This document has been reviewed for OPSEC, and no OPSEC sensitive information was found.

DRAFT MULTIPLE PATHWAY

HEALTH RISK ASSESSMENT REPORT

FOR

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT (PCAPP) PROJECT

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EXECUTIVE SUMMARY

This Multiple Pathway Health Risk Assessment (MPHRA) is a screening-level approach to evaluate the health risks associated with operations at the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) facility and was performed to support the Colorado Department of Public Health and Environment (CDPHE) hazardous waste permitting process and pursuant to Pueblo County Hazardous Waste Incinerator or Processor Site Certificate of Designation Regulations for the PCAPP. Implementation of this MPHRA was conducted in accordance with a CDPHE approved protocol that was developed specifically for PCAPP. The objectives of the MPHRA were to (1) evaluate how chemicals reasonably expected to be present in PCAPP air emissions can be transported through the environment and into the food chain, (2) assess how different people (human receptors) can directly or indirectly come into contact with these substances (exposure pathways), and (3) calculate the cumulative risks (carcinogenic effects) and hazards (noncarcinogenic effects) for each exposure scenario. The results of the MPHRA demonstrate that operations at PCAPP meet all acceptable risk thresholds defined by CDPHE. A summary of the MPHRA results are as follows:

- A total of 62 chemicals of potential concern (COPCs) were identified from literature, available data from sources similar to the PCAPP, and/or from bench-scale evaluations of the processes expected to be used at the PCAPP. Of the 62 COPCs; 19 have carcinogenic toxicity factors, 38 have chronic noncarcinogenic toxicity factors, and 46 have acute toxicity factors.

- The worst-case lifetime cancer risk to any receptor is 28 times lower than the CDPHE acceptable risk level of 1 in a million (i.e., 1.0 E-06). The subsistence farmer and fisher represent the receptors with the greatest lifetime risk.

- For noncarcinogenic effects, the worse-case combined Hazard Index (HI) is 62 times lower than the CDPHE acceptable level of 0.25. Following a pattern similar to the carcinogenic effects, the human receptor with the highest total HI for all combined pathways was determined to be the farmer.

- The total acute HI (i.e., the hazards associated with short-term emission release events for each COPC that has both a quantified short-term emission rate and an available acute toxicity value) is 37 times lower than the CDPHE acceptable level of 1.0.

- An analysis was performed on 24 sources of uncertainty that presented probable ranges (i.e., minimum and maximum) for the risk and hazard. The application of this uncertainty assessment demonstrates that operations at PCAPP, when all assumptions are incorporated at the most conservative levels, are still well within the acceptable cancer risk and HI levels.

The methodology employed in conducting this MPHRA was based on CDPHE and United States Environmental Protection Agency (USEPA) guidance and generally follows the fundamental process adapted by USEPA from well-established chemical risk assessment principles and procedures. For this screening-level MPHRA, emissions from the proposed PCAPP operations were characterized, air concentrations and deposition rates resulting from PCAPP emissions were modeled, and the proper exposure scenarios were selected for evaluation in order to obtain a conservative (worst-case) estimate of the potential risk. This was necessary to determine whether a more detailed site-specific assessment was warranted. This screening-level MPHRA, which combines conservative exposure assumptions with maximum

media concentrations, results in an estimate of risk that exceeds possible risk that any individual would actually experience. The following is a summary of the method used to perform this MPHRA.

- An estimated emission rate was determined for each COPC for which data were available to base the estimate. Emission rates were estimated based on the maximum design emission rate for each PCAPP emission unit.

- An air pollutant dispersion model (AERMOD) was then used to quantify atmospheric concentrations and deposition rates of the emitted COPCs in the areas in and around the facility. Impacts to on-site and off-site locations were used to evaluate exposure to human receptors under different exposure scenarios. As a very conservative approach, the maximum total COPC-specific air concentrations and deposition rates were used to calculate exposure, even though they vary by location for each COPC.

- A conceptual site model was developed to identify the various pathways by which human receptors would be potentially exposed to the emitted COPCs. This included evaluation of chronic (long-term) exposure to off-site receptors (residents, subsistence farmers, subsistence fishers) and acute (short-term) exposure to on-site receptors (PCD workers). The COPC concentrations in the various exposure media (e.g., air, soil, water, food) were then calculated to quantify exposure to each COPC for the identified human receptor under each exposure pathway.

- Direct exposure to COPCs via inhalation was evaluated for all of the off-site receptors for the 5 years of PCAPP operation. Indirect exposure as a result of continued exposure to contaminated soil, surface water, and food was evaluated for the off-site receptors for durations up to 40 years. Acute exposure to an on-site PCD worker was evaluated under the assumption that the worker is located at the point of maximum calculated on-site impacts over the entire acute exposure event.

- The toxicity assessment weighs the available evidence regarding the potential for particular chemicals to cause adverse effects (both carcinogenic and noncarcinogenic) in an exposed individual. Toxicity values were selected for each COPC using the hierarchal approaches recommended by USEPA.

As stated above, PCAPP emissions have been demonstrated to produce exposures that are below all CDPHE specified risk threshold values. This screening-level MPHRA employs very conservative assumptions and represents a worst-case estimate of potential impacts. As the screening-level results are acceptable, no further refinement of the conservative screening assumptions is deemed necessary. Upon acceptance of this MPHRA, and in concert with its review and acceptance of the engineering design aspects of the PCAPP, CDPHE will issue the Stage III, Class 3, RCRA Research, Development and Demonstration (RD&D) permit modification request approval. During pilot-scale operations the PCAPP will monitor actual emissions to corroborate the MPHRA conclusions.