

Comments on Potential Water Resource Impacts of the
Proposed Cortina Landfill

Re: Public Notice SPK-2008-00912

Comments Submitted to
Colusa County Citizens for Safe Water and Sierra Club Yolano Group
by

G. Fred Lee, PhD, PE, BCEE, F.ASCE and Anne Jones-Lee, PhD

G. Fred Lee and Associates

EI Macero, California

530 753-9630

gfredlee@aol.com www.gfredlee.com

February 7, 2011

The Cortina Band of Wintun Indians leased land to the Cortina Integrated Waste Management Inc. (CIWMI), a subsidiary of Earthworks Industries of Vancouver, Canada, for the development of the proposed Cortina Landfill. The purpose of the landfill is to provide an income for tribal members. Since the proposed landfill would include fill and other impacts on the waters of the US a Clean Water Act section 404 permit is required. On behalf of Colusa County Citizens for Safe Water and Sierra Club Yolano Group we reviewed the CWIMI CWA 404 permit application to the Army Corps of Engineers (ACOE) Sacramento District and submit these comments concerning potential impacts of the proposed landfill facility on water resources.

The ACOE summary of request for comments stated, *"the U.S. Army Corps of Engineers, Sacramento District, (Corps) is evaluating a permit application to construct the Cortina Integrated Waste Management project at the Cortina Indian Rancheria, which would result in direct impacts to approximately 0.615 acres of waters of the United States, including wetlands, in or adjacent to Strode Creek."* The ACOE document also stated, *"Environmental Setting. There are approximately 3.038 acres of stream, seep, and pond habitats within the project area."* These conditions require that the ACOE evaluate the impact of developing the proposed landfill on the water resources of the area near the landfill and downstream from it. Pursuant to this request for comments we wish to provide the following comments.

Background to Comments

I (G. F. Lee) examined a large file of documents pertinent to the proposed Cortina Landfill provided to me by members of Colusa County Citizens for Safe Water (CCCSW) and obtained from the Internet. I visited the general area just outside of the Cortina Rancheria tribal lands – up to the property gate on Spring Valley road – in the summer of 2008, and attended a Wintun Environmental Protection Agency (WEPA) Public Hearing on July 7, 2008.

These comments on those materials are based on my more than five decades of experience devoted to evaluating the impacts of municipal solid waste (MSW) landfills on public health, surface and groundwater resources, and the interests of those who live, work, or otherwise use lands and waters in the sphere of influence of proposed new landfills or landfill expansions. I have examined water quality/water resource issues associated with more than 80 landfills located in various areas of the US and in several other countries. In addition to reviewing real,

anticipated, and potential initial (near-term) impacts of landfills, we have pioneered in discussing anticipated and potential long-term (postclosure and post-postclosure) issues and threats associated with waste management practices, including US EPA Subtitle D landfills. Many of those issues are also of concern relative to the design, closure, and postclosure and beyond monitoring/maintenance of the currently proposed Cortina Landfill.

We have discussed many of the key technical aspects of the protection of public health and environmental quality from impacts of waste management facilities in the following report, referred to in these comments as the "Flawed Technology Review":

Lee, G. F., and Jones-Lee, A., "Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste," Report of G. Fred Lee & Associates, El Macero, CA, December (2004). Updated June (2010).

<http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf>

This review contains over 140 references to the literature on the topics discussed.

Several of our papers/reports have discussed issues of specific concern regarding potential impacts of the proposed Cortina Landfill including:

Lee, G. F., and Jones-Lee, A., "Potential Impacts of Landfills on Wetlands," Report of G. Fred Lee & Associates, El Macero, CA, April (2007).

<http://www.gfredlee.com/Landfills/LFImpactWetland.pdf>

I have also been involved in investigating the water quality characteristics of wetland areas, and published the following paper on these issues:

Lee, G. F., Bentley, E., and Amundson, R., "Effects of Marshes on Water Quality," IN: Ecological Studies 10, Coupling of Land and Water Systems, Springer-Verlag, New York, pp. 105-127 (1975).

<http://www.gfredlee.com/SurfaceWQ/MarshesBentleyAmundson.pdf>

An issue of particular concern in reviewing the Cortina Landfill CWA 404 permit application is that this landfill will alter the surface and groundwater hydrology of the region and therefore impact the hydrology of the nearby wetlands. I have been involved in reviewing the potential impact of landfills that are to be sited near wetlands. For example is the proposed landfill in Richmond, Rhode Island. It was found that the proposed construction of this landfill would impact the surface water and groundwater supply for a wetlands located just downstream of the landfill. This impact could significantly adversely impact the ecology of the wetlands. This landfill was not approved for development.

During the 1970s through the 1980s we conducted about \$1-million of research for the Corps of Engineers' Waterways Experiment Station Dredged Material Research Program and for several ACOE Districts on characteristics and impacts of dredged material disposal in waterbodies. We provided an overview of water quality impacts of fill projects in the following paper:

Lee, G. F., and Jones, R. A., "Evaluation of Potential Water Quality Problems Associated with Highway Excavation and Fill," IN: Leachates: Terrain Analysis, Transportation Research Record 892, Transportation Research Board, National Academy of Sciences, Washington, DC, pp 2-8 (1982).

<http://www.gfredlee.com/Sediment/HighwayExc-Fill.pdf>

In addition to the publications highlighted above, we have published many other papers/reports pertinent to the protection of public health and environmental quality from adverse impacts of landfilling waste management practices. Many of them are available on our website at [<http://www.gfredlee.com/plandfil2.htm>]. Additional information on our qualifications to submit these comments are appended to this review.

The comments presented herein make reference, via URL links, to many papers/reports or other materials that are available through the Internet. Those referenced materials and publications/reports cited in these comments are to be incorporated as part our comments.

In the comments presented below reference is made to the following SCS Engineers report that presents some information pertinent to conducting a CWA 404 permit review.

SCS Engineers, “Basis of Design Report and Preliminary Closure and Postclosure Maintenance Plan, Cortina Integrated Waste Management Facility, Cortina Rancheria, Colusa County, California,” Report of SCS Engineers, Pleasanton, CA to Cortina Integrated Waste Management, Inc., Santa Rosa, CA, May (2008)

A summary of several of these issues are discussed herein with reference to specific section of the SCS report.

Inadequate Environmental Impact Assessment

The landfill applicant prepared an Environmental Impact Statement (EIS) for the Cortina Landfill development project; the final Environmental Impact Statement was released by the US Department of Interior Bureau of Indian Affairs Pacific Region in September 2000. I reviewed sections of the FEIS that are pertinent to our review of the 404 Permit application, including Section 3.2 Water Resources, Section 3.4 Biological Resources, and Section 4.2 Water Resources. FEIS section 3.2 Water Resources states, “*This section provides site-specific data and description of surface water hydrology, groundwater hydrology, and water quality.*” It provided some information of the occurrence of surface and groundwater in the area of the proposed landfill. Section 4.2 Water Resources states, “*This section analyzes the proposed site, based on hydrogeologic considerations, to determine its suitability for construction, operation, and closure of the proposed project and alternatives. Principal areas of concern addressed in the analysis include (1) potential flooding and erosion associated with alteration of surface drainage patterns; (2) potential landfill destabilization by underlying springs, seepage, and shallow groundwater; and (3) potential surface and groundwater quality impacts due to failure of the landfill containment system.*”

Assumptions that form the basis for this analysis are derived from a series of EPA documents (EPA 1985, 1986, 1987a, 1987b, and 1988c), which comprise the major technical guidance in support of federal regulations governing design, construction, and maintenance of lined waste containment facilities. These assumptions include the following:

- *Engineered fills can be designed to ensure integrity of overlying liners, seals, roadways, and general facilities.*
- *A liner and leachate collection system can be designed and constructed to adequately isolate waste material from the subsurface environment.*

Borings, water sampling, and aquifer testing performed at the site have been reviewed and have been determined to be representative of surface and groundwater conditions at the site.”

As stated in this quoted passage, in evaluating the potential impacts of proposed landfill Padre assumes that the landfill can be designed to “ensure” the integrity of liners and other containment systems and that the liner and leachate collection system can be designed to adequately isolate waste material from the subsurface environment, one must presume for as long as the isolation is needed—for as long as the wastes pose a threat. In making those claims, Padre Associates fails in meeting the purpose and requirement of an FEIS of providing reliable and full disclosure of potential impacts and consequences of the construction of this landfill. At the time when the final FEIS was released in 2000 it was well-known in the professional landfill literature that such assumptions were unreliable. While the quoted passage cited US EPA documents as providing support for the EIS’s claims and assumptions about liner integrity, the 1988c document cited was not the key US EPA document published on the technical issues of the long-term integrity of Subtitle D liner systems. As part of adopting the RCRA Subtitle D regulations, the US EPA stated in the draft regulations that year (US EPA, 1988a),

“First, even the best liner and leachate collection system will ultimately fail due to natural deterioration, and recent improvements in MSWLF (municipal solid waste landfill) containment technologies suggest that releases may be delayed by many decades at some landfills.”

US EPA, “Solid Waste Disposal Facility Criteria; Proposed Rule,” Federal Register 53(168):33314-33422, 40 CFR Parts 257 and 258, US Environmental Protection Agency, Washington, D.C., August 30 (1988a).

The US EPA (1988b) Criteria for Municipal Solid Waste Landfills stated,

“Once the unit is closed, the bottom layer of the landfill will deteriorate over time and, consequently, will not prevent leachate transport out of the unit.”

US EPA, “Criteria for Municipal Solid Waste Landfills,” US Environmental Protection Agency, Washington, D.C., July (1988b).

As discussed in the “Flawed Technology” review, the inevitable failure of US EPA Subtitle D landfill liner and leachate containment systems that leads to groundwater pollution was repeatedly confirmed by US EPA officials and others during the 1990s, well-before the issuance of the FEIS. The Padre Associates assumption that liners and other waste isolation systems critical to public health and environmental protection will function perfectly forever (for as long as the wastes in the landfill will be a threat) renders the EIS’s assessment of the impact of the proposed Cortina Landfill unreliable and should have caused the Department of Interior Bureau of Indian Affairs (BIA) and others to find that that FEIS is unreliable and non-certifiable.

Further, as discussed in our comments presented herein on the deficiencies in the 1988 SCS report on the basis of the landfill design, the proposed design of the landfill does not adequately address the long-term failure of the landfill containment and other systems.

Page 4.2-11 paragraphs 3 and 4 attempt to use our (Lee and Jones-Lee) writings to claim that the deficiencies in the minimum-design US EPA landfill liner system are completely eliminated by construction of a double-composite liner system. However, Padre provides an unreliable and highly misleading reporting of our writings on this issue. Padre fails to discuss the fact that Lee

and Jones-Lee point out that even double-composite liner systems will eventually fail to prevent leachate from polluting groundwater under a landfill. Lee and Jones-Lee discuss the advantage of a properly designed, placed, maintained, and monitored double-composite liner/leak detection system in that it affords the opportunity to detect the failure of the uppermost liner before leachate pollutes groundwater. Such a system does not preclude breach of the engineered systems, it simply affords the opportunity to detect incipient breaching of the upper liner and the opportunity to remediate the landfill containment system before groundwater is polluted. Lee and Jones-Lee discuss this and other approaches that can be useful to address the problems caused by inadequacies in postclosure funding and by the truly long-term (post-postclosure) threats posed by closed landfills, inadequacies that virtually ensure that landfill cover systems will not be monitored and maintained for as long as the wastes in the landfill are a threat to generate leachate when contacted by water. As discussed in these comments, SCS states that CIWMI plans to provide postclosure funding for landfill monitoring and maintenance for only 30 years, which is a very small portion of the time during which the wastes in the landfill will be a threat to generate leachate that can pollute groundwater. Therefore, the construction of a double-composite liner in the proposed Cortina Landfill will not prevent pollution of groundwater or of surface water since the shallow groundwater is connected to surface waters of the area.

We have considerable experience in reviewing the adequacy of EIS/EIRs for proposed landfills; the Cortina EIS is one of the most superficial EISs that we have reviewed. The 2000 FEIS is badly out-of-date in describing the impacts of the currently proposed Cortina landfill project. It is our understanding that the US EPA is reviewing the need for a new EIS that would adequately discuss the currently proposed project. Since a properly prepared EIS for a landfill project must provide current, reliable, detailed information on the potential impacts of the proposed project, the ACOE should reject this proposed CWA 404 permit application until a credible EIS has been prepared for the Cortina Landfill Project.

Impact on Seasonal Waterbodies

In its request for comments on the proposed Cortina Landfill the ACOE stated, "*Environmental Setting. There are approximately 3.038 acres of stream, seep, and pond habitats within the project area.*" Of particular concern about the proposed landfill are the near-term local impacts that will result from the filling of approximately 0.6 acres of waters and wetlands in the landfill area as proposed, irrespective of the nature of the fill material. The ACOE has determined that potential impacts on both perennial and seasonal waterbodies that will be impacted by fill must be addressed in the CWA 404 permit. There is growing technical understanding that seasonal waterbodies are important water resources in an area. The waterways, wetland, and seasonal and semi-permanent pool areas provide valuable habitat and food/water for local wildlife. Pool areas in the vicinity of the proposed landfill provide unique habitats that, of themselves, merit protection, especially in light of the US EPA's reporting that more than 90% of California's seasonal pools have already been lost, and that, "*their disappearance marks the loss of rare and important habitat and some of the associated plant and animal species as well.*"

Information on seasonal pools and wetlands is provided in:

<http://www.vernalpools.org/> and http://ceres.ca.gov/wetlands/whats_new/vernal_sjq.html

and <http://water.epa.gov/type/wetlands/vernal.cfm>. Information on the ecological resources of ephemeral streams such as the Strode Creek and other waterbodies that will be impacted by the proposed landfill is presented in:

Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D. P. Guertin, M. Tluczek, and W. Kepner.. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046, 116 pp. (2008).
<http://azriparian.org/docs/arc/publications/EphemeralStreamsReport.pdf>

The abstract for the Levick et al. US EPA report states,

“Ephemeral and intermittent stream systems comprise a large portion of southwestern watersheds, and contribute to the hydrological, biogeochemical, and ecological health of a watershed. Given their importance and vast extent, it is concluded that an individual ephemeral or intermittent stream segment should not be examined in isolation. Consideration of the cumulative impacts from anthropogenic uses on these streams is critical in watershed-based assessments and land management decisions to maintain overall watershed health and water quality.”

While the focus of that US EPA report is on ephemeral stream situations in Arizona, it provides important information concerning potential impacts of altering the hydrology of the Cortina landfill area and downstream in Strode Creek that must be evaluated in issuing a CWA 404 permit to place fill in the waterbodies in the area of the proposed Cortina landfill.

Downstream Impacts

The construction of the proposed landfill will also impact the downstream waters through its alteration of the hydrology of the headwaters area for Strode Creek. Further, the eventual failure of the landfill containment system and the release of leachate to Strode Creek will be a threat to downstream aquatic life and water-associated terrestrial life, as well as to the use of the Creek waters for domestic and agricultural water supply. An area of increasing concern is the presence of unrecognized, unregulated chemicals in municipal solid wastes (MSW) leachate that are a threat to the environment and the use of the creek waters for domestic and agricultural water supply. Only a small number of the myriad potential hazardous and deleterious chemicals are monitored/regulated in MSW leachate. As discussed in the “Flawed Technology” review, additional chemicals that were not previously recognized as emerging contaminants are being identified in MSW leachate. This results in the need for all agencies issuing permits for a proposed landfill to ensure that the proposed landfill is sited, designed, constructed, closed and provided with adequate postclosure funding to protect public health and the environment.

Suitability of Proposed Cortina Landfill Site for a Landfill

The proposed site for the Cortina landfill is one of the worst possible sites for a landfill. Some of the issues of concern are summarized below.

Hydraulic connection to waters of the area. The landfill is proposed for siting in the headwaters of a water resource system that provides a water supply in the vicinity of the proposed landfill and nearby areas and supplies surface and groundwaters in the Central Valley. This hydraulic connection between the proposed landfill and downstream areas is of importance because of the

inevitable alterations in the hydrology/water supply of the areas and local and downgradient water quality when the proposed landfill liners eventually fail to contain the waste-derived hazardous and otherwise deleterious pollutants deposited in the landfill. The failure of the landfill containment and monitoring systems are summarized below. The wastes proposed to be deposited in the landfill will be a threat to public health and the environment effectively forever. Even presuming high-quality construction, the landfill liner system proposed for this landfill will deteriorate over time and lead to pollution of water resources hydraulically connected to the landfill by leachate and its associated waste-derived contaminants.

High Groundwater Table. The SCS report states on page 19, *“Based on the previous reports, shallow groundwater is anticipated to be present in the bottoms of drainages. Springs have been observed onsite within and outside the landfill footprint. Springs and seepage areas have been noted along the canyon areas indicating that groundwater is, at least part of the time, discharging from the Cortina Formation to the surface water drainage.”*

Page 36 of the SCS report states, **“3.5 GROUNDWATER SUBDRAIN SYSTEM**
“Due to the steep rugged terrain at the site, groundwater from the higher elevations emerges at the surface of the ground as springs in the canyon areas. The proposed cell excavations may eliminate some of the springs and others may appear after the excavations. It will be important to identify and map the locations of the springs so they can be accounted for in the liner system design and during construction.

Landfill liner systems are impermeable and prevent liquids from passing through them; however it is important to collect and manage spring water beneath the liner system to prevent pressure from building up that could lift and possibly damage the liner system.”

Section 3.5.2 “Groundwater Subdrain Plan states,
“To prevent water pressure from building up beneath the liner system, a subdrain system has been incorporated into the design to collect and transport water from beneath the liner to prevent a build up of pressure. The main elements of the subdrain system consist of finger “French-drain” type trenches extending into the main drainage for the cells. Branching trenches lead to specific seeps or springs that are identified after the cell excavations are complete.”

In an attempt to eliminate the potential impacts of the high groundwater table, SCS proposes to construct a groundwater subdrain system. Such systems can be inadequately designed especially in a complex groundwater system such as that which underlies the proposed landfill, and considering the fact that it would need to function properly and reliably for as long as wastes remained buried. Such systems can readily become plugged and thereby fail to prevent the adverse impacts of a high groundwater table under the landfill liner system. Furthermore, once the landfill is constructed it will be impossible to eliminate the errors and deficiencies inherent in the construction of the groundwater subdrain.

Regulatory agencies typically require at least five feet of separation between the bottom of the wastes in the landfill and the highest point of the groundwater table. This requirement is intended to prevent entrance of groundwater into the containment system or landfilled wastes. The proposed liner system would cover several established groundwater seeps/discharge points.

The SCS report's claim that landfill liners "*are impermeable and prevent liquids from passing through them*" is not in keeping with what is known and well-recognized in the technical community and literature about landfill liner systems. The fact is that plastic sheeting liners, even when first placed with high-quality construction, have some holes in them; over time, they deteriorate leading to more holes and diminishing integrity. While the applicant proposes to try to control the impacts of the high groundwater table, such controls even if initially effective will eventually fail due as components deteriorate and as groundwater that may enter the landfill wastes exacerbates the problems; this will lead to even greater leachate generation and environmental pollution than would be experienced without an elevated groundwater level.

Earthquake Fault in the Area of Proposed Landfill. The SCS report states on page 14 in the discussion of the geology of the landfill area, "*• A small reverse or thrust fault, the Valley-Side Fault, is located near the eastern boundary of the Rancheria. This fault has resulted in a portion of the Cortina Formation being thrust upward through the Tehama Formation. Subsequent erosion of the Tehama has exposed the Cortina thrust block as several small fensters (windows) near the eastern boundary of the Rancheria (see Figure 9).*" Page 14 of the SCS report also states, "*CIWMI proposes to construct the landfill in a seismic impact zone as defined by the WEPA and federal Subtitle D regulations.*"

The location of this proposed landfill relative to this fault should be sufficient grounds for rejection of the landfill application. There is no doubt that seismic activity could lead to more rapid failure of the landfill containment system and the monitoring systems than would be expected to occur under normal conditions. R. Anderson, formerly of the California Integrated Waste Management Board (IWMB) and now of CalRecycle, reviewed impacts of earthquakes on California landfills in:

Anderson, R., "Earthquake Related Damage and Landfill Performance" ASCE Geotechnical Special Publication No. 54, "Earthquake Design and Performance of Solid Waste Landfills," American Society of Civil Engineers, New York, NY, pp 1-16 (1995).

Anderson reported that the containment systems of many of the landfills inspected following earthquakes showed damage that was attributed to the earthquake. He reported, "*Damage to landfills observed by the IWMB staff is categorized into four groups: 1. cracking of daily, intermediate, or final covers; 2. damage to liners; 3. damage to environmental collection and control systems; and 4. damage to infrastructure such as water tanks and on-site structures.*"

His review included a discussion of each of those categories. In addition to visible damage to the exposed liners, there can be unseen, subsurface damage to the leachate collection system, liners, and other components that may not become apparent for many years. Strong earthquakes could be disruptive to the landfill cover, groundwater monitoring wells, and the landfill gas collection system.

Overall, the location of the proposed Cortina Landfill is not suitable for this landfill. The construction of this landfill and the associated filling of waters of the US will be detrimental to the water resources of the area and downstream.

Comments on Padre Associates CWA 404 Permit Application

Padre Associates Inc. (Padre) of Sacramento, CA submitted a Section 404 Permit application for the proposed Cortina Integrated Waste Management Project at the Cortina Rancheria, Cortina County, CA (No SPK-2008-00912) to the US Army Corps of Engineers Sacramento District on December 16, 2010. Following are comments on that application.

On page 3 of its cover letter accompanying the application Padre states, *“On-site mitigation is not feasible due to the lack of sufficient area not already vegetated. Our preference is to contribute to the National Fish and Wildlife Foundation Sacramento District Wetlands Conservation Fund. However, contributions to restoration projects sponsored by The Nature Conservancy, Trust for Public Lands, or Sacramento River Conservation Area Forum are being researched. Also, the purchase of credits at Wildlands’ Fremont Landing Conservation Bank is under consideration.”*

As discussed previously, some of the 0.615 acres of US waters comprise unique aquatic habitat that will require specific mitigation with the same type of habitat. General mitigation, such as that which might be achieved through the proposed contributions to certain organizations, would not properly mitigate the loss of the unique aquatic habitat in the US waters that will be destroyed by the construction of the proposed Cortina Landfill.

Pages 1-3 under Block 16 contains information that is largely copied from the SCS 2008 report. Our comments on the SCS report presented below address deficiencies in this section of the report; they are applicable to this section of the Padre CWA 404 application as well.

Page 5 paragraph 5 of the Padre application presents information on the SCS proposal to try to eliminate the potential impacts of the high groundwater table that occurs at the site of the proposed landfill. Our comments on the SCS report discuss potential problems/reliability of the proposed approach to control high groundwater impacts.

Suitability of the Cortina Landfill Design

The May 2008 SCS Engineers report devoted to the “Basis of Design Report and Preliminary Closure and Postclosure Maintenance Plan, Cortina Integrated Waste Management Facility, Cortina Rancheria, Colusa County, California,” provides some information on the design proposed for the Cortina Landfill. Comments on some of the issues of concern with respect to review of the CWA 404 permit are summarized herein.

Section 2 of the SCS report presents information on “Permit Application and Reporting Requirements.” This section the SCS report states on page 6 item (4), *“(4) Slope Failure. The operator shall notify WEPA immediately of any slope failure occurring in a disposal facility. The operator shall promptly correct any failure that threatens the integrity of containment features of the disposal facility after approval of the method and schedule by WEPA.”* The SCS report states that CIWMI will be responsible for landfill operation, maintenance, and monitoring for only a small portion of the time during which the wastes in this landfill will be a threat. How will the Cortina Band receive information on slope failure such could occur after an earthquake or on other situations that occur after CIWMI is no longer responsible for landfill maintenance? This should be specified in the application for this landfill and be considered in the CWA 404 permit review.

The SCS report states on page 4 item (5), “(5) *Detection of Liquid. The operator shall notify WEPA within three (3) days if liquid is detected in a previously dry leachate collection and removal system or unsaturated zone monitoring system or if a statistically significant increase is detected in the volume of fluid in a leachate collection and removal system.*” How will the Cortina Band receive information on leachate detected after CIWMI is no longer responsible for landfill monitoring/maintenance? With reference to items (4) and (5) what action will the Band take after it becomes aware of the slope failure and the presence of leachate in the previously dry leachate collection system? This should be specified in the application for this landfill and be considered in the CWA 404 permit review.

The SCS report on page 7 under Solid Waste Characteristics states, “*This classification allows for disposal of non-hazardous municipal solid waste.*” As discussed in the “Flawed Technology” review, the classification of a waste as “non-hazardous” also allows the deposition of some types of hazardous wastes and hazardous chemicals in MSW landfills that are a significant threat to public health, water resources, and the environment. The designation of a waste as “non-hazardous” does not mean that the waste materials will not have hazardous or otherwise deleterious effects.

The SCS report page 10 section 2.5.1.2 Containment System states, “*Landfill containment systems consist of two parts – a base liner system to underlie the waste materials, and a final cover system to be placed over the wastes. The containment systems serve two functions: (1) to prevent liquids infiltration into the waste mass that would lead to leachate generation; and (2) contain and collect any leachate that does develop and prevent contaminant migration into underlying soils.*”

Containment system design and construction will be in accordance with the standards set forth in SWMR § 600, Subparts B and C. Details are provided in Section 3.6 of this document. Briefly, the base liner system design includes redundant primary and secondary liners similar to a Class I landfill required by the Federal Regulations for a hazardous waste site. The total thickness of the bottom liner is approximately 3 feet. The base liner system will include dual, 80-mil high density polyethylene geomembranes, a geocomposite clay liner (GCL), and a leachate collection and removal granular layer. The base liner system exceeds the requirements of the federal, California, and WEPA regulations for a Class III landfill.” The details of the proposed liner design are presented in 3.6 .1 Description – Engineered Alternate. The “Flawed Technology” review provides detailed information from the professional literature that shows that the landfill systems of the type proposed will eventually fail to prevent the entrance of water into the landfilled wastes through the cover and into the landfilled wastes by groundwater infiltration. It also provides detailed information from the professional literature that shows that once water comes in contact with the wastes, leachate will be generated, and that liner systems of the type proposed will not prevent the passage of leachate through a deteriorated liner system into the underlying geological strata and entering waters of the US. Without adequate, failsafe provisions for adequate assured postclosure responsibility and funding for as long the wastes are in the landfill, there is no assurance that landfill-derived waste chemicals will not impair the use of these waters.

The SCS report, page 10, fourth paragraph states in part, “*A comprehensive water quality monitoring program will be implemented to confirm the effectiveness of the containment systems*”

and is described in detail in Section 3.9.” As with claims in other sections of the SCS report, this claim about the protective nature of the proposed landfill design is presented without discussing the severe time limitation that will exist on CIWMI’s responsibility for this landfill. As part of providing full disclosure of the potential impacts of this proposed landfill, the SCS report should provide full disclosure of how the so-called “comprehensive water quality monitoring” will be carried out by the Cortina Band for as long as the wastes in the landfill will be a threat to generate leachate when contacted by water.

Overall, Section 2 of the SCS report, Permit Application and Reporting Requirements, is inadequate and in some cases unreliable in providing information that the regulatory agencies and the public can reliably evaluate the potential and reasonably anticipated impacts of the proposed Cortina Landfill. This application should be rejected as being inadequate. If the Cortina Band wishes to continue to try to develop a proposed landfill in what is clearly an inappropriate location, it should redo the application with the understanding that it will not be possible to develop a truly protective landfill that can provide disposal costs that are competitive with other waste management options in the area that the proposed landfill proposes to serve.

Other Landfill Design and Operation Issues

Page 39 of the SCS report in 3.7.4 Leachate Recirculation states, *“As stated in paragraph 3.7.3 leachate may be re-circulated back to the active landfill cell either by pipeline or tanker truck. Leachate would be used in lined areas to control dust and to promote the degradation of waste.”* The use of leachate for dust control is not allowed in US landfills due to the potential of polluting surface water runoff with pollutants.

The SCS report beginning on page 42 is 3.9.1 Groundwater Monitoring and 3.9.1.1 General Approach to Groundwater Monitoring. From the information provided it is apparent that the proposed number and placement of the groundwater monitoring wells is insufficient to comply with regulatory requirements to detect the presents of leachate polluted groundwater when it first reaches the point of compliance for groundwater monitoring. An analysis of the ability of the monitoring well array should be presented to demonstrate that this array has the capability of detecting leachate polluted groundwater at the point of compliance for groundwater monitoring with at least a 95% reliability from a leak in the landfill liner system from any location in the landfill liner.

The SCS report page 64 presents 4.5.4.2 Final Cover Profile. The proposed design of the landfill cover presented in this section will not prevent water that falls on the surface of the landfill from entering the wastes for as long as the wastes in the landfill will have the potential to generate leachate when contacted by water. The low permeability layer in the proposed cover will deteriorate and no longer function as an effective barrier to water penetrating into the wastes. These issues are discussed in the “Flawed Technology” review.

In the Valle, R. Associate Director Waste Management Division US EPA Region 9 letter to Bryce Howard, Cortina Waste Manager, Cortina Integrated Waste Management, Inc. dated June 17, 2008, the US EPA Region 9 discusses some of the potential problems with the applicant’s proposed design for the Cortina Landfill. SCS engineers in response to US EPA comments on the proposed design of the Cortina Landfill submitted,

SCS Engineers, “Agency Review Comments and Responses Site - Specific Flexibility Requests – Seismic Stability Demonstration and Alternative Liner and Final Cover Demonstration Cortina Integrated Waste Management Facility, Colusa County, CA” submitted to the US EPA July 13, (2010)

and the additional information submitted by SCS to the US EPA in September 2010.

Review of the US EPA comments and the SCS Engineers submitted in July and September 2010 in response to the issue raised by the US EPA shows that SCS continues to ignore the true long term threat that the wastes in the proposed Cortina Landfill represent to public health and the environment though the eventual failure of the landfill containment system and postclosure monitoring and maintenance for as long as the wastes in the landfill will be a threat.

Landfill Funding Issues

The development of the proposed Cortina Landfill project has encountered funding problems. In December 2009, Earthworks Industries (<http://www.earthworksinc.com/news.php>) announced that North Bay was terminating the financial arrangements with Earthworks in developing this landfill.

SCS report states on page 2 paragraph 1, “*The Cortina Band intends to lease a portion of the Rancheria land to CIWMI. The land would be leased to CIWMI for 25years, renewable for an additional 25 years.*” Evidently this means that the Cortina Band will assume full responsibility for the postclosure monitoring, maintenance, and groundwater remediation, and for any and all liabilities that develop from releases from the landfill for as long as the wastes in the landfill will be a threat to release hazardous and otherwise deleterious chemicals to the offsite lands. The landfill developer (CIWMI), which will be the entity that will derive the profits from the landfill operation, will only provide landfill postclosure care for a limited portion of time that the wastes in the landfill will be a threat to public health and the environment; after that time, it will dump the responsibility of the postclosure funding and responsibility on the Cortina Band. Such a situation is of particular concern in a CWA 404 permit review in that there the is no assured postclosure funding source that will be able to provide the required public health and environmental protection and remediation for as long as the wastes in this landfill will be a threat. The “Flawed Technology” review discusses the fact that the wastes in this type of landfill will be a threat to release chemicals that are hazardous/deleterious for a very long period of time – likely for hundreds to thousands of years. Under the current financial arrangements for developing this landfill, the US waters that are of concern in this CWA 404 review will almost certainly be impacted by pollutants derived from the landfill as the liner system eventually fail to prevent leachate from leaving the landfill and entering nearby and downstream waterbodies.

Page 71 of the SCS report in 4.5.4.2 Final Cover Profile in section 5.5 POST-CLOSURE COST ESTIMATE presents TABLE 5-5. PRELIMINARY POST-CLOSURE MONITORING AND MAINTENANCE COST ESTIMATE which presents the projected postclosure costs for “*Total 30 Year Cost \$8,880,000.*” It is apparent according to the SCS report that CIWMI only proposes to provide specified postclosure funding for the minimum period required under US EPA Subtitle D regulations of 30 years. It is well-understood that 30 years is only a very small portion of the time after closure of this type of landfill that funding will be needed for postclosure monitoring, landfill maintenance, and groundwater pollution remediation. The state

of California Title 22 regulations require that postclosure funding be provided for as long as the wastes in the landfill have the potential to pollute groundwater. As discussed in the “Flawed Technology” review that period of time can readily be hundreds to thousands of years. With CIWMI’s plan to terminate its activities at the landfill within 25 to 50 years and to then turn over the postclosure responsibilities and activities to the Cortina Band for funding, the Cortina Band will be inheriting a massive financial liability if this landfill is constructed as proposed.

We (Lee and Jones-Lee) were involved in review of the proposed Campo Landfill in San Diego County, CA that was proposed on Indian land as a means of generating income for the Campo Indian Band. The site for that proposed landfill was also highly unsuitable for a landfill. The comments we submitted on the draft Supplemental EIS referenced below included a discussion of the long-term financial liability that the Campo Indian Band would experience in funding postclosure activities.

Lee, G. F., and Jones-Lee, A., “Comments on ‘Draft Supplemental Environmental Impact Statement (DSEIS) proposed Campo Regional Landfill Project on the Campo Indian Reservation in San Diego County, California,’ Dated February 26, 2010,” Report submitted to Dale Risling, Acting Regional Director, Pacific Regional Office, Bureau of Indian Affairs, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, April 29 (2010). <http://www.gfredlee.com/Landfills/CampoLandfillDSEIS.pdf>

In May 2010, after further review of this issue, the Campo General Council determined that it would not proceed with the development of that landfill because of the long-term risks and funding liability. Information on this issue is available at http://www.campo-nsn.gov/press/campo_news_05-28-2010.html

The Padre CWA 404 application contains an Appendix C Biological Assessment dated December 2010. Some of that section is a repeat of the information in the SCS design report that we commented upon previously. The Biological Assessment is significantly deficient; as discussed in our previous comments, it fails to discuss the impacts of placing fill materials in seasonal ephemeral waterbody ecosystems.

Overall, the Padre Associates’ CWA 404 application is significantly deficient in providing thorough, reliable information on the potential impacts of the proposed Cortina Landfill on the waters of the US. Therefore, the ACOE should reject this application.

The ACOE should thoroughly evaluate not only the near-term initial environmental quality implications of the proposed filling of waters of the US associated with the landfill construction, but also the inevitable long-term impacts of the landfill and the lack of assured postclosure funding for landfill monitoring and maintenance on the US waters being reviewed under the CWA 404 permit.

Biographical Information for G. Fred Lee and Anne Jones-Lee

Expertise and Experience in Hazardous Chemical Site and Municipal/Industrial Landfill Impact Assessment/Management

Dr. G. Fred Lee's work on hazardous chemical site and municipal/industrial landfill impact assessment began in the mid-1950s while he was an undergraduate student in environmental health sciences at San Jose State College in San Jose, California. His course and field work involved review of municipal and industrial solid waste landfill impacts on public health and the environment.

He obtained a Master of Science in Public Health degree from the University of North Carolina, Chapel Hill, in 1957. The focus of his masters degree work was on water quality evaluation and management with respect to public health and environmental protection from chemical constituents and pathogenic organisms.

Dr. Lee obtained a PhD degree specializing in environmental engineering from Harvard University in 1960. As part of this degree work he obtained further formal education in the fate, effects and significance and the development of control programs for chemical constituents in surface and ground water systems. An area of specialization during his PhD work was aquatic chemistry, which focused on the transport, fate and transformations of chemical constituents in aquatic (surface and groundwater) and terrestrial systems as well as in waste management facilities.

For a 30-year period, he held university graduate-level teaching and research positions in departments of civil and environmental engineering at several major United States universities, including the University of Wisconsin-Madison, University of Texas at Dallas, and Colorado State University. During this period he taught graduate-level environmental engineering courses in water and wastewater analysis, water and wastewater treatment plant design, surface and ground water quality evaluation and management, and solid and hazardous waste management. He has published over 1,100 professional papers and reports on his research results and professional experience. His research included, beginning in the 1970s, the first work done on the impacts of organics on clay liners for landfills and waste piles/lagoons.

His work on the impacts of hazardous chemical site and municipal/industrial solid waste landfills began in the 1960s when, while directing the Water Chemistry Program in the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison, he became involved in the review of the impacts of municipal solid waste landfills on groundwater quality.

In the 1970s, while he was Director of the Center for Environmental Studies at the University of Texas at Dallas, he was involved in the review of a number of municipal solid and industrial (hazardous) waste landfill situations, focusing on the impacts of releases from the landfill on public health and the environment.

In the early 1980s while holding a professorship in Civil and Environmental Engineering at Colorado State University, he served as an advisor to the town of Brush, Colorado, on the potential impacts of a proposed hazardous waste landfill on the groundwater resources of interest to the community. Based on this work, he published a paper in the Journal of the American Water Works Association discussing the ultimate failure of the liner systems proposed for that landfill in preventing groundwater pollution by landfill leachate. In 1984 this paper was judged by the Water Resources Division of the American Water Works Association as the best paper published in the journal for that year.

In the 1980s, he conducted a comprehensive review of the properties of HDPE liners of the type being used today for lining municipal solid waste and hazardous waste landfills with respect to their compatibility with landfill leachate and their expected performance in containing waste-derived constituents for as long as the waste will be a threat.

In the 1980s while he held the positions of Director of the Site Assessment and Remediation Division of a multi-university consortium hazardous waste research center and Distinguished Professor of Civil and Environmental Engineering at the New Jersey Institute of Technology, he was involved in numerous situations concerning the impact of landfilling of municipal solid waste on public health and the environment. He has served as an advisor to the states of California, Michigan, New Jersey and Texas on solid waste regulations and management. He was involved in evaluating the potential threat of uranium waste solids from radium watch dial painting on groundwater quality when disposed of by burial in a gravel pit. The public in the area of this state of New Jersey proposed disposal site objected to the State's proposed approach. Dr. Lee provided testimony in litigation, which caused the judge reviewing this matter to prohibit the State from proceeding with the disposal of uranium/radium waste at the proposed location.

Dr. Lee's expertise includes surface and ground water quality evaluation and management. This expertise is based on academic course work, research conducted by Dr. Lee and others and consulting activities. He has served as an advisor to numerous governmental agencies in the US and other countries on water quality issues. Further, he has served on several editorial boards for professional journals, including Ground Water, Environmental Science and Technology, Environmental Toxicology and Chemistry, J. Stormwater, J. Remediation etc. Throughout his over-50-year professional career, he has been a member of several professional organization committees, including chairing the American Water Works Association national Quality Control in Reservoirs Committee and the US Public Health Service PCBs in Drinking Water Committee.

Beginning in the 1960s, while a full-time university professor, Dr. Lee was a part-time private consultant to governmental agencies, industry and environmental groups on water quality and solid and hazardous waste and mining waste management issues. His work included evaluating the impacts of a number of municipal and industrial solid waste landfills. Much of this work was done on behalf of water utilities, governmental agencies and public interest groups who were concerned about the impacts of a proposed landfill on their groundwater resources, public health and the environment.

In 1989, he retired after 30 years of graduate-level university teaching and research and expanded the part-time consulting that he had been doing with governmental agencies, industry and community and environmental groups into a full-time activity. A principal area of his work since then has been assisting water utilities, municipalities, industry, community and environmental groups, agricultural interests and others in evaluating the potential public health and environmental impacts of proposed or existing hazardous, as well as municipal solid waste landfills. He has been involved in the review of approximately 85 different landfills and waste piles (tailings) in various parts of the United States and in other countries, including 12 hazardous waste landfills, eight Superfund site landfills and five construction and demolition waste landfills. He has also served as an advisor to a hazardous waste landfill developer and to IBM corporate headquarters and other companies on managing hazardous wastes.

Dr. Anne Jones-Lee (his wife) and he have published extensively on the issues that should be considered in developing new or expanded municipal solid waste and hazardous waste landfills in order to protect the health, groundwater resources, environment and interests of those within the sphere of influence of the landfill. Their over 150 professional papers and reports on landfilling issues provide guidance not only on the problems of today's minimum US EPA Subtitle D landfills, but also on how landfilling of non-recyclable wastes can and should take place to protect public health, groundwater resources, the environment, and the interests of those within the sphere of influence of a landfill/waste management unit. They make many of their publications available as downloadable files from their web site, www.gfredlee.com.

Their work on landfill issues has particular relevance to "Superfund" and hazardous waste site remediation, since regulatory agencies often propose to perform site remediation by developing an onsite landfill or capping waste materials that are present at the Superfund site. The proposed approach frequently falls short of providing true long-term health and environmental protection from the landfilled/ capped waste.

In the early 1990s, Dr. Lee was appointed to a California Environmental Protection Agency's Comparative Risk Project Human Health Subcommittee that reviewed the public health hazards of chemicals in California's air and water. In connection with this activity, Dr. Jones-Lee and he developed a report, "Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview," that served as a basis for the human health advisory committee to assess public health impacts of municipal landfills.

In 2004 Dr Lee was selected as one of two independent peer reviewers by the Pottstown (PA) Landfill Closure Committee to review the adequacy of the proposed closure of the Pottstown Landfill to protect public health, groundwater resources and the environment for as long as the wastes in the closed landfill will be a threat.

In addition to teaching and serving as a consultant in environmental engineering for over 50 years, Dr. Lee is a registered professional engineer in the state of Texas and an American Academy of Environmental Engineers (AAEE) board certified Environmental Engineer. The latter recognizes his leadership roles in the environmental engineering field. He served as the chief examiner for the AAEE in north-central California during 1990-2010 and in the 1980s in New Jersey, where he has been responsible for administering examinations for professional

engineers with extensive experience and expertise in various aspects of environmental engineering, including solid and hazardous waste management.

His work on landfill impacts has included developing and presenting several two-day short-courses devoted to landfills and groundwater quality protection issues. These courses have been presented through the American Society of Civil Engineers, the American Water Resources Association, and the National Ground Water Association in several United States cities, including New York, Atlanta, Seattle and Chicago, and the University of California Extension Programs at several of the UC campuses, as well as through other groups. He has also participated in a mine waste management short-course organized by the University of Wisconsin-Madison and the University of Nevada. He has been an American Chemical Society tour speaker, where he is invited to lecture on landfills and groundwater quality protection issues, as well as domestic water supply water quality issues throughout the United States.

Throughout Dr. Lee's 30-year university graduate-level teaching and research career and his subsequent 22-year private consulting career, he has been active in developing professional papers and reports that are designed to help regulatory agencies and the public gain technical information on environmental quality management issues. Drs. Lee and Jones-Lee have provided a number of reviews on issues pertinent to the appropriate landfilling of solid wastes. Their most comprehensive review of municipal solid waste landfilling issues is what they call the "Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste," which was originally developed in 1992, and redeveloped and updated in the fall of 2004. Between the two versions they have published numerous invited and contributed papers that provide information on various aspects of municipal solid waste landfilling, with emphasis on protecting public health and the environment from waste components for as long as they will be a threat. The "Flawed Technology" review has been periodically updated, including the most recent update in June 2010, which can be found on their website at <http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf>

This review provides a comprehensive, integrated discussion of the problems that can occur with minimum-design Subtitle D landfills and landfills developed in accord with state regulations that conform to Subtitle D requirements. The "Flawed Technology" review contains a listing of the various reviews that Drs. Lee and Jones-Lee have developed, as well as peer-reviewed literature. Over 40 peer-reviewed papers are cited in "Flawed Technology" supporting issues discussed in this review.

Drs. Lee and Jones-Lee have developed guidance on the evaluation of the potential impacts of landfills. This guidance is available as,
Lee, G. F., and Jones-Lee, A., "Guidance on the Evaluation of the Potential Impacts of a Proposed Landfill," Report of G. Fred Lee & Associates, El Macero, CA January (2007).
<http://www.gfredlee.com/Landfills/EvaluationImpactLF.pdf>.