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Revision 0

200-ZP-1 Optimization Study Plan Update

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
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200-ZP-1 Optimization Study Plan Update

Presented by: M. E. Byrnes, CH2M HILL Plateau Remediation Company (CHPRC)
Presented to: Department of Energy-Richland and Environmental Protection Agency (EPA)
Date: September 12, 2019

Meeting Agenda

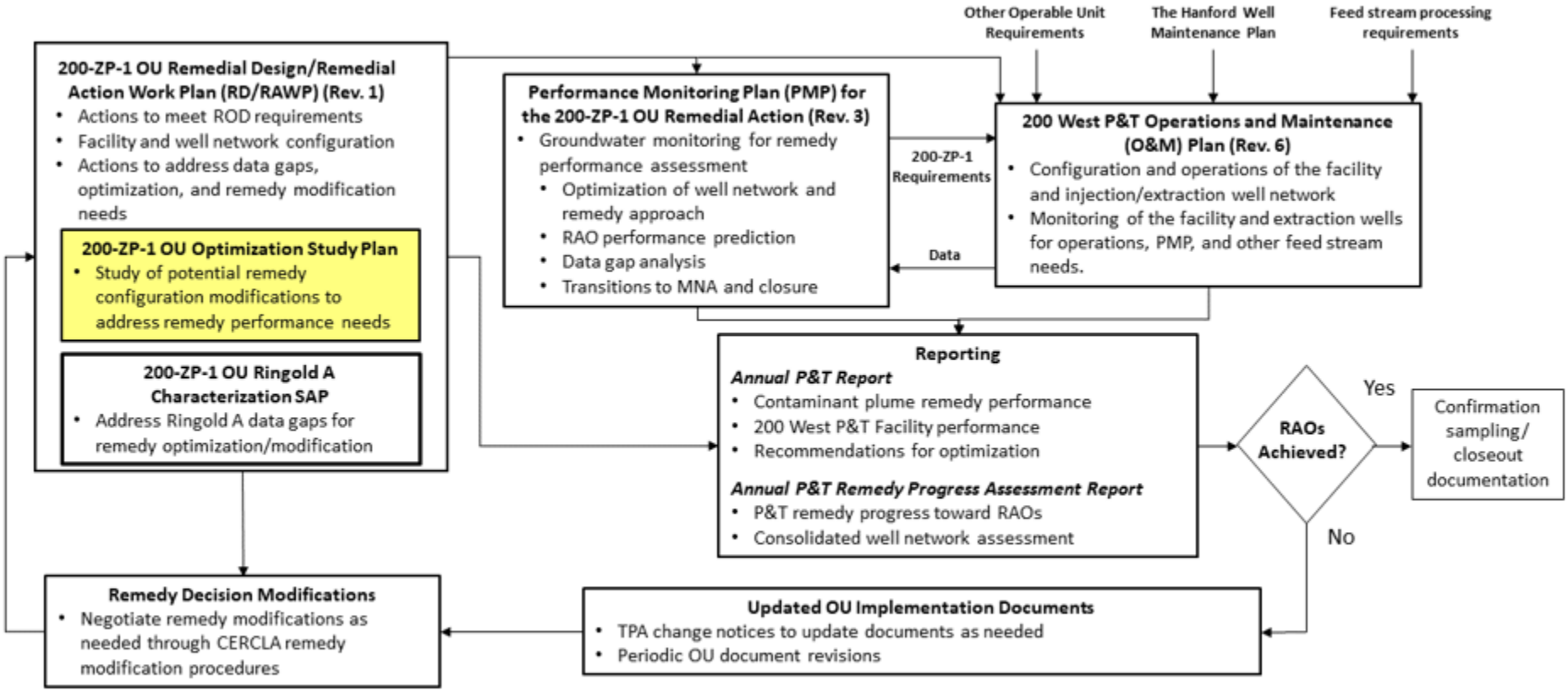
- Preparing for Optimization Study Plan
- Results from most recent groundwater modeling runs
- Optimization Study Plan schedule
- EPA questions/clarifications on Optimization Study Plan
- Remedial Design/Remedial Action Work Plan (RD/RAWP) and Performance Monitoring Plan (PMP) changes
- Path forward

Preparing For Optimization Study Plan

Near-Term Activities Being Performed	FY19	FY20	FY21	FY22
Finalize Optimization Study Plan, Rev. 0				
Finalize RD/RAWP Rev. 1				
Finalize PMP, Rev. 3				
Finalize O&M Plan, Rev. 6				
Prepare DQO/SAP Defining Optimization Sampling/Analytical Requirements				
Install 10 Additional Optimum Location Extraction Wells				

Preparing For Optimization Study Plan

- Remedy Implementation Flow Diagram

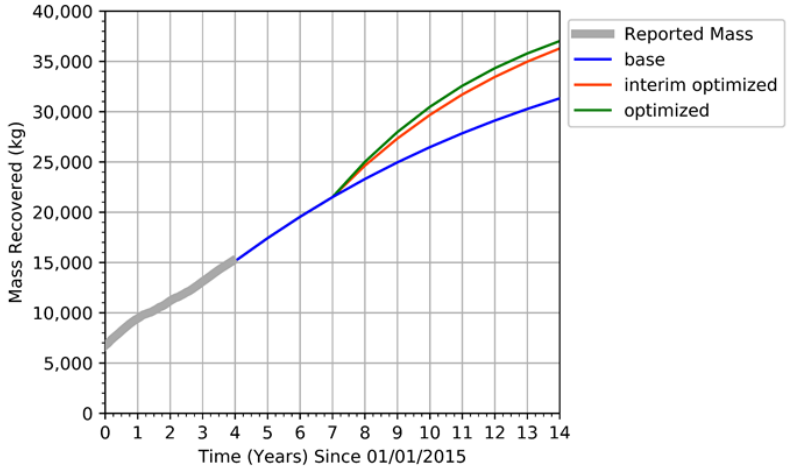


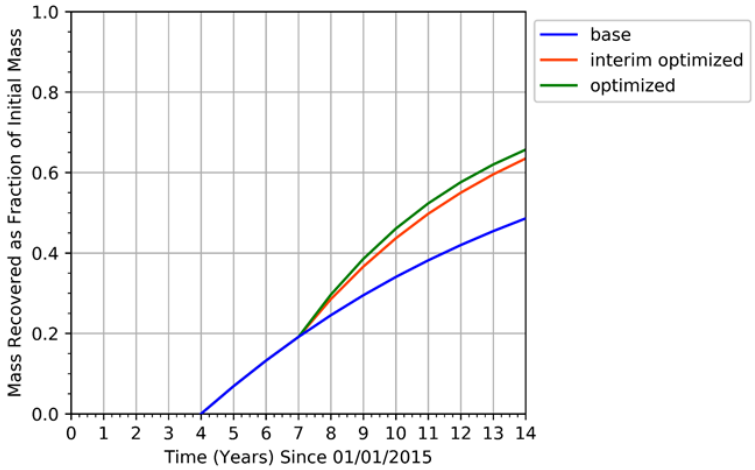
Results From Most Recent Groundwater Modeling Runs

- Optimization approach;
  - Start simulation in 2019
  - NO_3 treatment ends on 12/31/20 (current target is 10/01/19)
  - 200-ZP-1 rate increases to 3,070 gpm on 1/1/22
  - Using injectivity analysis distribute 1,100 gpm to best injection wells
  - Optimize extraction well locations through 2028 to create the most change possible for the analysis (targets higher concentration areas)
  - Also conducted a simulation with FY19 average rates with NO_3 treatment ending on 12/31/20 as basis for comparison
- Analysis Tools
  - CCl_4 and NO_3 plume maps
  - CCl_4 and NO_3 plume difference maps

Results From Most Recent Groundwater Modeling Runs

CCl_4 Mass Recovery



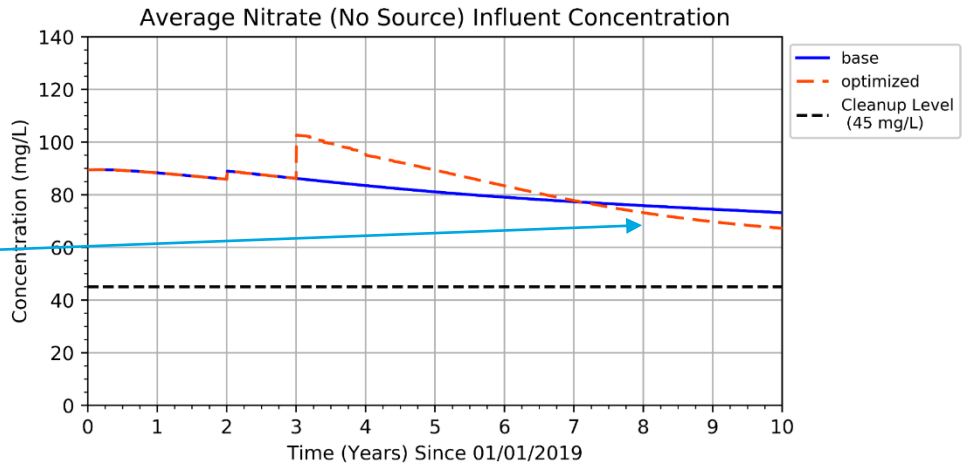


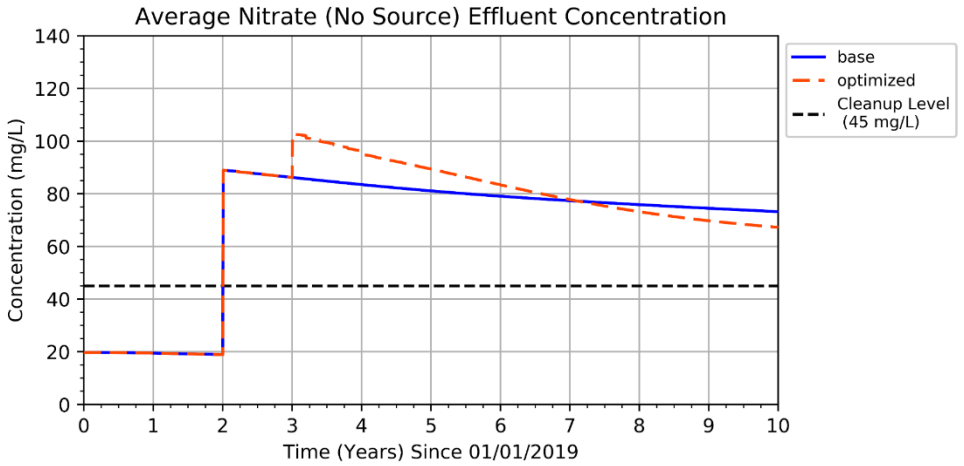
- The first year of increased rate produces strong additional mass recovery
  - Accesses new parts of the plume
- Optimized extraction removes about 4,000 kg (15%) more CCl_4 in the first 3 years of operation

Results From Most Recent Groundwater Modeling Runs

Simulated nitrate plant influent and effluent concentrations

- Optimized wellfield redistributes NO_3 mass faster than base operation

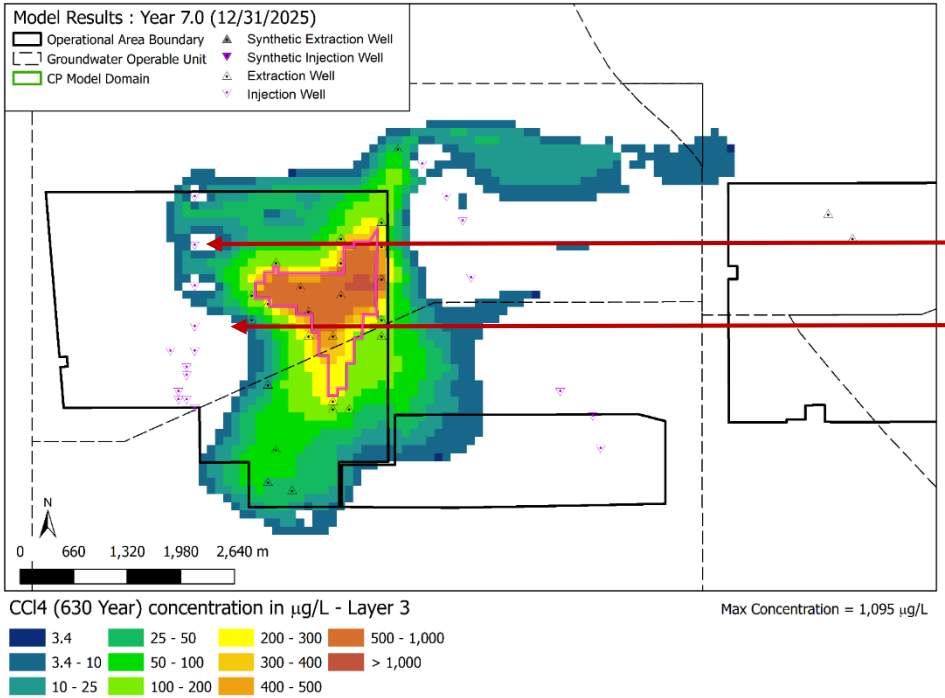




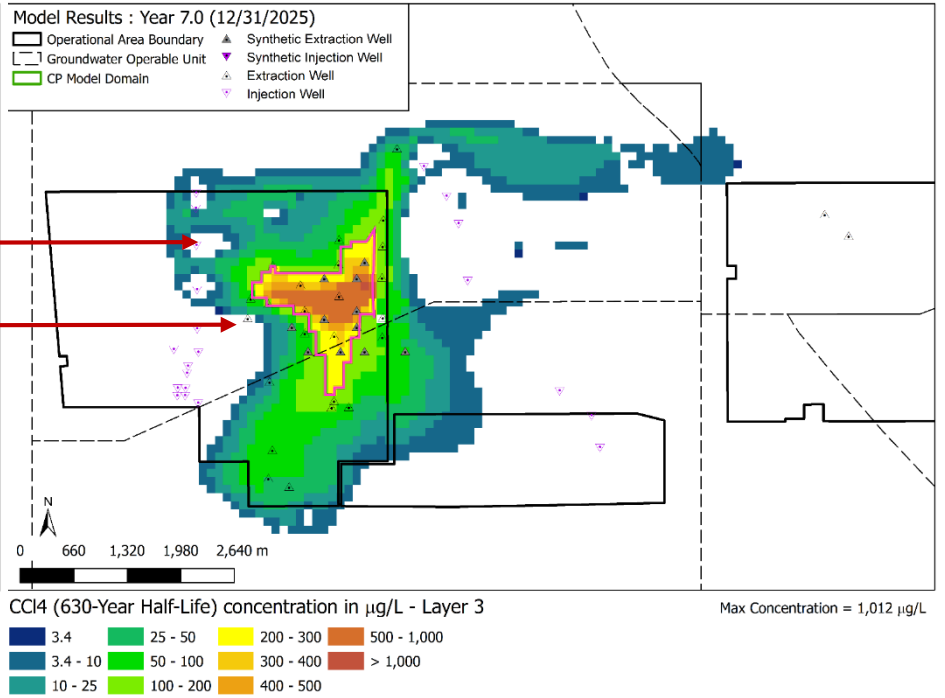
Results From Most Recent Groundwater Modeling Runs

Water table CCl_4 plume maps after 3 years of pumping at 3,070 gpm

Base



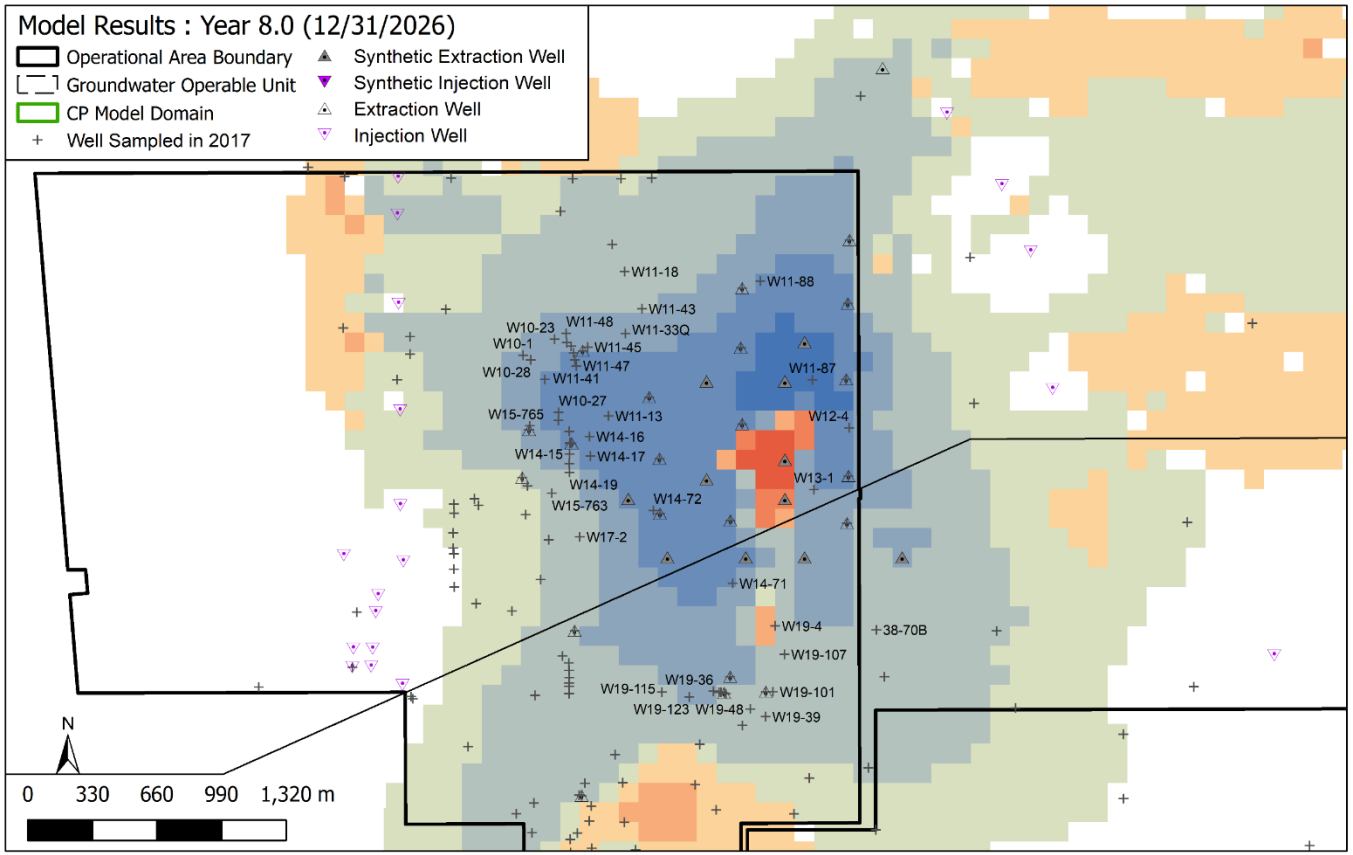
Optimized



- Optimized case has smaller >200 µg/L plume area as shown by pink polygon which represents optimized plume
- Higher flow rate can also be seen in more area below MCL (white space)

Results From Most Recent Groundwater Modeling Runs

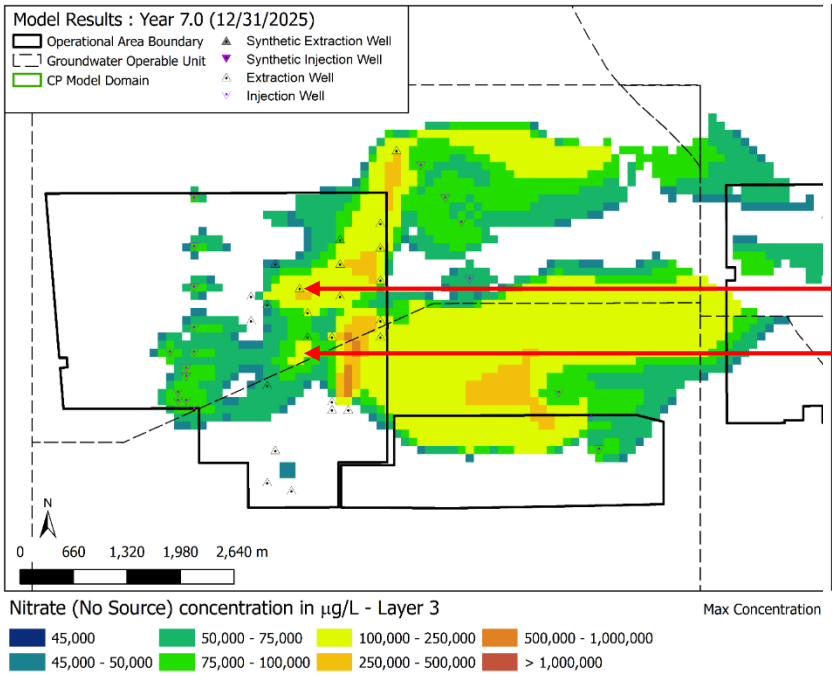
CCl_4 plume difference maps



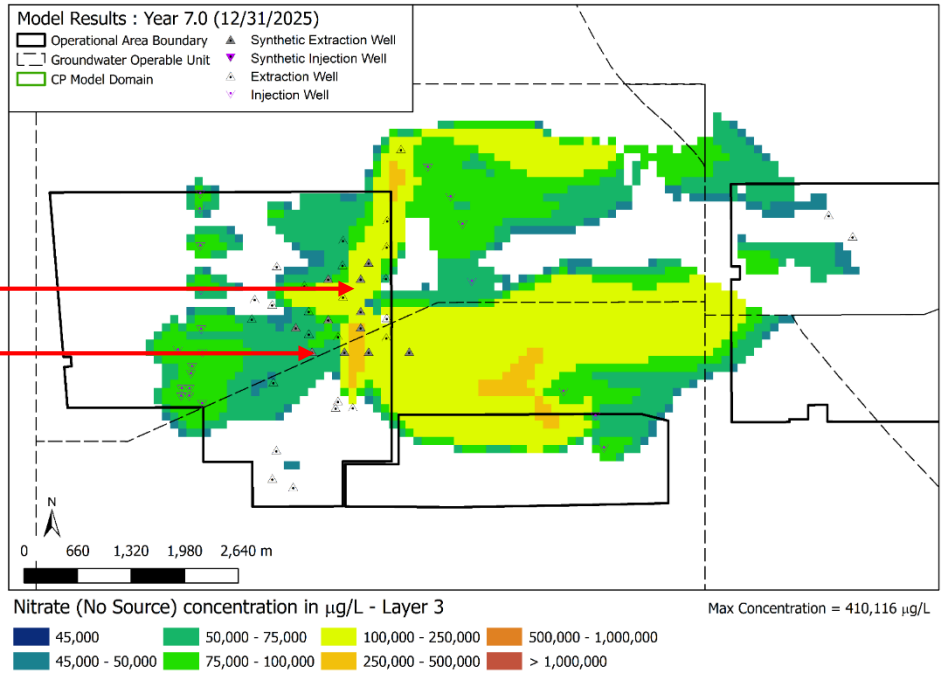
Results From Most Recent Groundwater Modeling Runs

Water table NO_3 plume maps after 3 years of pumping at 3,070 gpm

Base



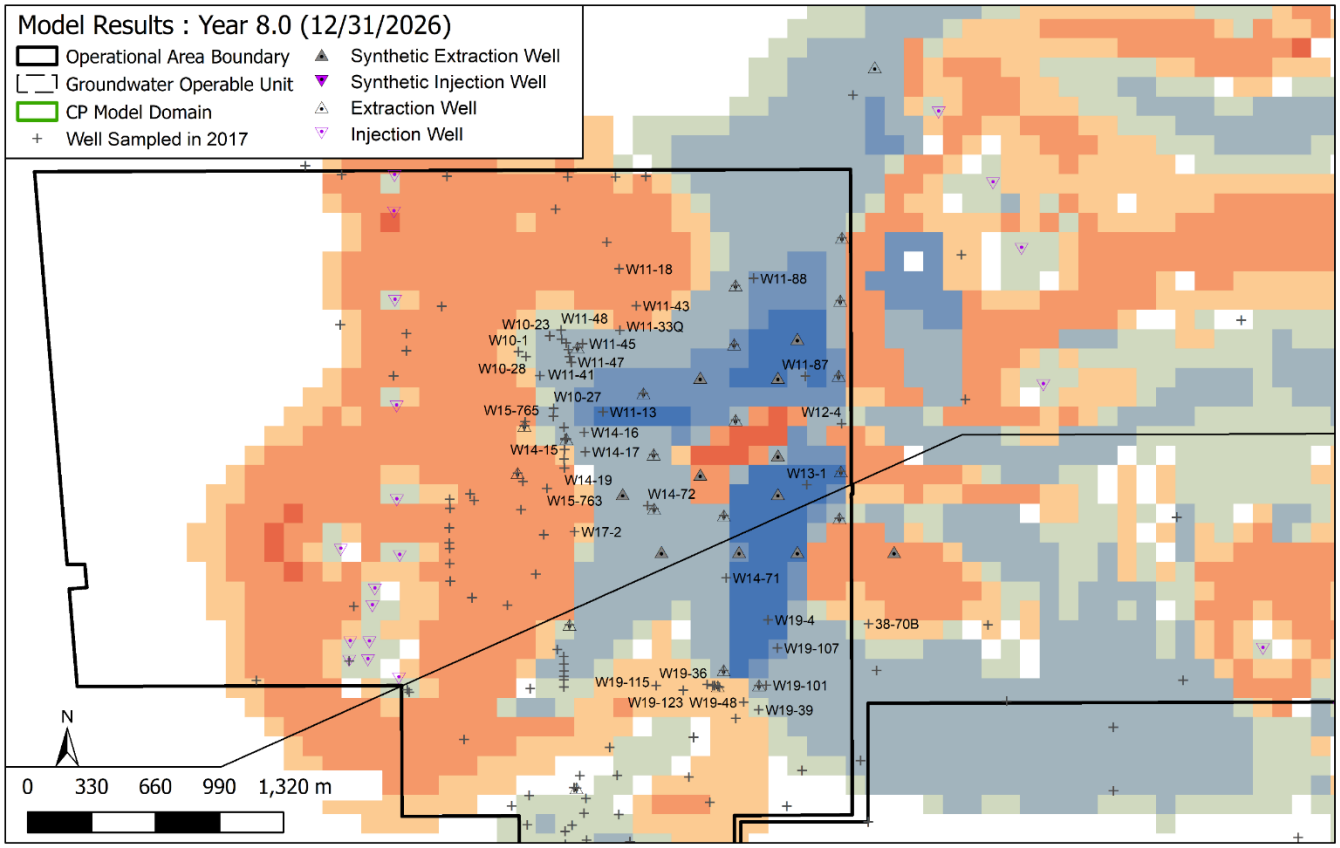
Optimized



- Increased circulation evident by lower plume concentrations in optimized case

Results From Most Recent Groundwater Modeling Runs

NO_3 plume difference maps



Nitrate (No Source) cumulative concentration difference in µg/L - Layer 3

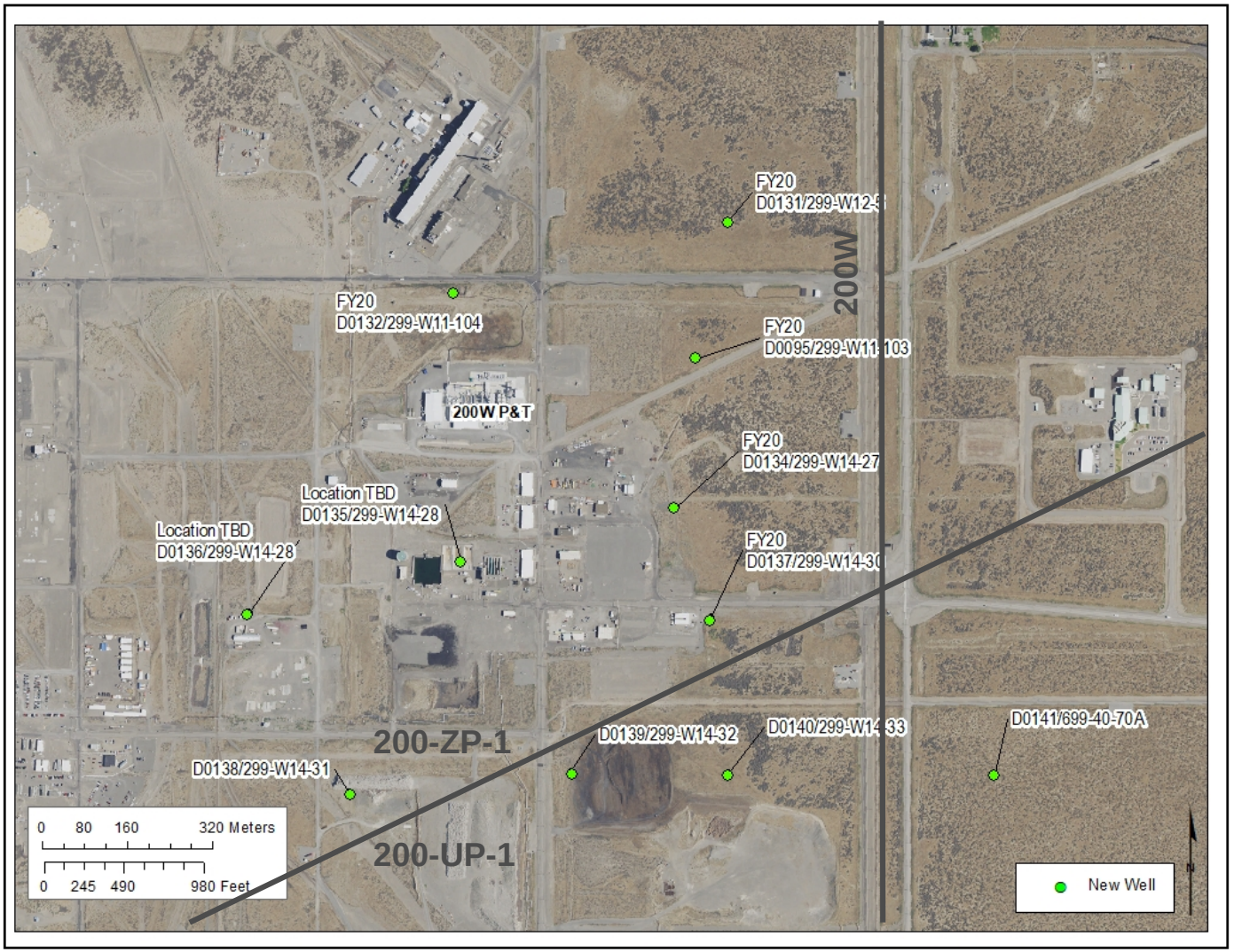
< -100,000	-4,500 - -450	4,500 - 45,000
-100,000 - -45,000	-450 - 450	45,000 - 100,000
-45,000 - -4,500	450 - 4,500	> 100,000

Max Concentration Difference = 387,402 µg/L

Min Concentration Difference = -90,631 µg/L

Concentration difference = base simulation - optimized simulation
Concentration difference > 0, optimized is cleaner than base
Concentration difference < 0, optimized is dirtier than base

Results From Most Recent Groundwater Modeling Runs



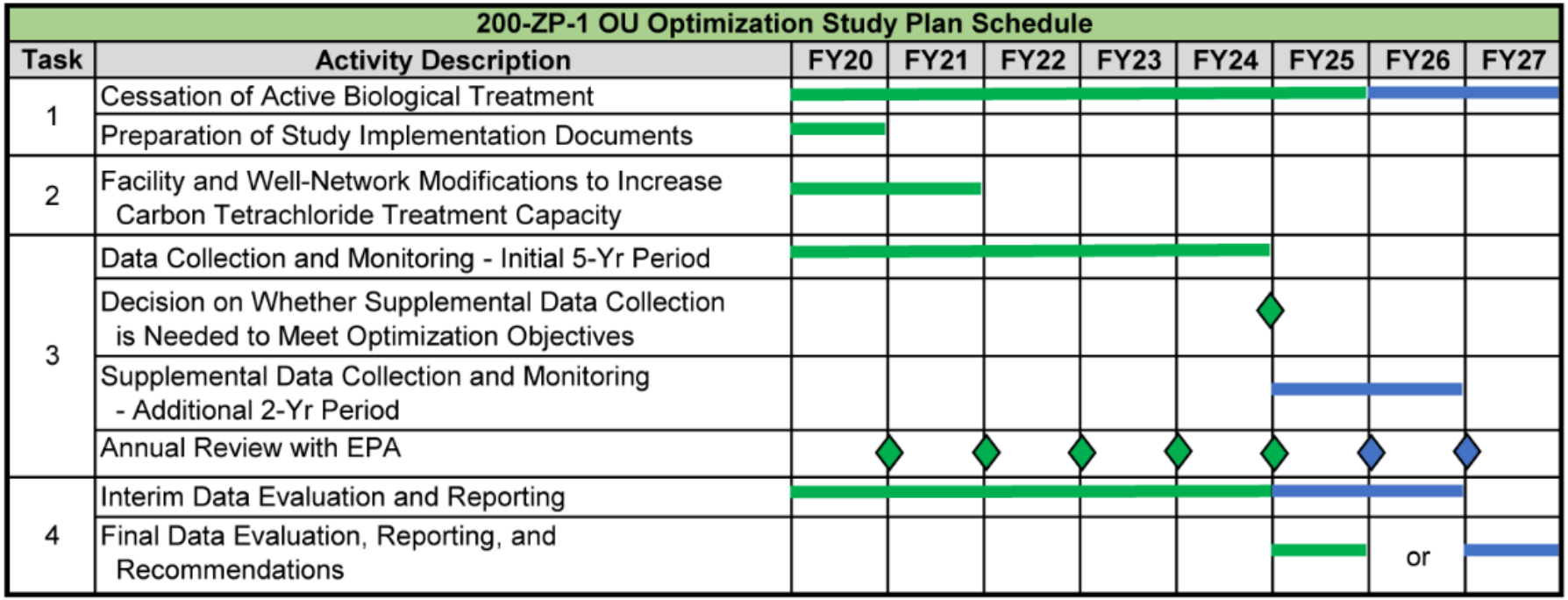
Results From Most Recent Groundwater Modeling Runs

Conclusions

- Optimized extraction removes 4,000 Kg more CCl4 than the existing configuration in a 3 year operational period at the increased pumping rate (~15% increase)
- Overall reduction of CCl4 plume improved under optimized conditions; noticeable differences within 3 years
- Reduction of high-concentration CCl4 plume core improved under optimized conditions; noticeable differences within 3 years
- Nitrate concentrations decline faster under optimized conditions
- Verification of plume changes and improved performance should be evident in monitoring data after 3 years of operation at the increased pumping rate

Optimization Study Plan Schedule

- EPA Should Receive “Official” Cleared Optimization Plan Monday September 16, 2019



EPA Questions/Clarifications On Optimization Study Plan

- Questions?

RD/RAWP Changes

- 200-ZP-1 RD/RAWP (DOE/RL-2008-78, Rev 0) was originally submitted in 2009, very early in the design phase (~10%) of the 200-ZP-1 remedy.
- Rev 1 Draft A was prepared to:
  - Document the as-built remedy configuration
  - Summarize remedy performance over the initial operations period
  - Identify remedy implementation challenges and data gaps
  - Provide recommendations for modification of remedy configuration to address those challenges and data gaps
  - Identify a regulatory path forward for long-term modifications to the remedy (e.g. Optimization Study, Focused Feasibility Study/Proposed Plan and ROD Amendment)

RD/RAWP Key Changes

- Chapter 1 – Introduction
  - Updated nature and extent discussion
  - Updated summary of interim remedial measures
  - Added discussion of integration with other OUs and 200 West P&T
- Chapter 2 – Basis for Remedial Action
  - Updated discussion of remedy performance monitoring consistent with PMP, O&M Plan and associated SAP documents
- Chapter 3 – Remedy Design and Implementation
  - Updated to document final design and as-built remedy configuration and other significant changes implemented during the initial operations period

RD/RAWP Key Changes

- Chapter 4 – Remedy Optimization (New Chapter)
  - Summarizes remedy performance over initial operation period and progress achieved
  - Identifies remedy implementation challenges and data gaps
    - CCl4 half life
    - CCl4 mass distribution and Ringold A characterization data needs
    - Hydraulic containment of “thumb” area
    - Well fouling
    - Biological treatment cost and complexity
  - Provides recommendations to perform the following tasks to address the data gaps and performance challenges
    - Install new extraction well to contain the “thumb”
    - Perform CCl4 biotic degradation rate study
    - Characterize Ringold A and Ringold Lower Mud
    - Implement measures to prevent well fouling (e.g. sodium hypochlorite disinfection system)
    - Perform optimization study to evaluate changes to the remedy configuration to enhance CCl4 remedy performance (e.g. 200 West P&T expansion) and evaluate suspension of biological treatment

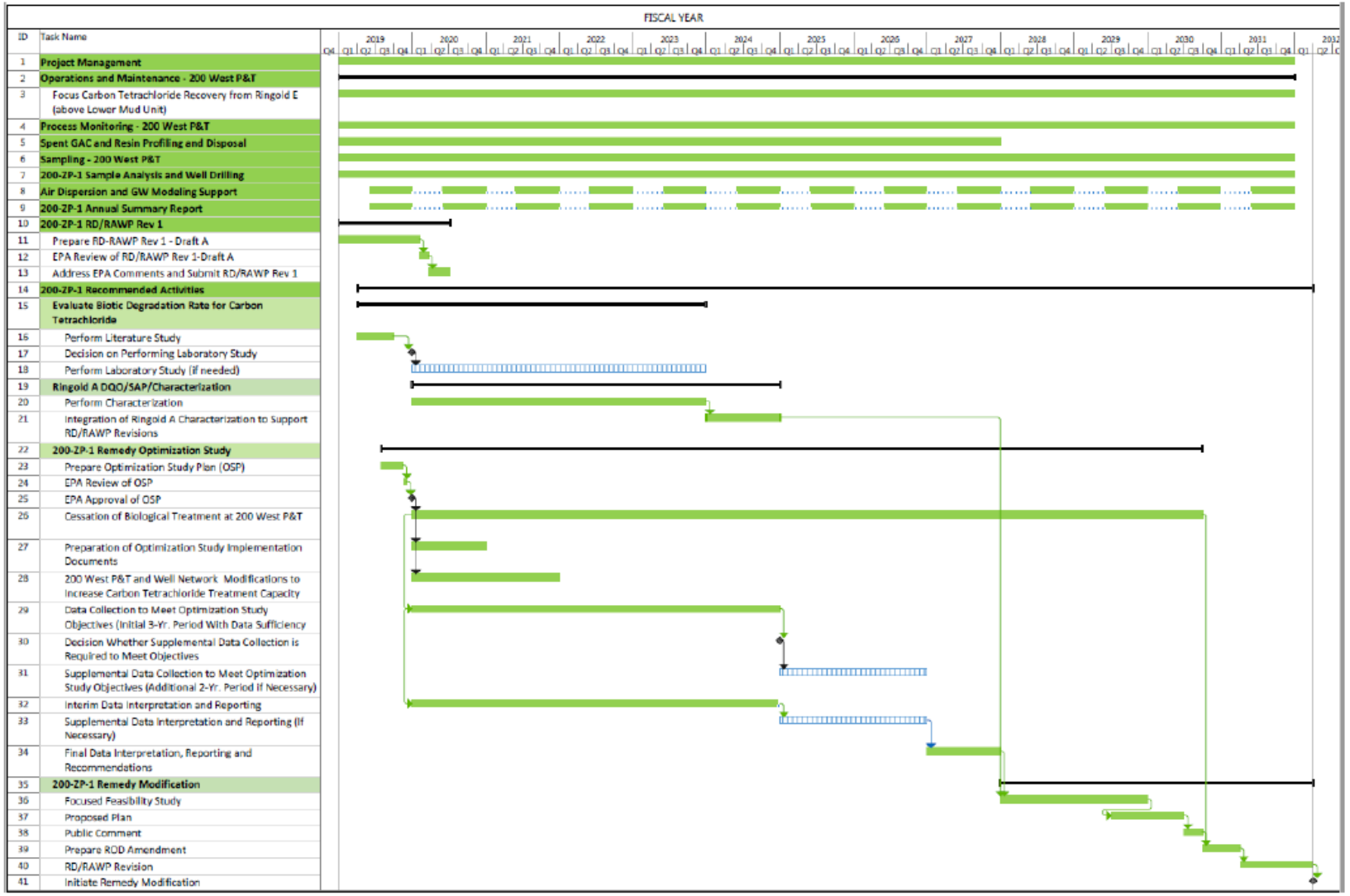
RD/RAWP Key Changes

- Chapter 5 – Remedial Action Approach and Management
  - Added document flow chart and discussion and to tie remedy implementation documents together
  - Updated discussion of reporting requirements to match annual P&T reports and quarterly briefings
- Chapter 6 Environmental Management and Controls
  - Changed to promote consistency with 200-UP-1 RD/RAWP
- Chapter 7 Decontamination and Decommissioning
  - Added minor changes to interim decommissioning discussion
- Chapter 8 – Cost and Schedule
  - Provided discussion of cost breakdown and updated project to date costs and projected costs out through FY 2020.
  - Updated schedule to incorporate RD/RAWP recommendations (e.g. Optimization Study)

RD/RAWP Key Changes

- Appendix A - Nature and Extent (new)
- Appendix B – Applicable or Relevant and Appropriate Requirement (ARARs) – No changes
- Appendix C - Summary of Regulatory Requirements (new)
  - Provides a compliance matrix identifying the regulatory requirements identified in the 200-ZP-1 Operable Unit (OU) Record of Decision (ROD)
- Appendix D – Remedy Performance Evaluation (new)
  - Presents a detailed performance evaluation of the initial remedy operation period to assess progress toward meeting 200-ZP-1 OU Remedial Action Objectives (RAOs) and other interim goals.

RD/RAWP Key Changes



Note: See the Optimization Study Plan (DOE/RL-2019-38) for determination of the optimization study duration. If the 2-year optimization study supplemental data collection period is not necessary, the schedule for modification of remedy decision documents may be shortened. Regulatory documents will be updated to reflect current conditions.

Performance Monitoring Plan (PMP) Changes

- Key Changes
  - The current version (Revision 2) of DOE/RL-2009-115, *Performance Monitoring Plan for the 200-ZP-1 Groundwater Operable Unit Performance Monitoring Plan*, was issued in 2017 following 4 years of operation of the 200 West P&T.
  - This revision (Revision 3, Draft A) primarily consists of the following changes:
    - Updates to all chapters of the PMP main text, with extensive changes to Sections 1.4 [Data Quality Objectives (DQO) summary] and 4.3 (performance monitoring analysis and reporting).
    - Extensive updates to the DQOs in Appendix A.

Performance Monitoring Plan (PMP) Changes

- Key Changes
  - Extensive updates to the performance monitoring Sampling and Analysis Plan (SAP) in Appendix B, including the following:
    - Incorporation of most of the recommendations in SGW-60527 (Rev. 0), *CR-2016-1543 – Redundancy Analysis for the 200-ZP-1 Groundwater Monitoring Network* into the PMP main text and Appendices B and C.
    - Incorporation of many of the recommendations in SGW-61350 (Rev. 1), *Data Gaps Evaluation in Groundwater Monitoring at the Hanford 200-ZP-1 Groundwater Operable Unit* into the PMP main text and Appendix G
  - Addition of the remediation well installation SAP as Appendix G.

PMP Changes – Data Quality Objectives (DQOs) and Performance Monitoring Analysis and Reporting

- Key Changes
  - The Draft A PMP Revision 3 has been extensively updated to reassess and further develop the DQOs in Appendix A (as summarized in Section 1.4) for comprehensively assessing performance of the 200-ZP-1 OU remedy:
    - The update to the DQOs resulted in extensive changes to performance monitoring analysis and reporting section (4.3) of the PMP.
    - The primary change in Section 4.3 is related to the newly developed decision-making process that is multistage and tied to the first three of the four remedy components (excluding institutional controls).
    - Requirements for this new process are presented for each stage/phase of the remedy and include the associated decision statements, data inputs, analytical approaches, and decision rules to evaluate performance and effectively proceed to the next phase of the remedy.
    - By following this multistage progression for the decision-making process, the analysis and reporting requirements change depending on the stage of the remedy.

Path Forward

Near-Term Activities Being Performed	FY19	FY20	FY21	FY22
Finalize Optimization Study Plan, Rev. 0				
Finalize RD/RAWP Rev. 1				
Finalize PMP, Rev. 3				
Finalize O&M Plan, Rev. 6				
Prepare DQO/SAP Defining Optimization Sampling/Analytical Requirements				
Install 10 Additional Optimum Location Extraction Wells				

200-ZP-1 OU Optimization Study Plan Schedule									
Task	Activity Description	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
1	Cessation of Active Biological Treatment								
	Preparation of Study Implementation Documents								
2	Facility and Well-Network Modifications to Increase Carbon Tetrachloride Treatment Capacity								
3	Data Collection and Monitoring - Initial 5-Yr Period								
	Decision on Whether Supplemental Data Collection is Needed to Meet Optimization Objectives								
	Supplemental Data Collection and Monitoring - Additional 2-Yr Period								
	Annual Review with EPA								
4	Interim Data Evaluation and Reporting								
	Final Data Evaluation, Reporting, and Recommendations							or	

Green bars indicate the anticipated activity periods if no supplemental data collection is needed to meet optimization objectives
Blue bars indicate the alternative activity periods if supplemental data collection is needed to meet optimization objectives

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