AIRCRAFT EMERGENCIES

Airport fire fighters usually first become aware of an aircraft emergency through notification by the F.A.A. Control Tower. This notification will come by direct telephone line or the Ground Control radio frequency.

There is a wide variety of different type aircraft problems which necessitate action by C/F/R personnel. However, all problems are usually classified as either Alert 1, Alert 2 or Alert 3.

ALERT 1: This is usually declared by the aircraft pilot when minor difficulty with the craft is experienced. Crash/Fire/Rescue personnel are required to stand-by in their apparatus and monitor the Ground Control radio until the aircraft has landed safely and station #12 is advised by the Control Tower that stand-by status is no longer required. If, in the opinion of the Battalion Commander or ranking fire official, the aircraft problem is serious enough to warrant a stand-by at the runway, he can, and frequently does, overrule the pilot's decision and declare an "Alert 2" emergency.

ALERT 2: This indicates a major problem with the aircraft and Crash/Fire/Rescue apparatus and personnel stand-by at the runway on which the landing will be made. The stand-by position for each piece of apparatus is determined by the nature of the problem. The fire commander uses the information available to him to determine how the aircraft is likely to be affected by the problem when it touches down. Fire apparatus are positioned accordingly.

For instance, if the aircraft is experiencing a problem with braking mechanisms, it can be expected to roll almost the entire length of the runway. The greatest danger would be in the aircraft over-running the end of the runway which would most likely be disastrous. Fire apparatus would be concentrated near the roll out end of the runway. This would place them in the best tactical positions should the aircraft be unable to stop. Conversely, if the nature of the difficulty indicated a short roll out after the touch down, apparatus would position near the approach end of the runway. Apparatus are frequently repositioned during stand-by as additional information concerning the problem becomes available to the fire commander. Experience has shown that most aircraft incidents do occur near the runway ends.

ALERT 3: Identifies a crash which has already occurred or is almost certain to occur shortly. When an aircraft crash occurs, the Airport Disaster Plan is immediately implemented. Off-field apparatus and personnel are dispatched even before the airport units arrive at the crash site. The need for additional medical help, specialized equipment, etc., is determined by the nature of the crash and the number of expected survivors.

All airport fire fighters have pre-assigned responsibilities in the Disaster Plan and must, be thoroughly familiar with these procedures.

When warranted, the fire commander will request an airport assignment for Alert 2's and/or Alert 3's Fire Alarm will dispatch apparatus to one or more of the five rendezvous points at Miami International

Airport (see map at end of this section). These points are designated by the Airport Fire Commander at the time the request is made.

1. "High - Rise Assignment"

   "Highrise Assignment"

   When Battalion #6 or the on-Scene OIC requests an High-rise assignment.

   The following units will be dispatched by Fire Alarm:

   3 - Engines or Telesquirts

   2 - Rescue units

   2 - Aerial pieces (one will be a true aerial or platform and the second may be a telesquirt)

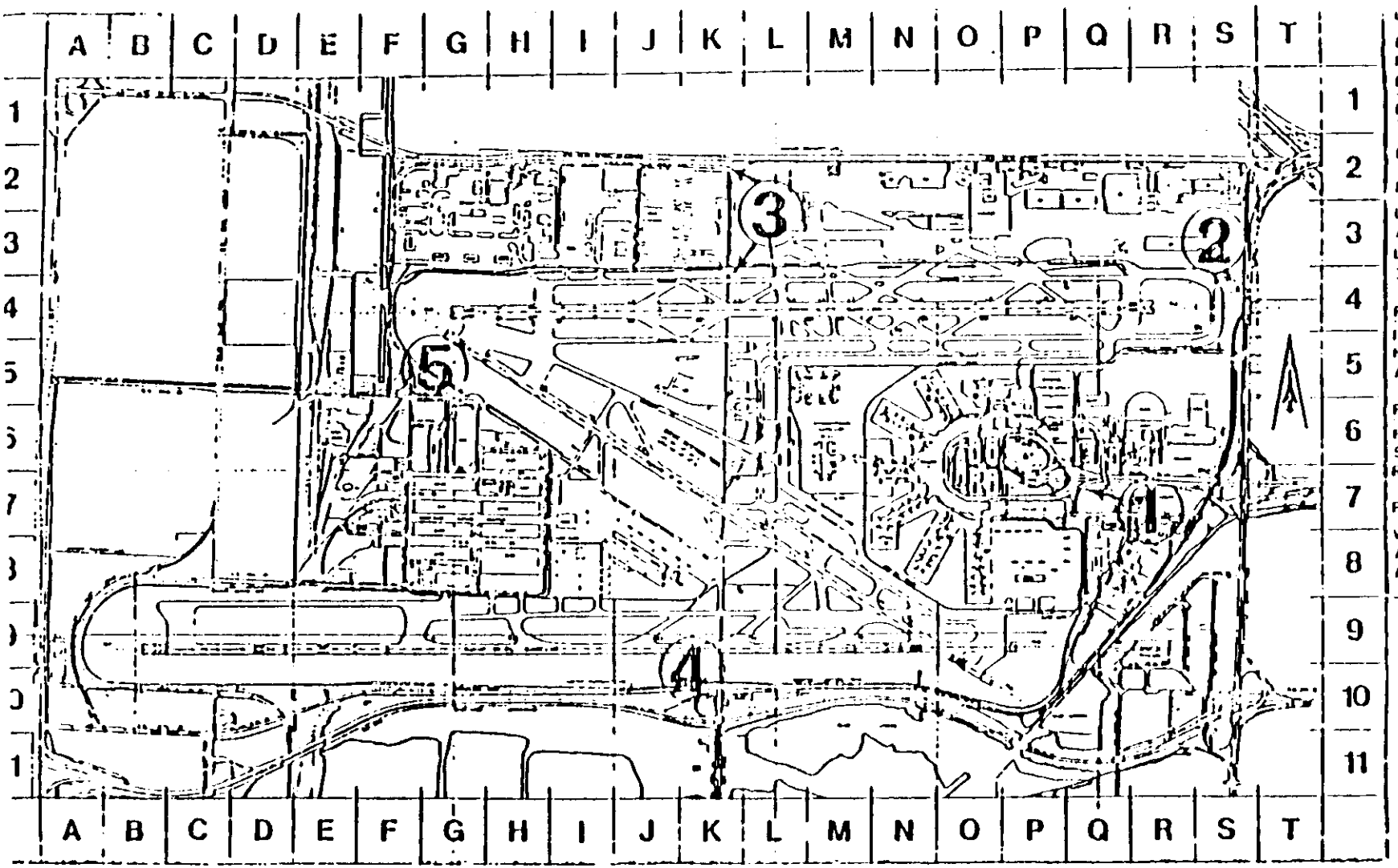
   1 - Battalion Commander

   1 - Operations Chief

2. "Airport Assignment"

   This is to be requested in Alert 3 situations or Alert 2 situations which in the opinion of the Airport OIC warrant a response greater than a "Hi-Rise Assignment". The determination would be made on the basis of aircraft passenger load, nature and seriousness of the problem and the potential for an aircraft crash. An airport assignment consists of a double high-rise assigment and two additional rescue units. Any time an Alert 3 is announced, Fire Alarm will dispatch an airport assignment.

As you can see, the difference in equipment and personnel between the two dispatches is considerable. When an airport assignment is dispatched, a move-up is started to cover vacated areas. If it is determined that not all the equipment or manpower will be required at the stand-by position or incident site, unneeded units should be cancelled as soon as possible.



IAMI INTERNATIONAL AIRPORT

ETRO-DADE AVIATION DEPARTMENT

FIRE MUTUAL AID RENDEZVOUS POINTS

August 1980 Exhibit 10.2-4

STANDBY POSITIONS FOR AIRCRAFT EMERGENCIES

When an aircraft emergency is declared, it is imperative to position C/F/R apparatus adjacent to the service runway as expediently as possible. The most practical standby position would be at the projected stopping point of the aircraft. However it is difficult to ascertain this point due to the many variables involved.

The type of emergency is the main factor in determining the best C/F/R standby positions. Certain emergencies, such as wheels-up, no flaps, can cause an aircraft to use more runway than anticipated. For this reason, the standby positions have been broken down into two common categories:

1. Normal standby positions
2. Extended rollout standby positions

Emergencies that fall into the NORMAL STANDBY POSITION would include:

A. Engine trouble or engine out
B. Partial hydraulic system loss
C. Fire
D. Bomb aboard or bomb threat
E. Unknown (emergency where information is not available or has not been relayed)
F. Smoke
G. Unsafe gear indication (might require repositioning of units to side of runway opposite defective main gear)

Emergencies that would fall into the EXTENDED ROLLOUT STANDBY POSITIONS category include:

A. No brakes
B. No flaps

C. No reverse thrusters

D. Complete hyraulic failure

E. Wheels-up landing

Emergencies are not limited to those listed, nor are the categories they are grouped into, be considered a hard and fast rule. The many variables involved make it necessary for the Fire Commander to be the final authority in the positioning of the C/F/R apparatus.

POSITIONING OF UNITS

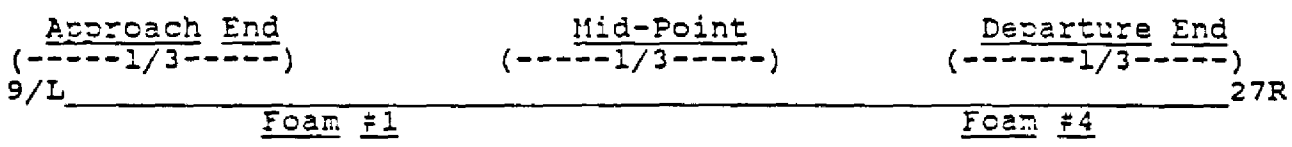
To simplify positioning the apparatus, we have divided each runway into three basic sections:

1. First 1/3 = approach end
2. Second 1/3 = mid point
3. Last 1/3 = departure end

For example, the normal standby position for Foam #5 on Runway 9/L would be on the west end at the mid-point of the first 1/3 or approach end of the runway. Foam #4 would take position at the east end at the mid-point of

the last 1/3 or departure end of the runway (see figure #1 exmaple).

Figure #1



NORMAL STANDBY POSITIONS

E-12, R-12, QRV-8 Spare Foam Truck	Standby at mid-point of active runway i.e.; approximately Red Road.
Foam #4: (27/R, 27/L, 30) (9/L, 9/R, 12)	 Standby at mid-point of the approach end. Standby at mid-point of the departure end.
Foam #5: (27/R, 27/L, 30) (9/L, 9/R, 12)	 Standby at mid-point of the departure end. Standby at mid-point of approach end.

EXTENDED ROLLOUT POSITIONS
(9/L, 27/R) (9/R, 27/L) (12, 30)

E-12, R-12, QRV-8	Same as NORMAL STANDBY
Spare Foam Truck: Foam #4	 When incoming aircraft are landing to the East, remain in the normal STANDBY POSITION. When incoming aircraft are landing to the West, position to the Red Road location. When incoming aircraft are landing to the East, position to the Red Road location.

POINTS TO REMEMBER

1. Foam #4 is normally on the east end, Foam #5 normally on the west end of the runway, except for EXTENDED ROLLOUTS where the appropriate vehicle positions along Red Road.
2. All other units normally position along Red Road. (Including the spare foam truck).
3. All units normally position south of runways 9/L, 27/R and north of runways 9/R, 27/L, 12, 30. (EXCEPTION: If aircraft

has unsafe gear, repositioning is recommended if the questionable gear is on the same side of the aircraft as the apparatus).

This consideration for repositioning may be to move the apparatus to the opposite side of the runway, or in order to maintain an advantageous down wind position, have the apparatus pull back a safe distance from the runway.

4. For all positioning, it is imperative to remain clear of runways, maintain safe distances from high speed turnoffs, and stay constantly alert for taxing aircraft.
5. For those emergencies in which the C/F/R commander can anticipate a short landing (i.e.; low on fuel, or engine problems) and the aircraft reaching the runway is questionable, the C/F/R commander should consider moving a unit from the departure end of the runway closer to the approach end. (See figure 2 at the end of this chapter.)

The basic drawing shows Normal Stand-by Positions. Foam #4 (where indicated by the dotted line) has repositioned for a westerly landing in an extended roll out situation. Were this is an easterly landing with an extended roll out situation, Foam #5 would reposition and Foam #4 would remain stable.

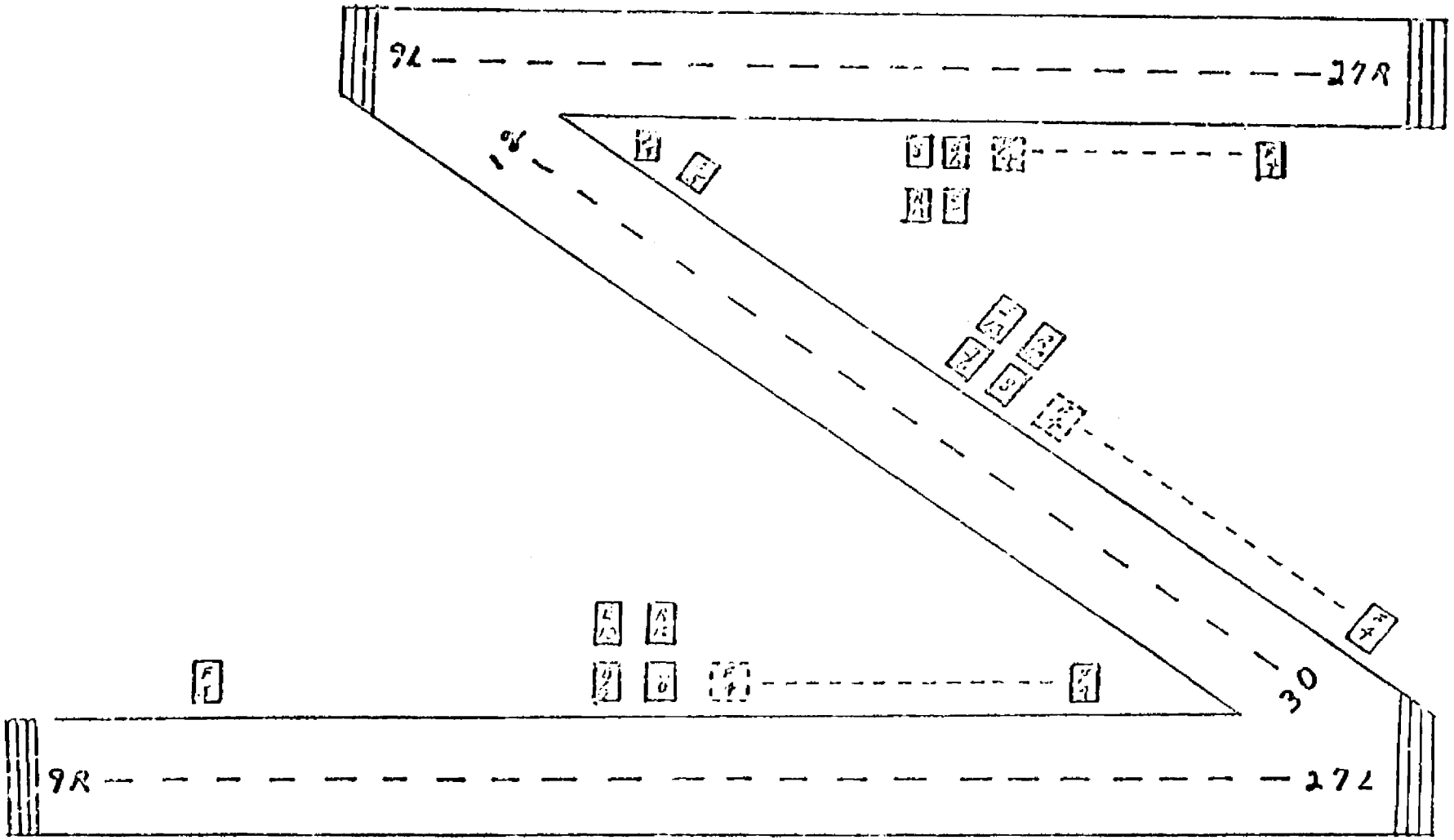


Figure #2

AIRCRAFT INTERIOR FIRES

With the advent of the Air Canada DC-9 incident, at the Greater Cincinnati International Airport, questions arise such as:

1. How would we have handled that situation?
2. Are we adequately prepared for that type situation?

Historically we have drilled and trained in the control and extinguishment of flammable liquid fed fires on the exterior of the aircraft. The top priorty being to provide a survivable interior atmosphere and adequate safe escape routes for survivors of a sizeable aircraft incident.

The incident at Cincinnati points out the necessity to re-establish some of our priorities and prepare ourselves mentally and strategically for the potential of an interior fire landing at our airport.

GAINING ACCESS

The first consideration upon notification of an aircraft landing with an interior fire is, how do we gain access in the event the occupants are unable to assist in opening normal as well as emergency exits? Training in this area must be repetitive enough that the techniques involved become second nature for all types of aircraft. When it is necessary for us to assist in providing evacuation openings keep in mind the order of performance:

1. Main entry doors
2. Emergency exit doors
3. Cutting openings in the fuselage

As with any interior fire, a charged line should be in position at

any entry point.

ENTRY AND ATTACK

Aircraft interiors contain many ordinary combustibles, as well as plastics, which when involved in fire produce gasses that are highly toxic.

Full bunker gear and S.C.B.A. must be worn by all personnel involved in the rescue and fire attack. For ordinary combustibles, such as encountered in an interior fire, water fog is our best agent utilizing the indirect application technique. However, "AFFF" may be a major consideration, depending upon the magnitude of the fire due to the location of fuel lines within the aircraft and the fact the center lower fuselage section (between the wing roots) on some aircraft is also a fuel tank. "AFFF" also possesses wetting agent qualities and may be quite desirable for deep seated class "A" fires. Depending upon the magnitude of fire involvement, multiple points of attack through various access points may be desirable. As with any interior fire, care must be exercised so as not to drive the fire into previously uninvolved areas with our fog streams. After control and extinguishment, a toxic and hazardous atmosphere will continue to exist for some time. The expedient use of exhaust fans needs to be considered and continued until such time as the interior is well ventilated. Fire suppression capability needs to be maintained within the aircraft during this process in case of any reignition.

UNOCCUPIED AIRCRAFT

Unattended aircraft with doors closed present the unique problem of

delayed detection. This in turn can conceal a smoldering fire for an extended period of time creating all the potential for a back draft situation. Ventilation in conjunction with fire attack must be considered.

Extreme caution is to be exercised when opening any doors or emergency exit windows and charged lines should be in position to combat the potential outbreak of fire.

FIRE LOCATION

The potential for ignition sources from areas other than the cabin itself is very great. Fire may originate in a variety of different areas and travel uncontrolled through the length and width of the aircraft between the interior cabin liners and the exterior fuselage skin. When this is the case it may be very difficult to determine the exact extent of fire spread.

If this type of spread is suspected, we must go to great lengths checking interior cabin liners and exterior fuselage skin for areas which appear to be abnormally hot. If suspected areas are identified, it will become necessary to remove sections of the cabin liner (i.e.; walls, ceiling, floor) to stop the fire spread and insure extinguishment.

BURNING ODOR CHECK LIST

Although by no means complete, below listed is a guide for areas to check out when we respond to a call for a burning odor or light smoke from an unknown source:

1. Seat arm rest ashtrays - Check all the arm rest ashtrays for smoldering cigarette butts. Feel the area for hot spots. Check the floor area for signs of charring.
2. Galley area - Check the food preparation areas, being aware ovens and hot plates may still be hot from recent use. Check all drawers, cabinets and waste receptacles.
3. Rest rooms - This area has proven to be the source of many cabin fires and is to be thoroughly examined. There are many compartments and spaces where an incipient fire could remain undetected for long periods of time. Ground crew mechanical assistance may have to be obtained to assist with checking the commode waste water pump system, which contains a motor which has frequently shown signs of overheating.
4. Lighting - Frequently aisle lighting is of the fluores - cent tube type, which may have a ballast overheating.
5. Cockpit area - Check the circuit breaker panels. A popped or tripped circuit breaker may give an indication of an electrical system malfunction or overheat.
6. Aircraft exterior - Frequently upon landing a brake or tire may overheat causing a strong burning odor. Check wheel well areas for any indications of this. Check the exterior of the aircraft for any indication of abnormal heat, such as, paint blistering or charring.

STRATEGY CONSIDERATIONS (open classroom discussion)

1. When responding to an aircraft with reported smoke, what should your considerations be?
2. When enroute you see flames and smoke in the aircraft interior, what actions should you take?
3. What considerations would be given to passenger evacuation?
4. If doors and emergency exits are not already open and there is definitely a fire on board, what would the considerations be?
5. What would be the best agent and technique for attacking this interior fire?
6. What are the major considerations when entry is required
7. If passengers and crew have been evacuated and you must search for the source of smoke, what areas should the search cover?

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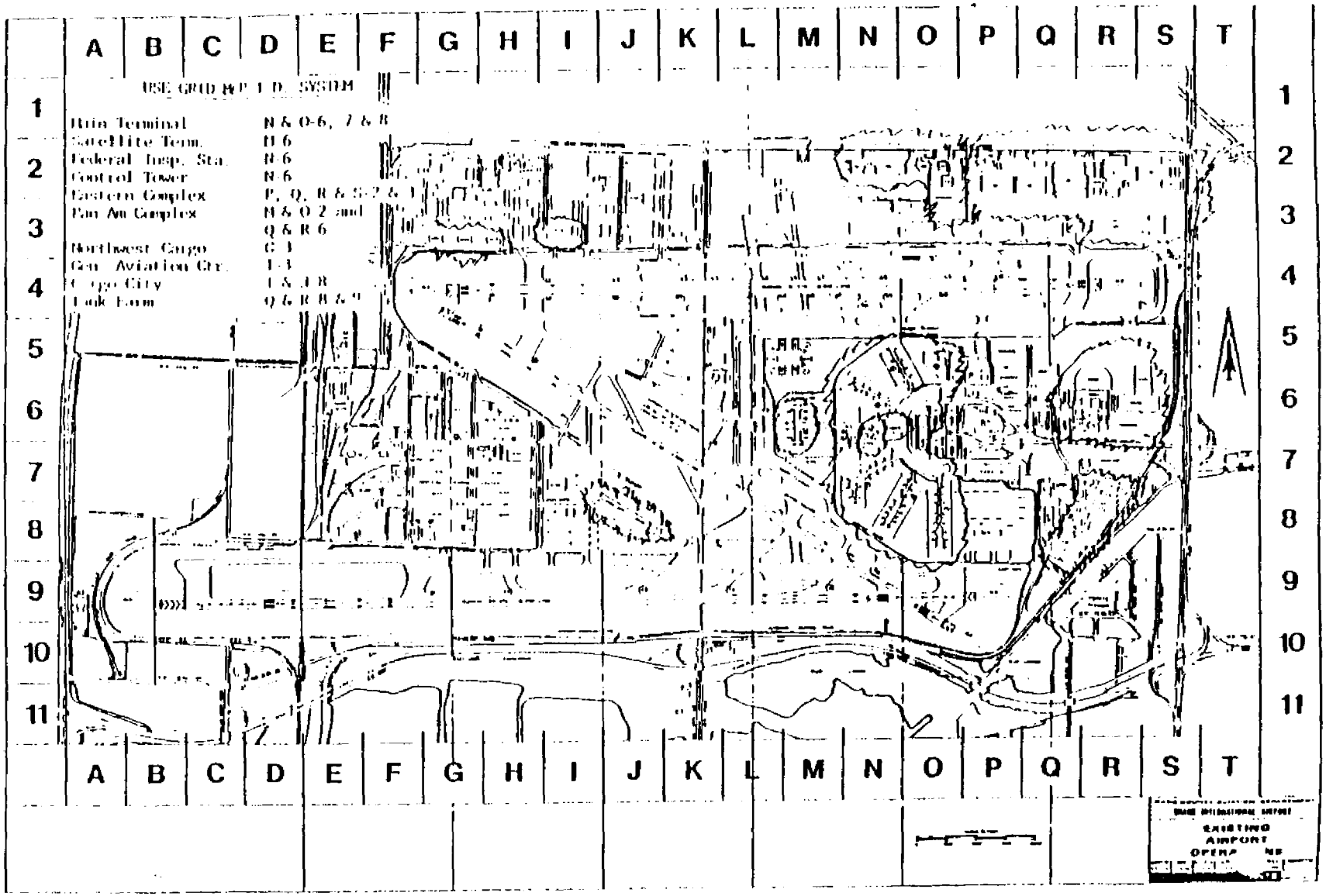
DRILLS

1. All personnel should get hands on training in laddering different types of aircraft. Familiarization with which ladders are needed to reach specific areas of different types of aircraft.
2. Hands on training opening all types of exits. (i.e.; normal and emergency)
3. Advance hand lines to all exit points.
4. Enter aircraft through all types of exits in full bunker gear, including S.C.B.A.


A B C D E F G H I J K L M N O P Q R S T
1 2 3 4 5 6 7 8 9 10 11
BASE GRID MAP I.D. SYSTEM
Rotunda N & O-6, 7 & 8
Satellite Term. H-6
Federal Insp. Sta. H-6
Control Tower N-6
Eastern Complex P, Q, R & S-2 & 3
Pan Am Complex N & O-2 and Q & R-6
Northwest Cargo C-3
Gen. Aviation Ctr. I-3
Cargo City I & J-8
Oak Farm Q & R-8 & 9
EXISTING AIRPORT

FLAMMABLE LIQUIDS

All fire fighters must have a good working knowledge of the characteristics and inherent dangers of flammable and combustible liquids. This is especially true for Airport fire fighters. Most major fires involving aircraft can be attributed to the presence of large quantities of Aviation Gasoline (AVGAS) and/or jet fuel. Most of the specialized C/F/R apparatus and extinguishing agents are designed to deal with this type fire. IFSTA #206 (included in this study package) covers the properties of AVGAS and jet fuel in depth.

Fuel spills frequently result from aircraft fueling operations. The size of the spill can vary from a few gallons caused by a simple overfill to several thousand gallons due to a major equipment failure. Spilled fuel, of course, constitutes a threat to life and property. The Airport Fire Station is notified and responds to all fuel spills over five feet in diameter. Large spills can become a major operation for the Fire Department. Environmental and safety considerations dictate that fuel must not be allowed to enter the Airport drainage system. Large spills must be contained to prevent this from happening, treated with foam extinguishing agent (to prevent ignition) and removed from the ramp through the use of portable scavenger pumps and/or absorption compounds.

The Fire Department and the fueling company are responsible for working together to accomplish clean-up of a major spill. Airport firefighters must be thoroughly familiar with the Major Fuel Spill Emergency Control Procedures (copy included).

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AVIATION DEPARTMENT
OPERATIONS BULLETIN No. 1037 (MIA)

FUEL SPILL PROCEDURES

These policies and procedures shall apply to all organizations required to conform to the Code of Metropolitan Dade County (ordinance No. 75-113) Rules & Regulations of Dade County Aviation Department, Chapter 25.

PURPOSE

To contain and remove the results of a fuel spill resulting from a fuel tender tank, fuel pit equipment, or aircraft tanks or piping malfunction, thus minimizing the possibility of fire, pollution, and other hazardous conditions.

Reference: Rules & Regulations, Chapter 25-6.23(e).

Fuel Spill Definitions

Minor - Fuel on pavement surface spreading not more than five (5) feet in diameter, but not ponding or of a continuing nature. Immediate absorption and clean-up accomplished by on-site personnel. Fire Department service normally not required.

Moderate - Fuel on pavement in excess of five (5) feet in diameter or of a continuing nature in sufficient quantities to flow or pond, but controllable and recoverable by fuel spill emergency kit equipment and absorption material, available

at the scene, by on-site personnel. Fire Department to be notified immediately for response and determination of additional required safety precautions.

Major - Fuel flowing from an uncontrollable source or spill of sufficient quantity to flow or pond, threatening serious fire and/or enviroment impact on Airport facilities. Bases for implementation of Fuel Committee Emergency Team and Fire Department supervision. Fire Department to be notified immediately and Fuel Spill Emergency Team procedures to be activated.

Fuel Spill Cleanup Responsibility

Recovery and cleanup of fuel spills in the following situations will be joint responsibility of indicated involved personnel:

1. Aircraft System malfunction:
   - A. Airline personnel and fueler personnel.
   - B. Service company personnel if required.
   - C. Fuel Committee Emergency Team if required.
   - D. Fire Department for standby, wash down, and hazard control.

2. Fuel Vehicle Malfunction- While Fueling:
   - A. Fueler personnel.
   - B. Airline and/or service company personnel.
   - C. Fuel Committee Emergency Team if required.

D. Fire Department for standby, wash down, and hazard control.

3. Fuel Vehicle Malfunction-not During Fueling:

A. Fueler personnel

B. Fuel Committee Emergency Team.

C. Fire Department for standby, wash down, and hazard control.

All other recovery team personnel should be available to assist as back-up, where spills of major proportion are involved.
NOTE: The on-scene Fire Commander will have final authority as to required action. In all situations, D.C.A.D. personnel will standby to assist with traffic control, etc. Police will be summoned if the situation warrants, to maintain scene control.

Equipment Requirements

Fuel recovery and cleanup equipment is to be provided in three different modes:

Mode 1 - Fuel Trucks & Hydrant Carts

1. Each unit to carry:

A. Drain cover 6'x 6' square.

Mode 2 - Fuel Spill Emergency Kit

The Emergency Kit shall be a portable unit (such as a baggage cart), covered and easily towed by any ramp tractor or other vehicle, located at designated position at each Terminal Concourse and other specified locations. Responsibility for provision of these units and maintenance

thereof, together with telephone numbers to contact for use, is as follows:

Concourse B & C	-	Eastern	(873-3101)
Concourse D	-	MDAD	(871-7357,871-7333)
Concourse E	-	MDAD	(871-7357,871-7333)
Concourse F	-	Pan Am	(874-2376)
Concourse G	-	Airlines jointly	(526-4001)
Concourse H	-	Delta	(526-4693,526-4695)
Concourse J	-	MDAD	(871-7357,871-7333)
Satellite and Remote Gates	-	MDAD	
36th Street	-		(526-6344)

Kits available from Page Aero Facilities & GAC for use by tenants as needed.

Equipment - Each Kit to Carry:

1. Drain Cover (1) 6'x 6'
2. Portable containment dikes (6) 6' long
3. Long handle squeeges (4), brooms & shovel (s)
4. Flame safe, explosive proof suction pump (1) equipped with shallow fluid pick-up adapter head.
5. Approved flammable liquid container, 50 gal. minimum capacity.
6. 400-500 pounds absorbent compound or equivalent capacity of absorbent pads.
7. Plastic bags for disposal of absorption material.

Mode 3 - Fuel Committee Emergency Team

Equipment - (Provider)

1. Drain cover (1) 6'x 6' square (each fueling vehicle)
2. Positive suction waste vehicle (minimum 2000 gal. capacity) A&A. Texaco.

3. Large supply absorbent compound - Delta
4. Long handle squeegees (4), brooms, shovel(s) (each airline or agency designated as responsible)

FUEL SPILL EMERGENCY ACTION PROCEDURES

Minor Spills

1. Stop fuel flow
2. Apply absorbent material
3. Safely dispose of absorbent material - use plastic bags.

Moderate Spill

1. Stop fuel flow
2. Simultaneously, to extent possible:
   A. Notify Fire Department (thru fueler supervisor or airline)
   B. Install drain cover if appropriate
   C. Place containment dikes as needed
3. Request nearest fuel spill emergency kit (see Mode 2 listing). Initiate containment and cleanup action using material from kit, including suction pump
4. Fire Department wash down and release area

Major Spill

1. Attempt to stop fuel flow
2. Simultaneously, to extent possible:
   A. Notify Fire Department - 871-7070 (thru fueler supervisor or airline)
   B. Notify Emergency Recovery Team (see Emergency Telephone List attached)

3. Emergency Team to initiate recovery procedures under Fire Department supervision
4. Fire Department wash down and release area

Notes:
A. In case of moderate or major spills, vehicular traffic and all personnel (other than cleanup personnel) shall be precluded from spill area until released by Fire Department. Particular attention is needed in this regard due to the increasing number of vehicles equipped with catalitic converters in exhaust systems.
B. Used absorbent material(s) are to be disposed of through burning in the M.D.A.D. incinerator, located north of the Airport Fire Station.

Training

All fueling company, airline, and ramp service personnel shall be made aware of their responsibility for rapidly cleaning up any fuel spilled, shall be trained to implement the above procedures, and safely operate spill containment and clean-up equipment in keeping with NFPA 407 and Chapter 25, code of Metropolitan Dade County.

Fueling Vehicles-Special Requirements & Inspection

1. No fueling vehicle hoses shall be connected to an aircraft until ready to actually start fueling. The operator must then remain in the immediate vicinity of the fuel vehicle, at all times that fueling hoses remain connected to the aircraft.

2. All fuel trucks and hydrant carts, operating at M.I.A., must be equipped with drive shaft guards to prevent rupture of tanks and piping systems.

3. All fueling equipment will be periodically inspected by the M.D.F.D. (Airport Division) and Aviation Department jointly. Equipment found to be unsatisfactory shall be removed from service immediately and the ramp decal shall be removed. The vehicle shall be prohibited from operating on the Airport until necessary repairs have been completed, the vehicle has been inspected in accord with established procedures, and the ramp decal has been reapplied.

Recovery of Costs

Because of the magnitude of certain fuel spills, it has been determined that charges for the service of the Fuel Committee Emergency Team have become necessary, if required to become involved in more than standby duty. (Time and material charges may also be made on occasion for M.D.A.D. personnel and equipment called into service). Appropriate charges for the Fuel Spill Emergency Team services will be assessed directly to the responsible company(ies) in accordance with the following schedule:

$100.00/hr. per recovery unit - minimum 1 hour
$35.00/man hour - minimum 1 hour
Plus replacement costs of material used

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FUEL SPILL EMERGENCY TEAM PHONE NUMBERS

A & A Services	- 526-6652
Citgo	- 526-6581
MDAD Ramp Office	- 871-7358 / 871-7333
Fire Department	- 871-7070
Texico	- 526-6755
A.S.I.I.	

FUEL STORAGE TANKS

There is in excess of 18 million gallons of storage capacity forjet fuel in the large vertical holding tanks at the M.I.A. Tank Farm complex (see Airport map). This fuel is piped into the holding tanks via the underground pipeline which runs from Port Everglades,in Broward County. Fuel is transferred from the Tank Farm to the aircraft servicing area by either underground pipeline (to stationary underground fueling hydrants) or by fuel tankers (trucks).

The threat of a major fire involving the fuel storage (Tank Farm) area is very real. Fire fighters must be familiar with storage tank design and structure, different roof types and logistical considerations involved in dealing with tank fires. The article, "Tanks a Lot" (included in this package) gives some very useful information relating to storage tanks and tank fires. Firefighters should familiarize themselves with this information.

Foaming agents are usually required to extinguish fires involving liquid hydrocarbons. The two types used at Dade County airport are Aqueous Film Forming Foam (AFFF), sometimes called "Light Water", and fluoroprotein foam. Both have certain desirable characteristics and are compatible when used together.

AFFF: The greatest advantage of this agent is its quick knock-down capability. It spreads quickly across the surface of burning fuel to give very rapid extinguishment. It can also be used quite effectively through standard fog nozzles as the need for aeration is not as great as for fluoroprotein foam. This agent also has the characteristics of "wet water" and can be applied to Class "A" materials to gain extinguishment of deep-seated fires.

The main disadvantage of AFFF is its limited resistance to burn-back. Once extinguishment is achieved, you cannot rely on the AFFF blanket to prevent re-ignition for more than ten minutes maximum, much less if the blanket is disturbed by pedestrian or vehicular traffic. Another undesirable characteristic is this agent's poor resistance to hydro-carbon contamination when "plunged" into a pool of fuel. The hydro-carbons then return to the surface along with the AFFF, application technique is very important when using AFFF. Plunging the agent into the fuel should be avoided. The rapid knock-down capability makes AFFF the agent of first choice in aircraft fire situations.

FLUOROPROTEIN FOAM: While this agent does not possess the rapid extinguishment characteristics of AFFF, it does offer excellent resistance to burn-back. It also resists hydrocarbon contamination which makes it very useful when agent must be projected over the rim of an involved storage tank or applied to a tank fire via sub-surface injection. The protective foam blanket produced by this agent is much more durable and stable than that produced by AFFF. However, it must be remembered that any foam blanket must be continuously monitored and maintained to be effective.

AFFF is applied at a 6% solution rate. That simply means that 6 gallons of AFFF is mixed with 94 gallons of water to produce 100 gallons of foam solution.

Fluoroprotein foam is applied at a 3% solution rate: 3 gallons of fluoroprotein foam and 97 gallons of water = 100 gallons of foam solution.

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TANKS A LOT

Sitting in our own backyard, so to speak, are some tanks. They are what some might refer to as a possible problem. The problem is not so much the tanks but what those tanks contain.

The vertical storage tanks have the capacity to contain in excess of 18,000,000 gallons of Jet-A-Fuel. There are seventeen (17) horizontal tanks with a total capacity of 453,728 gallons of AVGAS and/or other grades of gasoline.

Vertical tanks designed to contain flammable liquids usually are of three (3) basic types: (1) a weak-seam coned roof, (2) an open floating roof, or (3) a covered floating roof.

The coned roof type tank is designed to blow off or open up when internal pressure within the tank reaches a pre-determined point. In most cases, this will have occurred before the arrival of the Fire Department, and almost always as a result of exposure from another fire. The hazard would be extreme if the roof has not blown off. Cooling streams must be placed into service at once.

The open floating roof is just what it says. The tank roof floats upon the product in the tank. When the tank is empty, the roof will be almost at ground level with the walls of the
tank above and surrounding it. When full, the roof, of course, will be near the top of the tank. Where the floating pan meets the wall of the tank, a seal is accomplished by neoprene designed to the contours of

the tank. This type of tank is very subject to ignition by lightning which usually results in a small rim fire which, in most cases, can be extinguished with foam handlines or even portable Class "B" extinguishers.

A covered floating pan type tank can be identified by vents around the top portions of the tank. The roof on a covered floater will not necessarily have a weak seam. A fire in this type of tank is the most difficult to extinguish because access from the top is limited and sub-surface injection of agent is blocked by the floating pan. The major cause of severe fire in the covered floater is overfilling of the tank.

Fire in a weak-seam cone covered tank where the roof has blown will almost always involve the entire surface area and will require maximum effort to extinguish.

Fire in an open floater must be fought with great care that excessive agent or water does not sink the roof. Ground-operated lines applying water or agent at too high a rate can do this quite quickly. Aerial operations applying 1.6 g.p.m. per each ten (10) square feet of surface area is the N.F.P.A. recommendation. Without a doubt, airport units will be first-in at a Tank Farm fire. Not only that, but because of our foam capabilities, we will be the primary combat units.

Our training with spill-type fires such as could be expected in an aircraft incident has placed AF-3 in a top slot for quick knock-down.

Fires in a diked area in the Tank Farm could be worked in the same manner.

N.F.P.A. records on tank fires have proven that fluoroprotein-type foams are superior to AF-3. In the vertical application of foam, there is a "plunging" effect of the foam into the flammable liquid. Fluoroprotein foam is more desireable for vertical applications and sub-surface injection becasue it is more resistant to breaking down in the presence of hydrocarbon-type fuels.

Requirements of the N.F.P.A., based on previous tank fires, indicate that the sub-surface injection application rate requirements for a seventy-five foot (75') diameter tank, would be 442 g.p.m. If applied to the surface by nozzles, the rate must be increased to 1.6 g.p.m. per ten (10) square feet or 707 g.p.m. of foam solution.

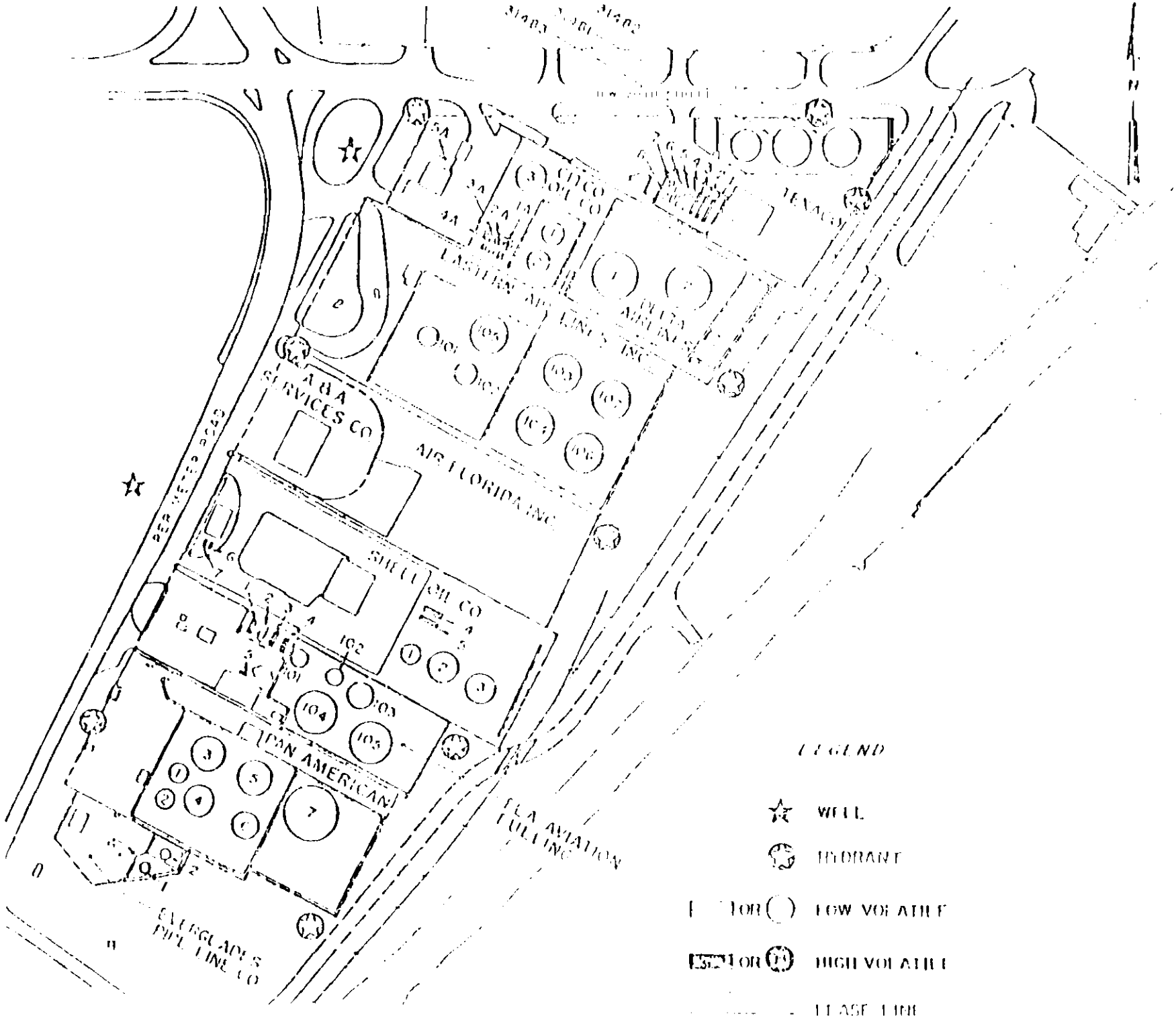
N.F.P.A. goes on to say that we must be prepared to continue the above flow for at least fifty-five (55) minutes. So, where multiple tanks are involved, we could expect to consume thousands of gallons of foam solution.

One thing is for sure, a fire like this would raise pure hell with the "Air Quality Index".

Tanks.

FUEL FARM DATA

TRACT NO	LESSEES	TANK NO	STORAGE CAPACITY 1000	FUEL TYPE	VOLATILE
1	TEXACO	3|463	15 Bbl	JET A	LOW
		3|46 & 3|462	20 Bbl	JET 'A'	LOW
		1, 2 & 3	30 Gal	AVGAS	HIGH
		4, 5 & 6	30 Gal	JET 'A'	LOW
		7	10 Gal	COMINGLED	LOW
		8	10 Gal	A.E.O.	LOW
2	CITGO OIL CO	1 & 2	6 Bbl	JET 'A'	LOW
		3	15 Bbl	JET 'A'	LOW
		1A, 2A & 3A	20 Gal	AVGAS	HIGH
		4A	20 Gal	A.E.O.	LOW
		5A	4 Gal	VEHICLE GAS	HIGH
	DELTA AIRLINE	1	35 Bbl	JET 'A'	LOW
		2	37.5 Bbl	JET 'A'	LOW
3	EASTERN AIRLINES INC	101	5 Bbl	JET 'A'	LOW
		102	7.5 Bbl	JET 'A'	LOW
		103 TO 107	20 Bbl	JET 'A'	LOW
4	A & A SERVICE CO				
	AIR FLORIDA INC				
5	SHELL OIL CO	1	5 Bbl	JET 'A'	LOW
		2 & 3	10 & 5 Bbl	JET 'A'	LOW
		4 & 5	20 Gal	AVGAS	HIGH
		6 & 7	4 Gal	VEHICLE GAS	HIGH
6	FLA AVIATION FUELING	101	3 Bbl	JET 'A'	LOW
		102	5 Bbl	JET 'A'	LOW
		103	10 Bbl	JET 'A'	LOW
		104 & 105	25 Bbl	JET 'A'	LOW
		1	15 Gal	VEHICLE GAS	HIGH
		2	15 Gal	VEHICLE DIESEL	LOW
		3 & 4	15 Gal	AVGAS	HIGH
		5	4 Gal	VEHICLE GAS	HIGH
7	PAN AMERICAN	1 & 2	5 Bbl	JET 'A'	LOW
		3 & 5	15 Bbl	JET 'A'	LOW
		4 & 6	10 Bbl	JET 'A'	LOW
		7	35 & 15 Bbl	JET 'A'	LOW
8	FIBERGLASS PIPE LINE COMPANY	1	5 Bbl	MIXED FUEL	LOW
		2	5 Bbl	CONTAMIN FUEL	LOW


SHELL OIL CO
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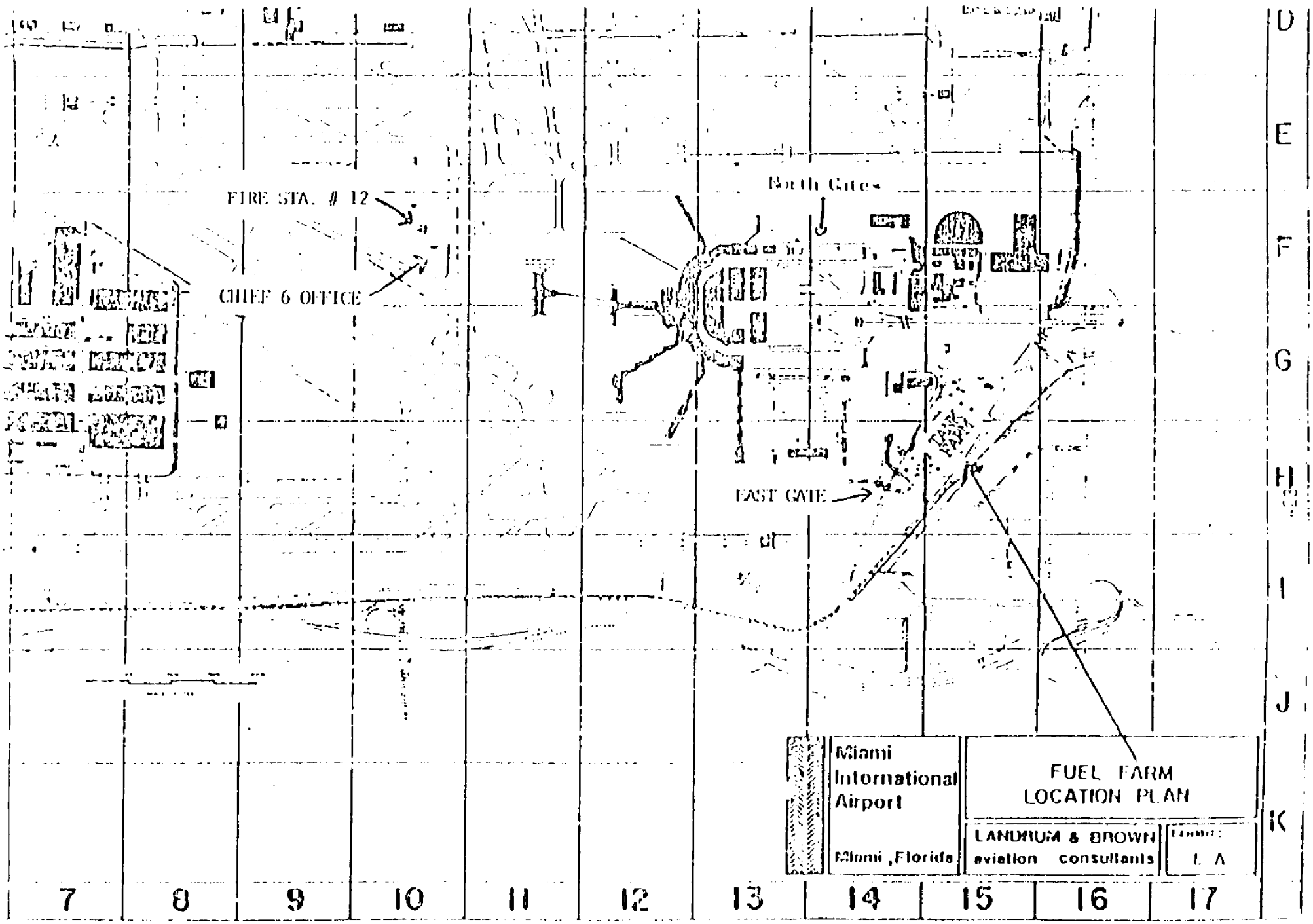
FIRE STA. # 12
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Miami International Airport
Miami, Florida
FUEL FARM LOCATION PLAN
LANDRUM & BROWN aviation consultants
L. A.