 48" x 6". There are 4 pallets per cubic yard.

3 Ammunition boxes weigh 9 pounds. There are 222 ammunition boxes in a ton.

4 Ammunition boxes are 15" x 13" x 9". There are about 27 boxes in a cubic yard.

One conclusion that can be drawn from the data in Table 2 is that the CWP incinerator is considerably more expensive than the other two options. The CWP incinerator is a recommended alternative for explosives-contaminated wood (USAEHA, 1991).

Conclusions and Recommendations

There is considerable variability in the cost associated with disposal of PCP-treated wood. It appears that few sites are handling wood with enough PCP to warrant a hazardous waste classification. Most sites are disposing of the PCP-treated wood waste in sanitary landfills indicating that the PCP levels are below EPA's hazardous waste criteria of 100 mg/L. The costs for disposal in a sanitary landfill were typically \$25 to \$31 per ton. One site quoted a price of \$103 per ton. Those sites that are paying to have wood disposed of in a hazardous waste landfill are paying \$220 to \$516 per ton to dispose of the waste. The installation paying the highest cost (Red River Army Depot) would like to be involved in research dealing with treatment alternatives, however, they only spent about \$28,000 in 1998 disposing of PCP-treated wood as hazardous waste.

Installations should not have difficulty disposing of PCP-treated wood. The DRMO routinely disposes of these types of waste through waste contractors. Those sites paying a high price to dispose of non-hazardous PCP-treated wood in sanitary landfills should consider chipping and composting of the wood. At the Blue Grass Facility the use of a chipper has reduced wood disposal costs by 60%. All installations should routinely characterize their wood waste and dispose of it accordingly. Developing a record of low PCP levels, as did Fort Sill, can lead to considerable savings by avoiding RCRA regulations. State regulators should be consulted for guidance in dealing with PCP-treated wood as state regulations may differ from federal regulations.

REFERENCES

Electric Power Research Institute. 1995. *Management Practices for Used Treated Wood*. TR-104966. Research Project 2879-02. EPRI, 3412 Hill Avenue, Palo Alto, CA.

EPA. 1999. 40 CFR 241: Guidelines for the Land Disposal of Solid Waste

EPA. 1999. 40 CFR 257: Criteria for Classification of Solid Waste Disposal Facilities and Practices

EPA. 1999. 40 CFR 261: Identification and Listing of Hazardous Waste

EPA. 1999. 40 CFR 268: Land Disposal Restrictions

USAEHA. 1991. *Pentachlorophenol Treated Materials*. USAEHA TG No. 146. U.S. Army Environmental Hygiene Agency is now the U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD

Personal correspondence with Robert Anthony. 1999. Emelle Hazardous Waste Landfill, Emelle, AL

APPENDIX A

Guidelines for Telephone Survey Regarding PCP-treated Wood Disposal at Army Installations

The Army has large quantities of pentachlorophenol (PCP)-treated wood (ammunition boxes, dunnage, etc.) and has a problem identifying the proper way to dispose/reuse it. The Army Environmental Center has asked TVA to study the problem of PCP-treated wood disposal to determine its magnitude, cost, and possible alternatives for disposal or reuse of the PCP treated wood.

As part of this study, environmental managers at installations that handle large quantities of PCP-treated wood are being asked to help TVA define the problem by providing answers to the following questions.

Installation Name _____

Point of Contact _____ Telephone Number _____

1. Does your installation handle a significant quantity of PCP-treated wood, and if so, how much is generated on an annual basis and how much is presently stored onsite, requiring disposal/reuse? _____
2. What is/are the current method(s) of disposal/reuse of the wood?

3. What is the estimated cost per unit of wood for the chosen method(s)?

4. Are there any regulatory issues/restrictions related to the disposal/reuse method(s)?

5. If disposal in a landfill is the current method of disposal, what is the availability of present and future landfill space? _____
6. What would be the cost of new landfill space if it were required?

APPENDIX B

Summary of Information Obtained Regarding PCP-Treated Wood Disposal

Installation	Summary of Information Regarding PCP-Treated Wood Disposal
Ft. Benning, GA	Pallets are chipped and composted for making mulch. Ammo boxes are landfilled in a Subtitle D landfill in Alabama for \$31/ton or are taken and sold by DRMO. Chipper can handle nails in pallets but not hinges on ammo boxes.
Ft. Jackson, SC	Handles a considerable number of ammo boxes. Most of the used boxes are sent back to the supplier for reuse. The rest are discarded in trash bins and sent to a landfill at a cost of about \$25/ton. Construction and demolition (C&D) debris is sent off post to a MSW landfill because former C&D landfills have become SWMUs.
Ft. McClellan, AL	Pallets are used until they fall apart. All wood goes into a C&D landfill. Very little ammunition is handled. Site is closing in the summer of 1999.
Ft. Sill, OK	Ft. Sill handles tons of artillery crates. Since it is all new material, it contains no PCP. After 6 years of monitoring and finding practically no PCP in the wood waste stream, the State has allowed Ft. Sill to dispose of wood in their own landfill or to chip it for mulch. Mulching costs around \$7/ton to process and spread. Landfilling costs around \$25/ton. Their landfill is expected to be filled up in 25 years at which time they will switch to the MSW landfill. Consequently they are trying to keep wood waste out of the landfill.
Ft. Bliss, TX	Pallets are being ground in a tub grinder. Wood that is not PCP-treated is made into mulch. PCP treated wood is placed in their own landfill. The cost for landfilling the wood waste is \$103/ton. This includes collecting, hauling, and amortization of the landfill cost.
Blue Grass, KY	BGAD's PCP-treated wood products are continually evaluated by a contracted environmental test facility. When samples are below the TCLP of 100 mg/L, the wood is turned over to an onsite disposal contractor who chips the wood for use as mulch or for disposal in the on-site landfill. When the chipped material is used for mulch, the metal is separated magnetically and sent to DRMO for disposal. Metal scrap stays with material being landfilled. Shredding of wood waste reduces the disposal cost by 60% and reduces storage space by nearly 88%.
Sierra AD, CA	Sierra generates 1 to 2 million pounds of wood waste per year. All of the wood is handled by DRMO. PCP-contaminated wood is shipped to Utah and landfilled at a cost of 11¢ per pound (\$220/ton). PCP-free wood is burned in an energy production facility at a lower cost.
Ft. Wingate, NM	Ammo boxes are the main source of wood waste. They are having no problem disposing of them. Pallets lack enough PCP to pose a problem.

Installation	Summary of Information Regarding PCP-Treated Wood Disposal
Letterkenny, PA	They have a short-term problem since the incinerator that had been taking the material went bankrupt. Consequently, they currently have no one to take the material. It is being shredded and stockpiled until another incinerator is located.
Lone Star, TX	Having no problems disposing of wood waste.
Radford, VA	Having no problems disposing of wood waste.
Kansas AAP, KS	Having no problems disposing of wood waste.
Holston, TN	Having no problems disposing of wood waste.
Yuma P G, AZ	Having no problems disposing of wood waste.
Redstone, AL	Having no problems disposing of wood waste.
Rock Island, IL	Wood is treated with copper naphthenate and presents no hazard. All wood is chipped and recycled.
Rocky Mtn Arsenal, CO	They have no known PCP contamination. They have a hazardous waste landfill that can be used to dispose of wood found to be hazardous due to PCP contamination.
Badger, WI	Having no problems associated with PCP-treated wood disposal.
Ft Monmouth, NJ	Having no problems associated with PCP-treated wood disposal.
Red River, TX	In 1998 they disposed of 109,740 pounds of wood as hazardous waste and 4,180 pounds as nonhazardous special regulated waste. The hazardous wood waste is accumulated as the old ammunition it contained is demilitarized by OB/OD. The cost for disposing of the hazardous waste is 25.8¢ per pound and the cost for the special waste is 11.8¢ per pound. Despite this high cost, Red River spent only \$28,313 in 1998 for disposing of PCP-treated wood as hazardous waste. The environmental POC mentioned that they would be interested in alternative solutions for dealing with the hazardous waste. They are also having problems getting wood analyzed for PCP and plan to send samples to an off-depot laboratory.
Picatinny, NJ	They currently have no problems with PCP-treated wood waste. They had problems years ago from burning the material in their burning ground.
Seneca AD, NY	Handles quite a bit of wood in ammo boxes. The boxes are checked for bullets, or residues and are then crushed and handled by DRMO who sends them to an incinerator for use as an alternate fuel.
RCRA Manager for TRADOC	Disposal of PCP-treated wood is not a problem at any facilities with which the office is involved.
DRMS Operations East	Ammo boxes are sold when marketable. Otherwise the PCP-contaminated wood is handled as a hazardous waste and is generally sent to a RCRA landfill.