

## HAB ISSUE MANAGER HANDOUT 4/12/2012

### HANFORD SITE RISK ASSESSMENTS: DO WE CARE?

The Hanford Advisory Board (Board/HAB) has a long history of input on both risk assessments and cleanup activities for the Department of Energy Hanford site. Specific Board advice on this subject was sent to the Tri-Party Agencies in Advice #s 134, 165, 246, and 253. HAB advice #s 23, 28c, 61, 153, 175, and 190 dealt with the related issue of cumulative risk analysis and/or application of the unrestricted use scenario in calculation of risks and risk to groundwater. This advice spanned seventeen years (1995-2012), and has remained consistent. Amazing accomplishment!

### WHY SHOULD WE CARE?

Risk assessment values are a core part of the process to determine if legal requirements have been achieved or if further cleanup actions are needed. This process applies to both soil waste sites and groundwater units.

### HOW ARE THEY BEING DONE AT HANFORD USING THE RIVER CORRIDOR CLEANUP AS AN EXAMPLE?

- The River Corridor Baseline Risk Assessment (RCBRA) is a very important part/basis of cleanup along the Columbia River. The Tri-Party Agencies have not yet reached agreement/approval of this document.
- Unapproved (Agency comments remain unresolved) 'secondary' documents with much uncertainty cited within them regarding site-specific information are used to support risk assessment decisions. *See the flow chart.*

### IS THERE A REASON FOR CONCERN?

Final cleanup levels are proposed based on unresolved comments and unapproved documents. Portions from the RCBRA and other unapproved documents are being pulled into the different Remedial Investigation/Feasibility Study/Proposed Plans [RI/FS/PP] for the River Corridor cleanup sites.

*See HAB Advice #253.*

### IS THERE A REASON FOR CONCERN REGARDING THE MODELING APPROACHES?

- The approach used to calculate Exposure Point Concentrations (EPCs) is a deviation from CERCLA risk assessment guidance and will be precedent setting. The way they have been calculated has also resulted in elimination of COCs.<sup>1</sup> [Note: Carbon-14 values are ½ of what they would have been using the cited CERCLA guidance approach]. EPCs are a part of the RA process.
- The alternative fate and transport model (STOMP-1D) soil screening levels are compared to EPCs. This has eliminated Contaminants of Potential Concern [COPCs] such as Hexavalent Chromium which would not have been eliminated using default MTCA [Model Toxic Control Act] calculations from wastes sites. *See examples from Table 7-1<sup>2</sup>. Compare column #7 with #9.* Values under the alternative fate and transport model are, in some cases [e.g. CAS # 18540-29-9], larger by a factor of 100. For this example, this results in this waste site not having Hexavalent Chromium listed as a COPC.
- The Preliminary Remediation Goals (PRGs) model included a very low recharge rate in model calculations. This resulted in much higher proposed cleanup levels than using MTCA default models.
- Ecology, while recognizing and approving the use of this code has not specifically approved the modeling results of the current STOMP-1D application as an alternative fate and transport model as described under MTCA 173.340.747(8) because they have yet to receive the actual data for the parameters used in the model and other documentation required by MTCA. The Tri-Parties agreed to start with parameters used in the Technical Guidance Document from the TW EIS, but allow use of others with adequate documentation. Cleanup levels for Ecology sites may be different for the same COC than at EPA lead sites due to site-specific modeling.

### OTHER RELATED CONCERNS:

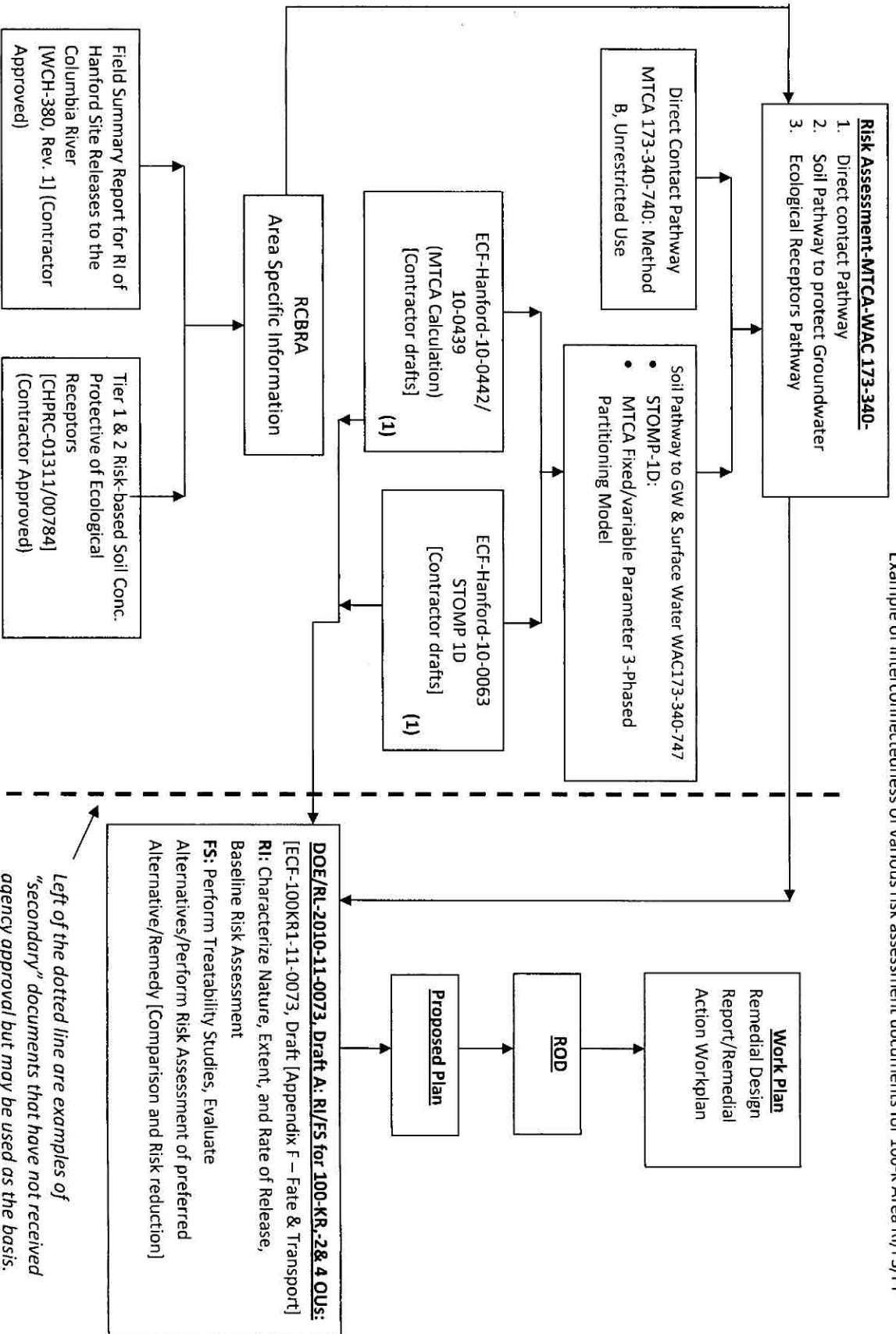
DOE has yet to outline how Hanford's multiple risk assessments will provide an integrated, comprehensive view of risk [#165]. Additive/synergistic health risks [#28].

<sup>1</sup> OSWER 9285-6-10, *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*, states that, "an exposure point concentration (EPC) is a conservative estimate of the average chemical concentration in an exposure medium." OSWER Publication 9285-7-081, *Supplemental Guidance to RAGS: Calculating the Concentration Term*, states that, "because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean should be used for this variable."

<sup>2</sup> 100-K Area RI/FS, DOE/RL-2010-97, DRAFT A, Appendix F - Fate & Transport - document ECF-100KR1-11-0073, *Comparison of 100-KR-1 and 100-KR-2 Source OU Exposure Point Concentrations to Soil Screening Levels Protective of Groundwater and Soil Screening Levels Protective of Surface Water*.

**HAB ISSUE MANAGER HANDOUT 4/12/2012**

Example of interconnectedness of various risk assessment documents for 100-K Area RI/FS/PP



Note (1): Documents found in Appendix F of DOE/RL-2010-11-0073, Draft A.

Table 7-1. Summary of Analytes that Exceed MTCa Fixed Parameter Three-Phase or STOMP ID Soil Screening Levels Protective of Groundwater (Without Background Consideration)

| Waste Site/Decision Unit   | Analyte Group | Analyte Name        | CAS No.    | Units | Exposure Point Concentration | MTCa Fixed Parameter 3-Phase Soil Screening Level Protective of Groundwater | Is EPC > Soil Screening Level Protective of Groundwater? | STOMP ID 1000 Contaminant Source Model (Irrigation Recharge Scenario) Soil Screening Level for Groundwater Protection | Is EPC > Soil Screening Level Protective of Groundwater? |
|----------------------------|---------------|---------------------|------------|-------|------------------------------|---|--|---|--|
| 100-K-29 Shallow Focused   | non-Rad       | Arsenic             | 11097-69-1 | µg/kg | 2,300                        | 56  | Yes  | 72  | Yes  |
| 100-K-29 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 2,300                        | 3.7   | Yes  | 16,800  | No   |
| 100-K-29 Shallow Focused   | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 3,200                        | 192   | Yes  | 182,070   | No   |
| 100-K-29 Shallow Focused   | non-Rad       | Lead                | 7439-92-1  | µg/kg | 63,200                       | 9,060   | Yes  | 182,070   | No   |
| 100-K-30 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 2,600                        | 3.7   | Yes  | 72  | No   |
| 100-K-30 Shallow Focused   | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 702                          | 192   | Yes  | 16,800  | No   |
| 100-K-30 Shallow Focused   | non-Rad       | Lead                | 7439-92-1  | µg/kg | 36,000                       | 5,060   | Yes  | 182,070   | No   |
| 100-K-30 Shallow Focused   | non-Rad       | Mercury             | 7439-97-6  | µg/kg | 17,500                       | 1,210   | Yes  | 24,276  | No   |
| 100-K-31 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 2,800                        | 3.7   | Yes  | 72  | Yes  |
| 100-K-31 Shallow Focused   | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 220                          | 192   | Yes  | 16,800  | No   |
| 100-K-31 Shallow Focused   | non-Rad       | Lead                | 7439-92-1  | µg/kg | 43,400                       | 9,060   | Yes  | 182,070   | No   |
| 100-K-31 Shallow Focused   | non-Rad       | Mercury             | 7439-97-6  | µg/kg | 5,200                        | 1,210   | Yes  | 24,276  | No   |
| 100-K-32 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 3,000                        | 3.7   | Yes  | 72  | Yes  |
| 100-K-32 Shallow Focused   | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 230                          | 192   | Yes  | 16,800  | No   |
| 100-K-32 Shallow Focused   | non-Rad       | Mercury             | 7439-97-6  | µg/kg | 2,400                        | 1,210   | Yes  | 24,276  | No   |
| 100-K-33 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 6,700                        | 3.7   | Yes  | 72  | Yes  |
| 100-K-33 Shallow Focused   | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 1,400                        | 192   | Yes  | 16,800  | No   |
| 100-K-33 Shallow Focused   | non-Rad       | Lead                | 7439-92-1  | µg/kg | 27,800                       | 9,060   | Yes  | 182,070   | No   |
| 100-K-33 Shallow Focused   | non-Rad       | Mercury             | 7439-97-6  | µg/kg | 6,800                        | 1,210   | Yes  | 24,276  | No   |
| 100-K-56.1 Shallow Focused | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 937                          | 192   | Yes  | 16,800  | No   |
| 100-K-78 Shallow Focused   | non-Rad       | Aluminum            | 7429-90-5  | µg/kg | 1,08E+07                     | 1,50E+06  | Yes  | -   | -  |
| 100-K-78 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 4,330                        | 3.7   | Yes  | 72  | Yes  |
| 100-K-78 Shallow Focused   | non-Rad       | Cobalt              | 7440-48-4  | µg/kg | 6,110                        | 4,820   | Yes  | -   | -  |
| 100-K-78 Shallow Focused   | non-Rad       | Iron                | 7439-89-6  | µg/kg | 1,96E+07                     | 151,000   | Yes  | 3,04E+06  | Yes  |
| 100-K-78 Shallow Focused   | non-Rad       | Manganese           | 7439-96-5  | µg/kg | 288,000                      | 50,200  | Yes  | -   | -  |
| 100-K-85 Shallow Focused   | non-Rad       | Aluminum            | 7429-90-5  | µg/kg | 7,65E+06                     | 1,50E+06  | Yes  | -   | -  |
| 100-K-85 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 2,800                        | 3.7   | Yes  | 72  | Yes  |
| 100-K-85 Shallow Focused   | non-Rad       | Cobalt              | 7440-48-4  | µg/kg | 8,400                        | 4,820   | Yes  | -   | -  |
| 100-K-85 Shallow Focused   | non-Rad       | Iron                | 7439-89-6  | µg/kg | 2,27E+07                     | 151,000   | Yes  | 3,04E+06  | Yes  |
| 100-K-85 Shallow Focused   | non-Rad       | Manganese           | 7439-96-5  | µg/kg | 327,000                      | 50,200  | Yes  | -   | -  |
| 116-K-1 Deep               | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 590                          | 192   | Yes  | 16,800  | No   |
| 116-K-1 Shallow            | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 260                          | 192   | Yes  | 16,800  | No   |
| 116-K-2 Deep               | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 3,153                        | 192   | Yes  | 16,800  | No   |
| 116-K-2 Overburden         | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 300                          | 192   | Yes  | 16,800  | No   |
| 116-K-2 Shallow            | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 308                          | 192   | Yes  | 16,800  | No   |
| 116-K-4 Shallow            | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 583                          | 192   | Yes  | 16,800  | No   |
| 116-K-5 Shallow Focused    | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 3,700                        | 3.7   | Yes  | 72  | Yes  |
| 116-K-5 Shallow Focused    | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 330                          | 192   | Yes  | 16,800  | No   |
| 116-K-5 Shallow Focused    | non-Rad       | Lead                | 7439-92-1  | µg/kg | 11,300                       | 9,060   | Yes  | 182,070   | No   |
| 116-KW-3 Shallow           | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 749                          | 192   | Yes  | 16,800  | No   |
| 116-KW-4 Shallow Focused   | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 2,600                        | 3.7   | Yes  | 72  | Yes  |
| 116-KW-4 Shallow Focused   | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 240                          | 192   | Yes  | 16,800  | No   |
| 128-K-1 Shallow Focused    | non-Rad       | Arsenic             | 7440-38-2  | µg/kg | 3,700                        | 3.7   | Yes  | 72  | Yes  |
| 128-K-1 Shallow Focused    | non-Rad       | Hexavalent Chromium | 18540-29-9 | µg/kg | 480                          | 192   | Yes  | 16,800  | No   |
| 128-K-1 Shallow Focused    | non-Rad       | Lead                | 7439-92-1  | µg/kg | 10,800                       | 9,060   | Yes  | 182,070   | No   |