

# Solid Waste Industry Group

**Sanitation Districts of Los Angeles County**  
**San Bernardino County Department of Public Works Solid Waste Division**  
**Recology**  
**Ventura Regional Sanitation District**  
**OC Waste & Recycling**  
**Rural Counties' Environmental Services Joint Powers Authority**  
**Waste Management**  
**Republic Services**  
**Riverside County Waste Management Department**  
**Waste Connections**  
**Salinas Valley Solid Waste Authority**  
**Kern County Waste Management Department**  
**Fresno County Public Works & Planning**  
**San Joaquin County Department of Public Works, Solid Waste Division**  
**Monterey Regional Waste Management District**  
**League of California Cities**  
**California State Association of Counties**  
**Solid Waste Association of North America, California Chapters**  
**City of Sunnyvale**

October 4, 2010

Mr. Watson Gin  
Project Manager  
CalRecycle  
1001 I Street  
P.O. Box 4025  
Sacramento, CA 95812

Dear Mr. Gin:

**Proposal for Best Management Practice (BMP) Covering Seismic  
Events in Site-Specific Non-Water Quality Corrective Action Plans**

The Solid Waste Industry Group (SWIG) appreciates the opportunity to participate in the development of the guidance document that will be used by landfill operators in California to prepare non-water quality corrective action plans. These plans will be the basis for landfill operators to provide any additional financial assurance to the state beyond that already provided to the Regional Water Quality Control Boards for known releases to groundwater or reasonably foreseeable water quality corrective action. The draft guidance document outlines

how the non-water quality corrective action cost estimate should be derived. The extent of corrective action (repair) that may be needed is determined by the severity of the catastrophic (causal) event that is assumed to someday impact the landfill. The draft guidance document specifies what causal events should be used to estimate the potential damage that may occur at a landfill and, therefore, the cost of corrective action. Each causal event is described in the form of a BMP. The BMPs contained in CalRecycle's draft guidance document use causal events that we believe are not "reasonably foreseeable" and are, therefore, unacceptable as proposed.

The signatories to this letter, which collectively represent the majority of the solid waste management infrastructure in California, propose an alternative BMP for earthquakes which meets the intent of the financial assurance regulations adopted by CalRecycle in 2009, and incorporates the current standard of practice in geotechnical engineering for evaluating seismic hazards or risks and for structural design. SWIG will send a separate letter proposing alternative BMPs for the other causal events identified in CalRecycle's draft guidance document. *This letter only addresses the seismic BMP.*

### **Intent of Financial Assurance Regulations**

In lieu of providing financial assurance for the complete replacement of the final cover, the regulations allow landfill operators to submit a site-specific non-water quality corrective action plan that evaluates the potential damage that can be caused by a "reasonably foreseeable" causal event that exceeds the landfill's existing design standard. Based on the potential damage, the cost to restore the landfill back to the existing design standard is estimated. Given that each landfill is different, the specific setting, geological profile, and other local characteristics need to be taken into account or considered in the corrective action plans.

### **Class III Landfill Seismic Design Standard**

As described in Title 27, the current minimum seismic design standard for Class III landfills is the maximum probable earthquake (MPE). The MPE is the largest earthquake that is likely to occur during a 100-year time period. The level of ground shaking that is likely to impact the landfill is typically estimated using a deterministic method. The vast majority of Class III landfills in California are designed to the MPE standard.

The premise that seismic events that exceed these well-established design standards are somehow "reasonably foreseeable" is troubling to the solid waste industry in California. Establishing financial assurance for such an extreme event that, by any measure, is so rare and improbable and so far above the established Class III design standards in California strains credibility. While a seismic event may be "theoretically foreseeable" it is not necessarily "reasonably foreseeable."

### **Methods for Assessing Seismic Hazards**

The seismic hazard or risk that a building or structure may have depends on the likely ground motion or shaking that can occur from an earthquake. The greater the ground motion, the

more structural damage can occur. There are two methods used to assess seismic hazards or risks, which, in turn, can be used to estimate the extent of potential structural damage:

- *Deterministic*: This method uses the location and magnitude of the largest known earthquake source closest to the site and estimates the maximum ground shaking (peak ground acceleration) that a site will experience from this particular seismic event. This is an older method that is often used for determining the MPE and always used for estimating the maximum credible earthquake (MCE).
- *Probabilistic*: This method uses the information from all historic earthquakes, plus geologically inferred earthquake sources (faults, locations, and magnitudes) around the site, and computes the peak ground acceleration that a site may experience during a certain return period. This method represents the current standard of practice for evaluating seismic hazards for most civil and structural engineering design projects.

### **Proposed Seismic BMP**

We propose that there be two tiers of evaluation in the corrective action plan for seismic events:

- If the landfill feature, such as the final refuse-fill slope or final cover system, is designed to the MCE, then no corrective action cost estimation or analysis is required. It is certainly not “reasonably foreseeable” that a landfill feature designed to the MCE will have any significant damage from the seismic event.
- For landfill features not designed to the MCE, operators would evaluate the potential damage caused by a seismic event with a return period ranging from 200 to 475 years using the probabilistic method. The earthquakes associated with this range of return period are, in most cases, significantly greater than an MPE. The third party involved in developing the corrective action plan would determine the specific return period after evaluating all site-specific factors, some of which may include risk factors identified in the AB 2296 study<sup>1</sup>.

### **Technical Rationale for Proposed BMP**

The intent of the proposed BMP is to use the current standard of practice for evaluating seismic hazards to determine a site-specific and reasonable foreseeable seismic event that is appropriate for landfills and relevant to estimating corrective action costs.

#### Seismic Hazard Classification of Landfills

At CalRecycle’s seismic workshop on August 30, 2010, the current standard of practice for designing various types of facilities and evaluating seismic hazards was presented. When determining the relative hazard that a facility or structure bears, the standard practice is to consider the consequence of structural failure or damage, such as:

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<sup>1</sup> Study to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills, November 2007.

## SWIG Proposal for the Seismic BMP

- Loss of human life
- Disruption of essential services, such as medical and other lifeline facilities
- Property losses
- Environmental impacts

Using these criteria, earthquakes represent a high risk or hazard to dams, levees, hospitals, schools, and nuclear power plants given the potential loss of life that could occur as a consequence of structural failure. Class III landfills, which are not built for human occupancy, are considered a relatively low hazard since there would generally be no potential for loss of life, no likely disruption of essential services, and typically minimal to no property losses. The environmental impacts would be limited for several reasons: monolithic final covers can be quickly repaired by adding dirt, landfill gas collection systems can be restored in a relatively short amount of time, and structures on the landfill, for the most part, are not critical to the day-to-day operation of the landfill and would have minimal impact on the environment. Many landfills also have impervious barriers underground to prevent any contaminated groundwater from migrating offsite. Additionally, leachate generation and landfill gas production rates typically decline rapidly after landfill closure, lessening the risk over time.

### Seismic Standards Used Today

The following are examples of seismic standards used to design facilities, all of which have a higher hazard risk level than Class III landfills:

- The United States Army Corps of Engineers, which oversees a wide range of facilities (mostly water-bearing) ranging from minimal to extremely high seismic hazards, uses the probabilistic method and a 144-year return period as their operating basis earthquake.
- As part of the Urban Levee Geotechnical Evaluations Program, the California Department of Water Resources (DWR) uses the probabilistic method and ground motions associated with a 200-year return period to evaluate the seismic stability of critical levees in the Sacramento-San Joaquin Valley and to identify areas in need of repair. This is also used by DWR to develop mitigation measures and corrective action cost estimates.
- In simple terms, the California Building Code (CBC) essentially requires that ground motions associated with a 475-year return period be used for designing buildings for human occupancy.
- The Office of Statewide Health Planning and Development has historically required hospitals to use ground motions associated with 475-year return period as a seismic design requirement for maintaining the building operational after an earthquake.

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Based on the body of current engineering practices, a probabilistically derived earthquake with a return period ranging from 200 to 475 years is the appropriate standard for estimating reasonably foreseeable corrective action costs for landfills.

Your consideration of our proposed seismic BMP is very much appreciated.

Yours very truly,

Robert Ferrante  
Head, Solid Waste Management Department  
Sanitation Districts of Los Angeles County  
(562) 908-4288, ext. 2403

Gerry Newcombe  
Deputy Administrative Officer  
County of San Bernardino Department of Public Works  
Solid Waste Management Division  
(909) 386-8703

Rachel Oster  
Government Relations Manager  
Recology  
(415) 875-1223

Sally Coleman  
Director of Operations  
Ventura Regional Sanitation District  
(805) 658-4674

Michael Giancola  
Director  
OC Waste & Recycling  
(714) 834-4122

Mary Pitto  
Regulatory Affairs Advocate  
Rural Counties' Environmental Services JPA  
(916) 447-4806.

Chuck White  
Director of Regulatory Affairs/West  
Waste Management  
(916) 552-5859

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Anthony M. Pelletier, P.E.  
Republic Services, Inc  
Director, Engineering and Environmental Management  
(925) 201-5807

Hans Kernkamp  
General Manager & Chief Engineer  
Riverside County Waste Management Department  
(951) 486-3232

Tom Reilly  
California Engineering / Corporate Compliance Manager  
Waste Connections  
(916) 608-8209

Douglas E. Landon  
Director  
Kern County Waste Management Department  
(661) 862-8936

John R. Thompson  
Resources Manager  
Fresno County Resources Division  
Public Works & Planning  
(559) 262-4259

R. Patrick Mathews  
General Manager/CAO  
Salinas Valley Solid Waste Authority  
(831) 775-3000

Desi Reno  
Integrated Waste Manager, Solid Waste Division  
San Joaquin County Department of Public Works  
(209) 468-3066

William M. Merry, P.E., DEE  
General Manager  
Monterey Regional Waste Management District  
(831) 384-5313

Kyra Emanuels Ross  
Legislative Representative  
League of California Cities  
(916) 658-8252

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Karen Keene  
Legislative Coordinator  
California State Association of Counties  
(916) 327-7500

Paul Yoder  
Legislative Advocate  
California Chapters Legislative Task Force  
Solid Waste Association of North America  
(916) 446-4656

Mark Bowers  
Solid Waste Program Manager  
City of Sunnyvale  
(408) 730-7421

Cc: Margo Reid-Brown, Director, CalRecycle  
Mark Leary, Deputy Director, CalRecycle  
Ted Rauh, Assistant Director, CalRecycle  
Scott Walker, Chief of Financial Assurances, CalRecycle  
Michael Wochnick, Supervisor, CalRecycle