DOE MODEL FIRE PROTECTION BASELINE CAPABILITIES

I. Introduction & Overview

The purpose of the document is to comprehensively delineate and rationalize the roles and responsibilities of the _____ Fire Department and Fire Protection (Engineering). For each responsibility it attempts to answer the following questions:

- What is being done?
- Why is it being done?
- How do we measure success?
- What resources are minimally required?
- Are there potential areas for greater efficiency?

Justification for performing individual responsibilities is provided both in terms of existing explicit DOE requirements and on a qualitative basis. Required resources are principally defined in terms of numbers of personnel, apparatus and equipment, and time "loading" (amount of time spent within the last year on this activity). The determination of required personnel and material resources was based on industry standards, such as those promulgated by the National Fire Protection Association (NFPA), as well as Department of Defense criteria (DOD 6055.6). Note, however, that in many instances, there is no explicit requirement in the above-referenced standards for a given level of capability. Under those circumstances, rational analysis and engineering judgment were used to derive minimum requirements.

It must be emphasized that, for the fire department, the responsibilities, performance elements and required resources are **MINIMUMS** that were developed based on assumptions (some nonconservative) regarding the potential nature of site emergencies.

The potentially most demanding incident for the fire department at RFETS is an interior structural fire within Building _____ that features a casualty requiring medical assistance. The most taxing responsibility associated with this scenario is deploying a sufficient number of hose lines inside the fire area. NFPA and DOD criteria would require the capability to supply from 500 gallons per minute (GPM) to several thousand GPM for manual fire fighting. Because of the existing fixed fire protection features (including sprinkler systems) in these buildings and others on site, this needs assessment was predicated on the fire department being required to deploy two hose lines and supply only ___ GPM inside any fire area within __ minutes. If a greater fire flow is required by DOE for interior operations, additional resources (including personnel) would have to be provided.

There is also a recognized potential for the occurrence of an event (fire, EMS call, or false alarm) concurrent with a major site emergency. The fire department will have to find the means to respond as they have in the past. Consequently, this document attempts to realistically reflect the resources necessary to respond to a simultaneous fire, or medical emergency or unwanted fire alarm. However, the fire department has only a limited capacity (call back, limited mutual aid, and transition from "offensive" to

"defensive" tactics) to effectively deal with such circumstances. To the extent that DOE does not provide the fire department with additional resources beyond existing capabilities to be able to respond to concurrent emergencies, the Department is assuming some risk. This assumption of risk is considered reasonable as of this date given the fire loss record and extent of fire prevention activities and fixed fire protection on site. Note that there is a significant potential increase in risk in the future when decontamination and decommissioning (D&D) activities begin in earnest and that this baseline document must be revalidated at that time.

For Fire Protection (Engineering), individual responsibilities have been validated by both Order requirements and supplementary justification.

Performance measures for the engineering staff were developed on the basis of providing a "prompt" response to requests for technical assistance from site "customers."

Minimum resources required for Fire Protection is dependent upon the inventory of current assignments and a reasonable determination of the time necessary to complete those assignments. The only firm technical basis available to make this determination is the amount of time that has been required historically to perform similar tasks. To the extent that a firm accounting of "Time Loading" was not currently available, estimates were used in developing this report.

In comparing the existing engineering staff to any potential "alternative," it is more prudent to look at the qualifications of the staff, their historic ability to produce quality work, their site familiarization and other intangibles rather than focusing on costs alone.

II. Fire & Emergency Services Program Responsibilities

(Operations Division) (__ Personnel)

(A) Manual Fire Suppression

Technical Requirement:

DOE 5480.7A, "Fire Protection," requires that all sites "have access to a fully staffed trained and equipped emergency response force."

DOE 5480.5, "Safety of Nuclear Facilities" and DOE 5480.5, "Safety of Nuclear Facilities" require "Operational Safety Requirements (OSRs) setting forth the approved limitation of safe operations." RFETS OSRs are based on the ability of the site fire department to respond to and suppress a fire within a timely manner.

DOE 5480.3A, "Planning and Preparedness for Operational Emergencies," requires development and maintenance of emergency planning, preparedness, and response capabilities, in order to minimize the consequences to workers, national security, the public, and the environment from incidents involving DOE operations.

Facility Final Safety Analysis Reports (FSAR), accident analysis, credit the fire department with the capability to mitigate fires within nuclear facilities to ensure protection of the public.

Justification:

Although many of the site's facilities are protected by automatic fire suppression systems, a number are not. The site fire department represents the only effective means for fire suppression. For those facilities that are protected by such systems, the design basis is "control" not fire extinguishment. Consequently, the fire department is critical to complete extinguishment and to perform overhaul activities.

Off-site fire departments are neither obligated nor completely willing to respond to all site emergencies. Building Emergency Support Teams (BEST), which are maintained on a voluntary basis, are not fully trained and equipped to deploy hose lines and to perform other critical fire ground activities. Therefore, DOE at Rocky Flats must have this capability established within the site fire department.

Performance Measure:

The fire department must be capable of deploying two charged hose lines and flow at least ___ gallons per minute within any fire area of any site facility within __ minutes of initial receipt of an alarm.

Required Resources:

__ Engines
1 Ambulance
__ Incident Command Unit

Adequate fire fighting and personnel protection equipment which conform with the requirements of the applicable NFPA code or standard.

1 Incident Commander
__ Nozzlemen (two, 2-person attack lines, 150 GPM/line)
2 Fire fighters for emergency medical support
__ Fire fighters working ventilation and checking for fire extension
1 Engine operator
__ Fire fighters who will provide rapid intervention, safety officer, and other related duties, such as "hot bottle" change out

In the event a second fire or related event occurred concurrently, the fire department would issue an "all call" for off-duty personnel, exercise mutual aid commitments, and shift fire ground tactics at the initial event from "offensive" operations to "defensive." The potential for concurrent incidents necessitates the provision of "reserve" mobile apparatus, including an engine and ambulance, consistent with industry practice.

Time Loading (Historic):

In the last year for which records are available, the Fire Department responded to ___ emergency calls related to fires, alarm activation, odor/smoke investigation, and other such types of alarms. Most of these could have been the precursor of a major incident. Many of the incidents were held to minor problem because of the early intervention of the Fire Department. These calls represent 51 percent of all emergency responses.

Potential Economies and Areas for Improved Efficiency:

Because the fire department is on-site and is capable of responding quickly to incipient fires and related events, the loss potential is reduced. In other words, by responding quickly to a fire in its initial stages a greater life and fire loss is prevented. The potential for an off-site radiological release due to a fire in a nuclear facility is also significantly reduced. This represents a significant existing economy compared to an off-site fire department.

BEST Teams have been organized at a number of facilities in an effort to provide a limited capability supplementary emergency force to respond to incipient fires and medical emergencies. Certain functions that come within the scope of the responsibilities of the Teams are redundant to the fire department and could be eliminated.

To the extent that the fire department has consistently demonstrated the ability to respond to an incident in a timely manner, with the appropriate equipment and with the skills to use them, having personnel assigned to the BEST Teams with the same responsibility is unnecessary and represents an unjustified cost. Fire suppression and search and rescue are two responsibilities that readily present themselves for consideration. Under these circumstances, the Teams could be reconfigured to be a support organization for the fire department, similar to the "Emergency Squad" concept employed at other DOE sites, such as Y-12. The actual determination as to what the ultimate composition and responsibility of any particular Team should be is dependent on the conclusions of a fire hazards analysis, Safety Analysis Reports, needs assessment, as well as Nuclear Safety approval.

(B) **Emergency Medical Services**

Technical Requirement:

DOE Order 5480.8A, "Contractor Occupational Medical Program," requires an occupational health program.

Justification:

Many of the activities conducted on-site represent a significant risk to site personnel. Despite the best efforts at prevention, accidents and other medical emergencies will continue to occur as they have occurred in the past. An Advance Life Support Emergency System has been established on-site to provide prompt and effective medical treatment.

Performance Measure:

Appropriate apparatus, drugs, supplies, and qualified technicians must be provided to effectively attend to the single most severe anticipated medical emergency (contaminated cardiac arrest or trauma) within __ minutes in any area on site.

Required Resources:

1 Ambulance, equipped in accordance with the requirements of the Colorado Department of Public Health and Environment
__ Rescue unit supplied with ancillary support EMS equipment

1 Driver
__ Medical technicians in attendance during the entire length of the call

In the event a second medical emergency occurred concurrently, the fire department would utilize site medical department personnel to the extent that they were available (day time). An additional capability is _____ and/or helicopter transport.

The potential for concurrent incidents necessitates the provision of a reserve ambulance, consistent with industry practice.

Time Loading:

Average of ___ medical call per year.

Potential Economies and Areas for Improved Efficiency:

None identified without a significant increase in risk and degradation of EMS capability. This service could be contracted out to an outside ambulance service but the response time would be increased significantly (approximately 15 minutes to the plant perimeter gate) at considerable risk to the patient. With cardiac cases, the first 5 to 6 minutes are critical. With trauma cases, it is imperative to have a patient under treatment at a hospital within one hour. There is no reasonable assurance that these critical parameters could be met, other than by the site emergency response forces.

Additionally, outside ambulance agencies are not prepared or willing to treat radioactively contaminated patients. Moreover, the agencies will, typically, not maintain site specific equipment and supplies for these types of incidents.

(C) **Hazardous Materials Mitigation/Clean Up**

Technical Requirement:

Section 4.b., of DOE 5480.7A, requires contractors to establish a capability to ensure that there not be "...an on-site or off-site release of radiological and other hazardous material that will threaten the public health and safety or the environment."

State of _____ Code _____, Contingency Plans and Emergency Procedures, requires a capability to effectively respond to accidents involving release of hazardous materials.

Justification:

Operations at _____ feature continuing instances of hazardous materials releases of a routine nature and the potential for significant accidental releases. No other off-site response capability exists. _____ could not operate without a program such as this. A decision was made to place this responsibility within the structure of the fire department.

Performance Measure:

The fire department must be capable of deploying hazardous material incident mitigation equipment and trained personnel within __ minutes of receipt of notification, sufficient to effectively control the

single most severe anticipated incident (Level II) as determined by engineering analysis and incident pre-plans. Personnel must be trained to the NFPA 472 Technician level and must meet the requirements of 29 CFR Part 1910.120 to the Technician Level. Appropriate training on Packaging and Transportation must be provided for personnel in accordance with State of _____ Code of Regulation.

Required Resources:

1 Engine
1 Hazardous Materials Unit
1 Incident Command Unit
1 Utility Truck
1 Ambulance, fully equipped as delineated above.
Supply trailer(s)

Appropriate Equipment, Supplies and Procedures that conform with 29 CFR Part 1910.120 and the applicable NFPA codes and standards.

1 Incident Commander
2 HAZMAT Tech. Forward
2 Back-up Tech. fully suited
__ Support Techs. (1 for accountability, 1 for decon.]
__ Safety Officer
__ Decon Leader who could serve as medical officer

Time Loading:

In ____ there where ___ actual HAZMAT responses which represent __ percent of all emergency responses. In ____, __ percent of fire fighter's training time was spent in Hazardous Material training.

Potential Economies and Areas for Improved Efficiency:

No additional economies identified within the fire department. Having the fire department responsible for this function is itself a significant economy compared to other sites which have a separate hazardous materials mitigation and cleanup organizations.

(D) **Technical Rescue**

Technical Requirement:

DOE 5480.7A, "Fire Protection," requires that all sites "have access to a fully staffed, trained and equipped emergency response force."

Section 4.c., of DOE 5480.7A, requires the contractor to establish a capability to "...provide an acceptable degree of life safety to DOE and contractor personnel and that there be no undue hazards to the public..."

Justification:

Routine activities conducted on-site subject workers to hazards associated with confined spaces and heights, among others. A capability must be available to effectively respond to accidents and related incidents in these environments. Off-site response organizations are not willing to enter all areas at _____. Additionally, delays associated with the utilization of off-site organizations would, under some circumstances, jeopardize victims.

Performance Element:

The fire department must be capable of responding within __ minutes of receipt of an alarm with appropriate apparatus, personnel and equipment to effectively deal with the most credible technical rescue incident as determined by pre-plans.

Required Resources:

__ Light rescue/brush attack vehicle
__ Utility vehicle
Equipment trailer(s)

1 Incident Commander
__ Operations Officer
2 Fire fighters (for entry)
2 Fire fighters (EMS duties)
2 Fire fighters (rapid intervention, safety, EMS support)
__ Fire fighter (air supply)

Time Loading:

The fire department performed ___ technical rescue during 19__.

In that same calendar year, training in technical rescue took _____ hours which represents _ percent of the total fire fighter training.

Potential Economies and Areas for Improved Efficiency:

No additional economies identified within the fire department. Reliance on the fire department to perform these duties in conjunction with their existing responsibilities represents a significant economy compared to having a separate organizations with this responsibility.

(E) **Emergency Fire System Isolation & Stabilization**

Technical Requirement:

DOE 5480.7A, "Fire Protection," requires that all DOE facilities be provided with ".. a reliable water supply of acceptable capacity for

fire suppression." Additionally, the Fire Protection Order requires that "If fire protection will be inoperable for a significant period of time, interim compensatory measures shall be implemented until operability is restored."

Final Safety Analysis Reports (FSAR) consider many fire suppression systems as vital safety systems. Operability of these systems is part of the authorization basis.

Justification:

Emergency isolation and stabilization of fire systems include unplanned events such as: fire main breaks, frozen sprinkler pipes, inadvertent activation of an automatic systems and isolation after a fire event. A quick response is necessary to minimize water damage and impacts on other vital safety systems. Emergency services provide reliable/trained personnel to isolate an unplanned event in a timely manner and provide interim compensatory measures until either the system is stabilized or placed back in service. This is a critical responsibility during off shifts when other site personnel would not be available to perform this function.

Performance Measure:

Emergency services must provide a continuous response capability sufficient to respond to any credible interruption within __ minutes and to isolate and stabilize fire suppression system pipe breaks or inadvertent activation.

Required Resources:

__ Engine or utility vehicle

__ Officer
__ Fire fighters

Time Loading:

Approximately __ man-hours were utilized for isolation and stabilization operations during the past year. This activity was in support of the Utilities and Fire System Services organization. (This figure does not include time lost to building occupants and time devoted to fire watches.)

Potential Economies and Areas for Improved Efficiency:

The proposed site water supply refurbishment project will increase the integrity of the domestic/fire water system and should reduce the number of instances in the future when the fire department will be called upon to provide this service.

(F) Fire System Trouble and Supervisory Investigation

Technical Requirement:

Section 9.c.(4), of DOE 5480.7A, requires the establishment of "operability" criteria for fire protection systems and stipulates that a program be in place for assuring that systems are capable of performing as designed and installed.

Justification:

Trouble and supervisory signals are generated when the self-monitoring feature of the fire system detects a fault and sends a signal to the central Fire Alarm Station. Although these are different from fire signals, they have the potential to conceal or block fire alarm signals and can even be initiated by a fire. An immediate investigation is needed to determine if a full fire response is necessary to reset systems, silence alarms, secure the scene, implement TSR requirements, and initiate corrective action.

Performance Measure:

The fire department must have a 2-person team at the source of a fire-related alarm within __ minutes of indication at the fire alarm center.

Required Resources:

__ Utility vehicle

__ Officer
__ Fire fighter

This response minimizes the impact on emergency resources. This team is dispatched to the scene in a non-emergency vehicle. They would sweep the area and immediately call in a full response in the event a fire was found. Two persons are necessary to assure their safety in the event a fire is encountered. If there is an ongoing HAZMAT or fire event or if a second supervisory/trouble signal is received, a fire engine and crew are dispatched to investigate. In some cases, off-duty personnel must be recalled.

In the event a second alarm occurred concurrent with a fire or related incident, the fire department would issue a "call" for off-duty personnel, exercise mutual aid commitments, and/or shift fire ground tactics at the initial event from "offensive" operations to "defensive." The potential for concurrent alarms necessitates the provision of "reserve" mobile apparatus, consistent with industry practice.

Time Loading:

Approximately one such signal is received daily, typically requiring an hour to secure the scene and initiate corrective actions. When a supervisory/trouble condition cannot be cleared, one fire fighter must remain on the scene until the facility manager can mobilize a fire watch. These alarms should not be confused with nuisance (false) alarms which also average about one per day. Nuisance alarms register as fire alarms and receive a full emergency response since they are suspected to be fire alarms until confirmed otherwise. The number of supervisory/trouble alarms and nuisance alarms are a reasonable order of magnitude for a site with over 1,000 alarm points.

Potential Economies and Areas for Improved Efficiency:

Economies have already been achieved by sending a two-person investigative team rather than a full emergency response. In theory, facility managers could be tasked with the responsibility of investigating supervisory/trouble alarms. However, many facilities do not have adequate personnel available on all shifts. Also, training would be required for a large number of personnel, and unlike BEST training, would have to be mandated.

Many fire departments now charge for non-fire responses. Costs could be transferred from building's overhead to the Fire Department by charging a fixed price per response. This might also give facility managers another incentive to quickly and permanently repair deficient systems.

The alarm technicians also maintain 24-hour coverage. If an immediate response can be assured, dispatching alarm technicians instead of fire fighters would also allow for more prompt troubleshooting and correction of faults, but would not allow for initial investigation and call in for a full response in the event of an actual emergency.

A Capital Project exists to replace portions of the Plant Fire Alarm System. Phase A of the project will mainly replace the core system within the fire house and signal input/output panels in the buildings. Building systems may be replaced in later phases. A reduction in supervisory alarms is anticipated when the system replacement is complete.

(G) Fire Hydrant Flow Testing & Maintenance

Technical Requirement:

DOE 5480.7A requires "a reliable water supply of acceptable capacity." The DOE Order also requires that fire protection systems be tested and maintained in accordance with National Fire Protection Association Standards. Furthermore, a functional water supply is

required for operations in a number of site buildings covered by Operational Safety Requirements.

Justification:

Hydrant flow testing is essential to assure operability and to verify availability of water flow for vital safety systems.

Performance Measure:

Fire hydrants and fire mains must be flow tested and maintained in accordance with established frequencies to demonstrate required flow specified in fire department pre-plans and facility FHAs.

Required Resources:

__ Utility vehicle

__ Fire Fighters

Time Loading:

___ man hours per year.

(This reflects that, in addition to flowing each hydrant on-site, the on-duty fire fighters also fill the oil reservoir for the stem, wire brush and lubricate the outlets, check a number of other code requirements, operate the water main isolation valve for the hydrant, mechanically exercise the hydrant, and fill out any impairment forms or work orders required).

Potential Economies and Areas for Improved Efficiency:

These activities are done by water utilities rather than by fire departments in many communities today. However, a direct transfer would not result in any savings unless the utility personnel are already testing the same devices. It was reported that they do not. Fire Protection Engineering selects a portion of the water system each year for thorough loop testing to measure available flows and detect restrictions that may be developing. Although fire fighters assist with the testing, the relatively small number of hydrants involved may not result in enough savings to justify the increased coordination. Other sites have collected data on failures of fire systems and determined that with favorable water quality characteristics, an annual (rather than semi-annual) flow test is sufficient. A monitoring program could be implemented at _____ to determine if a similar exception could be made, resulting in a 50% reduction from current levels of activity.

(H) **Fire Pre-plans Development**

Technical Requirement

Section 9.a.(2) c., of DOE Order 5480.7A, "Fire Protection," requires "Fire pre-plans."

Justification:

DOE Orders and good practices dictate that all building and structures be reviewed and plans be developed to cope with emergencies that may occur. The plans must be updated in order to be reliable during an emergency. The fire department is the most logical organization to perform this task.

Performance Measure:

Fire pre-plans must be developed in a timely manner and updated in accordance with established frequencies and when significant changes to facilities occur.

Required Resources:

__ Fire fighter
__ Fire Protection engineer

(Personnel must have a working knowledge of the facility and access to relevant information.)

Time Loading:

_____ hours were devoted to pre-plan development, review and in-service facility tours within the past year.

Potential Economies and Areas for Improved Efficiency:

The amount of resources necessary to support this activity is expected to diminish over time as the initial developmental effort evolves into a period of routine pre-plan updates and revisions.

(I) **Fire Watch & Hazardous Materials Controlled Burn Services**

Technical Requirement:

Controlled burning of excess chemicals (shock sensitive) is conducted by Waste Operations and a fire watch is required as part of the State and County permits .

Justification:

A fire watch is required during hazardous materials controlled burns to minimize the risk of the fire spread.

Performance Measure:

The fire department must be capable of providing apparatus and the qualified individuals, personnel protection equipment and manual fire fighting equipment for each fire watch and hazardous material controlled burn.

Required Resources:

__ Engine/Brush Truck

__ Operator/Officer
__ Fire Fighters

Time Loading:

Approximately __ man-hours were required for this operation in the past year.

Potential Economies and Areas for Improved Efficiency:

Controlled burning of these chemicals is the most economical disposal method available.

(J) Site Fire Alarm Evacuation Program Planning

Technical Requirement

DOE Order 5480.7A requires that there "... be a means to notify and evacuate building occupants in the event of a fire."

Justification:

To help assure an orderly and safe evacuation of facility occupants during a fire or other related emergency, the fire department has been tasked with performing annual fire alarm drills and provide assessments as to their effectiveness.

Performance Measure:

Annual fire drills must be conducted in all occupied facilities. Written evaluations on the effectiveness of the drills should be provided to Building Management to allow for corrective training or actions.

Required Resources:

__ Engine/Brush Truck

__ Fire Officer
__ Drill Coordinator (Training Captain)
__ Fire Fighters

Time Loading:

Approximately ___ hours have been invested by the drill coordinator (Training Captain) in changes to plant protocols, procedures and training programs, as well as employee media announcements.

It is anticipated that approximately ___ man-hours will be required for fire alarm drills in the ___ office occupancies and __ hours will be required for the __ major facilities at _____. Of these hours, ___ will be required by the response crews in the Operations Division and ___ from the Drill Coordinator on the Support Services staff.

Potential Economies and Areas for Improved Efficiency:

No potential economies identified. The fire department has the inherent capability to perform this activity effectively and efficiently.

(K) Training, Certification & Physical Fitness

Technical Requirement

DOE 5480.7A, "Fire Protection," requires that all sites "have access to a fully staffed, trained and equipped emergency response force."

29 CFR 1910.120 stipulates that emergency response to hazardous waste operations "...shall have procedures, personnel and equipment for handling emergency response."

Justification:

Training, certification, and physical fitness of the fire department personnel is required to maintain proficiency and guarantee safety during emergency operations. As no specific training criteria is outlined in DOE Orders beyond those promulgated by the NFPA, personnel at _____ are also trained using criteria defined in the State of _____ Fire Safety certification program and the State of _____ Department of Health certification program.

Performance Measure:

Fire department personnel must be trained in accordance with the State of _____ certification requirements for fire fighters, emergency medical responders, and hazardous material responders as

outlined in the department's established training program. Appropriate facilities, equipment, scenarios, training outlines and personnel to accomplish the task that are required.

Resources Required:

Classroom and physical fitness facilities
Live fire training site(s)

__ Full time instructors (See Section III (A))
__ Full time "equivalent" fire fighters

Time Loading:

During 19__ a total of _____ hours were logged in for fire department training. (The amount of training required will vary depending on the topic.)

Potential Economies:

No potential economies were identified. The issue of training for emergency response personnel is multi-faceted with regards to requirements, topics and needed resources. It reaches across many areas of expertise. There is no better way of providing this training than through the in-house program offered by the site fire department. Physical fitness training reduces on the job injuries, deaths, and leave due to illnesses.

III. Fire & Emergency Services Program Responsibilities

(Support Services) (__ Personnel)

(A) Training Compliance

Technical Requirement

DOE 5480.7A, "Fire Protection," requires that all sites "have access to a fully staffed, trained and equipped emergency response force."

29 CFR 1910.120 stipulates that emergency response to hazardous waste operations "...shall have procedures, personnel and equipment for handling emergency response."

Justification:

Training, certification, and physical fitness of the fire department personnel is required to maintain proficiency and guarantee safety during emergency operations.

Performance Measure:

Fire department training programs must be developed and implemented in accordance with DOE requirements. All training must be completed on schedule as established by DOE, NFPA and the State of _____. Instructors must be state of Colorado Certified.

Resources Required:

Auditorium and classrooms
Physical fitness facilities
Live fire training site(s)

__ Full time instructors
__ Full time "equivalent" fire fighters

Time Loading:

Approximately _____ hours of instructor time was devote to fire department training.

Potential Economies:

No potential economies were identified. Outside instructors would not possess the level of site familiarity as the current staff.

(B) Apparatus/Equipment Maintenance

Technical Requirement:

Section 9, of DOE 5480.7A, requires "...a fully staffed, trained and equipped emergency response force..." Paragraph 9.b.(5) of the Fire

Protection Order also requires that apparatus and equipment "...shall be maintained in accordance with the applicable NFPA standards..."

Justification:

A comprehensive and regular maintenance program for mobile apparatus and manual fire fighting and personnel protection equipment is essential to ensure that the fire department is fully capable of responding effectively to site emergencies.

Performance Measure:

All fire department mobile apparatus, manual fire fighting and personnel protection equipment shall be inspected and maintained on a regular basis in accordance with DOE and NFPA requirements, industry practice and site procedures. Appropriate reserve apparatus and equipment must be available in the event that primary apparatus and equipment is unavailable due to maintenance activities.

Resources Required:

__ Technician
Shop Space and tools

Time Loading:

Approximately _____ man-hours were devoted to this activity within the last reporting period.

Potential Economies:

None identified. The fire department technician performs a wide range of maintenance activities for the fire department and other site organizations. The work is done promptly and completely. This itself is a significant economy which would not be realized if this responsibility was shifted to another organization or outside contractor. Outsourcing would also reduce the availability of apparatus for emergencies.

(C) **Communications**

Technical Requirement:

Section 9, of DOE 5480.7A, requires an effective "means to summon the emergency response forces in the event of a fire."

Justification:

The fire alarm and signalling system is a critical element of the site's fire protection program and an essential capability to summon emergency response forces in the event of a fire, medical emergency or related event. Dispatching is also needed to coordinate response,

summon additional assistance, coordinate system testing, and other related responsibilities.

Performance Measure:

The fire alarm and signalling system must be operational at all times. Emergency dispatchers must process every request for emergency services within __ seconds. "In service" time should average ___ minutes.

Resources Required:

__ communication technicians

Time Loading:

Approximately _____ man-hours were required within the past year to staff the fire alarm center. This includes continuous 24-hour coverage as well as a 2-person shift at "peak" times. This figure does not include the dispatchers required to staff the back-up alarm center.

Potential Economies:

None identified in personnel without a corresponding significant increase in overtime hours to cover holidays and days off.

The planned fire alarm system improvement project will achieve greater efficiency in operations as a result of the use of state-of-the-art technology.

IV. Fire Protection Program Responsibilities

(Fire Protection Engineering) (__Personnel)

(A) Fire Hazards Analysis/Fire Protection Assessments

Technical Requirement:

DOE 5480.7A, "Fire Protection," requires that "A graded FHA, that reflects the risks from fire in a facility, shall be performed for new facilities...for nuclear facilities...and as directed by the CSO." The Order also requires that the fire hazard analysis "...shall be performed under the direction of a qualified fire protection engineer."

Section 8.i.(5), of DOE 5480.7A, requires contractors to "Conduct fire protection assessments of facilities according to the scope and frequency established by this Order."

Justification:

Fire hazards analyses and periodic inspections are necessary to provide a comprehensive and technically valid assessment of the fire risks to a facility as well as an indication of existing deficiencies that would degrade fire safety below acceptable levels. A graded fire hazard analysis provides the technical basis for designing effective fire protection measures and can also be utilized as justification for implementing cost-effective solutions to fire protection issues. Periodic assessments are critical toward assuring that existing fire protection remains effective as facility occupancy changes occur.

Performance Measure:

Comprehensive fire hazards analysis and fire protection assessments have been performed for site facilities as directed by DOE 5480.7A, "Fire protection."

Required Resources:

The equivalent of ___ qualified fire protection engineers (approximately _____ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity within the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

To the extent that fire protection engineers are presently assigned to individual projects on the basis of a direct relationship between task complexity and staff knowledge and experience, no further economies seem possible without adversely effecting the quality of the final work product.

In order to complete initial analyses/assessments, consideration should be given to utilizing the services of qualified outside fire protection engineering consultant(s) so as to be able to more efficiently respond to increases in work load. This will also result in a significant benefit if an unexpected reduction in engineering activity occurs.

(B) **Life Safety Evaluations**

Technical Requirement:

Section 4.c., of DOE 5480.7A, requires that contractors "... provide an acceptable degree of life safety to DOE and contractor personnel and that there are no undue hazards to the public from fire and its effects in DOE facilities."

Justification:

To the extent that issues arise periodically on-site that relate to achieving a satisfactory level of life safety, staff engineers are needed to provide qualified technical opinion. This helps assure that decisions that are made regarding operations and construction will not adversely effect life safety.

Performance Measure:

Written requests for a Life Safety Evaluation are acknowledged promptly. Initial facility assessment is performed or scheduled within one week (or mutually agreed alternative). Final report or evaluation, if necessary, is completed within agreed deadline.

Required Resources:

The equivalent of ___ qualified fire protection engineer (approximately ___ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity within the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

Prior consultation with Fire Protection Engineering on life safety issues has already avoided and will continue to avoid unnecessary and costly alterations by the Operations Managers.

Consideration should be given to assigning on a rotating basis "lead engineers" and "alternates" to individual facilities and implementing a flexible program of regular but "informal" facility tours. This will expand existing working relationships between the staff and operating personnel and may make it possible to achieve a more efficient technical assistance effort by avoiding the need to "research" or view conditions at issue.

(C) **Fire Hazard & Risk Calculations**

Technical Requirement:

Section 9.a.(3), of DOE 5480.7A, requires "graded fire hazards analyses" under various circumstances. The Order also requires that engineering analyses be the technical basis for decisions relating to the need for fire protection.

Justification:

Routine decisions, such as plant modifications and process changes, that effect fire safety should be based on valid technical considerations. The engineering staff provides "expert" advice to facility managers and others so as to assure that such changes are implemented safely.

Performance Measure:

Written requests for a fire hazard and risk calculation are acknowledged promptly. Initial facility assessment is performed or scheduled within one week (or mutually agreed alternative). Final report or evaluation, if necessary, is completed within agreed deadline.

Required Resources:

The equivalent of ___ qualified fire protection engineer (approximately ___ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity within the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

Refer to Section IV.(B), above.

(D) **Fire Protection System Design & Construction Review**

Technical Requirement:

DOE 5480.7A requires "...a system to ensure that the requirements of the DOE Fire Protection Program are documented and incorporated in the plans and specifications for all new facilities... This includes review and comment by a qualified fire protection engineer..."

Justification:

A thorough review of fire protection systems during their design and construction will help ensure that these systems will perform as expected during a fire.

Performance Measure:

Bid packages, specifications, plans and other related documents are completely reviewed by stipulated deadlines. All review comments are appropriately documented. Periodic inspections are performed on site to monitor construction activities and to identify deviations from approved plans and specifications.

Required Resources:

The equivalent of ____ qualified fire protection engineer (approximately ___ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity in previous fiscal years.

Potential Economies and Areas for Greater Efficiency:

None identified. This activity, itself, is an effective way to prevent costly post-construction modifications by assuring that the initial design and on-site fabrication are correct.

(E) **Fire Protection Equivalencies/Exemptions/CSAs**

Technical Requirement:

DOE 5480.7A requires that the analyses which support requests for approval of fire protection-related exemptions and equivalencies and Compliance Schedule Approvals are reviewed by the cognizant fire protection engineer.

Justification:

Review of these issues by the engineering staff helps to ensure that these deviations and schedular extensions are technically valid and

that sufficient compensatory measures are in place, where appropriate, to provide an adequate level of safety.

Performance Measure:

Written technical analyses are written (or reviewed) within agreed deadlines. Documents are clearly written, concise and comprehensively address all relevant fire safety issues. Final analyses are found acceptable by the cognizant DOE fire protection engineer.

Required Resources:

The equivalent of ____ qualified fire protection engineer (approximately ___ hours) in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the previous fiscal year.

Potential Economies and Areas for Greater Efficiency

This activity, itself, is a significant economy in that it is part of a process that avoids unnecessary expenditure of DOE funds to correct fire code "deviations" that do not significantly effect fire safety. Within the past fiscal year, this activity has "saved" the Department over $_____ at _____.

(F) **Fire Code Analysis**

Technical Requirement:

DOE 5480.7A mandates conformance with applicable fire safety requirements of the Code of Federal Regulations (CFR) and NFPA Codes and Standards. It also requires contractors to "maintain or have access to an adequate fire protection staff, including qualified fire protection engineer(s)" to interpret code requirements for activities on site.

DOE 6430.1A requires conformance with applicable building codes.

Justification:

The ability of facility managers and other plant personnel to consult with the engineering staff on fire safety code issues ensures that site activities are performed safely and that plant modifications and other construction-related activities are implemented in accordance with accurate interpretations of code requirements.

Performance Measure:

Written requests for such analyses are acknowledged promptly. Initial assessment is performed or scheduled within one week (or mutually agreed alternative). Final report or evaluation, if necessary, is completed within agreed schedule.

Required Resources:

The equivalent of about one qualified fire protection engineer (approximately _____ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

None identified. Because the engineering staff has been able to accurately interpret fire code requirements, plant modifications and other construction activities on-site have avoided unnecessary costs associated with erroneous interpretations of codes and standards.

(G) Training and Personnel Development

DOE 5480.7A and DNFSB Recommendation 93-3 stipulate that continuing education and training should be provided to maintain and enhance the level of competency of the fire protection staff.

Justification:

Continuing education and training of the fire protection engineering staff is necessary to ensure proficiency.

Performance Measure:

Fire protection engineering personnel must receive continuing education and training in accordance with their "Individual Development Plans (IDP) or equivalent.

Resources Required:

Approximately __ hours per person will be devoted to this activity in the current fiscal year or a cumulative total for the engineering staff of approximately ___ hours.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Most of this training is required by plant policy. Less training may be provided. However, a reduction in this activity will have a long-term detrimental effect on the proficiency and morale of the staff.

(H) **Program Development**

Technical Requirement:

Section 9.a.(1), of DOE 5480.7A, requires the development of fire protection program documents.

Justification:

The documented fire protection program needs to be periodically reviewed and updated to reflect changing site circumstances and new requirements.

Performance Measure:

Fire protection program documentation is maintained current.

Resources Required:

The equivalent of ___ qualified fire protection engineer in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Reliance on "model" program elements and those developed by other DOE contractors.

(I) **Audit Support**

Technical Requirement:

Section 8.i.(6), of DOE 5480.7A, requires contractors to "provide fire protection technical assistance to DOE."

Justification:

Every fire protection audit that is performed by outside oversight organizations on-site requires a point of contact to facilitate the retrieval of documentation, respond to questions, provide tour assistance and other related activities.

Performance Measure:

An appropriate level of technical assistance is provided to auditors; DOE, State of _____, DNFSB, etc.

Required Resources:

The equivalent of about ___ qualified fire protection engineer (approximately ___ hours) in the current fiscal year.

Time Loading;

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Joint fire protection audit activity.

V. Fire Protection Program Responsibilities

(Fire Prevention Bureau) (__ Personnel)

(A) Fire Prevention Inspections

Technical Requirement:

Section 5.c., of DOE 5480.7A, requires that the "Fire protection criteria delineated in the ... (National Fire Protection Association Codes and Standards) are the minimum requirements for the implementation of the DOE Fire Protection Program."

NFPA 1, "Fire Prevention Code," delineates a limited number of specific inspection requirements for cooking equipment, fire extinguishers, certain process operations and standpipe systems.

Justification:

A regular program of fire prevention inspections interspersed with comprehensive fire protection engineering evaluations will facilitate the timely identification and mitigation of fire hazards.

Performance Measure:

Fire prevention inspections must be performed in accordance with established frequencies and scope. Noted deficiencies must either be corrected immediately or a written notice issued to the facility manager to identify required remedial action. Such notices shall be tracked until corrective action has been completed.

Required Resources:

The equivalent of ___ fire prevention inspectors (_____ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to fire prevention building inspections within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Consideration should be given to performing this activity in conjunction with the informal tours by the engineering staff and the facility familiarization/pre-plan validation tours by the fire department.

Consideration should also be given to reducing the frequency of tours in facilities that demonstrate a "good record" of past inspections (similar to the OSHA philosophy).

It is recommended that the total number of **separate and distinct** fire safety-related facility tours be reduced to enhance efficiency and reduce overlapping activities. Consolidation of such tours is suggested, similar to what has already been implemented by Fire Protection Engineering on a more limited scale.

(B) **Cutting & Welding Permits**

Technical Requirement:

Section 9.c.(1), of DOE 5480.7A, requires procedures for activities such as...isolation of hot work...which contribute to decrease in fire risk."

Justification:

A cutting and welding permit program contributes significantly to safe operations and reduced incidents of fire.

Performance Measure:

Permits are issued for all cutting and welding activities. Appropriate safeguards, such as fire watchers, are in place in conjunction with cutting and welding activities. Periodic inspections are conducted to verify that permitted activity is being performed in accordance with established procedures.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the past fiscal year.

Potential Economies and Areas for Greater Efficiency:

None identified.

(C) **Code Enforcement**

Technical Requirement:

Section 5.c., of DOE 5480.7A, requires that the "Fire protection criteria delineated in the ... (National Fire Protection Association Codes and Standards) are the minimum requirements for the implementation of the DOE Fire Protection Program."

Justification:

A regular program of fire prevention inspections interspersed with comprehensive fire protection engineering evaluations will facilitate the timely identification and mitigation of fire hazards.

Performance Measure:

Fire prevention inspections must be performed in accordance with established frequencies and scope. Noted deficiencies must either be corrected immediately or a written notice issued to the facility manager to identify required remedial action. Such notices should be tracked until corrective action has been completed.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Refer to V.(A)., above.

(D) **Life Safety Inspections**

Technical Requirement:

Section 4.c., of DOE 5480.7A, requires that contractors "... provide an acceptable degree of life safety to DOE and contractor personnel.

Justification:

Periodic inspections are necessary to provide a comprehensive and technically valid assessment of the fire risks to a facility as well as an indication of existing deficiencies that would degrade life safety below acceptable levels. Periodic assessments are critical toward assuring that existing fire safety features remain effective as facility occupancy changes occur.

Performance Measure:

Comprehensive fire protection assessments have been performed for site facilities as directed by DOE 5480.7A, "Fire Protection."

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

See V.(A)., IV.(A), and IV.(B)., above. Some of the responsibilities of the Fire Prevention Bureau overlap with those of Fire Protection Engineering. Consolidation of some of these responsibilities in one organization will reduce questions regarding "jurisdiction" and will enhance efficiency.

(E) **RCRA Inspections**

Technical Requirement:

None identified.

Justification:

A regular program of RCRA inspections interspersed with comprehensive evaluations will facilitate the timely identification and mitigation of fire hazards.

Performance Measure:

RCRA inspections must be performed in accordance with established frequencies and scope. Noted deficiencies must either be corrected immediately or a written notice issued to the facility manager to identify required remedial action. Such notices should be tracked until corrective action has been completed.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Inspections, with appropriate documentation, may be performed by Facility Managers as part of their existing responsibilities.

(F) **Flammable Liquids Cabinet Inspections**

Technical Requirement:

Section 9.c.(1), of DOE 5480.7A, requires procedures for activities such as...isolation of hot work...which contribute to decrease in fire risk.

Justification:

A regular program of fire prevention inspections interspersed with comprehensive fire protection engineering evaluations will facilitate the timely identification and mitigation of fire hazards.

Performance Measure:

Fire prevention inspections must be performed in accordance with established frequencies and scope. Noted deficiencies must either be corrected immediately or a written notice issued to the facility manager to identify required remedial action. Such notices should be tracked until corrective action has been completed.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

See V.A.

(G) **Basic Code Consultation**

Technical Requirement:

DOE 5480.7A mandates conformance with applicable fire safety requirements of the Code of Federal Regulations (CFR) and NFPA Codes and Standards. It also requires contractors to "maintain or have access to an adequate fire protection staff, including qualified fire protection engineer(s)" to interpret code requirements for activities on-site.

Justification:

The ability of facility managers and other plant personnel to consult with the engineering staff on fire safety code issues ensures that site activities are performed safely and that plant modifications and other construction-related activities are implemented in accordance

with accurate interpretations of code requirements.

Performance Measure:

Written requests for such analyses are acknowledged promptly. Initial assessment is performed or scheduled within one week (or mutually agreed alternative). Final report or evaluation, if necessary, is completed within agreed deadline.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Because the engineering staff has been able to accurately interpret fire code requirements, plant modifications and other construction activities on-site have avoided unnecessary costs associated with erroneous interpretations of codes and standards.

Some of the activity performed by this group may overlap with the responsibilities of Fire Protection Engineering. There also may arise questions regarding the "jurisdiction" of these two groups over a particular issue. Consolidation of the Fire Protection Engineering and Fire Detection Engineering organizations may enhance efficiency.

VI. Fire Protection Program Responsibilities

(Fire Detection Engineering) (__ Personnel)

(A) Fire Detection Design & Design Review

Technical Requirement:

DOE 5480.7A requires "...a system to ensure that the requirements of the DOE Fire Protection Program are documented and incorporated in the plans and specifications for all new facilities..."

Justification:

A thorough review of fire protection systems during their design and construction will help ensure that these systems will perform as expected during a fire.

Performance Measure:

Bid packages, specifications, plans and other related documents are completely reviewed as scheduled. All review comments are appropriately documented. Periodic inspections are performed on-site to monitor construction activities and to identify deviations from approved plans and specifications.

Required Resources:

The equivalent of ___ qualified engineer (approximately _____ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity in the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

As the site-wide fire alarm system nears completion, this level of activity is expected to decrease.

This activity, itself, is an effective way to prevent costly post-construction modifications by assuring that the initial design and on-site fabrication are correct.

Some of the activity performed by this group may overlap with the responsibilities of Fire Protection Engineering. There also may arise questions regarding the "jurisdiction" of these two groups over a particular issue. Consolidation of the Fire Protection Engineering and Fire Detection Engineering organizations may enhance efficiency.

(B) **Security Detection Design**

Technical Requirement:

Section 1670-3 of DOE 6430.1A requires that new and replacement security alarm equipment be approved by the cognizant authority.

Justification:

A thorough review of security detection systems during their design and construction will help ensure that these systems will perform as expected and required during a security-related incident.

Performance Measure:

Bid packages, specifications, plans and other related documents are completed by stipulated deadlines. Periodic inspections are performed on-site to monitor construction activities and to identify deviations from approved plans and specifications.

Required Resources:

The equivalent of one qualified detection system specialist (approximately _____ hours) in the current fiscal year.

Time Loading:

Approximately _____ hours have been devoted to this activity in the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

This activity, itself, is an effective way to prevent costly post-construction modifications by assuring that the initial design and on-site fabrication are correct.

(C) **Major Projects Support**

Technical Requirement:

DOE 5480.7A requires "...a system to ensure that the requirements of the DOE Fire Protection Program are documented and incorporated in the plans and specifications for all new facilities..."

Justification:

A thorough review of fire detection and security systems during their design and construction will help ensure that these systems will perform when required.

Performance Measure:

Bid packages, specifications, plans and other related documents are completely reviewed by stipulated deadlines. All review comments are appropriately documented. Periodic inspections are performed on site to monitor construction activities and to identify deviations from approved plans and specifications.

Required Resources:

The equivalent of _____ qualified fire protection engineer and detection system specialist (approximately ___ hours) in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity in the previous fiscal year.

Potential Economies and Areas for Greater Efficiency:

This activity, itself, is an effective way to prevent costly post-construction modifications by assuring that the initial design and on-site fabrication are correct.

Some of the activity performed by this group may overlap with the responsibilities of Fire Protection Engineering. Consolidation of the Fire Protection Engineering and Fire Detection Engineering organizations may enhance efficiency.

(D) **Engineering Operability Evaluations**

Technical Requirement:

Section 9.c.(4), of DOE 5480.7A, stipulates that "minimum requirements to establish operability shall be developed for fire protection features. Periodic tests...shall confirm that these features are operable."

Justification:

Routine decisions, such as plant modifications and process changes, that effect fire safety and security should be based on valid technical considerations. The staff provides "expert" advice to facility managers and others so as to assure that such changes are implemented safely and securely.

Performance Measure:

Written requests for such evaluations are acknowledged promptly. The initial assessment is performed or scheduled within one week (or mutually agreed alternative). Final report or evaluation, if

necessary, is completed within agreed schedule.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the past fiscal year.

Potential Economies and Areas for Greater Efficiency

None identified.

(E) **Subject Matter Expert Technical Support to the Site**

Technical Requirement:

DOE 5480.7A mandates conformance with applicable fire safety requirements of the Code of Federal Regulations (CFR) and NFPA Codes and Standards. It also requires contractors to "maintain or have access to an adequate fire protection staff, including qualified fire protection engineer(s)" to interpret code requirements for activities on site.

Justification:

The ability of facility managers and other plant personnel to consult with the staff on fire safety code and security system-related issues ensures that site activities are performed safely and securely and that plant modifications and other construction-related activities are implemented in accordance with accurate interpretations of requirements.

Performance Measure:

Written requests for such analyses are acknowledged promptly. Initial assessment is performed or scheduled within one week (or mutually agreed alternative). Final report or evaluation, if necessary, is completed within agreed schedule.

Required Resources:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

Because the engineering staff has been able to accurately interpret fire code and security requirements, plant modifications and other construction activities on-site have avoided unnecessary costs associated with erroneous interpretations of codes and standards.

Some of the activity performed by this group may overlap with the responsibilities of other engineers within Fire Protection Engineering (see Section IV). Questions may arise regarding the "jurisdiction" of these two groups on a particular fire protection issue. Consolidation of the Fire Protection Engineering and the Fire Detection Engineering organizations may enhance efficiency.

(F) **Detection Standards Development**

Technical Requirement:

Section 9.a.(1), of DOE 5480.7A, requires the development of fire protection program documents.

Justification:

Detection standards require periodic review and update to reflect changing site circumstances and new requirements.

Performance Measure:

Detection standards are maintained current.

Resources Required:

Approximately ___ hours in the current fiscal year.

Time Loading:

Approximately ___ hours have been devoted to this activity within the last fiscal year.

Potential Economies and Areas for Greater Efficiency:

None identified.