COLORADO
Department of Public
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

April 18, 2016

Colonel Thomas Duncan II
Commander, Pueblo Chemical Depot
45825 Highway 96 East
Building 1
Pueblo, CO 81006

Gregory Mohrman, PCAPP Site Project Manager
Assembled Chemical Weapons Alternative Program (ACWA)
45825 Highway 96 East
Process Support Building (PSB)
Pueblo, CO 81006

Rick Holmes, Project Manager
45825 Highway 96 East
Process Support Building (PSB)
Pueblo, CO 81006

RE: Approval of Draft Mulit-Pathway Health Risk Assessment Report for Pueblo Chemical Agent-Destruction Pilot Plant Facility and Explosive Destruction System

Gentlemen:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the "Division") has reviewed a revised copy of the draft Multi-Pathway Health Risk Assessment (MPHRA) Report for the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Facility and Explosive Destruction System (EDS) recently provided on March 22, 2016. The draft MPHRA Report was revised to address Division comments and changes to the previous draft report based on discussions with your staff over the last several months.

The draft MPHRA Report identifies the anticipated types and potential quantities of hazardous waste constituents that may be emitted from PCAPP and the EDS during treatment operations and an estimate of the potential risk to human health that may be associated with their release. PCAPP emissions estimates for hazardous waste constituents were based on the design of the facility and the type and concentrations of hazardous waste constituents that may be present in the waste munitions as well as those that may be generated during treatment of the mustard agent. Dispersion of these potential chemicals from PCAPP and the EDS were estimated using air modeling programs and toxicological risk for both direct and indirect pathways were evaluated using standard screening level inputs and default parameters published by the U.S. Environmental Protection Agency. The estimated risk for PCAPP and the EDS considered both the short term acute and long-term cumulative health effects that may be associated with human exposure to the potential constituent emissions under a variety of exposure scenarios.

The revised draft MPHRA Report indicates that the estimated potential risk to human health associated with anticipated chemical emissions from PCAPP and the EDS will not exceed the acceptable carcinogenic risk level of one in one million or the acceptable non-carcinogenic hazard index of .25. The report also identifies the uncertainty in the risk assessment estimate and indicates that PCAPP and EDS emissions would not exceed acceptable levels of risk when some of the major uncertainties associated with the estimated risk are considered.

In general, the revised draft MPHRA Report was well organized and addressed previous Division comments and concerns. The Division concurs with the estimate of potential risk for PCAPP and the EDS. We also generally agree with the uncertainty of the risk estimate as described in the revised draft report, however believe some changes to the draft report were necessary to clarify certain issues, to eliminate redundant statements or to correct inaccurate language. These changes are included as a redline-strikeout word document for your review. The Division has reached a decision to approve the MPHRA Report as final with the changes described above. A copy of the final MPHRA Report for PCAPP and the EDS is attached to this letter.

As discussed, the Division has used the MPHRA to understand the potential health impacts of estimated and modeled emissions from PCAPP and the EDS to develop conditions in the final Research, Development and Demonstration Permit. Once PCAPP operations begin, testing of the emissions from the facility will be required in accordance with the permit to verify and validate the types and quantities of hazardous waste constituents that will be emitted during hazardous waste treatment operations. PCAPP will perform a post MPHRA on the actual emissions from PCAPP and the EDS in accordance with 6 CCR 1007-3, Section 100.28(i).

We appreciate your efforts in completing the MPHRA for PCAPP and the EDS. If you have any questions concerning this matter, please contact me at (303) 692-3426.

Sincerely,

Kevin Mackey, Unit Leader
Hazardous Waste Permitting Unit
Hazardous Waste Program

Attachments: Final MPRHA Report for PCAPP and EDS
Final MPHRA Report for PCAPP and EDS (redline-strikeout)

cc: Mike Roach, U.S. Environmental Protection Agency Region VIII
David Kreutzer, Office of the Attorney General
Terrance Jackson, ACWA
Mike Saupe, Bechtel Pueblo Team
T.C. Spear, Bechtel Pueblo Team
Ken Williams, Pueblo Health Department
Joan Armstrong, Pueblo Planning and Development
Irene Kornelly, CAC Permitting Workgroup Chair

OPSEC Review Completed
1/14/2016

MULTIPLE PATHWAY HEALTH RISK ASSESSMENT REPORT

PCAPP WITH EDS

Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Project

QUALITY LEVEL: ☐ Q ☐ Non-Q ☒ NA

001	3 / 15 / 16	Incorporated CDPHE Comments	KMH/MTR	JC	NA	NA	JE
000	7 / 7 / 15	Issued for Use	KMH/MTR	JC	NA	NA	JE
REV.	**DATE**	**REASON FOR REVISION**	**BY**	**CHKD**	**EGS**	**PROJ ENGR**	**APPR**

ORIGIN		**JOB NO. 24852**	
Bechtel Pueblo Team		**SPECIFICATION No.** 24852-3RC-000-V0007	**REV** 001
		Sheet 1 of 664	

FOR OFFICIAL USE ONLY

INTENTIONALLY LEFT BLANK

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, including the Explosive Destruction System (EDS), 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 and EDS. The objectives of the MPHRA were to (1) evaluate how chemicals reasonably expected to be present in PCAPP and EDS 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 indicate that operations at PCAPP and EDS will meet all acceptable risk levels defined by CDPHE regulation. A summary of the MPHRA results are as follows:

- A total of 104 chemicals of potential concern (COPCs) were identified from literature, available data from sources similar to the PCAPP and EDS, and/or from bench-scale evaluations of the processes expected to be used at the PCAPP. Of the 104 COPCs, 31 have carcinogenic toxicity factors, 75 have chronic noncarcinogenic toxicity factors, and 89 have acute toxicity factors.

- The maximum estimated lifetime cancer risk to any human receptor is 3.8 times lower than the CDPHE acceptable risk level of 1 in a million (i.e., 1.0 E-06). The subsistence fisher represents the receptor with the highest estimated lifetime cancer risk.

- For noncarcinogenic effects, the maximum estimated combined Hazard Index (HI) to any human receptor is 8.2 times lower than the CDPHE acceptable level of 0.25. The infant subsistence farmer represents the receptor with the highest estimated noncancer hazard.

- The total acute HI for the on-site worker is 7.9 times lower than the CDPHE acceptable level of 1.0. The total acute HI for the off-site resident is 89 times lower than the CDPHE acceptable level of 1.0. The estimated acute HI represents the total hazard 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.

- An analysis was performed on major sources of uncertainty that could produce an overestimate or underestimate of cancer risks and noncancer hazards. The sources of uncertainty were evaluated both quantitatively and qualitatively and include an indication as to whether the uncertainty source produces an overestimate, underestimate, or over- and under-estimate of risk. Although some uncertainty exists that cannot be quantified in this MPHRA, the estimated risks and hazards are all well below the CDPHE acceptable 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 and EDS operations were characterized, air concentrations and deposition rates resulting from PCAPP and EDS emissions were modeled, and the proper exposure scenarios were selected for evaluation in order to obtain a conservative exposure estimate (i.e., reasonable maximum exposure [RME]) and the associated potential risk and hazard. This was necessary to determine whether a more detailed site-specific assessment was warranted. This screening-level MPHRA applies conservative exposure assumptions with annual average media concentrations at the maximum exposure location to produce RME estimates of risk and hazard. 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 and modeled data and emission test data for EDS.

- 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 conservative approach, the maximum total COPC-specific air concentrations and deposition rates were used to calculate the combined maximum exposure location, even though the locations of maximum concentrations and depositions rates differ 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, 1 year or greater) exposure to off-site receptors (residents, subsistence farmers, subsistence fishers) and acute (short-term, 1 hour or less) exposures to an on-site receptor (PCD worker) and an off-site receptor (resident). For chronic exposures, the average annual 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-year operating period. Indirect exposure as a result of continued exposure to contaminated soil, surface water, and food was evaluated for the off-site receptors for lifetime exposure durations of up to 40 years. Acute exposures of an on-site PCD worker and of an off-site resident were evaluated under the assumption that the worker and resident are located at the point of maximum 1-hour average calculated on-site and off-site (fence line) impacts, respectively, over the entire 1-hour acute exposure duration.

- The toxicity assessment weighed 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 hierarchical approaches recommended by USEPA.

As stated above, PCAPP and EDS emissions have been assessed to produce estimated exposures that are below all CDPHE-specified acceptable risk levels. This screening-level MPHRA employs conservative assumptions on parameters such as emission rates, consumption rates of contaminated foodstuff, exposure locations, and other exposure parameters. Therefore, the MPHRA results represent reasonable maximum exposure estimates of potential impacts. Because the screening-level results presented herein are acceptable, no further refinement of the conservative screening-level assumptions is deemed necessary for the current inputs and assumptions. The MPHRA will be updated and rerun using the test results obtained during pilot-scale operations.

INTENTIONALLY LEFT BLANK