



JUNE 2003

State Water Resources Control Board

REPORT NO. 03-****
DIVISION OF WATER QUALITY

REVIEW OF PRACTICES TO
ENSURE EXCLUSION OF PROHIBITED
WASTES FROM LANDFILLS WITHOUT
APPROPRIATE CONTAINMENT



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REVIEW OF PRACTICES TO ENSURE
EXCLUSION OF PROHIBITED WASTES
FROM NONHAZARDOUS WASTE LANDFILLS
WITHOUT APPROPRIATE CONTAINMENT

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EXECUTIVE SUMMARY

The FY 2002-03 Budget Act directed the State Water Resources Control Board to submit to the Legislature a report concerning whether current practices ensure that wastes classified as prohibited are excluded from landfills without appropriate containment.

Wastes are classified according to the risk posed to human health and the environment. Landfills are classified according to the level of containment provided and can only accept specific classes of waste. The exclusion or prohibition of specific wastes is based on containment features at landfills. The current practices to ensure exclusion of prohibited waste from landfills without appropriate containment include regulatory prohibitions, implementation of prohibitions through pre-disposal waste management and waste screening.

A significant effort continues to be expended, in the form of training, developing guidance materials, and implementing waste screening programs, to ensure the proper handling and disposal of prohibited wastes. In addition, significant efforts are made at the local level, e. g., neighborhood hazardous waste collection programs, to divert household hazardous waste from the municipal solid waste stream. Despite these measures, prohibited wastes are occasionally discovered in landfills. To ensure environmental protection, landfills are required to have a number of siting, containment, and fluid release features. Ultimately, the landfill containment system (liners) provides the final barrier necessary for environmental protection.

Three-quarters of the landfills accepting municipal solid waste are either unlined or have only a clay liner, both of which are known to provide inadequate containment of contaminants to groundwater. This report recommends state and local agencies consider measures both to accelerate the closure of clay-lined or unlined landfills and to divert wastes that pose a greater threat to water quality to landfills with composite liners. The report also recommends:

- Agencies should continue to provide education and outreach to the regulated community and emphasize the need for practical recognition of prohibited waste as part of the educational outreach effort.
- State and local regulatory agencies should continue to team with landfill operators in providing educational information on identification and management of prohibited waste to waste generators. Where feasible, incentives should continue to be developed for reuse/recycling of prohibited waste streams.
- Waste generators should be held strictly accountable for proper management of prohibited wastes.
- Although waste screening is required at landfills, landfill operators should be encouraged, and where economically feasible required, to implement the robust industry-standard waste screening programs described in this report.

CHAPTER 1 INTRODUCTION - CLASSIFICATION OF WASTES AND LANDFILLS

The FY 2002-03 Budget Act directed the State Water Resources Control Board (SWRCB) to submit to the Legislature a report concerning whether current practices ensure that wastes classified as prohibited (e.g., hazardous or radioactive) are excluded from landfills without appropriate containment.

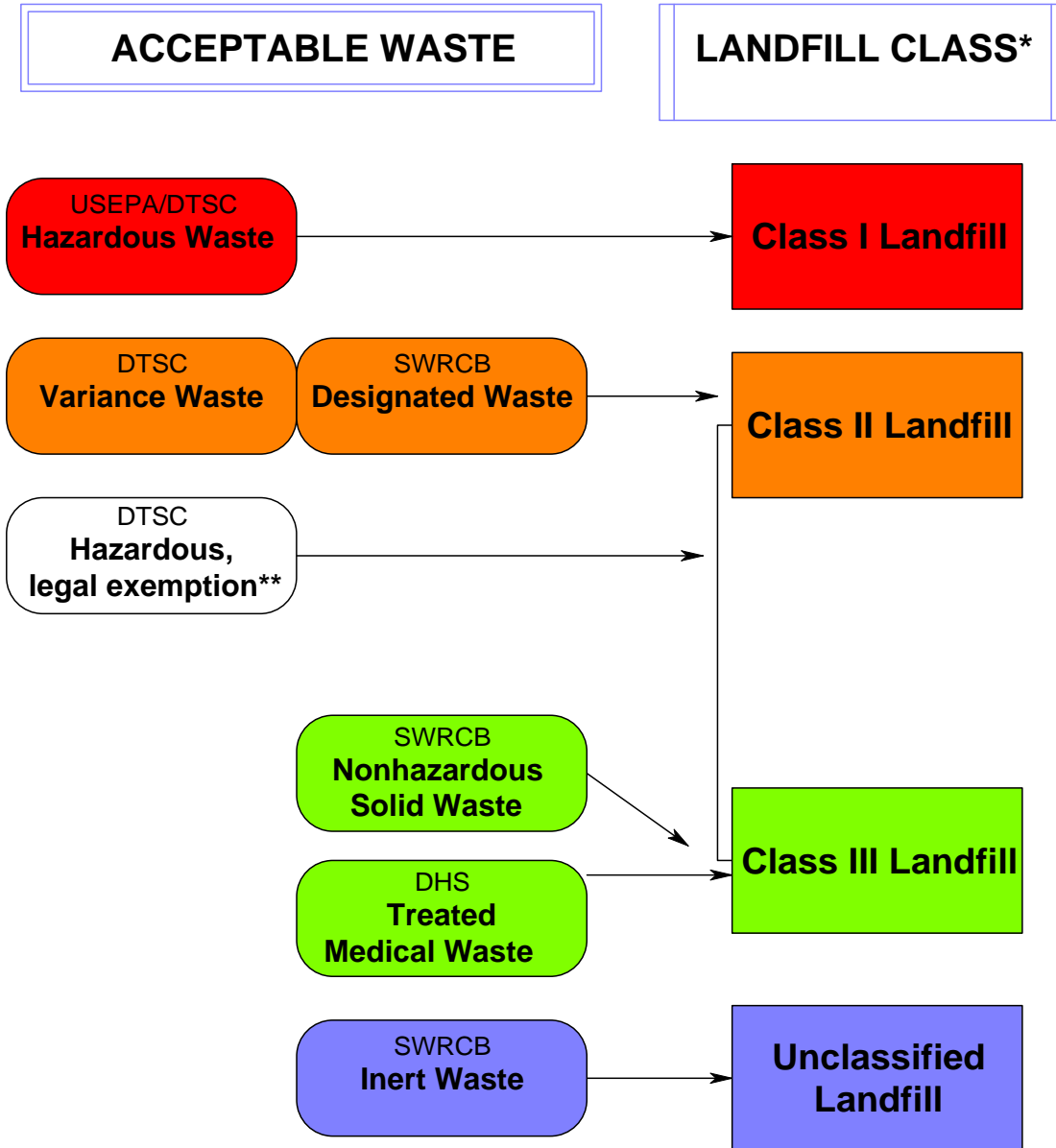
The waste classification system is an amalgam of federal and state classifications and requirements that have been simplified for this report and shown schematically in **Figure 1 – Classification of Waste and Landfills**. Wastes are classified according to the risk posed to human health and the environment if not properly managed. The general waste categories of waste are:

- Medical waste – Department of Health Services (DHS);
- Radioactive waste – U.S. Nuclear Regulatory Commission and DHS;
- Hazardous waste – U.S. Environmental Protection Agency (USEPA) and the Department of Toxic Substances Control (DTSC); and
- Solid waste – USEPA, California Integrated Waste Management Board (CIWMB), and SWRCB.

For hazardous and solid waste, the SWRCB established a tiered waste classification system according to risk of impairment to water quality. From highest to lowest perceived threat to water quality the four classes are: hazardous waste, designated waste, non-hazardous solid waste, and inert waste. The SWRCB also classifies the landfills where hazardous and solid wastes are disposed according to the level of protection they provide for water quality based on siting and containment features: Class I, Class II, Class III, and Unclassified.

The four classes of hazardous and solid waste and four classes of landfills of the tiered SWRCB system correlate as follows: “Hazardous waste” is primarily disposed at Class I landfills. “Designated waste” is a lower threat to water quality than waste required to be disposed in a Class I landfill. Designated waste is defined as including (1) hazardous waste that is not required to be disposed at Class I landfills, and (2) non-hazardous waste posing a greater threat to water quality than non-hazardous solid waste. Designated waste is primarily disposed at Class II landfills. “Non-hazardous solid waste” is disposed at Class III landfills. Non-hazardous solid waste is generally considered to be “garbage” that individuals generate. Another term for garbage is municipal solid waste (MSW). However, the threat to water quality of MSW has been shown to be greater than previously thought, and SWRCB requires greater containment features than the original classification anticipated. “Inert waste” poses the lowest threat to water quality, because it can contain only minimal putrescible waste. (Putrescible wastes create acids that leach out metals.) Inert waste can be disposed at Unclassified landfills, which have the least containment features. All landfills may also accept wastes with lower threat to water quality than the waste for which the landfill was designed to contain.

FIGURE 1 – Classification of Waste and Landfills



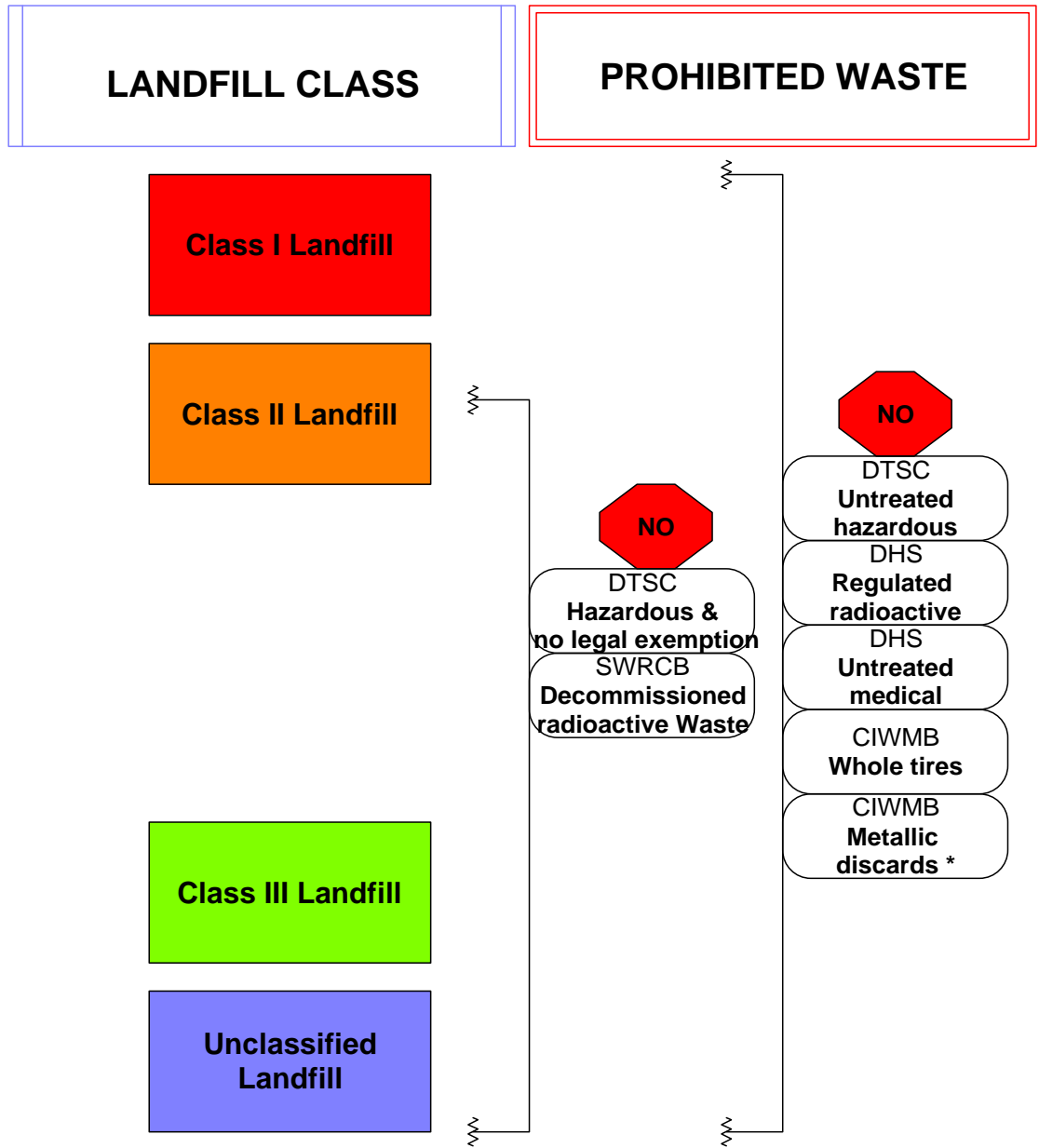
* Landfills can accept wastes with lower threat to water quality. Waste discharge requirements for each landfill specify acceptable and prohibited wastes.

** Specific legal requirements apply. See Table 2 summary.

Of the operating landfills that accept waste commercially, there are three Class I, 19 Class II, 155 Class III, and 23 Unclassified landfills. These numbers reflect the relative volume of each waste type. Since the greatest volume of waste generated is MSW, the main focus of this report is on the wastes prohibited from the 155 Class III landfills.

Regulatory agencies specify wastes that are prohibited from each class of landfill as shown in **Figure 2 – Waste Prohibited from Landfills**. In addition, landfill owners may specify additional prohibited wastes based on local concerns. This report describes and assesses in more detail the system for prohibiting wastes and areas for improvement. Chapter 2 describes the historical background for classification of wastes and landfills. Chapter 3 discusses the relationship among the regulatory agencies, waste generators and the waste management industry (landfill owners). Chapter 4 discusses the process and practices for prohibiting waste and ensuring its exclusion from landfills without appropriate containment. Chapters 5 presents findings and recommendations for actions that could improve success in environmental protection from prohibited wastes.

FIGURE 2 – Waste Prohibited from Landfills



* Metallic discards are prohibited if there is economic feasibility to recycling.

CHAPTER 2 HISTORICAL BACKGROUND AND WATER QUALITY PROTECTION REQUIREMENTS

From Dumps to Landfills

Although Regional Water Quality Control Boards (RWQCBs) regulated landfills as long ago as the 1950's, they were generally sited and operated without regard for impact on the environment. "Dumps" were unlined and located at convenient dumping locations (e.g., natural ravines, canyons, ocean cliffs, estuaries, and abandoned gravel pits). Waste types were not segregated and waste was often burned. These locations and practices exacerbated water quality impacts.

Air-quality regulations enacted in the late 1960s moved landfills away from burning and toward waste containment. In 1972, the SWRCB promulgated its first regulations for waste discharges to land. In 1984, the SWRCB made significant revisions to its regulations (Subchapter 15 of Title 23), requiring new landfills to evaluate siting conditions, creating tiered waste classification and landfill classification systems, setting minimum siting and liner requirements for each landfill type, and imposing groundwater monitoring to detect a release.

Appropriate Containment

Over the last 20 years, landfill regulations have been revised in an effort to ensure that waste is isolated from surface water and groundwater through engineered containment structures such as low-permeability liners and final covers. Advances have been made in several areas to better protect water quality; some of these systems are described briefly in the following sections:

The use of liners is an important step in protecting water quality beneath landfills, as fluid (leachate and landfill gas) migration through wastes in unlined landfills is the primary source for groundwater contamination. Leachate is the fluid that drains from a landfill downward; landfill gas is mostly methane gas usually with some volatile organic compounds (VOCs) which can migrate in any direction. The SWRCB classification system created in 1984 anticipated certain waste streams should be disposed in certain classes of landfills. For example, MSW would go to Class III landfills, which were required to have a liner of only compacted clay. However, an exemption to the compacted clay liner was allowed if natural clays could slow landfill leakage.

Results of the SWRCB Solid Waste Assessment Test (SWAT) program showed that over 85 percent of unlined and clay-lined landfills released waste constituents into groundwater. Review of these data motivated the SWRCB in 1993 to require composite liners at new MSW landfills and expansions of existing MSW landfills. A single composite liner has two parts that have complementary characteristics – plastic sheeting and an underlying layer of clay. Supporting data from USEPA nationwide studies of solid waste landfill leachate showed that over 200 hazardous constituents are commonly found in the leachate.

The following are current containment requirements for each class of landfill:

- ◆ Class I landfills must have a double liner system using composite liners. The Class I double liner system has four components:
 1. A drainage layer underlying the waste to drain fluids off the liner system;
 2. An upper single composite liner to minimize a release;
 3. A drainage layer to collect and remove leachate that might reach it through the top layer;
and
 4. A lower single composite liner.Class I landfills also must be sited where natural geologic materials make it less likely that waste that might be released could affect waters of the state.

- ◆ Class II and Class III landfills have a much lower level of containment, except those which are new or lateral expansions of MSW landfills. The containment system required for new MSW landfills and expansions of existing MSW landfills provides a high level of containment. It is a single composite liner system which has two components:
 1. A drainage layer underlying the waste to drain fluids off the liner system; and
 2. A composite liner to minimize a release.

- ◆ “Unclassified” landfills do not have prescribed containment features, but they are determined during the review of the landfill owner’s report of waste discharge and issuance of waste discharge requirements (WDRs).

The prescribed containment systems are minimum requirements. RWQCBs have the authority to increase the stringency of requirements in individual WDRs based on threat to water quality. Approximately three-quarters of the unlined or clay-lined MSW landfills in operation prior to 1993 remain active. To reduce the threat to water quality, wastes which could pose a greater threat are directed by RWQCBs, to the extent practical, to be discharged to composite-lined landfills. Such wastes would include those with a high moisture content.

Fluid Detection and Recovery

In addition to the requirements for siting and for containment systems, there are also requirements for systems to detect and manage fluids from landfills for protection of both water quality and human health. These requirements include leachate collection and recovery systems, landfill gas recovery systems, and groundwater monitoring and corrective action programs.

Gas recovery systems have become integral in reducing volatile organic compound emissions, both to atmosphere and groundwater, from landfills. Previously viewed as only an air quality-related nuisance, landfill gas generated by waste decomposition is a well-documented source for organic compound detections in groundwater. Gas recovery wells are installed both at active landfills and many inactive facilities to reduce gas emissions to the atmosphere and gas migration to groundwater. Occasionally, larger landfill sites use the landfill gas (mostly methane) to generate power.

Groundwater monitoring is required to determine whether the landfill has affected groundwater. Groundwater monitoring is also necessary to determine the effectiveness of any necessary corrective action. Groundwater samples are analyzed for organic compounds, general water chemistry parameters, and metals. All operating landfills and most landfills closed in the last 15 years have groundwater monitoring systems. Over the years, groundwater monitoring demonstrated that most landfills without composite liners have had measurable though localized adverse impacts on groundwater.

CHAPTER 3 REGULATORY AGENCIES, WASTE GENERATORS, AND LANDFILL OPERATORS

Regulatory agencies, waste generators, and the landfill industry all have roles in the management of waste prohibited from solid waste landfills. This section discusses the basic roles of those involved in the process. See Figures 1, 2, and 3.

REGULATORY AGENCIES

Regulatory agencies require generators to properly manage their waste. They also require landfill owners and operators to protect human health and the environment from waste disposal.

U. S. Environmental Protection Agency

The USEPA implements federal law and through regulations promulgates nationwide standards related to hazardous waste and MSW. The USEPA's hazardous waste program is implemented by DTSC, while the MSW landfill program is implemented by the SWRCB/RWQCBs and the CIWMB.

The USEPA adopted regulations that define hazardous waste (federal RCRA hazardous waste). The regulated community includes hazardous waste generators, transporters, treatment, storage and disposal facilities, as well as hazardous waste landfill owners/operators.

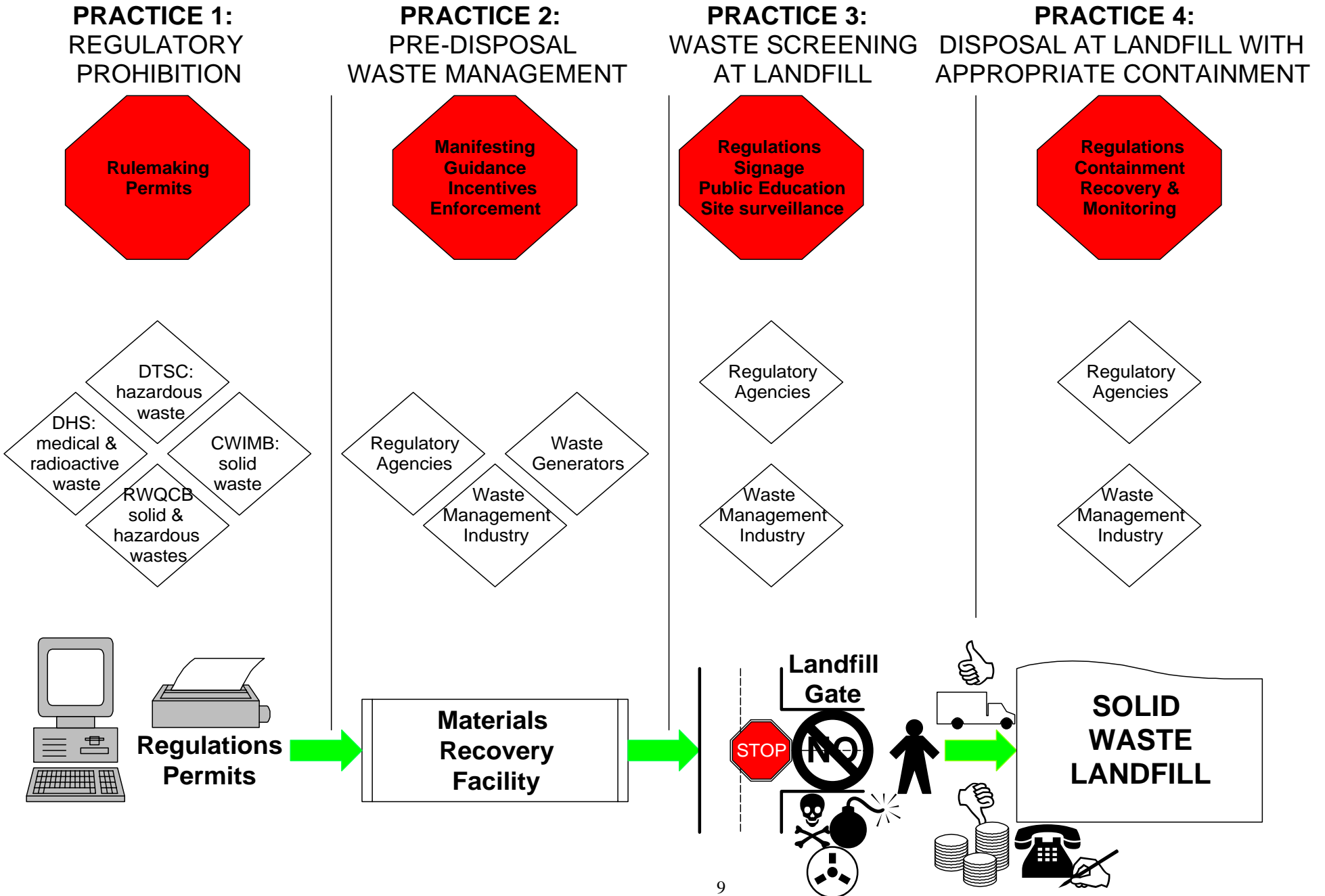
RCRA hazardous wastes are prohibited from MSW landfills; however, USEPA exempts some hazardous wastes, which are allowed to enter MSW landfills. For example, hazardous wastes from households and small quantity generators are exempt under the federal hazardous waste program. Since MSW is known to contain household hazardous waste, the USEPA created the MSW landfill program.

State Water Resources Control Board/ Regional Water Quality Control Boards

SWRCB regulations classify wastes according to risk of impairment to water quality. SWRCB defers classification of hazardous, radioactive, and medical wastes to other agencies. SWRCB regulations classify landfills according to the level of protection they provide for water quality. Landfill classification is described in the next chapter. In addition to classification, the SWRCB promulgates statewide requirements for siting, operation, and closure of landfills.

The RWQCBs issue WDRs to individual landfill owners. WDRs are based on the landfill operators' proposal in a Report of Waste Discharge-Joint Technical Document (JTD). The JTD identifies the proposed wastes to be disposed, the landfill containment system design, and monitoring program. The RWQCB evaluates the proposal and specifies in the WDRs acceptable waste, prohibited waste, the containment system, and the monitoring program. RWQCBs follow up with compliance and enforcement efforts to ensure adequate protection of water quality.

FIGURE 3 – Practices to Ensure Exclusion of Prohibited Waste From Landfills Lacking Appropriate Containment



California Integrated Waste Management Board

The CIWMB is the lead agency for solid waste management. The CIWMB implements statutory waste diversion mandates and regulates public health and safety aspects of landfills. CIWMB's regulatory requirements are implemented primarily through local enforcement agencies. The CIWMB approves local enforcement agencies' Solid Waste Facility Permits for landfills that specify acceptable and prohibited wastes.

The CIWMB and the SWRCB share the federal program approval to implement the USEPA's MSW landfill program, which includes some Class II and most Class III landfills. SWRCB addresses water quality and CIWMB addresses other aspects of MSW landfill operations.

Department of Toxic Substances Control

The DTSC is delegated to implement USEPA's hazardous waste program as an authorized state program. In addition to regulating federal RCRA hazardous waste generators and treatment, storage or disposal sites, the DTSC regulates additional California-only hazardous waste (non-RCRA hazardous waste) within the state. The DTSC does not recognize the majority of the federal exemptions and regulates these wastes as California-only hazardous wastes. Non-RCRA hazardous wastes are prohibited from MSW landfills. However, the DTSC has the authority to allow hazardous waste that meets certain conditions to be disposed at non-Class I landfills as long as the non-Class I landfill is not otherwise precluded from accepting the hazardous waste.

Department of Health Services

The DHS licenses hospitals and other medical facilities and regulates the management of medical waste. The Medical Waste Management Act (HSC 117690) (MWMA) prescribes medical waste management and defines medical waste. Compliance with the MWMA is the responsibility of the generator for proper storage, transportation and treatment of waste. Medical wastes that are not regulated are part of the solid waste stream.

The DHS also implements the Radiation Control Law to license and regulate radioactive waste, and to oversee and control those activities that could lead to the introduction of radioactive waste into the environment. The DHS implements a State Agreement Program of the Nuclear Regulatory Commission (NRC) and regulates certain wastes rather than the NRC.

DHS performs statewide environmental monitoring for indications of radioactive contamination, participates in emergency response actions, and reviews remediation plans and actions for sites where radioactive materials were used and not licensed. Requirements exist regarding disposal of high- and low-level radioactive waste. Licensed facilities that have been decommissioned no longer contain wastes above regulatory levels. This decommissioned waste, as well as other waste with radiologic levels below regulatory limits (e.g., watch dials), are considered to be part of the solid waste stream.

GENERATORS

Regulatory agencies require generators to properly manage their waste. The manner of waste management varies based on the waste type prescribed by the regulatory agency: DHS for medical waste and radioactive waste; USEPA and the DTSC for hazardous waste; and CIWMB for solid waste.

- Hazardous waste generators must comply with the Hazardous Waste Control Law (HSC Chapter 6.5) and Division 4.5, Title 22, California Code of Regulations for proper handling, transportation, treatment, storage or disposal of hazardous waste.
- Medical waste generators must comply with the MWMA for proper storage, transportation and treatment of waste.
- Radioactive waste generators must comply with the Radiation Control Law for management and disposal of radioactive waste.
- Solid waste generators must comply with the Solid Waste Disposal Act (PRC Division 30).

WASTE MANAGEMENT INDUSTRY

(from *Special Waste Management Fact Sheet Series*, Solid Waste Association of North America)

Landfills owners/operators are either public agencies or private companies. The landfill owner/operator is responsible for ensuring that wastes that are prohibited are precluded from discharge to the landfill. The landfill owner/operator's role is to:

- Comply with federal and state regulatory requirements to reduce the quantity of prohibited wastes that may enter the municipal solid waste stream;
- Protect worker health and safety;
- Protect long-term liability of the solid waste facility operator;
- Encourage proper disposal of hazardous and other prohibited wastes;
- Identify generators of prohibited wastes placed in the municipal solid waste stream;
- Assist enforcement efforts against recalcitrant generators to require them to properly manage prohibited wastes;
- Assist with proper management of prohibited wastes that are delivered to the landfill, for their appropriate return; and
- Promote programs to provide practical options for proper waste disposal, such as household hazardous waste collection programs.

CHAPTER 4 PROHIBITED WASTE AND THE PRACTICES TO ENSURE ITS EXCLUSION

This chapter describes the current practices to ensure exclusion of prohibited waste from landfills without appropriate containment as shown in **Figure 3 – Practices to Ensure Exclusion of Prohibited Waste from Landfills Lacking Appropriate Containment**.

REGULATORY PROHIBITION OF WASTE

Practices to ensure prohibition of waste from landfills begin with regulatory prohibition. These practices are:

- Statutory or regulatory agency rulemaking which establish criteria and describe prohibited wastes and their appropriate management, and
- Permit issuance for each landfill that specifies prohibited wastes.

Rulemaking

The regulatory agencies have established criteria defining prohibited waste to protect human health and the environment. In the following presentation of practices, it is clear that although the criteria are explicit, they apply to overlapping waste types and translation to the real world recognition of prohibited wastes is a challenge.

Consistent with the waste and landfill classification system, prohibited waste is based on the class of landfill. Additional wastes may be prohibited on a landfill-specific basis depending on local concerns. The general categories of prohibited waste are medical, radioactive, hazardous, and certain solid wastes depending on the landfill type. The categorically prohibited wastes are shown schematically in Figure 1 and discussed below under Regulatory Prohibition of Waste.

HAZARDOUS WASTE

USEPA and DTSC have created criteria for hazardous waste classification. Hazardous waste falls into two categories: 1) the hazardous waste is listed by name, regardless of concentration (“listed waste”); or 2) the hazardous waste is based on the waste’s characteristics: toxicity, ignitability, corrosivity, or reactivity (“characteristic waste”). Most characteristic wastes must be tested to determine if they are hazardous wastes.

While USEPA and DTSC dictate that hazardous wastes must be land disposed at Class I landfills, the SWRCB/RWQCBs and CIWMB/LEAs establish additional prohibitions for non-RCRA hazardous wastes that are authorized by statute or regulations that allow non-Class I landfill disposal. These hazardous waste prohibitions are listed in Table 1. Federal RCRA wastes are banned from any landfill disposal unless they are treated to meet land disposal standards. All hazardous waste is prohibited from Unclassified landfills.

TABLE 1 - PROHIBITED HAZARDOUS WASTES

Hazardous Waste	Landfill prohibition
RCRA hazardous*	Class I, II, III, Unclassified
CA hazardous	Class II, III, Unclassified
CA hazardous w/ exemption **	Non-composite lined Class II, III; Unclassified

* RCRA hazardous waste is prohibited from any landfill unless it meets treatment standards that allow its disposal to land.

** Exemptions include statutory and regulatory exemptions that are waste-specific or available to DTSC for groups of waste. See Table 2.

However, as previously mentioned, there are statutory and regulatory provisions that allow non-RCRA hazardous waste to be disposed at non-Class I landfills. These are shown in Table 2. Based on the criteria that define federal and state hazardous waste and the exemptions for certain hazardous wastes, it is clear that visual recognition of hazardous wastes is not an easy task. For example, untreated wood is allowed in MSW landfills and treated wood from a utility service may be disposed at a non-Class I under certain conditions, but other treated wood is banned. Distinguishing untreated wood from treated wood may be difficult. Additionally, the nature of the treatment for the treated wood is an important factor in determining appropriate disposal.

**TABLE 2 - WASTE EXHIBITING HAZARDOUS WASTE CHARACTERISTICS
DISPOSED AT NON-CLASS I LANDFILLS**

Type of Wastes	Basis for Exemption or Exclusion	Authority	Summary of Provisions
GROUPS OF WASTE			
Special Waste	CCR, Title 22, Sec. 66261.126	Regulatory	Hazardous waste that have a Special Waste classification by DTSC, can be disposed at a non-Class I landfill upon an DTSC approved disposal variance and authorization from the RWQCB.
Wastes with DTSC Variance	HSC Sec. 25143	Statutory	DTSC has the authority to grant a disposal variance to any non-RCRA hazardous waste if the activity is deemed to be insignificant or adequately regulated by another agency.
Universal Waste (lamps, batteries, and some mercury thermostats)	CCR Title 22, 66273.8	Regulatory	Household and conditionally exempted small quantity generator (CESQG) waste may be disposed at municipal solid waste landfills up to 2/8/06 for household and 2/8/04 for CESQG.

TABLE 2 (continued)

Type of Wastes	Basis for Exemption or Exclusion	Authority	Summary of Provisions
INDIVIDUAL WASTE STREAMS			
Asbestos Containing Waste	HSC Sec. 25143.7	Statutory	Asbestos-containing waste can be disposed at any landfill with the approval of the RWQCB.
Treated Wood Waste from Utility Services	HSC Sec. 25143.1.5	Statutory	Wood products that were used in utility services can be disposed at a composite-lined municipal solid waste landfill.
Cement Kiln Dust	HSC Sec. 25143.8	Statutory	Cementitious material is not regulated as hazardous waste if it fails only the nonaqueous corrosivity test and is managed onsite in accordance with RWQCB requirements.
Biomass Ash	HSC Sec. 25143.5	Statutory	Ash from biomass operations is not regulated as hazardous waste if it fails only the nonaqueous corrosivity test.

Note: All the above wastes must not be regulated as a federal hazardous waste or must be exempted from the federal requirement of disposal in a hazardous waste landfill

MEDICAL WASTE

The DHS has defined waste that has been used for medical procedures as regulated medical waste. Regulated medical waste is required to be placed in red bags. The red bags must be transported by licensed haulers who autoclave them so that they can be disposed in Class III landfills. A red bag that has been autoclaved looks different from one that has not been (i.e., it is shriveled up, so landfill personnel could recognize whether it is acceptable or prohibited). Most regulated medical wastes, if not “red-bagged,” would not likely be detected by landfill personnel. Medical waste that is not regulated by DHS need not be red-bagged and is accepted as part of the solid waste stream (i.e., hospital garbage, waste from home use such as personal diabetic needles). Recent continued attempts to deliver red bags that have not been autoclaved to landfills in Riverside County in order to save healthcare costs resulted in enforcement by the local District Attorney and large fines.

TABLE 3 - PROHIBITED MEDICAL WASTE

Medical Waste	Landfill prohibition
Regulated medical waste that has not been red-bagged and autoclaved	All Class I, II, III, Unclassified

RADIOACTIVE WASTE

Radioactive waste regulated by DHS/NRC as high- or low-level radioactive waste are not part of the hazardous or solid waste streams and are prohibited from all Class I, II, III and Unclassified landfills. Additionally, Governor Davis' Executive Order D-62-02 directed the SWRCB to impose a moratorium on disposal of all radioactive wastes from decommissioned facilities at Class II, Class III, and Unclassified landfills in California. Other wastes containing radionuclides below the regulatory limits promulgated by DHS (e.g., food waste containing the natural radionuclide potassium 40) are considered to be part of the solid waste stream.

TABLE 4 - PROHIBITED RADIOACTIVE WASTES

Radioactive Waste	Landfill prohibition
High level radioactivity	All Class I, II, III, Unclassified
Low level radioactivity	All Class I, II, III, Unclassified
Waste from decommissioned licensees (Moratorium on disposal by Executive Order D-62-02)	All Class II, III, Unclassified
Self-illuminating signs (EXIT signs containing tritium)	All Class I, II, III, Unclassified – required to be returned to manufacturer
Non-decommissioned and below regulatory limits	None

SOLID WASTE

Prohibition on the disposal of solid waste is primarily based on the landfill classification system that allows certain wastes and therefore prohibits others. Designated waste, non-hazardous solid waste, and MSW (which crosses both categories) are prohibited from landfills as shown in Table 5. Designated wastes are prohibited from Class III landfills unless the RWQCB finds an individual landfill provides appropriate water quality protection. Designated waste is prohibited from Unclassified landfills. Non-hazardous solid waste is prohibited from Unclassified landfills. Inert waste is not considered a prohibited waste, but as with all wastes, must be compatible with the waste in the landfill unit where it is disposed.

In addition, there are two waste types that are prohibited from landfills for other than water quality reasons: 1) metallic discards (e.g., washing machines) if there is economic feasibility to recycling, and 2) whole tires which tend to rise in landfills over time and instead can be shredded.

TABLE 5 - PROHIBITED SOLID WASTES

Solid Waste	Landfill prohibition
Designated	Unclassified Class III unless WDR allows
Non-hazardous solid	All Unclassified
MSW	Non-composite-lined landfill units constructed after 1993* All Unclassified
Metallic discards	All landfills if there is economic feasibility to recycling
Whole tires	All landfills, but shredded tires are allowed

* Small rural landfills after 1994/1995

Permitting

CIWMB/LEAs and RWQCBs identify in permits and WDRs, respectively, those wastes that are acceptable and prohibited from solid waste landfills. Wastes are described/listed in general terms (e.g., “hazardous wastes”). Listing individual wastes would require frequent and costly updates as the list may be constantly revised. In addition, some landfills have additional prohibitions based on local concerns, such as dried sewage sludge.

PRE-DISPOSAL WASTE MANAGEMENT

Regulatory agencies with authority to regulate particular waste streams - DTSC, CIWMB, and DHS - work with the generators of waste, waste management industry, and local agencies to ensure appropriate waste management practices, including disposal requirements for prohibited wastes. A primary management goal is to keep prohibited waste from being commingled with the solid waste stream. To minimize opportunities for commingling, regulatory agencies require manifesting of waste where necessary, enforce, and provide incentives and special programs.

Proper identification and management of waste by generators is essential for effective exclusion of prohibited wastes from the solid waste stream, particularly hazardous waste, medical waste, radioactive waste, and designated waste. All waste generators are required to determine whether their waste is a hazardous waste and, if hazardous, must manage it appropriately, including using a hazardous waste manifest for transportation, treatment, storage, and disposal. As discussed above, visual inspection of a waste does not guarantee accurate characterization. Further testing for suspected prohibited waste at a solid waste landfill is not a common practice for a variety of technical and economic reasons. Therefore, accurate generator identification and management of waste is a critical element to segregate prohibited waste for disposal. To assist in the hazardous waste identification and appropriate management, DTSC sponsors training for generators and inspectors. In addition, enforcement of administrative and criminal violations has a deterring effect.

WASTE SCREENING AT A SOLID WASTE LANDFILL

Regulatory

SWRCB and CIWMB regulations require landfill operators to implement a program to ensure appropriate waste is discharged at the landfill. CIWMB regulations focus on operations at landfills and include more specific requirements. These include requiring landfill owner/operators to implement a program for detecting and preventing the disposal of hazardous wastes, including random inspection of incoming loads, documentation, training of personnel in waste recognition, and notification of agencies if such waste is discovered. CIWMB provides written guidance regarding recognition of prohibited waste, training regarding loadchecking programs, and maintains monetary grant programs for public education on household hazardous waste disposal and alternatives. DTSC provides training to waste generators and inspectors on hazardous waste identification and management. The LEAs inspect landfills monthly. RWQCBs perform annual and ad hoc inspections. The LEAs, RWQCBs, and local health departments must be notified if prohibited waste has been illegally disposed at a landfill. Finally, the SWRCB's Enforcement Policy identifies knowing acceptance of prohibited waste as one of the nine priority violations at a landfill.

Waste Management Industry

(from *Special Waste Management Fact Sheet Series* of the Solid Waste Association of North America)

Waste screening is an essential solid waste management activity that is required by federal and state regulatory agencies for protection of health and the environment. Waste screening is a series of techniques using a landfill operator's best efforts to minimize the potential for hazardous and other prohibited wastes to commingle with waste delivered to a landfill.

Objectives:

The objectives of a waste screening program include:

- Comply with federal and state regulatory requirements to reduce the quantity of prohibited wastes that may enter the municipal solid waste stream;
- Protect worker health and safety;
- Protect long-term liability of the solid waste facility operator;
- Encourage proper disposal of hazardous and other prohibited wastes;
- Identify generators of prohibited wastes placed in the municipal solid waste stream;
- Assist enforcement efforts against recalcitrant generators to require them to properly manage prohibited wastes;
- Assist with proper management of prohibited wastes that are delivered to the landfill, for example through their appropriate return; and
- Promote programs to provide practical options for proper waste disposal, such as household hazardous waste collection programs.

These objectives are achieved by imposing operational procedures at the facility and documentation of these activities. Waste screening involves a range of activities and occurs at all types of solid waste facilities (i.e., materials recycling facilities [MRF], transfer stations, and landfills). Solid waste facility operators find it extremely important to involve the generators in the waste screening program, since it is more effective to prevent prohibited wastes from entering the waste stream than to find it after mixture with solid waste.

Waste Screening Activities:

Waste screening activities consist of six main activities: customer notification; employee training; site surveillance; waste inspection; recordkeeping; and waste management activities. Screening activities occur at the entrance gate, public unloading areas, and the tipping area.

Customer Notification, Public Education and Signage:

Customers must be notified of the facility's policy regarding acceptance of hazardous and other prohibited wastes, and that waste loads could be subject to random or intentional checks at any time. Notification emphasizes the prevention of hazardous and other prohibited wastes from being disposed of in the solid waste stream. Typical notification includes garbage bill enclosures, posted signs, and notices on garbage containers, etc. Facility signage should list typical prohibited wastes and state that prohibited wastes are not accepted at the facility and that loads are subject to waste screening.

Employee Training:

Facility personnel must receive training in the following areas: effects of hazardous substances, identification of prohibited materials, and notification and response procedures.

Site Surveillance:

Incoming loads are screened at the entrance station for the presence of hazardous or other prohibited wastes. This regular surveillance of loads by facility personnel allows for a high degree of visual inspection of incoming wastes. Such visual surveillance provides overall assurances that a majority of the delivered loads do not contain prohibited wastes.

Waste Inspection:

The intent of a waste inspection is to provide the landfill operator with assurance that prohibited wastes are not hidden in the load. Random or intentional waste inspections by trained personnel involve a more extensive examination of a particular waste load and occurs on a frequency appropriate to the facility operations. On a regular or random basis loads can be unloaded in a designated area for a more extensive inspection before disposal. Individual containers in a load may be targeted for examination. This visible inspection allows other customers to see the extent of the program and that their loads could be targeted in the future. Intentional inspections are needed to target repeat or recalcitrant customers.

Recordkeeping:

Documentation demonstrates evidence of screening activities. It also provides information about recalcitrant customers who repeatedly attempt to unload prohibited wastes.

Waste Management:

If prohibited wastes are identified or suspected during any of these activities, the person delivering the waste is notified that the wastes must be removed from the site, and that arrangements for proper disposal must be made. Obtaining cooperation of customers is a prime objective of the program. Procedures for addressing recalcitrant customers are also addressed.

If prohibited wastes are identified after accidental waste disposal, landfill operators are required to contact the appropriate agency delegated for the prohibited waste (LEA, DTSC, RWQCB, or the local health agency). The local agencies are more actively involved in deciding what response should be taken against an accidental landfilling of prohibited waste. In deciding whether to recover and remove the illegal waste when an error occurs, the threat to the environment is weighed against the risks associated with recovery. Removal also depends on how long it has been since the error occurred, i.e., how much waste would have to be moved to reach the illegal waste and what are the health and safety risks. RWQCBs may strictly interpret WDRs and hold the landfill responsible for the “illegal” disposal. Some RWQCBs have required the landfill operator to remove wastes long after the inappropriate disposal. Landfill operators must rely on generators’ waste identification and management and their subsequent transporters that the waste has been properly identified and manifested.

DISPOSAL AT LANDFILL WITH APPROPRIATE CONTAINMENT

The final practice of “Disposal at Landfill with Appropriate Containment” follows pre-disposal waste management and waste screening activities at the landfill. The federal and state regulatory waste management systems rely on this final practice to ensure adequate environmental protection from contaminants of concern found either in “acceptable” waste or in the inevitable disposal of prohibited waste. The requirements prescribed by regulatory agencies were described in Chapter 2.

Chapter 2 also pointed out that SWRCB regulations are minimum requirements, and the RWQCBs have the authority to increase the stringency of requirements in individual WDRs based on threat to water quality. To reduce the threat to water quality, wastes that could pose a greater threat are directed by RWQCBs, to the extent feasible, to be discharged to those landfills or portions of landfills which have composite liners. In addition, RWQCBs may require a higher level of containment at a new landfill or expansion of an existing landfill than the required minimum system. For example, some MSW landfills are required to design a system better than a single composite liner system to protect water quality.

While the SWRCB considers composite liners to be adequate minimum containment for MSW, about three-quarters of most MSW landfills that are open and accepting waste are unlined or clay-lined. These landfills were operating at the time of the 1993 regulatory change requiring new and laterally expanding landfills to have composite liners.

CHAPTER 5 FINDINGS AND RECOMMENDATIONS

As discussed in Chapter 4, in order to ensure prohibited wastes are excluded from disposal at landfills lacking appropriate containment, the federal and state regulatory waste management systems rely on four general practices. The findings and recommendations of this report are organized according to these general practices.

I. REGULATORY PROHIBITION OF WASTE

A. Finding

The waste classification system is complex due to the testing criteria needed to identify some of the prohibited wastes, the types of waste (medical, radioactive, tires, etc.), and the number of state and federal agencies responsible for waste classification. Adding to this complexity are statutory provisions, enacted over the last several years, that govern the disposal of certain wastes from certain generators as well as the impracticality of requiring households to test their waste to determine the appropriate classification.

Recommendation

- Continue to provide education and outreach to the regulated community.

- Emphasize the need for practical recognition of prohibited waste as part of the educational outreach effort.

B. Finding

WDRs can be written to prohibit wastes that have a greater threat to water quality (e.g., wastes with greater liquid content) to landfills with more protective containment features (i.e., composite lined landfills).

Recommendation

Wastes of greater threat to water quality that are part of the solid waste stream should be identified. Where feasible these wastes should be prohibited from disposal at non-composite-lined units and directed to composite-lined landfills through future landfill permit revisions, or new rulemaking.

II. PRE-DISPOSAL WASTE MANAGEMENT

A. Finding

Not all prohibited wastes are required to be manifested and tracked “from cradle to grave”. In addition, effectively testing each load of waste is infeasible, both physically and economically. Regulatory agencies and landfill operators rely to a large extent on generator characterization and management of waste.

Recommendation

- State and local regulatory agencies should continue to team with landfill operators in providing educational information on identification and management of prohibited waste to waste generators. Where feasible, incentives should continue to be developed for reuse/recycling of prohibited waste streams.
- Waste generators should be held strictly accountable for proper management of prohibited wastes.

III. WASTE SCREENING AT LANDFILL

A. Finding

Waste screening protocols have been developed by the landfill industry which are effective at identifying the more significant volumes and types of waste that are prohibited from landfills. Implementation of the more sophisticated screening protocols tend to be at the larger, urban landfills.

Recommendation

Although waste screening is required at landfills, landfill operators should be encouraged, and where economically feasible required, to implement the robust industry-standard waste screening programs described in this report.

IV. DISPOSAL AT LANDFILL WITH APPROPRIATE CONTAINMENT

A. Finding

- Disposal of “accepted” wastes as well as incidental or inadvertent disposal of prohibited waste as a part of municipal solid waste (MSW) is less of an environmental concern when landfill containment is sufficient to protect the environment.
- Composite-lined landfills provide significantly greater environmental protection than non-composite lined (e.g., clay-lined or unlined) Class III landfills.
- Three-quarters of the operating MSW landfills are either clay-lined or unlined.

Recommendation

- The practice of disposing MSW at non-composite-lined landfills should be phased out as soon as practicable because of its documented threat to water quality. Regulatory agencies should consider measures to accelerate the closure of clay-lined or unlined landfills.
- As presented in Recommendation I.B., regulatory agencies should consider measures to divert those wastes that pose a greater threat to water quality to landfills with composite liners.