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**Subject: Equipment Replacement Schedules for Revised Project Mitigation Measures in the China Shipping Supplemental EIR (APP #150224-504/SCH #2003061153)**

This memorandum describes the steps and strategies Harbor Department staff undertook to develop equipment-replacement schedules for inclusion in Revised Project mitigation measures, and specifically how those steps were informed by data and information collected as part of the Berths 97-109 China Shipping Container Terminal Supplemental Environmental Impact Report (SEIR).

### Baseline Conditions

Generally speaking, the purpose of mitigation under CEQA is to avoid or reduce the significant adverse effect of a proposed project, compared to baseline conditions. Therefore, the first step in designing mitigation measures to reduce or avoid the significant adverse effects of the Revised Project for the China Shipping Container Terminal, was development of a baseline of existing conditions using the best available data. This step included obtaining cargo handling equipment inventories and cargo throughput data handled at the terminal under baseline year conditions. Data for two baseline years were collected for preparation of the SEIR for the Revised Project, 2008 and 2014. Generally, the same process of collecting data for both baseline years was performed and consisted of the following records:

1. Cargo handling equipment inventories containing detailed information on the number of specific types, makes and models of terminal equipment operated by West Basin Container Terminal (WBCT), for years 2008 and 2014, respectively, came from two primary sources. The first is an equipment inventory that is collected by the Harbor Department as part of its annual emissions inventory and is maintained by Starcrest Consulting Group, LLC. See references LAHD, 2015 for equipment data for 2014 and Draft SEIR Appendix D, China Shipping Past Performance Review dated August 2014 that cites the equipment inventory for 2008. The second is equipment inventory data that is obtained directly from WBCT and China Shipping. See references WBCT, 2016 Communication and attached equipment inventory from meeting notes dated October 27, 2016; September 30, 2015 Letter to POLA Janna Sidley from China Shipping and attached equipment inventory; and email communication between POLA Lisa Ochsner and Mark Wheeler and Willy Won of WBCT dated February 1, 2018 regarding 2017 WBCT CHE inventory.

2. Equipment activity data showing hours of usage for each equipment type for years 2008 and 2014, respectively, was combined with the equipment inventory data cited above from the following references: Draft SEIR Appendix D, China Shipping Past Performance Review dated August 2014; WBCT, 2016 Communication and attached equipment inventory from meeting notes dated October 27, 2016; September 30, 2015 Letter to POLA Janna Sidley from China Shipping and attached equipment inventory; and email communication between POLA Lisa Ochsner and Mark Wheeler and Willy Won of WBCT dated February 1, 2018 regarding 2017 WBCT CHE inventory.
3. Cargo throughput data for years 2008 and 2014, respectively, was obtained from POLA Goods Movement Division from the following references: Confidential Attorney-Client Privilege email communication regarding China Shipping Supplemental EIR analysis between Shozo Yoshikawa and Chris Bobo dated March 10, 2016 with attached "POLA 2014 monthly throughput by terminal" excel spreadsheet; and Confidential Attorney-Client Privilege email communication regarding China Shipping SEIR Recirculation Throughput Forecast between Shozo Yoshikawa and Chris Bobo dated February 22, 2018 with attached "CY 2008 with pivot tables" excel spreadsheet.

WBCT owns the cargo handling equipment that is used at both the China Shipping and adjacent Yang Ming terminals and the equipment inventories reflect all of the equipment that is shared between the two terminals. Therefore, the Port utilized the baseline equipment inventories in combination with the baseline cargo throughput data to apportion the amount of equipment that is utilized at the China Shipping terminal relative to the amount of cargo throughput handled at that terminal. This is explained in more detail in Section 2.4.3 of the Recirculated Draft SEIR. As detailed in the sections below, once data for characterizing baseline conditions were collected, those data were also used to develop equipment-replacement schedules for inclusion in Revised Project mitigation measures, in order to ensure that those mitigation measures would be technologically, operationally, and economically feasible.

#### Remaining Useful Life and Estimated Value

In developing Revised Project mitigation measures, staff reviewed letters from China Shipping informing the Port that immediate replacement of existing equipment with remaining useful life would be costly and quoted unit prices for certain types of equipment based on what was commercially available at that time. For instance, China Shipping stated in a letter dated March 25, 2015, that immediate replacement of LPG yard tractors (178 total) at a cost of approximately \$110,000 per tractor for Tier-4 compliant engines is not economically or competitively feasible and that newer units purchased in 2007 and 2011 retained useful life and were still under warranty. With regard to top-handlers, replacement of the oldest units (8 total) at a cost of \$580,000 each could be done over the course of 18 months with newer top picks (30 total) still retaining useful life. China Shipping advised that replacement must be done in a time frame that is economically feasible and tied to the useful life of the equipment. These

letters are all included in the reference LAHD, 2017 POLA and China Shipping Correspondence and Meetings Regarding Mitigation Measures.

In light of this information from China Shipping, and in light of information about equipment procurement times (described below), staff utilized 2008 and 2014 baseline information described above to develop equipment-replacement schedules for Revised Project mitigation measures AQ-15 (yard tractors) and AQ-17 (other yard equipment). This information was used to designate equipment without economically valuable remaining useful life for replacement at the earliest practicable time, and also to develop phased schedules for replacement of equipment with remaining useful life that would allow for exhaustion of that remaining useful life prior to required replacement.

The main basis for developing equipment-replacement schedules for existing equipment for inclusion in Revised Project mitigation measures is to assume that all equipment will likely be replaced, with or without a mitigation-measure requirement to do so, when it has reached the end of its “useful life,” as that term is defined by the California Air Resources Board, based on published data. See reference LAHD, 2011, Inventory of Air Emissions CY 2010, Table 5.10.

Using the equipment inventory from the 2014 baseline year, staff made a technical request to WBCT to verify the remaining useful life of each piece of equipment and to determine its estimated value. See email communication between POLA Lisa Ochsner and Mark Wheeler and Willy Won of WBCT dated November 29, 2016 with attached “POLA CHE FMV review” excel spreadsheet. The analysis revealed the following:

1. The oldest yard equipment with model years pre-2000 (except for one diesel RTG), and the oldest LPG yard tractors pre-2004, had reached and/or exceeded CARB’s estimated useful life. WBCT’s analysis showed these units had \$0 estimated residual value. These units represented approximately 23% of the total inventory.
2. Newer yard equipment with model years post-2000, and newer LPG yard tractors post-2007, had remaining useful life ranging from 2-21 years, with a total estimated value of approximately \$5.2 million. These units represented approximately 77% of the total inventory.

#### WBCT’s Procurement Timeline and Operational Needs/Constraints

Other factors taken into account in developing equipment-replacement schedules for inclusion in Revised Project mitigation measures included the production and lead time WBCT would need to procure new equipment and infrastructure needs in response to a mitigation requirement to do so. In a meeting between POLA and WBCT on October 27, 2016 (see reference WBCT, 2016 Communication), WBCT informed the Port of the following:

1. Assuming equipment that is commercially available today, there is lead time required for units to be ordered, built, delivered, and put into operation. Lead times for some individual units ranged from as short as one month to as long as one year. WBCT informed POLA that replacing entire fleets in adequate numbers to avoid downtime in operations could require a lead time of 5-6 years for yard tractors (assuming 122 units) and 3-4 years for top picks. (see reference WBCT, 2016 Communication.)
2. Using existing platforms such as LNG for yard tractors was favorable to avoid changes in fueling infrastructure and services, which would add to the cost of mitigation.
3. With regard to converting some equipment to all electric, WBCT confirmed it was possible for some units with new charging infrastructure such as for small 5-ton forklifts and shuttle buses (Note: buses were not originally part of any mitigation). In addition, all electric RTGs can operate in the surcharge area of the terminal because electrical infrastructure already exists there; however, hybrid RTGs (6-8 units) would need to operate in the southern part of the terminal (import area) because electrical infrastructure is not in place and the configuration has space constraints due to short container stack rows, which makes the deployment of electric RTGs infeasible.
4. An alternative fuel sweeper could be purchased in the future (by year 2030). Note, this unit was not originally part of any mitigation.

Based on this information, it was determined that immediate replacement of any type of equipment is not realistic for a terminal operator and that the timing, even for the oldest units where replacements are commercially available, would still need to account for the lead time described above. At a minimum, the Port determined the earliest phase in schedule is one year which is sufficient for acquiring certain units that are commercially available in a reasonable quantity to avoid downtime and for integration into operations. In addition, the Port was able to identify opportunities where certain types of zero emissions equipment such as small forklifts, electric RTGs, and shuttle buses could be deployed in a reasonable timeframe without terminal constraints or infrastructure challenges.

#### Cleanest Available Technology and Estimated Cost

An in-depth analysis of the cleanest available technology that could be imposed as revised mitigation was performed for the SEIR. The technological assumptions the Port relied upon for the SEIR was based on the use of commercially available technology, and in some instances the Port communicated with vendors to ensure that any replacement equipment was commercially available in specific size, horsepower, load, etc. to meet the specifications of existing equipment and operational needs. In addition, a review of demonstration projects involving zero and near-zero emissions equipment testing at the Port was conducted to determine the status of emerging technologies. As

a separate process, a feasibility assessment of cargo handling equipment was done for the 2017 CAAP by the Ports. A number of references are included in the SEIR on this topic and a detailed master response on the status of zero- and near-zero emissions technologies is included in the Final SEIR.

Based on this analysis, the Port prepared a list of equipment types to be considered as revised mitigation for cargo handling equipment along with phase-in equipment-replacement schedules that vary for each specific equipment type based on commercial status and availability. Consideration was also given to the status of emerging technologies that could become available when a future replacement or purchase is required. The Port felt this is the best strategy from both an emissions reduction standpoint and an economic feasibility standpoint because 1) it allows the cleanest available equipment to be deployed as it becomes commercially available, which presumably will be cleaner in the future compared to what is available today for purchase, and 2) would be in alignment with future 2017 CAAP goals as further discussed below.

The mitigation list was vetted by Port management and communicated to WBCT and China Shipping in several meetings (see LAHD, 2017). The mitigation list was then used to estimate the cost of the replacement equipment and infrastructure requirements. Specific cost references include the following:

1. Communications with West Basin Container Terminal (WBCT) notes prepared by Lisa Ochsner, POLA, meeting date October 27, 2016
2. DRAFT Evaluation of Compliance Status and Compliance Cost for Mitigation Measures for China Shipping Terminal (November 20, 2013, Revised September 29, 2014 for Yard Equipment)
3. Estimated CHE Cost Scenarios for China Shipping prepared July 27, 2016
4. Cost scenarios for equipment and Engineering infrastructure estimates prepared July 22, 2016
5. B100-102 Preliminary Cost Estimate for Electrification prepared July 12, 2019
6. Cost scenarios table II Revised July 5, 2016
7. Cost scenarios table II Revised from Chris Cannon July 11, 2016

## Consistency with 2017 CAAP Goals

The 2017 CAAP envisions that by 2030, the Port will rely on zero- and near-zero emission technologies for all cargo handling equipment. The 2017 CAAP also obligates the Port and terminal operators to a firm process of evaluating terminal equipment and developing a 10-year procurement schedule for new equipment. In order to align with these CAAP strategies, the revised mitigation measures take into account the integration of current and future zero- and near-zero emissions technologies by requiring the phase-in of ultra-low NOx yard tractors in the near-term (within one year) and within five years, all electric 5-ton forklifts, all electric RTGs in the surcharge area and diesel-electric hybrid RTGs in the import area, the cleanest available sweeper, and zero emissions shuttle buses. Lastly, lease measure LM AQ-1, requires a purchase preference for zero emissions or the cleanest available whenever equipment is purchased or replaced in subsequent phase-in schedules.

Should you have any questions regarding the information contained in this memorandum, please feel free to contact Lisa Ochsner of my staff at 310-732-3412.