



Environmental Guidance Regulatory Bulletin

Office of Environmental Policy and Guidance • RCRA/CERCLA Division (EH-413)

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Amendments to the Corrective Action Management Unit Rule; Final Rule (67 FR 2962)

Effective Date: April 22, 2002

Rule Synopsis

On January 22, 2002, the U.S. Environmental Protection Agency (EPA) issued a *Federal Register* notice finalizing detailed standards for corrective action management units (CAMUs) used for the on-site management of cleanup wastes. This final rule establishes regulations governing: (1) grandfathering CAMUs to allow them to continue to operate under the 1993 CAMU regulations; (2) the types of cleanup wastes that may be managed in a CAMU; (3) minimum and alternate liner and cap designs for new, replacement, or laterally expanding CAMUs; (4) treatment requirements for wastes placed in CAMUs; (5) information submittals for CAMU applications; (6) responses to releases from CAMUs; and (7) public participation requirements for CAMU decisions.

Background

Subtitle C of the Resource Conservation and Recovery Act (RCRA) governs the identification, generation, transportation, treatment, storage, and disposal of hazardous wastes. Since 1980, EPA has implemented a comprehensive regulatory framework governing the “cradle-to-grave” management of hazardous wastes and their constituents. Although they are generally oriented towards prevention of, rather than response to, releases, these regulations apply identically to all hazardous wastes regardless of how, when, or where generated. Thus, during environmental restoration, closure, and cleanup of contaminated sites, these regulations apply to contaminated wastes, debris, and media (or portions thereof) that contain or otherwise qualify as hazardous waste.

EPA has long recognized that the Subtitle C regulatory framework governing hazardous wastes, particularly the land disposal restrictions (LDRs) at 40 CFR Part 268 and minimum technology requirements (MTRs)¹ unintentionally

present incentives to selecting less permanent remedies which leave cleanup wastes in place. Thus, environmental restoration project managers are often left with only two choices: (1) pursue the legal option of capping or treating cleanup wastes in place, thereby avoiding the LDRs, MTRs, and certain other management requirements or (2) excavate the cleanup waste and treat it to the full extent required by the LDR requirements and dispose of the waste in compliance with the “as-generated” hazardous waste disposal unit requirements.

As part of its efforts to remove these disincentives, on February 16, 1993, EPA published final regulations for CAMUs (58 FR 8658). This rule, summarized in an EH-413 *Environmental Guidance Regulatory Bulletin* titled *CAMU/TU Final Rule Issued* (dated May 12, 1993, at http://tis-nt.eh.doe.gov/oepa/guidance/rcra/camu_tu.pdf), provided considerable flexibility, allowing EPA and implementing states to tailor design, operating, closure/post closure, and waste treatment requirements for on-site CAMUs to site- and waste-specific conditions.

Although many stakeholders supported the 1993 CAMU rule, it was legally challenged after promulgation (*Environmental Defense Fund v. EPA*, No. 93-1316 (D.C. Cir.)). On February 11, 2000, EPA and the petitioners reached settlement on the CAMU litigation. The settlement outlined potential amendments to the 1993 rule, including treatment and design standards for and modifications to the definition of wastes that are eligible for management in CAMUs. These amendments comprised part of the CAMU proposed rule that appeared in the August 22, 2000, *Federal Register* (65 FR 51080).

Redeposition of remediation waste on-site may not always be the most desirable cleanup scenario if the facility lacks a suitable disposal facility or is unable to assure long-term management of such a unit. Based on detailed recommendations offered by a waste treatment industry trade association, EPA issued a “supplemental proposal” to allow for the off-site management of CAMU-eligible wastes provided certain conditions are met (66 FR 58085; November 20, 2001).

Final Rule

On January 22, 2002, EPA issued amendments to the regulations governing CAMUs (67 FR 2962). The remainder of this bulletin reviews: (1) those CAMU-related amendments that supplement, create new, or otherwise alter the 1993 CAMU requirements

¹ RCRA requires MTRs consisting of double liner and leachate collection systems be integrated into hazardous waste landfill designs.

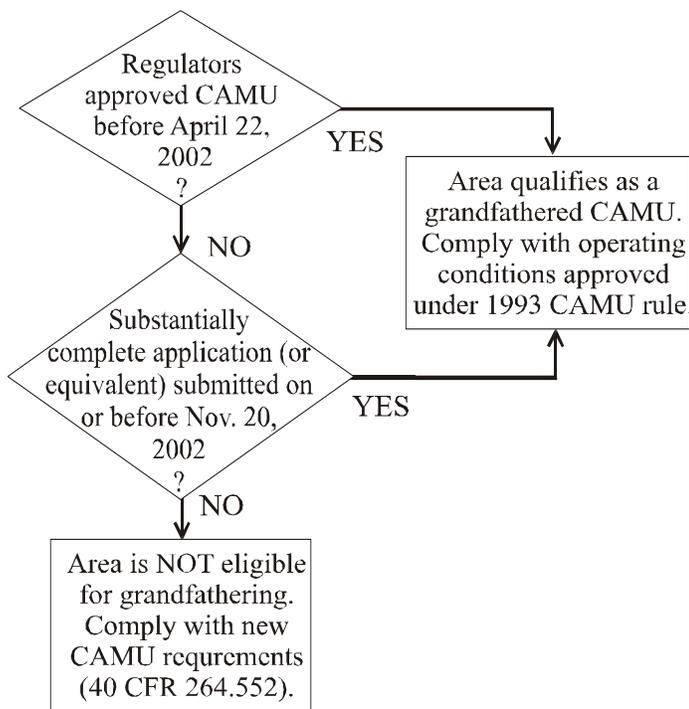
summarized in EH-413's May 1993 *Regulatory Bulletin*; (2) conforming changes to the "staging piles" regulations² expressly allowing certain physical operations that prepare wastes for subsequent management or treatment; and (3) the new provision allowing off-site disposal of hazardous CAMU-eligible waste in hazardous waste landfills.

CAMU-related Amendments

"Grandfathering" of Existing CAMUs

To avoid disruptions of CAMUs that have already been approved or that are well along in the regulatory review process, EPA issued a grandfathering provision. Figure 1 illustrates the two types of grandfathered CAMUs.

Figure 1. Criteria for Grandfathered CAMUs (67 FR 3003)



Grandfathered CAMUs will remain subject to the 1993 CAMU rule for the life of the CAMU "so long as the waste, waste management activities, and design of the CAMU remain within the general scope of the CAMU as approved." Changes that fall "within the general scope of the CAMU as approved" include: (1) changes that could be made without modification of the approved CAMU permit conditions, (2) placement of unauthorized but similar wastes (i.e., wastes with similar constituents and origin), (3)

² Areas that are used to temporarily accumulate solid, nonflowing "remediation waste" from cleanup operations may be designated as staging piles provided that such areas are under the control of the owner/operator and contiguous to where the solid or hazardous waste, media, and/or debris originated (40 CFR 264.554).

changes that retain the same basic design but enlarge (e.g., vertically expand) a CAMU to accommodate an extra volume of waste, and (4) changes allowing extended operation of a CAMU, provided its continued operation falls within the original "general scope" (67 FR 3004).

Changes that are determined to be *outside* the scope of the originally approved CAMU would be subject to the new requirements, if applicable. A change in one CAMU feature, however, would not automatically require reapproval of the entire CAMU under the new standards and would not cause it to lose its grandfathered status. For example, a change to allow placement of new waste types in a grandfathered CAMU would require that the wastes be treated to meet the new standards, and certain CAMU operating and closure standards may need to be modified; however, the entire CAMU would not have to undergo reapproval (67 FR 3004).

Waste Streams Eligible for Management in CAMUs

The EPA's amended regulations allow grandfathered CAMUs to continue receiving the broader category of "remediation waste," redefined as "all solid [nonhazardous] and hazardous wastes, and all media (including groundwater, surface water, soils and sediments) and debris that are managed for implementing cleanup" (40 CFR 260.10). All other CAMUs (i.e., new, replacement, or laterally expanded CAMUs) are limited to managing a separate subcategory of wastes.

Known as "CAMU-eligible waste," the first sentence of its definition mirrors EPA's redefinition of remediation waste. The remainder more explicitly identifies the types of wastes that may be placed in CAMUs, including wastes, media and debris found in land-based units and being managed for implementing cleanup. Table 1 (next page) outlines this term's key features and criteria.

Although generally within the meaning of CAMU-eligible, soils and other materials contaminated by spills or releases might be disallowed from management in a CAMU under the discretionary kick-out provision when:

- information indicates that such soils or materials have not been managed in compliance with applicable standards or unit design requirements,
- noncompliance with other applicable RCRA provisions likely contributed to releasing the waste,
- noncompliance was intentional to take advantage of the CAMU rule requirements, or
- noncompliance was the result of careless management practices (40 CFR 264.522(a)(2)).

This provision was promulgated to ensure that the CAMU amendments do not create any incentive to mismanage as-generated wastes (e.g., to create CAMU-eligible waste, and do not reward past non-compliance).

Table 1. Selected Waste Streams and Their CAMU-eligibility		
Waste Stream	CAMU-Eligible	NOT CAMU-Eligible
“As-generated” wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site	<ol style="list-style-type: none"> 1. Non-hazardous as-generated wastes (e.g., fly ash, cement kiln dust, coal combustion wastes) being used to facilitate treatment of cleanup waste or CAMU performance 2. Waste managed for implementing cleanup associated with, but not produced during management of, “as generated” waste <ul style="list-style-type: none"> • soil surrounding surface impoundment that has become contaminated by leachate • soil or other materials contaminated by spills or releases from ongoing industrial process. 	<ol style="list-style-type: none"> 1. Any type of <i>hazardous</i> as-generated wastes 2. Wastes such as spent solvents produced during manufacturing operations 3. Wastes produced during management of “as generated” waste such as <ul style="list-style-type: none"> • sludges that are periodically removed from surface impoundment during normal waste management routine • leachate from a landfill’s collection system, stabilized, and sent for land disposal.
Closure and Historic wastes	<ol style="list-style-type: none"> 1. Waste from closure of permanent land-based units (e.g., landfills, surface impoundments, land treatment units 2. Waste from closure of miscellaneous (RCRA Subpart X) units when the unit is intended to be a permanent disposal site 3. Waste removed from abandoned land-based units, regardless of whether the units were to be permanent or non-permanent. 	<ol style="list-style-type: none"> 1. Waste from closure of non-permanent land-based units (e.g., containers, tanks, waste piles) when the unit is not intended to serve as the final resting place for such waste 2. Waste from closing miscellaneous (RCRA Subpart X) unit when the unit was <i>not</i> intended to serve as final disposal site.
Wastes in containers, tanks or other non-land-based units	<p>Hazardous waste:</p> <ul style="list-style-type: none"> • First placed in containers, tanks and other non-land based units (e.g., containment buildings) as part of cleanup • Found above or below ground in crumbling or unstable containers, tanks and other non-land based units being managed for implementing cleanup • In buried containers, tanks, or other non-land-based units that are “intact or substantially intact” and excavated (i.e., unearthed or dug up) during cleanup. 	<p>Hazardous wastes in “intact or substantially intact” containers, tanks, or other non-land-based units (i.e., units that can be removed without likelihood of a significant release even if minor imperfections exist) found above ground during cleanup and being managed for implementing cleanup. (67 <i>FR</i> 2969 codified at 40 CFR 264.552(a)(1)(ii)(A))</p>

Design and Operating Standards for CAMUs

New, replacement, and laterally expanded CAMUs in which wastes will remain after closure are subject to three amendments to the CAMU design standards—liner standard, cap standard, and releases to groundwater. Table 2 (next page) identifies the national minimum design standards for such CAMUs,

Certain CAMUs are *not* subject to the minimum national standards. These include CAMUs that:

- Receive only CAMU-eligible wastes having constituent concentrations *at or below* remedial levels or goals applicable to the site (40 CFR 264.552(g));
- Are existing solid waste management units or areas of concern (AOCs) and become designated as CAMUs during site cleanup (67 *FR* 2978);
- Qualify as grandfathered CAMUs subject to the 1993 CAMU rule requirements (see Table 2);
- Are being used for storage and treatment only and are subject to staging pile requirements (see Table 2); and
- Are subject to approved alternate liner, cap, or leachate collection system (LCS) requirements.

Alternate Liner, Cap, and LCS Requirements. To accommodate site- and waste-specific circumstances and the use of CAMUs for land treatment, EPA issued two

provisions establishing opportunities for persons to propose, and Regional Administrators to approve, alternate liner, cap and LCS requirements for affected CAMUs. To obtain approval for alternative liner and LCS designs, owners/operators need to demonstrate one of the following (40 CFR 264.552(e)(3)(ii)):

- alternate design and operating practices that, together with location characteristics, influence technical performance of alternate liner and LCS designs (i.e., climate, geology, hydrology, and soil chemistry), will prevent migration of hazardous constituents into ground or surface water at least as effectively as the standard liner and LCS; and
- The CAMU is “to be established in an area with significant levels of contamination, and the Regional Administrator finds that an alternative design, including a design that does not include a liner, would prevent migration from the unit that would exceed long-term remedial goals.”

When approving alternate designs that do not include a liner or LCS, the Regional Administrator must find that potential migration of hazardous constituents from the CAMU will be consistent with the remedial goals for the facility (for example, not cause cleanup goals to be

Table 2. New CAMU National Minimum Design Standards Versus 1993 CAMU Rule Requirements³

Design Standard	1993 CAMU Rule	CAMUs Used for Storage and Treatment Only	New, Replacement, or Laterally Expanded CAMUs in which Wastes Will Remain After Closure
LINER	“CAMU shall be managed and constructed so as to minimize further releases to the extent practicable”(40 CFR 264.552(c)(4)).	“Staging piles must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment and minimize or adequately control cross-media transfer . . . through the use of <i>liners</i> . . .” (emphasis added) (40 CFR 264.554(d)(1)(ii)).	(1) Composite liner consisting of: <ul style="list-style-type: none"> • a lower component consisting of at least two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec; and • an upper flexible membrane liner (FML) with a minimum thickness of 60-mil for high density polyethylene (HDPE) or 30-mil for all other FMLs IMs that is installed in direct and uniform contact with the lower compacted soil component; and (2) Leachate collection system that maintains less than a 30-cm depth of leachate over the liner (40 CFR 264.552(e)(3)).
CAP	Requires capping of CAMUs where wastes will remain in place after closure considering several factors, but does not specify standards for such caps (40 CFR 264.552(e)(4)(ii)(B)).	“Staging piles must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer . . . through the use of liners, <i>covers</i> , run-off/run-on controls, as appropriate” (emphasis added). (40 CFR 264.554(d)(1)(ii)).	CAMUs with constituent concentrations <i>above</i> remedial levels or goals applicable to the site, cover the CAMU with a final cover designed and constructed to meet the five performance criteria: <ul style="list-style-type: none"> • provide long-term minimization of migration of liquids through the closed CAMUs, • function with minimum maintenance, • promote drainage and minimize erosion or abrasion of the cover, • accommodate settling and subsidence so that the integrity of the cover is maintained, • have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present (40 CFR 264.552(e)(6)(iv)).
RELEASES TO GROUND-WATER	Requires monitoring for existing releases to ground water and identifying any new releases from CAMUs after closure, but does <i>not</i> specifically require notification or corrective action of releases (see 40 CFR 264.552(e)(3)).	Staging piles must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment; however, staging piles do <i>not</i> include any provisions explicitly requiring any type of monitoring, notification, or corrective action of releases.	<ul style="list-style-type: none"> • Performance standard requiring “notification to the Regional Administrator and corrective action as necessary to protect human health and the environment for releases to ground water” • Determined on a site-specific basis in the broader context of facility-wide cleanup based on conditions such as extent of existing contamination, distance to nearest ground water well, ground water flow rates, and statistical sampling protocols. • Does not alter the more general 1993 CAMU performance standards (40 CFR 264.552(e)(5)(iii)).

³ When constituent concentrations in all wastes placed in a CAMU, including treatment and/or storage-only CAMUs, are *at or below* cleanup levels or goals for the facility, the CAMU does *not* have to comply with CAMU design standards or staging pile requirements, as applicable, or groundwater monitoring requirements (40 CFR 264.552(g); 67 FR 2995; January 22, 2002; and 65 FR 51108; August 22, 2000).

exceeded at locations where potential receptors would be located) (see 67 *FR* 2979).

EPA's amendments also allow owners/operators to propose, and Regional Administrators to approve, alternate cap designs when such designs facilitate treatment or performance of the CAMU (40 CFR 264.552(e)(6)(iv)(B)).

CAMU-eligible Waste Treatment Requirements

CAMU-eligible wastes containing principle hazardous constituents (PHCs) otherwise subject to LDR must be treated to achieve minimum national treatment standards or site-specific treatment standards developed through application of a number of adjustment factors (40 CFR 264.552(e)(4)(v)).

Principal Hazardous Constituents (PHCs). The EPA views a determination regarding the presence of PHCs in CAMU-eligible wastes as a normal part of well-designed cleanup processes leading to remedy selection and (in some cases) to the decision to consider use of a CAMU. The PHC concept applies after a decision has been made to excavate and manage cleanup wastes and is intended to identify higher-risk constituents in CAMU-eligible wastes.

During site characterization, owners/operators and permitting agencies typically identify which wastes are hazardous, which materials warrant remediation or removal, and which constituents will be used to establish site cleanup levels. This process results in the identification of what are generally known as the "risk drivers."

PHCs are defined as those constituents that "pose a risk to human health or the environment that is substantially higher than the cleanup levels or goals at the site" as established in a site-specific decision document (e.g., ROD, final permit, order) (40 CFR 264.552(e)(4)(i)). Regulators will select PHCs from those constituents that would, absent CAMU regulations, be subject to RCRA land disposal restrictions (LDR) treatment standards. The lists of constituents otherwise subject to LDR is **limited to**: (1) "regulated hazardous constituents" found in 40 CFR 268.40 (listed wastes); (2) "underlying hazardous constituents" (UHCs) found in 40 CFR 268.48 (characteristic wastes); and (3) "constituents subject to treatment" (for contaminated soil).

In making PHCs determinations, regulators will assume that an individual is directly exposed (through ingestion and/or inhalation) to the constituents in the CAMU-eligible waste, consistent with the exposure assumptions used to develop site-specific cleanup levels or goals, and considering reasonably anticipated land use (which could be residential, industrial, agricultural).

In general, regulators will designate constituents posing "a risk to human health and the environment substantially higher than that posed by the cleanup levels or goals at the site" as PHCs when:

- they are carcinogens posing a potential direct risk from ingestion or inhalation at the site at or above 10^{-3} , and
- they are noncarcinogens posing a potential direct risk from ingestion or inhalation at the site an order of magnitude or greater over their reference dose (i.e., greater than or equal to ten times the hazard quotient (67 *FR* 2983)).

This approach is expected to screen out constituents posing lower risks and CAMU-eligible wastes with lower concentrations of higher-risk constituents.

When making PHCs designations based on risks posed by the potential migration of constituents from the waste to ground water, regulators will consider constituent concentrations and fate and transport characteristics under site conditions, and site-specific factors such as:

- location of the CAMU,
- the nature of the wastes placed in the CAMU (e.g., mobility),
- how the waste placed in the CAMU will be managed (e.g., the type of CAMU that will be used and potential rates of liquid percolation into and out of the unit),
- transport of constituents to ground water or air, and
- beneficial uses of ground water (67 *FR* 2984).

To account for risk scenarios not otherwise addressed in the other PHC determinations (direct exposure and waste-to-ground water), regulators will, on a site-specific basis, designate constituents as PHCs based on other factors (e.g., ecological concerns, potential risks posed by dermal contact, or constituent mobility). This is true even when risk levels are higher or lower than the standard risk levels for carcinogens, and non-carcinogens provided constituents pose risks that are "substantially higher than the cleanup levels or goals at the site." The EPA does not, however, expect that PHCs will be designated based on other factors (i.e., ecological risks) unless such other factors were among the drivers for site cleanup level or goals (67 *FR* 2984).

It should be noted that owners/operators **cannot** use pre-treatment of the waste or other activities intended to reduce constituent concentrations to below PHC levels to avoid a PHC determination. Rather, PHC determinations and the related application of CAMU treatment standards and adjustment factors should be made based on constituent concentrations in CAMU-eligible waste as the waste is initially managed (67 *FR* 2982).

Treatment Standards. PHCs in CAMU-eligible wastes being disposed of in a new, replacement, or laterally expanded CAMUs and remediation waste considered **outside** the scope of the originally approved grandfathered CAMU) must be treated to achieve the minimum national treatment standards. However, if warranted, treatment standards may be developed (based

on site-specific circumstances) through application of a number of adjustment factors.

Minimum national treatment standards. Application of the minimum national treatment standards requires that the PHC concentrations in soil and non-soil wastes be reduced ninety percent unless such treatment would result in concentrations that are less than ten (10) times the relevant Universal Treatment Standard (UTS) (67 *FR* 2985). In this case, treatment would be capped at ten times the UTS. This standard was established for hazardous contaminated soil in the LDR Phase IV rule and is commonly referred to as “90% capped by 10xUTS” (63 *FR* 28556, 28603; May 26, 1998).

Site-specific treatment standards. The EPA expects implementing agencies to start treatment determinations using the minimum national treatment standards. When such standards are unachievable, the CAMU regulations attempt to avoid discouraging aggressive cleanup by offering appropriate opportunities to develop site-specific treatment standards through application of a number of adjustment factors. The EPA has stated, as a general matter, it has neither a preference for nor against application of the five adjustment factors (67 *FR* 2994), which include:

Technical impracticability. Owners/operators can propose, and regulators can adjust, CAMU treatment standards based on a finding that it is not technically feasible to achieve the minimum national treatment standards, or to conduct meaningful treatment at all, because of factors relating to the performance capability or cost of technology. The EPA intends that the technical impracticability adjustment factor include:

- the general concepts of “technically infeasible” and “inordinately costly” as those terms are used in the Federal CERCLA program; and
- two concepts under the current LDR treatment variance, including standards which are “unachievable” and/or “technically inappropriate” (40 CFR 268.44(h)(1) and (h)(2)(i), respectively) (67 *FR* 2989, January 22, 2002 codified at 40 CFR 264.552(e)(4)(v)(A)).

Consistency with cleanup levels. Regulatory authority can require, on a site-specific basis, more or less treatment of PHCs when treatment to the minimum national treatment standards would result in concentrations of PHCs that are significantly *above* or *below* the cleanup levels for the site. Cleanup levels are typically drawn from state or Federal default standards or from a more site-specific analysis and/or a site-specific risk assessment (40 CFR 264.552(e)(4)(v)(B)).

Community views. Based on local communities’

concerns about factors such as the long-term reliability of remedies, worker safety, cross-media transfer of pollutants, and interference with their day-to-day lives (e.g., from traffic, odors, or noisy technologies), regulatory authority may require more or less treatment than would be required under the minimum national treatment standards (40 CFR 264.552(e)(4)(v)(C)).

Short-term risks. Regulatory authority can require more or less treatment than would be required if the technology necessary to achieve the minimum national treatment standards, or the analysis necessary to determine whether treatment standards have been achieved would cause unacceptable short-term risks to workers or the public (40 CFR 264.552(e)(4)(v)(D)).

Engineering design and controls. Using five sets of engineering design-and-control circumstances, regulators can adjust, on a site-specific basis, the minimum national treatment standards to require less treatment than would otherwise be required. Designs and controls viewed as offering long-term protection include: (40 CFR 264.552(e)(4)(v)(E))

- when the minimum national treatment standards are substantially met and PHCs are of very low mobility (67 *FR* 2991);
- when cost-effective treatment has been used and the CAMU meets the liner and leachate collection requirements for new hazardous wastes land disposal units (67 *FR* 2992);
- when the Regional Administrator determines that cost-effective treatment is not reasonably available and the CAMU meets the liner and leachate collection requirements for new hazardous waste land disposal units (67 *FR* 2992);
- when cost-effective treatment has been used and PHCs in the treated wastes are of very low mobility (67 *FR* 2993); and
- when the Regional Administrator determines that cost-effective treatment is not reasonably available, PHCs are of very low mobility, and the CAMU meets or exceeds the liner and leachate collection system standards for new, replacement, or laterally expanded CAMUs in 40 CFR 264.552(e)(3)(i) and (ii), or the CAMU provides substantially equivalent or greater protection (67 *FR* 2993).

The applicability of these five *circumstances* are illustrated in an “if/then chart” in Table 3. [As discussed below, most but not all of the engineering design and controls adjustment factors are available for off-site permitted hazardous waste landfills.]

Table 3. If / Then Chart Illustrating Application of Engineering Design and Controls Adjustment Factor			
If	And if	And if	Then
Treatment standards in §264.552(e)(4)(iv) are <i>not</i> substantially met.	Cost-effective treatment has <i>not</i> been used.	Regional Administrator (RA) has <i>not</i> determined that cost-effective treatment is not reasonably available.	RA may <i>not</i> consider adjusting based upon the “long term protection offered by the engineering design of the CAMU and related controls.”
Treatment standards in §264.552(e)(4)(iv) are <i>not</i> substantially met.	The PHCs in the waste or residuals are of very low mobility.	RA may consider adjusting based upon the “long term protection offered by the engineering design of the CAMU and related controls” 264.552(e)(4)(v)(E)(1).
Cost-effective treatment has been used.	The CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d).	RA may consider adjusting based upon the “long term protection offered by the engineering design of the CAMU and related controls” 264.552(e)(4)(v)(E)(2).
The RA determines that cost- effective treatment is not reasonably available.	The CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d).	RA may consider adjusting based upon the “long term protection offered by the engineering design of the CAMU and related controls” 264.552(e)(4)(v)(E)(3).
Cost-effective treatment has been used.	The PHCs in the treated waste are of very low mobility.	RA may consider adjusting based upon the “long term protection offered by the engineering design of the CAMU and related controls” 264.552(e)(4)(v)(E)(4).
The RA determined that cost- effective treatment is not reasonably available.	The PHCs in the waste are of very low mobility.	Either the CAMU meets or exceeds the liner standards for new, replacement, or laterally expanded CAMUs in paragraph (e)(3)(i) and (ii) of this section, or the CAMU provides substantially equivalent or greater protection.	RA may consider adjusting based upon the “long term protection offered by the engineering design of the CAMU and related controls” 264.552(e)(4)(v)(E)(5).

EPA expects that decisions about treatment standards (including application of the adjustment factors) to be made as a part of CAMU determinations and, as a general matter, apply for the life of the CAMU. After a CAMU has been approved, any changes made to treatment (or other) requirements would be in response to an evolution of understanding of site-specific conditions. A more comprehensive understanding of the site-specific conditions should be gained during an iterative cleanup process. Any changes in treatment standards or other requirements would be subject to appropriate procedural safeguards (e.g., permit modification process; procedures for amending orders).

Assessing Compliance with Treatment Standards. For *non-metals* and metals removal (rather than stabilization) technologies, compliance with 90 percent reduction is based on *total* PHC concentrations. The EPA has established the toxicity characteristic leaching procedure (TCLP) as the default test for determining compliance with the CAMU 90 percent reduction in PHC concentrations.

Leaching conditions represented in the TCLP may not be present at many remediation sites. Thus, the TCLP will not always be the most reliable test for predicting site-specific leaching behavior for waste disposed of at a site. Where a regulatory agency can specify a disposal site for remediation waste, (such as a CAMU) and conditions at the specific cleanup site differ from those simulated by the TCLP, alternatives to the TCLP may be selected. Alternative tests must take into account conditions at the site and be better suited to assess the likely leaching behavior of waste disposed of at that site (including in a CAMU). The final rule provides the Regional Administrators the flexibility to specify alternative leach tests that are “appropriate for use” to determine compliance with the CAMU treatment requirements use alternatives to the TCLP. However, use of alternatives to the TCLP could mean that either more or less treatment will be needed to meet the standard compared with evaluating treatment with the TCLP at that site.

Site-specific use of alternatives to the TCLP would most often be appropriate in cases where:

- disposal conditions are known and differ from municipal solid waste landfill conditions,
- the waste will not be co-disposed with municipal solid waste (where the TCLP would more likely be appropriate), and
- there is an appropriate alternative test that more accurately reflects the individual site conditions.

Additional site- and waste-specific factors affecting metals leaching that EPA expects to consider include:

- disposal site and waste pH,
- anticipated rainfall infiltration of the site,
- characteristics of other waste co-disposed at the site, and
- the anticipated long-term structural integrity and porosity of wastes stabilized using cement or other pozzolonic treatment materials (67 FR 2987).

Appropriate use of alternative tests might include testing over a range of pH values known to occur at the site. The Synthetic Precipitation Leaching Procedure (SPLP; SW-846 Method 1312), along with new tests that are under development or have been adopted by European countries, or by adjusting liquid/solid ratios either in the test or mathematically after testing can be used to estimate metal leaching rates and the annual mass that would be leached.

As discussed below, supplemental amendments allow for the disposal of CAMU-eligible wastes in off-site permitted hazardous waste landfills. In these instances, EPA believes that it is unlikely that alternatives to the TCLP for measuring treatment compliance before off-site disposal will be approved because the regulatory authority at the remediation site may not know the details of how the disposal site is managed or the local conditions at the site, let alone the location of the specific landfill at the time of application (67 FR 2988).

Surrogate Constituents to Measure Compliance.

Regardless of which test is deemed appropriate, and selected for use at a particular site, EPA will allow, on a site-specific basis, the analysis of a subset of PHCs to determine whether treatment standards are achieved rather than requiring analysis of all PHCs present (67 FR 2994). Regulators will consider factors such as the difficulty of treatment, grouping of constituents with similar properties, and the ability to analyze the constituents when selecting the subset of PHCs to be evaluated. As a general strategy, owners/operators should propose to analyze, within a group of constituents with similar treatment properties, the most difficult constituents to treat, since treatment of the most-difficult-to-treat constituents will result in treatment of the other constituents as well.

Timing of Compliance with Treatment Standards.

The EPA believes it is appropriate to allow treatment requirements to be met prior to, or within a reasonable time after, placement of wastes in a CAMU so that CAMUs can be used to facilitate treatment remedies (65 FR 51108, August 22, 2000). As a general rule, EPA expects that treatment technologies, such as biotreatment, that are implemented after wastes are placed in a CAMU, will achieve treatment standards within months or years, not decades, except in very unusual circumstances (67 FR 2994).

Information Submission Requirements for CAMU Applications

In general, facilities will already have waste-related information available prior to requesting approval of a CAMU. The CAMU final rule defines more specifically the types of information that owners/operators must submit to enable the Regional Administrator to designate a CAMU. Unless information is not reasonably available (as described below), EPA requires owners/operators to provide the following information for wastes proposed for placement in a CAMU:

- the origin of the waste and how it was subsequently managed (including a description of the timing and circumstances surrounding the disposal and/or release),
- whether the waste was listed or identified as hazardous at the time of disposal and/or release, and
- factual information on the dates of waste disposal and/or release relative to the effective dates of LDR requirements (40 CFR 264.552(d)).

In instances in which the above information has previously been submitted to EPA, and remains timely and accurate, owners/operators can simply identify the information in this past submittal rather than resubmit (67 FR 2974 - 2975). Although EPA has not established a level of detail associated with fulfilling this requirement, submittals should be focused on the information needed for the decision at hand (e.g., for decisions about whether waste is CAMU eligible) and should avoid the collection of information not necessary to inform or support the decision in question.

“Unless Not Reasonably Available.” At some facilities, wastes may have been disposed of prior to enactment of RCRA’s cradle-to-grave program, or owners/operators may be unable to link contamination (e.g., contaminated soil) with waste management activities historically associated with the facility. To address these circumstances, EPA promulgated the “reasonably available” standard. When required information is not reasonably available, DOE can fulfill its obligations by furnishing EPA information, based on knowledge on the waste origin (67 FR 2975).

General CAMU Information Submissions. While requiring more specific information on wastes destined for placement into a CAMU, EPA did *not* alter the general information submission performance standard established in the 1993 CAMU rule. The EPA interprets this standard as requiring information relating to all aspects of implementation, including factors that are not specifically listed in 40 CFR 264.552(c) (e.g., information relating to the inclusion of a regulated unit in a CAMU).

Public Participation Requirements for CAMU Decisions

In the 1993 CAMU rule, EPA established provisions requiring that rationale for designating a CAMU be documented and made available to the public (58 *FR* 8672). Furthermore, CAMU standards are to be incorporated into existing permits using permit modification procedures (including the public participation procedures) of 40 CFR 270.41 and 270.42. The final CAMU amendments expand on the 1993 CAMU public participation requirements by requiring (1) public notice and “reasonable opportunity” for public comment before designating a CAMU, and (2) Regional Administrators to document rationale, including the degree of treatment necessary, for any proposed site-specific adjustments to the minimum national treatment standards (40 CFR 264.522(h)).

The “reasonable opportunity” standard is designed, as a general minimum, to ensure sufficient information about a prospective CAMU is available. It is intended to provide a meaningful opportunity for comment before a final agency determination is made. By avoiding more prescriptive provisions, EPA expects CAMUs will be considered and approved within the broader corrective measures process using administrative mechanisms that already exist (i.e., RCRA Part B permits; post-closure permits; enforceable documents). Notwithstanding, CAMUs can continue to be approved as part of permit modification procedures, including the existing public participation requirements.

Staging Piles

On November 30, 1998, EPA published the *Hazardous Remediation Waste Management Requirements (HWIR-Media): Final Rule* (63 *FR* 65874 - 65947), which adopted selected elements from the HWIR-Media proposal (61 *FR* 18780; April 29, 1996), including a new type of hazardous waste management unit called a staging pile. This type of unit was created for accumulation and temporary **storage** of solid, non-flowing hazardous “remediation waste.” In June 1999, the EH-413 issued a *Regulatory Bulletin* summarizing elements of the HWIR-Media rule, including staging pile requirements, at <http://tis-nt.eh.doe.gov/oepa/guidance/rcra/rbfin-tt.pdf>.

As illustrated in Table 2, CAMUs that are used for storage and treatment **only** are subject to the design,

operating, and closure standards for staging piles. The CAMU Amendments final rule codifies an amendment to the term “storage” (for staging piles only) to allow physical activities intended to prepare wastes for subsequent treatment that might otherwise meet the definition of “treatment” (e.g., physical mixing, blending and sizing of waste). More significant treatment operations involving something other than physical treatment (i.e., when the chemical character or composition of the waste is changed through chemical or biological treatment) are subject to the final CAMU regulations.

CAMU-Eligible Wastes Destined for Off-Site Permitted Hazardous Waste Landfills

Responding to commenter recommendations submitted on the August 2000 CAMU proposed rule, EPA issued a supplemental notice addressing the off-site management and disposition of CAMU-eligible wastes (66 *FR* 58085; November 20, 2001). The CAMU Amendments final rule directs the regulatory authority overseeing corrective action at the cleanup site to determine whether its CAMU-eligible waste is suitable for disposal in an off-site Subtitle C landfill and what conditions most appropriately apply to CAMU-eligible waste disposed of *without* first being treated to meet the applicable LDR treatment standards.

Conditions for Using Off-site Landfills

In addition to stakeholder (public) participation, recordkeeping, and several additional procedural conditions, the final CAMU amendments codify basic conditions that must be met before the regulatory authority will approve placement of CAMU-eligible hazardous waste in an off-site hazardous waste landfill. These prescribed conditions require the following:

- Wastes must meet the definition of CAMU-eligible waste (as defined at 40 CFR 264.522(a)(1)),
- PHCs in CAMU-eligible hazardous waste must be identified and treated to meet minimum national or site-specific adjusted treatment standards in lieu of otherwise applicable LDR treatment standards,
- The landfill must be located off-site and meet the requirements for new landfills (40 CFR Part 264, Subpart N), and
- The landfill must have a RCRA permit specifically authorizing receipt of CAMU-eligible waste.

Limitation To CAMU-eligible Waste. The EPA extends to off-site permitted hazardous waste landfills its restriction that only CAMU-eligible waste can be placed in such units without first meeting LDR treatment standards or obtaining a variance. Also, EPA retains RCRA’s ban on liquids in landfills and prohibits the

placement of “as-generated” hazardous waste, unless full compliance with LDR treatment standards is achieved (67 *FR* 2998). The EPA recognizes, however, that as-generated non-hazardous wastes are not *regulatorily* restricted from placement in hazardous waste landfills and, therefore, do not require a “to facilitate treatment or the performance of the CAMU” exemption (67 *FR* 2998).

Treatment Requirements. Prior to placement into an off-site landfill, both soil and non-soil CAMU-eligible waste that contain PHCs must undergo treatment. Treatment requirements for such waste generally mirrors the treatment standards for CAMU-eligible waste placed in CAMUs. That is, standards require treating PHCs to meet either the minimum national treatment standards (90% capped by 10xUTS) or site-specific treatment standards adjusted based on one or more of the enumerated factors.

Although site-specific adjustment factors for off-site landfills are similar to those for CAMUs, the final CAMU amendments do *not* allow off-site landfills to use:

- CAMU adjustment factor B (consistency with site cleanup levels), or
- three of the five circumstances under the CAMU engineering design and controls adjustment factor ((E)(3), (4), and (5)).

Additionally, conditions of the second engineering design and controls circumstance (“E(2)”), which adjusts treatment levels based on the use of a cost-effective technology and the protection offered by disposal unit design, are significantly tighter for off-site landfills. These conditions require treatment of PHCs to a “significantly-reduces-the-toxicity-and-mobility” performance standard and is required in all cases (40 CFR 264.555(a)(2)(iii)).

Limitation to Off-site Permitted Hazardous Waste Landfills. To avoid adopting a course of action that may have unintended consequences, EPA limits the disposal of CAMU-eligible waste to off-site Subtitle C landfills that meet the requirements for new landfills (40 CFR part 264, Subpart N) and have a RCRA permit specifically authorizing receipt of CAMU-eligible waste (40 CFR 264.555(a)(3)).

Approval Procedures and Implementation.

Environmental restoration project managers desiring to transport CAMU-eligible waste to an off-site permitted hazardous waste landfill will generally have to furnish the same information as persons requesting approval of an on-site CAMU (67 *FR* 2999). Thus, applicants must provide to the regulatory authority at the cleanup site sufficient information to demonstrate that the waste is CAMU-eligible, to identify PHCs, to adjust treatment levels as appropriate (e.g., to demonstrate technical impracticability), and similar information. The applicant would not be

expected to provide information that is irrelevant to the decision (e.g., the specific design of the receiving landfill).

Approval of CAMU-eligible waste for placement in an off-site landfill would occur under procedures identical to CAMU approval procedures, with approval issued by the regulatory authority overseeing cleanup (40 CFR 264.555(c)). The approval process requires that the regulatory authority modify the permit for a hazardous waste landfill to allow receipt of CAMU-eligible waste, *before* it can receive such waste. Permit modifications will follow procedures specified in 40 CFR 270.42 or comparable state regulations. At a minimum, these procedures require public notice, an opportunity for comment, and an opportunity for a hearing. (EPA assumes in most cases that states will choose the class 2 permit modification process, although class 3 modifications would meet the general performance standard as well.)

In some cases, state or Federal regulations would already require a permit modification at a facility, but in others— for example, where the waste met the waste acceptance criteria (WAC) in the permit—they might not. In any case, the regulations ensure that the permit is modified through a public process before allowing receipt of CAMU-eligible waste (40 CFR 264.555(d)).

As described at 67 *FR* 3001, commenters to the November 2001 supplemental proposal (66 *FR* 58085) expressed concerns that EPA expected states to modify a facility’s permit for each new remediation or every time it received CAMU-eligible waste from a new off-site location (see [DOE letter dated December 5, 2001, Re: 66 FR 58085; "Supplemental Proposal to the Corrective Action Management Unit Rule"; Proposed Rule](#)). In the final rule, EPA clarifies its intent that receiving landfills only modify facility permits once (with public notice, comment, and opportunity for a hearing). In fact, EPA expects that some commercial hazardous waste landfills will immediately seek “enabling permit modifications.” Once approved, these would allow the facility to accept any CAMU-eligible waste that had been approved for off-site disposal by the appropriate regulatory authority at the remediation site (67 *FR* 3001).

Be aware that as part of the permit/permit modification process at the receiving landfill, the permitting authority could impose additional conditions it determines are necessary or appropriate. Furthermore, authorities can accommodate any special concerns of the local community through the RCRA “omnibus” provision. The EPA expects, however, that compliance with the CAMU amendments, combined with the design and management standards required at the receiving facility under its RCRA permit, will provide sufficient assurance that

CAMU-eligible waste will be safely managed (67 FR 3001).

Abbreviated Notice Procedures. To accommodate stakeholder concerns that decisions on CAMU-eligible waste from a particular cleanup might not be protective at a receiving facility, EPA provides an abbreviated notification procedures (40 CFR 264.555(e)). These must be fulfilled for each remediation before the subject CAMU-eligible waste is placed in an off-site landfill.

These procedures require a landfill—which may have modified its permit through a public process and already been approved to receive CAMU-eligible waste—to notify the RCRA permitting authority and persons on its mailing list of its intent to receive CAMU-eligible waste from a particular off-site cleanup. This notice would identify the location of the remediation site, the principal hazardous constituents, and the treatment requirements. The public then would have fifteen days to provide comments or express concerns to the regulatory agency.

Regulators have (1) an *additional* fifteen days to object to the placement of the CAMU-eligible wastes in the landfill, and (2) the authority to extend the review period an additional thirty days because of public concern or insufficient information. If the regulatory authority objects to the placement or does not notify the owner/operator of its choice not to object, the facility cannot receive the waste until the objection had been resolved, or the permit is modified under 40 CFR 270.42 to specifically authorize receipt of the CAMU-eligible waste.

To expedite this process, EPA issued a provision (40 CFR 264.555(e)(iv)) that allows the facility, the local public, and the regulatory agency to collaboratively identify situations in which, because of minimal risk (e.g., total volume of CAMU-eligible waste from a particular remediation is negligible), they can agree that the notification procedures are not necessary. The EPA urges owner/operators to work closely with the appropriate regulatory authorities and the local public to look for opportunities to expedite the process.

Other RCRA Cradle-to-grave Requirements.

Since the amendments addressing off-site permitted hazardous waste landfills are narrow in scope, CAMU-eligible hazardous wastes remain subject to all applicable hazardous waste requirements (e.g., waste analysis plans, standard RCRA waste management requirements, manifesting, recordkeeping, reporting, operating records, and LDR tracking requirements).

Regarding the LDR notification, EPA regulations require generators to send a one-time written notice to the land disposal facility to provide specific information (e.g., EPA waste identification numbers, the manifest number of the

first shipment, and waste analysis data) “when exceptions allow certain wastes or contaminated soil that do not meet the [land disposal restriction] treatment standards to be land disposed.”

Also, to ensure adequate tracking and accountability when CAMU-eligible waste is treated off-site, EPA requires that the off-site treatment facilities meet LDR certification requirements (40 CFR 264.555(f)) by certifying that the treatment meets the requirements of the off-site provision (as opposed to the LDR requirements).

State Authorization

Under RCRA Section 3006, EPA may authorize a qualified state to administer and enforce a hazardous waste program, including issuing and enforcing RCRA permits within the state, in lieu of the federal program. A number of competing considerations come into play when determining state authorization status for CAMU rules. These include whether:

Before a DOE site can integrate one or more CAMUs into its site-wide cleanup strategy, the state in which the site is located must, at a minimum, adopt the CAMU provisions.

- the regulation is issued under the Hazardous and Solid Waste Amendments of 1984 (HSWA);
- the regulation is new or modifies previous regulations that may or may not have already been adopted by a State and for which the State has (or has not yet) been authorized; and
- the regulation is more or less stringent than any preceding regulation it modifies.

These considerations are discussed in more detail below and are collectively reflected in Table 4 (next page), which illustrates which agency (EPA or State), if either, will implement CAMU amendment provisions.

Designation of the CAMU Amendments

EPA issued the CAMU amendments under RCRA sections 3004(u) and (v), which are HSWA provisions. (67 FR 3006). [This authority also formed the statutory basis for the original Federal CAMU regulations (see 58 FR 8658, 8677; February 16, 1993).]

Regulations that Are New/Modify Existing Regulations

The CAMU Amendments include new federal regulations and provisions that modify existing federal regulations. Specifically, 40 CFR 264.555, which allows placement of CAMU-eligible waste in off-site permitted hazardous waste landfills, is viewed as a new regulation. CAMU and staging pile amendments modify existing regulations (40 CFR 264.552 and 264.554, respectively).

Table 4. State Implementation of CAMU Amendments

CAMU Amendment Provision	States with Neither RCRA Base Program Nor HSWA HSWA Affected Program Authorization	States with RCRA Base Program Authorization But Not HSWA Affected Program Authorization	States with RCRA Base Program Authorization and HSWA Affected Program Authorization But <i>Not</i> 1993 CAMU Authority	States with RCRA Base Program Authorization and HSWA Affected Program Authorization, Including CAMU Authority
CAMU Amendments	EPA, unless and until State becomes authorized for both RCRA base and HSWA affected programs	EPA, unless and until State becomes authorized for HSWA affected program	Neither EPA nor State unless and until State becomes authorized for HSWA affected program	EPA, unless and until State obtains interim authorization-by-rule or final authorization
Staging piles	EPA, unless and until State becomes authorized for both RCRA base and HSWA affected programs	EPA, unless and until State becomes authorized for HSWA affected program	Neither EPA nor State unless and until State becomes authorized for HSWA affected program	Neither EPA nor State unless and until State amends HSWA affected program and EPA approves
Off-site permitted hazardous waste landfills	EPA, unless and until State becomes authorized for both RCRA base and HSWA affected programs	EPA, unless and until State becomes authorized for HSWA affected program	Neither EPA nor State unless and until State becomes authorized for HSWA affected program	Neither EPA nor State unless and until State amends HSWA affected program and EPA approves

Regulations That Are More or Less Stringent

When EPA promulgates a *new* HSWA requirement that is *more stringent or broader in scope* (e.g., Phase II LDR treatment standards for Toxicity Characteristic (TC) organics), the new requirement takes effect in all States on the effective date stated in the rule, regardless of a state’s authorization status or program. It is implemented exclusively by EPA until States become authorized (RCRA section 3006 (g)). When EPA *modifies* a HSWA regulation to make it *more stringent* (e.g., CAMU Amendments versus 1993 CAMU rule), the modification goes into effect on the effective date stated in the rule (April 22, 2002). In these cases, EPA carries out HSWA requirements and prohibitions, including issuing new permits implementing those requirements, until it authorizes the state to do so.

HSWA regulations that are viewed as *less stringent* than existing federal requirements become effective only in unauthorized states, and states that have not been granted authorization for the affected aspect(s) of the hazardous waste program. Moreover, states with interim or final authorization are *not* required to adopt HSWA (or non-HSWA) regulations that are less stringent.

Status of 1993 CAMU Rule and CAMU Amendments

Except for regulations governing off-site permitted hazardous waste landfills (40 CFR 264.555), the CAMU amendment design, operating and treatment standards are viewed as more stringent than the 1993 CAMU rule. Relative to other HSWA provisions (i.e., LDRs and MTRs), CAMU regulations (both the 1993 CAMU rule and the

CAMU Amendments) are viewed as *less stringent*. Therefore, states that are authorized for corrective action but have not received authorization for the 1993 CAMU rule are *not* required to seek authorization for the CAMU amendments, since existing corrective action and LDR regulations are more stringent than the Federal CAMU regulations. States that have already been granted authorization for the 1993 CAMU rule, however, must revise their programs so that they are not less stringent than the federal program. Since they were promulgated under HSWA authority, EPA will implement, consistent with more stringent state law, the amended CAMU regulations in states authorized for the 1993 CAMU rule unless states obtain authorization by the effective date using EPA’s new “interim authorization-by-rule” process (67 FR 3007).

Questions of policy or questions requiring policy decisions will not be dealt with in EH-413 Regulatory Bulletins unless that policy has already been established through appropriate documentation. Please refer any questions concerning the subject material covered in this Regulatory Bulletin to:

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