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# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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October 5, 1994

The Honorable Tara O'Toole  
Assistant Secretary for Environment,  
Safety and Health  
Department of Energy  
Washington, DC 20585

Dear Dr. O'Toole:

The enclosed paper was presented at the Department of Energy Standards Workshop on October 3, 1994. You may find the viewpoints expressed of some interest.

Best regards,

*Joseph J. DiNunno*  
Joseph J. DiNunno

Enclosure

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# Environmental Protection Standards - A Challenge

Paper prepared for  
The Department of Energy Workshop on  
Standards Initiatives in Environmental Management  
at the  
Hyatt Regency Hotel  
Reston Town Center  
Reston, Virginia  
October 3, 1994

by

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Member,  
Defense Nuclear Facilities Safety Board<sup>1</sup>

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<sup>1</sup>The views presented are solely those of the author. They are not to be taken as any official action or expression by the Board as a whole.

## Environmental Protection Standards - A Challenge

The Department of Energy is faced with the responsibility for the massive cleanup of the toxic, hazardous and radioactive residuals from a half century of nuclear technology development and the production of nuclear materials and nuclear weapons. The DOE complex comprises some 20,000 facilities located on about 20 different sites with a total area of approximately 3300 square miles. While most of the residuals remain in the facilities, approximately 700 square miles of the sites are reported to be sufficiently contaminated to require cleanup. To date 351 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) operable units at 21 sites on the Superfund National Priority List (NPL) have been targeted for cleanup. In addition there are numerous other Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation Recovery Act (RCRA) and Decontamination and Decommissioning (D&D) projects in the cleanup

program. All told cleanup projects number approximately 900 at this point.

The environmental restoration activities of the DOE are somewhat unique relative to those being undertaken by other Federal agencies. This uniqueness stems from the self-regulatory responsibilities for radiological protection assigned to the department under provision of the *Atomic Energy Act of 1954* and perpetuated through subsequent legislation that established the Department. More specifically, the still operative provisions of the *Atomic Energy Act* require the Department to:

“...Establish by rule regulation, or order such standards and instructions to govern the possession and use of special nuclear material and by-product material as the Commission” (Note: the former Atomic Energy Commission and now the Department of Energy) “may

deem necessary or desirable to promote common defense and security or to protect or to minimize danger to life or property.”

Under the provisions of this Act, a considerable body of good practices has been developed in the form of rules, orders, and standards for ensuring health and safety of people against the potential exposure to ionizing radiation. Much of this development preceded the enactment of laws such as the *Resource Conservation Recovery Act* and *Comprehensive Environmental Response, Compensation, and Liability Act* which greatly enlarged the field of substances requiring special treatment in the interest of public health and safety. Given the chronology of these major pieces of legislation, it should be no surprise in observing that there exists a considerably greater body of standards relative to the protection of public health and safety and the environment pertaining to design, construction and operation of nuclear facilities than for decontamination, decommissioning and

environmental restoration. This is true not only for DOE's defense nuclear complex but also the commercial nuclear industry. This situation is simply a reflection of the stage of maturity of the nuclear age. More facilities have been built and operated than decontaminated and dismantled.

The focus of this workshop upon new initiatives for environmental management is very timely. The DOE, faced with the enormous challenge of safely decontaminating many obsolete and aged facilities and safely cleaning up the associated land areas, has much need for standards. Standards are required not only to define what must be achieved in the way of cleanup but to every extent possible how to achieve the stated objectives.

Congress and the Environmental Protection Agency are currently struggling with the most basic expression of what must be accomplished. They are attempting to develop consensus on a

definition of how clean is clean enough. Debate is centered on setting an acceptable risk criterion; i.e: risk of a fatality from defined exposure levels. Risk values for latent cancer in the range of one in ten thousand to one in a million are under consideration. Such a criterion would be universally applied to all man-made pollutants, including radioactive ones. While there is consensus that risks to health and safety following cleanup should be quite low, the uncertainties with respect to (1) the science from which such risk values were estimated, (2) the ability to demonstrate compliance, and (3) the benefits from compliance relative to costs make difficult the establishment of a risk criteria. Hopefully, one of the results of this workshop will be that we leave with a better understanding of this issue and a status report on the latest developments on the subject. I believe that substantial forward movement in the national cleanup task i.e., The removal of Superfund sites from the National Priority Listing - will not develop until consensus is reached on a national "clean" criterion.

As you well know the "L" in C.E.R.C.L.A stands for liability.

Those tasked with cleanup under the provisions of this law need to know when cleanup has been done sufficiently to be relieved from further liability. In a larger sense, it may be even more useful to know when liabilities are not likely to be incurred. In any case, the development and implementation of good "how-to" practices for both avoiding potentially harmful discharges and cleaning up sites will be strongly influenced by the target cleanup objectives such reference criteria represent.

As a young engineering student, I recall being told repeatedly by my professors that I was being trained to apply science and engineering to the solution of problems. A good measure of common sense would always be helpful. However, for a solution to be acceptable, it also had to be affordable. While my faith in this advice has been shaken at times, I remain convinced that it is still sound. To be successful, environmental restoration programs must not only reflect a good

science-based set of objectives but also fiduciary responsibility in developing and executing remedial programs. As supportive as Congress, and the Administration are of environmental cleanup and protection, such support is likely to wane if the public perceives that tax dollars are not being well-spent.

I also believe that the development and use of cost-effective practices that are captured in standards and related guidance documents can contribute much to cost effective solutions. To those charged with directing and managing the environmental cleanup effort should also be given the tasks of capturing the techniques and methodologies evolving from current cleanup projects and of continuing to upgrade and disseminate this knowledge as the field cleanup efforts grow. Undoubtedly many of you here are or will be involved with such effort.

My experience in standards work over the years allows me to offer you a number of observations that might be helpful:

1. *Standards fall generally into two broad categories -  
Definitions of*

- *What should be done*
- *How to accomplish it*

In general, the minimum requirements as to what should be done emanate from Congress and/or regulatory authorities.

Such statutory and regulatory requirements are then commonly supplemented by agency policies, rules, orders, standards and guides. In our society, the right to exercise such authorities stem from those being served. Yet to be well served requires active participation by those being served. Neither Congress nor our regulatory authorities

are so uniquely qualified in the scientific and technical fields for which they establish statutory and regulatory requirements as to proceed to develop requirements without external input. Just and effective laws relative to scientific and technical issues require inputs from those who are responsible for developing or using a technology. There exist administrative procedures that foster such participation. For government agencies to effectively advise Congress and for industry and public interest groups to effectively participate, all must work diligently to prepare reasonable and rationale inputs.

In my view Congress and regulatory authorities serve best in developing consensus on what should be done, leaving the regulated to take the lead in determining how to accomplish it. A good example is the way the nuclear utility industry stepped in to establish the Institute for

Nuclear Power Operations (INPO) following the accident at Three Mile Island. This Institute has developed many "how to" standards that form a recognizable basis for safe operations of the nuclear power industry.

In the case of DOE, a hierarchy of agency policies, rules, orders, standards and guides for nuclear facilities is illustrated by figure 1. For protection of health and safety and the environment this composite which I identify as a "Body of Good Practice", forms the basis for a Safety Management Plan. As I have indicated earlier, a considerable greater "Body of Good Practice" exists for facility life cycle phases of design, construction and operation than for decontamination, decommissioning and environmental restoration. This is illustrated by figure 2.

2. *"How to" type of standards best evolve from having the subject matter experts document what they have successfully done and why.*

Dr. Tara O'Toole, Assistant Secretary for Environment, Safety and Health in testimony presented on September 22, 1994 to the Energy Sub-Committee of the House Committee on Space and Science stated the following:

*"The men and women assigned to this cleanup -- scientists, engineers, technicians, and laborers -- will be pioneers in the true sense of the word. They will be defining a new industry, one devoted to site characterization and environmental restoration. Their jobs will range from design and construction of specialized remediation projects to the operation of earth-moving equipment and packing of waste drums.*

*Others will be plant operators, maintenance personnel, and technical experts at vitrification plants and incinerators."*

I would add to her observation that the DOE also has the opportunity to make as major a contribution to the development of standards and guides in the decommissioning of nuclear facilities and restoration of sites as they once did for the emerging nuclear power field. Millions of dollars are being spent on new technology developments in support of environmental restoration, particularly those having promise for application in the next ten years. Further, a number of D & D demonstration projects have been authorized. The capture in standards and guides of effective practices that are demonstrated should be a fundamental component of these efforts. Moreover, as DOE contracts out the remedial tasks to the

many industrial firms that will undoubtedly participate, DOE standards personnel and their support contractors should strive to extract from the work plans and safety management plans that are required by CERCLA, those common practices that are found most technically suitable and cost effective. The early accumulation and promulgation of these practices can form the basis upon which an effective, safety-oriented D&D and environmental restoration program can be managed. I know that such efforts can be successful for I have just described the genesis of the early standards and guides that were used by NRC to regulate commercial nuclear power and related licensed nuclear facilities. Standards evolve from practices that get sharpened as users attempt to apply them to a variety of situations. Such progress should be captured by the standards process. However, for such a standards development program to be successful, it is my view that

DOE needs to establish an effective central organization to coordinate and promulgate these standards, as was done by its predecessor agency, the AEC.

3. *Those technical personnel charged with drafting proposed standards should avoid to every extent possible the complexity of mixing scientific, social and political objectives. Stick to developing science-based advisories for those who must deliberate upon the social and political ramifications.*

When nuclear power generation began to develop in the industrialized world, we in the United States were at the forefront of this emerging technology. One of the first challenges the regulatory staff of the Atomic Energy Commission faced was the development of power plant siting criteria. The very cautious approach taken in siting

the first few reactors was captured in criteria set forth in 10 CFR 100. These criteria encouraged locations relatively remote from population centers and meteorological, geological, hydrological and geographical features that would minimize risks of offsite exposures should accidental releases of radioactivity be experienced. The draft criteria were provided for comment to a number of other nations interested in nuclear power. Concern was expressed by some countries that the United States criteria could be precedent setting and could make siting difficult for them because of the greater density of development within their boundaries.

While we in the United States were mindful of this concern and included language that made clear that these were national requirements only, we had to take the position that our more conservative criteria best met our national needs

at the time. We were quite prepared to share with the international community our experiences in applying them. My experience over the years in supporting various international standardization activities of the IAEA has shown me not only that there can be significant benefits in nations sharing experiences and practices but also has reinforced my perception that achieving international consensus on good practices and standards is extremely difficult and time consuming. Yet, there are many areas in the nuclear field for which the IAEA has been able to document recognized good practices eg: limits on maximum permissible exposures, nuclear safety, waste management. Nations seem to prefer however, to have the flexibility to adapt international practices to national needs rather than develop and adopt consensus standards.

The economic implications of environmental protection requirements especially are proving to be a major obstacle in achieving international consensus on protective measures. The recent backing off from goals set for air quality improvements at the South American conclave last year is a good example. My advice: Develop good practices nationally - then talk internationally. A corollary, of course, is not to advocate internationally what we are not prepared to do nationally.

4. *Standards as consensus products frequently reflect that core upon which there is general agreement but too often in the process of developing consensus are pared down to the minimum in guidance.*

The development of consensus on anything in our society today is a formidable task. The far flung DOE complex that has operated for years as a loosely-integrated set of field offices, managing a wide diversity of activities, represents a particularly difficult challenge. This inherent in-house diversity is further complicated by current DOE leadership that places high priority upon public involvement in the department's programs. The term "stakeholders" has become common place. The Price Anderson Amendment of 1988 further complicated this picture by establishing a program for enforcing DOE rules and orders with penalty sanctions. Rulemaking, of course, entails Administrative Procedures Act requirements for issuance of public notice of proposed draft requirements with opportunity for public comment.

As difficult as it is at times to develop consensus among the technical community, the resolution of differences among this wider set of interested parties will be even more formidable. Only those with openness, patience and fortitude will prevail. The situation will require a rule-making standards leadership empowered and able to make hard decisions.

5. *Best available technology and as-low-as-reasonably achievable concepts have been used to define goals, but such definitions can be extremely difficult to apply and enforce. Conflict resolution becomes too often a lengthy legal paradise.*

My personal experience with such concepts has been largely in air quality requirements made applicable by Clean Air Act provisions. In the early years after these

requirements were enacted my air quality experts spent more time and made more consultant fees on the witness stands presenting and defending "best-available technology" (BAT) concepts than doing air quality monitoring and devising protective measures. I developed from this experience a wariness of technical approaches in legislation that in effect:

- 1) throw upon the judicial system the burden of deciding what constitutes technical adequacy
  - 2) require a body of case law to establish a definition of best available practice
6. *Establishment of reference levels for how clean is clean enough should have a reasonable basis for determination of compliance. If compliance must be shown through*

*modeling and analytical calculations, guidance should be provided as to acceptable modeling methods. Where reference levels are couched in terms of risk, a reasonable base of statistical evidence should exist to establish credible probabilities of experiencing such risk.*

In establishing reference dose limits of 10 CFR 100 for use in siting commercial nuclear power plants, we of the regulatory staff recognized that such limits would not be very useful unless we also explained to potential licensees a basic calculational model that would be acceptable for demonstrating compliance. We made it clear that variations were permissible but the rationale for variances would be required. This approach proved to be quite understandable and widely accepted. In contrast, I offer you the reference 10,000 year dose criteria of EPA with respect to a High Level Waste (HLW) repository. The

Waste Isolation Pilot Plant (WIPP) history is a good example of the difficulty of demonstration of compliance.

In summary, my message to you is:

1. Make the development of standards a fundamental part of the D&D and environmental restoration effort.
2. To every extent possible have a strong science base for mandatory requirements.
3. Sharpen your consensus building skills.
4. Be prepared to act openly but decisively.
5. Think nationally and share globally.

FIGURE 1

# RADIOLOGICAL SAFETY MANAGEMENT

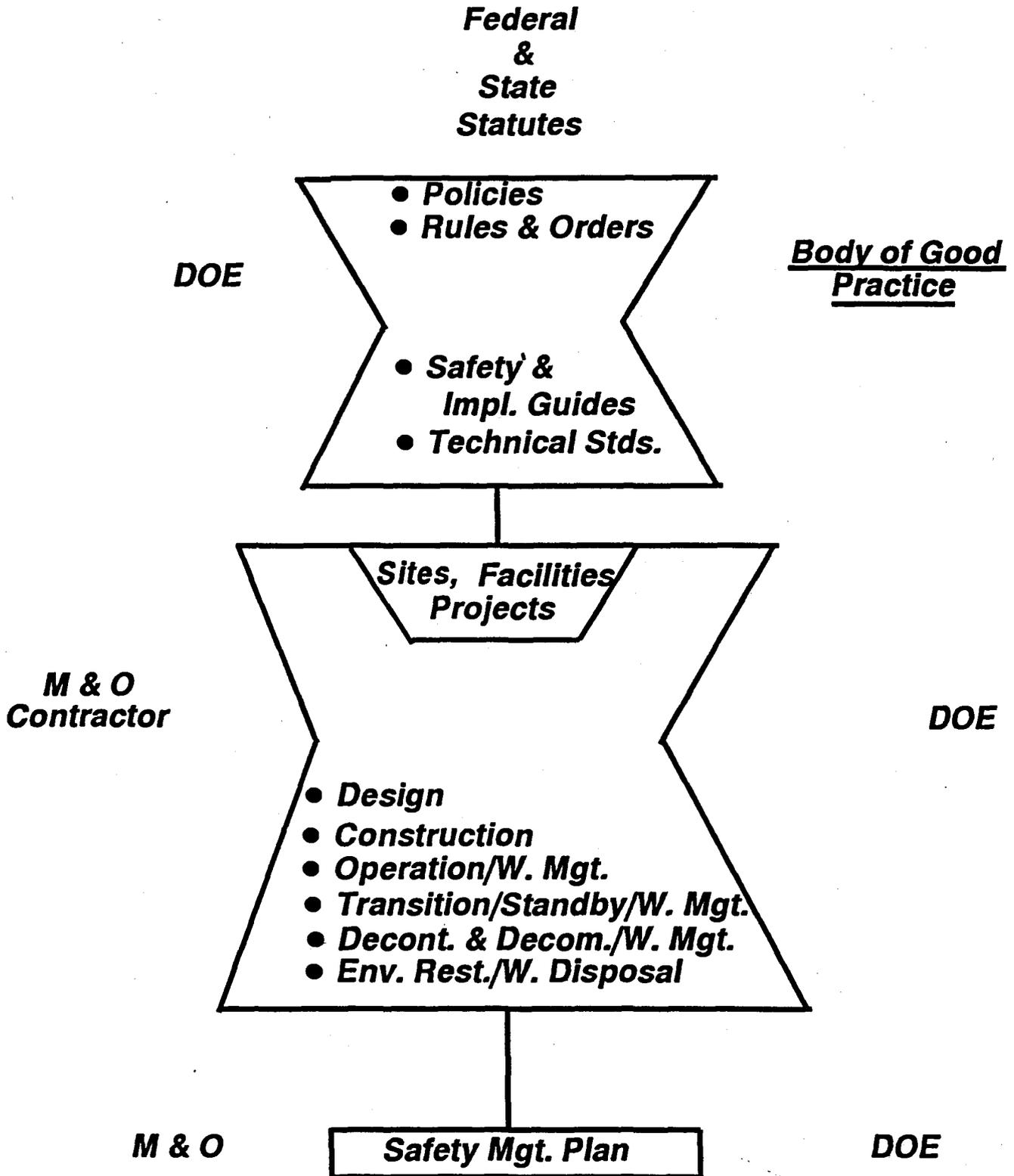
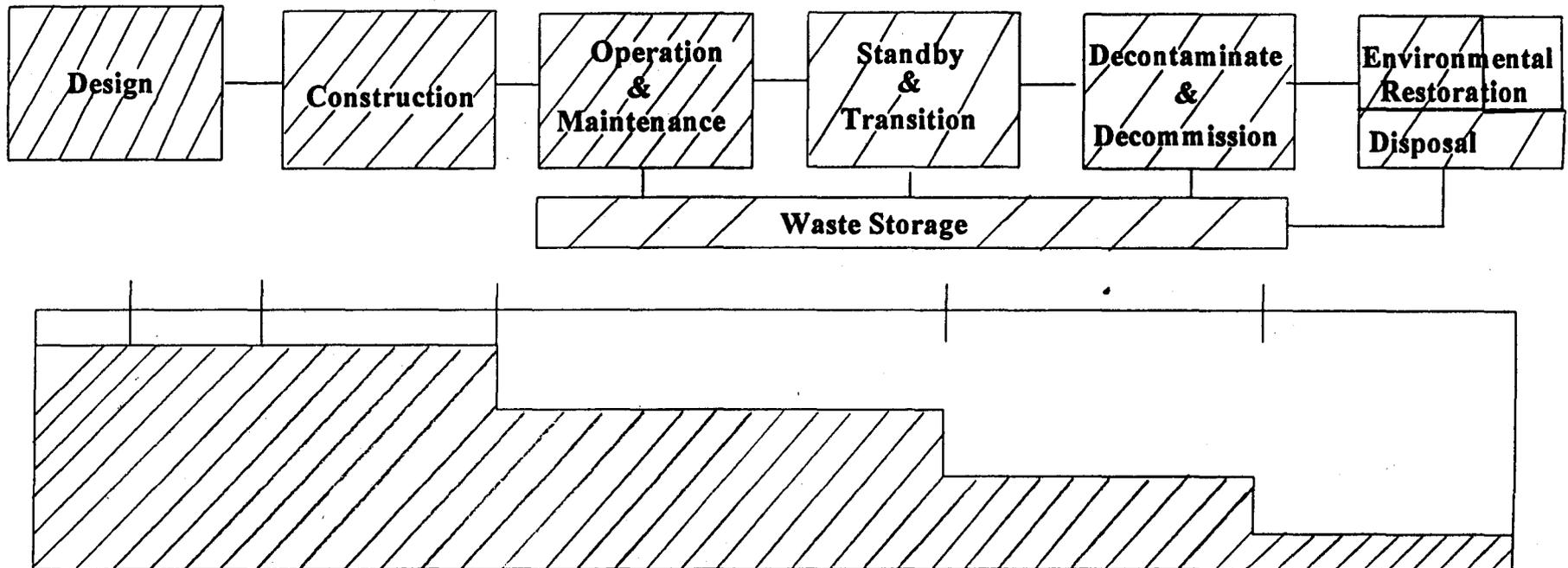


FIGURE 2

## DEFENSE NUCLEAR FACILITY LIFE CYCLE



**BODY OF GOOD PRACTICE**

United States Government

Department of Energy

memorandum

Richland Operations Office

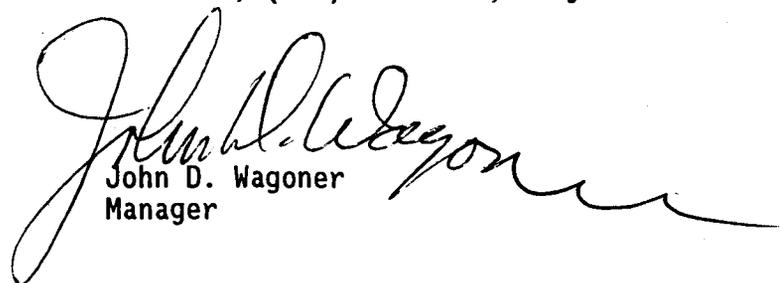
DATE: OCT 03 1994  
REPLY TO:  
ATTN OF: HRD:CEM  
SUBJECT: TRANSFER OF AMI SIDPARA

TO: Tara J. O'Toole, Assistant Secretary  
for Environment, Safety and Health  
EH-1, HQ

Mr. Ami Sidpara was to have transferred from the Richland Operations Office (RL) to an EH-HQ position located at the Fernald Area Office, effective October 2, 1994. I have requested that Mr. Sidpara remain in his current position of Supervisory General Engineer, GM-801-15, with the Office of Tank Waste Remediation System. Mr. Sidpara is the Director, Tank Operations Division, and as such, is the line DOE manager responsible for operations related to safe storage of radioactive liquid waste in underground storage tanks at the Hanford Site.

The Tank Waste Remediation System (TWRS) Program, is one of the most complex, costly, and highly scrutinized programs in the Department of Energy. This effort is a critical activity for the Department of Energy as a whole. Mr. Sidpara's personal contribution to this extremely critical activity is such that I believe it is in the best interests of the Department that he continue to serve in this capacity, and he has agreed.

I am requesting that EH waive the repayment of costs for Mr. Sidpara's house-hunting trip. At your earliest convenience, please notify Cindy Mason, Human Resource Services Division, (509) 376-5732, of your decision.

  
John D. Wagoner  
Manager

cc: R. S. Scott, EH-15, HQ