UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

REGION III

STATEMENT OF BASIS

OCCIDENTAL CHEMICAL CORPORATION
BELLE, WEST VIRGINIA

EPA ID NO. WVD 005010277

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I. Introduction

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for the Occidental Chemical Corporation (OxyChem) Facility located in Belle, West Virginia (Facility or Site). EPA's proposed remedy for the Facility consists of establishment of a Technical Impracticability Boundary for groundwater, groundwater monitoring, engineering controls consisting of capping and a barrier wall, and institutional controls to implement land and groundwater use restrictions.

The Facility is subject to EPA's Corrective Action program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901, et seq. The Corrective Action program requires that facilities subject to certain provisions of RCRA investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that have occurred at or from their properties.

EPA is providing a thirty (30) day public comment period on this SB. EPA may modify its proposed remedy based on comments received during this period. EPA will announce its selection of a final remedy for the Facility in a Final Decision and Response to Comments (Final Decision) after the public comment period has ended.

EPA will make a decision after considering all comments received during the comment period, consistent with applicable RCRA requirements and regulations. If the decision is substantially unchanged from the one proposed, EPA will issue a final decision and inform all persons who submitted written comments or requested notice of EPA's final determination. If the final decision is significantly different from the one proposed, EPA will issue a public notice explaining the new decision and will reopen the comment period. In the Response to Comments section attached to the Final Decision, EPA will respond in writing to each comment received.

Information on the Corrective Action program as well as a fact sheet for the Facility can be found by navigating http://www.epa.gov/reg3wcmd/correctiveaction.htm.

II. Facility Background

A. Site History

The Facility is located at 301 Dupont Avenue, Belle, West Virginia, on approximately 23.5 acres. It is situated in the floodplain of the Kanawha River, northwest of the town of Belle in Kanawha County, West Virginia. The Facility location is depicted on Figure 1. The Facility is bordered to the west by the DuPont Belle Plant, to the east by Reynolds Branch, to the north by old US Route No. 60 and to the south by the Kanawha River.

Industrial operations have occurred at the Facility since the 1920s. At least twelve industrial companies have occupied separate portions of the Facility property at various times, including such operations as: steel production, crude tar refining, pipe cleaning, concrete product manufacturing, catalyst manufacturing, and the production and storage of various chemicals. From the 1940s until plant operations ceased in 1994, the western portion of the Facility was used for chloromethane production and the manufacture of various chlorinated compounds. One industrial establishment, Givauden-Virginia, Inc., leased the central portion of the Facility. From

January 1935 until 1948, Givauden-Virginia, Inc. produced aluminum chloride by reacting molten aluminum with chlorine; additionally a pilot plant produced benzyl chloride at the Facility by reacting toluene with chlorine. Operations ceased in 1948 when an explosion reportedly demolished most of the Givauden-Virginia, Inc. plant. The Facility was subsequently sold to Union Concrete in 1952. Ownership of the various properties was consolidated by Diamond Shamrock in 1953.

The former structures, with the exception of a former stormwater treatment plant control room, have been dismantled and razed. A small, prefabricated building (Injection Building) erected in 2003 to house the mixing and injection equipment for the In-Situ Enhanced Reductive Dechlorination (ERD) Interim Measure (IM) of the Production Source Area (PSA) was moved next to the control room in 2006 (Figure 2). The Storm Water Treatment Plant was decommissioned, dismantled, and razed in 2007 with the approval of the West Virginia Department of Environmental Protection (WVDEP) and EPA (Letter from Deborah Goldman, EPA, to George Luxbacher, Glenn Springs Holding, October 18, 2006).

As a result of past operations at the Facility, groundwater at the Facility is contaminated with volatile organic compounds (VOCs), principally chloroform, methylene chloride, carbon tetrachloride, and trichloroethene, at concentrations exceeding maximum contaminant levels (MCLs) codified at 40 C.F.R. Part 141 and promulgated pursuant to the Safe Drinking Water Act, 42 U.S.C. §300f, et seq.

B. Site Geology and Hydrogeology

The Facility's stratigraphy consists of unconsolidated overburden soils overlying sandstone bedrock. Three unconsolidated overburden units and two bedrock units have been identified at the Facility, as follows:

- The uppermost soil unit, hereafter called Unit 1, consists of a heterogeneous mixture of surficial fill and reworked native soils. Fill material includes limestone gravel, concrete, black fly ash, some sandstone fragments, and minor amounts of reddish, weathered shale. The thickness varies across the site, ranging from zero to approximately 27 feet below ground surface (ft-bgs). Generally, Unit 1 exhibits low permeability due to the high percentage of silt and clay mixed with the fill materials. Unit 1 is unsaturated.

- Unit 2 is a very low permeability deposit (silty clay to clay) that is part of the Pleistocene-age Kanawha River Terrace deposits and is primarily comprised of silty clay. Unit 2 is located beneath Unit 1 and acts as a confining layer for Unit 3, described immediately below. The Unit 2/Unit 3 contact, which is gradational, is present between 23 and 42 ft-bgs. The majority of groundwater flow in Unit 2 is downward towards Unit 3 with an estimated downward groundwater velocity of 0.003 feet per day.

- Unit 3, also part of the Pleistocene-age Kanawha River Terrace deposits, consists of sand and gravel, which extend to the top of the underlying bedrock that begins at approximately 50 to 55 ft-bgs. The thickness of Unit 3 varies but is typically 15 feet thick, except along the Kanawha River, where Unit 3 is approximately 20-feet thick. Groundwater flow in Unit 3 is towards the Kanawha River.

- Bedrock immediately below Unit 3 is a War Eagle Sandstone, a massively bedded sandstone unit of the Kanawha Formation that is the uppermost bedrock unit underlying the Kanawha River terrace deposits. The War Eagle Sandstone unit is a fine- to coarse-grained, micaceous sandstone that fines upward through its entire thickness.

III. Summary of Environmental History

OxyChem entered into an Administrative Order on Consent (Order) with EPA in October 1992. The Order required the completion of a RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) for the Facility. The RFI Phase I and Phase II reports were submitted to the EPA in 1998 and 2001, respectively, and were approved by EPA in a letter dated February 10, 2004. The RFI identified two source areas – the PSA, located in the central portion of the Facility, and Area 7, located in the southeast corner near the Kanawha River. In April 2009, a CMS for Area 7 and selected Facility wide issues (2009 CMS) was submitted; it was approved by EPA on June 4, 2009.

A comprehensive Facility-wide CMS, including a Technical Impracticability Determination addressing groundwater remediation standards, was submitted to EPA for review on December 12, 2012. An Addendum to the CMS was submitted April 2, 2013, completing the December CMS submittal. The CMS was approved by EPA on July 31, 2013.

A. RCRA Facility Investigations

As a result of the Phase II RFI, two source areas were identified for the Facility: the PSA and Area 7. The PSA includes four separate areas: the former unlined surface impound (FUSI), located on the western portion of the Site; Trench D located in the western central portion of the Site; Area 3 located in the central portion of the Site; and Trench Y located in the eastern central portion of the Site. The RFI Phase I and Phase II investigated these areas and deemed them potential source areas, collectively referred to as the PSA.

Based on the Phase I and Phase II RFI's, the majority of the contaminants of concern (COCs) were found in high concentrations in stratigraphic Unit 2, bound in the tight silts and clays. Concentrations observed in Unit 2 suggest the presence of dense non-aqueous phase liquid (DNAPL). DNAPLs are liquid substances that are more dense than water and that have a tendency to sink to the bottom of groundwater aquifers. Unit 3 is impacted because of the downward migration of COCs from Unit 2. The RFI identified several COCs, including chloroform, methylene chloride, carbon tetrachloride, and trichloroethene, which are related to the former chloromethane manufacturing processes within the PSA. During recent sampling events (2008 to 2012), the COCs observed in Unit 3 have consisted mostly of methylene chloride and chloroform, with additional elevated detections of carbon tetrachloride, 1,1-dichlorethene, 1,2-dichloroethane, vinyl chloride, and trichloroethene.

As reported in the 2009 CMS, the COCs in Area 7 are primarily chlorinated VOCs (CVOCs) and coal tar constituents and include chloromethanes, benzene and polynuclear aromatic hydrocarbons (PAHs). During the recent sampling events (2008 to 2012), the CVOCs observed in Unit 3 consist mostly of methylene chloride and chloroform, with additional elevated detections of naphthalene, trichloroethene, and 1,2-dichloroethene.

Part of the Phase I RFI was the completion of the Human Health Risk Assessment (HHRA) and the Ecological Risk Assessments (ERA). Two documents were submitted addressing the ecological risk assessment:

- *RCRA Facility Investigation Phase I Addendum 2 Report* (as it relates to the Phase I Ecological Risk Assessment), Revised 1 July 1998; and
- *Phase II Ecological Risk Assessment*, 5 October 2000.

In addition the human health risk assessment was presented in three documents:

- *Human Health Risk Assessment for Surface Water and Sediment*, 10 July 2001 – Revised 8 August 2002;
- *Human Health Risk Assessment Supplemental, Inhalation of Volatile and Particulate Emissions Evaluation,* 4 January 2003; and
- *Human Health Risk for Soil and Ground Water,* 29 May 2003.

The Phase I ERA concluded that terrestrial species were not at significant risk and no further terrestrial assessment was recommended. The results of surface water sampling conducted in 1999 for the Phase II ERA did not identify any impacts associated with the Facility. Additionally, the results of the benthic macroinvertebrate and fish surveys in the Kanawha River were inconclusive regarding potential Facility-related impacts to the River.

Based on the conclusions of the HHRA for surface water, sediment, vapor inhalation, soil and groundwater, hazards and risks associated with anticipated routine exposures that may occur do not pose a risk to humans who may live nearby or work at the Facility. It is noted there are no current or future direct exposures anticipated with groundwater at the Facility. Only a few of the anticipated scenarios, specifically exposures incurred through construction activities or exposures that could occur should the Facility be used for future residences, resulted in hazards/risks above EPA's noncarcinogenic target benchmark of 1.0 or above the acceptable cancer risk range of 1×10^{-6} to 1×10^{-4} for the direct contact pathway. The Facility-wide re-grading and clean fill cover, completed in 2007, addressed the potential direct contact exposures identified by the HHRA.

B. Interim Measures – Enhanced Reductive Dechlorination

In December 2003, to address impacts in the PSA, Enhanced Reductive Dechlorination (ERD) via molasses injections was implemented as an interim measure (IM) under an EPA-approved workplan.

The ERD IM was initiated in December 2003 via manual injections as a means to degrade COC contamination in the PSA. ERD is a bioremediation technique that employs carbohydrate solution (e.g., food-grade molasses) that is injected into the groundwater. The injected molasses provides excess organic carbon, which then initiates a succession of biological events in the subsurface that enhance reductive dechlorination of the COCs present.

From 2003 to 2009, in accordance with the EPA-approved In-situ ERD IM Work Plan, (July 2003) and the Progress Report 1 (July 2005), Glenn Springs Holdings, Inc. (GSH), a

wholly-owned subsidiary of Oxychem, completed the application of molasses in the PSA. Additionally, hydraulic fracturing of Unit 2 was performed in an attempt to enhance delivery of molasses. In June 2009, the ERD system was taken offline to evaluate its effectiveness.

An updated progress report was submitted to EPA (Langan Engineering 2009) presenting performance sampling data for all sampling events conducted up to September 2008. The progress report concluded that ERD was not effective in remediating the source of dense non-aqueous phase liquids (DNAPL) in Unit 2 due to the limitations of high COC concentrations and low permeability. No significant reductions in COCs were observed at any of the Unit 2 monitoring wells. While ERD was effective in reducing COCs, the frequency and concentrations of the ERD injections were overloading the natural system with methylene chloride.

C. Area 7 Barrier Wall Interim Measure

In 2005, GSH submitted a workplan to complete the installation of a sheet-pile Barrier Wall as an interim measure (IM) for Area 7. The workplan was approved by EPA and the Barrier Wall was installed in late 2005. The Barrier Wall consists of 1,218 feet of steel sheets driven into bedrock approximately 50-feet below grade; it enclosed 1.62 acres. The extent of the Barrier Wall is shown on Figure 2. The sheet pile interlocks and bedrock interface were grouted with a cement grout tested for its compatibility with Area 7 CVOCs. This IM was recommended as the final remedy for Area 7 in the 2009 *CMS* and *CMI Workplan* (Langan 2009). The 2009 *CMS* and *CMI Workplan* were approved by EPA on May 1, 2009.

GSH completed construction activities detailed in the CMI Workplan, which included the installation of 96 Unit 1 TreeWells®[1] and 23 Unit 3 TreeWells® in Area 7. As part of a performance monitoring system, 23 Unit 3 piezometers were installed to function as groundwater elevation measuring points. After completion of the barrier wall around Area 7, a 9-mil geotextile material was laid over the surface and keyed into the soil immediately outside the sheet pile wall and anchored with sand bags. The 9-mil material was subsequently replaced with a 12-mil geotextile material in October 2008. The completion of the soil cap is scheduled to occur in 2013 and consists of removal, disposal and replacement of the existing synthetic cover, the even spreading of clean soil to a twelve-inch minimum thickness, reseeding, and a final confirmation survey.

After the installation of the Area 7 Barrier Wall, a short term pumping test was completed in March 2006. During this test a Unit 3 groundwater well (MW-34) inside the wall was pumped at approximately 4.5 gpm for 2 hours and drawdown in Unit 2 and Unit 3 was monitored. After two hours of pumping, the groundwater elevations at two monitoring Unit 3 locations (MW-17 and MW-18) dropped almost 2-feet; however, drawdown was also observed in MW-33, a Unit 3 well located outside the wall, suggesting a hydraulic connection between the areas inside and outside of the barrier wall.

[1] Willow trees were installed inside a large-diameter plastic casing where the tree roots come into contact with groundwater thereby utilizing the ability of trees to uptake groundwater through natural processes. A higher hydraulic head in the deeper aquifer forces groundwater up through a piezometer into the sealed off casing around the tree roots.

D. Site-wide Regrading

In the fall of 2006, with EPA approval, the Facility, with the exception of Area 7, was re-graded with at least six inches of clean fill. GSH submitted the Sitewide Re-Grading Workplan (as part of the Area 7 Barrier Wall IM Workplan), detailing the placement of at least six inches of clean fill across the Facility in order to eliminate both the direct contact exposure pathway and the need to collect and treat storm water. Facility re-grading activities were completed in 2007; Facility re-grading elevations are shown on Figure 2. As presented in the Corrective Measures Implementation (CMI) Workplan, dated March 31, 2009, revised April 13, 2009, Area 7 has preliminary grading that was designed to enhance storm water run-off.

As part of Facility re-grading activities, selected wells were abandoned and others were extended so the well casings would remain above grade once the re-grading activities were completed. All earthwork was completed under a West Virginia National Pollutant Discharge Elimination System (NPDES) General Water Pollution Control Permit for storm water with all of the appropriate sediment and erosion controls. Once the Facility was re-graded, it was seeded with native vegetation in accordance with a Wildlife Habitat Council (WHC) plan to establish vegetative growth and to prevent erosion and reduce runoff.

Since 2009, the meadow has been in an almost fully established state, with some minor areas requiring re-planting due to land disturbance during well installations. The meadow includes native warm season grasses and wildflowers, which provide a habitat for grassland birds, songbirds, hummingbirds, insects, and small mammals. In the spring of 2011, GSH enhanced the meadow by planting native tree and shrub species and adding bluebird boxes to encourage the nesting of this avian species. Because of these recent efforts, the WHC issued a Wildlife at Work program certification for the Facility. The program is designed to create, conserve, and restore wildlife habitats on corporate lands. The Facility has had a WHC certification since 2009.

E. Groundwater

Groundwater quality monitoring has been performed since 1990 to support investigation activities. Groundwater monitoring was performed from 2003 to 2009 in accordance with the 2002 Voluntary Groundwater Sampling Workplan. In 2009, a revised Voluntary Groundwater Sampling Workplan was submitted and approved by EPA. Results of all groundwater monitoring are provided to EPA in progress reports submitted every two months.

Based on recently collected groundwater analytical data, the highest and most frequent detections are of chloroform and methylene chloride. Stratigraphic Unit 2 contains the highest detections; the highest chloroform detection was found in monitoring well P-10, while the highest methylene chloride detection was found in P-29 during the 2010/2011 sampling events in the PSA. These COCs are also found in Unit 3 and bedrock groundwater at lower concentrations beneath the PSA. The highest COC concentrations in Unit 3 are found beneath the PSA and inside the Area 7 barrier wall. Additionally, carbon tetrachloride and degradation daughter products (e.g. 1,1-dichloroethene, 1,1-dichloroethane, vinyl chloride, etc.) of the COCs are observed in groundwater. Also, groundwater data from the adjacent DuPont facility collected from Stratigraphic Unit 3 and shallow bedrock well sampling demonstrate that the COCs are delineated in Unit 3 and bedrock to the west. Groundwater is delineated to the east in Unit 3 by Reynold's Branch and by DW-14 in bedrock.

The detections in Unit 3 are relatively consistent throughout the historical data and depict three specific areas of contamination as follows:

- Source area: these wells are located in the PSA and inside the Area 7 barrier wall and exhibit concentrations above MCLs. Soils in Unit 2 are the true source, while impacts in Unit 3 are a result of the mass flux from Unit 2. The concentrations in the PSA above the MCLs in Unit 3 are focused in the FUSI;
- Sentinel area: these wells are located downgradient and sidegradient of the PSA, in Unit 3 and exhibit significantly reduced concentrations of COCs;
- River/Compliance area: these wells are located downgradient of the sentinel area, adjacent to the River and outside of Area 7, and have inconsistently exhibited selected COCs above MCLs.

Detections of the COCs above the MCLs were also observed in bedrock, specifically in DW-03, DW-07 and DW-10 located along the Kanawha River. Additionally, DW-05 had minor detections (ranging from 4.5 to 10.0 micrograms per liter (µg/L)) of methylene chloride above the MCL (5.0 µg/L) during the 2010/2011 sampling event and DW-14 had minor detections (ranging from 3.3 to 7.2 µg/L) of vinyl chloride above the MCL (2.0 µg/L) during the 2010/2011 sampling event. The majority of the bedrock wells outside of Area 7 area were non-detect for COCs.

F. Natural Attenuation

Natural attenuation entails a variety of physical, chemical and/or biological processes that reduce the mass, toxicity, mobility, volume or concentration of constituents of concern. These processes are classified as degradation (biological or chemical), sorption (chemical) and dispersion, diffusion, dilution, and volatilization (physical). Facility conditions were evaluated in a manner consistent with the Technical Protocol for Monitored Natural Attenuation of Chlorinated Solvents in Groundwater by Todd Weidemeier (September 1998) for the purpose of understanding the fate and transport of PSA source contaminants. As remedies were evaluated, the containment option, consistent with Human Health and Ecological Risk Assessments, was evaluated as a stand-alone remedy.

The primary constituents of concern are related to the former chloromethane manufacturing processes, which took place in the PSA. Based on groundwater analytical data collected, the highest and most frequent detections are of chloroform and methylene chloride. Stratigraphic Unit 2 has the highest detections due to its low permeability soils; the highest chloroform detection was found in monitoring well P-10 at a concentration of 130,000 parts per million (ppm), while the highest methylene chloride detection was found in monitoring well P-29 at 20,000 ppm during the 2010/2011 sampling events in the PSA. These COCs are also found in Unit 3 and bedrock groundwater at lower concentrations beneath the PSA as a result of the downward flux from Unit 2. These concentrations decrease as groundwater flows downgradient towards the Kanawha River. Additionally, degradation daughter products (e.g. 1,1-dichloroethene, 1,1-dichloroethane, trichloroethene, vinyl chloride, etc.) of the COCs are observed in groundwater downgradient of the PSA.

All contaminants show decreasing trends over time in the source area and decreasing trends over distance downgradient of Area 3 towards the River. For example, methylene

chloride concentrations in MW-10 and MW-31 source area wells were detected at concentrations of 1,300 µg/L and 280 µg/L in November 2003, prior to ERD injections, and then decreased to below the MCL in the most recent sampling events. Downgradient of the source area, concentrations are detected at several orders of magnitude lower or not detected at all. Concentrations are decreasing over time in the source area and are also decreasing over distance downgradient of Trench D. Similar to other areas within the PSA, concentrations in wells immediately downgradient of Trench D were detected at several orders of magnitude lower and concentrations in wells further downgradient were not detected.

Biological reductive dechlorination, a potential component of natural attenuation, is catalyzed by certain species of naturally occurring bacteria capable of replacing the chlorines on the chlorinated solvents. Data from field and/or microcosm studies collected at the Facility directly demonstrate the occurrence of particular natural attenuation processes and their ability to degrade the COCs. Some of the most ubiquitous strains of bacteria capable of reductive dechlorination are Dehalococcoides (DHC) and Dehalobacter (DHB). Methanogens (MGN) are another general type of microorganisms that produce methane as a metabolic byproduct in anoxic conditions and degrade the chlorinated solvents in the process. Microorganisms exhibit localized trends with elevated counts in monitoring wells sampled as part of the evaluation. Both DHC and DHB are detected at elevated concentrations in Unit 2 and Unit 3 monitoring wells. MGN counts are significant throughout the Facility in Unit 3 and bedrock wells as shown in Figure 26 of the CMS.

Biogeochemical monitoring (Langan Engineering, 2012) at the Facility constitutes strong evidence that natural degradation is occuring. Several sampling events were implemented at the Facility and included select parameters to assess the biological and chemical conditions supporting natural degradation processes. Dissolved oxygen (DO) and Oxidation-Reduction Potential (ORP) were used to evaluate the degradation potential of the Facility conditions. ORP readings measured during monitoring events in Unit 3 wells in the PSA and downgradient of the PSA indicate reducing conditions. Unit 2 and Unit 3 wells along the River exhibit ORP and DO levels indicative of aerobic conditions.

Total Organic Carbon (TOC) is used as a food source (electron donor) for the microorganisms that degrade the chlorinated solvents and generally needs to be present in concentrations greater than 20 mg/L to enable the microorganisms to proliferate sufficiently to support degradation of the contaminants. Biological Oxygen Demand (BOD) is the amount of dissolved oxygen necessary to aerobic biological organisms in a body of water in order to break down organic material present in a given water sample at a specific temperature over a specific time period, and is a general measure of bioavailability of organic carbon. TOC concentrations were observed at significantly higher concentrations than background in Unit 2 and Unit 3 wells within the PSA, but only at slightly elevated concentrations downgradient of the PSA and along the River as shown on Figure 22 of the CMS. BOD concentrations were observed at levels consistent with the TOC trends.

The electron acceptors utilized during microbial respiration will affect the extent and rates of biodegradation activity. Several chemical indicators are specific end or starting products of microbial metabolism. Their presence and/or absence, in comparison to background levels, can therefore be used to infer biodegradative processes. Indicators analyzed included sulfate/sulfide, nitrate/nitrite/Total Kjeldahl Nitrogen, and manganese, but none of these were present at concentrations significant enough to constitute evidence of their respective reductive

dechlorination process. Of all the indicators only total and dissolved iron concentrations are detected at significant concentrations. The iron concentrations are shown in Figure 23 of the CMS. In the process of iron reduction, which is the most relevant process at the Facility, iron (III)(Fe^{+3}) is reduced to iron (II) (Fe^{+2}). Therefore, elevated levels of Fe^{+2} in the groundwater may be indicative of microbial iron reduction.

During microbial respiration, carbon dioxide (CO2), carbonate (CO3), and bicarbonate (HCO3) are produced. Alkalinity is one indicator that incorporates these three byproducts of microbial process. Chloride is another indicator of biodegradation of chlorinated solvents as chlorine atoms are released when reductive dechlorination reactions are completed. Chloride and alkalinity show localized trends supporting ongoing degradation.

Elevated concentrations of CO2 and methane will also indicate microbial activity in samples, as they are byproducts of biodegradation processes. Their presence is an indication of biologically active subsurface conditions. The most relevant end gas observed in support of the occurrence of ongoing biodegradation is methane.

Direct evidence for biodegradation can also be found by looking for known metabolic byproducts of the contaminants. Metabolic acids and Volatile Fatty Acids (VFA), produced by degradation of the primary substrate, indicate microbial activity, as well as substrate distribution. Furthermore, metabolic acids can be fermented to produce hydrogen for anaerobic dechlorination. Acetate (Acetic Acid) and Formic Acid are the byproducts of the acetogenesis pathway. These degradation by-products are detected at high concentrations in Unit 3 and bedrock wells in both the PSA and downgradient of the PSA in comparison to the low concentrations measured in Unit 2 and background. Wells in the PSA exhibit high concentrations of VFAs, specifically acetic acid and formic acid.

To conclude the evaluation of potential degradation pathways, worksheets were prepared for each sample location and are included as Appendix J of the CMS. The worksheets provide details about the location and the geologic unit they are screened in (Unit 2/3 or bedrock). The worksheets also describe the geochemical conditions, microbiology and other chemistry data, providing reference ranges or threshold values where available. When favorable conditions and evidence of natural degradation are observed in individual wells, the processes that are likely taking place are pointed out. Text summaries for all wells evaluated are also included in the worksheets.

An example of the positive results of the evaluation is the Unit 2/Unit 3 well cluster situated in the FUSI area: P-29 and MW-29R. These wells illustrate an example of the degradation mechanisms occurring in the PSA. P-29 is a Unit 2 well containing some of the highest concentrations of chloromethanes (chloroform at 7,300 ppm, methylene chloride at 27,000 ppm). The conditions for natural degradation do not appear favorable as the pH is on the acidic side, chloride concentration is high, and alkalinity is zero, showing no buffering capacity. Bacterial counts are almost non-detect and evidence of degradation through dissolved end-gases of VFAs is also not detected in P-29. However, immediately beneath P-29, the Unit 3 well MW-29R exhibits both favorable biogeochemical conditions and evidence of natural degradation processes. Concentrations of chloromethanes are also orders of magnitude lower than those observed in P-29. In MW-29R, the pH is closer to neutral, which is favorable for microbiological activity and evidenced in the significantly high counts of both DHC and DHB bacteria. ORP and DO also show reducing conditions and TOC is detected at a significant

concentration. Dissolved iron is approximately 30 times the background concentrations while ORP is -108 Mv, providing evidence for iron reducing activity. Methane and VFAs (in particular, acetate) are detected significantly above background concentrations without the presence of high counts of methanogens.

Some natural attenuation is occurring at the Facility. These processes are not sufficient to meet groundwater standards that would allow unrestricted use in a reasonable timeframe, in part because of the presence of DNAPLs. Therefore, EPA is not selecting a natural attenuation remedy for this Facility. However, while EPA is proposing partial containment (barrier wall, geomembrane cap, vegetative cover) with accompanying land and groundwater use restrictions as the remedy for this Faciltiy, the investigation of the natural attenuation processes did provide evidence of the inhibition of the mobility of contaminants through natural attenuation. This further buttresses EPA's confidence in its proposed remedy and provides an added degree of assurance regarding the effectiveness of the proposed remedy.

G. Groundwater/Surface Water

Mass balance calculations were completed for groundwater to surface water discharge in the area closest to the River to evaluate potential migration or potential impacts of groundwater COCs to the Kanawha River. Although the risk assessments completed for the Facility concluded there was no elevated risk to surface water, a number of COCs were currently or historically detected at concentrations above their respective MCLs adjacent to the River. Therefore, mass balance concentrations were calculated. The mass balance fate and transport modeling equation used computes groundwater concentrations that would not result in discharges above the WVDEP Surface Water Quality Criteria (SWQS). WVDEP SWQS for the Kanawha River is the Human Health Category C Exposure Criteria which considers Water Contact Recreation Impacts, as per 47 CSR 2, Appendix E, Table 1. Freshwater Chronic Criteria from the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRTs) were used instead when WVDEP SWQS were not available.

The calculated concentrations were compared to the highest historically observed concentrations along the River and the highest observed concentrations from the semi-annual groundwater sampling events completed after the conclusion of the ERD injections along the River. None of the COCs detected exceed the calculated groundwater to surface concentrations for either historical high concentrations along the River or for the most recent concentrations along the River. As an additional degree of conservatism, the calculated values were decreased by two orders of magnitude and compared to the existing groundwater data and there were still no exceedances. Therefore, based on these fate and transport calculations, the groundwater detections in monitoring wells along the River will not result in contaminant concentrations in surface water that would exceed surface water standards.

IV. Corrective Action Objectives

EPA has identified the following Corrective Action Objectives for soils and groundwater at the Facility:

A. Soils

EPA has determined that re-grading activities have eliminated direct contact issues for human receptors and there is no risk of exposure to surficial soil. Subsurface soils are

contaminated at concentrations that exceed residential risk based standards. EPA's Corrective Action Objective for Facility soils is to control exposure to the hazardous constituents remaining in the subsurface.

B. Groundwater and Technical Impracticability

Technical impracticability (TI) for contaminated groundwater refers to a situation where achieving groundwater cleanup standards associated with final cleanup standards is not practicable from an engineering perspective. The term "engineering perspective" refers to factors such as feasibility, reliability, scale or magnitude of a project, and safety. Restoration of sitewide groundwater to MCLs has been deemed technically impracticable for the following reasons:

1) COCs are present as unrecoverable DNAPL;
2) The permeability of Unit 2, where the majority of the COC mass is located, is extremely low;
3) Currently available remedial technologies proved to be ineffective in reducing COCs to MCLs, in addition to the difficulty in delivering remedial measures to the low permeable soils in Unit 2; and
4) Removal or destruction of source mass is not feasible from an engineering perspective given the depth and scale of the DNAPL.

Therefore, EPA's Corrective Action Objectives for Facility groundwater are to control exposure to the hazardous constituents remaining in the groundwater; protect the current existing receptors (bedrock and the Kanawha River) from unacceptable concentrations from COC impacts; ensure that the dissolved groundwater plume is contained and will not migrate beyond the extent of the current groundwater plume; demonstrate mass loss over time or distance from the PSA and Area 7; and ensure that no groundwater discharge concentrations would result in surface water concentrations that are above the WVDEP surface water criteria.

V. Proposed Remedy

The proposed remedy for the Facility consists of:

1) Establishment of a TI zone for groundwater with long term monitoring;

2) Completion of the vegetative cover in Area 7, maintenance of the barrier wall, vegetative cap and Tree Wells in Area 7, as well as maintenance of the Facility-wide vegetative cover; and

3) Land and groundwater use restrictions.

The proposed remedy also includes established performance standards to ensure compliance with Corrective Action Objectives through groundwater monitoring. The performance standards for the groundwater monitoring program will be the concentrations calculated, including the two-order of magnitude safety factor, as part of the groundwater/surface water mass balance. The ultimate goal of the remedy is to ensure the overall protection of human health and the environment. EPA has determined that it is technically impracticable (TI) to attain EPA Groundwater Protection Standards throughout the groundwater plume. The

rationale for EPA's TI determination is that the free product (DNAPL) at the Facility is unrecoverable due to the hydrogeologic characteristics of the subsurface, the location of the DNAPL, and the extent of the DNAPL. Numerous remedies were attempted to remediate groundwater as documented in the CMS (2013) and presently there are no technologies proven to be economical given the current understanding of capabilities and limitations of cleanup technologies. Land and groundwater use restrictions will prevent exposure to remaining contamination for the foreseeable future.

A. Groundwater – Establishment of a TI Zone with Long Term Monitoring

Because of the constraints of unrecoverable DNAPL and the particular hydrogeological conditions at the Site and adjacent property, i.e., impermeable soils, preventing MCL attainment throughout the groundwater plume, EPA is proposing that ongoing groundwater monitoring, along with the establishment of a TI Zone is the remedy that represents the best balance of the criteria that EPA considers when selecting a remedy. This remedy will be protective of human health and the environment. In addition, ongoing natural attenuation will continue to degrade source area COCs thereby containing the plume onsite. Discharges of contamination will not cause exceedances of the WVWQS of the Kanawha River or cause an unacceptable risk in that River. The existing hydraulic control of the TreeWells® and cover/cap and the barrier wall system protects bedrock and the Kanawha River from concentrations that would cause unacceptable risk from COCs in Area 7.

Groundwater is identified within Units 1, 2, 3 and shallow bedrock throughout the Facility. The TI zone is defined as groundwater within the area depicted on Figure 3 of this SB. OxyChem will be required to submit an annual report to EPA: 1) documenting that the groundwater plume is stable or decreasing; 2) confirming the concentrations in wells along the Kanawha River do not exceed the concentrations established in the CMS that would cause unacceptable risk to that River; and 3) demonstrating that mass loss is occurring over time and distance from the PSA.

B. Completion of the Vegetative Cover in Area 7; Maintenance of the Barrier Wall, Vegetative Cap, and Tree Wells in Area 7; and Maintenance of the Facility-wide Vegetative Cover

Because contaminants remain in the subsurface soil and groundwater at the Facility above levels appropriate for residential use, EPA's proposed remedy requires the completion of a vegetative cap in Area 7. Once the Area 7 vegetative cap is complete, the proposed remedy requires maintainance of the soil cover and vegetative cap across the entire Site, maintainance of the barrier wall surrounding the subsurface contamination of Area 7, and maintainance of the Area 7 Tree Wells.

C. Land and Groundwater Use Restrictions

Because contaminants remain in the soil and groundwater at the Facility above levels appropriate for residential use, EPA's proposed remedy requires land and groundwater use restrictions to restrict activities that may result in exposure to those contaminants. EPA proposes that the restrictions be implemented and maintained through institutional controls (ICs). ICs are non-engineered instruments, such as administrative and legal controls, that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land or resource use.

EPA is proposing the following land and groundwater use restrictions be implemented through ICs at the Facility:

a) The Facility shall not be used for residential purposes;
b) Groundwater at the Facility shall not be used for any purpose, including, but not limited to, use as a potable water source, other than to conduct the maintenance and monitoring activities required by WVDEP and/or EPA;
c) All earth moving activities at the Facility, including excavation, drilling and construction activities, shall be conducted in a manner such that the activity will not pose a threat to human health and the environment or adversely affect or interfere with the final remedy (and shall require development of a Soil Management Plan that includes appropriate Personal Protective Equipment requirements sufficient to meet EPA's acceptable risk and complies with all applicable OSHA requirements). No such activities shall take place at the Facility unless EPA, in consultation with WVDEP, provides prior written approval;
d) The Facility shall not be used in a way that will adversely affect or interfere with the integrity and protectiveness of the final remedy;
e) Any Owner of the Facility property or any portion thereof shall provide EPA and WVDEP with a "Certified, True and Correct Copy" of any instrument that conveys any interest in the Facility property or any portion thereof. Any such conveyance must provide for the continuation of the ICs until EPA, in consultation with WVDEP, determines the ICs are no longer necessary;
f) Any Owner of the Facility property of any portion thereof shall allow the EPA, state, and/or their authorized agents and representatives, access to the Property to inspect and evaluate the continued effectiveness of the final remedy and, if necessary, to conduct additional remediation to ensure the protection of the public health and safety and the environment.

The land and groundwater use restrictions necessary to prevent human exposure to contaminants at the Facility will be implemented through enforceable ICs such as an order and/or an Environmental Covenant pursuant to the West Virginia Uniform Environmental Covenants Act (WV Code Chapter 20 Article 22B). If EPA determines that additional maintenance and monitoring activities, institutional controls, or other corrective actions are necessary to protect human health or the environment, EPA has the authority to require and enforce such additional corrective actions through an enforceable mechanism which may include an order or Environmental Covenant, provided any necessary public participation requirements are met. If any individual with an interest in the Facility property believes that information shows that any use restrictions proposed in this remedy and later selected by EPA is no longer necessary to protect public health and the environment, the individual may submit such information to EPA for consideration. EPA can change any such restriction if it determines it is no longer necessary, after any required public comment period.

VI. Evaluation of Proposed Remedy

This section provides a description of the criteria EPA used to evaluate the proposed remedy consistent with EPA guidance, "Corrective Action for Releases From Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule," 61 Federal

Register 19431, May 1, 1996. The criteria are applied in two phases. In the first phase, EPA evaluates three decision threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, EPA then evaluates seven balancing criteria to determine which proposed remedy alternative provides the best relative combination of attributes.

A. Threshold Criteria

1. Protect Human Health and the Environment - This criterion is met without additional remedial actions with respect to current risk except for potential current construction workers - the Facility property is vacant, there is no current potable use of groundwater, and the plume of contaminated groundwater is stable and not affecting potential receptors. The proposed remedy will continue to protect human health and the environment from exposure to contamination, including future risks. Land and groundwater use restrictions will prohibit future uses that would pose an unacceptable risk through the use of an environmental covenant or other administrative mechanism.

2. Achieve Media Cleanup Objectives - EPA's proposed remedy meets the cleanup objectives appropriate for the expected current and reasonably anticipated future land use. The proposed remedy meets the cleanup standards for current and future use of groundwater, since the proposed remedy provides that all uses of groundwater other than maintenance and monitoring acitivities are to be prohibited. No on-site receptors exist for groundwater. Groundwater is not used for potable purposes within three miles of the Facility. The proposed remedy does not meet groundwater cleanup standards that would allow for the beneficial use of groundwater at the Facility. Achieving groundwater MCLs is technically impracticable because of the geology of the area, the location of the mass of the COCs and the presence of DNAPL. The activity use restriction will eliminate future unacceptable exposures to both soil and groundwater. Therefore, concentration specific cleanup goals for groundwater were not developed since EPA is granting a TI waiver for the groundwater. Specific soil cleanup standards are not set because the partial containment remedy (barrier wall/geomembrane cap/vegetative cover) and use restrictions protect public health and the environment.

3. Control the Source of Releases - In its RCRA Corrective Action proposed remedies, EPA seeks to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Controlling the sources of contamination relates to the ability of the proposed remedy to reduce or eliminate, to the maximum extent practicable, further releases. Releases occurred during the seventy years the Facility was used for assorted manufacturing operations. Remediation of the source material has been demonstrated to be technically impracticable through the failed implementation of ERD and the evaluation of additional remedial options as part of the CMS. The Area 7 IM (barrier wall/geomembrane cap/vegetative cover) are preventing migration of COCs from Area 7. Natural attenuation processes between the PSA and the Kanawha River are preventing migration of COCs from the PSA to the Kanawha River in concentrations that would pose an unacceptable risk.

B. Balancing/Evaluation Criteria

1. Long-Term Reliability and Effectiveness - The proposed remedy of containment will

maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents remaining in soils and groundwater. The long term effectiveness is high, as ICs are readily implementable and easily maintained. The barrier wall and geomembrane cap are completed. In addition, most of the vegetative cap is already in place. Once the grading work is finished, all of these physical elements are easily maintained and highly effective in the long run

2. Reduction of Toxicity, Mobility, or Volume of Waste - Natural degradation processes will reduce the toxicity and volume of contaminants in groundwater over time, and the barrier wall in Area 7 reduces the mobility of wastes; however, this proposed remedy of containment and exposure prevention does little to reduce the source mass. OxyChem evaluated other technologies as part of the CMS, including ERD, zero valent iron permeable reactive barrier, and air sparging; none of the evaluated remedies were shown to effectively address this criterion and these additional technologies poorly addressed various other criteria in this evaluation.

3. Short-Term Effectiveness - EPA's proposed remedy does not involve any additional activities, such as construction or excavation, that would pose short-term risks to workers, residents, and the environment. The Area 7 barrier wall was completed in October 2005. The geomembrane cap was completed in 2009. Facility-wide regrading was completed in 2009. The additional grading in Area 7 can be safely and effectively achieved. The Facility is enclosed by fencing, which restricts access. Groundwater is not used for any purposes other than monitoring or maintenance. Mass flux from Unit 2 into Unit 3 appears to be in equilibrium based on groundwater monitoring results, indicative of a stable plume. Groundwater discharge to the River has been shown not to result in unacceptable risk or exceedances of the WVWQS; therefore the proposed remedy's short-term effectiveness is high.

4. Implementability - EPA's proposed remedy is readily implementable. The remedy will be implemented using existing monitoring wells. EPA proposes that the ICs be implemented through an enforceable mechanism such as an order and/or an Environmental Covenant pursuant to the West Virginia Uniform Environmental Covenants Act. Therefore, EPA does not anticipate any regulatory constraints in implementing its proposed remedy. Furthermore the proposed remedy for Area 7 has effectively been implemented and all that remains is a vegetative cap, easily completed using well-known earth-moving technology.

5. Cost - The majority of the capital costs for the proposed remedy have been incurred previously: monitoring well installation; barrier wall installation; geomembrane cap installation; Facility-wide soil cover and regrading. The additional vegetative cap installation for Area 7 is estimated to cost $335,000. Additional costs associated with cap maintenance, implementation of use restrictions, and groundwater monitoring and reporting are minimal. This proposed remedy has an estimated ten-year cost of approximately $928,000 and a present worth of $798,000. Based on EPA's best professional judgment, the proposed remedy is cost effective for the Facility.

6. Community Acceptance - OxyChem currently meets with a Community Advisory Panel to foster an open dialogue, an exchange of ideas, better understanding and cooperation with the surrounding community regarding safety, and environmental protection programs. There have been no known conflicts within the community regarding the investigation and remediation efforts. Ultimately, community acceptance of EPA's proposed remedy will be evaluated based on comments received during the public comment period and will be described in the Final

Decision and Response to Comments.

7. State/Support Agency Acceptance - WVDEP has reviewed and concurred with the proposed remedy for the Facility. Furthermore, WVDEP has provided input and been involved throughout the investigation process.

VII. Environmental Indicators

Under the Government Performance and Results Act (GPRA), EPA has set national goals to address RCRA corrective action facilities. Under GPRA, EPA evaluates two key environmental clean-up indicators for each facility: (1) Current Human Exposures Under Control and (2) Migration of Contaminated Groundwater Under Control. The Facility met these indicators on April 17, 2003, and September 30, 2005, respectively. The environmental indicators are available at http://www.epa.gov/reg3wcmd/ca/wv/webpages/wvd005010277.html.

VIII. Financial Assurance

OxyChem will be required to demonstrate and maintain financial assurance for completion of the remedy pursuant to the standards contained in Federal regulations 40 C.F.R. § 264.145 and 40 CFR § 264.143.

IX. Public Participation

Interested persons are invited to comment on EPA's proposed remedy. The public comment period will last thirty (30) calendar days from the date that notice of the start of the comment period is published in a local newspaper. Comments may be submitted by mail, fax, e-mail, or phone to Mr. Erich Weissbart at the address listed below.

A public hearing will be held upon request. Requests for a public hearing should be made to Mr. Erich Weissbart of the EPA Region III Office (215-814-3284). A hearing will not be scheduled unless one is requested.

EPA may modify the proposed remedy based on new information and/or public comments. Therefore, the public is encouraged to review the Administrative Record and to comment on the proposed remedy presented in this document.

The Administrative Record contains all the information considered by EPA for the proposed remedy at this Facility. The Administrative Record is available to the public for review and can be found at the following locations:

U.S. EPA Region III
1650 Arch Street
Philadelphia, PA 19103
Contact: Mr. Erich Weissbart (3LC20)
Phone: (215) 814-3284
Fax: (215) 814-3113
Email: weissbart.erich@epa.gov

and

West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304
Contact: Cathy Guynn
Phone: (304) 926-0499
Email: catherine.n.guynn@wv.gov

Signature: Date:

John Armstead, Director
Land and Chemicals Division
USEPA, Region III

Attachment 1	Administrative Record File Index of Documents
Figure 1	Site Location Map
Figure 2	Site Map
Figure 3	TI Area

ATTACHMENT 1

OCCIDENTAL CHEMICAL CORPORATION

BELLE, WEST VIRGINIA

STATEMENT OF BASIS
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS[2]

1. Letter from Robert Greaves, EPA, to Anthony Santavicca, Occidental Chemical Corporation, dated 25 September 1992, transmitting Administrative Order on Consent.

2. Letter from Deborah Goldblum, EPA, to George Luxbacher, Glenn Springs Holding, dated 10 February 2004, approving RFI Phase I and Phase II reports.

3. Letter from Deborah Goldblum, EPA, to George Luxbacher, Glenn Springs Holding, dated 18 October 2006, approving plan to decommission and dismantle storm water treatment plant.

4. Letter from William Geiger, EPA, to Jeffrey Kogut, Glenn Springs Holding, dated 4 June 2009, approving CMS for Area 7.

5. Letter from Erich Weissbart, EPA, to George Luxbacher, Glenn Springs Holding, dated 31 July 2013, approving Facility-wide CMS.

6. Internal Memorandum from Ruth Prince, EPA, to Erich Weissbart, EPA, dated 24 July 2013, explaining why there is no risk posed by the Site to benthic macroinvertebrates.

7. Internal Memorandum from Ruth Prince, EPA, to Erich Weissbart, EPA, dated 7 August 2013, explaining why there is no risk posed by the Site through inhalation.

8. Report: *In-Situ Enhanced Reductive Dechlorination Interim Measures Workplan*, prepared by ARCADIS, 18 July 2003.

9. Report: *Production Source Area In-Situ Enhanced Reductive Dechlorination Interim Measures - Progress Report 1*, prepared by ARCADIS, August 2005.

10. Report: *Production Source Area Enhanced Reductive Dechlorination Interim Measures - Progress Report #2*, prepared by ARCADIS, 28 September 2009.

11. Report: *RCRA Facility Investigation Phase I Addendum 2 Report*, prepared by ERM, Revised July 1, 1998.

12. Report: *Phase II Ecological Risk Assessment*, prepared by ERM, October 5, 2000.

13. Report: *RCRA Facility Investigation, Phase II Interim Data Report*, prepared by ERM, February 2, 2001.

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2 This Index of Documents for the Occidental Chemical Corporation, Belle, West Virginia, Statement of Basis hereby incorporates by reference all sampling data that underlies the data summaries contained in the documents that make up this Administrative Record. To view the sampling data, contact EPA Region III.

14. Report: *Human Health Risk Assessment for Surface Water and Sediment,* prepared by ERM, July 10, 2001, Revised August 8, 2002.

15. Report: *Human Health Risk Assessment Supplemental, Inhalation of Volatile and Particulate Emissions Evaluation*, prepared by ERM, January 4, 2003.

16. Report: *Human Health Risk for Soil and Ground Water*, prepared by ERM, May 29, 2003.

17. Report: *Area 7 Interim Remedial Measure Workplan for Area 7*, prepared by Langan, April 25, 2005, Revised May 25, 2005.

18. Report: As-*Built Documentation, Barrier Wall Construction, Area 7*, prepared by Langan, July 13, 2006.

19. Report: *Stormwater Treatment Plant Shutdown Request*, prepared by Langan, August 23, 2006.

20. Report: *Excavated Soils Management*, prepared by Langan, September 12, 2006.

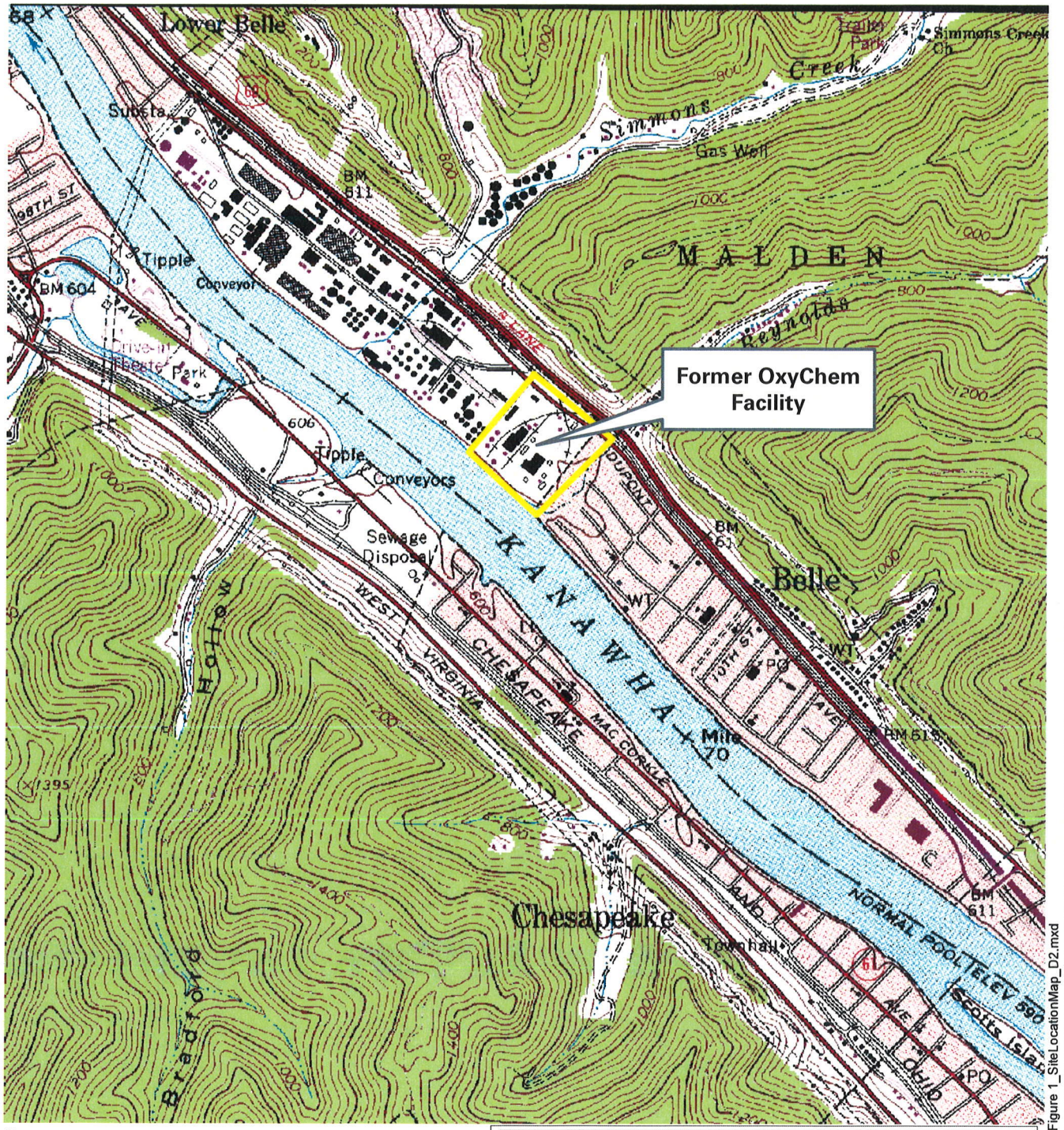
21. Report: *Corrective Measures Study*, prepared by Langan, December 17, 2008, Revised March 26, 2009, Revised April 13, 2009.

22. Report: *Corrective Measures Implementation Workplan*, prepared by Langan, March 31, 2009.

23. Report: *Corrective Measures Study, Volumes I and II*, prepared by Langan, December 11, 2012.

24. Report: *Addendum to the 2013 Corrective Measures Study*, prepared by Langan, April 2, 2013.

25. Design Summary and Cost Estimate for Area 7 Cap, prepared by Glen Springs Holding, August 12, 2013.



Note:
USGS Topographic map, Belle, WV quadrangle,
U.S. Geological Survey, 1965, photorevised 1977.

N
W E
S

Legend

Approximate Property Boundary

Figure 1 Site Location Map
Former OxyChem Facility
Belle, West Virginia

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES
30 South 17th Street Suite 1500 Philadelphia, PA 19103

0 750 1,500 Feet

SCALE:	1" = 1500'
DATE:	March 18, 2005
DRN. BY:	CJS
CKD. BY:	LG
JOB#:	2593102

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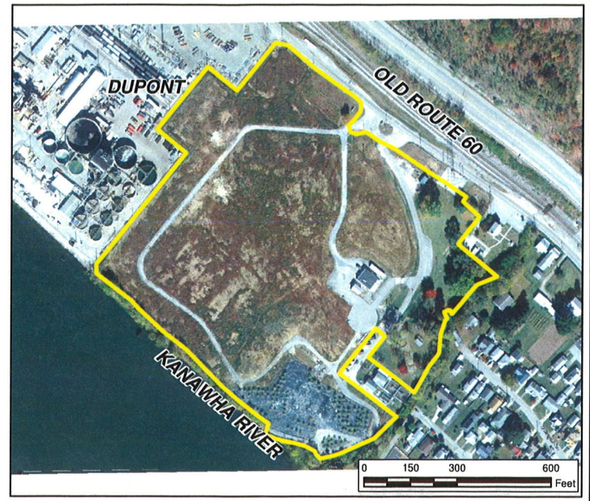


DUPONT

Old Route 60

Production Source Area

FUSI

Trench D

Area 3

Trench Y

AREA 7

Trailer

Control Room

Injection Building

2 - 18" pipes

Drainage Swale

Town of Belle Treatment Plant

OUTFALL 004 (Inactive)

OUTFALL 003 (Inactive)

KANAWHA RIVER

REYNOLDS BRANCH

LEGEND

- Unit 3 Monitoring Well
- Unit 2 Monitoring Well
- Bedrock Monitoring Well
- Unit 3 Tree Wells
- Piezometer Location
- Property Boundary
- Production Source Area
- Barrier Wall Alignment -Sheet Pile (Revised July 2005)
- 606 Topographic Contours (NAVD88)
- Infiltration Gallery
- Paved Road
- Gravel Road
- Drainiage Swale
- Abandoned Well
- DP - Unit 1 Injection Well
- FW - Unit 2 Injection Well
- IW - Unit 3 Injection Well
- OW - Unit 3 Observation Well
- NRW - NAPL Recovery Well
- SPZ - Unit 1 Piezometers
- PW - Unit 3 Pump Test Well
- Outfall

NOTES

1) CAD basemap adapted from Environmental Resources Management (ERM) (ERM12904-030405 CAD Drawing created March 16, 2005).
2) Drawing and survey elevations based on 2009 Potesta site wide survey.

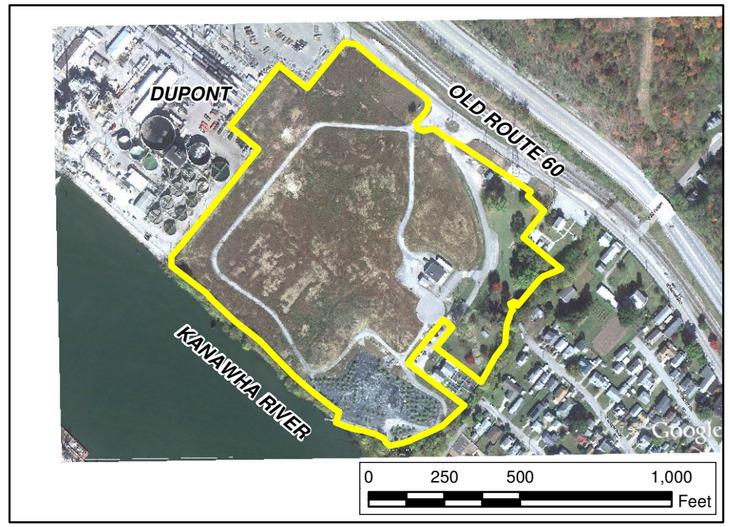
Figure 2 - Site Map
Former OxyChem Facility
Belle, West Virginia

0 50 100 200 Feet

LANGAN
30 S. 17th Street, Suite 1300
Philadelphia, PA 19103
215.864.0640 (phone)
215.864.0671 (fax)

SCALE: 1"=100'
DATE: January 3, 2012
DRN BY: MH
CKD BY: JS
JOB #: 2593102

Path: \\langan.com\data\PH\data1\2593102\ArcGIS\Mapdocuments\CMS_Jan2012\Figure 2 - Site Map_TY.mxd



LEGEND

- Unit 3 Monitoring Well
- Unit 2 Monitoring Well
- Bedrock Monitoring Well
- Piezometer Location
- Barrier Wall Alignment -Sheet Pile (Revised July 2005)
- 606 Topographic Contours (NAVD88)
- Production Source Area
- Property Boundary
- Paved Road
- Gravel Road
- Drainiage Swale
- TI Area

NOTES

1) CAD basemap adapted from Environmental Resources Management (ERM) (ERM12904-030405 CAD Drawing created March 16, 2005).
2) Drawing and survey elevations based on 2009 Potesta site wide survey.

Figure 3 - TI Area
Former OxyChem Facility
Belle, West Virginia

0 75 150 300 Feet

LANGAN ENGINEERING & ENVIRONMENTAL SERVICES
30 S. 17th Street, Suite 1300
Philadelphia, PA 19103
215.864.0640 (phone)
215.864.0671 (fax)

SCALE:	1"=150'
DATE:	July 17, 2013
DRN BY:	MH
CKD BY:	JH
JOB #:	2593102

Path: \\langan.com\data\PH\data1\2593102\ArcGIS\Mapdocuments\CMS_Jan2012\Figure 3 - TI Boundary_071713_11x17.mxd