PERMIT ATTACHMENT

APPENDIX XI

RISK ASSESSMENT REPORT

This appendix contains the Executive Summary of the Human Health and Ecological Risk Assessment Report. For the remainder of the HHERA Report, refer to the April 2016 Permit Application.

September 2018

APPENDIX XI

RISK ASSESSMENT REPORT

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

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Summary of Documents

The risk assessment was performed according to a USEPA-approved Risk Assessment Workplan developed in 2003, updated by agreement with the USEPA to include elements of more recent 2005 USEPA guidance for risk assessments of waste combustion facilities. The USEPA approvals were received prior to the initiation of this study which included evaluations of potential human health and ecological risks associated with both furnace stack air emissions and fugitive air emissions from spent carbon unloading. At USEPA's request, the assessment also included evaluations of potential risks associated with exposure to the facility's effluent discharge to the Colorado River Sewage System Joint Venture (CRSSJV) publicly owned sewage treatment plant and with exposure to airborne chemicals in the workplace at the facility. The risk assessment for this project is presented in two documents. The first document is the *Draft Risk Assessment for the Siemens Water Technologies Corp. Carbon Reactivation Facility in Parker, Arizona* which was submitted to USEPA on July 30, 2007. The second document is the *Response To USEPA Region IX Comments on the Draft Siemens Water Technologies Corp. Carbon Regeneration Facility Risk Assessment* which was submitted to USEPA on March 13, 2008, to respond to comments on the draft risk assessment that were received from the Agency in late 2007.

In conclusion, the risk assessment demonstrates that, using conservative assumptions:

- the potential risks associated with air emissions from the Siemens Water Technologies Corp. carbon reactivation furnace and from spent carbon unloading are below regulatory and other target risk levels for both human health and ecological receptors;

- the incremental contribution of the facility effluent on the CRSSJV wastewater treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health; and

- modeled on-site air concentrations due to fugitive emissions during spent carbon unloading at the facility, and measured worker breathing zone concentrations, do not exceed occupational exposure limits.

EXECUTIVE SUMMARY

SIEMENS WATER TECHNOLOGIES CORP.
CARBON REGENERATION FACILITY RISK ASSESSMENT
PARKER, ARIZONA

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March 13, 2008

EXECUTIVE SUMMARY
RISK ASSESSMENT FOR THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REACTIVATION FACILITY IN PARKER, ARIZONA

The Siemens Water Technologies Corp. facility (SWT facility) is a carbon reactivation plant located within the 269,000 acre Colorado River Indian Tribes (CRIT) Reservation just outside of the Town of Parker in La Paz County, Arizona. The facility is located in an industrial park established by CRIT on Tribal land and is operated pursuant to a lease between the company and CRIT. The facility reactivates spent carbon which has been previously used to remove pollutants from water and air. The spent carbon is reactivated by heating it to very high temperatures under controlled conditions in a carbon reactivation furnace. The newly reactivated carbon is then reused as an activated carbon product.

A human health and ecological risk assessment of the facility was conducted as part of the facility's permitting activities for the carbon reactivation furnace under the Resource Conservation and Recovery Act permitting regulations at 40 CFR §270.10. A risk assessment is a scientific study that is used to help evaluate risks associated with exposure to chemicals in the environment. This risk assessment represents one of the final steps in a process that has extended over a seven year period beginning with the U.S. Environmental Protection Agency's (USEPA's) request to develop a Risk Assessment Workplan. The risk assessment was conducted by a team of scientists and engineers from independent consulting firms with expertise in risk assessment, toxicology, environmental engineering and air dispersion modeling.

This risk assessment was performed according to a USEPA-approved Risk Assessment Workplan ("Workplan") developed in 2003, updated by agreement with the USEPA to include elements of more recent 2005 USEPA guidance for risk assessments of waste combustion facilities. The USEPA approvals were received prior to the initiation of this study which included evaluations of potential human health and ecological risks associated with both furnace stack air emissions and fugitive air emissions from spent carbon unloading. At USEPA's request, the assessment also included evaluations of potential risks associated with exposure to the facility's effluent discharge to the Colorado River Sewage System Joint Venture (CRSSJV) publicly owned sewage treatment plant and with exposure to airborne chemicals in the workplace at the facility.

The risk assessment for this project is presented in two documents. The first document is the *Draft Risk Assessment for the Siemens Water Technologies Corp. Carbon Reactivation Facility in Parker, Arizona* which was submitted to USEPA on July 30, 2007. The second document is the *Response To USEPA Region IX Comments on the Draft Siemens Water Technologies Corp. Carbon Regeneration Facility Risk Assessment* which was submitted to USEPA on March 13, 2008, to respond to comments on the draft risk assessment that were received from the Agency in late 2007.

The risk assessment used a large amount of site-specific data, including but not limited to:

- comprehensive testing of emissions from the furnace stack, with analysis for site-specific chemicals of potential concern;
- data on spent carbon characteristics, the facility configuration, and facility operations;
- local land use and demographic information;
- water resources data available from the U.S. Geological Survey and the U.S. Bureau of Reclamation; and
- meteorological data from Parker, Arizona.

In the absence of site-specific information, health-protective default values recommended by the USEPA were used. Chemical-specific toxicological data and chemical properties for the compounds selected for evaluation were obtained from the USEPA or from other public health agencies, organizations or databases primarily recommended by the USEPA. In addition, many mathematical models developed by the USEPA and presented in the Agency's guidance documents were applied to perform the risk assessment calculations. Overall, the models and input data used in the risk assessment are expected to provide conservative (i.e., health protective) estimates of potential risks.

Potential risks from stack emissions into the air were evaluated for over 170 compounds selected for detailed assessment based on a comprehensive performance demonstration test (PDT) approved in advance by the USEPA and conducted at the facility by an independent testing firm. The PDT involved several days of stack gas sampling and sophisticated chemical analysis. The list of chemicals selected for evaluation included compounds that were detected in stack emissions and also over 80 compounds that were not detected but were included in the calculations as a conservative measure to ensure that risks would not be underestimated. Stack emission rates for the selected compounds were calculated based on either PDT results, proposed permit limits or, for a few chemicals, long-term average chemical feed rates and a conservative value for the furnace's destruction and removal efficiency. Potential risks from fugitive air emissions were evaluated for 23 compounds selected for evaluation based on their concentrations in spent carbon, the number of deliveries and amounts delivered to the facility, chemical toxicity, and volatility. Air dispersion and deposition modeling was conducted using a model developed and approved by the USEPA to allow calculation of chemical concentrations in air and deposition rates onto the earth's surface within a 154 square mile study area surrounding the facility. The mathematical equations used to calculate the fate and transport of each chemical in the environment, environmental concentrations for each chemical, and human exposures and risks, were based on current USEPA guidance and solved using the Industrial Risk Assessment Program software.

Human Health Risk Assessment

The stack emissions human health risk assessment calculated exposures for several different types of individuals who could hypothetically be exposed to emissions from the plant: adult and child residents, adult and child farmers, adults and children assumed to eat fish caught from the Colorado River or the Main Drain, and a nursing infant. In risk assessment terminology, these groups of individuals are known as "receptors". Each adult or child receptor was assumed to be exposed through a variety of pathways (e.g., the adult farmer receptor was assumed to be exposed via inhalation, soil ingestion, homegrown produce ingestion, and ingestion of home-raised or locally-raised beef, pork, poultry, and eggs). Each adult receptor was also conservatively assumed to be the mother of a breast-fed infant with the potential for transmission of chemicals from the mother through nursing. The fugitive emissions human health risk assessment evaluated inhalation exposures for adult and child residents, and adult and child farmers.

A variety of risk evaluations were performed in the human health risk assessment, as summarized below:

- Chronic long-term excess lifetime cancer risks from stack emissions were lower than USEPA's combustion risk assessment target level of $1x10^{-5}$ (one in 100,000) over a 70-year lifetime when all compounds were included. The excess lifetime cancer risks were reduced to 30 or more times lower than the target risk level when just one compound (that was not detected in the stack gases and has not been received at the facility in spent carbon) was

removed from the analysis. Excess lifetime cancer risks due to inhalation of fugitive emissions were at least 200 times below the USEPA target risk level. When excess lifetime cancer risks from both stack and fugitive emissions are considered together, the cancer risk estimate remains below the USEPA target risk level.

- An analysis of chronic long-term non-cancer effects from exposure to stack and fugitive emissions showed that adverse chronic non-cancer effects would not occur. Calculated exposures were at least five times lower for stack emissions, and 250 times lower for fugitive emissions, than the conservative non-cancer target level of 0.25 used by USEPA for combustion sources.

- An analysis of short-term acute inhalation exposures showed that adverse acute effects would not occur at assessed residential locations and also at maximum impact points beyond the facility boundary as a result of both stack and fugitive emissions.

- The calculated air and soil concentrations for residential receptors were determined to be below conservatively-derived preliminary remediation goals that have been developed by USEPA Region 9.

Ecological Risk Assessment

An ecological risk assessment was also conducted to evaluate potential effects of stack emissions on selected representative ecological receptors within the facility area. The ecological analysis evaluated potential impacts to wildlife that was considered to be at greatest risk based on habitat use, exposure potential, ecological significance, and population status. The habitat types that were considered consisted of creosote bush scrub, agricultural areas, riparian corridors and backwaters, the Colorado River, and the Main Drain. The species selected for evaluation consisted of aquatic life, plants, the badger, Gambel's quail, the great horned owl, the burrowing owl, the southwestern willow flycatcher, the double-crested cormorant, the Yuma clapper rail and mule deer. Potential risks were evaluated by comparing calculated concentrations or exposures to toxicity reference values (TRVs) derived to be protective of these receptor groups. The TRVs were obtained from a variety of sources, including the USEPA, the State of Arizona, ecological databases and the published literature.

The calculated environmental concentrations and exposures to animals and birds were not only below the TRVs but also below the conservative ecological target risk level specified by USEPA Region 9 for this project (i.e., a hazard index value of 0.25). These site-specific results indicate that adverse ecological effects from exposure to stack emissions are not expected to occur for the evaluated receptors. Concentrations in surface water and sediment were found to be more than 800 times lower than the 0.25 target hazard index level. Concentrations in plants ranged from just below the 0.25 target level to more than 400 times lower than the 0.25 target level. Exposures to selected bird species were found to be at least five times lower than the 0.25 target level. Finally, exposures to the evaluated mammal species were determined to be at least 5,000 times below the 0.25 target level.

Wastewater Discharge from the Facility to the Wastewater Treatment Plant

The risk assessment also evaluated the potential incremental impact of the facility's wastewater effluent on chemical concentrations discharged from the publicly owned treatment plant into the Main Drain. The analysis also evaluated potential fish tissue concentrations and associated potential human health fish ingestion risks in the Main Drain downstream of the treatment plant's discharge point. This

evaluation focused on 19 compounds selected based on measurements obtained from the facility's effluent discharge.

This evaluation showed that the incremental contribution of the facility's effluent on the treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health. The modeled discharge concentrations were below or equivalent to the most stringent applicable state water quality standards and criteria and the treatment plant's discharge permit limits for all evaluated compounds. Semi-annual toxicity tests performed on the treatment plant's discharge since 2000 have consistently shown no toxicity to aquatic organisms. Additionally, potential risks due to ingestion of fish caught from the Main Drain associated with the incremental contribution of the SWT facility effluent were all below USEPA target risk levels for both cancer and non-cancer effects.

Evaluation of Fugitive Emissions in the Workplace

The risk assessment included an evaluation of workplace air concentrations associated with spent carbon unloading using methods consistent with those adopted by the U.S. Occupational Safety and Health Administration and the National Institute of Occupational Safety and Health. This analysis compared modeled on-site ambient air concentrations for the 23 selected compounds due to fugitive emissions, and measured industrial hygiene worker breathing zone concentrations, to workplace permissible exposure limits. The workplace evaluation indicated that modeled ambient air concentrations due to fugitive emissions during spent carbon unloading, and measured worker breathing zone concentrations, did not exceed occupational exposure limits within the property boundary.

Conclusion

In conclusion, the risk assessment demonstrates that, using conservative assumptions:

- the potential risks associated with air emissions from the Siemens Water Technologies Corp. carbon reactivation furnace and from spent carbon unloading are below regulatory and other target risk levels for both human health and ecological receptors;

- the incremental contribution of the facility effluent on the CRSSJV wastewater treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health; and

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