Supplement and Amendment to the PRMMP for the Los Esteros Critical Energy Facility

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Purpose

The purpose of this Supplement and Amendment to the existing Paleontological Resources Monitoring and Mitigation Plan (PRMMP) is to comply with Conditions of Certification (COCs) PAL-1 through PAL-6 in the *Final Commission Decision* for the *Los Esteros Critical Energy Facility II Phase 2* (03-AFC-2). In particular, this document addresses COC PAL-2, which states:

> **PAL-2:** Prior to site mobilization, the designated paleontological resource specialist shall prepare a Paleontological Resources Monitoring and Mitigation Plan to identify general and specific measures to minimize potential impacts to sensitive paleontological resources, and submit this plan to the CPM for review and approval. After CPM approval, the project owner's designated paleontological resource specialist shall be available to implement the Monitoring and Mitigation Plan, as needed, throughout project construction.
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> Protocol: The project owner shall develop a Paleontological Resources Monitoring and Mitigation Plan in accordance with the guidelines of the Society of Vertebrate Paleontologists (SVP, 1994) that shall include, but not be limited to, the following elements and measures:
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> - A discussion of the sequence and procedures of project related tasks, such as any pre-construction surveys, fieldwork, flagging or staking; construction monitoring; mapping and data recovery; fossil preparation and recovery; identification and inventory; preparation of final reports; and transmittal of materials for curation;
> - Identification of the person(s) expected to assist with each of the tasks identified within this condition for certification, a discussion of the mitigation team leadership and organizational structure, and the inter-relationship of tasks and responsibilities;

- Where monitoring of project construction activities is deemed necessary, the extent of the areas where monitoring is to occur and a schedule for the monitoring;
- An explanation that the designated paleontological resource specialist shall have the authority to halt or redirect construction in the immediate vicinity of a vertebrate fossil find until the significance of the find can be determined.
- A discussion of equipment and supplies necessary for recovery of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;
- A discussion of the inventory, preparation, and delivery of fossils for curation into a retrievable storage collection in a public repository or museum, which meets the Society of Vertebrate Paleontologists standards and requirements for the curation of paleontological resources; and,
- Identification of the institution that has agreed to receive any data and fossil materials recovered during project-related monitoring and mitigation work, discussion of any requirements or specifications for materials delivered for curation and how they will be met, and the name and phone number of the contact person at the institution.

Verification: At least forty-five (45) days prior to the start of construction, the project owner shall provide the CPM with a copy of the Paleontological Resources Monitoring and Mitigation Plan prepared by the designated paleontological resource specialist for review and approval. If the plan is not approved, the project owner, the designated paleontological resource specialist, and the CPM shall meet to discuss comments and negotiate necessary changes.

The PRMMP for Phase 1 of this project (CH2M HILL, 2002) is adopted herein, as amended pursuant to a better understanding of the low paleontological resources potential of the project area, as described below. This memo describes mitigation measures appropriate to the site as currently understood, and its adoption amends the original PRMMP.

Project Description and Location

The proponent of the LECEF proposes to add a Phase 2 to the LECEF project that would include the following major components:

- Heat recovery steam generator (HRSG) tube sections and steam drums and piping, to be installed within and around the existing HRSG casings
- HRSG duct burners
- A six-cell, plume-abated, cooling tower
- A nominal 140-MW steam turbine generator
- Pumps for circulating and boiler-feedback water

- A deaerating surface condenser
- A second ammonia storage tank
- A 230- kV transmission connection to the adjacent Silicon Valley Power facility

The LECEF is located in the northern Santa Clara Valley at 1515 Alviso-Milpitas Road, north of State Route 237 and approximately 800 feet east of Zanker Road. The southern terminus of San Francisco Bay lies approximately 4 miles west-northwest of the site. Elevation is approximately 10 to 15 feet above current mean sea level, and declines gradually toward the Bay to the northwest. Coyote Creek and an adjacent flood control channel lie to the east of the site. Between the historic Bay shoreline and the site the historic habitat consisted of low-lying estuarine marsh and ground characterized by a shallow groundwater table.

Existing Paleontological Sensitivity

Previous Investigations and Monitoring Results

As required under the conditions of certification for the initial phase of LECEF, prior to its implementation a PRMMP was developed (CH2M HILL, 2002). The purpose of a PRMMP is to ensure that actions that are a part of project build-out do not to significantly impact paleontological resources. The PRMMP describes mitigation measures and guidance for implementation of paleontological monitoring (if any), and procedures for the recovery of paleontological resources that may be encountered during construction. The mitigation stipulated in the PRMMP for Phase 1 (CH2M HILL, 2002) was based on the initial finding that sediment in the project area was paleontologically sensitive.

Subsequent subsurface investigations at the LECEF included presence-absence testing conducted by mechanical-excavation (Busby, 2002), and paleontological monitoring of excavations for plant construction (Lawler Associates Geoscience [LAG], 2004). The stratigraphy at the site is generally estuarine clay overlain by a fluvial silty sand. The latter frequently contains historic and recent debris. In a few locations a greater depth of fluvial sand has been noted, likely channel fill related to nearby Coyote Creek.

No paleontological materials were encountered during the geoarchaeological investigations or the paleontological monitoring. Further, no stratigraphic evidence of Pleistocene or older strata were encountered, such as a buried paleosol, stratigraphic discontinuity, or terrestrial (as opposed to estuarine) sediment. Based on the findings of the initial monitoring program, as well as an understanding the geology of the area, LAG (2004) concluded that:

> "The high rate of sedimentation in this portion of the San Francisco Bay would suggest that all sediments within…. the light brown clay are Holocene or sub-recent in age." (ibid, p. 5).

Based on these results and the geological considerations summarized below, during planning for subsequent improvements at the LECEF recommendations were made that paleontological resources monitoring *not* take place (see attached technical memorandum dated August 16, 2005, updated May 5, 2008). The recommendations presented here are not withstanding the stipulations in the COCs for Phase 2 (CEC-800-2005-004-CMF), which are based on the finding that construction will affect paleontologically sensitive sediment. The results of actual field investigations and monitoring discussed above, and the geomorphic

setting of the project area described below, indicate this is not the case and that affected sediments possess low paleontological sensitivity.

Geologic and Stratigraphic Context

The Santa Clara Valley is a north-south trending trough which, not far to the north of the LECEF, lies below sea level and consequently is occupied by San Francisco Bay. In coastal settings such as this the landscape changes radically. During the last glacial maximum (about 18,000 B.P. [years before present]) sea level was about 400 feet lower than now (Bloom, 1983). As a consequence, the shoreline lay far to the west of San Francisco near the present-day Farallon Islands, and the "Bay" of that time was a broad and deeply incised dry valley, essentially a northern extension of Santa Clara Valley (e.g., Sloan and Lipps, 2002; Clifton and Leithold, 1991).

Due to the geomorphic effects of lowered sea level, the land surface in the vicinity of the LECEF was nowhere near its current position. In valleys such as this, entrenchment occurred as rivers and streams eroded down to a substantially lower glacial-age base level. As a consequence, at valley-bottom settings near the Bay such as the LECEF project area, the Pleistocene-Holocene boundary is many tens of feet below the surface. This boundary is conventionally thought of as the boundary between paleontologically sensitive sediment below, and sediment with low paleontological sensitivity above. When sea level began to rise at the end of the Pleistocene, the valley bottom began to rapidly aggrade (accumulate sediments and therefore increase basal elevation) in response, and would have been within a few meters of the present surface by the time modern sea level was reached about 3,500 B.P. (e.g., Malamud-Roam, 2002).

Conclusion and Effects Assessment

Sediments are usually considered of high to moderate paleontological sensitivity if they are sufficiently old to contain fossilized material, that is, of Pleistocene age (older than about 10,000 B.P.). The sediments that have been encountered to date at the LECEF site, and that are likely to be affected by development of Phase 2, are younger than 3,500 B.P. and therefore possess low paleontological sensitivity. Currently, there is no reason to expect that older sediment immediately underlies the area that would be disturbed by LECEF Phase 2 construction. Therefore, the construction of LECEF Phase 2 will have no effect on significant paleontological resources.

Paleontological Resources Monitoring and Mitigation Plan

Impact Potential and Recommendation

The potential for LECEF Phase 2 construction to affect sediments possessing moderate to high paleontological sensitivity is remote in this geomorphic setting. Therefore impacts to paleontological resources from Phase 2 implementation are not likely to occur. Hence, it is recommended that ***no*** onsite monitoring is required, but that a paleontological resources module be included in the Worker Environmental Awareness Program training used during the LECEF construction, that the training materials include current telephone numbers for the Designated Paleontological Resource Specialist (PRS), and that a PRS be selected for the project to implement recovery measures in the unlikely event a discovery is made.

Mitigation Measures

The original PRMMP for the LECEF facilities identified mitigation measures for potential effects to sensitive paleontological resources. Subsequent monitoring and the results of geological investigations in the area summarized above conclude that there are no sensitive paleontological resources likely to be affected by construction of LECEF Phase 2. Therefore, mitigation for potential effects to paleontological resources will be restricted to the following:

Paleontological Resources Specialist

To comply with COC PAL-1, prior to the start of any project-related ground disturbance the project owner shall ensure that a designated paleontological resources specialist (PRS) approved by the CEC is available for field activities and prepared to implement the paleontological Conditions of Certification. To comply with COC PAL-5 the PRS will implement evaluation and recovery measures pursuant to the PRMMP previously developed for Phase 1 (CH2M HILL, 2002), in the unlikely event of a discovery.

Worker Environmental Awareness Training Program (WEAP)

To comply with COC PAL-3, a paleontological resources module will be prepared for the WEAP and be provided to construction personnel. All construction personnel engaged in ground disturbing activities are to receive this training. The training will inform workers of the potential to encounter fossil resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve such resources. The training is also to include the reporting procedures that workers are to employ should paleontological resources be discovered during excavations. Workers will receive environmental awareness training prior to beginning construction activities.

Conclusions

The results of paleontological monitoring and geological investigations allow an informed evaluation of the paleontological resources potential of the LECEF Phase 2 project area. It is low. Therefore, recommended mitigation measures for construction phase excavations for Phase 2 are limited to worker education and designation of a PRS for duration of construction. In the unlikely event of a discovery, the PRS would implement mitigation measures including evaluation and recovery pursuant to the PRMMP previously prepared for this project area (CH2M HILL, 2002).

References

Atwater, B. F., Hedel, C. W., and Helley, E. J. 1977. Late Quaternary Depositional History, Holocene Sea-Level Changes, and Vertical Crustal Movement, Southern San Francisco Bay, California. *U. S. Geological Survey Professional Paper*. 1014, 114 p.

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Attachment
Recommendation & Justification for No Further Paleontologic Monitoring at LECEF
(August 16, 2005; Updated May 5, 2008)

Recommendation & Justification for No Further Paleontologic Monitoring at LECEF

PREPARED FOR: Dana Petrin/Calpine

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PREPARED BY: Geof Spaulding, CH2M HILL/LAS

DATE: August 16, 2005; Updated May 5, 2008

Initial subsurface testing and paleontological monitoring have failed to reveal paleontological resources or paleontologically sensitive sediments in the vicinity of the Los Esteros Critical Energy Facility (LECEF). There is good basis for this; geomorphic investigations of the San Francisco Bay and its tributary valleys show that paleontologically sensitive sediments are buried at deeper levels than would be encountered by project-related excavations. Therefore, it is recommended that future construction not be subject to paleontological monitoring because paleontologically sensitive sediments will not be encountered. This applies to sediments shallower that 20 feet below current surface, and to elevations below 20 feet amsl. The rationale for this recommendation is presented below.

Setting & Background

The LECEF is located in the northern Santa Clara Valley at 1515 Alviso-Milpitas Road, north of State Route 237 and approximately 800 feet east of Zanker Road. The southern terminus of San Francisco Bay lies approximately 4 miles west-northwest of the site. Elevation is approximately 10 to 15 feet above current mean sea level, and declines gradually toward the Bay to the northwest. Coyote Creek and an adjacent flood control channel lie to the east of the site. Between the historic Bay shoreline and the site the historic habitat consisted of low-lying estuarine marsh and ground characterized by a shallow groundwater table.

Subsurface investigations at the LECEF included presence-absence testing conducted by mechanical-excavation prior to the initiation of construction (Busby, 2002), and paleontological monitoring of excavations for plant construction (Lawler Associates Geoscience [LAG], 2004). The stratigraphy at the site is generally estuarine clay overlain by a fluvial silty sand. The latter frequently contains historic and recent debris. In a few locations a greater depth of fluvial sand has been noted, likely channel fill related to nearby Coyote Creek.

No paleontological materials were encountered during the investigations or the monitoring. Further, no stratigraphic evidence of Pleistocene or older strata were encountered, such as a buried paleosol, stratigraphic discontinuity, or terrestrial (as opposed to estuarine) sediment. These markers are typically found at depths exceeding 50 to 100 feet in the Santa Clara Valley (e.g. Wentworth et al., 2003), and would be expected to mark the transition between Holocene sediments of low paleontological sensitivity and Late Pleistocene sediments of high paleontological sensitivity based on other work. Based on the findings of

the initial monitoring program, as well as an understanding the geology of the area, LAG (2004) concluded that

> "The high rate of sedimentation in this portion of the San Francisco Bay would suggest that all sediments within…. the light brown clay are Holocene or sub-recent in age." (ibid, p. 5).

Geologic & Stratigraphic Context

The Santa Clara Valley is a north-south trending physiographic trough which, not far to the north of the LCEF, lies below sea level and consequently is occupied by San Francisco Bay. In coastal settings such as this the landscape changes radically over relatively short time frames. During the last glacial maximum (about 18,000 B.P. [years before present]) sea level was about 400 feet lower than now (Bloom, 1983). As a consequence, the shoreline lay far to the west of San Francisco near the present-day Farallon Islands, and the "Bay" of that time was a broad and deeply incised valley representing a northerly extension of the present Santa Clara Valley (e.g. Sloan and Lipps, 2002; Clifton and Leithold, 1991).

Due to the geomorphic effects of lower sea level, the land surface in the vicinity of the LECEF was no where near its current position. In valley settings such as this, glacial-age "fluvial entrenchment" occurs as rivers and streams erode down to a substantially lowered base level. As a consequence, in valley-bottom settings near the Bay such as the current project area, the Pleistocene-Holocene boundary is many tens of feet below the surface. For example, in the central portion of the Bay, McGann et al. (n.d.) report that the surface of Pleistocene sediments lies at depths exceeding 20 feet and as much as 50 feet below the surface of Holocene muds. The depth of the Santa Clara Valley in the vicinity of the project site during the last glacial age was proportionate to that of sea level as well, and erosion down to that greater depth would have removed older sediment in the project area. When sea level began to rise at the end of the last glacial age, the valley bottom began to aggrade (accumulate sediments and therefore increase basal elevation) in response, and would have been within a few meters of the present surface by the time modern sea level was reached about 3,500 B.P. (e.g. Malamud-Roam, 2002).

Conclusion

The sediments that have been encountered to date at the LECEF site are younger than 3,500 B.P., for the reasons described above and based on previous studies in the Bay area (e.g., Atwater et al., 1977; Malamud-Roam, 2002). Therefore, they are considered to possess low paleontological sensitivity. Sediments are considered of high paleontological sensitivity if they are sufficiently old to contain fossilized material, or of Pleistocene age (older than about 10,000 B.P.). Geological relationships indicate that the sediments encountered to date in the vicinity of the LECEF site are younger than 3,500 B.P. and there is no reason to expect that older sediment underlies the area that would be disturbed by the LECEF outfall construction. Hence, it is my recommendation that no onsite monitoring is required, but that paleontological worker environmental awareness training used during the LECEF construction be implemented, and that the training materials include current telephone numbers for the Designated Paleontological Resource Specialist (Dr. Geof Spaulding, or other CEC-approved DPRS).

References

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Endorsement:

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