DYNEGY

Dynegy Moss Landing, LLC

State Water Resources Control Board
Once-Through Cooling Water Policy

IMPLEMENTATION PLAN
for the
Moss Landing Power Plant

April 1, 2011

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I. Introduction

Dynegy Moss Landing, LLC (Dynegy) submits this Implementation Plan for the Moss Landing Power Plant pursuant to the "Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling" (Policy) and California Water Code section 13383. As requested by the State Water Resources Control Board (Board) November 30, 2010 letter regarding "Implementation Plans and Immediate and Interim Requirements for the Once–Through Cooling Water Policy" ("Implementation Plan Letter"), this submittal also includes a new application to renew the facility's National Pollutant Discharge Elimination System (NPDES) permit.

Executive Summary

Dynegy has selected Track 2 as its compliance option at Moss Landing. As demonstrated herein and as previously determined, in substantial part, by the California Energy Commission (CEC) in its site certification approval for Moss Landing Units 1 and 2, compliance with Track 1 using closed cycle cooling alternatives is not feasible at Moss Landing for one or more of the following reasons: space constraints at the site; inability to obtain air permits due to insufficient emission reduction credits and conflicts with ambient air quality standards; conflicts with visual standards; and conflicts with local land use rules. Moreover, with respect to Moss Landing Units 1 and 2, Track 1 compliance is not feasible commercially or equitably given the large capital investments that were recently made in those Units in reliance on the site-specific Regional Water Board's NPDES permit determination and CEC certification, both of which expressly approved the use of the Units' upgraded once-through cooling system under existing law.

For Moss Landing Units 1 and 2, Dynegy proposes to comply with the Policy using the existing once-through cooling system through the end of 2032. At that time, Dynegy will evaluate repowering or installation of feasible impingement and entrainment control technologies, if any. Interim mitigation required by the Policy is already satisfied for Units 1 and 2 through the existing beyond Best Technology Available (BTA) mitigation project that was mandated by the facility's NPDES permit and CEC certification and will produce biological health and productivity benefits to the Moss Landing watershed aquatic habitat in perpetuity.

For Moss Landing Units 6 and 7, Dynegy intends to evaluate certain impingement and entrainment control measures (i.e., technologies, operational measures, and combinations thereof) to determine if any such measures will enable Units 6 and/or 7 to achieve compliance with Track 2 requirements. If Dynegy determines that any such control measures exist and are commercially viable, Dynegy anticipates implementing the selected control measures by no later than December 31, 2017, the currently applicable final compliance deadline. Unless the final compliance deadline is suspended or extended, if Dynegy determines in its sole discretion that no commercially viable control measures capable of achieving compliance with Track 2 exist for Units 6 and/or 7 (or in the event implementation is not completed by the final compliance deadline), Dynegy anticipates that it will cease cooling water intake flows to Units 6 and/or 7 by December 31, 2017 until either (i) that time as commercially viable

control measures capable of meeting Track 2, if any, are implemented, or (ii) a decision is made to retire Unit 6 and/or 7. In addition, if Dynegy determines that no commercially viable control measures exist for Units 6 and/or 7 to achieve compliance with Track 2, Dynegy may consider repowering Units 6 and/or 7. Based on a preliminary analysis and contingent on numerous currently unknown future variables, repowering, if commercially viable and if pursued, would be limited by air permitting emission reduction credit requirements to a simple-cycle combustion turbine in the 100 to 180 MW (nominal) range.

In accordance with the preliminary implementation schedule set forth herein, Dynegy anticipates making a final decision in spring 2015 regarding which compliance measure(s) to pursue at Moss Landing Units 6 and 7, at which time we expect to submit an amended implementation plan. Prior impingement and entrainment studies at Moss Landing accurately reflect current impingement and entrainment impacts; thus, additional baseline impingement and entrainment studies are not needed.

As its interim mitigation option in the event Moss Landing Units 6 and/or 7 operate beyond October 1, 2015 using once-through cooling without achieving final compliance and continuing until the Unit(s) achieves final compliance, Dynegy chooses to provide funding to the California Coastal Conservancy for purposes of working with the California Ocean Protection Council to fund an appropriate project that mitigates interim impingement and entrainment impacts.

* * * * *

This Implementation Plan and the information contained herein are subject to material change. As recognized by the Board, if an implementation plan or associated information changes after submittal, the facility may submit amendments at a later date. This Implementation Plan reflects information currently available and known to Dynegy and provides as much detail as is reasonably possible about future activities that are contingent on and affected by numerous currently unknown factors. Dynegy expressly reserves the right to, and intends to, amend and/or supplement this Implementation Plan as relevant information develops and circumstances warrant.

II. Implementation Plan

The information presented below follows the implementation plan requirements as set out in the "Implementation Plan and Report of Waste Discharge Requirements" attachment to the Board's Implementation Plan Letter. For clarity and simplicity, the enumerated requirements identified in the attachment to the Implementation Plan Letter are reproduced in the headings below in their entirety, except where otherwise noted.

1. Identifies the compliance alternative (Track 1, Track 2 or retirement) that you have selected. If Track 2 is selected, it must be accompanied by a demonstration that compliance with Track 1 is not feasible. If you decide to retire one or more units, please identify the specific closure date for each unit when power generation and water inflows will cease. If one or more units will be repowered or new units will be constructed as replacement, please identify a specific on-line date for each new or repowered unit.

Dynegy has selected the Track 2 compliance alternative for Moss Landing.

A. Track 1 is Not Feasible[1]

Compliance with Track 1 is not feasible at Moss Landing for one or more of several reasons.

To comply with Track 1 at any one of the Moss Landing Units (e.g., achieve a minimum 93 percent reduction in intake flow rate compared to design flow), Dynegy would have to convert the unit's cooling system to closed cycle cooling by installing a wet cooling tower(s), dry cooling tower(s), hybrid wet/dry cooling, an air cooled condenser, or spray cooling ponds. Alternatively, intake flows to the unit would have to be reduced through operating restrictions on the unit. However, achieving a 93 percent reduction in intake flows through operating restrictions would equate to approximately 51 hours per month in maximum plant output. Such a drastic limitation on generation output would provide very little support in terms of grid reliability and it would not be feasible to commercially maintain the Units with such limited capacity. Thus, from a commercial perspective, operating restrictions alone cannot be accomplished and, accordingly, are not feasible to comply with Track 1.

During the permitting of Moss Landing Units 1 and 2, both the Central Coast Regional Water Quality Board (Regional Water Board) and the California Energy Commission (CEC) rejected closed cycle cooling options at Moss Landing and concluded that, once the applicant complied with the conditions of certification, the continued use of once-through cooling did not cause significant adverse environmental

[1] The Policy (Section 5) defines "not feasible" to mean "cannot be accomplished because of space constraints or the inability to obtain necessary permits due to public safety considerations, unacceptable environmental impact, local ordinances, regulations, etc. Cost is not factor to be considered when determining feasibility under Track 1." Dynegy reserves the right to supplement and/or amend the demonstration that Track 1 is not feasible at Moss Landing.

impact.[2] Through extensive public processes, mechanical and natural draft wet cooling towers using either freshwater or sea water, dry cooling/air cooled condenser, hybrid wet/dry cooling, and/or spray cooling pond options at Moss Landing were specifically analyzed and each was rejected. As demonstrated in those proceedings and set forth below, closed cycle cooling is not feasible at Moss Landing.

Both the Regional Water Board and CEC expressly rejected freshwater wet cooling because sufficient quantities of freshwater are not available at Moss Landing.[3] Sufficient local freshwater supplies to utilize freshwater wet cooling continue to be unavailable today. Thus, compliance with Track 1 using freshwater wet cooling is not feasible at Moss Landing.

In addition, the CEC rejected sea water cooling towers at Moss Landing due to numerous unacceptable environmental harms, stating: "[s]eawater towers were eliminated due to environmental harm from discharge of concentrated effluent, visibility impacts of the towers themselves, noise, saltwater drip impacts to agriculture, visible vapor plume emissions, [and] additional energy requirements …."[4] Similarly, the CEC rejected dry cooling/air cooled condensers given their size (extending up to 90 feet high and covering 1.5 acres) and resulting in parasitic load representing approximately 60 MW of total plant capacity.[5]

i. Space Constraints

Space constraints at Moss Landing render certain Track 1 alternatives not feasible.

Sufficient available space does not exist for Moss Landing Units 6 and/or 7 to utilize an air cooled condenser. Based on a preliminary engineering analysis, an air cooled condenser for either Unit 6 or 7 would require a footprint of 305 feet x 435 feet (x 157 feet high) within approximately 50 feet of the turbine building. The available space between the turbine building and Highway 1 is less than 200 feet.[6]

Likewise, sufficient available space does not exist for Moss Landing Units 6 and 7 to utilize dry cooling towers. Based on a preliminary engineering analysis, a dry cooling tower would require a footprint of 400 feet x 960 feet. While a single cooling tower

[2] California Energy Commission, Commission Decision, Application for Certification Moss Landing Power Project, Docket No 99-AFC-4, Finding 12, at 188 (Nov. 2000) ("Commission Decision") (copy enclosed as Attachment A); California Regional Water Quality Control Board Central Coast Region, Staff Report, Duke Energy Moss Landing Power Plant, Units 1 and 2, Review of Finding No. 48, NPDES Permit Order No. 00-041 (Apr. 10, 2003) ("Staff Report") (copy enclosed as Attachment B).
[3] Commission Decision at 159; Staff Report at 10. See also Testimony of Duke Energy Moss Landing LLC, State of California, Regional Water Quality Board, Compliance with Remand of a Portion of NPDES Permit Re Cooling Water Intake of New Units 1&2, NPDES Permit No. CA0006254, at 70-72 (2003) ("Duke Testimony") (copy enclosed as Attachment C).
[4] Commission Decision at 159-160.
[5] Commission Decision at 160.
[6] See also EPRI, Issues Analysis of Retrofitting Once-Through Cooled Plants with Closed-Cycle Cooling, California Coastal Plants, App. B.10 (Oct. 2007) (for Moss Landing Units 6 and 7 "[t]here is no available space close enough to the turbines on these units to install an air-cooled condenser with a reasonable steam duct length").

could be put into service for either Unit 6 or 7, there is not enough space on site for two cooling towers for both Units 6 and 7.

Sufficient available space may not exist for Unit 2 to utilize an air cooled condenser. Based on a preliminary engineering analysis, the air cooled condenser footprint for Unit 2 (or Unit 1) would require 171 feet x 257 feet (x 122 feet high). In order for an air cooled condenser to fit on site for Unit 2, an existing plant building would have to be demolished and high voltage power lines would have to be relocated.[7]

Spray cooling ponds also are not feasible for all four Units due to space constraints at the site. Based on a preliminary engineering analysis, the total space required for cooling ponds for Units 1 and 2 was estimated at 225 feet x 3,000 feet (i.e., two 225 ft. x 750 ft. ponds per unit) or approximately 16 acres, and for Units 6 and 7 was estimated at 325 feet x 4,600 feet (i.e., two 325 ft. x 1,150 ft. ponds per unit) or approximately 34 acres. The site only has approximately 33 acres of available space to the east of Units 1 and 2. Thus, spray cooling ponds are not feasible for all the Units. Spray ponds for Units 1 and 2 would leave insufficient space for spray ponds for Units 6 and 7. Spray ponds for Units 6 and 7 (if feasible in terms of the tight space and operational considerations of moving waters between the ponds and the Units) would leave insufficient space for spray cooling ponds for Units 1 and 2. Spray ponds for either power block also may not be feasible due to the proximity of the available space to the existing switchyard.

ii. Inability to Obtain Necessary Permits

a. Unacceptable Environmental Impacts

1. Insufficient Emission Reduction Credits

Wet cooling is not feasible at Moss Landing because there are not enough particulate matter/PM_{10} emission reduction credits (ERCs) in the Monterey Bay Unified Air Pollution Control District (MBUAPCD) to meet the air permit requirements needed to install and operate a wet cooling system.[8]

Based on a preliminary engineering analysis performed in 2010, wet cooling towers for Units 1 and 2 would increase the facility's emissions by 170 tons per year (tpy) of particulate matter (PM) and 92 tpy of PM_{10}, and wet cooling towers for Units 6 and 7 would increase the facility's emissions by 409 tpy of PM and 220 tpy of PM_{10}. Dynegy currently owns only 0.455 tons of PM ERCs in the MBUAPCD registry and thus would have to acquire ERCs from other sources.[9] Importantly, the MBUAPCD's applicable offset ratio varies from 1.2:1 to 2:1 depending on the location of the ERC generating source. Prior analysis of wet cooling towers (mechanical or natural draft using drift

[7] See Duke Testimony at 110-111 (use of air cooled condensers for Units 1 and 2 would require substantial relocation of existing facilities, including transmission lines).
[8] The MBUAPCD has not been designated a state or federal $PM_{2.5}$ nonattainment area. Therefore, $PM_{2.5}$ offsets would not be required. $PM_{2.5}$ permitting requirements are discussed further below.
[9] MBUAPCD, Summary of Emission Banking Transactions, received from MBUAPCD Feb. 14, 2011 (copy enclosed as Attachment D).

eliminators) using more conservative assumptions[10] for Units 1 and 2 concluded that wet cooling on Units 1 and 2 would increase the facility's PM_{10} emissions by 184 tpy and, based on the MBUAPCD's applicable offset ratio, would alone require 221 to 368 tpy of PM_{10} ERCs for air permitting.[11] Based on estimated emissions from the preliminary engineering analysis performed in 2010 and the MBUAPCD's applicable offset ratios, wet cooling towers for Units 6 and 7 alone would require 264 to 440 tpy of PM_{10} ERCs for air permitting. The total estimated PM_{10} ERC requirement for wet cooling for all four units would be 485 to 808 tpy.

However, the current total inventory of PM_{10} ERCs in the MBUAPCD emissions registry is only 209 tons.[12] Even if Dynegy were successful in purchasing all currently available PM_{10} ERCs, there would be insufficient ERCs to support wet cooling towers for Moss Landing. Even for a subset of Units (e.g., Units 1 and 2) or an individual Unit at Moss Landing, it is highly unlikely Dynegy could successfully acquire a sufficient quantity of currently available PM_{10} ERCs needed to obtain a preconstruction air permit necessary for wet cooling. Doing so would require Dynegy to acquire the ERCs from another entity (and likely multiple entities) and each of the sellers currently holding such ERCs would have to forego whatever projects they themselves may want to pursue with their ERCs.[13]

Other potential sources of ERCs that were considered are (1) interpollutant offsets; (2) PM_{10} offsets created through road paving; and (3) out-of-basin offsets. Under MBUAPCD rules, PM_{10} offsets may be provided in the form of NO_x and/or SO_x emissions reductions at ratios that are determined on a case-by-case basis. The minimum offset ratio is 1.2:1 to 2.0:1, the same as the distance-based ratios. According to the District ERC registry,[14] there are approximately 419 tons of NO_x ERCs and 377 tons of SO_x ERCs held in the MBUAPCD. However, Dynegy does not own any NO_x or SO_x ERCs, so they would have to be purchased from other ERC holders. As discussed above for PM_{10} ERCs, acquiring NO_x and/or SO_x ERCs from other entities would require the sellers to forego projects they intended to pursue. Therefore it is unlikely that Dynegy could successfully acquire sufficient interpollutant offsets to provide the required ERCs for wet cooling towers at Moss Landing. Even if Dynegy were, in fact, able to obtain District approval to use the minimum interpollutant offset ratios possible, given the fact that most of the available ERCs would have to use a 2.0:1 ratio, Dynegy would have to acquire 84 percent of all of the available PM_{10}, NO_x and SO_x ERCs within the Monterey Bay air district to support the conversion of all four units to wet cooling. This is not feasible.

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[10] Prior analysis assumed 2.0 cycles of concentration, while the 2010 study assumed 1.5 cycles of concentration. Prior analysis assumed that 100 percent of drift was PM_{10}, while the 2010 study accounted for size of drift based on cooling tower design and determined that only 54 percent of PM emissions from cooling tower would be expected to be in the PM_{10} size range.

[11] Duke Testimony at 58-60.

[12] MBUAPCD, Summary of Emission Banking Transactions (27.183 PM_{10} tons are held in the Community Bank and 181.954 PM_{10} tons held by companies). See Attachment D.

[13] See Duke Testimony at 58-60 (demonstrating at the time of NPDES permitting of Units 1 and 2 that the quantity of PM_{10} ERCs required to cover the additional PM_{10} emissions associated with wet cooling for just Units 1 and 2 exceeded the total inventory of all PM_{10} ERCs in the MBUAPCD).

[14] MBUAPCD, Summary of Emission Banking Transactions (see Attachment D).

MBUAPCD rules also allow ERCs to be created by applying emissions reductions beyond those required by District or federal requirements. In 2009, Dynegy performed a limited study of the potential for creating PM_{10} ERCs by paving unpaved roads in the air basin. This study determined that approximately 300 tpy of PM_{10} ERCs could potentially be created by paving roads in San Benito County. Potential road paving ERCs from the other counties in the air basin were not quantified but were expected to be of similar quantities. Each road paving project would be subject to a variety of reviews by local land use agencies, transportation agencies, and the local air district, and would likely be subject to a CEQA review. To the best of Dynegy's knowledge, no one in California has undertaken a road-paving PM_{10} ERC project of this magnitude.

Finally, under certain conditions MBUAPCD Rule 207, section 4.3.3.2, allows the use of offsets from an adjacent air basin to be used, at a minimum ratio of 2.5 to 1. Before such out-of-basin credits can be used, the transfer would have to be approved by the governing boards of both air districts. Theoretically, this would allow the use of ERCs from the BAAQMD, the SJVAPCD, or the SLOAPCD. In reality, however, PM_{10} ERCs are in very short supply in all of these districts. Even if Dynegy were able to acquire sufficient ERCs outside the air basin (as discussed above, this would require the sellers to forego their own projects), it is unclear whether other District governing boards would be willing to effectively restrict development opportunities in their own Districts by allowing the transfer of credits for a project outside the District. Also unclear is whether the MBUAPCD Governing Board and local residents would feel that the significant environmental impacts of particulate emissions from the cooling towers (see subsection 2 below) would be adequately mitigated by emission reductions occurring tens or hundreds of miles away in another air basin.

Thus, wet cooling towers are not feasible for Units 1 and 2 and/or Units 6 and 7 because insufficient ERCs exist to obtain an air preconstruction permit. Moreover, even for a subset of Units (e.g., Units 1 and 2) or an individual Unit at Moss Landing, it is highly unlikely Dynegy could successfully acquire the sufficient quantity of currently available PM_{10}, interpollutant or interbasin ERCs needed to obtain a preconstruction air permit necessary for wet cooling. Doing so would require Dynegy to acquire the ERCs from another entity (and likely multiple entities), and each of the sellers currently holding such ERCs would have to forego whatever projects they themselves may want to pursue with their ERCs. Thus, wet closed cycle cooling is not feasible at Moss Landing.[15]

While there are no data available regarding PM_{10} emissions from spray cooling ponds, it is expected that such emissions would be comparable to, or somewhat less than those associated with wet cooling towers for a comparable heat rejection load.[16] Thus, the ERC constraints identified above are also expected to be present for the spray cooling pond compliance option.

[15] Similarly, the feasibility of a hybrid wet/dry cooling system would be affected by ERC constraints. Duke Testimony at 121-127.
[16] Duke Testimony at 135.

2. Conflicts with Ambient Air Quality Standards

Wet cooling towers are also not feasible for compliance at Moss Landing due to adverse environmental impacts associated with increased particulate emissions.

The MBUAPCD has been designated a federal attainment area for $PM_{2.5}$ and is unclassified for PM_{10}, meaning that major modifications with significant increases in PM_{10} or $PM_{2.5}$ would be required to undergo Prevention of Significant Deterioration (PSD) review. Because the MBUAPCD implements its own PSD program, a separate permit from USEPA would not be required; however, the same requirements and limitations apply for the local program as for a program implemented by USEPA.

During the prior NPDES permit proceeding for the Moss Landing Units 1 and 2 modernization project, a significant impact level analysis was conducted for implementation of sea water mechanical draft cooling. The resulting 24-hour PM_{10} maximum modeled impact was 8.2 $\mu g/m^3$, which would exceed the federal Significant Impact Level of 5 $\mu g/m^3$.[17] While the determination of a significant PM_{10} impact alone would not prevent the project from being approved, it would make the approval process more difficult. Use of sea water in a natural draft cooling tower system would increase the impact to 35 $\mu g/m^3$, which not only would be a significant adverse air quality impact, but would also violate the MBUAPCD's allowable increment for PM_{10} of 21.1 $\mu g/m^3$ (24-hour average).[18] Given that wet cooling for Units 6 and 7 would increase particulate emissions by more than two times compared to Units 1 and 2, wet cooling for Units 6 and 7 would also be expected to violate MBUAPCD's allowable increment for PM_{10} (24-hour average). As a result, a wet natural draft cooling tower could not be permitted by the MBUAPCD and, thus, is not feasible for Track 1 compliance.[19]

The federal $PM_{2.5}$ standards and EPA's Significant Impact Levels and increments for $PM_{2.5}$ (1.2 $\mu g/m^3$ and 9 $\mu g/m^3$, respectively, on a 24-hour average basis)[20] also could present a siting constraint impossible for wet cooling towers to meet. The increment represents an absolute regulatory limit on "the maximum allowable level of ambient pollutant concentration increase that is allowed to occur."[21] As discussed above, the modeled 24-hour average PM_{10} impact from a sea water mechanical draft cooling tower at Moss Landing Units 1 and 2 alone was previously determined to be 8.2 $\mu g/m^3$. Making the conservative assumption that $PM_{2.5}$ emissions are the same as PM_{10} emissions, the 24-hour $PM_{2.5}$ impacts from Moss Landing Units 1 and 2 alone would also be 8.2 $\mu g/m^3$, meaning that Units 1 and 2 alone could consume virtually all of the 9 $\mu g/m^3$ increment and make it impossible for any other sources of $PM_{2.5}$ to be constructed in the vicinity. It was also previously estimated that, based on relative PM_{10} emission rates, mechanical draft wet cooling systems for Units 6 and 7 would be expected to have ambient impacts more than twice those of Units 1 and 2. Under these

[17] Duke Testimony at 60-62.
[18] Duke Testimony at 96-98.
[19] Duke Testimony at 98.
[20] USEPA, Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM2.5) - Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC), Final Rule, 75 Fed. Reg. 64863 (Oct. 20, 2010).
[21] 75 Fed. Reg. at 64875.

circumstances, it is expected that 24-hour average $PM_{2.5}$ impacts from mechanical draft wet cooling towers for Units 6 and 7 would be shown to exceed the allowable increment and as a result could not be permitted.[22]

Even with the use of PM_{10} suppression technologies (such as high efficiency drift eliminators), mechanical draft wet cooling towers on Moss Landing Units 1 and 2 and Units 6 and 7 would emit up to 466 tons of PM_{10} each year.[23] This is over five times the amount of PM_{10} emissions currently emitted by the plant.[24] Even the more refined 2010 preliminary engineering analysis concluded that mechanical draft wet cooling towers for all four Moss Landing Units would emit up to 312 tons of PM_{10} per year, over three times the PM_{10} currently emitted. Much of the emitted particulate matter would be in the form of sea salt. Moss Landing is located in the midst of prime agricultural land and is upwind of an adjacent dairy. The accretion of this much salt on agricultural land raises serious concerns regarding potential detrimental impact on the fertility of this land and its agricultural production. For this reason, the CEC rejected sea water cooling at Moss Landing, in part, due to "saltwater drip impacts to agriculture."[25] In addition, salt drift from wet cooling towers at Moss Landing may also cause potential safety issues with arcing in the adjacent PG&E switchyard, which is a critical grid reliability infrastructure, as well as impose substantial maintenance burdens for all equipment around the plant.

b. Conflicts with Visual Standards

Wet cooling, including a hybrid wet/dry system, is not feasible at Moss Landing for compliance with Track 1 because it would conflict with numerous visual standards.

Moss Landing is surrounded by the scenic Elkhorn Slough and located along Highway 1. The addition of a cooling tower and its plume would adversely impact the viewshed. The CEC expressly rejected closed cycle wet cooling at Moss Landing, in part, because of "visibility impacts of the towers themselves" and "visible vapor plume emissions".[26]

As analyzed in the prior NPDES permit proceeding, a natural draft wet cooling tower for Units 1 and 2 would stand approximately 450 tall by 250 feet wide and become the most visually dominant feature in the viewshed.[27] On average, during daylight hours, the plume emitted from the natural draft cooling tower would rise 870 feet into the air and would be 693 feet long. The plume would be visible 97 percent of the time. The cooling tower and plume would have a significant adverse visual impact.[28] In addition,

[22] Although it may be possible to demonstrate that $PM_{2.5}$ emissions from a wet cooling tower are substantially lower than PM_{10} emissions, Dynegy is not aware of an instance in which EPA Region 9 has accepted such a demonstration for PSD permit purposes.
[23] Tetra Tech, California's Coastal Power Plants: Alternative Cooling System Analysis, at J-16 - J-17 (Feb. 2008) ("Tetra Tech").
[24] Tetra Tech at J-17.
[25] Commission Decision at 159-160. See also Tetra Tech at p. 4-11 (acknowledging that "[s]alt deposition may affect particular crops under narrowly drawn conditions"); Staff Report at 10 (Regional Water Board staff "acknowledges that salt drift may be an important issue at [Moss Landing"]).
[26] Commission Decision at 159-160.
[27] Duke Testimony at 100.
[28] Duke Testimony at 101-103.

analysis of sea water mechanical draft cooling at Moss Landing Units 1 and 2 indicated that water vapor plumes (because the equipment would be in two bays, there would appear to be two plumes) would be visible approximately 95 percent of the time, nearly all hours of the year.[29] The average plumes would be 163 feet high and 1,299 feet long. This would also have a significant adverse impact on the viewshed.[30] With spray ponds, the source of the visual plumes would be the largest of any of the cooling alternatives (1,240 feet).[31] Moreover, because the plumes from spray ponds would originate at ground level, during certain meteorological conditions the plumes could cloud driving on Donlan Road and create a potential safety hazard.[32] Because of the larger volumes of water that must be cooled for Units 6 and 7 relative to Units 1 and 2, the adverse visual impacts of cooling towers and associated plumes, as well as spray ponds, for Units 6 and 7 would be at least as significant as those previously analyzed for Units 1 and 2.

The Coastal Act, as well as local land use policies, requires protection of the visual corridors at Moss Landing. For example, Section 30251 of the Coastal Act states:

> The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas to minimize alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

Additionally, there are numerous local laws, ordinances, regulations and standards (LORS) addressing visual impacts that any project must meet. For example, the County of Monterey North County Land Use Plan, Chapter 2.2.2.1, mandates that "[v]iews to and along the ocean shoreline from Highway One, Molera Road, Struce Road, and public beaches, and to and along the shoreline of Elkhorn Slough from public vantage points shall be protected." Additionally, the Moss Landing Community Plan, Chapter 5.6.3.6, provides that "[v]iews of the Moss Landing community, harbor and dunes from Highway 1 should be protected through regulation and landscaping and siting of new development adjacent to the highway to minimize the loss of visual access." Other LORS addressing visual impacts with which wet cooling or spray ponds would conflict are identified in enclosed Attachment E.

Given the height, size, location and plume presented by wet cooling towers (mechanical or natural draft towers, or in a hybrid wet/dry cooling) or spray ponds, any

[29] Duke Testimony at 65.
[30] Duke Testimony at 66-68.
[31] Duke Testimony at 135.
[32] Duke Testimony at 135.

of the Track I compliance options at Moss Landing would be inconsistent with state and local visual policies and, thus, not feasible.

c. Conflicts with Local Land Use Regulations

Track 1 compliance is not feasible at Moss Landing due to conflicts with local land use regulations.

Elimination of Moss Landing's existing once-through cooling system using dry cooling (or freshwater wet cooling)[33] would render the facility non-coastal dependent and create conflict with local zoning requirements.[34] The Moss Landing Power Plant site is zoned for heavy industrial use in the coastal zone. Multiple policies in the County land use planning documents require any new development or expansion of existing development to be coastal dependent use (LUP Policies 4.3.6.F.1 and 5.5.2.10 and Coastal Implementation Plan policies 20.144.140.B.5.c.1 and 20.144.160C.1.k). The Coastal Implementation Plan uses the Coastal Act definition for the term "Coastal-Dependent", consistent with Section 30101 of the Coastal Act, as an area for uses that must be "located on or adjacent to the sea in order to function." Because dry cooling (and freshwater wet cooling) would eliminate Moss Landing's need for sea water in conflict with the applicable zoning ordinance, dry cooling is not feasible for compliance with Track 1.

In addition, the height of a natural draft wet cooling tower would not comply with the Monterey County ordinance regarding Coastal Implementation Plan.[35] As a non-conforming use due to height limits, natural draft wet cooling is not feasible at Moss Landing for compliance with Track 1.

Cooling towers also may not be feasible at Moss Landing due to conflict with local land use noise standards. For example, Title 20 of the Monterey County Zoning Ordinance (the Coastal Implementation Plan) provides criteria for evaluating potential noise impacts on surrounding areas. In that regard the CEC expressly rejected wet cooling for Units 1 and 2 due, in part, to increased noise.[36]

An analysis by Duke Energy during the NPDES permit process for the Moss Landing modernization project identified numerous conflicts with existing land use regulations and ordinances stemming from the construction of alternative cooling technologies at the site. An updated table identifying those conflicts with LORS is enclosed as Attachment E. Those applicable LORS cannot be met due to cumulative visual impacts, air quality impacts, and other conflicts with the Moss Landing Power Plant Master Plan. These LORS remain in effect today and render compliance with Track 1 not feasible at Moss Landing.

[33] Commission Decision at 159; Staff Report at 10 (insufficient freshwater resources exist at Moss Landing to support freshwater wet cooling). See note 3 and accompanying text.
[34] Duke Testimony at 119.
[35] Duke Testimony at 104.
[36] Commission Decision at 159; see also Commission Decision at 160 (cooling towers would "be a significant source of increased noise").

iii. Track 1 is Not Feasible for Moss Landing Units 1 and 2

Track 1 compliance for Moss Landing Units 1 and 2 also is not feasible given their unique status as recently installed capital intensive units that relied upon site-specific Clean Water Act Section 316(b) determinations made through public processes and conditions imposed by permitting authorities at that time. After extensive site-specific evidentiary hearings and based upon the recommendations of a Technical Working Group (TWG) comprised of many of the same neutral experts the Board relied upon in developing the Policy, the CEC concluded that closed cycle cooling was infeasible for Units 1 and 2 and that the continued use of once-through cooling did not cause significant adverse environmental impacts.[37] The Regional Water Board also rejected closed cycle cooling.[38] In reliance upon those decisions, the Moss Landing owners made the original investment decision to construct Units 1 and 2, which included many millions of additional dollars to upgrade the once-through cooling system (including the installation of inclined 5/16 inch mesh traveling screens and shortening of the intake tunnel) and provide permanent habitat enhancements to the watershed.

To effectively reverse those determinations by now requiring compliance with Track 1 fails to recognize that the decision to construct Units 1 and 2 was made in reliance on those prior determinations. Moreover, requiring compliance with the Track 1 standard without any new site-specific evidence of impingement and entrainment impacts that were not previously considered in those determinations is arbitrary and unfair. It is highly likely (if not certain) that a significant increase in the original capital cost of Units 1 and 2 due to imposition of Track 1 equivalent standard would have rendered the facility uneconomic and Units 1 and 2 would not have been constructed. Thus, compliance with Track 1 is not feasible for Moss Landing Units 1 and 2.[39]

B. Retirement or Repowering as Potential Compliance Options

i. Units 1 and 2

Dynegy proposes to operate Units 1 and 2 using the existing once-through cooling system through the end of 2032. At that time, Dynegy will evaluate repowering or installation of feasible impingement and entrainment control technologies, if any.

This proposal is based on prior discussions with Board members and Staff who have recognized Moss Landing Units 1 and 2's unique status given the significant financial investment that was recently made in these efficient Units in reliance on the CEC's certification and the Regional Water Board's NPDES permit approval of the Unit's upgraded once-through cooling water intake structure, permitting decisions that were made through public processes and included a site-specific Clean Water Act Section 316(b) determination of best technology available (BTA) and an environmental enhancement program to permanently mitigate any beyond BTA residual once-through

[37] Commission Decision, Finding 12, at 188.
[38] NPDES Permit No. CA0006254; see Staff Report.
[39] Given current and foreseeable market conditions, adding $100 million or more of capital and reducing the output and thermal efficiency of the facility without a mechanism for remuneration of such impacts is economically and commercially contra indicated.

cooling impacts from the Units. The proposal also follows on the Board Staff's proposed amendment to the Policy addressing recently installed combined-cycle units that the Board has tabled for consideration until after the Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS) reviews submitted compliance plans and makes recommendations to the Board.[40]

Moss Landing Units 1 and 2 have the lowest design cooling water intake demand of all California once-through cooling power plants, as well as the second lowest average cooling water flow-to-energy generation ratio (average MG/Mwh) of those plants.[41] Units 1 and 2 also have lower air pollutant emissions factors -- both for criteria pollutants and carbon dioxide -- than the other conventional steam boiler once-through cooling power plants in California.[42] Thus, Moss Landing Units 1 and 2 are more efficient in terms of water and fuel use compared to conventional steam boiler once-through cooling facilities and, in that regard, have lower environmental impacts.

The proposed compliance approach appropriately recognizes the large capital investment (many hundreds of millions of dollars) recently made in constructing these Units. As acknowledged by Board Staff, in contrast to the older technology steam boiler units that "have long since recouped their initial investments and no longer carry this additional financial burden", recently installed combined-cycle facilities "are typically amortized over long periods (20 years or more) and have likely not been recouped yet."[43] In fact, utility investments are typically made assuming much longer time periods, i.e., 40 years or more. An additional risk premium would likely have been required by the original investment decision makers had it been known that Unit 1 and 2 operations using once-through cooling would be forced by the State to cease in 2017.

The proposal also properly recognizes that the decision to construct Units 1 and 2 was made in reliance on a site-specific Regional Water Board NPDES permit determination and a CEC certification for cooling water intake structures under Clean Water Act Section 316(b). After extensive evidentiary hearings, the CEC concluded that closed cycle cooling was infeasible and that the continued use of once-through cooling did not cause significant adverse environmental impact.[44] After extensive evidentiary hearings, the Regional Water Board also rejected closed cycle cooling.[45] The Moss Landing owners relied upon the Regional Water Board and the CEC decisions in spending many millions of dollars to construct Units 1 and 2 specifically to reduce flow impacts, including upgrading the once-through cooling system by installing inclined 5/16 inch mesh traveling screens and shortening the intake tunnel.

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[40] State Water Resources Control Board, Board Meeting Minutes December 14-15, 2010, Agenda Item 12; Proposed Amendment to the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Staff Report (Sept. 29, 2010).
[41] State Water Resources Control Board, Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Final Substitute Environmental Document, at Figure 11, at p. 41 and Figure 17, at p. 91 (May 4, 2010) ("Final SED").
[42] Final SED, Table 20, at p. 92.
[43] Final SED at 91.
[44] Commission Decision, Finding 12, at 188.
[45] NPDES Permit No. CA0006254; see Staff Report.

Moreover, the Regional Water Board's NPDES permit and the CEC certification imposed a mitigation program requirement that was designed to address the beyond BTA once-through cooling impacts of Units 1 and 2 throughout the operating life of the Units.[46] Specifically, the owner of the Moss Landing power plant was directed to pay $7 million to a dedicated fund to be used by the Elkhorn Slough Foundation for the acquisition and permanent preservation of lands that directly impinge on or contribute damaging impacts to Elkhorn Slough, habitat restoration activities, and long-term stewardship of the mitigation projects in perpetuity.[47] The mitigation project has been successfully implemented: as reported by the Elkhorn Slough Foundation, "in terms of acreage of land and water permanently protected, the goals [of the mitigation plan] were far exceeded."[48] Due to the conservative approach used by the Regional Water Board and CEC to calculate the dollar amount of the mitigation project, the mitigation project more than compensates for the beyond BTA once-through cooling system impacts from Unit 1 and 2.[49] Importantly, the biological health and productivity benefits from the mitigation project to the Elkhorn Slough watershed aquatic habitat will continue in perpetuity; that is, beyond the life of the Units.

In short, the adverse environmental impacts associated with the Unit 1 and 2 once-through cooling water system have already been minimized and the Units have, in effect, achieved compliance with the Policy. Thus, it is entirely appropriate for the Board to conclude that Moss Landing Units 1 and 2 may comply with the Policy by operating the existing once-through cooling system through the end of 2032, at which time Dynegy will evaluate repowering or installation of feasible impingement and entrainment control technologies, if any.[50]

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[46] Commission Decision at 170-172, 194-200; NPDES Permit No. CA0006254, at Findings 50 and 51. The mitigation projects for Units 1 and 2 focused on entrainment impacts because the TWG concluded that the once-through cooling system for Units 1 and 2 did not have significant impacts associated with impingement.

[47] The CEC also required the owner of the Moss Landing power plant to provide $425,000 to the Monterey Bay Marine Sanctuary to fund studies of the thermal effects of once-through cooling at the plant. Commission Decision at 200-201. In addition, the plant owner voluntarily provided $1 million in monitoring funds to respond to the concerns of certain local environmental groups. Duke Testimony at 9, n.12.

[48] Elkhorn Slough Foundation, The Elkhorn Slough Environmental Enhancement and Mitigation Plan, Interim Report, Annual Update, 2 *(*July 2010) ("Elkhorn Slough Mitigation Plan Interim Report") (copy enclosed as Attachment F).

[49] For example, the "conservative upon conservative" framework used to develop the required dollar amount of the mitigation program estimated entrainment loss by assuming: i) 100 percent mortality of all entrained larvae, ii) continuous operation of Units 1 and 2 (i.e., 24 hours per day, 365 days per year), and iii) sources waters were limited to Elkhorn Slough (i.e., for purposes of determining entrainment impacts, had the assumed source waters included Moss Landing Harbor where the cooling water intake structures are located, the entrainment impact -- expressed as a percentage loss of productivity to entrainment -- would have been lower than the percentage actually used to calculate the $7 million mitigation amount). See Commission Decision, at 170-171, 180. See also Staff Report at 14 (recognizing that the Unit 1 and 2 mitigation approach "more than compensates for impacts measured and not measured because it addresses the underlying basis of larval production, that is, habitat quantity and quality over the long-term.")

[50] Moss Landing Units 1 and 2 also will be required to comply with any applicable new federal BTA regulations for existing electric generating facilities. On March 28, 2011, the USEPA signed a proposed rule to establish such national BTA standards.

ii. Units 6 and 7

Dynegy currently does not have any definitive plans to retire or repower Moss Landing Units 6 and/or 7. However, unless the Policy's December 31, 2017 final compliance deadline for Moss Landing is suspended or otherwise extended, if Dynegy determines in its sole discretion that no commercially viable impingement and entrainment control measures capable of achieving compliance with Track 2 exist for Units 6 and/or 7, Dynegy anticipates ceasing water intake flows to Units 6 and/or 7 by December 31, 2017 until either (i) that time after the final compliance deadline as commercially viable control measures capable of meeting Track 2, if any, can be implemented, or (ii) a decision is made to retire Unit 6 and/or 7.

In addition, unless the final compliance deadline is suspended or otherwise extended, in the event no commercially viable impingement and entrainment control measures capable of achieving compliance with Track 2 are identified, Dynegy may consider repowering Units 6 and/or 7, contingent on certain key factors, including determination of permitted technologies, energy market conditions, and other issues affecting commercial viability, such as securing a suitable long-term power sales/power purchase agreements(s) for the output of the repowered units or other sources of capital. A specific on-line date for a repowered unit is not currently knowable given the many variable contingencies and currently unknown factors that would affect a repowering schedule, if repowering is pursued. Additional conceptual information regarding a potential repowering project involving Units 6 and 7 is provided below in response to Item 5.

2. Describes the general design, construction, or operational measures to be undertaken to implement your selected alternative.

a. If Track 1 is selected, will the units be re-powered, or retrofitted, and will closed-cycle wet cooling or dry cooling be employed?

Not applicable. Track 1 is not the selected compliance alternative at Moss Landing.

b. If Track 2 is selected, what combination of impingement and entrainment control measures has been or will be employed on each unit at your facility? For example, such control measures may include, but are not limited to, closed-cycle cooling (wet or dry), reductions in velocity at the intake, movement of the intake structure, application of screens on the intake structure, reductions in flow, either operationally or mechanically (e.g., variable frequency drive pumps), installation of fish return systems, etc.

A. Units 1 and 2

Moss Landing Units 1 and 2 currently utilize the following impingement and entrainment control measures:

- 5/16 inch mesh inclined traveling water screens;

- initial bar racks with approximately 4 inch center-to-center spacing, which provide 3½ inch wide openings between bars;

- a relocated intake structure that shortened the intake tunnel from 350 feet to approximately 10 feet; and

- operating practices for the circulating water pumps that minimize operation time of the pumps.[51]

For Units 1 and 2, Dynegy proposes to use the existing once-through cooling system impingement and entrainment control measures through the end of 2032. At that time, Dynegy will evaluate repowering or installation of feasible impingement and entrainment control technologies, if any.

B. Units 6 and 7

Moss Landing Units 6 and 7 currently utilize the following impingement and entrainment control measures:

- 3/8 inch mesh vertical traveling water screens;

- initial bar racks with spacing between the bars at 3⅝ inches; and

- operating practices for the circulating water pumps that minimize operation time of the pumps.

At this time, Dynegy has not made any final decisions regarding what, if any, impingement and entrainment control measure(s) (or, alternatively, repowering) may be employed at Moss Landing Units 6 and/or 7 to meet Track 2. It is currently uncertain which, if any, control measure(s) (i.e., impingement and entrainment reduction technologies, operational practices, or some combination of both) will enable Units 6 and/or 7 to comply with Track 2 standards.

Dynegy's Implementation Plan for Units 6 and 7 will proceed in two phases. In the first phase, Dynegy intends to continue to investigate and evaluate the viability of various impingement and entrainment control measures, independently and in combination with one another, that may enable Units 6 and/or 7 to meet Track 2 requirements. In the second phase, based on the results of the investigations in the first phase, Dynegy will in its sole discretion determine whether any impingement and entrainment control measures, individually or in combination, are commercially viable to achieve Track 2 compliance at Units 6 and/or 7 and decide which control measure(s), including the possibility of repowering or retirement, to pursue. The control measure(s) that Dynegy ultimately selects for one of the Units may be different than the measure(s) selected for the other Unit. Dynegy will then submit an updated Implementation Plan for Units 6 and 7 and, upon receipt of approval from the Board (and receipt of any other

[51] Additionally, with the retirement of the former Moss Landing Units 1-5, the Unit 1 and 2 modernization project reduced that intake's permitted intake flow by 34 percent. See NPDES Permit No. CA0006254, at Finding 49.

necessary permits from other regulatory authorities), proceed to implement such measures.

In the first phase of its Implementation Plan for Units 6 and 7, Dynegy intends to study select control measures, either independently and/or by participating with other California coastal power plant owners and operators in pilot studies and/or support studies of certain impingement/entrainment reduction technologies.[52] The pilot studies generally would be aimed at identifying the potential biological performance of selected technologies. The support studies would provide data necessary for thorough evaluation of the potential biological performance of the technologies or potential operations and maintenance issues with the technologies. Before a final decision is made to pursue any particular control measure(s) at Moss Landing Units 6 and/or 7, additional site-specific engineering or other evaluations may be needed.

Dynegy has not yet made a final decision regarding which studies, if any, it will pursue in the first phase of its Implementation Plan for Moss Landing Units 6 and 7. Studies that Dynegy is currently considering include, but are not limited to, the following:[53]

- Cylindrical Wedgewire Screens

This pilot study would be conducted at the West Basin Municipal Water District (WBMWD) pilot desalination facility in Santa Monica Bay. As currently envisioned, the study would address the effectiveness of different slot size wedgewire screens in excluding larval forms, the effectiveness of wedgewire screens in reducing impingement, and the clogging and fouling rates of the wedgewire screens modules.

- Fine Mesh Traveling Screens

This study would evaluate fine mesh screen efficacy to minimize mortality of both impingeable and entrainable life stages. As currently envisioned, the first phase of the study would involve flume trials of fine mesh screen impingement and return system mortality. The second phase would involve a full traveling screen trial to provide real-world proof regarding the reduction of larval mortality using fine mesh screens.

- Hydrodynamic Studies of Wedgewire Screen Intakes

These studies would provide hydrodynamics data and information to assess the effectiveness of different wedgewire screen intake designs. The results of these studies would supplement previous modeling work performed for the WBMWD desalination project. As currently envisioned, the studies would include an evaluation of the entrainment reduction efficiency of the screens as a function of sweeping flows.

[52] As currently envisioned, Tenera Environmental Inc. and MBC Applied Environmental Sciences would perform the studies involving the participation of other California coastal power plants.

[53] Other studies may be pursued. For example, based on preliminarily analysis, Dynegy does not currently intend to study dual flow (double entry-single exit) screens as a potential control measure for meeting Track 2 at Units 6 and 7, but we may revisit this compliance option again in the future.

- Cooling Water Intake Structure Fish Survival Assessment

Larval mortality as a result of passage through once-through cooling water systems is less than 100 percent for some species, and survival may actually be high for some organisms. This may be especially true for facilities, like Moss Landing, that do not have offshore intakes with long conduits, since predation in long conduits can be a significant source of larval mortality. The potential for even low levels of survival may help Moss Landing achieve compliance with Track 2. As currently envisioned, this assessment would involve laboratory tests of factors that contribute to entrainment mortality (e.g., pressure and temperature changes, physical impacts and turbulence, macrofouling predation) to provide guidance on the feasibility of pursuing site-specific field studies of through-plant survival.

- Orientation of Wedgewire Screen Intakes

This study would evaluate the entrainment reduction performance effects of changing the orientation/direction of wedgewire screens. Tenera Environmental Inc. would perform the pilot study at the Santa Cruz desalination plant in conjunction with the City of Santa Cruz Water Department.

- AquaSweep^{tm} Technology

AquaSweep^{tm}, a non-screening technology based on the principle of inertial separation, is an emerging impingement and entrainment reduction technology being developed by C-Water Technologies, Inc. Computational fluid dynamic modeling has successfully demonstrated that AquaSweep^{tm} effectively excludes fish eggs and larvae while allowing water to pass into the power plant intake. In the next phase of AquaSweep^{tm} development, a scaled proof-of-concept model will be built and tested. Additional information regarding AquaSweep^{tm}, including a description of the technology and a timeline for its commercialization, is provided in Attachment G.

- Operational Control Measures

This study would evaluate various operational scenarios for reducing entrainment that can be optimized around seasonal and diel variation in larval concentrations at Moss Landing. The scope of this work would primarily involve the development of an entrainment data modeling tool for use in evaluating different operational scenarios involving different technological control measures that will allow calculation of estimated entrainment based on various reductions in intake water flow on a monthly or daily basis. The modeling data may also have applicability to impingement compliance strategies.

c. If closed-cycle wet cooling is selected as a compliance alternative, the plan must address whether recycled water of suitable quality is available for use as makeup water.

Not applicable. Closed cycle wet cooling is not selected as a compliance alternative at Moss Landing.

3. Proposes a realistic schedule for implementing these measures that is as short as possible. In proposing a schedule, identify specific milestones and associated dates for measure implementation, including: procurement cycles for entities to which plant output is sold, any necessary permits, demolition of existing facilities, and construction of new components.

A. Units 1 and 2

See the discussion in II.2.A above on pages 15-16.

B. Units 6 and 7

After evaluating the results of any impingement and entrainment control measure studies that it may pursue, Dynegy will determine in its sole discretion which option(s), if any, are commercially viable for achieving Track 2 compliance at Moss Landing Units 6 and 7. Once Dynegy has made a final decision regarding which control measure(s), if any, will be pursued, Dynegy will submit an amended Implementation Plan with a revised implementation schedule that provides more definitive timeframes and/or approximate dates.

Pending a final decision selecting a control option(s) to pursue, and based on the limited information currently known and available, Dynegy provides the following initial preliminary implementation schedule with estimated approximate timeframes/dates. The initial preliminary schedule covers any potential impingement and entrainment technologies that may be studied. The tasks and estimated approximate dates in this initial preliminary schedule are subject to material change as relevant information develops and future events occur.

Task	**Estimated Approximate Timeframe/Date(s)**
Studies of Control Measures	4/1/11 – 4/1/14
Determine Commercial Viability of and Select Compliance Option, Secure Power Purchase Agreement & Submit Amended Implementation Plan	4/1/15

SWRCB Approval of Implementation Plan and Issuance of Necessary Permits by Other Agencies[54]	3/31/16
Engineering & Procurement/Equipment Manufacturing	4/1/16 – 4/1/17
Construction and Commissioning	4/1/17 – 11/15/17
Outages:[55]	
Unit 6	5/1/17 - 7/28/17
Unit 7	8/11/17 - 11/9/17
Final Compliance (Units 6 & 7)	11/15/17

Securing a commercially acceptable power purchase agreement is a critical path task, as are Board approval of the amended implementation plan and obtaining any necessary permits from other regulatory agencies. If these critical path tasks are not successfully completed or are delayed, implementation of the remaining tasks would be terminated or delayed.

4. Identifies the time period, if any, when generating power is infeasible and describes measures taken to coordinate this activity through the appropriate electrical system balancing authority's maintenance scheduling process and/or infrastructure planning process. For each period when power generation is infeasible, describe the reason for this constraint.

Given that Dynegy has not yet made a final decision on which control measure(s) will be pursued, we cannot identify with certainty the time period, if any, when generating unit outages must be taken due to installation of the selected control measure(s). Once Dynegy decides which impingement and entrainment control measure(s) will be pursued, an amended Implementation Plan will be submitted to identify more definitively the time periods, if any, when generating unit outages will be taken. A preliminary estimate of approximate outage dates under any potential technology installation scenario is identified in the response to Item II.3 above and, with respect to a potential repowering scenario, if pursued, in Item II.5 below. Planned maintenance outages during which generating power is infeasible are addressed in the response to Item III.2 below. Dynegy will submit and coordinate all necessary scheduled generating unit outages with the California Independent System Operator Corporation (CAISO) in accordance with the outage coordination requirements set forth in the CAISO tariff, to which Moss Landing is bound through its Participating Generator Agreement with the CAISO.

[54] If California Environmental Quality Act (CEQA) review is required for any necessary permits or any necessary permits are contested, the schedule for remaining tasks may be materially delayed.
[55] Outages, if any, taken for purpose of compliance with the Policy would be subject to future applicable energy purchase and sales agreements in effect at the time.

5. If implementation plans include re-powering of existing units, please provide as much detail as possible on the new generating units, as specified below.

Dynegy currently does not have any definitive plans to repower any of the Moss Landing Units. However, based on studies of impingement and entrainment control measures that it may pursue, if Dynegy determines that no control measures are commercially viable for Units 6 and 7 to achieve compliance with Track 2, Dynegy may consider repowering Units 6 and/or 7. Any decision to repower Units 6 and/or 7 would be contingent on certain key factors and currently unknown future variables, including determination of permitted technologies, energy market conditions, and other issues affecting commercial viability, such as securing a suitable long-term power sales/power purchase agreement(s) for the output of the repowered unit(s) or other sources of capital. The following discussion of a possible repowering scenario is for conceptual purposes only, is based on a preliminary analysis, and is subject to material change. In the event Dynegy decides to pursue repowering of Units 6 and/or 7, Dynegy will submit an amended Implementation Plan with appropriate details.

a) The size (in Mega Watt) of the re-powered generating units

If repowering of Units 6 and 7 is pursued using a fossil fuel technology, based on a preliminary analysis, the approximate size of the repowered unit would be in the 100 to 180 MW range. A key factor limiting the size of a potential repowering project involving Moss Landing Units 6 and 7 would be the availability of emission reduction credits (ERCs), particularly for nitrogen oxides (NO_x).

b) Technology of the re-powered units (i.e., combined-cycle, single gas turbines, etc.)

If repowering of Units 6 and 7 is pursued using a fossil fuel technology, based on a preliminary analysis, the repowered unit would be a single natural gas-fired simple-cycle turbine. Smaller units, including the possibility of natural gas-fired reciprocating engines, or a slightly larger repowered unit also may be feasible from an ERC/air permitting perspective if additional ERCs become available or if the use of interpollutant ERCs is permitted by the Monterey Bay Unified Air Pollution Control District (MBUAPCD).

c) The amount of power that would still be generated during repowering process, and the ultimate generating output once the repowered process has been completed

If repowering of Units 6 and 7 using fossil fuel technology is pursued and assuming, based on a preliminary analysis, that a 180 MW repowering unit can be permitted from an ERC perspective, approximately 1,329 MW of available power generation to the grid would be lost by the replacement of Units 6 and 7 (i.e., 1,509 MW, the rated net capacity of existing Units 6 and 7, less 180 MW from the repowered unit = 1,329 MW lost). Because Dynegy has not yet made a final decision to pursue repowering and, if so, how repowering would be physically implemented on site, it is presently unknown whether power would still be

generated by Unit 6 and/or 7 during any repowering process.

d) Timetable for the above repowering process

A timetable for a repowering option involving Units 6 and 7, if pursued, is not available due to the many variable contingencies and currently unknown factors that would affect any such timetable. In very general terms, based upon the results of the studies of impingement and entrainment control measures that may be pursued, if Dynegy determines that no control measures are commercially viable for Units 6 and 7 to achieve compliance with Track 2, we estimate that a repowering option, if pursued, would take approximately 36 to 42 months to implement, with major milestones to include, but not limited to, securing a commercially acceptable power purchase agreement, design engineering, permitting, construction, and startup commissioning.

e) Electrical characteristics of the new repowered generating units if available when implementation plans are submitted

Electrical characteristics of a potential repowered generating unit(s) are not available at this time.

f) Available information on obtaining required air permits and required offsets

If repowering is determined to be commercially viable and if it is pursued, Dynegy would need to obtain an air permit from the MBUAPCD prior to commencing construction on the repowering unit. We estimate that the air permitting process could take 12 to 18 months once a complete permit application is filed. Based on a preliminary analysis, we do not believe that repowering with up to approximately 180 MW would trigger PSD permitting because the repowered/replacement unit would net out of PSD review.[56]

At this time, based on preliminary analysis, Dynegy believes that a simple-cycle combustion turbine in the 100 to 180 MW range could be installed at Moss Landing without additional ERCs beyond those offsets generated by the shutdown/ repowering of Units 6 and 7 and Dynegy's current ERC holdings in the MBUAPCD. The limiting pollutant is NO_x. If the MBUAPCD were to allow use of interpollutant offsets, such as VOC for NO_x, and/or if NO_x ERCs could be acquired from other sources, multiple smaller units or a slightly larger repowered unit may be feasible from an ERC/air permitting perspective. However, as discussed previously, although NO_x ERCs have been banked in the MBUAPCD,[57] it is unknown if Dynegy could successfully acquire any NO_x ERCs (and, if so, how many) because it would require the current owners of those ERCs to forego whatever projects they themselves may intend to pursue with their ERCs. As a result, a repowered unit at

[56] If a PSD permit is required, the permitting process may take longer than 12 to 18 months.
[57] MBUAPCD Summary of Emission Banking Transactions (see Attachment D). The current total inventory of NO_x ERCs in the MBUAPCD is approximately 419 tons. Dynegy does not currently hold any NO_x ERCs in the MBUAPCD.

Moss Landing, if any, may be effectively limited to the contemporaneous emission reductions generated by the shutdown/repowering of Units 6 and 7 and Dynegy's current ERC holdings in the MBUAPCD.

Importantly, in addition to an air preconstruction permit, other environmental permits or approvals may be needed before repowering of Units 6 and 7 could be pursued (e.g., CEC certification, California Coastal Commission). The permitting process to obtain any one of these required permits could significantly delay the timetable for a potential repowering project and the inability to obtain such a required permit would preclude the project.

6. Identifies the transmission configuration around the units, and specifies planned upgrades and known contingencies related to these transmission facilities, so as to document awareness of transmission improvements as part of the generation planning process.

Moss Landing is located south of (but not in) the Greater Bay Area local reliability area in the Central Coast and Los Padres planning area. Dynegy, as an independent power producer, and not a transmission owning or operating utility, does not have the knowledge needed to provide a detailed response to this question. Information regarding the CAISO's transmission planning process can be found at http://www.caiso.com/1f42 /1f42d6e628ce0.html. The CAISO's 2010/2011 statewide conceptual transmission plan can be found at http://www.caiso.com /2b0a/2b0aec5d58d70.pdf. The CAISO's most recent reliability assessment, which sets forth the CAISO's proposed mitigation for several contingencies involving transmission lines terminating at Moss Landing, is available at http://www.caiso.com /280d/280dc32b51b0.pdf.

As currently envisioned, any repowering project involving Moss Landing Units 6 and/or 7, if pursued, would result in fewer MW at Moss Landing than is currently located there. Consequently, Dynegy does not believe any transmission modifications or upgrades would be required solely to accommodate repowering, if pursued, at Moss Landing. Likewise, we do not believe that any transmission modifications or upgrades would be necessary if impingement and entrainment control measures are installed on or implemented at Units 6 and/or 7 to meet Track 2. Again, apart from information made available through the CAISO transmission planning process, Dynegy does not have information regarding PG&E's plans for transmission modifications in the affected planning area.

7. In addition to the implementation plan, please provide any prior studies that accurately reflect current impingement or entrainment impacts. Prior impingement studies must accurately characterize the species currently impinged and their seasonal abundance. Prior entrainment studies must account for seasonal variation in oceanographic conditions and larval abundance and behavior such that abundance estimates are reasonably accurate and must have used a mesh size of 333 or 335 microns for entrained larvae sampling.

The Moss Landing Power Plant Modernization Project 316(b) Resource Assessment (April 2000) ("MLPP 316(b) Resource Assessment")[58] and Moss Landing Power Plant Units 1&2 and Units 6&7 Impingement Study Data Report (March 2007) ("MLPP Impingement Study"),[59] copies of which are enclosed as Attachments H and I, respectively, accurately reflect current impingement and entrainment impacts of the existing Moss Landing Power Plant (MLPP) intakes.

The MLPP 316(b) Resource Assessment report contains the study plan, description of field and analytical methods, detailed results, and evaluation of alternative intake technologies. This recent study, as well as the more recent MLPP Impingement Study, was designed in a collaborative effort by scientists representing Federal and State resource and regulatory agencies and academic institutions. The Technical Working Group (TWG) scientists routinely attended meetings for the specific purpose of designing sampling plans that would accurately describe the species composition, abundance and behavior of larval fishes and shellfishes that were entrained and also found living in the facility's source water and at risk to entrainment. The statistical design of the studies also took into account the need to identify spatial and seasonal variation in these populations, particularly as might be influenced by oceanographic conditions during the course of the study. A rigorous quality assurance and control program[60] exercised throughout the study audited the field, laboratory, and analytical methods employed during the studies. Study results were routinely shared with TWG members to enable real-time review and opportunity for study plan modification. This adaptive management process facilitated the high degree of accuracy achieved in both collection and analysis of the study's entrainment and impingement data.

The benefit of entrainment reduction is not evaluated as a simple percent reduction in the number of larval entrained, but instead it is the ratio of the number of larvae entrained to the number of an individual species' larvae at risk to entrainment. Considering just the number of larvae entrained does not provide any information on the potential impact to the entrained species' population or its sustainability. However considering the ratio of the number of species' larvae entrained to the number at risk to entrainment is a true measure of impact and potential risk to the population. It is also a statistic that is immune to seasonal and annual changes (variations) in a species' larval abundances.

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[58] Moss Landing Power Plant Modernization Project, 316(b) Resource Assessment (April 28, 2000), prepared for Duke Energy Moss Landing LLC by Tenera Environmental Inc. (copy enclosed as Attachment H).

[59] Moss Landing Power Plant Units 1&2 and Units 6&7 Impingement Study Data Report (March 2007), prepared for Moss Landing Power Plant by Tenera Environmental Inc. (copy enclosed as Attachment I). These impingement data replaced the impingement data in the MLPP 316(b) Resource Assessment that were collected during the 1979-1980 MLPP 316(b) study and had been used to estimate the rate of impingement until the new Units 1 and 2 intake could be constructed and impingement studied. In addition, the new impingement data replaced/reanalyzed impingement at Units 6 and 7, which had not been studied since the 1979-1980 MLPP 316(b) Study.

[60] A laboratory quality control (QC) program for all levels of laboratory sorting and taxonomic identification was applied to all samples. The QC program also incorporated the use of outside taxonomic experts to provide taxonomic QC and resolve taxonomic uncertainties.

The entrainment study design adopted by the TWG scientists employed a method of assessing entrainment impacts that essentially eliminated traditional statistical concerns of interannual variation in larval abundance. The sampling and analytical methodology, as recognized by its acronym "ETM" (Empirical Transport Model) and described in a CEC publication,[61] has been widely applied throughout the State by Regional Water Quality Control Boards, the CEC, the California Department of Fish and Game, the California Coastal Commission, and other State and Federal resource and regulatory agencies to assess entrainment impacts. The steady oversight of the TWG scientists throughout the course of the MLPP 316(b) Resource Assessment from study design to final report along with the project's Quality Control program assured the assessment's outcome of thorough, accurate, and purposeful findings.

Towed net sampling began March 2, 1999 and continued through February 24, 2000. Samples taken directly in front of the intakes for the new combined-cycle units (Units 1 and 2) and for Units 6 and 7 were collected by towing a bongo frame with 0.71 m (2.3 ft) diameter openings and equipped with two 335 µm mesh plankton nets and codends. Samples were collected over a continuous 24-hour period; each period was divided into six, 4-hour sampling cycles. Two tows were conducted during each cycle. Sample collection methods were similar to those developed and used by the California Cooperative Oceanic and Fisheries Investigation (CalCOFI) in their larval fish studies (Smith and Richardson 1977). Each net mouth was fitted with a calibrated flowmeter to record the water volume filtered that was used to convert the contents of the net sample to standard concentrations.

The findings of the MLPP 316(b) Resource Assessment are as relevant today for the purpose of assessing potential entrainment and impingement effects as when reported in 2000. By the analytical design discussed above, entrainment impacts were assessed using methodology immune from change over time, if there are no changes in the location, capacity, or operation of the intakes or in the source water biological and hydrodynamic characteristics. The location and capacity of the MLPP intakes have not changed since 2001, nor has the permitted intake flow been modified. Therefore, the ratio of permitted intake flow withdrawal to source water flow has remained unchanged. Moreover, there is no reason to believe that there has been significant change in the species composition of source water or the species composition of entrained organisms.

Source water for the MLPP is withdrawn from tidal flows that ebb and flood past the plant's shoreline intake located inside Moss Landing Harbor. The majority of the facility's source water originates from inside the Harbor and connecting sloughs with smaller amounts coming from outside the Harbor during high tides. However, even this incoming ocean source water is a mixture of recently ebbed harbor water and ocean water that has been strongly influenced by its tidal residence in Moss Landing Harbor.

[61] Steinbeck, J., J. Hedgepeth, P. Raimondi, G. Cailliet, and D. Mayer, Assessing Power Plant Cooling Water Intake System Entrainment Impacts, California Energy Commission Consultant Report, CEC-700-2007-010 (2007). The authors of this peer-reviewed paper were also members of the MLPP TWG, along with other agency scientists.

The species composition of larval fish collected in the MLPP 316(b) Resource Assessment entrainment samples was mostly Harbor and slough species. The larval fishes found in the Harbor and surrounding habitat are dominated by three species of gobies that occupy mud burrows throughout the Harbor and slough's extensive intertidal and subtidal areas of shallow, soft-bottom habitat. These same species of gobies are ubiquitous in their distribution and occur in large numbers in most California bays, lagoons, and sloughs. Studies of their adult populations have shown in many instances that gobies appear to have completely saturated their available habitat. The ability of the two-inch fish to reproduce itself, laying a thousand eggs or more several times a year, guarantees a nearly continuous abundance of larval and juvenile gobies seeking available habitat. A fundamental flaw of the Policy is that the vast majority (up to 85 percent) of fish larvae that will be saved by reducing entrainment losses are goby larvae that need more coastal bay, lagoon, and slough habitat, not more unentrained larvae. While sound scientific evidence exists that restoration of California coastal habitat effectively mitigates entrainment losses of gobies (in addition to creating benefit in perpetuity for myriads of unentrained marine species), there is virtually no scientific evidence of such benefit from the Policy to reduce or eliminate once-through cooling entrainment losses. A corollary of this fact is that the Policy's focus on reducing once-through cooling entrainment will have no measurable benefit, particularly in bay and lagoon settings. This is also why it is reasonable to conclude that because there has been no significant change in the amount of available goby habitat in Moss Landing since the 316(b) Resource Assessment study in 2000, the study's reported entrainment results and impact assessment remain accurate and valid at the present time.

Impingement study results reported less than three years ago in the MLPP Impingement Study remain accurate and valid at the present time by reason of their recent date of collection and reporting. Organisms impinged in MLPP's cooling water intake structure were sampled during a 24-hour period (survey) one-day per week from November 9, 2005 through November 1, 2006. Each survey was divided into approximately four 6-hour cycles. During periods of heavy debris loading, the traveling screens operate automatically due to a pressure differential between the upstream and downstream sides of the screens, caused by clogging from debris or they can be manually operated. Organisms collected during these non-scheduled screen washes were added to those collected during scheduled screen washes. In addition to identifying and enumerating the fishes and macroinvertebrates impinged, the operating status of the circulating water pumps and environmental data (weather conditions and tidal height) were recorded for each cycle. Hourly records of circulating water pump operation were supplied by MLPP for all weekly survey periods.

In short, prior impingement and entrainment studies at Moss Landing accurately reflect current impingement and entrainment impacts of the existing cooling water intakes, thus, additional baseline impingement and entrainment studies are not needed.

III. Immediate and Interim Requirements in Section 2.C of the Policy

1. No later than October 1, 2011, an existing power plant with an offshore intake shall install large organism exclusion devices having a distance between exclusion bars of no greater than nine inches, or install other exclusion devices, deemed equivalent by the State Water Board. [remainder omitted]

Not applicable. Moss Landing does not have an offshore intake. The intake structures for Units 1 and 2 and Units 6 and 7 are located at the east shoreline in Moss Landing Harbor.[62]

2. No later than October 1, 2011, an existing power plant that includes a unit that is not directly engaging in power-generating activities or critical system maintenance must cease intake flows, unless you demonstrate to the State Water Board that a reduced minimum flow is necessary for operations. Therefore, by April 1, 2011, you must provide information regarding when it is likely that each unit in your facility may not be generating power, or when you are performing critical system maintenance that would result in the cessation of intake flows. This information may be provided in terms of likely months when there will be no intake flow, with the understanding that if a need for power arises, that intake flows will re-start, as long as appropriate documentation is later provided regarding that unexpected power demand. If a reduced minimum flow is necessary for operations during the period when power is not typically generated, then you must define specifically why that is the case and provide an estimate of minimum flows as compared to historic flows during corresponding months 2000-2005 when power is not typically generated.

A. Necessary Minimum Flow When Not Directly Engaged in Power Generating Activities/Critical System Maintenance

i. Units 1 and 2

Unit 1 and Unit 2 are each equipped with three circulating water pumps that have a combined permitted flow of 180 million gallons per day (MGD) (i.e., a total of six circulating water pumps with an aggregate 360 MGD permitted flow for the Unit 1 and 2 power block cooling water system). The permitted flow rate of each of these circulating water pumps is 41,667 gallons per minute (GPM). Each pump is limited to no-flow or full flow operation. When Unit 1 or 2 is in service directly engaging in power generating activities (i.e., paralleled to the grid) and operating in 2x1 mode (i.e., output of greater than 250 MW), all three circulating water pumps on the Unit are in service. When Unit 1 or 2 is operating in 1x1 mode (i.e., output of 250 MW or less), two circulating water pumps are in service.

[62] The onshore intake structure for Units 1 and 2 has initial bar racks with approximately 4 inch center-to-center spacing (which provides 3½ inch wide openings between bars) that exclude, among other things, large organisms. Similarly, the onshore intake structure for Units 6 and 7 has initial bar racks with spacing between the bars at 3⅝ inches that exclude, among other things, large organisms.

In accordance with Moss Landing's station operating policies that have been in effect for several years, when Unit 1 or 2 is not directly engaging in power generating activities, intake flows are ceased except as described in the following scenarios in which minimum flow is necessary for operations and critical system maintenance (i.e., flow cannot be postponed until the Unit is generating electricity):

a. When Unit 1 or 2 is out of service and not in start up or shut down mode: If Unit 1 or 2 has been shut down for greater than 24-36 hours, the circulating water system does not operate. In the event of an extended outage lasting more than seven days, a single circulating water pump on each Unit would be started for one hour per week to prevent/reduce the formation and accumulation of toxic/flammable hydrogen sulfide gas in the intake tunnels. This minimum flow is a critical system maintenance activity needed to ensure worker safety and to prevent damage to the equipment (e.g., minimize corrosion). Based on the permitted flow rate of a single pump, flow during this one-hour period per week is 2.50 million gallons per Unit.[63]

b. When Unit 1 or 2 is in shut down mode: When Unit 1 or 2 is shutdown (i.e., separated from the grid), one of the two circulating water pumps that remained in service below 250 MW's is immediately removed from service and the second pump is typically removed from service 24 to 36 hours after the Unit is shutdown, provided the equipment has been completely cooled down (i.e., depending on numerous factors, such as ambient conditions and the mode of shutdown, the second pump may run for up to 36 hours after the Unit is shutdown in order to completely cool down the equipment). This typical 24- to 36-hour period of flow is the minimum necessary to ensure adequate, safe cooling of the condensing equipment and auxiliary systems. Without this minimum flow, the equipment would be damaged and rendered inoperable. Based on the permitted flow rate of a single pump, flow during this typical 24- to 36-hour period is approximately 60-90 million gallons per Unit. Although infrequent and atypical, the ability to continue flow on one pump for up to 36 hours after Unit shutdown is necessary to ensure safe shutdown of the equipment.

c. When Unit 1 or 2 is in start up mode: Two circulating water pumps on a Unit being placed in service are both started approximately two hours prior to the first gas turbine generator going into service (i.e., paralleled to the grid). This approximate two hours of flow is the minimum necessary to provide condenser cooling and cooling for auxiliary systems being placed in service as unit start up activities progress. Without this minimum flow, the Unit cannot start up, i.e., the equipment would be damaged and rendered inoperable. The Unit's third circulating water pump is placed in service when Unit load is increased to greater than 250 MW's (i.e., 2x1 operating mode) per Unit. Based on the permitted flow rate of a single pump, flow during this two-hour period is approximately 10 million gallons per Unit.

[63] A comparison "to historic flows during corresponding months 2000-2005 when power is not typically generated" as requested in Item III.2 is not provided because Units 1 and 2 generated power in all months from the commencement of operations in 2002 through 2005.

d. Screen Wash Pumps: The screen wash pumps operate each week for four to six hours when the Units are generating or not generating power when the intake structure screens are rotated for maintenance pressure washing. Operation of the screen wash pumps during this maintenance activity, which maintains the water velocity at its lowest flow to reduce entrainment and impingement, is critical to fully clean the screens. Based on the facility's NPDES permit, the average flow for the screen wash pumps is 1.3 MGD (covers Moss Landing Units 1 and 2, and Units 6 and 7).

e. Environmental Testing and Other Critical System Maintenance: As a matter of routine station operating practice, Moss Landing attempts to schedule and perform all required testing (annual flow velocity testing, permit required monitoring, etc.) that is dependent on operation of the circulating water pumps when the pumps are otherwise operating (e.g., during power generation, during weekly pump operation to prevent/reduce hydrogen sulfide gas accumulation when the Units are not operating, etc.) Nevertheless, the plant will in certain infrequent circumstances operate the circulating water pumps for the sole purpose of performing required testing or meeting other demands. For example, when mandatory NPDES permit annual intake velocity testing requiring certain tidal conditions cannot be scheduled during periods when the circulating water pumps are otherwise operating, the pumps are run as needed to perform the required testing. In addition, on rare occasions, the pumps will be run to clear shells in the intake tunnels.

Also, during long periods of non-operation, such as overhauls or forced outages lasting more than seven days, the circulating water pumps are run to remove hydrogen sulfide gas from the tunnels where the condensers may become fouled (condenser tube sheet fouling). When this occurs, the condenser tube sheets are cleaned and all three pumps on the impacted Unit(s) are run again for one hour. Debris deposited on the tube sheets, as a result of the run, is removed. This process is repeated until the tube sheets remain clean following running of the pumps. It is anticipated that no more than four one-hour runs of all three pumps per unit would be necessary to complete this infrequent cleaning process. Total flow for the four one-hour runs, per Unit, would be 30 million gallons (60 million gallons for both Units). This activity is expected to take place no more frequently than three times annually.

In each such instance as described, operation of the three circulating water pumps is minimized to the duration necessary to accomplish the intended purpose of the activity.

ii. Units 6 and 7

Units 6 and 7 are each equipped with two circulating water pumps that have a combined permitted flow of 432 MGD (i.e., a total of four circulating water pumps with an aggregate 864 MGD permitted flow for the Unit 6 and 7 power block cooling water system). The permitted flow rate of each of these circulating water pumps is 150,000 GPM. Each pump is limited to no-flow or full flow operation. When Unit 6 or 7 is in service directly engaging in power generating activities, the normal mode of operation is

for both circulating water pumps associated with the particular Unit to remain in service. Both pumps must run when a Unit is operating because each pump serves only one-half of its Unit's split condenser and the steam from the steam turbine flows to both halves of the condenser.

In accordance with Moss Landing's station operating policies that have been in effect for several years, when Unit 6 or 7 is not directly engaging in power generating activities (i.e., separated from the grid), intake flows are ceased except as described in the following scenarios in which reduced minimum flow is necessary for operations and critical system maintenance (i.e., flow cannot be postponed until the Unit is generating electricity):

a. When Unit 6 or 7 is out of service and not in start up or shut down mode: Once Unit 6 or 7 has been shut down for greater than 24 hours and the shutdown is expected to continue for more than seven days, each circulating water pump for the Unit is placed in service for one hour each week to prevent/reduce the formation and accumulation of toxic/flammable hydrogen sulfide gas in the intake tunnels. This minimum flow is a critical system maintenance activity needed to ensure worker safety and to prevent damage to the equipment (e.g., minimize corrosion). Based on the permitted flow rate of a single pump, flow during this one-hour period per week is 18 million gallons per Unit.[64]

b. When Unit 6 or 7 is in shut down mode: When Unit 6 or 7 is shutdown (i.e., separated from the grid), one of the Unit's two circulating water pumps is immediately removed from service and the Unit's second circulating water pump is typically removed from service 24 to 36 hours after the Unit is shutdown, provided the equipment has been completely cooled down (i.e., depending on numerous factors, such as ambient conditions and the mode of shutdown, the second pump may run for up to 36 hours after the Unit is shutdown in order to completely cool down the equipment). This typical 24- to 36-hour period of flow using one pump is the minimum necessary to ensure adequate cooling of auxiliary systems. Without this minimum flow, the equipment would be damaged and rendered inoperable. Based on the permitted flow rate of a single pump, flow during this 24- to 36-hour period is 216-324 million gallons per Unit. Although infrequent and atypical, the ability to continue flow on one pump for up to 36 hours after Unit shutdown is necessary to ensure safe shutdown of the equipment.

c. When Unit 6 or 7 is in start up mode: The circulating water pumps on a Unit being placed in service are both started approximately 16 hours prior to the Unit going into service (i.e., paralleled to the grid). This approximate 16-hour period of flow is the minimum necessary to provide condenser cooling and cooling for auxiliary systems being placed in service as Unit start up activities progress. Without this minimum flow, the Unit cannot start up, i.e., the equipment would be damaged and rendered

[64] We have not provided a comparison "to historic flows during corresponding months 2000-2005 when power is not typically generated" as requested in Item III.2 because it is not valid comparison for Units 6 and 7 given changes in market conditions/dispatch, applicable energy purchase and sale agreements, and station operating practices.

inoperable. Based on the permitted flow rate of the pumps, flow during this 16-hour period is 288 million gallons per Unit.

d. Screen Wash Pumps: The screen wash pumps operate when the Units are not generating power to rotate and clean the intake structure screens during the activity described in Item a above (weekly pump operation to eliminate hydrogen sulfide gas). Operation of the screen wash pumps is a critical during this maintenance activity to keep the traveling screens clean and maintain design velocity to reduce impingement and entrainment. Based on information reported in the facility's NPDES-permit required Discharge Monitoring Reports and as identified in the facility's NPDES permit, the average flow for the screen wash pumps is 1.3 MGD (covers Moss Landing Units 6 and 7, and Units 1 and 2).

e. Environmental Testing and Other Critical System Maintenance: As a matter of routine station operating practice, Moss Landing attempts to schedule and perform all required testing (annual flow velocity testing, permit required monitoring, etc.) that is dependent on operation of the circulating water pumps when the pumps are otherwise operating (e.g., during power generation, during weekly pump operation to prevent/reduce hydrogen sulfide gas accumulation when the Units are not operating, etc.) Nevertheless, the plant will in certain infrequent circumstances operate the circulating water pumps for the sole purpose of performing required testing or meeting other demands. For example, when mandatory NPDES permit annual intake velocity testing requiring certain tidal conditions cannot be scheduled during periods when the circulating water pumps are otherwise operating, the pumps are run as needed to perform the required testing. In addition, on rare occasions, the pumps will be run to clear shells in the intake tunnels.

Also, during long periods of non-operation, such as overhauls or forced outages lasting more than seven days, the circulating water pumps are run to remove hydrogen sulfide gas from the tunnels where the condensers may become fouled (condenser tube sheet fouling). When this occurs, the condenser tube sheets are cleaned and both pumps on the impacted Unit(s) are run again for one hour. Debris deposited on the tube sheets, as a result of the run, is removed. This process is repeated until the tube sheets remain clean following running of the pumps. It is anticipated that no more than four one-hour runs of each pump would be necessary to complete this infrequent cleaning process. Total flow for the four one-hour runs, per Unit, would be 72 million gallons (144 million gallons for both Units). This activity is expected to take place no more frequently than three times annually.

In each such instance described above, operation of the circulating water pumps is minimized to the duration necessary to accomplish the intended purpose of the activity.

B. Likely Periods When the Units May Not Be Generating Power

i. Demand for Power

a. Units 1 and 2

Units 1 and 2 typically run most weekdays and summer peak season weekend days and cycle off line on most nights. Based on past operations, there are no months or other extended periods during a calendar year that the Units typically do not operate their cooling water systems due to lack of demand for power from the Units. The Units are contractually obligated to be available to run throughout the year.

b. Units 6 and 7

Units 6 and 7 typically run during high demand periods in the months of April through (and including) September, with occasional, less frequent operation during other months of the year. The Units are contractually obligated to be available to run throughout the year. Thus, as the demand for power arises during any part of the year and the Units are called by the CAISO to run, Units 6 and 7 will be started up (and, accordingly, intake flows will occur) to directly engage in power generating activities.

Units 6 and 7 are anticipated to have an important role in helping integrate renewable power into the state's electrical grid because they are able to ramp up and down much faster than newer generation. For example, Moss Landing Units 6 and 7 can each ramp up at a rate of 30 MW/minute (from 200 MW to 730 MW), as compared to the new combined-cycle combustion gas turbine generation Units 1 and 2, which can ramp up no faster than a rate of 20 MW/minute (from 290 MW to 510 MW). The rapid ramping characteristics of Units 6 and 7 allow them to adjust energy output to the grid to respond to changing energy production from variable wind and solar sources.

ii. Planned Outages

Maintenance outages involving shutdown of the Moss Landing Units would result in the cessation of water intake flows, except as identified above for critical system maintenance.[65] The maintenance outage schedule for Moss Landing varies based on numerous factors, such as turbine inspection findings and data provided by the steam turbine manufacturer.

Typically, planned maintenance outages at Moss Landing occur as follows:

Units 1 and 2

- 9-day outages in the spring each year

[65] For Moss Landing Units 1 and 2, no circulating water pumps run when both gas turbines are in outage.

- 3-day outages in the fall each year

Units 6 and 7

- 10-day outages in the late winter or early spring each year
- 5-day outages in the fall each year

In accordance with the outage coordination requirements set forth in the CAISO tariff, by October 15th of each year, Dynegy provides the CAISO with a proposed schedule of maintenance outages for each unit at Moss Landing, including start and finish times/dates, for the following calendar year. Quarterly updates of the proposed maintenance outage schedule, including any additional outages anticipated in the next 12 months from the time of the report, are also submitted to the CAISO as part of the CAISO's long range outage planning process. Pursuant to the CAISO tariff, an individual generator's outage program is considered confidential information.[66] Access to Moss Landing's current proposed outage schedule for approximately the next 12 months, as filed with the CAISO, should be coordinated with the CAISO through the SACCWIS.

3. For those facilities that have not achieved final compliance by October 1, 2015, the owner or operator must implement measures to mitigate the interim impingement and entrainment impacts resulting from the cooling water intake structure(s), and continuing up to and until the facility achieves final compliance with the requirements of the Policy. If you do not plan to achieve final compliance by October 1, 2015, you must include in your implementation plan to be submitted no later than April 1, 2011, the specific measures that will be undertaken to comply with this additional requirement. The options you may choose from include [Option c. is not chosen and, thus, omitted here]**:**

A. Units 1 and 2

a. A demonstration that existing mitigation efforts, including any projects that are required by state or federal permits as of October 1, 2010, compensate for the interim impingement and entrainment impacts.

For Moss Landing Units 1 and 2, existing mitigation efforts required by state or federal permits as of October 1, 2010, compensate for interim impingement and entrainment impacts. The CEC's certification of and the Regional Water Board's NPDES permit for the Moss Landing Unit 1 and 2 project imposed mitigation and restoration programs that were designed to address the beyond BTA once-through cooling impacts of Units 1 and 2 throughout the operating life of the Units.[67] Specifically, the owner of the Moss Landing power plant was directed to pay, and did pay, $7 million to a dedicated fund to be used by the Elkhorn Slough Foundation for the

[66] CAISO Tariff § 20.2(e).
[67] Commission Decision at 170-172, 194-200; NPDES Permit No. CA0006254, at Findings 50 and 51.

acquisition and permanent preservation of lands that directly impinge on or contribute damaging impacts to Elkhorn Slough, habitat restoration activities, and long-term stewardship of the mitigation projects in perpetuity.[68]

The sufficiency of the mitigation project to mitigate beyond BTA entrainment impacts was well established in the record. The mitigation requirements were developed by the Technical Working Group, which was formed by the Regional Water Board and the CEC to evaluate the potential impacts of Units 1 and 2 and was made up of representatives from various regulatory agencies (i.e., Regional Water Board, CEC, California Coastal Commission, and California Department of Fish and Game), the scientific community, and the project applicant.[69] Using the site-specific assessment of entrainment effects expressed as the average of each entrained species of larval fish fractional loss of its source water population, the TWG estimated the number of acres of habitat to produce the fractional loss of entrained larvae. The TWG then converted the number of acres to a dollar value ($7 million) based on realistic price per acre.[70] Notably, the mandated $7 million figure is significantly higher than the lower values produced by other valuation methodologies.[71]

The $7 million mitigation project has offset entrainment impacts many times over because it was built upon numerous conservative assumptions.[72] For example, the estimate of entrainment loss conservatively assumed 100 percent mortality of all entrained larvae and the continuous operation of Units 1 and 2 (i.e., 24 hours per day, 365 days per year). However, some larvae may survive entrainment,[73] and the Unit 1 and 2 cooling water pumps never run continuously for a 12-month period. Moreover, the entrainment impacts from Units 1 and 2 assumed that the source waters were limited to Elkhorn Slough; had the assumed source waters included Moss Landing Harbor where the cooling water intake structures are located, the entrainment impacts -- expressed as a percentage loss of productivity to entrainment -- would have been lower than the percentage actually used to calculate the $7 million mitigation payment amount.[74] In short, “the most conservative approach” was used to give the highest estimate of [entrainment] loss” for purposes of determining an appropriate mitigation project to address the impact of Units 1 and 2.[75] Indeed, in the NPDES permit proceeding, Regional Water Board Staff also concluded that the approach used to

[68] The CEC also required the owner of the Moss Landing power plant to provide $425,000 to the Monterey Bay Marine Sanctuary to fund studies of the thermal effects of once-through cooling at the plant. Commission Decision at 200-201. In addition, the plant owner voluntarily provided $1 million in monitoring funds to respond to the concerns of certain local environmental groups. Duke Testimony at 9, n.12.

[69] Commission Decision at 146. The TWG focused the mitigation projects for Units 1 and 2 on entrainment impacts because it concluded that the once-through cooling system for Units 1 and 2 did not have significant impacts associated with impingement.

[70] Commission Decision at 172.

[71] See Staff Report at 14.

[72] See Commission Decision at 170-171, 180.

[73] Duke Testimony at 6, 9 n.13; EPRI, “Review of Entrainment Survival Studies: 1970-2000”, Technical Report No. 100757 (2000).

[74] Commission Decision at 170-171.

[75] Commission Decision at 171 (citing testimony of Dr. Peter Raimondi, Professor of Marine Biology at U.C. Santa Cruz, the Regional Water Board’s special consultant to the TWG).

determine appropriate mitigation regarding Units 1 and 2 "more than compensates for impacts measured and not measured because it addresses the underlying basis of larval production, that is, habitat quantity and quality over the long-term."[76]

Importantly, the mitigation project required by both the CEC certification and the NPDES permit is for "permanent preservation and enhancement" of the Elkhorn Slough watershed to increase the biological health and productivity of the aquatic habitat and must "accomplish short-term and long-term stewardship … of the selected mitigation projects in perpetuity."[77] Both the CEC certification and the NPDES permit also encouraged leveraging of the mitigation funds to obtain "additional benefits for the Elkhorn Slough watershed".[78]

The required Moss Landing Unit 1 and 2 mitigation programs have been successfully implemented: since the owners of Moss Landing initially funded the $7 million, the Elkhorn Slough Foundation has protected over 2,600 acres and leveraged the initial funds provided by Moss Landing to acquire real estate valued at close to $30 million, as well as engaged in phased restoration activities encompassing more than 2,000 acres of land in the Elkhorn Highlands and a series of wetland properties.[79] As stated in Elkhorn Slough Foundation's 2010 interim report on the status of the mitigation plan, "tremendous progress [has been made] toward the goals outlined in the plan. In terms of acreage of land and water permanently protected, the goals were far exceeded."[80]

Because the beyond BTA once-through cooling impacts of Units 1 and 2 have already been offset and will continue to be offset for the entire operating life of the Units by existing mitigation efforts required by Moss Landing's NPDES permit and the CEC certification, Moss Landing Units 1 and 2 meet the interim mitigation requirements of the Policy. Thus, no further interim mitigation requirements should be imposed for Units 1 and 2.

B. Units 6 and 7

b. A demonstration that the interim impacts will be compensated for by providing funding to the California Coastal Conservancy, which will work with the California Ocean Protection Council to fund an appropriate mitigation project. It is the preference of the State Water Board that this option be selected.

For the period of time that Moss Landing Units 6 and/or 7 operate beyond October 1, 2015 using once-through cooling without achieving final compliance and continuing until the Unit(s) achieves final compliance, Dynegy chooses to provide funding to the California Coastal Conservancy for purposes of working with the California Ocean Protection Council to fund an appropriate mitigation project that mitigates the interim

[76] Staff Report at 14.
[77] NPDES Permit at Condition 50; see also Commission Decision, at 195, 196.
[78] Commission Decision at 195; NPDES Permit at Condition 50.a.
[79] Elkhorn Slough Mitigation Plan Interim Report at 3 - 7 (see Attachment F).
[80] Elkhorn Slough Mitigation Plan Interim Report at 2 (see Attachment F).

impingement and entrainment impacts. Dynegy proposes that the amount of mitigation funding be based on the actual cooling water intake flow of each Unit, as determined from Discharge Monitoring Report (DMR) data submitted to the Central Coast Regional Water Quality Control Board, for the period October 1, 2015 until the Unit achieves final compliance with the Policy. The amount of the mitigation funding would be determined in the future, consistent with the Board's action on other implementation plans. Dynegy proposes to submit payment of the appropriate funds to the California Coastal Conservancy by March 1 of each year for flows occurring in the prior calendar year (or part of the calendar year, as appropriate, e.g., by March 1, 2016 for actual flows during the interim period October 1, 2015 through December 31, 2015) until final compliance is achieved.

In the context of interim mitigation, intake flows are an appropriate basis for determining mitigation funding. By basing mitigation funding on actual cooling water intake flow as determined by the facility's otherwise reported DMR data, the proposed approach avoids the uncertainties that are associated with the implementation of any mitigation project and the difficulties in determining the appropriate level of funding for projects that might continue to require funding and provide benefits well beyond the date when final compliance is achieved. Finally, given the conservatism of the Moss Landing Unit 1 and 2 mitigation project and its successful implementation, interim impingement and entrainment impacts from Units 6 and 7 have, in part, already been offset.

IV. New Application for Renewal of NPDES Permit/New Report of Waste Discharge

As requested in the Board's Implementation Plan Letter, Dynegy hereby submits a new application to renew Moss Landing's NPDES permit.[81] The application is enclosed as Attachment J.

[81] The prior renewal application for Moss Landing's NPDES permit, including EPA Form 3510 and Form 2C and a Reasonable Potential Analysis Report, was timely submitted to the Central Coast Regional Water Quality Control Board by letter dated April 22, 2005. That prior renewal application is incorporated herein by reference in its entirety.