MEMORANDUM

TO: The Record

FROM: Elaine Eby, Environmental Scientist
Anita Cummings, Environmental Scientist

SUBJECT: Develcpment of Proposed Treatment Standards for TC Metal Wastes and Various UTS Metals

The Agency is proposing to revise treatment standards for twelve metal ccnstituents based on grab samples collected from two different treatment technologies. (Both of these treatment technologies were identified as BDAT in the Phase IV proposed rule.) One of these data sets was collected in response to comments recieved by the Agency in response to the proposal (See item). The other is based on HTMR treatment that was previously submitted by Company X (See item 3) which was also based on grab sampling. (Note: All the "items" identified in this memoradum can be found in the docket submittal entitled, "Documents Supporting the Re-Proposed Treatment Standards for D005, D006, D007, D008, D010, and D011 Wastes and the Proposed Revision to the Universal Treatment Standards for Barium, Cadmium, Chromium (total), Lead, Selenium, Silver, Antimony, Beryllium, Nickel, Thallium, Vanadium and Zinc").

COMMENTS RECEIVED ON THE PROPOSED RULE

In response to the proposed Phase IV rule, commenters asserted that the proposed treatment standards were inappropriate for the following reasons: 1. Proposed treatment standards were based entirely on data from High Temperature Metal Recovery (HTMR), a technology inappropriate for many TC metal waste streams; 2. Data was not entirely based on grab sampling, 3. Treatment perfcrmance data was not representative of the diversity of TC metal and other metal-containing wastes, and 4. Treatment standards may not be achievable in multiple metal waste streams. (A complete set of the comments submitted in response to the proposed rule can be found in the RCRA docket).

The Agency believes that with regard to the first point the commenters are mistaken, The Agency has stated repeatedly that BDAT for TC metals is both HTMR and stabilization.(See 60 FR 43654,August 22, 1995 and page 3-7 of the background document entitled, "Proposed Best Demonstrated Available Technology (BDAT)

Background Document for Toxicity Characteristic Metal Wastes D004-D011". July 1995). In response to the concerns raised by the commenters regarding the use of both grab and composite data, the lack of current stabilization data for TC metal wastes, and the concern that some UTS levels may be unachievable by stabilization, the Agency began an effort to obtain additional treatment performance data that was based entirely on grab samples and better characterized the diversity of metal wastes.

ANALYSIS OF SUBMITTED DATA

In response to the proposed rule, the following commenters provided the Agency with stabilization performance data; Battery Council International, American Foundrymen's Association, Chemical Waste Management, and the Environmental Treatment Council. These commenters provided extensive "composite" data on the stabilization of various TC metal wastes. While each of the data sets provided information on the various performance levels of stabilization treatment, they did not provide the Agency with the full range of information necessary to re-evaluate or recaluste the treatment standards based on EPA's BDAT protocol. (See USEPA. "Final Best Demonstrated Available Technology (BDAT) Background Document for Quality Assurance/Quality Control Procedures and Methodology". Office of Solid Waste, October 23, 1991). (See items 7,9,11,12,13,14,21).

COLLECTION OF NEW PERFORMANCE DATA

In an effort to obtain additional data, EPA conducted site visits, in September 1996, at hazardous waste treatment facilities. (See items 19,20,27). These facilities represented different treatment operations: one facility was a large commercial TSDF that employed conventional stabilization technology to treat a wide array of inorganic metal wastes, the second was an on-site treatment facility that focused on the stabilization of inorganic metal slag and the third focused on non-conventional stabilization techniques. During two of these site visits the Agency either gathered performance data from company records or requested the collection of actual treatment performance data through sampling and analysis. Both facilities provided the Agency with detailed performance data consistent with BDAT protocols (all data were submitted as grab samples). (See items 2,5,6,21).

The performance data represented a wide range of metal-

bearing wastes (both listed and characteristic) that the Agency believes represents the most difficult to treat metal-bearing wastes.(See item 2). The types of wastes treated included mineral processing wastes, baghouse dust, battery slag, soils, pot solids, recycling by-products, and sludge. Untreated TCLP metal concentrations ranged from 4430 mg/l for lead to 1580 mg/l for chromium tc 82 mg/l for barium. Numerous waste streams also contained multiple metals which would be representative of a characteristic waste with Underlying Hazardous Constituents (UHCs), while cther waste streams had significant concentrations of combination metals including; lead and cadmium, barium and lead, and chromium and antimony. The Agency reviewed all the performance data and the facility treatment operations and determined that both facilities were well-designed and well-operated and represented BDAT technology for a full range of TC metals and the metal UHCs that are often found in these wastes.

In additicn, between October 1994 and December 1995, the Agency obtained performance data from one HTMR facility based totally on grab samples. (See item 3).

DEVELOPMENT OF NEW TREATMENT STANDARDS

With the aquisition of these two new data sets, the Agency believed that a reassessment of the UTS values were approporiate for the following TC metal constituents: barium, cadmium, chromium, lead and silver; and the following UTS metals; antimony, nickel, thallium, vanadium and zinc. (It should be noted that vanadium and zinc are not regulated as underlying hazardous constituents in characteristic wastes.)

The assessment began with the calculation of treatment standards for each of the two data sets, i.e., stabilization and HTMR. (See items 2, 3). Next, the Agency compared these treatment levels. (See item 2). Based on this comparison, the Agency selected the highest standard for each metal to establish UTS and to allcw for process variability and detection limit difficulties. The Agency believes that this approach is consistent with the intent of UTS and derives limits achievable by both HTMR and stabilization technologies. The analysis shows that for the following constituents(antimony, barium, lead, thallium and zinc) stabilization is the higher treatment number, while HTMR technology has the higher treatment number for the other constituents (beryllium, cadmium, chromium, nickel, and silver).

As a result of this new analysis, the Agency is proposing to change the treatment standard for the following TC metal wastes as well as their associated UTS: barium, cadmium, chromium, lead and silver. In addition, the Agency is proposing to change UTS for antimony, nickel, thallium, vanadium and zinc. With these changes, the Agency is establishing metal UTS based solely on grab samples treatment of a wide array of metal-containing wastestreams.

CHANGES TO BACKGROUND DOCUMENT

In support of the previously published Phase IV proposal, the Agency developed a backgound document in support of the proposed standards (see "Proposed Best Demonstrated Available Technology (BDAT) Background Document for Toxicity Characteristic Metal Wastes D004-D011, July 1995). As a result of our new analysis of data and the revisions to the UTS for metal consitutents, some chapters of the document are no longer germaine to this rulemaking. The following is a chapter by chapter edit of that document.

Chapter One - Introduction

See instead preamble to today's proposal

Chapter Two - Industries Affected and Waste Characterization

This chapter remains the same. See attached.

Chapter Three - BDAT Treatment Standards for Nonwastewater Forms of D004 - D011

This chapter is no longer germaine to today's proposal. The Agency is proposing to change the treatment standards for the following TC metal wastes as well as their associated UTS: barium, cadmium, chromium, lead, selenium, and silver. (A discussion of the proposed UTS for selenium can be found in today's preamble.) In addition, the Agency is proposing to change the UTS for antimony, beryllium, nickel, thallium, vanadium and zinc.

The types of applicable treatment technologies for metals remain the same: acid leaching, stabilization, high temperature metals recovery, retorting, hydrometallurgical recovery processes, and recycling. The Agency has identified HTMR and

stabilization as BDAT for metal constituents in nonwastewater forms of D005, D006, D007, D008, D010, and D011 wastes and for most other metal containing wastes.

The Agency retains the following rational for identifying HTMR and stabilization as BDAT for most metal constituents in nonwastewater forms of listed and characteristic metal wastes. Because metals cannot be destroyed, treatment options for metal-bearing wastes are limited. Typically, the treatment options include technologies that either can recover the metal or incorporate the metal into a stable matrix resistant to leaching. The Agency believes that the "best" treatment for metal constituents is recovery, especially in cases of high metal waste concentrations. Of the applicable technologies, HTMR appears to be the most matrix-independent (i.e., it consistently achieves the same levels of treatment performance regardless of influent matrix composition and therefore the need for data on the most difficult to treat waste seems unneccessary). HTMR also generally decreases the amount of material sent for land disposal, recovers valuable resources, and incorporates metals that are not recoverable into a stable slag matrix.

The Agency's review of the HTMR performance data (See item 3) indicates that the slag residues for land disposal leach concentrations of metals that are comparable to residues from stabilization of a diverse group of metal-containing wastes. (See item 2). Furthermore, the use of HTMR is consistent with the national policy, identified in HSWA, to reduce the quantity of hazardous constituents disposed in landfills (this is in contrast to non-recovery technologies, such as stabilization, which are not intended to reduce the total concentration or quantity of hazardous constituents in the waste and, in fact, can increase the volume being sent to landfills). In addition, because metals are recovered instead of land disposed, ore processing is reduced, thus saving energy and pollution from those processes.

EPA recommends, however, that if recovery is not feasible because the metal content in the waste is too low or the material contains constituents that may adversly affect recovered products, then the generator should investigate alternative ways to generate wastes that are amenable to recovery (e.g., segregation) or substitute materials that are suitable for recovery in their processes, for those unrecoverable material that will eventually become wastes.

The Agency realizes that recovery of metals from all waste is not practical; at some level of metal concentration, recovery efforts typically cease, and the remaining metals must be incorporated into a leach resistant matrix for safe disposal.

The Agency notes, however, that when it establishes concentration-based treatment standards, the regulated community may use any non-prohibited technology to treat the waste to meet the treatment standards, compliance with a concentration-based treatment standard requires only that the effluent concentration be achieved; once achieved, the waste may be land disposed. The waste does not have to be treated by the technology identified as BDAT; in fact, concentration-based treatment standards provide flexibility in the choice of a treatment technology. Any treatment, including recycling or any combination of treatment technologies, unless prohibited (e.g., impermissible dilution) or defined as land disposal (e.g., land treatment), may be used to achieve these standards.

The Agency has developed revised universal standards for the following twelve metals constituents; barium, cadmium, chromium (total), lead, selenium, silver, antimony, beryllium, nickel, thallium, vandium and zinc. These standards also apply to the specific TC metal wastes, D005,D006, D007, D008, D010 and D011. A universal standard is a concentration limit established for a specific constituent regardless of the waste matrix in which it is present.

Universal standards for the twelve metal constituents regulated in nonwastewater forms of metal-containing wastes are based upon the treatment performance data from stabilization and HTMR. EPA believes that the performance data used to develop UTS for metals are comprehensive and represent a diverse group of waste matrices.

Chapter 4 - BDAT Treatment Standards for Wastewater Form of D004-D011 Wastes

Not relevant to the proposal.

Appendix I
No longer relevant.

Appendix E
No longer relevant.