Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

12-AMRP-0172

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Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton
Richland, Washington 99354

Mr. D. A. Faulk, Program Manager
Office of Environmental Cleanup
Hanford Project Office
U.S. Environmental Protection Agency
309 Bradley Boulevard, Suite 115
Richland, Washington 99352

Addressees:

COMPLETION OF HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (TRI-PARTY AGREEMENT) TARGET MILESTONE M-016-110-T01, "DOE SHALL TAKE ACTIONS NECESSARY TO CONTAIN OR REMEDIATE HEXAVALENT CHROMIUM GROUNDWATER PLUMES IN EACH OF THE 100 AREA NATIONAL PRIORITY LIST OPERABLE UNITS SUCH THAT AMBIENT WATER QUALITY STANDARDS FOR HEXAVALENT CHROMIUM ARE ACHIEVED IN THE HYPORHEIC ZONE AND RIVER WATER COLUMN"

This letter is to notify the State of Washington Department of Ecology and U.S. Environmental Protection Agency of the progress towards completion of Tri-Party Agreement Target Milestone M-016-110-T01, "DOE shall take actions necessary to contain or remediate hexavalent chromium groundwater plumes in each of the 100 Area National Priority List Operable Units such that ambient water quality standards for hexavalent chromium are achieved in the hyporheic zone and river water column." The Tri-Party Agreement Target Milestone due date is December 31, 2012. The U.S. Department of Energy Richland Operations Office (RL) has taken actions necessary to contain or remediate hexavalent chromium in the 100 Area, and has made significant progress towards the Tri-Party Agreement Target Milestone as of September 2012.

Soil remediation to remove the sources of hexavalent chromium, along with significant expansion of the pump and treat capacity in the 100 Area Operable Units, has significantly reduced the amount of hexavalent chromium contamination in the groundwater. The attached white paper provides detailed evidence that RL has taken action to contain or remediate hexavalent chromium groundwater plumes in the 100 Area Operable Units.

If you have any questions please contact me, or your staff may contact Briant Charboneau of my staff on (509) 373-6137.

Sincerely,

Jonathan A. Dowell, Assistant Manager
for the River and Plateau

AMRP:MWC

Attachment

cc w/attach:
G. Bohnee, NPT
R. Buck, Wanapum
C. E. Cameron, EPA
L. M. Dittmer, CHPRC
D. E. Dooley, CHPRC
R. H. Engelmann, CHPRC
S. Harris, CTUIR
R. Jim, YN
R. A. Kaldor, MSA
S. L. Leckband, HAB
N. M. Menard, Ecology
K. Niles, ODOE
T. W. Noland, MSA
R. E. Piippo, MSA
D. Rowland, YN
D. G. Singleton, Ecology
Administrative Record
Environmental Portal

DOE-RL Completion of Tri-Party Agreement Target M-016-110-T01, due date December 31, 2012

"DOE shall take actions necessary to contain or remediate hexavalent chromium groundwater plumes in each of the 100 Area NPL operable units such that ambient water quality standards for hexavalent chromium are achieved in the hyporheic zone and river water column."

DOE has taken remedial actions to remove source soil contamination, expanded groundwater pump & treatment operations in the 100-K, 100-D and 100-H areas, and optimize hydraulic containment towards meeting the intent of the 2012 Target date for taking action necessary to contain or remediate the hexavalent chromium groundwater plumes in the 100 Area OUs of the Hanford Site. As a result, the groundwater in close proximity to the Columbia River show major improvements to water quality as evidenced through decreasing trends in hexavalent chromium concentrations. The decreasing concentrations along the Columbia River shoreline are provided in Figures 1, 2, and 3 depicting the K, D and H Area hexavalent chromium plumes and associated near-shore extraction wells and trend plots. In most cases, hexavalent chromium concentrations at near-shore extraction wells and groundwater compliance wells are below the Remedial Action Objective (RAO) of 20 ug/l. This data indicates that excellent progress is being made towards the Tri-Party goal of protecting the Columbia River. Sampling data and modeling indicates there are some areas where the RAO has not yet been achieved and either the response to the groundwater remediation has not yet been fully realized or further optimization of the groundwater remediation well networks is required. Continued optimization of the well network should be expected in these areas to maintain efficacy of the remedial efforts due to the dynamic nature of the groundwater plumes along the river.

In 2009, the Tri-Parties approved Change Package M-16-08-07, which contained a series of TPA milestones and target dates to "take action" as steps in a strategy to restore Hanford groundwater along the Columbia River to beneficial use. Modeling was performed to evaluate the effectiveness of the groundwater and source unit remedial actions to date and to design additional actions for achieving the Target date goals. Based upon the modeling and groundwater sampling it was determined that increased P&T treatment capacity was required (in addition to the sustained source unit reduction through waste site remediation) to meet the objective to reduce the hexavalent chromium contamination in the 100 Area groundwater operable units.

It was acknowledged during the TPA milestone negotiations, that there was no way to definitively know exactly what the aquifer response would be to a proposed remedial action until the system was built and operated for a for period of time. This fact was a contributing reason as to why the commitments were phrased as "take actions" versus to "achieve." There was and is an understanding that further action will continue to occur until the plumes are fully remediated. The final CERCLA documents are currently being prepared and will propose another significant increase in treatment capacity and well networks to allow more extraction in the middle of the plumes which will further accelerate the plume remediation. It is anticipated that the 100-K/D/H areas will have final RODs within a year and implementing milestones will be established after each ROD is approved.

Source remediation is key to eliminating groundwater contamination and to date, more than 4,600,000 tons of waste (including soil and debris) from chromium-contaminated waste sites and

1255 gallons of concentrated sodium dichromate liquids from pipelines have been removed and disposed from the 100-K/D/H/B/C and 100-F areas. Specific remediation quantities are broken out by area below:

- 100-BC: To date, over 840,000 tons of soil and other waste disposed from concentrated sodium dichromate sites at 100-B/C with source remediation nearly complete. A large portion of this contaminated soil is from the excavations at 100-C-7 and 100-C-7:1. 230 gallons of residual concentrated sodium dichromate liquid in pipelines were drained and disposed. Approximately 1 million tons of waste was removed from radioactive liquid effluent waste sites where low concentrations of hexavalent chromium were present.
- 100-K: Approximately 650,000 tons of waste was removed from radioactive liquid effluent waste sites where low concentrations of hexavalent chromium were present.
- 100-D/H: Over 200,000 tons of soil and other waste were excavated and disposed from concentrated sodium dichromate waste sites at 100-D, with remediation still on-going. 825 gallons of residual concentrated sodium dichromate liquid in pipelines were drained and disposed. Approximately 1,200,000 tons of waste was removed from radioactive liquid effluent waste sites at 100-D and 100-H where low concentrations of hexavalent chromium were present.
- 100-F: Over 150,000 tons of soil and other waste were excavated and disposed from concentrated sodium dichromate waste sites at 100-F. 200 gallons of residual concentrated sodium dichromate liquid in pipelines were drained and disposed. Approximately 600,000 tons of waste was removed from radioactive liquid effluent wastes sites where low concentrations of hexavalent chromium were present.

In early 2011, DOE requested and received EPA's concurrence that actions for the 100-FR-3 and 100-BC-5 groundwater operable units should wait until the Remedial Investigation/Feasibility Study (RI/FS) process and corresponding Records of Decision (ROD) are completed. Also, hexavalent chromium is not a significant groundwater contaminant at 100-N Area; hence, the discussion below regarding the 2012 Target date is only relevant to 100-K/D/H areas of the River Corridor.

New high-capacity P&T systems were constructed in the 100-K, 100-D and 100-H areas, increasing the treatment capacity by greater than 400%, from 600 gallons per minute (gpm) to 2,500 gpm. In addition to these new facilities, older facilities were upgraded. The well fields were designed and installed to extract the hexavalent chromium contaminated groundwater prior to it reaching the river, and the well fields continue to be optimized in order to increase containment. Since October of 2008, 311 new wells and 37 soil borings were installed in the 100 Areas as part of ongoing groundwater treatment and monitoring activities. As of September 2012, over 4.9 billion gallons of contaminated groundwater were treated resulting in the removal of over 2290 kilograms of hexavalent chromium. Figures 4 and 5 show the amount of groundwater treated and the amount of hexavalent chromium removed has dramatically increased during the last four years as a result of the actions taken towards meeting this commitment.

The actions described above, both source soil area and groundwater remediation activities, demonstrate that DOE has taken actions to contain and remediate hexavalent chromium in the groundwater. DOE's efforts in 100-B/C, K, N, D/H, F and 300 Area areas will continue to be monitored against the remaining M-016-110 Target dates. These include efforts to stop all groundwater contamination above ambient water quality standards in 2016 and to remediate these plumes by 2020. In addition, DOE will focus on completion of new implementing milestones for the final RODs for both source and groundwater remediation within the River Corridor.

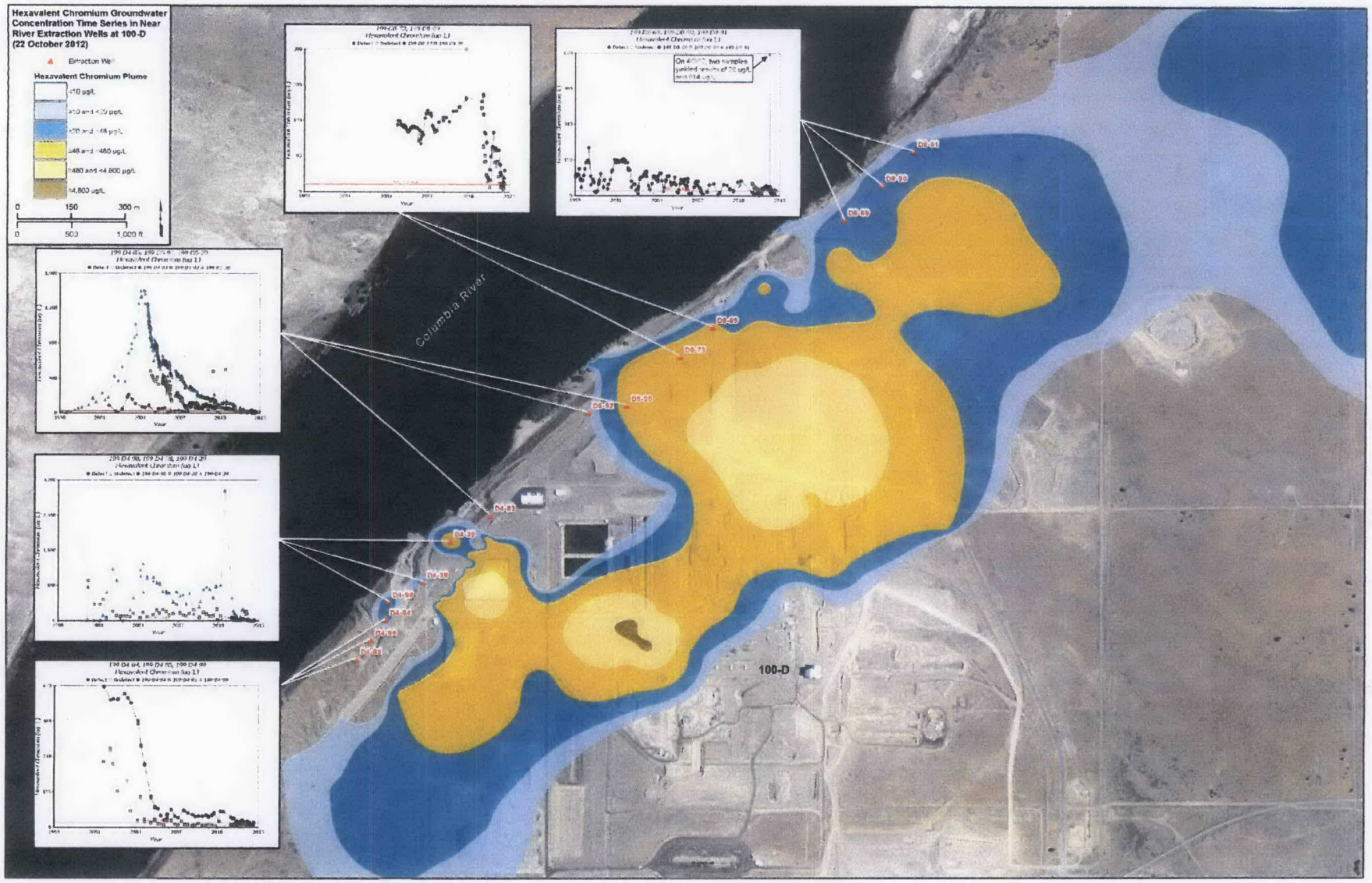

Figure 3. Hexavalent chromium groundwater concentrations time series 100-D.

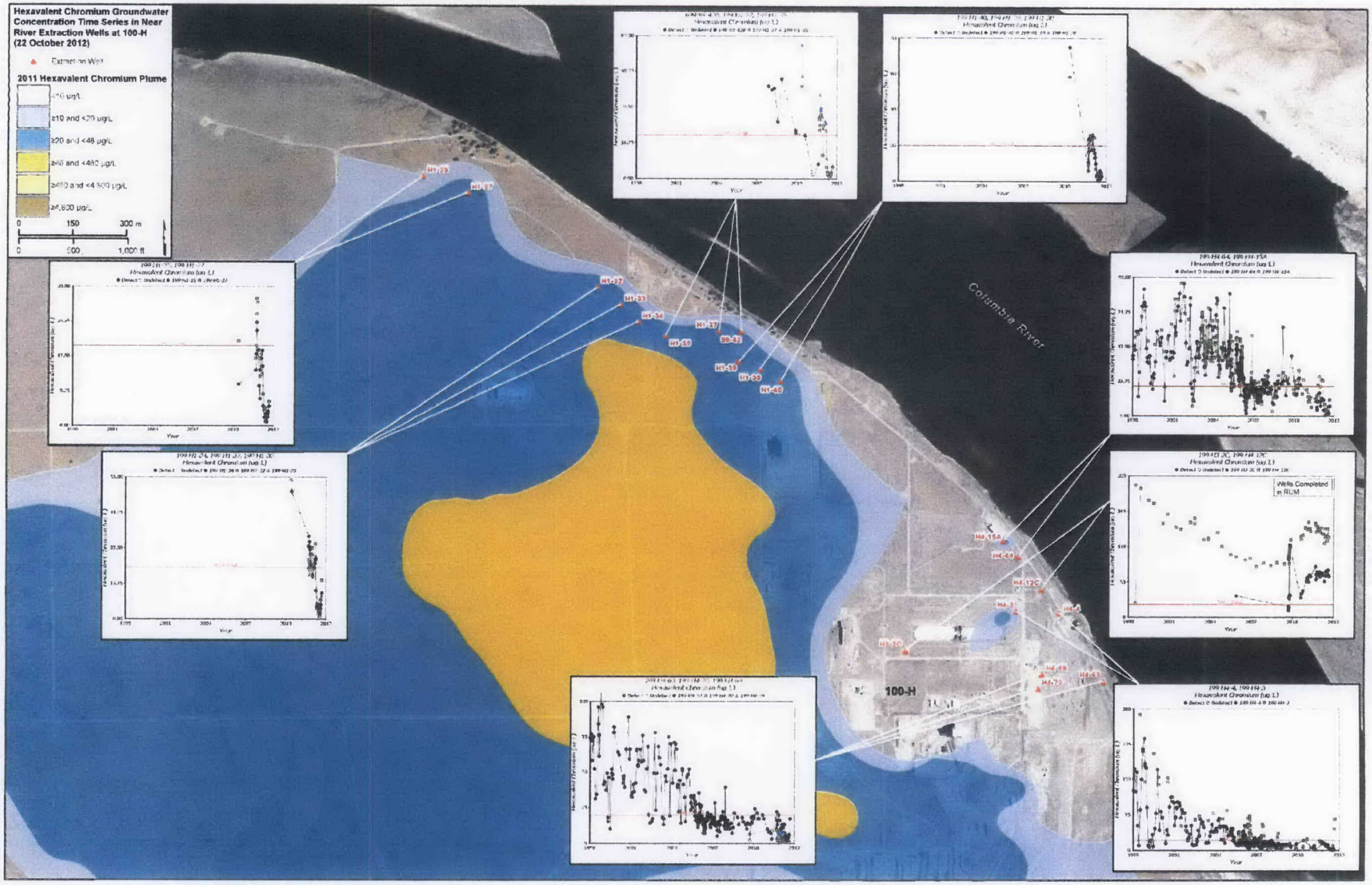

Figure 4. Hexavalent chromium groundwater concentrations time series 100-H.

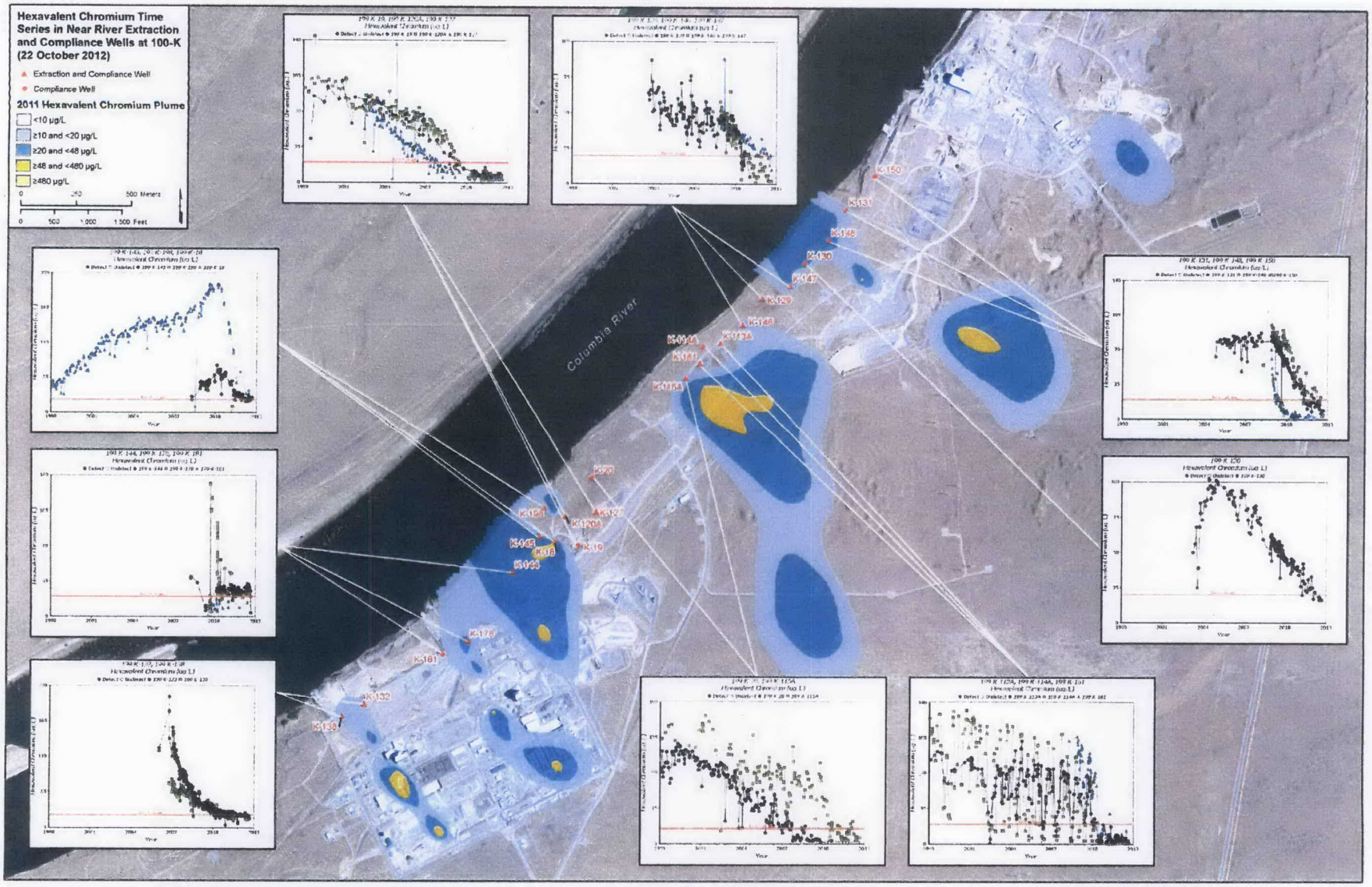

Figure 5. Hexavalent chromium groundwater concentrations time series 100-K.

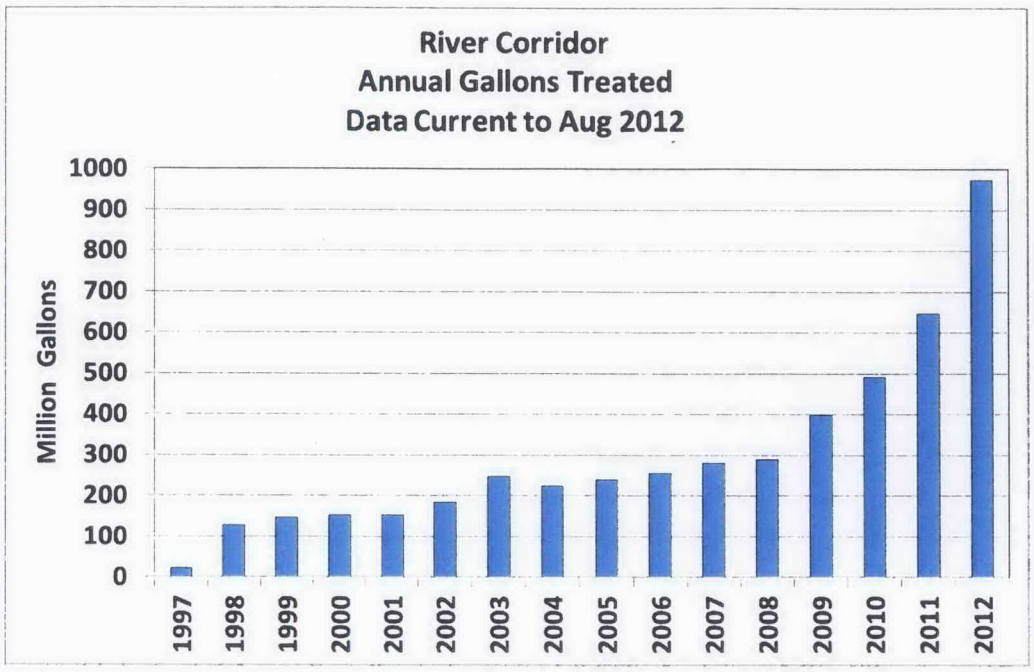

Figure 4. Remedy optimization and expansion activities significantly increased the treatment of chromium contaminated groundwater in the 100-K, 100-D, and 100-H Areas between 2008 and 2012.

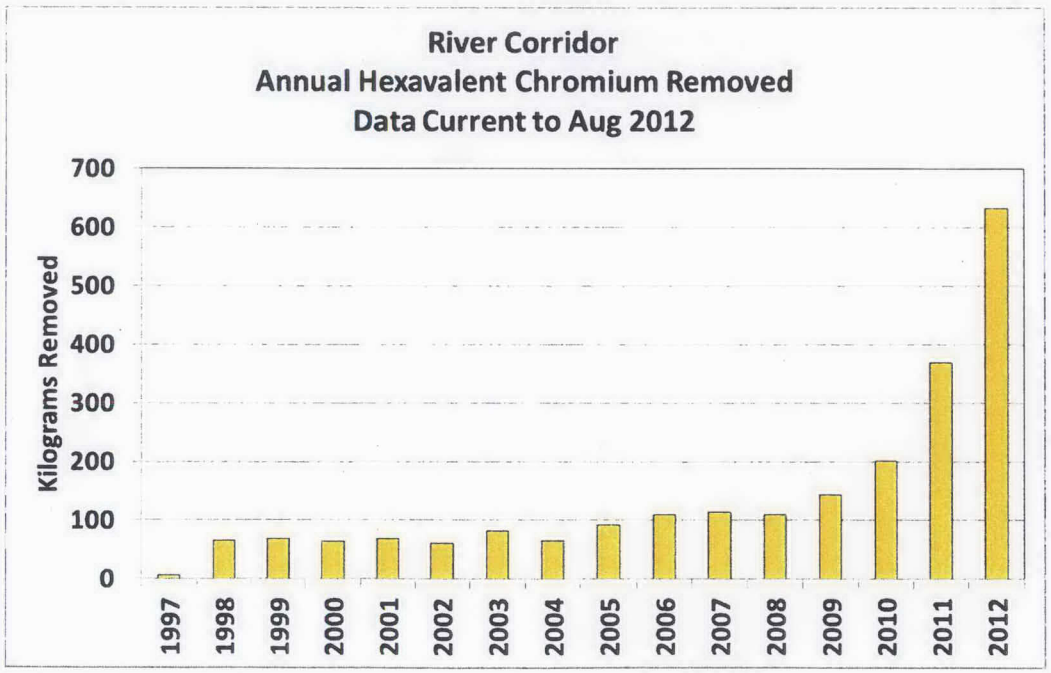

Figure 5. Increased P&T system capacity between 2008 and 2012 dramatically increased the rate at which hexavalent chromium is removed from contaminated groundwater in the 100-K, 100-D, and 100-H Areas.