

Emergency Operations Center

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ABSTRACT

The Emergency Operation Center (EOC) is a site from which NASA LaRC Emergency Preparedness Officials exercise control and direction in an emergency. Research was conducted in order to determine what makes an effective EOC. Specifically information concerning the various types of equipment and communication capability that an efficient EOC should contain (i.e., computers, software, telephone systems, radio systems, etc.) was documented. With this information a Requirements Document was written stating a brief description of the equipment and required quantity to be used in an EOC and then compared to current capabilities at the NASA Langley Research Center.

INTRODUCTION

Emergencies occur everywhere and can strike anyone. In case of an emergency the response is of vital importance in order to control the situation and preserve the lives of the people involved. To do this in a coordinated manner, guidance, control, and equipment are needed. Here at NASA Langley Research Center emergencies such as natural disasters (hurricanes, tornados, floods, etc.) or manmade disasters (fires, spills, etc.) must be managed in a fast and accurate way to ensure the continuous operation of the center. For this to occur, an Emergency Operations Center (EOC) must be established. In this Center, personnel will need access to the most recent and reliable information when an emergency occurs, so they can dispatch the appropriate personnel and equipment to the site of the emergency. Also from the EOC, all other actions will be directed and controlled in order to proceed in a coordinated way and thereby respond in an efficient and effective form.

The LaRC EOC is located in building 1248, Room 114 and it contains some equipment but the EOC is not totally operational at this point. Some equipment is being bought and other has to be ordered. The EOC will be activated in case an emergency occurs on the center and will remain operational until normal operations are restored.

One of the most important aspects in achieving the objectives of the EOC is its equipment. In order to operate under any circumstances, it has to be well equipped with all the tools necessary to access accurate and on-time information and to communicate with the site of the emergency and off-center. Research was conducted to determine what communication capabilities the EOC should contain in terms of equipment in order to provide it's personnel with the proper tools to ensure the operations at this NASA center.

RESEARCH SUMMARY

The search for information on what makes an EOC effective was not an easy task. There were hardly any written sources of information available when search was performed at the LaRC Library. So the approach taken was to compare LaRC 's EOC to EOC 's at other NASA centers. Several centers were contacted: Kennedy Space Center, Johnson Space Center and Ames Research Center. Wayne Kee, Emergency Preparedness Planning Officer at Kennedy Space Center, mailed some information about their EOC procedures, a brief summary of their equipment and a layout of their EOC. Robert Gaffney, from JSC, electronically sent their Requirement Document and detailed information on their visit to the Los Angeles County EOC and Consolidated Fire Protection District EOC. John Woods, Ames Research Center, is sending some information on their EOC but it has not yet arrived. In addition to contacting these centers, efforts were made to contact the Federal Emergency Management Agency (FEMA), regional agency. Besides all this, research was done on the Internet-Netscape where general information on Greater Houston Transportation & Emergency Management Center, NACEC (North American Center for Emergency Communications Inc.) Disaster Support Services and Minneapolis Emergency Communications Center was obtained. The fire department at LaRC and the Newport News Emergency Response Team were also visited as part of the research. A main source of information was Doug Smith (LaRC Fire Chief), who is currently working on improving the EOC capabilities.

Because Langley Research Center is located on a high risk area for hurricanes and floods it is very important to have equipment that can give real time information on weather prediction and hurricanes or storms tracking. Additional research was done to determine what would be the best system for LaRC needs. The Kavouras company and the Weather Channel were contacted to obtain information on their equipment and services.

In addition, the Security and Fire department dispatch facilities were joined and will now be located in building 1248. To perform this consolidated function, a console was needed. The AMCO company was contacted and a sales representative came to the Center to recommend the most suitable console for this purpose. Several layouts were submitted by the company and one which met the requirements was bought.

After organizing the obtained information, a Requirements Document was written explaining some general requirements that the EOC must satisfy and the type of equipment it should contain in order to meet these requirements. The approach taken to do this Requirements Document was to consider what the EOC personnel need to do in a specific emergency and then state the equipment that will be required to accomplish this. The Requirements Document for the LaRC Emergency Operations Center is as follows:

REQUIREMENT DOCUMENT EMERGENCY OPERATIONS CENTER

General Requirements:

1. Building construction should be resistive to natural hazards (earthquake and storms) and should be located on a high lying area.
2. The EOC must be able to access the most recent and reliable information dealing with weather conditions, building information, hazardous materials (quantity and storage place), pressure isolation valves, electrical disconnect switches or switch gear and fire alarm sensors.
3. EOC 's personnel must be able to communicate with the people at the site of the emergency.
4. The EOC must be capable of communicating with the City of Hampton or the City fire stations.
5. EOC 's personnel shall be able to send emergency messages throughout the center and activate the sirens from the EOC.
6. To ensure reliable operations of the center, backup power systems and redundancy of communication systems are required.
7. Books, references, and all important telephone numbers should be readily accessible to the EOC personnel.
8. The Center should include mark-up boards and maps of the Center (buildings, roads), to be posted on the Center walls.
9. Personnel assigned to the EOC should be knowledgeable and competent when using the equipment.
10. Drills should be conducted to verify the operation of the center and maintenance and inspection of the equipment should be done periodically.
11. EOC should have a storage stocked with food, fuel and water for personnel remaining without outside contact or should have some sort of agreement with the cafeteria in order to be provided with supplies.

In order to satisfy these general requirements, equipment requirements must be specified and they are as follows:

Equipment Requirements:

I. Telephone Systems:

This is the major system used in receiving emergency calls, communicating off-center and can be used to communicate with personnel at the site of the emergency.

This system includes telephones, cellular phones, a fax machine, a paging system and a dedicated telephone line.

The EOC should contain at least one telephone unit, one Telecommunication Device for the Deaf (TDD) unit and an emergency phone-dedicated line used in case of telephone failure. This dedicated line is a separate phone line that can be used to call off-center. In addition the

EOC must have at least one fax machine and one paging system to contact key personnel. Also, a minimum of five cellular phones should be provided for LaRC operations: Fire Chief, Emergency Preparedness Officer, Office of Environmental Engineering, Head of OSEMA, and Head of Security. Besides all this, being a NASA Center, government telecommunications service, the GETS is available, a system which gives phone call priority service.

Currently there is a telephone unit, a paging system, a dedicated telephone line and two cellular phones in the LaRC EOC.

II. Computer System:

This system includes computers, scanners and printers.

Computers are needed on the EOC in order to have access to the most recent and reliable information dealing with building information, hazardous materials (quantity and storage place), pressure isolation valves, electric disconnect switches or switch gears and fire alarm sensors. Computers should be open architecture which allows linkage to other computers at the center.

The EOC should contain at least three computers, (1) FIRST access-graphic interface with the fire department (2) an INDIGO workstation and (3) a PC. In case of a fire alarm, the FIRST access interface will show the building and room where the alarm was generated on a graphic map. In addition, the interface will tell the number of handicapped persons assigned to a building and any chemicals located there. The INDIGO workstation will be tied to FATBOY. Here the GIS and all the building information may be found. This information includes the master plan of building brochure, online high voltages, gas and water, and the information about safety coordinators and safety heads. Approximate measurements of required monitors are 15", 17", and 21". In addition to the computers; the EOC should have at least one color scanner and two printers.

Currently, on the EOC there is one computer, a PC with the software to simulate the other two, but it is very slow and cannot run at the same time. The EOC also includes one black/white scanner and two HP laser jet printers. Also the following networks and software are currently available or accessible on the computer of the EOC.

Networks:

- * larcnet-main system
- * fatboy-GIS, building information
- * harvie-material tracking system, Bionetics server will show the hazardous material and chemicals on the center.
- * DOD material tracking system
- * clairborne-OSEMA sun workstation
- * longstreet-network server tied to nas
- * nas-lessons learned, IEEE parts and world wide interface
- * gidep(Government-Industry Data Exchange Program)-very similar to nas
- * neonet

Software:

- * ARCINFO-imaging language, building brochure it is similar to CAD but better.
- * EXCEED-workstation simulator, turn PC into Sun workstation
- * VGAS-fire alarm graphical display, language for the FIRST access

- * PROLAB-material tracking system used for harvie
- * GIDEP(Government-Industry Data Exchange Program) -own software
- * AUTOCAD

The EOC should contain it's own license for ARCINFO, the latest version of AUTOCAD and software for the INDIGO workstation if needed.

III. Mobile Communication System:

During an emergency, personnel should respond and arrive at the site as quickly as possible. Emergency personnel must be equipped with the necessary equipment to communicate with the EOC or outside the Center if needed. People at the site must be able to have access to the information on the computers in the EOC and send back information to the main computers.

This system should include a portable computer, fax machine, printer, telephone and a scanner (smart case). Also required for this system are cellular phones and a radio system.

Currently there is one "smart case" available on the center but it is only functioning partially, there is access to the main computer but cannot execute programs yet.

The radio system is important for communications with the emergency site and off-center in the event of telephone failure.

This system includes handheld radios, base unit and dedicated handheld radios. The dedicated handheld radios are to be used only by the EOC personnel during an emergency, they serve as a backup system for the regular handheld units.

The EOC should contain at least one base unit, four dedicated handheld radios and approximately 20 units of handheld radios. The radio system should also include a repeater radio system. This allows the user to not have to go through the base unit in order to communicate to another user, with a 35 miles radius.

Currently there are available the 20 units of handheld radios and a base unit but these are of an older type that have a 10 miles radius and need to go through the base unit to contact another user.

IV. Power Backup System:

In case of an emergency the EOC should be able to operate under any circumstances.

Diesel power generators are required in order to provide power for the EOC 's equipment. Because diesel generators have a three-second lag time, battery backup is also needed. An unlimited power supply, for computers and other equipment without battery backup should be included.

Currently everything in the EOC and fire department has backup from diesel generators which are located behind the fire station in building 1248. These diesel generators will last for hours and once running out of power a fuel truck will supply fuel that will last for weeks.

V. Weather Station:

The LaRC center is located in a high risk area for hurricanes, floods and tornadoes and therefore these natural disasters are more likely to strike this center. Because of this, it is very important for the EOC to have some equipment that can help its personnel have access to the

most recent information on weather conditions; in order to alert the NASA community working here and to take the necessary steps to prevent any fatal outcome that may occur.

The EOC should have equipment that can give real time information on weather prediction and hurricanes or storms tracking. The Kavouras company offers some equipment to meet these needs. Probably the two that can best suit our needs are the RADAC 2100 or VISTA 1500. The RADAC 2100 is a multitasking , on duty, 24 hours a day weather workstation that gives nationwide real time access to weather information and the VISTA is a weather briefing station, quick one touch that gives rapid reviews in real time.

Currently the Weather Channel is available on the center and information can be obtained from the Internet.

VI. Other Equipment:

This includes some other specifications or equipment that is not available now at the EOC. EOC 's personnel should have access to an emergency broadcast system (EBS) as a way of alerting the people throughout the center and giving them directions in case of an emergency.

The EOC should also contain the following:

- TV and VCR

- AM/FM radio, batteries

- At least four units of rechargeable flashlights

CONCLUSION

Because of lack of time, this project was not totally finished. The research or search for information took longer than expected so the project was delayed. Once finished with the Requirements Document, layouts have to be made of the EOC in order to distribute the equipment in the most favorable way.

Through the research conducted a good deal was learned on emergency response. The EOC plays an important role in this and if properly equipped, can help minimize the loss of human life and property damage. In conclusion, although we are now in the process of updating the EOC, once finished, it will contain state of the art equipment that will help it's personnel control any emergency on the Center.

