

CAN THE MIXED WASTE REGULATORY GRIDLOCK BE BROKEN?

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ABSTRACT

DOE and the commercial sector have for some time struggled with plans to appropriately manage their respective mixed waste inventories without a great deal of progress having been made. The Federal Facility Compliance Act of 1992 has provided a focus and a framework including a relatively aggressive schedule for developing treatment plans for each of the DOE sites. The plans will have enforceable milestones. The Act also calls for an evaluation of the possible benefits of regional treatment. While not specifically addressed by the Act, disposal of the treated DOE waste and the ultimate disposition of the commercial mixed waste inventory are also part of the equation. There are other important issues that must be wisely addressed if this mission is to succeed, such as the promulgation of reasonable and workable mixture and derived-from rules. This paper identifies several of these issues and proposes a direction to be taken. As an example, singular regulatory authority is recommended and that dual regulation of mixed waste be reserved for specific circumstances in which the risks associated with both the hazardous and radioactive constituents are comparable.

BACKGROUND: HOW DID WE GET HERE?

The Department of Energy Office of Environmental Management (EM), under the current leadership of Assistant Secretary Thomas Grumbly, faces many formidable challenges to its mission of restoring or remediating the environment at its former weapons production sites, and providing final disposition for massive quantities of waste currently in storage; all for the most part, a legacy of the triumph of the United States in the Cold War with the former Soviet Bloc. Significant and totally unanticipated world events relevant to the mission of the DOE weapons complex have occurred with rapidity beginning with the fall of the Berlin Wall on November 10, 1989 followed by the collapse of the Soviet Union in late 1991. These events, along with others, caused then President Bush to announce during his State of the Union address in 1992, the cessation of the last of the weapons production activities, thus thrusting the EM organization and its mission to the forefront of DOE both in terms of visibility and budget. During this same time period, 1989-93, the EM organization was formed by Secretary of Energy Watkins with Leo Duffy as the first EM-1 and grew from about twenty-five individuals at DOE/HQ to its current staffing of several thousand federal employees and support contractors.

Unfortunately, the rapid turn in world events along with the rapid growth in the organization charged with leading the DOE cleanup activities, has not necessarily been matched by progress in striving to resolve some of the difficult and challenging technical and institutional issues facing this country by providing for the safe disposition of the wastes and contamination derived from the Cold War victory. One of these challenges receiving a significant amount of attention currently is that of the proper management, including characterization, storage, treatment and disposal, of low level mixed waste.

When the Resource Conservation and Recovery Act (RCRA) was first promulgated in 1980, waste management personnel in the DOE complex gave no thought to the prob-

lems with mixed waste that would arise a few years down the road. In fact, mixed waste was not a term in our vocabulary yet. There was concern about the impact of RCRA on DOE's substantial hazardous waste management activities; whether DOE would follow the *intent* of the law or actually enter into the RCRA regulated community with its Identification Numbers, Interim Status, Part B permits, inspections fines and penalties. In 1984, DOE lost the lawsuit, Legal Environmental Assistance Foundation (LEAF) vs. Hodel, which settled all of those questions except the part about fines and penalties; still, the focus was hazardous waste. Shortly after the suit was settled and when most DOE sites were developing compliance plans for their RCRA hazardous waste, environmental action groups such as LEAF and the Natural Resources Defense Council (NRDC) began to point out to DOE that significant portions of the radioactive waste it generated contained RCRA hazardous constituents and therefore should be subject to the rules and regulations of RCRA. The term "mixed waste" then began to be used with some regularity albeit confusion. It is interesting that in the same year of 1984 that DOE acceded to RCRA regulation for its hazardous waste only, the Hazardous and Solid Waste Amendments were passed by Congress. This Act led to promulgation of the Land Disposal Restrictions in 40CFR268. We certainly had no idea at that time of the complexities that would result from these regulations, both RCRA and HSWA, in the efforts of DOE and the commercial sector to manage their mixed waste.

DOE was involved for the next 2-3 years in working with the US EPA to identify just what DOE wastes would be called "mixed" and therefore subject to dual regulation. This activity resulting in the so called "byproduct rule making" which awarded DOE jurisdiction over the radioactive component of mixed waste and EPA (or the authorized states) jurisdiction of the RCRA hazardous component. Since these two components are obviously inseparably commingled, the result is trying to satisfy two sets of rules, regulations and requirements

when both contaminants are present, even if one is there in a relatively minute concentration.

During this same time period, 1985-88, the NRC and EPA issued a series of joint guidance documents concerning the definition and identification of commercial mixed waste, and the siting and design of disposal facilities. In addition, the EPA was providing clarification on how to receive interim status for generators who were just beginning to realize the problems that mixed waste would bring them. Toward the end of this time period, general recognition began of complications arising from the Land Disposal Restrictions (LDR). Among other things, LDR called for all mixed wastes to be treated to a final treatment standard or by a specified best demonstrated available technology (BDAT) prior to land disposal. Furthermore, 40CFR268.50 prohibited the storage of mixed waste unless it is being stored "...solely for the purpose of the accumulation of such quantities of hazardous (mixed) waste as necessary to facilitate proper recovery, treatment, or disposal..." In other words, having no available treatment or disposal was not a legitimate reason for storage. At this point (early 1988) in the promulgation of these regulations, which divided the hazardous waste universe into parts and phased in implementation, spent solvents and the California list wastes were already affected. Thus any facility storing, for example, a RCRA listed solvent was immediately out of compliance with the LDR requirements and therefore subject to a notice of violation from EPA (or in most cases the regulating state authority) along with potential fines and penalties, unless of course, they were storing to accumulate sufficient quantity to treat. Given the limited national treatment capacity, that was very unlikely.

By mid-1988, when LDR was going to impact on the "first third" of the hazardous wastes, the mixed waste problem was apparent and the LDR "hammer" for both the first and second third was deferred until the third list was promulgated in May 1990. At that time, EPA granted a two year National Capacity Variance for the "thirds" wastes which expired in May 1992. DOE and EPA were attempting to finalize a "case by case" variance for this portion of the DOE mixed waste when Congress passed the Federal Facility Compliance Act (FFC Act) of 1992. This legislation waived sovereign immunity for DOE and other federal agencies with respect to RCRA, making it clear that the federal government was subject to the same fines and penalties as any other violator. It did recognize, however, the unique problem of mixed waste and granted an exemption from the storage prohibition until October 1995. By that time, site specific treatment plans covering mixed waste inventories at 50 DOE sites must be approved, modified, or rejected. The approved plans will have enforceable milestones for the various elements of the treatment process such as construction, permitting, and inventory workoff. DOE has responded to the requirements of the Act by forming a Federal Facility Act Task Force and a Policy Coordinating Group. They have developed an interim schedule calling for preparation of conceptual, draft and then final site treatment plans. They have submitted an inventory of mixed wastes and of existing or planned treatment facilities. And most importantly, they have reached an agreement with the National Governor's Association (NGA) to help facilitate the process of consensus building in the development of the site specific pieces of what clearly must be an overall national strategy for mixed waste management. The FFC Act has provided a unique opportunity and framework within which to focus upon the mixed waste problems and move toward a national resolve. How-

ever, we are now almost 16 months into the 36 month schedule and at this point the obstacles yet to be scaled seem formidable. Ultimately a number of key issues must be addressed in such a way that progress toward final disposition of the mixed waste inventories is not impeded while also assuring that the environment and public/worker safety and health are in no way compromised.

KEY ISSUES: BUILDING BLOCKS OR STUMBLING STONES

Identification/Characterization of Mixed Waste

A long standing problem key to the development of a mixed waste management program strategy, whether site specific or national, is the proper identification of the mixed waste inventory in both the federal and commercial sector. The first effort by the Department of Energy to develop a complex wide mixed waste inventory took place in late 1989 and was driven by the Federal Facility Compliance Agreement entered into at the Rocky Flats Plant. It covered only solvents, California list waste and dioxins and was nicknamed "THUD BABY" because of the impact it made when placed on someone's desk. In the years between 1989 and Oct 1992, DOE updated this information and developed similar data for the thirds portion of mixed waste including collecting information to support a petition for a 1-2 year case-by-case exemption to be tacked on to the 2 year National Capacity Variance. Before the petition could be answered, Congress passed the Federal Facility Compliance Act which required DOE to prepare a comprehensive inventory of their mixed waste, including 5 year projections of generation. An interim report was given to the States in April 1993 with an updated "final" version scheduled for release in the early months of 1994. The foremost comment received from the State review of the interim report was "NOT ENOUGH INFORMATION". Incidentally that report exceeded 4,000 pages and represented several man years of effort. Herein lies the primary problem with identification/ characterization. That is, when is a waste stream sufficiently characterized; for declaration as a mixed waste, for selection of a treatment option? Proper identification of the physical and chemical characteristics of a waste is a critical precursor to all management activities but it cannot become the activity. Generators must develop characterization plans that rely more heavily on well documented process knowledge, allowing the focusing of scarce analytical resources upon suspect mixed waste streams that may offer an opportunity to escape regulation by RCRA. In addition, large quantities of waste containers containing substantially the same type of waste, e.g. sludge from a wastewater treatment operation, should be characterized by selecting samples from the lot utilizing statistical sampling techniques. Consolidation of smaller volumes of waste into larger containers or tanks prior to sampling is another technique for constraining the overall cost of a characterization program. Other problems having an impact on the proper identification of mixed waste include: a) continued confusion regarding the relatively complex regulations in 40CFR261 for identifying hazardous wastes, b) inappropriate handling of samples and insufficient quality assurance plans which result in invalid, useless data, c) poor analytical practices and limited capability to handle the radioactive species, d) the relatively lead long time and high cost associated with performing a Toxicity Characteristic Leaching Procedure (TCLP), and e) a lack of technology to provide

characterization of certain waste streams that may have high rad content, be inaccessible, heterogeneous, etc.

The groups involved in the FFC Act framework must early on develop consensus on the characterization ground rules for mixed waste. We cannot wait until all waste is fully identified nor can we pay the price associated with that sampling program. But we must know enough. Clearly delineating "enough" is a critical step toward accomplishing the proper management of mixed waste.

Mixed and Derived From Rules & Below Regulatory Concern (BRC) at Both Ends

Two rules from the RCRA regulations that have added a significant degree of difficulty to the management of mixed waste have been the mixture and derived from rules. The mixture rule essentially states that if a listed hazardous waste is mixed with a non-hazardous waste media, the entire mixture becomes hazardous. It places no limit upon the relative concentration of the hazardous component, hence one can end up with the oft quoted "one drop of spent solvent in a drum of water" scenario. Such extreme examples may be the exception rather than the rule but they do indeed exist and call for unreasonable and expensive management of a counterfeit mixed waste stream. The "derived from" rule dictates that even after a listed waste has been appropriately treated, for example by incineration, that the residues of that treatment must continue to be treated as a hazardous waste unless the waste is taken through an expensive, protracted delisting procedure which even the EPA admits is seldom worth pursuing. Again this rule calls for practices that are unnecessary and without benefit with respect to the management of mixed waste. Both of these rules have been remanded to the EPA, not because it was deemed that they were inappropriate but because of errors in administrative procedures when they were promulgated. When they are reissued in draft form by the EPA for public comment, consideration should be given to the unique position of mixed waste where escape from regulation by the EPA, does not result in an uncontrolled, unregulated waste but rather shifts responsibility to the NRC or DOE.

The examples in the preceding paragraph point to the need for identification of some BRC levels for the RCRA hazardous constituent of mixed waste. However, there is also a benefit (and probably more likelihood) of developing a BRC for the radioactive contaminant. But in spite of many man years of technical and institutional effort, only a few examples of real BRC limits for radioactive waste exist, those being for scintillation cocktail and animal carcasses containing $<0.05 \mu\text{Ci/g}$ of H-3 or C-14. In 1990 the NRC proposed a process for developing additional BRC limits but public outcry forced its withdrawal. Some have attempted to use other standards as BRC limits for management of radwaste such as the 2.0 nCi/g limit from the DOT regulations which is the lower limit for radioactive materials offered for transport. This is clearly an erroneous practice. The drinking water standards for radionuclides have also been used as BRC limits for radwaste management with the theory being that if you can drink a solution containing 20 nCi/l of H-3, it's probably safe to dispose of that solution in a sanitary landfill (or at least in a RCRA disposal facility). Indeed, from a mixed waste perspective, the argument can be made that the term BRC takes on an entirely different meaning when applied to a dually regulated waste stream. Escape from one regulatory regime leaves the generator in the position of satisfying a second set of regulatory requirements. Furthermore, these requirements,

though different in their approach are consistent in their goal of protecting health, safety and the environment and are comparable in their rigor toward assuring that goal. For these reasons, it is most appropriate to develop standards for both the radioactive and hazardous components of mixed waste that permit management, including treatment and disposal under a single set of regulatory requirements that pertain to the constituent that is the predominant contaminant. Thus a RCRA hazardous solvent, for example, containing a "negligible" concentration of a radionuclide species could be managed as purely a RCRA waste, treated to satisfy LDR for the solvent, and disposed of at a permitted hazardous waste disposal unit. Correspondingly a radwaste stream with ppm concentrations of an RCRA hazardous waste could be managed as an AEA material and disposed of in an engineered low level radioactive waste burial ground. The waste acceptance criteria, required treatment, packaging, and engineered barriers associated with each respective disposal mode would mitigate the hazard to personnel, the public and the environment, regardless of whether one were dealing with the hazardous or radioactive constituent. These are important factors to consider in appropriate mixed waste management and should be based upon real risk contained in individual waste streams and not upon the ability of technology to detect increasing smaller quantities of radioactive or hazardous species in a waste, and by doing so impose unnecessary and duplicative requirements. This theme, which is certainly a key concept in the overall strategy to effectively manage mixed waste, is covered in detail in a paper by A. Thompson and M. Goo published in the Environmental Law Reporter (1). The parties to the FFC Act must recognize this as one of the more important issues that must be dealt with for the mixed waste strategy to move forward.

Stakeholder Involvement and Dealing with "Equity"

One might reasonably argue that the most important issue facing those working toward resolution of the mixed waste problem is that of full and open stakeholder involvement in the process. This circle of stakeholders would include anyone who has an interest in seeing the mixed waste problems in this country resolved. It would therefore include federal and commercial generators, federal and state regulators, T, S, D facility operators, Federal and State legislators, citizens and citizen groups. The FFC Act mandates the development of site specific treatment plans for each DOE site generating mixed waste. It also encourages public participation in this process although the specifics of that process are not detailed in the Act, other than the review that the final site treatment plans will receive by the respective authorized State regulatory body and an opportunity to receive public comment. However, the time when "public participation" meant review and comment of DOE programs and plans by interested citizens and other groups such as STGWG has passed. Stakeholders want to be involved in early discussion and formulation of plans. While there has been reasonably good exchange occurring between State regulators and their respective DOE sites, little has been done with other groups. The development of preferred options in the draft site treatment plans due out by August 1994 should have input from, for example, the newly formed/being formed Citizen Advisory Groups. These groups must have input into more than just a plan to treat specific mixed waste streams at a given site. They must be able to evaluate the concepts of regional treatment facilities in certain key locations around the country since it is clear that every

generating site cannot construct and operate treatment facilities on site to deal with all of their respective mixed waste. Some type of a regional complex will have to be developed particularly to support the treatment of low volume wastes generated at the "smaller" sites. In fact, the FFC Act addresses the concept of regional treatment, directing both the DOE and the States... "A plan required ... may provide for centralized, regional, or on-site treatment of mixed wastes, or any combination thereof....In reviewing the plan, the State shall consider the need for regional treatment facilities." Furthermore, while the FFC Act does not address disposal, the disposal issue cannot be excluded from discussions of mixed waste strategy development. A regional or central scheme for disposal is even more obviously needed than regional treatment. It is therefore extremely critical for overall success of this mission that the stakeholders begin early to develop a process that will allow consensus building. To some extent, DOE has formulated a plan for compliance with the requirements of the FFC Act that facilitates addressing these issues. They have, for example, formed an "alliance" with the National Governors Association (NGA). The NGA will act as a coordinator and facilitator in the process of interaction between the States and DOE. DOE has also developed a sequential process, starting with conceptual site treatment plans (CSTP) that are truly site specific, to the extent that each plan has, as a baseline option, the treatment of all wastes on site with no transport and treatment at off site facilities. The next step in the process is the development of preferred options from the several presented in the CSTP's. These preferred options will probably include off site treatment and will clearly call for a different process of stakeholder interaction than took place with the CSTP's. With the draft site treatment plans, stakeholders will now begin to see proposals for waste being transported into their state from other DOE sites. This is a critical but enormous step in the entire process of solving the mixed waste problem and one that must receive thoughtful attention. A plan must be formulated to move toward a consensus strategy for the entire DOE complex and the timing is very constrained. The schedule developed in response to the FFC Act requirements calls for the preferred options (DSTP's) to be prepared by August of this year. This is probably sufficient time for DOE to, in a unilateral activity, propose an overall strategy that would be relatively sound technologically and that could be supported by work done to date on the Programmatic Environmental Impact Statement (PEIS). However, this clearly is not an approach that would facilitate development of an agreed upon suite of final site treatment plans by Oct 95, the end point of this process as mandated by the FFC Act. If the final plans are expected to be approved and if they are expected to be integrated with respect to treatment, then a consensus building process utilizing the NGA et. al. must commence. Tools must be developed and/or enhanced for:

- a. Using a consistent approach for selection of preferred treatment options, site by site
- b. Enhancement of each plan to assure that rollups and intercomparisons are possible
- c. Performance of a system analysis of these options, particularly those involving offsite treatment, that includes risk and cost
- d. Identification and weighting of items for the equity discussions
- e.

Communication with and involvement of a broader segment of the public including use of Email, bulletin boards, satellite broadcasts, etc.

- f. Involvement of credible third party groups such as the National Academy of Sciences

More simply stated, the stakeholders are going to have to develop an enhanced mode of interaction for the next phase of this process, which began last October and continues until the Site Treatment Plans are approved (or modified, or rejected). The survey of existing waste stream data and treatment technologies has been done. It will continue to be made more complete. Options for treatment have been developed. The struggle to select and reach agreement on the preferred options must now take place. It cannot wait until we have all the information desired. It cannot wait for better, safer, faster, cheaper technology. It cannot wait for a change in the political scene.

There are processes available such as the Keystone approach that may be beneficial. There are other excellent tools, some of which have been utilized in the PEIS process, that can look at many factors for numerous scenarios and address "what if" questions. The process will be extremely difficult, more complex than most can imagine, particularly in the search for answers to questions of equity or whether we should wait for more information or better technology. Disposal of mixed waste will have to be included in the formula, and there are still other considerations we haven't discussed yet such as:

What About Commercial Mixed Waste?

Mixed waste has been and is being generated outside of the federal government by universities, hospitals, research facilities and other industrial concerns. The volumes are significantly smaller than those generated/stored by the DOE but nevertheless represent a problem in storage, treatment, and disposal that must be addressed. The FFC Act does not deal with this issue nor have, therefore, the conceptual site treatment plans developed by the DOE sites. The latest national inventory of commercial mixed waste indicates that the characteristics of commercial mixed wastes are, for the most part, very similar to that of their DOE cousins (2). While DOE obviously generates some mixed waste that the commercial sector does not, the opposite is not true. That is, there are essentially no wastes generated by the non-federal sector that could not technically be treated and disposed of in the future DOE mixed waste complex.

Discussions have been ongoing between DOE and the States regarding the possibility of DOE accepting this responsibility. Unofficially, DOE has put forth the possibility of receiving treated commercial mixed waste for final disposal at DOE sites with the understanding (or assumption) that there is sufficient treatment capacity available commercially to handle LDR requirements. It is not readily apparent that this is the case. One would assume that this issue could become an important part of equity discussions and it very well may. However, an unfortunate fact is that many of the States (California excepted) in which it would seem appropriate to site a DOE regional treatment facility, are also States in which relatively little commercial mixed waste is generated. Nevertheless, it seems apparent that this country cannot pursue a strategy for dealing with the large, complex mixed waste problems facing DOE without considering how the non-federal mixed waste inventory and future generation can be factored in. While the draft site treatment plans currently under

opment are not considering commercial mixed waste, it would certainly seem appropriate that an independent study be undertaken to overlay this inventory on the preferred options specified by the DOE sites to determine degree of fit and where shortfalls in capacity or other technical/institutional issues may arise.

Other Issues

This paper has identified several issues which are key to the overall development and implementation of a national mixed waste strategy. Space will not allow, nor will reader interest endure, further discussion on other issues. However, there are some that should be mentioned; some, in fact which may be more critical than characterization, "BRC", stakeholder involvement or commercial mixed waste. They are:

- Commercial treatment capabilities - While a few existing commercial facilities are being factored into the STP activities, there may be a significant cost advantage if DOE can interest the commercial sector in the development, construction, and operation of large scale mixed waste treatment complexes. Many of these vendors have contracted with specific DOE facilities in the development of onsite treatment capabilities, especially in the research and development of innovative technologies. However, there is also a significant expertise and experience in traditional hazardous waste treatment technologies that should be utilized.
- The RCRA permitting process - It is clear that the process of preparing a Part B permit for the construction and operation of mixed waste storage, treatment and disposal facilities must be cooperatively reviewed by both the regulators and the generators to determine where and how time might be saved from the 5-10 year periods that have been the norm rather than the exception up to this point.
- Technology development - DOE has established a significant research and development activity focus-

ing on mixed waste in the Mixed Waste Integrated Program (MWIP). It is pursuing new treatment technologies for waste streams where no current technology is applicable and is looking for improved technologies in other instances. It is joined by the Western Governor's Association and the DOIT program (Development of Innovative Technologies) in striving to provide the best that modern science can give. DOE, the commercial sector, and other stakeholders must continue to fight for improved integration of generator needs with researcher's activities and ongoing evaluation of programs to consider promising activities while aborting those which show little promise.

CONCLUSION

The FFC Act has provided the nation with an opportunity to focus upon, analyze, discuss, and move forward a plan to solve one of the significant environmental problems of this century. It is possible, though not necessarily highly probable, that as we enter the 21st century, programs and strategies will be in place that will accomplish just that. But it will not take place unless all groups are free in communication, willing to deal with issues described herein, (and others) and able to build a reasonable consensus that will lead to decisions to act. Let's get it done.

REFERENCES

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