



**Civil Contingencies Secretariat**

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# Hurricanes Katrina and Rita A Perspective

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# **HURRICANES KATRINA & RITA – A PERSPECTIVE**

## **INTRODUCTION**

1. What follows is an overview of the key experiences and lessons identified by the US authorities as a result of Hurricanes Katrina in Louisiana, Alabama and Mississippi and Rita in Texas which occurred in August and September 05. The information is based on personal accounts and detailed discussion with US officials including the Federal authorities both at the time of the Hurricanes and subsequently; with the Texas authorities and voluntary agencies who initially accepted the majority of the evacuees from Louisiana during Katrina and three weeks later had to organise their own evacuation as a result of Hurricane Rita; and with officials in Louisiana including Federal, State, National Guard and Federal military. I am extremely grateful to our US colleagues for sharing their thoughts with us and in such detail. This document is, by necessity, a summary of those discussions centred on the consequences of these catastrophic events and some of the actions that followed: it attempts to encapsulate both the big issues and the all important detail. It doesn't and never could encapsulate every aspect of the catastrophe. (For an official Lessons Learned Account please see the White House report available at <http://www.whitehouse.gov/reports/katrina-lessons-learned>.) This account does not, for instance, provide much detail on body recovery and identification because this is not an issue on which we have engaged in detail with the US authorities. The main aims of this document are to provide a brief overview of the US experience; enable the identification and implementation of specific lessons in terms of our own evacuation and shelter planning; and consider how the US experience in responding to a catastrophic incident might apply to the UK in a different context. I have skimmed over or omitted those issues that are specific to the US be it differences in constitutional arrangements, or the problems posed by the large number of law enforcement agencies etc. I have, however, attempted both to set the scene and give a flavour of difficulties US colleagues faced without labouring the detail. I have focused on consequence management as it occurred in the Southern Gulf States, principally on New Orleans and Houston, rather than events in Washington DC. Inevitably this summary will leave more questions in the minds of readers. Given the

enormity of the events in question, this is inevitable but I hope, at least, that this report plants useful ideas and trains of thought that can be followed up or developed to UK circumstances. Much of what is contained here will be the subject matter of two evacuation and shelter conferences organised by the Civil Contingencies Secretariat. I have intentionally not attributed views or comments to US officials: to the extent there are errors or misrepresentations in this document, the fault rests with the author.

2. I would like to thank the colleagues that accompanied me on the fact-finding trips to Houston, Texas and Louisiana, namely Dr Penny Bevan and Janet Meacham from DH, Sarah Nason of DEFRA, John Perkins of GO East Midlands, Sgt Gary Locker of ACPO and, in particular, to Phil Coppard, Chief Executive of Barnsley Metropolitan Borough Council.

3. I hope this document is of help to policy makers and planners alike. I have attempted to organise the detail into headings: notwithstanding the obvious overlap between them, I hope this will help planners focus more readily on their particular areas of interest. To the extent you find it useful, I would encourage a wide distribution within the emergency planning/public and voluntary sector community.

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## **BACKGROUND – HURRICANE KATRINA**

4. Hurricane Katrina hit the States of Alabama, Mississippi and Louisiana on Mon 29 Aug 05. It was notably powerful – it hit landfall as a Category 3 hurricane but was an especially large storm with winds extending 103 miles from its centre. The storm took all day to pass through the area. As well as high winds of up to 130 mph it generated a huge storm surge along the Gulf State coasts reaching up to 30 feet in Biloxi, Mississippi. It devastated a wide area of eastern Louisiana, Mississippi and Alabama seaboard and caused damage well inland. The cities of Gulfport, Biloxi and New Orleans were devastated by the force of the hurricane, the storm surge and the subsequent flooding. Alabama State was the worst affected by the hurricane itself. In total, Katrina affected an area of 92,000 square miles (an area the size of Great Britain), generating 2.5 million requests for assistance and displacing 770,000 people. In total, Katrina resulted in the deaths of over 1,300 people, the majority from New Orleans, Louisiana. In total 1.2 million people were evacuated: approximately 500,000 of those evacuees had not returned home by late December 05.

5. In New Orleans, the ferocity of the storm and the sea surge broke the system of levees protecting the city from flooding. New Orleans is situated between Lake Pontchartrain to the North and the Mississippi River to the South, adjoining the waters of the Gulf of Mexico. Much of the city is built substantially below sea level. The levees had been designed to protect from a Category 3 hurricane – a one in a hundred year event. Some overtopping of the levees had been expected but, in the event, the levees physically broke in 13 separate locations, allowing sea and river water to quickly inundate the city. Many of the failure points were where the concrete wall structure joined the earth banks, or where initial overtopping of the concrete walls caused erosion and undermining of the support and foundations of the walls on their landward side, resulting in them being pushed over by water pressure. This was unanticipated and therefore an unplanned for event, and of a completely different nature to the overtopping of the levees. The force, speed and scale of the invading water were the principal cause of the disaster that followed.

6. By way of contextual background to what follows, it is worth pointing out New Orleans is rated as the ninth poorest city in the US. New Orleans is 70% African-American. Louisiana has the fourth highest poverty rate in the country and the poverty rate in New Orleans is 38%. Around 120, 000 people in New Orleans do not own their own cars

### **The Emergency Response**

7. Hurricane Katrina struck New Orleans at 6am on Mon 29 Aug 05. In the days leading up to the hurricane striking, its progress across Florida and the Gulf of Mexico had been tracked and warnings given. It was only 24 hours before the hurricane struck that a mandatory order to evacuate the city was made. New Orleans is particularly vulnerable because it is built predominantly below sea level, and the height of the predicted storm surge was greater than the city's defences. In the event, many people stayed put. Typically these were the less mobile sections of the community, either through poverty and disadvantage, disability or special circumstances. The loss of life was, therefore, predominantly amongst these peer groups. In Louisiana, approximately 71% of the victims were older than 60, and 47% of those were over 75. At least 68 were found in nursing homes, some allegedly abandoned by their carers.

8. Amongst the first consequences of Hurricane Katrina striking early on Monday morning was the complete loss of communications. Radio masts were blown down and the cell phone network overloaded and crashed. Thirty-eight call centres were knocked out disrupting local emergency services and 3 million customer phone lines were knocked out in Louisiana, Alabama, and Mississippi. Broadcast communications were also affected – 50% of radio stations and 44% of the area's TV stations went off air. Although there were reports from members of the public early on the Monday that the levees had been breached, there was no proper recognition of the severity of the emergency until early on Tuesday, perhaps 16 to 18 hours later. The storm was active during the whole of daylight hours on Monday preventing air reconnaissance. The Army Corps of Engineers, who, with the local Levee Boards are responsible for the maintenance of the levees, had no option but to remain within their secure base in New Orleans whilst the disaster unfolded.

9. In terms of utilities, approximately 2.5 million power customers reported outages. The storm struck 466 facilities that handled large amounts of dangerous chemicals, and 31 hazardous waste sites. 170 drinking water facilities and dozens of waste water treatment facilities were destroyed or compromised. At least 10 oil spills occurred including 6 major spills of over 100,000 gallons. More than 7.4 million gallons poured into the Gulf Coast region's waterways (equal to two thirds the amount of America's worst oil disaster, the Exxon Valdez tanker spill in 1989).

10. The New Orleans City Council's organisation, including the Police Department, struggled to operate with personnel either evacuating with their families, or directly affected and stranded by the flooding. Some police officers deserted: as at Nov 05, 45 had been fired, 15 had resigned and 228 were being investigated. Because of the speed of the flooding, people remaining in the City fled to points of high ground. 30,000 people congregated at the New Orleans Superdome, 25,000 people at the Convention Centre and 14,000 people on the bridges on the I-10 highway intersection.

11. The Louisiana State National Guard was mobilised and drew on reciprocal arrangements with other States. Search and rescue was given priority and was improvised using shallow draught or air boats (typically used for work and pleasure in Louisiana's many marshlands waterways, and coastlands). The Coastguard and the Environment Protection Agency diverted from normal activities to mount search and rescue operations, including airlifting stranded people.

12. A number of fires broke out which could not be fought (or reached) by normal means and fire hydrants lacked pressure. Again, through improvisation, the Coastguard and the US Forestry Service were brought in using boat and airborne fire fighting equipment.

13. Overall, 80% of the city was flooded and major road links to the city were disrupted by broken bridges presenting major operations and logistics problems in mounting rescue and recovery efforts. In all, 11 major highways in the three States

were destroyed or impassable in the affected region and some areas were only accessible by helicopter.

14. The priority during the first few days was search and rescue. The recovery of bodies, including from public areas, was not to begin in earnest for over a week. Federal military forces were not given recovery of bodies as one of their missions: the contractors, Kenyons, were eventually contracted to collect remaining bodies. In addition, cemeteries in New Orleans were flooded raising coffins that then floated with the current.

15. Federal assistance, at the request of and in support of the Louisiana State Government, was mobilised in the hours and days following the Katrina emergency. (The exact timing of those requests and the speed of response are the subject of various congressional hearings and will not be dwelt upon here.) In accordance with the concept of operations in the National Response Plan (NRP), a Joint Field Office (JFO) was established at Baton Rouge, the State Capital, and about an hour's drive from New Orleans. The scale of the operation is shown by the size of the JFO.

By Dec 05, the JFO engaged some 4,000 staff of whom 40% were Federal employees, 20% State employees and 40% 'local hires'. The logistics effort gives further illustration. The logistics team grew from a staff of 10 on 27 Aug, immediately before the hurricane struck, to a peak of 272 in early Nov. By early Dec 05, logistics had overseen the delivery of 8,748 truckloads of supplies and equipment, 332 generators, set up 36 emergency camps with beds for 24,440 emergency workers, and established 103 facilities including the JFO itself, Disaster Recovery Centres and warehouses set up around affected areas, and delivered the necessary equipment to support the relief operations – 4,758 laptops, 3,851 cell phones, and office supplies – including a pallet of paper a day. In total 1,714 contracts were placed for equipment and services.

The equipment and supplies were sourced from a combination of the Federal supply depot and pre-negotiated supply contracts. Extensive use was made of Emergency Management Assistance Compact (EMAC) agreements that exist between States, not just for equipment and supplies but also for the recruitment of emergency workers and the temporary relocation of displaced

residents. The full evacuation of New Orleans has resulted in the dispersal of the city's residents across every State in the USA. International Aid was utilised, particularly in the provision of pumping and generating equipment: of most use were

financial donations and specific items eg pumping gear in response to requests for assistance rather than generic humanitarian aid.

16. Some 10 days after Katrina struck, estimates suggest that 10,000-15,000 people had elected to remain in New Orleans. Due to the health hazards, Mayor Nagin of New Orleans instructed police and National Guard to use force to enforce the mandatory evacuation order. This was not received well: residents barricaded themselves in their houses and threatened to use weapons to protect themselves. Law enforcement agencies were themselves unwilling to use force in the circumstances. The mandatory evacuation notice went un-enforced.

17. In the days that followed Katrina striking, all those in shelters – the Superdome, Convention Centre and I-10 interstate bridges - within Louisiana were evacuated to other States. The identification and tracking of displaced people, however, was a major issue. No effective system was set in place prior to dispersal. Tens of thousands were recorded as missing.

18. The dewatering of the City was finally completed on 11 Oct 05 leaving the long term recovery programme to get underway.

### **Military Assistance**

19. Military support came from two sources – the National Guard which reports to individual State Governors, and Federal military support. Under the Posse Comitatus rule, Federal military are not allowed to engage in law and order tasks and were thus used in a support role. The key tasks for the National Guard were: to save lives; to sustain law and order; to assist in evacuation including those with special needs; and to support the critical national infrastructure. There have been various reports, many contradictory, about the degree of lawlessness, violence and looting in New Orleans in the first few days following the hurricane. Undoubtedly the problem did exist to a degree and what is clear is that reactions to reports of violence, whether perceived or real, had an effect in terms of fuelling alarm and the consequences that followed eg calls to evacuate all hospital patients and an unwillingness of unarmed first responders to operate at night.

20. The key tasks for federal military forces were to assist with search and rescue; help clear properties; and assist with body recovery.

21. The Department of Wildlife and Fisheries assumed overall command and control for search and rescue. The National Guard coordinated helicopter support.

22. The Louisiana National Guard were activated on 26 Aug when Governor Blanco declared a state of emergency. When the hurricane hit on 29 Aug, National Guard strength was at 4, 549 and the first aviation support under EMAC arrangements arrived from other States. Numbers of National Guard, including those brought in from other States, climbed steadily thereafter. Eventually, over 50,000 National Guard members from fifty-four States, territories and the District of Columbia deployed to the Gulf Coast. Whilst their assistance was greatly required, the reception and integration of this support in the absence of a plan became quite resource intensive: on one day alone, 8,600 National Guard arrived from other States. The problems of integration were significant. Some 22,000 active duty troops were also deployed to the area.

23. One of the key tasks of the National Guard was to evacuate the Superdome and the Convention Centre. At the height, up to 30,000 took refuge in the Superdome and 25,000 at the Convention Centre. They were all evacuated by 3 Sept. The Superdome took 822 buses and 100 aircraft to evacuate and the Convention Centre was evacuated by 275 buses with 2,000 leaving by ferry and 3,000 by aircraft.

### **Medical Response**

24. In common with many members of the public, hospitals chose not to evacuate prior to the hurricane making landfall. As a result, several acute hospitals and both private and public hospitals (eg Baptist Hospital, Charity Hospital) were flooded, sustaining power outages. The absence of water and power resulted in no ventilation, food, or water; significant problems with cleanliness and hydration; and a reliance on portable oxygen. Without power and water, dialysis machines could not be run. Any remaining generators ran on diesel of which limited supplies were available. Staff

used doors taken from their hinges to serve as stretchers. Conditions were primitive. The subsequent evacuation of acute hospitals to pre-agreed out of State hospitals took up to 3 weeks overall. Evacuation was largely by air (helicopter). Charity Hospital took 5 days to be evacuated. Twenty-nine newborn babies were rescued from Louisiana State hospital, most of them motherless and some born prematurely, and another 100 from Touro Infirmary. The National Guard assisted in the evacuation. There are no figures available on the number of deaths of patients resulting from either the flooding/power outages or the evacuation but clearly patients' lives were lost. In total, 9 hospitals were evacuated.

25. No mental health facilities existed within the flooded area, although some mental health institutions had successfully evacuated in advance of the hurricane using their own transport and staff to escort patients. These were not high dependency or secure patients and they were accommodated in out-of-State hospitals in line with the emergency plan.

26. Many community-based elderly, special needs or partially disabled people were unwilling or unable to transport themselves and hence were not evacuated. There was no register of such people to enable identification or location. The transport capacity was in all probability available but insufficient heed was given of the warnings and the need to evacuate. Some nursing home staff self evacuated without regard for the residents. Criminal charges are being brought in such cases.

27. Following realisation of the extent of the disaster, 40 field hospitals were set up including one at New Orleans international airport comprising over 1,000 medical professional staff. Pharmacies were set up within FedEx trucks. Mobile medical teams were brought in from other States to assist, licensed by the Federal Government. Such teams typically do 2 week stints and are paid for by FEMA but at vastly reduced rates of pay. Fifty pre-formed teams exist each comprising around 35 members. Teams typically have 5 doctors with trauma experience, 5-7 nurses with emergency/ICU experience and the remainder are paramedics and pharmacists. Some teams have surgical capability. Twenty teams are kept at higher levels of readiness. No medical teams were sent to the Convention Centre (FEMA had not realised this was being used as a shelter) but they were positioned at the Superdome. Where teams

came from one hospital, the length of their absence sometimes created difficulties for the 'donating' hospital. The role of these teams following Katrina was largely administration of vaccinations and treatment of minor injuries. As part of the evacuation, a second tier of teams was established at each transit area. These were located at airports. Patients were seen and triaged prior to medevac flights. No special arrangements were made for children. Individual volunteer medical staff also joined the response effort but this presented coordination problems for those overseeing the medical response.

28. Counselling services were offered to medical staff. Mobile teams were gradually withdrawn as infrastructure recovery progressed and as evacuees were found temporary accommodation in other States. As of mid Dec 05, only one team remained.

### **Fatalities**

29. As at Dec 05, 100 bodies were still unidentified and it was estimated that DNA to identify these individuals would cost in the region of £13 million. Those remaining were being identified at a rate of approximately 20 per week, although recovery and restoration operations were uncovering further decomposed bodies. Federal DMORT teams had been brought in to help with identification, and these were supplemented by other experts from around the country. To facilitate this, tented structures were set up within hard standing buildings. Approximately 75% of the dead were identified using orthodontology or fingerprints: in some cases, museum expertise was enlisted to assist in the drying out of flood damaged medical and dental records. The remaining 25% were identified via DNA.

### **Communications**

30. Capacity was the main issue, along with the absence of a communications architecture for first responders. VHF radios were almost totally ineffective in an urban area as they depended on line of sight. Walkie talkies with a 3-5 mile range worked well. Levels of traffic on landlines, HF, satellite and cell phones were all operating at capacity.

## **HURRICANE KATRINA – SHELTER ARRANGEMENTS IN HOUSTON**

### **Shelters**

31. Many of those evacuated from the Superdome in Louisiana found refuge in the Reliant Park Centre in Houston. Reliant Park is owned by Harris County in Houston and has within it four main buildings including the Astrodome and 26,000 parking places. Reliant Park had originally been identified as a shelter in case of hurricanes hitting Houston but was later removed from the plans because its glass and temporary roof structure were deemed insufficiently safe to withstand hurricane force winds. In total, some 65,000 people were processed through the Reliant Centre and 27,000 people found shelter there for periods of 20 days or more. Typically, Reliant Park caters for crowds of up to 100,000 at up to 618 major events a year. Long term shelter, albeit of a smaller number of visitors, posed challenges of a different sort.

32. The Reliant Park staff warmed to their new task and set about doing what they did best – organising. They had their own catering company and security staff and although these arrangements needed to be supplemented they provided a good base from which to work. And the emergency services were familiar with the venue and its management. Beds and tables were provided (by the Red Cross and the State) and the pre-existing 20 wheelchairs the company owned had to be rapidly supplemented to make a total of 150. Company employees made arrangements to settle people in on arrival at the shelter thereby freeing up much needed emergency service resources. Evacuees were referred to as residents and every effort was made to allow residents to preserve their dignity. The shelter was up and running within 12 hours. Excellent relations existed with the Sheriff's office, and the Judge and his staff maintained high visibility to provide reassurance to residents.

33. Communications with Louisiana were patchy: it was not known when evacuees would arrive, who would arrive, how many would arrive, or what special needs they had. (It is now known that 200,000 people with chronic medical conditions were displaced and without access to their usual source of medical care or medications.)

34. Flexibility was the name of the game. With hindsight, emergency managers would have liked to have been able to offer evacuees water and lunch boxes on arrival but in the chaos this was not possible. Also with hindsight, the Red Cross would have been tasked to take the personal details of those disembarking from buses: as a result, this had to be done subsequently once people were in the shelter.

35. In terms of law enforcement, approximately 25 police officers provided security at the Astrodome, assisted by security cameras. They were watching principally for money and jewellery thieves as some residents had brought small valuables with them. Officers were also posted at the showers and the phone boxes. The first marijuana smoker caught was let off with a warning. The second was jailed in line with the Texan penal system and subsequent offenders dealt with similarly harshly as a deterrent to others. Outbreaks of gambling with social security money were also brought swiftly to a close. The temporary pharmacy set up at the centre had to be guarded at night. A cash point facility and a post office were also set up – these, too, had to be guarded. Law enforcement officers spoke of the benefits of knowing other responders and having had the ability to train and exercise together.

36. Within a relatively short period, residents started to receive payments. FEMA had determined that rather than creating a security problem with individuals having to secure large sums of cash, each household would be given a debit card with \$2,000 of credit. Unfortunately this proved too laborious to organise and the system is unlikely to be repeated: distribution was extremely labour-intensive and took several days, whilst would-be recipients queued for hours. FEMA then offered to make the money directly available to bank accounts on receipt on a completed on-line application: this didn't work as evacuees in most cases had neither access to a computer nor bank accounts. In addition, the Houston authorities believed that, whilst well-intentioned, there was no requirement for money as everything was provided free of charge. Indeed, some problems were created by the sudden availability of a large amount of money: some residents elected to buy 27" televisions and pairs of Nike trainers and these swiftly became the target of theft within the shelter. The possession of televisions also became an issue when it came to onward transportation of residents to States prepared to offer more durable accommodation arrangements – airlines and

coaches were ill-equipped to deal with large items such as TVs which would not go through scanners or sit comfortably in the overhead bins. The money also subsidised alcohol which led to alcohol-related crimes and increased security concerns for the law enforcement agencies.

37. Remaining residents finally departed the Astrodome when it had to be evacuated three weeks' later for Hurricane Rita. Had it not been for Rita, some residents might have been reluctant to leave. This was due in part to uncertainty about the future, wishing to stay put to enable other family members and friends to make contact, a belief that they could soon return home and the provision of free meals three times a day and free medical services.

38. The Reliant Centre had to cancel a number of events to act as a shelter. Many sponsoring organisations cancelling events did not in fact seek compensation but actual expenses were incurred in the running of the shelter which have been billed for. Discussions continue about the payment of these charges.

39. A large number of VIPs wanted to visit shelters for morale raising purposes. Media pools were set up to avoid media circuses. Visitors included Oprah Winfrey, Bill Clinton, Bill Crosby, Sean Penn and Brad Pitt. Such visits were time consuming for staff but extremely popular with shelter residents. Tours of the facilities were also arranged for the media but these were handled sensitively with due regard to the privacy of the residents.

### **Voluntary Services' Shelters**

40. As well as shelters run by the county, shelters were also set up by voluntary agencies in agreement with either FEMA or local first and second responders. What follows are the experiences of two such voluntary organisations.

### **American Red Cross**

41. The American Red Cross provided 1,150 shelters across 27 States and typically had been asked by first responders and county emergency planners to get

involved. In some cases, Fire stations had opened their doors to evacuees before realising that long term rather than temporary shelter was required and that having large numbers of evacuees in the building detracted from their ability to operate. At the peak in Houston, the Red Cross sheltered 4,000 evacuees in 36 shelters that were open for three weeks. Faith based organisations such as the Salvation Army also ran shelters. Both the Red Cross and Salvation Army typically sit on Silver level command boards along with 2 or 3 other high profile charitable organisations. None charged for their services – the volunteer ethos is significant in the US.

42. Most shelters were provided in churches. Volunteers wore ordinary clothes rather than uniforms in order to blend in and not come across as authority figures. Some volunteer-run shelters provided financial and psychological counselling services but these were not available in Red Cross Shelters. The biggest challenge was coping with special needs residents with needs including physical, emotional and psychological. Transportation was also an issue – residents needed to be transported to doctors' appointments, and to look at housing etc. Additionally, the Red Cross found themselves dealing with observers and visitors to the shelters who would unrealistically and therefore unhelpfully raise residents' expectations. Typically the Red Cross is not organised to take donations of food and clothes yet in the circumstances found itself doing just this. Health and fire safety reports did not make for good reading. In future, plans for dedicated shelters are to be developed in each zip code with associated stocks of supplies.

### **Salvation Army**

43. The Salvation Army typically organises shelter support such as the provision of food and drink and other support but, on this occasion, ran 36 shelters also. One of the biggest problems was uncertainty about how long people would remain in shelters and hence a lack of clarity on planning parameters. Shelters usually remain open for 3-4 days. Longer term shelters pose logistic problems and require the redirection of staff from other functions. Thus, for instance, youth clubs would need to be temporarily shutdown in order to resource the shelters. Longer term shelters presented issues such as the need to bus children to school and provide school uniforms. Activities also need to be planned for residents to help avoid psychological

problems – these included trips to the cinema, the bowling alley, and restaurants. There was also a requirement to support those residing with friends and families or in hotels. Differences in State law also raised issues such as different regulations governing child restraint in cars – the Salvation Army made available numerous child restraints. Pressure was put on food wholesalers to donate sufficient supplies of food: for a time, stocks of underwear were in short supply. Many of the Salvation Army's own food and hydration systems had been sent to Louisiana and Mississippi – with Texas bearing the brunt of sheltering, these were badly needed back in Texas. When shelter residents were able to take up offers of accommodation, furnishings needed to be provided with which the Salvation Army assisted. All assistance given by the Salvation Army was provided free of charge – activities and resources were sourced from fundraising although this has resulted in a considerable knock-on impact to other programmes. Although a few sizeable Katrina charitable funds had been set up (eg the Bush/Clinton fund) money was not filtering through to the Salvation Army.

### **Cruise Ships**

44. The US government chartered three Carnival Cruise Line ships at considerable expense (a \$236 million contract) with plans to house up to 7,000 including 4,000 evacuees from the Astrodome in two of the vessels docked in Galveston. It was thought this would be a popular option for those wanting privacy and some luxury after the strains of the public shelters. This was not, in fact, the case. Only 200 people volunteered. What had not been anticipated was the psychological and traumatic effects of having escaped flooding: it was more important to individuals to be on dry land than to have their own rooms, bathrooms etc. Another factor was that many people had not been on cruise ships before and did not know what to expect and they were also concerned the ships would set sail for other ports and they would have no control over the destination. Emergency managers also put in place regulations on no children under a certain age and families, understandably, did not want to be broken up. And there was an unrealistic hope that evacuees would be returning home in the next few days so could not see the point of moving to another temporary location. In the event, the ships were used to house emergency and recovery workers.

## **Volunteer Workers and Donations**

45. Over 60,000 volunteers worked in Houston on basic but essential tasks such as cleaning floors. Volunteers were documented and a system emerged whereby volunteers ran the system of volunteers. Bureaucracy was kept to a minimum. Donations of new clothes were requested but inevitably this presented an opportunity to dump old cloths. These and other donations had to be sorted and superfluous items disposed of.

## **Medical**

46. The first priority in receiving evacuees from Louisiana was to deal with the chronically ill eg diabetics and those with a requirement for dialysis. Emphasis was placed on triage:

- Those requiring immediate hospital treatment;
- Those requiring care but who could be dealt with in makeshift clinics within 24 hours;
- The general evacuated population.

47. Just 11 hours' notice was given of evacuees arriving. Where possible, doctors provided triage on coaches as they arrived. 100-150 people were seen in clinics every hour. The number of beds in clinics rose from 20 to 60. Clinics ran 24 hours a day in an attempt to avoid overloading A&E departments of hospitals. There was a requirement to treat physical injuries which had been sustained in the incident or subsequently.

48. Some 80 staff undertook health work in the Reliant Centre – this included food and sanitation inspection. One of the first and largest procurements was for hand sanitizer – hand sanitisation was crucial in the prevention of the spread of disease. Epidemiologists checked every triage record picking up eg cases of gastrointestinal illness: 'isolation areas' were created to stop disease spreading but those affected refused to be isolated without their family members for fear of being split up.

Agreement to allow all family members to be isolated together translated into a fear that all family members would be 'locked in' resulting in late presentation of individuals with symptoms so these fears had to be addressed. Risk communication was also an issue to be addressed, with first responders wearing protective masks and gloves thereby instilling fear in the residents. Advice and behaviours needed to be consistent. Carbon monoxide levels were also monitored in the context of the many vehicles involved in the evacuation and shelter operation, and the need to provide vehicular access for the disabled. On some occasions, levels were found to be too high. It was known there were TB cases amongst the evacuees but these had to be tracked down as no records existed. In all, 500 public health staff were involved.

49. Issues that posed particular problems were how to facilitate wheelchair access; and coping with the morbidly obese for whom, for example, manoeuvrability was an issue. In this regard, cot beds were not suitable for all residents. A pharmacy was set up in a trailer at the Reliant Centre but stocks of drugs under-estimated acute needs and patient volume. Maintaining control and coordination amongst doctors in a difficult and unique situation posed difficulties: there was a tendency in some quarters towards perfectionism.

50. The Federal Centre for Disease Control, based in Atlanta, sent a 20 person team to assist. This was welcome, providing support without interference.

51. In terms of vaccinations, Tetanus and Hepatitis A was given, and childhood vaccinations where required. Many people had no medical history or medication with them (and many medical records had been destroyed in the flooding). In some cases, where drugs had been acquired from large pharmacy chains, patients' drug records could be traced but this system was by no means comprehensive. An important lesson learned was the need for a good range of prescription drugs to be added to evacuation/all hazard medical kits in order to stabilise people prior to their reaching hospitals.

52. Psychological support also had to be provided, including counselling services. Furthermore, not all mental health patients self-identified and had to be located. Illegal drug users also had to be identified and provided with methadone.

53. Emergency medical services (in the US provided by the Fire Service) had to cope with numerous people presenting with open lesions and infected sores and showing symptoms of having spent time in contaminated water. The requirement to deal with so many evacuees in a short space of time resulted in overstretch in the region's emergency medical services. Over 30 ambulances were involved in the operation. As a result, Houston city response times were reduced and there was a dependency on mutual support arrangements with other areas. A lesson to emerge is the need to declare a state of emergency in receiving regions as well as those areas directly affected by the disaster.

54. In the slightly longer term, an additional 5 ambulances were added to cope with the increase in Houston's population.

### **Children**

55. A week after Katrina struck, some 1500 children were registered as separated from their parents. Some children were taken into care whilst authorities searched for the whereabouts of their parents: in other cases, parents had been separated from their children in the rescue and evacuation efforts. The National Center for Missing and Exploited Children coordinated the search, working closely with state and law enforcement, the FBI, and social services. A Katrina Missing Persons hotline was set up, manned by retired law enforcement officers. Calls received were verified by a second group of retired law enforcement officers then cases were referred to case officers who worked with law enforcement agencies to reunite families. The media were asked to show pictures and names of the children in care to alert parents to their whereabouts. CNN carried rolling pictures of these children on their screens and did in depth features of some of the children.

### **Pets**

56. Pets were a particular challenge. Where pets were rescued they were collected in makeshift shelters and attended by veterinary teams. Advice was to leave pets but many chose to ignore this advice. A scheme was operated whereby people could put

their pets into care and either offer them up for adoption with the result that pets were sent to homes all over the US, or owners were given a tracking number so they could keep tabs on their pet in care and be reunited when circumstances allowed. Such a system put a huge strain on animal rescue centres and animal welfare staff. It is now recognised that the majority of people will not evacuate without their pets hence new assumptions are needed about animal care.

### **Community Relations**

57. With the vast majority of the evacuees being of Afro African descent, community relations needed careful handling. Some crime resulted and two murders, although it was pointed out that the effects of these crimes were mitigated in terms of impact on the community by the harsh punishment system (including capital punishment) meted out in Texas. Insufficient criminal data was made available (or had been lost) by the New Orleans law enforcement agencies. A crime spike occurred but this was relatively small. Law enforcement agencies suggested that the larger criminal element had chosen to remain in New Orleans. At one stage there was a rumour that a number of paedophiles had been evacuated to Houston but this was thought to be inaccurate. Politicians put out supportive messages on these issues to ease community relations and the media behaved responsibly.

58. Social issues that were encountered included the effects of Texas residents moving further down social housing lists, some problems with discipline in schools, gangs roaming the streets, as well as funding issues – the impact upon budgets for healthcare and education. The Federal Government reimbursed up to 90% in the short term but with estimates of up to 40% of residents planning to remain in Texas, it was not clear how funding issues would be addressed in the longer term. Cash flows were also a concern with delays in reimbursement.

### **Onward Transportation to Other States**

59. Commercial air operators were financially incentivised to assist with the onward transportation of evacuees to other States. Military airfields were used but screening of passengers and baggage still had to take place. 43% of passengers were,

in the event, found to be carrying something that would not be allowed on aircraft. The Transport Security Agency deployed to the airfields to run the security operation but in too few numbers to deal with the volume of passengers and turnaround times. This resulted in aircrew flying times being exceeded and flights having to be cancelled. The National Guard were used to load baggage – a task they had not been trained for which added to the delays. Luggage usually comprised black bin liners but, as mentioned earlier, the \$2,000 given to each evacuee had resulted in the purchase of some 27” TVs which were problematic to load. Some States offered commercial one way air tickets and guaranteed housing and jobs for 1 month but take-up was poor – people were concerned they would not have the resources to make their way home.

## **NEW ORLEANS - RECOVERY AND MITIGATION**

### **Site Visit to New Orleans**

60. An extensive tour by coach of the damaged parts of the city was undertaken by the author and other UK representatives on 13 Dec 05. The initial approach to the city on I-10 into the central business district did not indicate the extensive damage the city had suffered. However, the tour of the residential districts, particularly the parishes of St Bernard and Orleans, illustrated the scale and extent of the devastation that had been wrought by the flood. Watermarks on walls and roofs showed the depth of flood water (typically about 5 feet). Many houses had suffered extensive structural damage with many lifted off their foundations. The spray paint markings on each house were evidence of the search and rescue operations that had been mounted. Neighbourhood after neighbourhood lay completely deserted and abandoned. Extensive work was, though, in progress on engineering work to the levees, on restoring public utilities and on clearing and sorting debris, albeit on a scale that looked forlorn against the size of the affected area and the scale of the damage. Everywhere, blue tarpaulin roofs were in evidence – erected by the Army Corps of Engineers in an attempt to prevent further damage to houses. The historic French Quarter had suffered some hurricane damage but was largely unaffected by the effects of flooding having been built on higher ground. It was, however, suffering commercially from a lack of tourism and trade.

### **Recovery and Mitigation**

#### **Introduction**

61. The following paragraphs attempt to summarise the various measures in place to restore the city of New Orleans to some semblance of normality. What is most striking, however, particularly when viewing the affected area, is the Catch 22 most property owners find themselves in. In evidence across the affected residential areas were hand painted signs reading “Owners Returning – Do Not Demolish”. But the process for return is not so easy.

62. It is hard to exaggerate the scale of the devastation in New Orleans (and other affected cities across the Gulf States). The infrastructure and with it any semblance of

normality had been utterly destroyed. There are no shops, no schools, and most forms of employment (except those trades engaged in the recovery process) have been lost. It is estimated that up to half of the city's 115,000 small businesses may be lost for good. Displaced people have been given temporary housing and, in many cases, offers of employment in other States and even those wanting to return have found themselves faced with the prospect of attempting to return to a city with little functioning housing and no supporting infrastructure.

63. House owners face a particularly difficult situation. The Federal Government has offered to pay a year's worth of mortgage payments for affected house owners insured by the Federal Housing Administration on condition that they will be in a position to live in their homes within 12 months: the loan will become payable at the end of the mortgage period and no interest will be charged. The private mortgage sector voluntarily granted a 3-4 month freeze on foreclosures but the period of grace has come to an end. The Federal Government extended the concept of no charge for those in hotel accommodation until the end of Feb 06 but is not extending the waiver further. And whilst Government loans are available at extremely favourable rates to assist homeowners undertake the repairs to their homes, many displaced people are loathe to take out loans which they will struggle to pay back. The sheer logistics of making those repairs are also difficult – the vast majority of homes are too badly damaged to allow residents to live in them whilst simultaneously making repairs. This necessitates long journeys from neighbouring Cities and States (not conducive with trying to earn money to pay mortgage fees, temporary housing costs and repair bills).

64. There is a huge shortage of qualified tradesmen to make repairs and inevitably there is a criminal element posing as tradesmen and out to make a fast buck. As at mid Dec 05, 10 camps remained housing 6,213 beds for recovery workers: others are accommodated in cruise ships in the port of New Orleans. In terms of damaged house owners, the lucky few are being housed in trailer homes provided by FEMA either adjacent to their damaged homes or in trailer parks. But demand considerably outstrips supply and legal difficulties (landowners refusing the establishment of trailer parks on their ground) are holding things up. The provision of the necessary utilities to individual trailers and trailer parks is also time consuming. Whilst many residents express a desire to return home, it is difficult to see quite how many will financially

and logistically be able to realise their dream certainly in the near to medium future. And the absence of residents, tourists and businesses reduces the tax base thereby damaging city and State revenues and their ability to fund the recovery effort. Estimates of 10 years are being put on a degree of normality returning by experienced recovery staff.

65. The following paragraphs provide details of the various Federal programmes aimed at recovery.

i) The Individual Assistance Programme is in two parts:

- Financial assistance with rent; housing repairs and replacement; other emergency costs; crisis counselling and disaster unemployment assistance. The costs of this were \$3 billion (up to early Dec 05), mostly in rent.
- Direct assistance with transitional housing. Of the total displaced persons:

45, 153 were living in their damaged dwelling  
215,648 had found alternative accommodation  
89,000 had not been contactable  
109,868 required assistance under the programme to provide them with a temporary housing unit or trailer.

Trailer parks and temporary housing units were being established within the city, or Louisiana State where possible, and in other States subject to political, town planning and other regulatory constraints.

ii) The Public Assistance Grant programme provides grants for the repair and replacement of disaster damaged public facilities. Grants are available for the repair and replacement of facilities to pre-disaster standards only. Grants are only available to State and local

governments and public agencies and certain not-for-profit bodies, bearing in mind that utilities are provided primarily by the private sector. All 'reasonable costs are eligible' and funding is normally at 75% but applications for assistance above that level can be requested by the State and will be determined on the basis of per capita resources.

66. Long Term Community Recovery and Mitigation is a specific Federal function under the National Response Plan. Long term community recovery programmes are active in 26 of Louisiana's Parishes in support of the primacy of State and local governments. Efforts are forward looking and market based, focusing on permanent restoration of infrastructure, housing and the local economy. Mitigation aims to reduce the risks from reoccurrence of similar events. As far as flood risks are concerned, this is in 3 parts:

- The national flood insurance programme extends the availability of flood insurance to all properties regardless of risk, subject to policies being taken out and premiums paid, and to communities agreeing to flood risk management programmes including eg the regulation of new development on the floodplain. Those without flood insurance are being allowed to claim on the Government backed scheme but are having payouts docked for the amounts they would have paid in premia. Policies pay out for repair to pre-event standard but also provide an additional \$30,000 for the increased costs of compliance with flood control regulations eg raising the elevation where the pre-existing property did not meet these requirements. The maximum insured limited of \$250,000 was insufficient for the wealthier areas of New Orleans. It is anticipated that there will be 250,000 claims against 400,000 existing policies in Louisiana, amounting to a costs of perhaps \$20 billion.
- A hazard mitigation programme which seeks to remove hazards from the flood plain to reduce both the risk of future events and the impact of a reoccurrence.
- An education and outreach programme to raise public awareness of risks and how to mitigate them.

## **Environmental Protection**

67. The following paragraphs provide a brief overview of the environmental issues that arose in New Orleans and the steps taken to deal with them.

68. In the US, the Environment Protection Agency (EPA) has the lead on land-based environmental issues and the US Coastguard on water. The day after Katrina struck, the EPA was gearing up for environmental sampling but was diverted to search and rescue: 800 people were rescued by the EPA.

69. The immediate environmental threat was toxicity of the flood water, either from stirring up of sediment in Lake Pontchartrain or the release of chemicals into the water. In the event, nothing toxic was found in the water or the air. High levels of bacteria were detected in the water as a result of raw sewage, and water contaminated with oil presented a hazard to the evacuation operation. The large petrochemical industry in the area had been well prepared and sealed off in advance of the hurricane although 7.4 million gallons of oil spillage did occur, much of it in one New Orleans parish. All such plants are required to have an environmental risk management plan and a spill prevention plan in place.

70. The main tasks and issues for the EPA were:

- 55 emergency environmental responses mainly for biomedical and dialysis waste;
- the collection and disposal of household containers for hazardous substances eg bleach, gasoline, propane gas etc. The EPA estimates they will have collected 10 million such containers through litter picking, work by the Army Corps of Engineers, or from household hazardous waste;
- the collection and disposal of damaged refrigerator and air conditioning units. The EPA estimates a total of up to 500,000 units will require disposal. Refrigeration plants contain frozen gas which requires removal before disposal. The refrigerators themselves usually contain rotting food;

- Alligators, snakes and poisonous spiders taking up refuge in piles of debris. Large areas of central reservation between roads have been set aside for wood and fallen trees – these in particular were a haven for snakes and spiders.
- Skin or superficial infections from bacteria in contaminated water;
- Disposal of debris. The estimated volume of debris is a staggering 46.8 million cubic yards (the equivalent of 5 American football pitches each piled 1 mile high). There is a target date of Jun 06 for clearance. Licensing of waste disposal sites is a State Government function and new sites are required: existing sites were filled within 1 week. Attempts are being made to sort the debris and burn, or grind the organic component to reduce volume. Some wooden debris is quarantined due to termite infestation. Wrecked cars were collected beneath highways and bridges.

71. The EPA consider that the erosion of the marshes (freshwater) of the Mississippi delta south of New Orleans increases the vulnerability of the City to approaching hurricanes from the Gulf. The former extensive marsh served to absorb energy from the hurricanes, reducing their strength before they reached the City.

72. Total EPA and Coastguard costs are estimated at between \$600-700 million.

### **Flooding**

73. An investigation is due in the summer on why catastrophic flooding occurred. But the general causes seem obvious enough. New Orleans is built below sea level and surrounded on three sides by water. This results in a bowl effect – storm surge follows the law of gravity and water meanders to the lowest points. New Orleans had an ageing levee system designed to protect against Hurricane Category 3 and the massive loss of protective wetlands made it, and the surrounding coastline, extremely vulnerable. Every four miles of wetlands is thought to be able to absorb about one foot of storm surge. Louisiana has been losing the equivalent of an acre of wetlands every 24 minutes from erosion. A Cat 3 hurricane is likely to attract a surge of around 14 feet – thus New Orleans levees could have been expected to stop the bulk of the surge but allow some flooding caused by overtopping. Easterly winds in advance of the hurricane raised the level of Lake Pontchartrain by 2 feet. Lake Pontchartrain is

the second largest salt water lake in the US. It is approximately 4 miles wide east to West and 24 miles from North to South. The levees were undermined as a result of breaches. Investigations are underway to determine the causes – were the breaches caused by design failure or maintenance, for instance? Weak soil/ground conditions into which the defence piles were driven may have had a role. Failures of design may also have occurred in relation to the ability of levees to withstand overtopping. This would suggest that understanding the impact of events, and modelling, are critical in the design and erection of flood defences.

74. In terms of the response, readiness to deal with a major flooding incident was not high. The resilience of services like electricity was low, rescue equipment for a flooding situation was limited, generators were all too often stored in basements, and communications equipment was not resilient. Many of those rescued had to be evacuated through holes they had made in their house roofs. Awareness of the risks and mitigating actions did not seem to play the role that might have been expected given the attendant level of risk.

75. Provision of high class Geographic Information Systems was critical to the recovery effort for planning particularly with regard to the repair of levees, debris collection, waste disposal sites, environmental damage etc. Without it, the recovery efforts would have been hampered.

76. Repairing the levee breaches is costing about \$200 million. The defences are being restored to Cat 3 standard prior to the next hurricane season starting in June.

## **HURRICANE RITA**

### **Introduction**

77. Hurricane Rita struck the western coastline of Louisiana and neighbouring Texas on 24 Sept 05. It is recorded as the largest storm in the history of the FEMA. Those communities directly in its path were effectively razed to ground level but, in the wake of the Katrina experience, large scale loss of life was avoided although, sadly, lives were lost in the course of the evacuation as a result of transport accidents or exacerbation of existing medical conditions: the evacuation effort was hampered by the fact that Texas was undergoing a heatwave (with temperatures of 108F) and the heat emergency plan had to be activated simultaneously so that, for example, people at risk had to be moved to air conditioned buildings.

78. The approaching hurricane led to the largest evacuation attempted in US history. Some 3 million people evacuated during Rita, concerned at the strength of Rita and the disaster that had befallen other States in Katrina. Of these, some 10% required public shelter.

### **Evacuation**

79. Texas had several days notice of the approach of Hurricane Rita and put into operation its evacuation plans. This began with a pre-event communications strategy with the following elements:

- “This is a mandatory evacuation: law enforcement agencies will get involved if you endanger others;
- Do not assume you will be rescued;
- Prepare for a long wait before help becomes available; and
- Get a full tank of petrol before evacuating by car.”

80. Pre-recorded reverse 911 calls were made to people in Houston in both English and Spanish but the system locked up and reduced the capacity of landlines

which was needed more elsewhere. The system is unlikely to be used again for a major emergency.

81. Although the principle of mandatory evacuation existed in Texas, it was decided not to declare a mandatory evacuation on the basis it was unenforceable (a lesson learned from New Orleans). Coastal areas were given priority for evacuation as these communities were most at risk. But in order to avoid large traffic jams, evacuation needed to be managed still further and greater regional decongestion needed to take place. On a practical note, many people in coastal areas owned boats and wished to take their boats with them by trailer thereby causing additional congestion on the roads. This had been foreseen but what had not was that families would evacuate using all their cars rather than one car per family and in some cases with their trailers and horseboxes as well: this led to very heavy congestion on the roads and shortages of petrol. Petrol shortages were exacerbated by the premature closure of petrol forecourts as a result of forecourt operators themselves evacuating. As a result, the emergency services had to 'break into' forecourts in order to dispense petrol. Similar problems occurred with security staff at airports also evacuating early necessitating cancellation of flights. Thus a lesson identified is the need to make arrangements with essential staff to remain perhaps by enabling them to evacuate their families first before returning to continue their roles. This lessons needs to apply to others both in the emergency services and those involved in essential services in the widest sense, for instance, food and convenience shops. In the US, first responders are now encouraged to be self sufficient for up to 1 week. Plans already existed to protect strategic assets and these were put into place, with Federal support as required. In some cases, additional essential workers had to be brought into the area. Many industries were shut down completely. Good relationships between local emergency planners and industry were essential in effecting pre and post event disaster planning.

82. Whilst Texas successfully evacuated its citizens, huge traffic jams occurred with vehicles running out of petrol and vehicles breaking down on the freeway. This had unforeseen consequences such as the exacerbation of medical conditions. This has led to a number of recommendations for future action for instance, the engagement of traffic experts for assistance in route planning and traffic management. Problems arose in: rapidly reversing contra flows whilst ensuring the ability to facilitate the

arrival of logistical aid, support and additional first responders and essential workers flowing *into* the State; managing the consequences of huge volumes of traffic being carried on contra-flowing highways converging onto minor roads; making toll roads free; availability of emergency service patrols on roads with supplies of food and water etc; pre-stationing of ambulances at 5 mile intervals; patrol of buses along hard shoulders to pick up stranded motorists complete with a two-part check form (one for owner and one left on dashboard of car) to match owners with recovered vehicles; bonus-incentivised pick-up trucks to collect broken down vehicles; the use of helicopters in traffic management with downlinks to emergency vehicles; the use of pre-designated pick-up points for those who require assistance with evacuation; and instructions to petrol stations to top up supplies 72 hours prior to planned evacuation.

83. Around 60 fatalities sadly occurred in the course of the evacuation operation. The most common causes of death were hypertension, heat exhaustion, heart attacks, epilepsy, vehicle fires and motor accidents. A website with details of fatalities was set up by the Medical Examiner to enable friends and family to trace individuals.

84. Other practical measures included closing schools to enable people with children to evacuate; and arranging for initial relief supplies to have a law enforcement escort to prevent commandeering. A hospital in Galveston was evacuated: 1,000 patients were evacuated in 36 hours utilising 400 ambulances and a dozen military aircraft and with no loss of life. Such an operation had taken considerable pre-planning. Prisons were evacuated using their own resources.

### **Special Needs**

85. As confirmed in both Katrina and Rita, the safe evacuation of those with special needs requires considerable pre-planning. US emergency planners are now adapting their plans to include the evacuation of the elderly or those with medical conditions by temperature controlled vehicle or by air and in an evacuation operation that begins preferably 48 hours prior to the evacuation of the main population. Special needs individuals may require medical staff to be in attendance and supplies of water and other facilities should be available. In Katrina and Rita it was discovered that some commercial operators would not carry patients who required oxygen, were

visibly unwell, or who had difficulty embarking and disembarking. Drop ramps proved very effective in embarking/disembarking special needs individuals. Some nursing homes relied on the same transportation and other assets as other nursing homes – US planners will aim to guard against this in future. Others relied on mothballed vehicles that, in the event, proved un-roadworthy, and dangerous. As in Katrina, some nursing staff abandoned their patients. Consideration is being given to the requirement for special needs facilities to be licensed to the effect that evacuation plans are in place and exercised regularly. Thought is also being given to the setting up and maintenance of a registry of homebound special needs individuals in each area. This will require agencies involved in assisting individuals on a day to day basis to keep records accessibly and up to date. Patient confidentiality may mean that legislation is required to enable such information to be shared with emergency management staff and first responders. Emergency planners had underestimated their role in the assisted evacuation of the elderly living in their own homes. Calls were received from family members notifying the authorities where elderly relatives lived, asking the authorities to evacuate them. This entailed sending taxis to collect individuals and making provision to evacuate them. It had previously been assumed that unless there were special needs, elderly people would for the most part be included in other family arrangements.

### **Mutual Aid/Federal Support**

86. Under emergency management guidelines in the US, local resources must first be utilised in an emergency situation. If this proves insufficient, the local level looks to the State, and then to other States under pre-agreed mutual aid arrangements or to the Federal level (FEMA). Statements of requirement should be based on *what* is required not *how* requests should be fulfilled. Thus a request might read ‘drinking water for 400 people for 4 days to be delivered to X’.

### **Evacuation Destinations**

87. In the US, cities receiving evacuees must be large enough to have the necessary infrastructure to absorb and support a large volume of people. Arrangements need to be in place with potential receiving areas *prior* to evacuation

occurring. Receiving areas need to be able to cope with not only large volumes of people but also with those with special needs, with children etc. Arrangements must be made for their reception and continued support, particularly supporting care services.

## **Media**

88. Over 2,000 media outlets from around the world descended on Houston at the time of Rita. This took a degree of handling and resource. The battle rhythm comprised three internal coordination meetings a day and two press conferences at 10.00 and 15.00. In Houston it is the responsibility of the Mayor and the county judge to organise emergency management. In Rita, the benefit of having senior and trusted officials providing updates and messages paid dividends. A website was also created which received over 600,000 hits. Facts sheets were provided to enable the media to get briefed – these proved popular and allowed the media to get quickly up to speed even when they had missed news conferences. A Media Alert Notification System whereby the media's attention was drawn towards noteworthy events was also used. Messages were authorised at Silver command level.

## **Communications**

89. Internal Communications: event summaries were available to Gold commanders and press officers and were used, amongst other things, as the basis of briefings to the media. Conference calls were carried out daily at several levels including for emergency management staff and for policy staff and elected officials. Information management was supported by 6 servers placed at different locations to increase resilience.

90. Houston has a good regional and county radio system supported by both permanent and portable radio towers. The numerous fire services and law enforcement agencies in the area also have their own radio systems. This caused problems of interoperability. Emergency planners routinely work and exercise with amateur ham radio operators. (This proved extremely useful in providing early notification of the arrival of incoming evacuee buses from New Orleans although

Louisiana did lose ham radio also for a while.) Cell phones went down first although the priority user system worked well. Landlines were also not very robust.

## KEY ISSUES

91. The following is not an exhaustive list of lessons learned which readers will be able to glean from the text. Rather it is a selection of the more pressing issues that have a particular read-across to emergency planning in the UK.

- i) Plan for the continuity of local government and first responders during a large scale emergency and make arrangements for the welfare of local staff and their families.
- ii) Consider the requirement to enable essential staff in the private sector (eg critical national infrastructure workers, petrol station operators, key public transport staff, supermarket/convenience store staff) to evacuate their families early before returning to assist in the main evacuation effort.
- iii) Local authorities' and cities' risk assessments and planning should be based on two separate events: the evacuation of citizens and the reception of those evacuated from elsewhere.
- iv) Both sets of plans (see above) should have healthcare elements to enable management of chronic conditions as well as injuries received in the incident or in the course of evacuation.
- v) Consideration should be given to the need for residential care homes and special needs facilities to be licensed to the effect that evacuation plans are in place and exercised regularly.
- vi) And both sets of plans (see above) will need to consider the requirement for additional policing in order to maintain essential law and order either as a result of the original incident/evacuation or to deal with a large influx of displaced people.
- vii) Evacuation plans need to take account of the untoward effects of weather. In the UK, this may be a heatwave but is more likely to be cold weather resulting in a requirement for blankets and hot drinks/food in order to avoid hypothermia and avoid aggravation of existing medical conditions. An evacuation plan that consists of telling people to get out on their own is not an evacuation plan. Special needs clients require considerable pre-planning both in terms of the evacuation itself, availability of medical support, and the receiving area. Traffic flows need to be thought through

well in advance and pre-planning is required to ensure sufficient essential workers are in place to both assist with the evacuation and to shore up critical national infrastructure.

- viii) The role of voluntary agencies needs to be agreed in advance along with details of facilities to be used, and repayment arrangements etc
- ix) Facilities need to be exist for rapid activation to enable tracking of evacuees, and missing persons including children.
- x) Expect pets to be evacuated with their owners and plan accordingly.
- xi) In using large venues as shelters eg stadia, retain the venue's commercial operators to help run the shelter.
- xii) The Federal (or in UK's case, Central) level of Government is simply not well placed to respond instantaneously to an emergency. The leadership, the enunciation of needs, and the ability to source from neighbouring areas is the most effective form of response in the first few hours and days. Regions and cities should therefore considering adopting pre-agreed mutual aid arrangements.
- xiii) Local authorities should consider the scope for centrally stockpiled supplies and equipment and the use of pre-agreed procurement contracts resulting in faster delivery and increased value for money.
- xiv) The availability of, or the ability quickly to set up, computer networks and records systems to manage all aspects of the emergency response and recovery effort is likely to be a particularly important part of the necessary logistics capability.

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