EVACUATION PROBLEMS AND SOLUTIONS

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I. PAST INCIDENTS POINT TO THE MAGNITUDE OF THE PROBLEM

+ Crestview Florida.....5,000 evacuated from 32 sq mile area
+ Miami Florida.....21,000 evacuated from Hurricane David
+ Gretna, Louisiana.....600 evacuated from chemical fire
+ Three Mile Island.....500,000 or more from 20 mile radius
+ Altamonte Springs Florida.....800 evacuated from 2,000 ft radius

II. THE DECISION TO EVACUATE

+ What factors bear on the decision?
+ When should the decision be made?
+ Who makes the decision to evacuate?

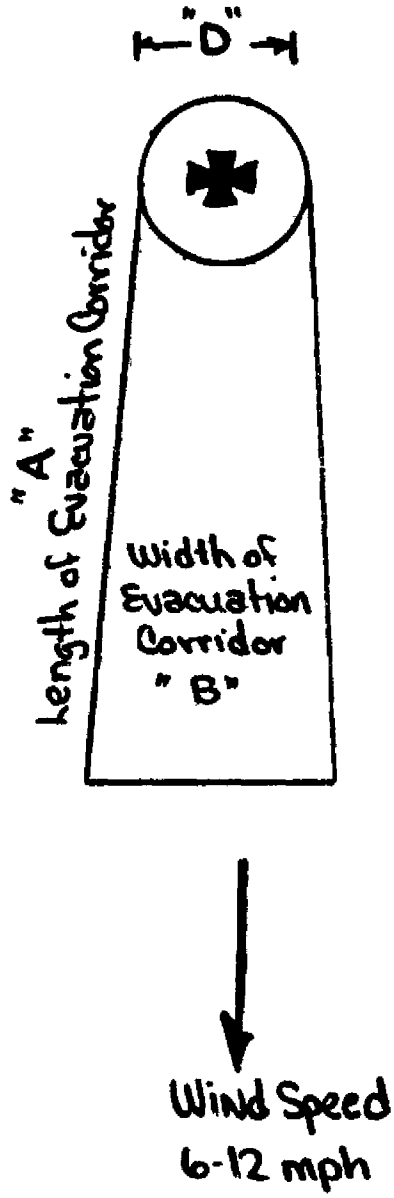
III. PRE-PLANNING WILL MAKE IT WORK EASIER

1. Develop a community wide disaster plan that contains a workable evacuation procedure
2. Everyone must understand the system! One organization is not enough.
3. Periodically conduct a disaster/evacuation drill
4. Make the disaster/evacuation as close to day-to-day operations as possible
5. Critique the drills and any incidents that you have

IV. FACTORS THAT MUST BE CONSIDERED AT THE TIME OF THE EVACUATION DECISION

1. Is the overall situation improving or deteriorating?
2. What type of evacuation must be done?
    - A. Precautionary: time is available
    - B. Emergency: time is not available
3. Who is available to do the evacuation?
    - A. Law enforcement is primary resource
    - B. Fire & EMS only secondary
4. What size area must be evacuated?
    - A. Primary evacuation area (2,000 ft radius)
    - B. Secondary evacuation area
5. Factors to determine the size of the area to be evacuated
    - A. Hazard of the material (life, fire, explosion, etc)
    - B. Size of the incident
    - C. Weather factors (wind speed, temp, humidity)
6. Estimation of time necessary to complete primary & secondary evac.
    - A. shortest possible time
    - B. longest possible time
7. Identify key life hazard locations in the evacuation area
    - A. Those locations that:
        - + will require unusual amounts of warning time
        - + will take an unusual amount of evacuation time
        - + where communications are poor or easily disrupted
    - B. Such as:
        - + Hospitals or nursing homes
        - + Correctional institutions
        - + Schools & day care facilities
        - + Apartment Complexs
        - + Hotels & Motels
        - + Shopping Centers
        - + Campgrounds

QUICK REFERENCE EVACUATION GUIDE



Hazardous Commodity Peril Distances

Commodity	*Description*		*Evacuation distances per observed (sq. ft.) area of spill*			
			200	*400*	*600*	*800*
Acrolein	Flammable liquid, thermally unstable, poison	A[V]	2 1 mi.	3.1 mi.	4.0 mi.	4.7 mi
		B[W]	1.3 mi.	1.9 mi.	2.4 mi.	2 8 mi.
		D[X]	360 yd.	530 yd.	650 yd.	760 yd.
Acrylonitrile	Flammable liquid, thermally unstable, corrosive	A	0.1 mi.	0.1 mi.	0.1 mi.	0.2 mi.
		B	0.1 mi	0.1 mi.	0.1 mi.	0 1 mi.
		D	20 yd.	20 yd.	30 yd	30 yd.
Ammonia	Nonflammable gas, corrosive	A	0.2 mi	0 3 mi.	0 4 mi	0.4 mi.
		B	0 1 mi.	0.2 mi	0.2 mi.	0.3 mi
		D	40 yd	60 yd.	80 yd.	90 yd.
Carbon disulfide	Flammable liquid	A	0.1 mi.	0 1 mi.	0.2 mi	0.2 mi.
		B	0.1 mi.	0 1 mi	0 1 mi.	0.1 mi.
		D	20 yd.	30 yd	40 yd.	45 yd.
Chlorine	Nonflammable gas, poison	A	0 8 mi	1.3 mi.	1.6 mi	1 9 mi.
		B	0.5 mi.	0.8 mi.	1 0 mi.	1.2 mi.
		D	160 yd.	240 yd.	300 yd.	340 yd
Ethyleneimine	Flammable liquid, thermally unstable, poison	A	0.9 mi	1 4 mi.	1.8 mi.	2.1 mi.
		B	0.6 mi.	0.9 mi.	1.1 mi	1.3 mi.
		D	180 yd.	260 yd	325 yd.	380 yd.
Ethylene oxide	Flammable gas, thermally unstable, corrosive	A	0.1 mi	0.1 mi.	0 2 mi.	0.2 mi.
		B	0.1 mi.	0 1 mi	0.1 mi.	0.1 mi.
		D	25 yd.	30 yd	40 yd.	45 yd
Fluorine	Poisonous gas, oxidizer, corrosive	A	0.5 mi.	0.8 mi.	1 0 mi	1.1 mi
		B	0.3 mi.	0.5 mi	0.6 mi	0 7 mi.
		D	105 yd.	150 yd.	185 yd.	220 yd.
Hydrogen chloride	Nonflammable gas, corrosive	A	0 6 mi	0.9 mi	1.2 mi.	1.4 mi
		B	0.4 mi.	0.6 mi.	0.7 mi.	0 9 mi.
		D	125 yd.	180 yd	225 yd.	260 yd.
Hydrogen cyanide	Flammable gas, poison, extremely hazardous	A	0.3 mi	0 4 mi.	0.6 mi.	0.7 mi.
		B	0 2 mi	0 3 mi.	0.3 mi.	0.4 mi.
		D	60 yd.	90 yd.	110 yd.	130 yd.
Hydrogen fluoride	Poisonous salt, corrosive	A	0.8 mi.	1.2 mi.	1 5 mi.	1.8 mi.
		B	0.5 mi.	0 7 mi.	0.9 mi	1.1 mi.
		D	160 yd.	225 yd	280 yd.	325 yd.
Hydrogen sulfide	Flammable gas, poison, extremely hazardous	A	0 4 mi	0.5 mi	0.7 mi.	0.8 mi
		B	0.2 mi.	0.3 mi.	0.4 mi	0.5 mi
		D	80 yd.	110 yd	140 yd	160 yd.
Methylamines, anhydrous	Flammable gas, corrosive	A	0 3 mi.	0.5 mi	0.6 mi.	0.7 mi.
		B	0 2 mi.	0.3 mi.	0.4 mi.	0.5 mi.
		D	70 yd.	100 yd.	125 yd.	150 yd.
Methyl mercaptan	Flammable gas	A	0.2 mi.	0.3 mi.	0.4 mi	0 5 mi.
		B	0 1 mi	0.2 mi	0 3 mi.	0.3 mi.
		D	50 yd	70 yd.	90 yd	100 yd.
Nitric acid, fuming	Poisonous liquid, oxidizer, corrosive	A	0.3 mi.	0.5 mi.	0.6 mi.	0.7 mi.
		B	0.2 mi.	0.3 mi.	0.4 mi	0.4 mi.
		D	65 yd.	100 yd	120 yd.	140 yd.
Nitrogen tetroxide	Poisonous gas, oxidizer, corrosive	A	0 3 mi.	0.5 mi	0 6 mi.	0.7 mi.
		B	0 2 mi	0 3 mi.	0.4 mi.	0.5 mi.
		D	70 yd.	100 yd.	125 yd	150 yd.

[V] The distance downwind from an accident scene that should be evacuated when the wind velocity is 6-12 miles per hour.

[W] The width of the corridor to be evacuated.

[X] The diameter of the accident zone, (the area that should be evacuated immediately).

Based on materials found in the USDOT Emergency Action Guide for Selected Hazadous Materials. Taken from Vehicle Rescue by Grant.

V. FACTORS THAT MAY BE PROBLEMS DURING THE EVACUATION

1. Human Behavior Factors

A. People don't want to leave unless there is a visible danger

B. The biggest problem is to get people to respond

C. Panic is not usually a problem

D. Convergence Behavior

> "...movement toward the disaster area is usually more significant than the flight or evacuation from the disaster area."

E. Is the evacuation order strong enough to move people to actio

F. People will tend to discount or reduce the severity of the incident ("It can't be as bad as that!")

2. Evacuation Order or Message

A. Speed for delivery is critical

B. Clarity

+ clear and unambiguous

C. Completeness

+ type of problem

+ time factor

+ hazard or damage estimation

+ protective action to be taken by citizen

D. Source that is giving order must be official and well-known

E. Content of all evacuation orders should be the same

F. Message should be easily understood by general public

+ no big words

+ consideration to foreign languages

G. Message should be as specific as possible

3. Size of the area will impact on notification method

    A. by foot

    B. by vehicle

    C. by air (helicopter)

4. What transportation will be used by evacuees?

    A. private auto

    B. school buses

    C. trucks

    D. foot (to move out of danger area, then by vehicle)

5. How can vehicle traffic be re-routed around the incident?

    A. who will provide traffic control

    B. will the re-routing effect the response of emergency units

6. What special problems can be expected from the residents of the area?

    A. handicapped

    B. infirm (bedridden)

    C. deaf or blind

    D. no personal transportation available

    E. unaccompanied children

7. How many people will be effected by the evacuation?

8. How are shelters designated and managed in the community?

    A. who has authority to open & staff shelters?

    B. where are the shelters located relative to the incident?

    C. does the public know how to get to the shelters?

9. How long will the evacuees be in the shelters?

    A. Food costs---who will provide and who will pay?

    B. Bedding

10. What problems will be encountered if utilities are shut-off?

    A. wider area than evacuated will be affected

    B. natural gas presents re-light problem

11. Should incident commander designate evacuee gathering points?

    A. locations easily identified by residents & non-residents

    B. evacuees gather here to be identified

    C. then move on to shelters

12. Patient triage areas should be established outside evacuation area.

    A. may be same as evacuee gathering points

    B. should have easy access and egress

13. Communications with persons doing the actual evacuation are key.

    A. if possible give each person an individual radio

    B. incident commander must keep track of these individuals

    C. progress reports must be made at designated times
    (ie., as each block is searched and notified)

    D. each person should be accounted for at designated times
    (ie., every five minutes)

14. Security of the evacuated area is important.

    A. to prevent entry or re-entry by residents

    B. to prevent looting

VI. THE ACTUAL EVACUATION EFFORT

1. Once the evacuation order is given the immediate area should be swept clear of all non-essential persons.

2. Evacuate "around and down"

3. Evacuate upwind or, if you are downwind to the incident, then evacuate at right angles to the wind.

4. Speed may be essential so use all available resources.

5. For emergency evacuations, use vehicles equipped with electronic sirens and public address systems.

6. Give your personnel instructions to be clear and to-the-point with citizens about the necessity for evacuation.

VII. AIDS TO THE INCIDENT COMMANDER

1. The Hazardous Materials and Command Kits.
    - A. Basic resource information about hazardous materials
    - B. Basic management materials for incident management
    - C. Key elements
        - + selected hazardous materials resource texts
        - + wide angle binoculars
        - + detailed maps of service area with evacuation grids
        - + 35mm camera with spare film
        - + plexiglass sheets with wax markers
        - + cassette tape recorder with spare tapes & batteries

+ weather instruments
+ smoke grenades
+ lighted clipboards
+ physical hazard marker tape
+ electronic timer with alarm
+ evacuation tags and tally system
+ triage tags
+ message pads
+ misc other supplies

VIII. SUMMARY

1. Plan for the incident and the evacuation.
2. Test the plan and the operation in a drill situation.
3. Critique all your situations and seek information on other incidents.
4. Remember that things will go wrong no matter what you do.
5. Think and question how it could be done better.