APPENDIX F

DEBRIS REDUCTION

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1. MISSION DEFINITION. Reduction of debris at storage/disposal sites may be included in the overall debris mission or be broken out as individual tasks to support disposal operations. This section will focus on three methods of reduction; burning, chipping and grinding, and recycling.

2. PRE-DISASTER PLANNING.

a. Local governments should pursue agreements with private industry for recycled materials such as timber, mulch/chips, and ash.

b. Corps:

(1) Vendor lists for chippers, air curtain burners and recyclers.

(2) On-the-shelf specifications for the above.

3. POST-DISASTER ASSESSMENT.

a. POC's:

(1) State/local environmental
(2) Vendors

4. SPECIAL COORDINATION ISSUES.

a. The planner must take into consideration the following when developing a debris reduction strategy:

(1) Geographic location
(2) Political climate
(3) Environmental sensitivity of the area
(4) Agricultural/Industrial requirements of the community

b. Other considerations such as home owners and civic associations, environmental groups and local political concerns need to be considered while enduring the immediate pressure to "Move it Now". The removal and reduction methods and the associated cost of each have be weighed against the political and environmental concerns of those who will have to live with your decision long after you have departed.

c. Burning: There are three burning methods available to dispose of woody debris:

(1) Open Burning
(2) Air Curtain Pit Burning
(3) Portable Air Curtain Incinerators

Each has its own advantages and disadvantages which should be considered before selecting and implementing it as part of the volume reduction strategy.

(1) Open Burning:

Open burning, if controlled, is a very cost effective means to reduce clean woody debris and may be suitable for rural, not urban areas. Consideration must be given to the type of debris to be burned. Clean woody debris presents little environmental damage and the resulting ash may be suitable as a soil additive for the local agricultural community. Extension personnel should be consulted to determine if the resulting ash can be recycled in the form of a soil additive. This action will help develop support for the open burn operations. The open burn option will quickly be terminated unless there is definitive control over what is burnt and there is some value to the community.

(2) Air Curtain Pit Burning:

(a) The air curtain pit burning method offers an effective means to expedite the volume reduction process while substantially reducing the environmental concerns caused by open burning. The air curtain burning method incorporates a pit constructed by digging below grade or building above grade (if high water table elevation) and a blower. The blower and pit make up an engineered system which must be precisely configured to properly function. The blower must have adequate air velocity to provide a "curtain effect" to hold smoke in and to feed air to the fire below. The pit configuration must have a precise width, depth and length to compliment the blower (see Appendices 5-A, B and C).

(b) The following recommendations/issues were generated from past disaster responses:

1) Air curtain subcontractors were not fully knowledgeable of the operating parameters.

2) There are no "industry standards" for air curtain operation. Specifications have to be customized using the information herein and include such items as minimum

blower air velocity, pit configuration, pit materials, ash handling, and acceptable smoke levels or air monitoring.

3) Pits must be constructed out of a highly compactible material that will hold its shape.

4) Water table elevation will govern if pit is constructed above or below grade.

5) Local officials and environmental groups need to be educated on the air curtain system.

6) Smoke generated by any of the above methods is often interpreted by the general public as an environmental impact. Therefore, it is important to also address smoke as part of the air monitoring guidelines.

Opacity - is the art of smoke reading; the visual measuring of smoke. It is a visual way to determine the amount of smoke that is being omitted by a source. For disaster situations, opacity requirements should be set at 15 percent for 50 minutes out of an hour not to exceed 40 percent opacity for the remaining 10 minutes. This will allow for foreign debris that may be put into the burner. A 30 minute start-up time with a minimum of 40 percent opacity should be allowed.

7) Recommended setback of at least 100' between the debris piles and the burn area. Minimum setback of burn area of at least 1000' from the nearest building. Contractors should assure that the public and workers are kept a safe distance from the burn site.

8) The burn should be extinguished approximately two hours before anticipated removal of ash mound. The ash mound should be removed when it reaches two feet below the lip of the burn pit.

9) The burn pits should be made of limestone or equal material, and be reinforced with earth anchors, wire mesh or other items in order to support the weight of the loaders. There should be an impervious layer of clay or limestone on the bottom of the pit to attempt to seal the ash from the aquifer. This should be at least one foot deep and should be replaced if scraped by dozers.

10) The ends of the pits should be sealed with dirt ash or other material to a height of four feet.

11) A twelve inch dirt seal should be placed on the lip if the burn pit area to seal the blower nozzle. The nozzle should be three to six inches from the end of the pit.

12) There should be one foot high warning stops at the edge of length of the pits to warn the operator. This should be of unburnable material.

13) No hazardous or contained ignitable material should be dumped into the pit. This is to prevent contained explosions.

14) The air flow should hit the wall of the pit at about two feet below the edge of the pit and the debris should not break the path of the air flow except during dumping.

15) The length of the pit should be no longer than the length of the blower system and the pit should be loaded uniformly along the length.

16) The contractor is responsible for ensuring that the public is protected from the burn operation. Signs, fences and other measures can be used depending on site conditions.

17) Particular emissions must meet State and EPA standards for burning operations.

18) The Contractor shall be responsible for dust control while handling ash materials.

(3) Portable Air Curtain Incinerators: Portable incinerators use the same methods as Air Curtain Pit Systems. The only difference is that portable incinerators utilize a pre-manufactured pit in lieu of a onsite constructed earth/limestone pit. Portable air curtain incinerators are the most efficient burning systems available. This is due to the pre-manufactured pit which is engineered to precise dimensions to compliment the blower system. The pre-manufactured pit requires little or no maintenance as compared to earth or stone constructed pits which are susceptible to erosion and sluffing. Portable air curtain units are ideal for areas with high water tables, sandy soils and where opacity (smoke) must be kept to a minimum. See Figures 5-A, 5-B, and 5-C.

d. Chipping and Grinding:

(1) General:

(a) Disasters such as hurricanes provide opportunities to employ large scale chipping and grinding operations. The economic feasibility of employing such operations must be carefully studied. The cost of chipping and grinding compared to burning are basically equal, however there are significant differences in volume reduction. Burning for example reduces the volume approximately 95% leaving an ash residue to dispose of. Chipping and grinding reduces the volume on a 1 to 4 ratio (4 cy is reduced to 1 cy) or by 75%. For chipping and grinding to be feasible the 25% of volume remaining (chips/mulch) must have some benefit or use. The recycling of wood chips by use as mulch, fuel, or wood products will help tip the economic scale toward chipping and grinding to support environmental concerns.

(b) The following information outlines the requirements needed to produce an acceptable mulch product through chipping and grinding.

1) Chip size: The average chip size produced should not exceed 4 inches in length and 1/2 inch in diameter. Production output should average 100 to 150 cubic yards per hour when debris is moderately contaminated and slows feeding operations, and 200 to 250 cy per hour for relatively clean debris. (Note; this is not machine capability, this is contractor output or performance capability.)

2) Contamination: Contaminates are all materials other than wood products. Contaminates must be held to 10% or less for the mulch to be acceptable. Plastics are a big problem and should be eliminated completely. To help eliminate contaminates, root rake loaders should be used to feed or crowd material to the grapplers. Bucket loaders tend to scoop up earth, which is a contaminate, and causes excess wear on the machines. The use of hand laborers must be utilized to pull out contaminates prior to feeding the chipper/grinders. The more contaminates the more numerous the laborers. Shaker screens are required when processing stumps with root balls or when large amounts of soil are present in the vegetative debris.

3) Storage: Chips/mulch should be stored in piles no higher than 15 feet. Logistical consideration of piles is important as not to hinder hauling operations.

(c) See Appendices 4-D through 4-K for information on chippers and grinders.

e. Recycling: Recycling is a term used to describe the potential for an economic return from processing debris. Recycling normally includes the following materials:

a. Metals
b. Soil
c. Wood
d. Construction Materials

The feasibility of recycling will normally be determined through contractor interest. Recycling contractors can provide valuable information as to types of recycling available, potential markets, and contract formats.

f. Environmental Issues: The following environmental issues need to be considered in any type of debris reduction operation:

a. Air Quality, (burning, dust)
b. Water Quality, (storm runoff, leaching)
c. Soil/Ash, (dust, leaching)
d. Disease and Hazards, (rodents, mosquitos, odors)
e. Congestion and Noise, (traffic, debris falling from trucks, back alarms, machine noise)
f. Hazardous and Toxic Waste, (separate contract, special holding area)