Impact of Small Nuclear Weapons on Washington, DC: Outcomes and Emergency Response Recommendations

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Abstract: The threat posed by the use of weapons of mass destruction (WMD), including nuclear weapons, within the United States has grown significantly in recent years, focusing attention on the medical and public health disaster capabilities of the nation in a large scale crisis. The expected initial use of nuclear weapons will be with the relatively smaller devices, from 1 to 10 Kt in explosive yield (comparable to 1,000 to 10,000 tons of TNT), with New York and Washington, DC as the most likely targets. The simulation of the detonation of either a 1 Kt or a 10 Kt nuclear device near the White House is presented in order to demonstrate the relative impacts on health outcomes, and recommendations made for emergency response to this threat. There are many limitations on the resources needed for mass casualty management, such as access to sufficient hospital beds including specialized beds for burn victims, respiration and supportive therapy, pharmaceutical intervention, and mass decontamination. Among the consequences of this outcome would be the probable loss of command-and-control, mass casualties that will now have to be treated in an unorganized response in hospitals on the periphery, as well as the other expected chaotic outcomes from inadequate administration in a crisis. Vigorous, creative, and accelerated training and coordination among the federal agencies tasked for WMD response, military resources, academic institutions, and local responders will be critical for large-scale WMD events involving mass casualties.

Note: This written statement is based on the following peer-reviewed scientific publications by this author on this topic, which contain these concepts in further detail.

Bell, W.C. and Dallas, C.E. Vulnerability of populations and the urban health care systems to nuclear weapon attack – examples from four American cities. International Journal of Health Geographics 6:5 pp1-33 (2007). **This publication is currently the 32nd most accessed biomedical paper worldwide of all time (out of 170 journals on biomedcentral, over 37,000 accesses), see: www.biomedcentral.com/mostviewed (click on most viewed articles of all time).**

Dallas, C.E. and Bell, W.C. Prediction Modeling to Determine Medical Response to Urban Nuclear Attack. Disaster Medicine and Public Health Preparedness, a journal of the American Medical Association Vol 1(2):80-89, (2007).

A. Utilization of Casualty Estimates in Nuclear Emergency Response

Without the directed use of accurate casualty distribution estimates, it is likely that past failures in mass casualty planning in large-scale medical disasters will be repeated. During the Sarin attack on Tokyo, hospitals became part of the problem when 23% of the healthcare workers became ill by unintentionally spreading the nerve agent to hospital and emergency staff workers. During the SARS epidemic in China, hospitals in Beijing and Hong Kong became “Super Seeders” of the *cornavirus* and dramatically accelerated contagion up to 250 individuals per day. A study by the American College of Emergency Physicians (ACEP) Task Force found that "little or no WMD-based expertise” existed among medical staff workers in hospitals [1]

Based on information from the National Commission on Terrorist Attacks upon the United States (9-11 Commission)[2] public hearings on the initial response show a terrible confusion among first responders that resulted in the addition of a “Catastrophic Incident Annex” to the second draft version of the National Response Plan (NRP) [3]. First responders during 9/11 suffered from an inability to communicate information concerning the scale and magnitude of the disaster, and thereby released conflicting public service information during the crisis that resulted in additional loss of life. The findings of these hearings show a critical need for a “National Strategy” for medical response to catastrophic incidents. The requirements of the Catastrophic Incident Annex exceed the CDC and HRSA benchmarks of 500 hospital beds for a population of one million needed for natural disasters. For an effective response, delineating the geographic zones in which different types of injuries are likely to be found, and delineating zones in which victims are likely to sustain multiple injuries, is critical. In the case of a nuclear explosion, thermal effects will produce very large numbers of burn casualties—a dramatic medical and security challenge that differs from routine medical emergencies or non-nuclear WMD events. Multiple trauma injuries will accompany the injuries inflicted by thermal radiation. These will be somewhat similar qualitatively to current trauma protocols, with the exception of fallout contamination, but will differ drastically on the quantitative level. Additionally, certain regions will experience the unique casualties from prompt and fallout radiation. Multiple effects make for sicker patients, slower recoveries, and greater danger of severe sickness or death—especially among the old, the young, and the infirm.

Weather and climate has a significant effect on impacts resulting from a nuclear detonation [4]. Wind is one major factor, as wind carries the resultant fallout cloud downwind. Atmospheric stability affects the height of the typical mushroom cloud and behavior of the fallout plume, and the amount, thickness and height of clouds impact the scattering, reflection and absorption of radiation. Atmospheric conditions affect the quantity of energy absorbed, reflected and scattered, with a highly significant impact on casualty distributions. Near surface bursts create craters and large amounts of dust and solids from the ground or buildings are thrown into the air. Wind speed and direction have a tremendous impact on where fallout radiation is deposited.

B. Impact of Small Nuclear Weapons on Washington, DC: Outcomes

Casualty Impacts in Washington Relative to Other Urban Centers

From the 10Kt device detonated near the White House, it could be expected that there would be at least 150,000 serious injuries, and that at least 70% of these could involve fatalities. Depending on the resources made available at the time, it is likely that there would be an attempt to evacuate as many as 500,000 people from the area, though the efficacy of such an attempt is questionable. At least 100,000 people would need decontamination by current standards, though once again it is dubious that adequate decontamination would be feasible in a timely fashion. By comparison, in more densely populated urban areas, the number of injuries could be up to 4 and 8 times higher in New York and Chicago, respectively. While this significant ratio difference is likely to be reflected in the radiation fallout induced injuries, blast and thermal injury differences between the more densely populated cities and Washington will be somewhat less. In categories such as thermal injuries, for instance, the difference is likely to be smaller, with approximately 2 and 4 times higher thermal injuries in New York and Chicago, respectively, relative to those in Washington. This will be due to a variety of interactive factors such as population density and building size/proximity.

Protection offered by Buildings and Vehicles

Buildings provide various degrees of protection from radiation according to the type of construction and location. The level of protection offered typically varies between 10% and 80%. Some of the factors which affect protection include whether the building is in an urban or rural area, the roof and wall type and thickness, number of floors and location of office or home relative to other floors e.g., single story, multistory, basement, top floors, middle floors and lower floors and whether glass is shattered by blast [5, 6]. Blast damage greatly reduces the protection factors through the blowing in of doors, loss of roof integrity, and breaking of windows. At Hiroshima, windows were broken at a radius of 15 km by overpressures of only a fraction of a pound per square inch and in exceptional cases were broken up to 27 km away [6]. Injury thresholds for window glass are considered to be about 0.6 pounds per square inch (psi) [7] or 6 km for 20 Kt and 18 km for 550 Kt detonations from fig 2.29 [8]. Recent research [9, 10, 11] has shown that buildings, even in their best condition, fail to provide good filtration from radioactive particles in the 1-10 micron range, where the greatest health threat exists.

The highest impacts of radiation generally occur when people are caught in the open, or, are tied up in traffic jams trying to escape in vehicles, which provide little protection against fallout. Based on evidence from recent natural disasters in Louisiana and Florida it is likely that major exit arteries after a nuclear event will be completely impassable during the time period when fallout is at a maximum exposing fleeing population to high levels of fallout**.** It is also expected that due to lack of information getting to the public, many people will try to flee by car or on foot, often in the wrong direction, again exposing themselves to high levels of radiation, as vehicles provide virtually no protection. Shelter in place options are poorly understood, and, without effective communications and well thought out and prepared plans by both authorities and potential victims, could prove equally disastrous.

Buildings also protect against thermal effects by blocking a direct line of sight to the detonation. The number, size and orientation of windows; presence or absence of intact windows after the blast; size, number of panes and tinting of glass, presence or absence of bug screens, and height, spacing and orientation of buildings all affect the effectiveness of thermal effects. Window coverings and type of furniture and furnishings will respond differently to the increased thermal surge, with some materials being more susceptible to burning than others.

Thermal Effects – Fires and Burns

Absorption of thermal energy can cause fires in the vicinity of the detonation point and burns to individuals, either directly from flash burns or indirectly from the mass fires themselves. Binninger et al [8] have conducted work for DTRA on fire prediction modeling. In urban environments, a large number of variables can affect the intensity and impact of the thermal pulse. These include the weapon yield, the fraction of the total yield emitted as thermal radiation, the distance between the weapon and point of interest, and the thermal radiation transmission through the immediate atmosphere.

It is recognized that casualties resulting from fires, and burns in nuclear attack would be of major impact for civil defense [12] and emergency health care. Major fires can occur when thermal fluences exceed 10 calories (cals) /cm^2 and are very common with fluences over 25 cals/cm^2 although this varies with the type of construction, building contents, and morphology of the city [8, 12]. Fires will start much easier when windows are blown out as glass greatly reduces the thermal fluence inside a room. Skin burns are generally classified into first (like very bad sunburn), second (produce blisters that lead to infection if untreated, and permanent scars) and third degree burns (which destroy skin and underlying tissue) and are dependent upon the intensity of the radiant exposure and the size of the explosive device. The entire US has specialized facilities to treat roughly 1,500 burn victims, and most of these beds are already occupied, which is far less than the burn casualties produced by one single small nuclear explosion. Even a small nuclear event will totally overwhelm our hospitals' ability to take care of resulting burn casualties.

Blast Damage

Most damage to buildings in cities comes from explosive blast. The blast drives air away from the explosion causing objects to be crushed and high winds that can knock objects down, such as people or trees. Four pounds per square inch (4psi) is usually enough to destroy most residential dwellings. Most blast deaths occur from the collapse of occupied buildings, or from people being blown into objects or objects impacting people. Typically about half the people whose low rise buildings collapse on them survive the collapse.

Source Region Electro-magnetic Pulse [SREMP]

Electrical and electronic equipment, both plugged-in and some unplugged, will be severely impacted in areas affected by Source Region Electro-magnetic Pulse [SREMP]. SREMP is produced by low-altitude nuclear bursts and will affect areas of from 3-8 km radius from the detonation point depending upon yield [33], with National Planning Scenarios assuming 4 kms for a 10 Kt device. This is roughly the same region likely to be affected by blast and shock. For hospitals this means power and any connected backup power sources will be lost, and most equipment connected using a plug to access power will likely have been destroyed by SREMP. Equipment that is unplugged may or may not be affected. SREMP affected areas extend up to the 1psi blast contour for small blasts (<10 Kt).

Prompt Radiation

Prompt radiation occurs from fission products in the first second after a nuclear explosion. In general, radiation doses closer to ground zero are very high with a rapid fall off in dose as one proceeds outward. Within the inner zone near ground zero fatalities are generally 100% for those exposed in the open, and, even for those in buildings, mortality will be high except for those in basements.

Fallout Radiation

The conical-shaped plumes of casualties generated by radioactive fallout account for the largest geographic distribution of effect from most nuclear weapon detonations. Most of the radioactive particles generated by the blast will fall within 24 hours on areas extending out from ground zero in the direction of prevailing winds, and is referred to as early fallout. These early fallout areas will have very high fatality rates in limited areas, with the appearance of radiation syndromes over the next several days. A major issue is the contrast between high toxicity in early fallout areas and relatively low or no toxicity in later fallout areas. Indeed, there will be a very great difference in risk between the early fallout induced fatalities and the much wider dispersion of fallout that would occur over the ensuing days. A major problem in risk communication will be the likely severe overestimation of risk from this later fallout, and the subsequent unnecessary dispersion of resources and fear/terror in areas which actually will have relatively little or no risk from the low levels of fallout there.

C. Impact of Small Nuclear Weapons on Washington, DC: Emergency Response Recommendations

Expansion of nuclear attack emergency response personnel

As there is little doubt that a nuclear weapon event will exceed the emergency response system capacity, particularly in the first hours of the event, it is obvious that an expansion of properly trained personnel to meet this glaring deficiency needs to be considered. There are a number of professional groups that have extensive health care training, but are not typically employed in emergency medicine due to the extensive additional training currently (and justifiably) required. Pharmacists, dentists, and veterinarians, for instance, take many of the same core health care courses as do physicians, nurses, and may even exceed the basic health care curricula of most paramedics and emergency medical technicians. It is worth consideration that with a certain level of additional training, these ancillary health care workers could be incorporated into an all-hazards emergency health care paradigm, especially with mass casualty burn care. The mobilization of health care workers from adjoining regions will be needed, as well as legislative remedies to allow for these personnel to function under a different standard of care in the event of overwhelming surge capacity [14].

The gap between resources and mass casualty surge is so significant that we can expect that there will still not be enough health care workers even with Herculean efforts to train and mobilize large numbers of ancillary health care personnel. Particularly problematic is the issue of the security support that this enlarged health care community will require under the unfavorable conditions surrounding the production of mass casualties.

The latent period that will certainly extend for many hours before substantial regional and federal resources arrive dictates local personnel dependence, whether health- and/or security-trained or not [15]. As the overwhelming majority of these victims would not be expected to survive until the regional and federal medical support could arrive, a maximal effort locally would be required in order to reach at least a portion of the patients that would be survivable with minimal care. Survival rates could be significantly increased if ancillary health personnel and properly trained citizens in support roles were trained in limited but strategic roles such as burn triage, debridement of wounds and administration of ameliorative short-term care. Infection is a major problem in the treatment of burn victims as well as other communicable diseases that would proliferate after nuclear attack [16,17,18]. The expansion of the proper debridement of wounds enabled by medical personnel expansion, followed by the appropriate pharmaceutical intervention to prevent subsequent infection would significantly increase mass burn victim survivability. A security support role for these personnel would include protection of patients and marking of the burn victim treatment site with a distinctive flag for further treatment later as additional resources become available. Emergency community clinics with their pharmaceuticals will need appropriately trained staff and protected by local volunteer law enforcement personnel, such as Volunteers in Police Service [19].

We need to estimate numbers and varieties of occupational groups in the Medical Reserve Corps (MRCs) [20] that would constitute the most effective health care and security cooperation in nuclear events, which would also have similar utility in all large-scale CBRNE mass casualty scenarios. The high degree of combined injuries in a nuclear attack will require a particularly broad range of occupational groups, as well as dramatically increased numbers of personnel. One example would be how these ratios should change for community health facilities operating in a mainly burn environment from a nuclear explosion for those areas where it was mainly radiation poisoning. It will be important to recruit as many medical personnel as possible with radiation training. There are a number of physicians with some training in radiation detection and effects in professional organizations, such as the American College of Radiology, the Society of Nuclear Medicine, and American Society of Therapeutic Radiology and Oncology [21].

Supervisor training, cross-training in health care and security procedures, and hands-on exercises are all research questions to be answered for recruiting citizens into health and security support roles. Recruitment of ancillary health care and security support for potentially hazardous service in high consequence events has obvious obstacles. Indeed, in most such events most individuals can be expected to look out for their own enlightened self interest, and for that of their families and valued relationships. As incentives to train and serve away from their families and increase the participation rate in these difficult times, one viable alternative is to look at making medical care available to volunteers' families and friends, special insurance for their homes, and access to special secure zones for their families and friends during such incidents. As the relative success with each approach is determined, additional incentives need to be evaluated, until successful recruitment goals are achieved in the most vulnerable urban target areas.

Critical need for public information campaigns for mass casualty response

Media training also provides considerable opportunities to reach a large number of potential health care and security providers for potential recruitment into high consequence medical support. Indeed, a "marketing" approach to reaching potential populations for recruits would be expedited by mass informational screening such as videos targeted for specific occupational or cultural populations. One viable approach would be to develop specific videos tailored to help recruit specific occupational groups to join the emergency health care providers and security support individuals. These information campaigns could be utilized to establish partnerships between community leaders, emergency responders, and the recruitment of "ancillary emergency responders" to facilitate two-way communication during mass casualty crises. Emergency responders will be able to make effective recommendations and monitor the responses of community members to the recommendations. It is important for the health care workers to know that the likelihood of significant radiation exposure to staff under most circumstances is actually small [22]. Community leaders are gatekeepers to provide access to those community members who could be the most profitable recruits to assisting in local mass casualty management.

Monitoring of nuclear attack patients as part of internally displaced populations

Among the issues related to all mass casualty medical care in the event of a major catastrophe are the thousands of internally displaced citizens (IDCs) who are displaced from their homes for lengthy periods. These people will need to be sheltered, fed, given potable water, non-food items, and basic health care such as immunizations or medicine. Security will be to be provided in adequate numbers to protect them from theft and from sexual assault, both of which reach alarming rates during crises situations all over the world.

It is essential that all IDCs be monitored to ensure that appropriate medical care is delivered to those in priority sequence, and to ensure that black-market activities are suppressed and that security, especially of women and children, is rigidly enforced. Security is always a major factor wherever there are large numbers of IDCs, especially as would occur in conjunction with mass casualties. Indeed, profound effects can be expected with the staff of burn units in these crises with both the surge in patients as well as security concerns [23]. Many people are threatened and prevented from reaching medical care. Monitoring of IDCs requires registration and a data base to keep track of all assistance and population movements.

The need for mass casualty care needs to be estimated carefully for mass burn care needs and in an all-hazards context in close relationship to the registration for IDCs, and appropriate training given. Ratios then need to be established for numbers of IDCs in different situations per security staff member and for IDCs per overall mass casualty patients, as well as subcategories such as IDCs per burn patients. Numerous other details would also be quantified for these categories, such as, for example, safety at toilets, which would depend upon numbers of supplemental toilets, location of toilets relative to perimeter, security of perimeter, location of men's relative to women's toilets and access routes, and lighting of toilets. Principles for laying out camps in great detail have been worked out by UNHCR, Norwegian Refugee Council and others, whether from scratch or extending existing facilities [24,25,26]. Protocols can be set in place in order to allow for high volumes of burn patients to be triaged and treated without a verified burn unit [27]. Systems to track large numbers of IDCs and refugees exist in many countries overseas and are administered by United Nations agencies such as OCHA and UNHCR. These systems need to be adapted and be made ready for use in urban nuclear attack.

Adaptations of pharmaceutical stockpile properties to mass casualty care

The pre-positioning of stockpiles of narcotics for use in mass burn care and the training of community workers will aid in the treatment of thousands of victims that would result from an urban nuclear attack, who otherwise would not receive these critically-needed medications (especially for burn treatment) until much later. In the anticipated target areas, it will be necessary to develop a plan for housing and securing a stockpile of narcotics for use in the event of a nuclear attack on a major city. Narcotics will have to be stored at military bases, police stations and jails. These places have 24 hour security and are easy to locate. The narcotics will have to be stored in a secure facility and monitored monthly for inventory by a pharmacist. One way to test the security of the facilities in advance of a crisis would be to make up sham morphine vials and place them in such a facility and monitor for theft.

Preparation for a nuclear event would require the development of a procedure for dispensing narcotics in the most efficient manner to serve mass burn casualties under crisis conditions. It will also be necessary to address laws concerning record-keeping, access to medications and HIPPA regulations. In most states the governor has the authority to suspend dispensing laws in an emergency. Well in advance of these mass casualty crises, a general policy would have to be developed and distributed to all State Boards of Pharmacy for lobbying their legislatures for the necessary changes in the law to allow these doctrines to be enacted by law. Training programs for community preparedness to enact these changes in pharmaceutical interventions would include first aid courses, CPR, pain assessment, medication administration, incident command and radio communications. The effectiveness of these training programs would have to be evaluated through simulation testing and table-top exercises.

Rapid mobilization of medical resources and personnel for nuclear attack mass casualty care

As most high consequence events are likely to both occur in urban areas and overwhelm (and derange) the available medical response there, the ability to rapidly and safely transfer medical personnel and equipment from surrounding areas is indispensable [28]. In most high consequence events, and especially in a nuclear detonation, medical personnel ingress and patient egress from the affected areas in urban environments will be severely constrained along land routes by panic evacuation, hazardous chemical, biological, or radiological conditions, building and road rubble distortions, and security and/or quarantine restrictions. The need to get medical personnel from outside areas into the affected urban areas would be severely constrained, especially in the first hours and days after an event when the medical care is needed the most, especially for burn care. Certain categories of equipment, such as ventilators, will also be in very short supply [29,30]. Many of these difficulties could be overcome with the utilization of air transport and medical evacuation capabilities, if adequate landing and response areas could be established where they were needed, and in a timely manner. In these areas, specific locations where airstrips could be rapidly constructed could be identified in advance of a crisis. Medical air evacuation, when quickly rendered feasible, can be the most feasible means of getting large numbers of patients that were seriously in need of medical care to distant medical facilities. The U.S. has the most extensive large airplane transport fleet in the world, which demands its incorporation into a credible urban medical transport response in high consequence events.

For each of the high consequence attack scenarios envisioned in an urban area, the optimal operational locations could be identified for health care response based on air transport intervention potential. In these predetermined regions, landscape features that could permit a minimum of a 3,500’ straight, level runway with the least effort would be identified. This is the smallest airstrip that is normally considered by the military as acceptable for the workhorse airplane of their transport fleet, the C-130. For the most part, this will involve straight sections of wide freeways, although other large areas might be incorporated. These sections could be identified at various intervals in the health care response regions that could be reasonably be predicted from simulations of the most likely regions to have treatable thermal injuries. Obviously, for the protection of the health care workers, planes would not be sent into the "wedge" of radiation victims, but only in the "horseshoe" areas of thermal affected populations. In this way, the limited resources could be concentrated by air transport into the areas where the most treatable patients are, and yet protect the health care workers. Plans for prepositioned equipment and pretrained local crews could be established to turn these planned areas into airstrips in the first hours after a high consequence event. Items such as bulldozers and sweeper trucks could be placed in warehouses in between nearby airstrip prospect areas, with the crews that would use them living and working in the immediate area. A certain number of supplies could be expected to get the medical response started with the arrival of the first personnel by air. In all of these considerations, a key element is the protection of the responding personnel, where every effort should be made to keep effective doses below 500 mSv (50rem), whole body doses below 1,000 mSv, and equivalent doses to the skin below 5,000 mSv [31].

Decision-making would be a key aspect of this air transport plan, as incorporated into the training and mobilization plan utilized for the medical and security crews involved in the effort. The ratio of security to medical personnel would need to be established over the course of air transport process. Depending on the security of the site, a higher number of security personnel may be needed if communications from the site indicate instability exists. Issues related to body disposal and removal will also require enhanced security personnel ratios with the expanded medical presence, though appropriate training for the security personnel is essential to preclude a rapid decline in performance under the stressful conditions [32,33]. The ratio of personnel versus supplies would be another issue – a high ratio of personnel: supplies would be expected in the first flights since some initial supplies were prepositioned, unless communication establishes that supplies have been lost by interdiction or attack. Research should be instituted into the decision making process to establish the progressive ratio change of more supplies and less personnel. Still another complicating factor is the prolonged nature of burn treatment, which will tie up very limited hospital resources in competition with other injury treatment (i.e. trauma) with a higher turnover rate which many will consider a more "efficient" use of these resources.

Conversion of Military Vessels to Civilian Emergency Response Platforms for Nuclear Attack Emergency Response

Historically, emergency response/relief efforts for disasters in coastal zones have consisted primarily of the mobilization of land based operations and assets, supplemented by available Navy and Coast Guard vessels. The unusually heavy 2004 and 2005 hurricane seasons exposed enormous weaknesses in the current land based coastal disaster response operations and dramatically illustrated the need for a more balanced approach in managing large-scale coastal disaster response with flexible maritime resource assistance.

One solution to this need would be to convert military vessels slated for removal from military service to a new role as civilian emergency response vessels dedicated to responding to large scale disasters in the coastal zones of the U.S. At present there exists an overwhelming need to provide specialized emergency response platforms and response teams that are comprehensive in nature and able to quickly overcome a number of possible disaster response shortcomings with solutions that help to further integrate local, state, federal, military, and civilian disaster relief efforts. In order to maintain cost effectiveness, these platforms should be privately built and operated, while being deployed and supervised at the federal level so as to not adversely affect current disaster planning and operational preparedness.

The flexibility and multitasking capabilities of this approach are based upon the use of obsolete, non-retention equipment and ships currently in the possession of the federal government. The use of these ships and equipment will relieve government disposal dilemmas and save millions in tax dollars while providing chemical, biological, nuclear (CBN) protected, self-sufficient and hardened emergency response platforms and logistical centers for "on scene" emergency response support for coastal disasters. This will enable emergency response personnel to carry out a more efficient and effective response during a mass casualty event or other large-scale disaster. This could provide a modern maritime emergency response platform that is capable of responding and providing disaster response and recovery to a coastal area of more than 15,000 square miles—that can integrate and enhance the effectiveness of both civilian and military disaster response teams and assets. These ships could address a number of problems inherent in the areas of mass casualty/emergency response, including: providing improvements in response capability and care of casualties, consumables provision/distribution, fuel distribution, transportation, safety, and overall disaster site command and control. With more than 60% of American citizens living in coastal counties, the use of these ships will provide much needed and unprecedented support for a number of important laws pertaining to national security such as: P.L. 109-417/The Pandemic and All Hazards Preparedness Act, Homeland Security Presidential Directive #18, and #20, National Security Presidential Directive #51, and the National Communications System Directive #3-10.

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