

April 21 2005

SUBJECT: Local Distribution Point Planning for Commodities

**1. Purpose:** The purpose of this document is to provide state, local and tribal agencies guidance when planning for distribution of emergency supplies and commodities to the public. This guidance centers on local distribution points where the commodities are placed into the victim's hands.

**2. Introduction:** The US Army Corps of Engineers, (USACE) provides predictive models of commodity needs based on hurricane winds, track of the storm, population density, and estimated number of residences without power. These models predict people "in need", this fact is very important for determining amount of commodities that may be required, however, **this fact is useless if commodities can't be placed into the victim's hands in a timely manner.** The 2004 hurricane season proved that the **ability to distribute commodities to the public is the controlling factor to determine supply, not the people "in need" as the models show.** **To successfully accomplish the commodity distribution mission, we must literally, "begin with the end in mind".** The successful execution of a distribution plan is essential for success. The plan must have pre-determined locations of distribution points, layout plans for each point, and include equipment and manpower requirements.

**3. Overview:** The type and quantity of supplies that the public will need in the aftermath of disasters or other crisis will vary due to many factors, and no one event will be just like another. Experience in emergency response over the years suggests some common necessities that the public will require to meet health, safety, and lifesaving needs. They include potable water (usually bottled), packaged ice, Meals Ready to Eat (MRE) and other supplies. In small scale disasters and in the initial hours of larger disasters, these commodities are often supplied by state and local governments, donations from industry, and volunteer agencies. When the need for commodities exceeds the states capability, under a Presidential Declaration, the state can request that FEMA provide the additional requirement. FEMA will provide commodities stored in bulk quantities at regional logistics centers in various locations, and if needed, task ESF#3 (USACE) to purchase additional quantities of ice and water. The FEMA/USACE provided commodities are delivered to state logistical staging areas where the state in-turn supplies the local distribution points. These commodities and supplies are most often delivered in over-the-road tractor trailer loads. Since these types of trucks (eighteen wheelers) are eighteen to thirty feet long, with a trailer that is forty-five to fifty-two feet long, large open areas are required to accommodate the vehicles with their loads. Distribution points must be areas that are paved, concrete, or gravel hard-stand that can withstand loads that are at load limits of national roadways. In addition to the area needed for the trucks, planning must include area for unloading, dumpsters, proper traffic flow, stockpiles, and ingress and egress for the distribution to the public. Figure 1 below shows the general flow of commodities from Federal to State to local distribution points.

**4. Key Background Information:** We live in a "just in time" world. The vendors that supply bottled drinking water, packaged ice and other commodities are geared to supply their normal business clients. They minimize storage costs and personnel costs by keeping production in line with demand. In large response efforts, packaged ice and water are provided from all over the US and Canada in order to meet the immediate demand. The same is true with the trucking

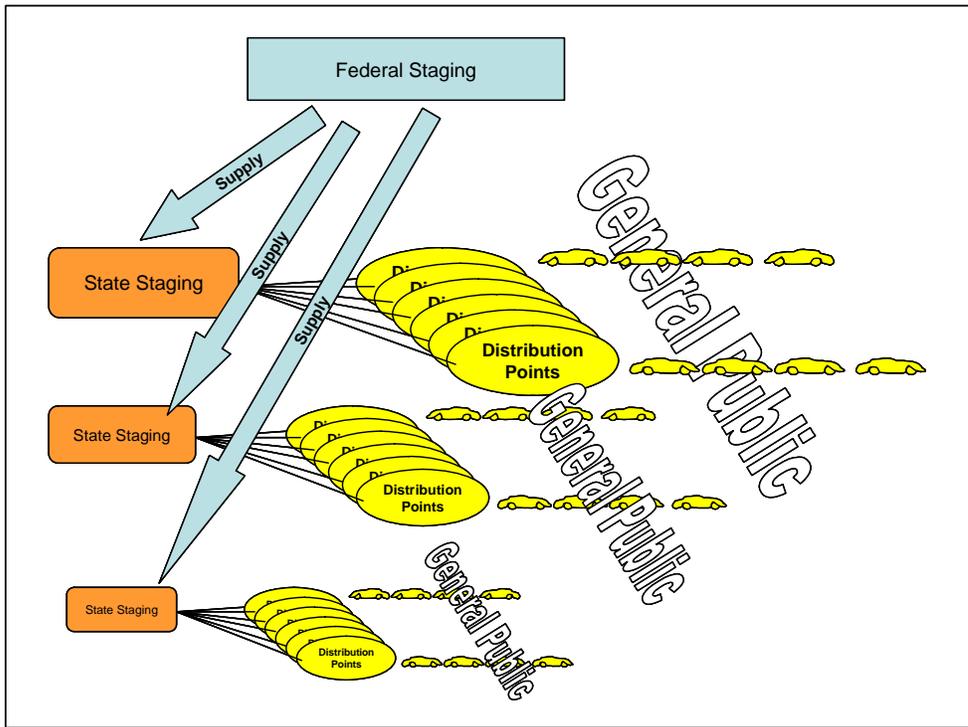


Figure 1

industry. Large over-the-road trucks are seldom idle and are in business to serve clients. This is especially true of refrigerated vans which are in high demand. When disaster strikes, the commercial world has to change their normal business structure to provide support to the effort. Vendors have to continue to support their normal customer base and gear up operations to support disaster requirements. This process, by rule of thumb for large orders, takes 48 hours during the weekday to deliver up to 50 loads and 72 hours to deliver up to 50 loads if initiated on a Friday after 12:00 noon. Because of these factors, the pre-positioning of commodities for a pending event is crucial.

4.1 In past responses, the industry has been impacted by large orders being cancelled and then re-ordered the next day. You can imagine the whiplash to their additional personnel, bottle suppliers, delivery schedules, trucking assets, and existing customers, that this can cause, especially on a weekend when they normally are not working. We will never eliminate this type of situation but, we as responders, need to understand the repercussions to our business partners. Another re-occurring impact is to the trucking industry. When large numbers of trucks sit for 4 or 5 days at a staging or distribution site without being off-loaded, this has a huge impact on re-supply, costs, and can result in trucking companies refusing to participate in future efforts. Our planning efforts must include ways to off-load trucks quickly to free up this limited resource.

**It's a lot better for the victims of a disaster to have a little ice melt at a distribution point rather than to hold the refrigerated truck and keep it from delivering another load.**

4.2 Another key aspect of commodities planning is the understanding of the "pipeline effect". The need for commodities is directly proportional to commercial power. If the power is out the need is there. When the power returns (with the exception of a contaminated water supply) the need is gone. During response operations the power restoration process must be closely Monitored and commodity supplies adjusted. The pipeline is defined as all the commodities purchased but not yet delivered and all the supply trucks that are in route between the supplier

and the distribution points. In large operations this number can be in the hundreds and if the power grid suddenly comes on line, the trucks and commodities in the pipeline will represent excess stockage. The pipeline effect will most always happen, but we as managers, must reduce the effect as much as possible through planning, communications, and coordination.

4.3 Distribution points provide a great place to communicate to the public by means of informational handouts. Community relations personal are included in the distribution resource plan. The key is to have the information packaged in a handout format to prevent people from exiting their vehicles. Maximum vehicle flow is crucial to reaching as many people as possible.

**5. Planning Factors:** The following are general information and common planning factors that, if used by all, will help in coordinating and communicating during the planning and response process.

5.1 General Information:

Ice: 8# (1bag) per person per day  
40,000 # per truck load  
20 Pallets per truck, 2000# per pallet, 250 - 8# bags per pallet, 5000 bags per truck  
25 Trucks = 1 million #

Water: 3 liters or 1 gal per person (3.79 liters per gal)  
18,000 liters or 4,750 gal per truck  
20 Pallets per truck, 900 liters per pallet, 237 gal per pallet, 1900 # per pallet  
212 Trucks = 1 million gal

MREs: 2 MREs per person per day  
21,744 MREs per truck load  
12 MREs per case, 1812 cases per truck  
46 truck loads = 1 million MREs

Tarps: 4,400 tarps per truck load  
Tarp size is generally 20' x 25'

5.2 Distribution Point Planning: The following are assumptions used for distribution planning:

- Victims will drive through a distribution point and be served without leaving their vehicles.
- Each car represents an average family of 3.
- Each vehicle passing through a distribution point would receive the following:

2 or 3 bags of ice  
1 case of water (9 – 12 liters)  
6 MREs  
1 tarp

1 truck load of ice and water will serve 1,660 vehicles or about 5000 people  
1 truck load of MREs will serve 3,624 vehicles or about 10,000 people  
1 truck load of tarps will serve 4,400 vehicles or about 4,400 homes

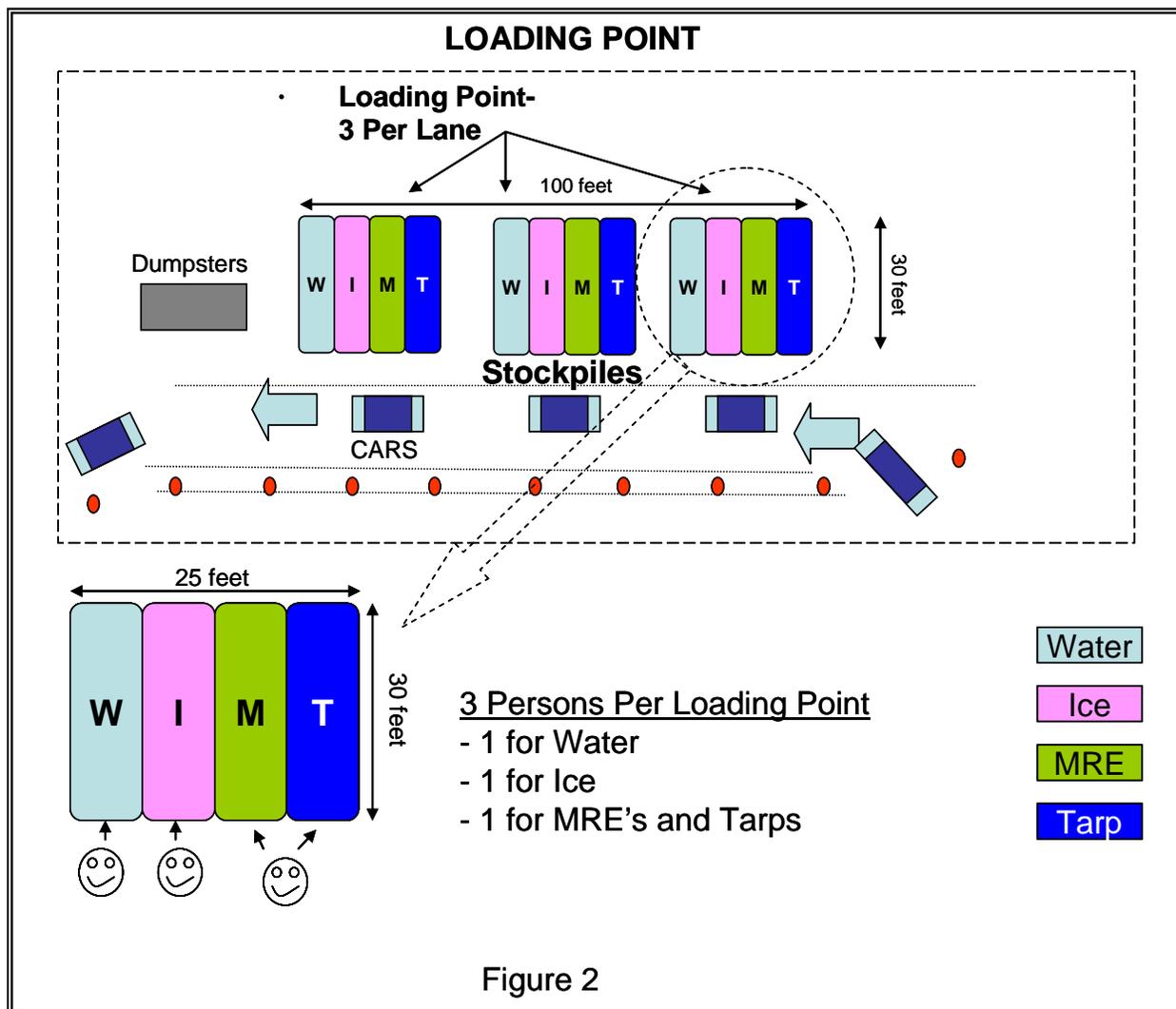
Distribution points will be open to the public for 12 hours per day.

Re-supply of distribution points will primarily be at night (while the point is closed to the public).

A loading point is where a stockpile of ice, water, MREs, and tarps are located. Each loading point has a team of people, (1 for water, 1 for ice, and 1 for MREs/tarps) that load these items into the vehicle as it stops in front of their position (see Figure 2).

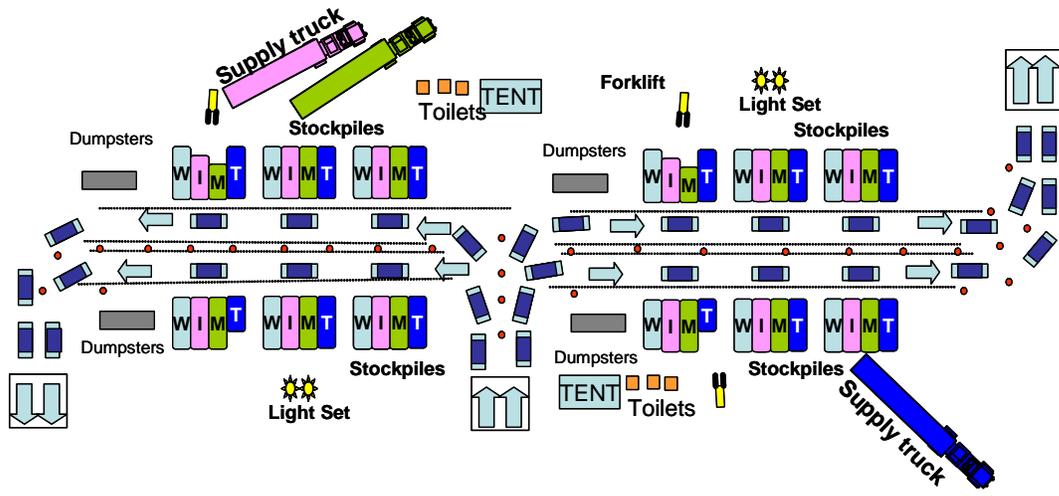
Based on past experience, a well planned and operated distribution point with one lane of traffic and 3 loading points can service 140 cars per hour. Based on a 12 hour work day, about 1,680 vehicles or  $1,680 \times 3 = 5000$  people can be served.

**6. Layout plans for distribution points:** The following plans provide examples of different sizes of distribution points and the resources required for operations.



### TYPE I - DISTRIBUTION POINT

Serves 20,000 persons per day  
560 vehicles per hour



Note: Individual vehicles drive through and ice & water is loaded into their trunks. Recommend One case water, 2 or 3 bags of ice per vehicle and 6 MRE's.

Supply trucks for Ice, Water, MRE's and Tarps are to be off-loaded promptly and returned for re-supply.

#### Maximum Loads per Day – Type I

Water	4
Ice	4
MRE	2
Tarp	2

Figure 3

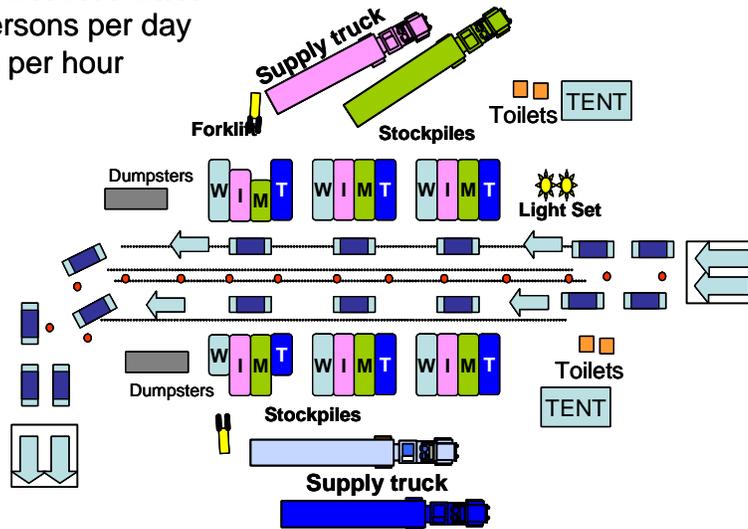
### Type I Distribution Point Resources Required

Type I Distribution Point					
Manpower				Equipment	
Type		Day	Night	Type	Number
Local Responsibility	Manager	1	0	Forklifts	3
	Team Leader	2	1	Pallet Jacks	3
	Forklift Operator	2	3	Power Light Sets	2
	Labor	57	4	Toilets	6
	Loading Point	36		Tents	2
	Back-up Loading PT	18		Dumpsters	4
	Pallet Jacks Labor	3		Traffic Cones	30
	<b>Totals</b>	<b>70</b>	<b>9</b>	Two-way radios	4
Others	Law Enforcement	4	1		
	Community Rel.	4	0		
<b>Grand Total</b>		<b>78</b>	<b>10</b>		

Figure 4

## TYPE II - DISTRIBUTION POINT

Serves 10,000 persons per day  
280 vehicles per hour



Note: Individual vehicles drive through and ice & water is loaded into their trunks. Recommend One case water, 2 or 3 bags of ice per vehicle and 6 MRE's

Supply trucks for Ice, Water, MRE's and Tarps are to be off-loaded promptly and returned for re-supply.

### Maximum Loads per Day – Type II

Water	2
Ice	2
MRE	1
Tarp	1

Figure 5

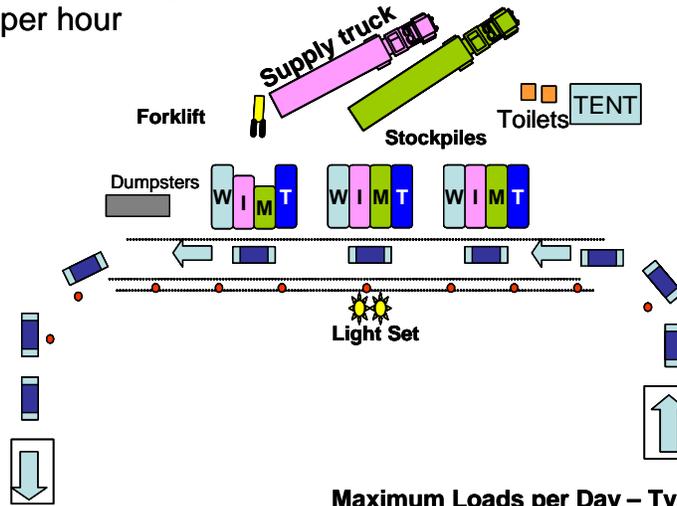
## Type II Distribution Point Resources Required

Type II Distribution Point					
Manpower				Equipment	
Type		Day	Night	Type	Number
Local Responsibility	Team Leader	1	0	Forklifts	2
	Forklift Operator	1	2	Pallet Jacks	2
	Labor	28	3	Power Light Sets	1
	Loading PT	18		Toilets	4
	Back-up Loading PT	9		Tents	2
	Pallet Jacks Labor	1		Dumpsters	2
	Totals	30	5	Traffic Cones	15
Others	Law Enforcement	2	1	Two-way radios	0
	Community Rel.	2	0		
Grand Total		34	6		

Figure 6

### TYPE III - DISTRIBUTION POINT

Serves 5,000 persons per day  
140 vehicles per hour



Note: Individual vehicles drive through and ice & water is loaded into their trunks. Recommend One case water, 2 or 3 bags of ice per vehicle and 6 MRE's

Supply trucks for Ice, Water, MRE's and Tarps are to be off-loaded promptly and returned for re-supply.

#### Maximum Loads per Day – Type III

Water	1
Ice	1
MRE	1/2
Tarp	1/2

Figure 7

### Type III Distribution Point Resources Required

Type III Distribution Point					
Manpower				Equipment	
Type		Day	Night	Type	Number
Local Responsibility	Team Leader	1	0	Forklifts	1
	Forklift Operator	1	1	Pallet Jacks	1
	Labor	14	2	Power Light Sets	1
	Loading PT	9		Toilets	2
	Back-up Loading PT	4		Tents	1
	Pallet Jacks Labor	1		Dumpsters	1
	Totals	16	3	Traffic Cones	10
Others	Law Enforcement	2	1	Two-way radios	0
	Community Rel.	1	0		
Grand Total		19	4		

Figure 8

**7. Planning Methods:** This section will discuss methods to determine the location and number of distribution points, (DP), provide suggestions for supplying manpower and equipment resources, and discuss distribution point operations.

**7.1 Determining the Location and Number of DP:** The number and general location of most DPs will be determined by population, however most all tribes, municipalities, and or major communities will require a DP, and in some cases, several.

The number of DPs can be determined mathematically. The Excel model shown in figure 9 will calculate the number of DPs required when the total number of people without commercial power is entered. The model uses a 40% factor to calculate the estimated number of people that will visit a DP. This figure is an estimated average percentage based on past experience. The model also considers only Type III DPs which consists of a one lane operation. **A Type III DP provides for 5000 people, and can handle one truck load of ice and water per day along with MREs and tarps. Therefore, for every truck load of ice or water ordered, there should be a corresponding DP or lane for off-loading.** The number of actual DPs can be lowered if a Type I or Type II DPs are used; however the number of "lanes" will remain the same. For example: If the model computes 32 Type III DPs that would equal 16 Type III and 8 Type II; or 16 Type III, 4 Type II and 2 Type I; all equaling 32 lanes.

Another method for determining the number and also location of DPs is through Geographical Information Systems, (GIS). Through GIS you can produce a dot density map that provides a visual dot for a selected density of population. To determine the location of DPs a dot density map should be produced based on a density of one dot for every 12,500 people (40% of 12,500 = 5000, the number of people served by a Type III DP). The location of the dot will provide a general start for locating a DP however, as stated before, consider all tribes, municipalities, and or major communities, having at least one DP.

The pre-planning of DP locations is critical to the public. This allows for the locations of the DPs be known to the public prior to an event before communications are impacted. This also allows for route clearing priorities and route mapping to be performed during the pre-planning process in lieu of the response process.

**7.2 Resourcing DPs:** DP operations, to include manpower and equipment, are a local responsibility. A partnership between the community and response planners is essential for the establishment of a successful distribution system that serves the public in their time of need. The most challenging resource to provide is manpower. Most local governments depend on the National Guard, volunteer fire departments, church groups and other volunteer agencies for manpower. All these sources are viable, however close coordination is needed to assure local governments are not using a specific resource in multiple locations. One good example of using a local resource is the use of local churches in the disaster area. Some churches have very large parking areas that work well for a Type III DP and the church can work with their congregation to establish a ministry to man and operate the DP. This example uses people from the community to help people in the community. Figures 4, 6, and 8 show the personnel and equipment requirements for each type of DP. The Excel model in Figure 9 provides a total roll up of personnel and equipment for all the DPs required.

Each DP requires an equipment package as shown in figures 4, 6, and 8. If the disaster receives a Presidential Declaration, the costs for renting this equipment will qualify for Federal reimbursement. It is recommended that the planning agent, city, county or tribal agency provide the equipment to the DPs located within their area of responsibility. Planning agents should work with local vendors and have agreements in place to provide the required equipment. The rates, either hourly, daily, or weekly should be discussed with the State Emergency Management office and FEMA to get guidance on best practices. This suggested method of supplying equipment helps prevent duplication and allows for easier reimbursement.

**7.3 DP Operations:** The successful operations of a DP requires a DP Team Leader or manager that understands the purpose, functions, and requirements of a DP. A successful Team Leader or manager must have the skills to motivate people, organize shifts, assure the right equipment is available, keep records on equipment usage, gather/record information on deliveries, arrange for future deliveries based on usage, and act as the primary POC for the DP with the local emergency management agency and possibly state or federal interest. Figures 11 – 14 are tracking charts that gather key information on deliveries. This information as well as any contract/delivery forms that require signing by the delivery driver must be collected and maintained until local, state, or Federal officials collect it. This information is vital for documenting payment to the delivery contractors.

Key checklist items for DP operations:

- Adequate Manpower (Consider backups for each position)
- Equipment (Forklift and pallet jack a must)
- Site Layout, good traffic flow
- Room for delivery trucks (18 wheelers without disrupting operations)
- Qualified Forklift Operator
- Security (Help with the general public)
- Traffic Control (Police at main intersections)
- Signs identifying the site as "Commodities Distribution Point"
- Request a Community Relations person to help handout information to the public
- Always keep safety first
- Provide a notebook for securing delivery charts and receipts
- Communications (Team Leader or manager will require communications)
- Train an assistant for night operations
- Ask for technical help through your Emergency Manager if assistance is needed

Questions on layouts, models or other information in this document should be directed to:

Mr. Allen Morse  
Disaster Program Manager  
Office of Homeland Security  
US Army Corps of Engineers  
Phone 251-604-4751  
E-Mail [thomas.a.morse@usace.army.mil](mailto:thomas.a.morse@usace.army.mil)

This is an active Excel File, simply double click on the face of the sheet, enter the # of people without power and push the enter key, the data will update with each entry.

### USACE PRE-EVENT Commodities Model

Enter # of people without power (Equals number of customers x 3) 500,000

# of people requiring commodities 200,000

# of Type III Dist. Points Req'd 40

Type III Dist. Point				
Manpower	Day	Night	Equipment	
<b>Local Req.</b>			Forklifts	40
Forklift Oper	40	40	Pallet Jacks	40
Laborers	600	80	Traff Cones	400
<b>Total</b>	<b>640</b>	<b>120</b>	Light Sets	40
Law Enf	80	40	Toilets	80
Comun Rel	40	0	Tents	40
<b>Grand Total</b>	<b>760</b>	<b>160</b>	Dumpsters	40

Tarps	
Loads	Each
45	200,000

Number of truck loads required per day for 24 days	Days	Water		ICE		MREs	
		Loads	K Gal	Loads	K Pounds	Loads	Each
	1	40	190.0	40	1600	20	434,880
	2	37	173.7	37	1463	18	391,392
	3	33	157.4	33	1326	17	360,329
<b>72 Hour Planning Total &gt;</b>		<b>110</b>		<b>110</b>		<b>55</b>	
	4	30	141.1	30	1189	15	323,054
	5	26	124.9	26	1051	13	285,778
	6	23	108.6	23	914	11.4	248,503
	7	19	92.3	19	777	9.7	211,227
60% Power back on-line >	<b>8</b>	16	76.0	16	640	8.0	173,952
	9	15	68.9	15	580	7.3	157,644
	10	13	61.8	13	520	6.5	141,336
	11	11.5	54.6	11.5	460	-	-
	12	10.0	47.5	10.0	400	-	-
	13	8.5	40.4	8.5	340	-	-
	14	7.0	33.3	7.0	280	-	-
	15	5.5	26.1	5.5	220	-	-
90% Power back on-line >	<b>16</b>	4.0	19.0	4.0	160	-	-
	17	3.5	16.6	3.5	140	-	-
	18	3.0	14.3	3.0	120	-	-
	19	2.5	11.9	2.5	100	-	-
	20	2.0	9.5	2.0	80	-	-
	21	1.5	7.1	1.5	60	-	-
	22	1.0	4.8	1.0	40	-	-
	23	0.5	2.4	0.5	20	-	-
	24	0.0	0.0	0.0	0	-	-
<b>Total Loads</b>		<b>312.0</b>	<b>1482.0</b>	<b>312.0</b>	<b>12480</b>	<b>125</b>	<b>2,728,095</b>

Figure 9

This is an active Excel File, simply double click on the face of the sheet, enter the # of active Distribution Points and push the enter key, the data will update with each entry.

### USACE POST EVENT Ordering Model

Enter Number of Type III Dist. Points to be used 32

- 1 Type II = 2 Type III
- 1 Type I = 4 Type III

Number of truck loads required per day for 24 days	Days	Water		ICE		MREs		Tarps	
		Loads	K Gal	Loads	K #	Loads	Each	Loads	Each
	1	32	152.0	32	1280	16	347,904		
	2	29	139.0	29	1170	15	318,084		
	3	27	125.9	27	1061	13	288,263		
<b>Initial Order (72 Hour Planning Total) &gt;</b>		<b>88</b>		<b>88</b>		<b>44</b>		<b>36</b>	<b>160,000</b>
	4	24	112.9	24	951	12	258,443		
	5	21	99.9	21	841	11	228,623		
	6	18	86.9	18	731	9.1	198,802		
<b>Next Order (next 72 Hour Planning Total) &gt;</b>		<b>63</b>		<b>63</b>		<b>32</b>			
	7	16	73.8	16	622	7.8	168,982		
60% Power back on-line >	<b>8</b>	13	60.8	13	512	6.4	139,162		
	9	12	55.1	12	464	5.8	126,115		
	10	10	49.4	10	416	5.2	113,069		
	11	9.2	43.7	9.2	368	-	-		
	12	8.0	38.0	8.0	320	-	-		
	13	6.8	32.3	6.8	272	-	-		
	14	5.6	26.6	5.6	224	-	-		
	15	4.4	20.9	4.4	176	-	-		
90% Power back on-line >	<b>16</b>	3.2	15.2	3.2	128	-	-		
	17	2.8	13.3	2.8	112	-	-		
	18	2.4	11.4	2.4	96	-	-		
	19	2.0	9.5	2.0	80	-	-		
	20	1.6	7.6	1.6	64	-	-		
	21	1.2	5.7	1.2	48	-	-		
	22	0.8	3.8	0.8	32	-	-		
	23	0.4	1.9	0.4	16	-	-		
	24	0.0	0.0	0.0	0	-	-		
<b>Total Loads</b>		<b>249.6</b>	<b>1185.6</b>	<b>249.6</b>	<b>9984</b>	<b>101</b>	<b>2,187,446</b>	<b>36</b>	<b>160,000</b>

Figure 10







