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October 9, 2007

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Subject: Response to ICF White Papers for Modeling of Frequency, Timing, Duration, and Costs of Corrective Action

Thank you for the opportunity to comment on the four (4) White Papers prepared by the Board's consultant addressing post-closure activities, corrective actions, and financial assurances. As the comment period was short, we request the opportunity to continue input and dialog on these important issues.

To estimate future costs associated with corrective action at closed municipal solid waste landfills in California, ICF has proposed to use probability for selection of input parameters into a financial analysis model. The input criteria (and associated White Paper identification number) include frequency (#7), timing and duration (#8), and cost (#9) of corrective action that can be assigned to low, medium, and high cost activities. Low cost corrective actions are proposed to include installing additional groundwater monitoring or extraction wells; medium cost corrective actions would include installing an active gas collection system; and high cost corrective actions would include groundwater remediation. The following sections identify the ICF recommendations and provide comment on their validity.

General Comments: A fundamental flaw running throughout the White Papers is the loose use of the term-of-art, "corrective action." Under the federal Resources Conservation and Recovery Act (RCRA) Subtitle D criteria, "corrective measures" (Section 257.26) or "corrective action" (Section 257.28) is the response required when constituents listed in Appendix II are detected at a statistically significant level exceeding the ground-water protection standards defined in Section 257.25 (h) or (i). Corrective action is identified when detection monitoring and then assessment determines the possibility of a release into groundwater, at which point a corrective action plan is created. Corrective measures do not include the ordinary operations of a facility to comply with RCRA design and operating standards, e.g., installation and operation of

landfill gas controls, installation and operation of groundwater monitoring, cap repair, ordinary closure and post-closure maintenance. "Corrective action" is a specific plan, and the activities itemized therein, in response to a release – not the activities routinely undertaken to prevent release in accordance with RCRA regulations and permit requirements. When the need for corrective measures is determined following detection and assessment monitoring and understanding of a "reasonably foreseeable" corrective action plan -- that is the time when financial assurance is required. It is understood that ICF is doing a theoretical estimate of the kinds of corrective action that are likely for the universe of 282 California landfills, but the costs must be founded in data describing the extent and cost of actual corrective action, not of general facility operation. ICF's forecast of corrective action costs, if they are to have legitimacy, must be founded on historical data on the cost of "corrective action" to date. These data do not appear in the ICF white papers, and it is for this reason we have often urged CIWMB to convene a workshop to discuss field experience with these issues. It is recommended that the State of California adopt regulations consistent with RCRA definition for "Corrective Actions".

Moreover, there is a critical issue of "corrective action" for whom? The fund discussed in White Paper 12 will vary widely in amount depending on whether it is meant to cover corrective action at all applicable landfills, or only for those on which the landfill owner defaults. If for all sites, total amounts will vary depending on whether the landfill owner can draw upon it as reimbursement for costs incurred, or whether reimbursement is tied to some recognition of surplus in the future. If the fund is only for corrective actions that are defaulted, the fund should be built on only the fraction of total modeled cost representing defaulting owners. The fraction should represent the number of landfills at which the state – as opposed to the owner, its insurer or other responsible parties – has assumed the costs of corrective action. The papers do not cite actual examples of defaults, so the modeled costs may be close to zero.

Task 3, Step 4: Modeling the Frequency of Corrective Actions in Fund Working Model (White Paper 7)

ICF Recommendation:

1) *The model should use the method of probabilities to determine whether a landfill incurs a corrective action in each year, and that these probabilities are based on landfill characteristics.*
2) *That proximity to urban areas, permitted capacity (size), engineering controls, rainfall intensity, and hydrogeology be used to predict the number of corrective actions. Specifically, low (e.g. installation of wells) and medium (e.g., installation of GCCS) cost corrective actions will use proximity to urban areas, permitted capacity, and rainfall intensity; and high cost (e.g., groundwater remediation) corrective actions will use permitted capacity, engineering controls, and hydrogeology.*

Accurately defining the "corrective action" forecast: ICF offers a number of solutions to the challenge of developing input parameters to determine frequency of corrective actions. The solutions appear to give greater weight to simplicity rather than technical defensibility since little supporting documentation is included in the draft White Paper for the probability values included for review. As noted above, ICF has not followed the regulatory definition of corrective

action. Under Subchapter 4, 21787 (Corrective Action Plans), cost estimates are required for "known or reasonably foreseeable release of pollution to the environment" determined after detection and assessment monitoring confirm a release into the environment, either from leachate release to groundwater or surface water or landfill gas impact upon groundwater. If ICF intends to forecast future corrective action, it must at least provide documentation on the corrective measures implemented at RCRA Subtitle D landfills in California to date in order to provide a factual basis for future projections. If ICF also believes its task is to project response to catastrophic events (as opposed to the delineated "corrective action"), then it should so stipulate and segregate in terms of estimates. The frequency of such catastrophic event should also follow historic trend. If the model assumes there will be variability in costs based on landfill characteristics, there must be a statistical basis for that assumption, as well as some statistical evidence that the characteristics selected are correct and significant.

A valid predictive study of potential future costs also should incorporate the impacts of a site's development of a preventative maintenance plan. A strong preventative program that includes pump inspection and repair/replacement, gas well maintenance, header maintenance for leachate and gas collection systems, management of gas condensate, monitoring well inspection and repair, and vegetative cover maintenance to preclude excessive erosion preserves the key engineering controls that constitute the backbone of an environmental containment and monitoring system. The State's pooled fund, and the ways in which fees are assessed and deployed, should be targeted to encourage these preventative actions. As currently envisioned, preventative maintenance is not only ignored, it is discouraged because its costs are not recognized and rewarded in terms of risks lowered and future liabilities avoided.

It may be, when the data are reviewed, that current controls required under RCRA Subtitle D and the Clean Air Act are so strong that no or little corrective action should be anticipated at modern facilities. Direct exposure of non-degraded solid waste to receptors would require a failure of the containment system and the site security system that is designed to limit access within the permitted footprint while the unit presents a potential threat to human health or the environment (HH&E). There is no documentation in the White Paper of containment system failures that caused uncontrolled direct contact by receptors to solid wastes (even under catastrophic conditions such as fire, earthquake, or tornado). Nor is there an articulation of the harm and therefore the costs incurred in the event of containment system failure (i.e., off-site adverse impacts to human health or the environment).

To address the regulatory definition of corrective action in terms of extrapolating from current incidents to project trends in future corrective action, engineering controls represent the greatest single component to assess threat, with hydrogeology and liquids management (as a means to modify the rate of waste biodegradation and reduce long-term threat potential of the waste) as key secondary factors. The type of waste, proximity to urban areas, sensitive habitat, or floodplain are only considered if there is a release to the environment and do not provide a reasonable bellwether of whether such a release will or will not occur. There is no correlation of threat to permitted capacity, rainfall, or side-slope design other than the fact that these factors are considered in the engineering design that is certified to meet engineering design specifications

for protection of public safety. If the landfill is located with a seismic impact zone, the engineering design must also consider such safety factors to ensure public safety for a reasonably foreseeable earthquake, and this likelihood would be considered in the category of catastrophic events.

The engineering controls implemented to control leachate and landfill gas (and contain solid wastes) are liner and cap systems, leachate collection and recovery systems (LCRS), and gas collection and control systems (GCCS). For sites without these controls, the potential for uncontrolled release of "pollutants" to the environment is greater than those sites with such controls. For sites with such controls (Subtitle D equivalent landfills) a release can only occur with the failure or lack of maintenance for system controls and the build up of leachate or landfill gas to a level that allows release through the primary containment system (liner or cap). For sub-surfaces releases, the hydrogeology plays a primary role in whether such a release will require regulatory corrective action or will be adequately contained or attenuated to not impact groundwater or surface water.

Accurately predicting the likelihood of corrective action and catastrophic response: ICF proposes to use the method of probability to determine the number of corrective actions per site over a period of 240 years, arbitrarily defined in consultation with CIWMB, but with no supporting data or even description of whether the professional judgment relied upon is from individuals or an engineering organization. A footnote in White Paper #9 explains that the 240-year projection is based upon the limitations of Microsoft Excel 2003. Basing a projection on the limitation of a particular software makes no more sense than basing it on the number of columns (years) that could be printed on a single sheet of paper (another technology limitation).

ICF goes on to say "Linking the occurrence and timing of corrective action also simplifies model development by using the same methodology to determine both the occurrence and timing of corrective actions, thus reducing the number of inputs and calculations." While the proposed analysis methodology meets a key objective of simplicity, it does not provide acceptable justification that such an approach will estimate "reasonably foreseeable releases of pollution to the environment."

Regarding ICF recommendation #2 (criteria to determine low, medium, and high cost corrective actions), two references were reviewed to consider the potential for impact of lined and unlined MSW landfill sites to cause regulatory corrective action. The Minnesota Closed Landfill Program (CLP), established in 1994, currently manages 112 unlined closed landfills that operated prior to, and not in compliance with, Subtitle D. Through 2006 the CLP has completed 107 major response actions that include such work as installation of enhanced covers, waste relocation (reduction of fill areas), and installation of gas collection systems (deep vents, flares, gas-to-energy). Through these efforts the MPCA estimates that 80 percent of the goal to limit landfill gas migration and leachate generation has been achieved in less than fourteen (14) years. While this benchmark is not definitive, it does provide evidence of real-world conditions with mitigation of potential threat to HH&E in a period of time that is more closely linked to the

regulatory threshold for PCC of 30 years than the arbitrary target proposed by ICF of 240 years. A copy of the report (Liesch Associates, Inc., 2007) is attached.

A second pertinent reference is a study of leachate impacts to groundwater located uniquely down-gradient of Subtitle D-lined MSW landfill cells. The study evaluated data collected from 738 monitoring wells located down-gradient of Subtitle D-lined cells at 98 distinct landfill sites. The study did not discover evidence of a release of leachate through a liner to groundwater at the point-of-compliance at any of the monitoring wells in the study. While this reference does not provide a projection of future performance of engineered containment systems, it does provide a performance-based objective metric regarding the frequency of corrective action impacts to groundwater within the time frame since the construction of Subtitle D-equivalent disposal cells. A copy of this report (WasteTech 2006) is also attached.

Both the Liesch (2007) and WasteTech (2006) reports reference a large database of sites over a variety of hydrogeologic conditions and engineering controls. They also contribute to the body of knowledge on probability of impacts to the environment requiring regulatory corrective action that does not support the estimates provided by ICF on frequency. *Also see* Geosyntec, *Technical Critique Report of "Day of Reckoning: Protecting California Taxpayers from the Looming Landfill Crisis*" (October 4, 2007, submitted to CIWMB by the Solid Waste Industry Group of California)(attached).

Task 3, Step 4 (c): Modeling the Timing and Duration of Corrective Actions in Fund Working Model (White Paper 8)

ICF Recommendation:

1) *Assume that a corrective action may occur in any year and that there is a probability of the corrective action occurring in each year.*
2) *Assume that the durations for these corrective actions be randomly selected from a uniform distribution.*
3) *Assume that the durations for high cost corrective actions are also randomly selected from a uniform distribution.*

In estimating timing and duration of corrective action, ICF proposes to assume that a corrective action may occur in any year and that there is a probability of the corrective action occurring in each year. Using this method, both the timing of corrective actions and the occurrence or frequency of corrective actions is handled in the same way. According to ICF, "(t)his helps to simplify the development of the model."

Simplistic probability models for timing and duration of corrective action are based upon the same flawed assumptions built into the probabilities that such a corrective action will occur. Much of the data relied upon by ICF to develop their probability values are from the CIWMB Solid Waste Information System (SWIS) providing distribution of cost for 282 landfills in California. This system documents projections of "known or reasonably foreseeable releases of pollution to the environment" and does not represent actual distributions to base future cost estimates upon. For example in the ICF category of high cost corrective actions, there is scant

information on the required duration of pump and treat groundwater remediation systems, although 30 years is a "default value" cited by ICF without reference. Thus there is little empirical data with which to develop a distribution. ICF recommends that the durations for high cost corrective actions are also randomly selected from a uniform distribution. There are no data indicating the number and characteristics of pump-and-treat remedies required as corrective action among the 282 subject facilities or if pump-and-treat remedies will be considered effective to as corrective measure for MSW landfill corrective action in the future.

The discussion also ignores the relationship between duration of corrective action and its likely extent given site operational practices. Sites with solid construction QA/QC and rigorous preventative maintenance programs can be expected to have less substantial, and shorter, corrective action obligations – if they have any at all.

Task 3 Step 4 (d): Modeling the Costs of Corrective Actions in Fund Working Model (White Paper 9)

ICF Recommendation:

1) *Use the landfill characteristic of size to estimate the costs of medium and high cost corrective actions; and for low cost corrective actions treating all landfills the same.*
2) *That the model determines corrective action costs using statistical distributions to better simulate the variability of costs that may be incurred by different landfills.*

Use of a simplistic factor such as landfill size to determine the costs for medium and high cost corrective action is flawed. The presence or absence of source controls (GCCS and LCRS) and the cost to install and/or maintain these systems should be a determining factor in determining future cost for corrective action since landfill gas and leachate releases are the primary drivers for regulatory corrective action. Cost estimates used by ICF to determine the distribution of costs were developed from analyzing the range of costs currently reported for corrective action coverage by the 282 landfills from the Solid Waste Information System (SWIS) and considering the corrective action cost estimates used in the "MMSW Landfill Liability Report." However it is important to note that the SWIS database represents an estimate of "known or reasonably foreseeable release of pollution to the environment" in accordance with CIWMB Rule 21787, and not a summary of actual corrective action cost incurred by these landfills. For a better estimation of costs, the costs provided for the Minnesota CLP program since 1994 for unlined landfills (and summarized in Liesch, 2007) provide a better estimate of future costs. Closed landfill facilities with engineering controls consistent with Subtitle D requirements are expected to have significantly reduced long-term corrective action costs since the primary control functions of leachate and landfill gas management (as well as containment of solid waste and degradation by-products) have been included in the landfill design and operations plan.

The White Paper takes pains to demonstrate how costs can be modeled year-by-year. If costs can be modeled by year, then cash flows can and should be discounted to present value obligations before applying the default rate to come up with a required pool of funds. It also should be assumed that the funds collected by the state will be maintained in a trust account and

interest earned added to the fund to further meet obligations. Some measure of funds will be retained even if funds are available for reimbursement since there will be at least a lag time, if not a certain overestimation of expenditure. If the funds are segregated in a trust account, a balance adequate to the year's expenditures should build very quickly given the present value nature of the obligation and the likely low frequency of draw down. If the funds are accumulation in a general purpose fund and interest not accumulated to build the account, this proposal is nothing more than a new general tax.

The paper indicates that current cost estimates are going to "increase by 20%." This is a very dramatic cost increase, and should not be incorporated absent an articulation of the data justifying a large inflation factor. The inflation factor is particularly inappropriate for post-closure care, which occurs on a regular basis and is quite predictable in amount and schedule.

The paper also indicates the "fund" will pay for post-closure maintenance and response. This appears contrary to applicable law, which requires that a facility owner pay for all maintenance and corrective action throughout the post-closure period. By assuming that both corrective action and routine maintenance will be paid by the fund – which, after all, has been postured as the safeguard for use only when the facility owner defaults on its obligations – total costs are artificially and dramatically inflated. This inflation is particularly unwarranted given the fact that the State has yet to provide the specific cases in which the State – as opposed to the owner, its insurer or responsible parties – paid for post-closure maintenance or corrective action.

It is difficult to respond adequately to the general cost estimates without the detail that ultimately will be provided in the exhibits, tables, and graphs. It is possible that those tables will reveal double counting of routine O&M under different tasks.

Task 3 Step 5: Modeling How Landfills Will Provide Funds (White Paper #12)

ICF recommendation: *Funding should be based on tons of waste rather than characteristics like size.*

ICF's recommendation that any new fee be imposed per ton of waste rather than characteristics like landfills size (or public vs. private ownership) is critical to the sustainability of California's proposal. We agree with ICF that landfill characteristics are not correlated with defaults, only with extent of costs if default occurs (and only for such features as engineering controls, preventative maintenance, hydrogeology, liquids management). And for this pooled fund, the total amount projected should correspond to California's experience with default rate, for which inadequate information is provided through these study white papers.

A per ton charge is the simplest, easiest to administer, most transparent and fairest means to amass a pooled fund. To fail to charge, or apply lesser charges, based upon factors extraneous to potential draw upon the fund disrupts the market place, gives the exempt or lesser burdened sector an unfair cost advantage, and shifts the waste stream and ultimate potential liability to the exempt rather than the covered parties. It is possible for municipalities, just as for corporations and small businesses, to default. It would make sense to graduate fees based upon credit risk,

with businesses and municipalities with higher bond ratings eligible for reduced fees, since this factor is directly related to potential default. If this fund is proposed, it will be important that it send price signals incentivizing excellence in facility construction and operation, diligent preventative maintenance, and fiscal prudence consistent with reduced credit risk.

Fund management is also critically important. Funding for this program must be segregated in order to assure it is preserved for its intended purpose.

Summary: There are many other issues that need to be fully vetted before rushing to judgment without full information. No final development of policy or regulations should be adopted until the current study commissioned by the Board is completed and thoroughly discussed with key stakeholders.

We encourage your serious evaluation of the issues raised in the correspondence. Further, we look forward to full engagement in the discussions that lead to reasonable and practical regulations to govern post-closure, corrective actions and financial assurance activities.

Sincerely,

Original Signed by:

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