



Department of Toxic Substances Control



Alan C. Lloyd
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Arnold Schwarzenegger
Governor

January 27, 2005

Mr. Dwight Gemar
Weston Solutions, Inc.
750 Dump Road
Mare Island
Vallejo, California 94592

Dear Mr. Gemar:

Mare Island Investigation Area H1, RCRA Landfill Post-Closure Security Fence Evaluation

Attached for your information is a Department of Toxic Substances Control memorandum presenting information regarding the IA-H1 RCRA landfill post-closure security requirements. As has been discussed in the past, and most recently at the December 2, 2004 RAB meeting, the Investigation Area H1 landfill area may be determined as part of a final Remedial Action Plan, RCRA Closure Plan, and RCRA Post-Closure Care Permit, to be unacceptable for public access. The attached memorandum presents information regarding regulatory requirements pertaining to this issue, and a basis for further discussion.

Should you have any questions regarding this letter, please call me at (510) 540-3773.

Sincerely,

Chip Gribble
Remedial Project Manager
Base Closure Unit
Office of Military Facilities

Attachment

cc: Mr. Gary Riley, RWQCB
Ms. Carolyn d'Almeida, USEPA
Mr. Jerry Dunaway, US Navy
Mr. Gill Hollingsworth, City of Vallejo
Ms. Myrna Hayes, RAB Co-Chair



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Department of Toxic Substances Control

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Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Chip Gribble
Remedial Project Manager
Office of Military Facilities
Site Mitigation & Brownsfields Reuse Program

FROM: Scott Ward *Scott Ward*
Hazardous Substances Engineer
Closure and Post-Closure Section
Northern California Permitting and Corrective Action Branch

DATE: January 26, 2005

SUBJECT: Investigation area H1, RCRA landfill post-closure security fence
evaluation, Mare Island, Vallejo, Solano County
Project Number 25045/200063-33/204 - HWMP

DOCUMENTS REVIEWED

1. Weston Drawing Number C-5: Final Grading Plan — south investigation area H1 remedial design plan
2. Weston Drawing Number C-6: Landfill cap section and access road details

INTRODUCTION

As you requested, the closure and post-closure section of the Northern California Permitting and Corrective Action Branch (NCP CAB) has prepared this memorandum to discuss the RCRA post-closure permitting requirements with respect to the proposed fence and land reuse at the RCRA landfill and containment area in Investigation Area H1 at the former Mare Island Naval Shipyard (MINS). The proposed fence design drawings reviewed are specified in the above cited documents.

The proposed fence consists of a single 3/4 inch cable raised to a maximum height of 2 feet and 6 inches at the support posts which are spaced every 16 feet. The fence will surround the entire 70 acre containment area and will be positioned just outside of the

containment area slurry wall. An access road will additionally be placed exterior to the fenced containment area.

The Mare Island Final Reuse Plan designates the containment area to be open space and recreational use (City of Vallejo, California, 1994). Additional information based upon discussions at meetings with the Restoration Advisory Board (RAB) and Weston Solutions indicates that the proposed fence will also include entry points which will connect to defined trails throughout the 70 acre containment area, with access trails leading to the top of the RCRA landfill refuse mound.

REGULATORY REQUIREMENTS

The federal Resource Conservation and Recovery Act (RCRA) of 1976 required the owners or operators of hazardous waste treatment and disposal facilities to operate with a RCRA hazardous waste permit after November 19, 1980. In accordance with the RCRA regulations, the Navy applied for, and received, an Interim Status permit from the Department for the hazardous waste landfill, and the industrial wastewater treatment plant and surface impoundments at Mare Island on December 11, 1981. The issuance of this Interim Status operation permit now requires that these historical hazardous waste operation areas be closed according to the regulatory requirements of the title 22 of the California Code of Regulations. Below, two sections of the California Code of Regulations that set forth the regulatory requirements for site access restrictions, which apply to the proposed fence and land reuse of the RCRA permitted hazardous waste units within Investigation Area H1, are discussed.

Security § 66264.14

Regulatory requirements of the California Code of Regulations, title 22, division 4.5, chapter 14, article 2, section 66264.14 specifies the following security measures be followed:

- The facility shall provide an artificial barrier (fence) that completely surrounds the RCRA units and prevents unknowing entry; or the facility shall provide 24 hour surveillance through video monitoring or guards that continuously monitor and control entry;
- The facility shall provide entry control at all times through gates or other entrances;
- The facility shall provide warning signs, written in all languages predominant to the area, legible from a distance of at least 25 feet, and in sufficient numbers to be seen from any approach. The signs must read, "Danger Hazardous Waste Area – Unauthorized Personal Keep Out".

Section 66264.14 does additionally permit a waiver of the requirements of this section if the facility can provide compelling justification which demonstrates that the security

requirements of this section are counterbalanced by other measures such as increased institutional controls and engineering design. Further detail regarding the type of justification the Department will require to exercise this waiver is provided in the following section.

Closure and post-closure § 66264.117

California Code of Regulations, title 22, division 4.5, chapter 14, article 7, section 66264.117, subsection (d) specifies regulatory requirements for post-closure care property use. As stated verbatim in section 66264.117 subsection (d):

- “Post-closure use of property on or in which hazardous waste remain after partial or final closure shall never be allowed to disturb the integrity of the final cover, liner(s), or any components of the containment system, or the function of the facility’s monitoring systems, unless the Department finds that the disturbance:
 - (1) is necessary to the proposed use of the property, and will not increase the potential hazard to human health or the environment; or
 - (2) is necessary to reduce a threat to human health or the environment.”

The exception to these requirements again, must demonstrate that deviations from the language of this section be counterbalanced by other measure such as increased institutional controls and engineering design, and additionally supported by a risk assessment showing that such deviations will not increase potential hazards to human health or the environment.

WAIVER OF SECURITY REQUIREMENTS

When considering the waiver of the requirements set forth in § 66264.14 or § 66264.117 (d), three elements of hazardous waste landfill post-closure are of particular importance. These elements include:

1. The proposed land reuse;
2. The proposed security, fence, gates, signs, and other institutional controls;
3. The proposed cap design and maintenance.

These three elements should be thought of as a single set of interrelated criteria. These criteria are considered balanced in what the Department would regard as a conventional hazardous waste landfill site in post-closure. A conventional site is one in which: (1) the land reuse plan restricts all activity from the site; (2) the security at the site does not deviate from the requirements set forth in § 66264.14, which commonly consists of a chain link fence, typically 6 feet in height, or a barbed wire fence from 3 to 5 feet, with access control through locked gates, and with appropriate signage; and (3) a landfill cap is designed to meet at least the minimum requirements for a RCRA landfill. These minimum requirements for a RCRA landfill cap are discussed in greater detail in the following section of this memorandum.

A waiver of the requirements set forth in § 66264.14 or § 66264.117 (d), and, subsequently, deviations from what the Department considers conventional would require a demonstration showing that the balance of the above stated elements of post-closure would be maintained through modifications to one or more of these criteria.

For example, if the land reuse is planned to allow access to the site, and security is intended to be less than what is set forth in § 66264.14, then other measures such as an over designed cap, increased institutional controls such as community education, educational signage, explicit plans for site access, and increased oversight, care, and cap maintenance, would be required to compensate for these deviations. Such deviations would also be required to be supported through a risk assessment which quantifies the intended land reuse, site access, and the resulting additional burden placed on the cap.

ADDITIONAL CONSIDERATIONS

- The California Code of Regulations, title 22, division 4.5, chapter 14, article 14, section 66264.310, subsection (a) specifies performance based landfill cap criteria. These criteria set forth the minimum performance based requirements for a RCRA landfill cap. As stated verbatim in 66264.310 (a):

“At final closure of the landfill or upon closure of any cell, the owner or operator shall cover the landfill or cell with a final cover designed and constructed to:

1. Prevent the downward entry of water into the closed landfill throughout a period of at least 100 years;
2. function with a minimum maintenance;
3. promote drainage and minimize erosion or abrasion of the cover;
4. accommodate settling and subsidence so that the cover’s integrity is maintained;
5. accommodate lateral and vertical shear forces generated by the maximum credible earthquake so that the integrity of the cover is maintained;
6. have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present”
7. conform to the provisions of subsections (e) through (r) of section 66264.228, except that the Department shall grant a variance from any requirement of subsections (e) through (r) which the owner or operator demonstrates to the satisfaction of the Department is not necessary to protect public health, water quality or other environmental quality.”

Subsections (e) through (r) of section 66264.228 are provided in Attachment A. The provisions of these subsections provide general criteria for the landfill cap layers, grading, runoff control, as well as several other criteria associated with the cap

construction and maintenance. These subsections however do not provide exact engineering design specifications.

- It has been the Department's experience that through natural weathering events alone, degradation and disrepair of post-closure components is inevitable. These post-closure components include the cap; security features such as fences, gates and signs; drainage structures; and monitoring and maintenance equipment. Degradation and disrepair of these components has been found to occur even at the most inaccessible closed hazardous waste landfill sites which strictly prohibit recreational activity.
- The potential for children and youth access to the landfill and containment area is greatly enhanced by the proposed land reuse, relaxed access restrictions, limited recreational space on the island, and proximity to residential housing. The potential for increased degradation caused by walking, running, bike riding, digging, or playing in a manner that intentionally or unintentionally disturbs post-closure components should be thoughtfully evaluated aside from considerations based on aesthetic qualities.
- It has been the Department's experience that over time, interest in post-closure site operation and maintenance decreases, as well as a willingness to spend limited financial resources.
- Long term site care and protection of human health for future residents should be the guiding considerations for the issues discussed in this memo.

REFERENCES

City of Vallejo, California. 1994. "Mare Island Final Reuse Plan." 26 July.

ATTACHMENT A

**California Code of Regulations, title 22, division 4.5, chapter 14, article 11,
section 66264.228, subsection (e) through (r)**

Subsections (a) through (d) of section 66264.228 are not included herein as these subsections do not specifically apply to the discussion of this memorandum.

Subsections (e) through (r) of section 66262.228 are presented verbatim to that of the California Code of Regulations title 22.

§66264.228. Closure and Postclosure Care.

(e) If waste is to remain in a unit after closure, the owner or operator shall comply with, and plan for compliance with the following:

(1) The unit shall be compacted before any portion of the final cover is installed.

(2) (reserved).

(3) (reserved).

(4) A foundation layer shall be provided for the compacted barrier layer of the final cover. If needed, the foundation layer shall contain herbicide sufficient to prevent vegetative growth, and shall be free of decomposable organic matter. The layer shall be compacted at a moisture content sufficient to achieve the density required to provide adequate support for the nonearthen membrane.

(5) A compacted barrier layer of clean earth shall be provided above the foundation layer, and shall be provided around the unit to a depth as low as the level at which the owner or operator has deposited waste, to prevent lateral migration of waste and gas and vapor from the waste. The layer of earth shall be wholly below the average depth of frost penetration, and shall be compacted at a moisture content sufficient to achieve a percent compaction that has been demonstrated, with the specific cover material to be used, to prevent the downward entry of water into the foundation layer for a period of at least 100 years.

(6) The earthen material shall contain herbicide sufficient to prevent growth of vegetation. The slope of the final top surface of the compacted barrier layer shall be sloped after allowance for settling and subsidence to prevent the build up of hydraulic head.

(7) the owner or operator may use nonearthen materials for the barrier layer provided it is demonstrated to the satisfaction of the Department that a barrier layer of alternative composition will equally impede movement of fluid and be as durable as a compacted earthen barrier.

(8) If hazardous waste is underlain by a liner containing a synthetic membrane, then a synthetic membrane shall be provided in the final cover above the compacted barrier layer. The membrane shall be made of material chemically resistant to the waste at the facility, whether or not contact between the membrane and the waste is anticipated, and shall have thickness and strength sufficient to withstand the stresses to which it shall be including shear forces, puncture from rocks or penetration from roots.

(9) If a synthetic membrane is used in the final cover system, the owner or operator shall provide a layer of material above the synthetic membrane of the final cover, and a layer of material below this synthetic membrane, to protect the membrane from damage.

(10) The owner or operator shall provide a water drainage layer, blanket or channel above the

compacted barrier layer of the final cover to provide a path for water to exit rapidly.

(11) The owner or operator shall provide a filter layer above the water drainage layer to prevent soils from clogging the drainage layer.

(12) The owner or operator shall provide a layer of top soil of thickness sufficient to support vegetation for erosion controlled deep enough to prevent root penetration into the filter layer. The top soil shall have characteristics to protect the compacted layer against drying that would lead to cracking, to resist erosion and to support vegetation growth.

(13) Permanent disposal areas shall be graded at closure so that with allowance for settling and subsidence, the slope of the land surface above all portions of the cover, shall be sufficient to prevent ponding of water. Such areas shall be graded to drain precipitation away from the disposal area. Portions of the land surface above the cover unavoidably slopes great enough to invite erosion which cannot be readily controlled by vegetation shall be protected by gunite, riprap or other material sufficient to provide erosion control.

(14) Unless vegetation on the cover would pose a significant fire hazard unacceptable to the fire prevention authority or would interfere with a planned postclosure use of the site that is acceptable to the Department, the owner or operator shall provide conditions favorable for hearty growth of vegetation that will provide erosion control without forming roots that would penetrate the compacted earth cover, and shall estimate the cost of providing such conditions and vegetation as part of the cost of closure. Vegetation for closed disposal areas shall be selected to require minimum watering and maintenance. Plantings shall not impair the integrity of containment structures or the final cover.

(15) At and after closure, permanent disposal areas shall have drainage systems capable of transporting water from the water drainage layer away from the closed facility and capable of diverting surface runoff away from or around disposal areas, containment structures, leachate collection systems and monitoring facilities. Drainage systems shall be capable of preventing erosion of containment structures. Drainage system components themselves shall be lined or otherwise protected against erosion.

(16)(A) When closing a permanent disposal site, the owner or which the horizontal location and elevation of the cover and other containment features, monitoring facilities and drainage features can be determined throughout the entire postclosure care period. All survey work shall conform to accepted survey practices and be performed and certified by a licensed land surveyor or registered professional engineer licensed to practice surveying.

(B) The owner or operator shall submit a copy of the surveyor's notes used to establish the benchmarks described in this subsection in accordance with section 66264.116.

(17) The owner or operator shall provide in the closure plan predictions of the magnitude of the drops in elevation that will occur at various portions of the top surface of the final cover as a result of settling and subsidence. The prediction shall account for compression of material underlying the liner (or underlying the waste if there is no liner) and compression of the liner, waste, fill and cover. The prediction of the drop in elevation due to compression shall account for immediate settlement, primary consolidation, secondary consolidation and creep, liquefaction and dynamic consolidation due to earthquake loads.

(18) If the following information has not already been submitted to the Department and if dikes and hazardous waste will remain at the site after closure, the owner or operator shall provide in the closure plan proof that the dikes have sufficient structural integrity to withstand forces to which they can be exposed during and after closure, including the following:

(A) descriptions of topography and site conditions as required by section 66270.14(b)(18);

(B) depiction of the design layout, sections and details of the impoundment and its components, including cover, dike, liner, drainage and leak detection system;

(C) a description of, and the results of, stability analyses for the following conditions:

1. foundation soil bearing failure;
2. failure in the dike slopes; and
3. build-up of hydrostatic pressure due to failure

of drainage system and cover, considering the potential for piping and erosion;

(D) strength and compressibility test results pertaining to the dike material;

(E) descriptions of dike construction and postclosure maintenance procedures with schedules and specifications;

(F) descriptions of subsurface soil conditions, groundwater levels, bedrock conditions and seismic setting of the site;

(G) discussion of the occurrence or nonoccurrence of the following factors and the significance of those factors to the integrity of the dikes:

1. frost, freezing, wind, rain, temperature variations, effects of vegetation and animals and activities of humans;

2. adversely oriented joints, slickensides or fissured material, faults, seams of soft materials and weak layers;

3. potential for liquefaction during earthquakes coincident with existence of saturated conditions due to failure of drainage system and cover;

(H) a certification by a professional engineer registered in California that the dikes have sufficient structural integrity to withstand forces to which they can be exposed during and after closure, based on analyses, tests and inspections that include the following:

1. a review of all the geologic, geotechnical, geohydrologic and other pertinent design, construction and service data;

2. a review of all climatic data, and special geologic events, such as earthquakes, which occurred during the entire period the impoundment was in service;

3. a field inspection to detect signs of settlement, subsidence, cracks, scouring, erosion, slides, holes, piping, seepage, sloughing, condition of vegetation, etc.; and

4. a determination if the original design was adequate and a review of possible changes in parameters used in the original design.

(19) The owner or operator shall include in the closure plan an explanation of how the cover, construction procedures and planned postclosure care are designed to accommodate or avoid the effects of differential settlement and consolidation without loss of integrity of the cover.

(f) Before installing the compacted barrier layer of the final cover the owner or operator shall accurately establish the correlation between the desired permeability and the density at which that permeability is achieved. To accomplish this the owner or operator shall:

(1) provide a representative foundation area for a test compacted barrier layer having drainage conditions representative of the closed facility under the compacted barrier layer;

(2) install a compacted barrier layer over that test area that has the depth and materials of construction that the compacted barrier layer for the entire landfill is planned to have, and that is compacted in the manner planned for the compacted barrier layer for the entire landfill;

(3) undertake permeability tests in the test area saturated conditions that represent the maximum hydraulic head to be exerted on the compacted barrier layer of the final cover. A sufficient number of tests shall be run to verify the results. A permeability test shall commence after the test apparatus has run for a time long enough to allow the required daily rate of replenishment water to maintain constant head or to follow an asymptotic or constant trend. The rate of evaporation from the test equipment used to determine permeability shall be established;

(4) undertake a sufficient number of tests in the test area to determine the average density at which permeability complying with subsection (e)(5) of this section is obtained.

(g) The owner or operator shall comply with the following when installing the compacted barrier layer of the final cover.

(1) In each day in which final cover material is compacted, the owner or operator shall establish a grid on the upper surface of each layer compacted that day and randomly conduct density tests. A sufficient number of tests shall be conducted to confirm the effectiveness and uniformity of the compaction.

(2) If the Department indicates areas where compaction tests will be needed, the owner or operator shall undertake such tests in those areas.

(3) If the average of the values of compaction from the tests is lower than the average density pursuant to subsection (f)(4) of this section, the entire layer installed on the day represented by the tests shall be removed and replaced with another layer compacted so that compaction tests taken indicate a density higher than the average density determined pursuant to subsection (f)(4) of this section.

(4) An independent, qualified person registered in California as a professional engineer or certified in California as an engineering geologist shall supervise the undertaking of all tests for permeability and percent compaction, shall supervise the construction of the final cover and shall prepare a report to be submitted to the Department which bears his or her signature and the date of the signature, and describes the results of all tests and indicates whether or not the cover, as installed, complies with the requirements of this chapter.

(5) Before starting compaction of earthen material to form the compacted barrier layer of the cover, the owner or operator shall submit to the Department the results of the following determinations, on material to be used for the compacted barrier layer of the final cover:

- (A) percent fines;
- (B) plastic limit, liquid limit, plasticity index and shrinkage factors;
- (C) soil classification;
- (D) carbon content;
- (E) concentration of soluble salts in soil pore water.

(h) All slopes shall be designed and constructed to minimize the potential for failure. Any slope failure occurring within the site shall be promptly stabilized and the Department and the appropriate regional board shall be notified immediately by the owner or operator of such failure and the methods taken for stabilization.

(i) Adequate facilities shall be provided to ensure for a 100 year period that no leachate shall be discharged to surface waters or groundwater, except as authorized by the hazardous waste facility permit.

(j) Hazardous waste and discarded hazardous material contained in the closed facility shall be protected from washout and erosion as the result of tides

or floods having a predicted frequency of once in 100 years.

(k) An inspection and monitoring program shall be established at every closed disposal area wherein an independent, qualified engineer registered in California shall annually evaluate and document the condition of all surface improvements, drainage facilities, erosion control facilities, vegetative cover, gas control facilities and monitoring facilities. This program shall also document the presence of any water or leachate flowing from the disposal area. The engineer shall evaluate the following and the effects of the following:

- (1) condition of access control (fences and gates),
- (2) condition of vegetation,
- (3) erosion,
- (4) cracking,
- (5) disturbance by cold weather,
- (6) seepage,
- (7) slope stability,
- (8) subsidence,
- (9) settlement,
- (10) monitoring the leak detection system, if there is one,
- (11) operation of the leachate collection and removal system,
- (12) monitoring the groundwater monitoring system,
- (13) condition of run-on and run-off control systems, and
- (14) condition of surveyed benchmarks.

The program shall be continued by the owner or operator of the disposal area throughout the postclosure care period. A copy of the annual report containing the above-cited observations shall be filed in a timely manner with the Department and the appropriate regional board.

(l) [Reserved]

(m) All constructed features which will remain at permanent disposal areas containing hazardous waste material shall be able to withstand the maximum credible earthquake without significant damage to foundations, structures, waste containment features and features which control leachate, surface drainage, erosion and gas.

(n) (Reserved)

(o) If monitoring equipment or other features which are required to be operable after closure of the facility pursuant to this chapter are rendered inoperable, the owner or operator shall render it operable or replace it with operable equipment or other features.

(p) Postclosure care which the owner or operator shall provide for shall include the conducting of surveys by a licensed land surveyor, to determine the horizontal location and elevation of the cover and other containment features, monitoring facilities and drainage features, and markers installed at the site pursuant to

subsection (e)(16) of this section. Such surveys shall be taken annually.

(q) The owner or operator shall reconstruct the closed facility to restore slopes and other conditions to conform to the requirements of this chapter when movement at the site has caused them not to comply with such requirements.

(r) The owner or operator shall submit annual reports to the Department describing measures undertaken at the site during the postclosure maintenance period.

NOTE: Authority cited: Sections 208, 25150, 25159, 25159.5 and 25245, Health and Safety Code; and Governor's Reorganization Plan Number 1 of 1991.
Reference: Sections 25150, 25159 and 25159.5, Health and Safety Code; and 40 CFR Section 264.228.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).
2. Amendment of subsections (b)(4)-(5), new subsection (b)(6) and amendment of Note filed 7-19-95; operative 8-18-95 (Register 95, No. 29).