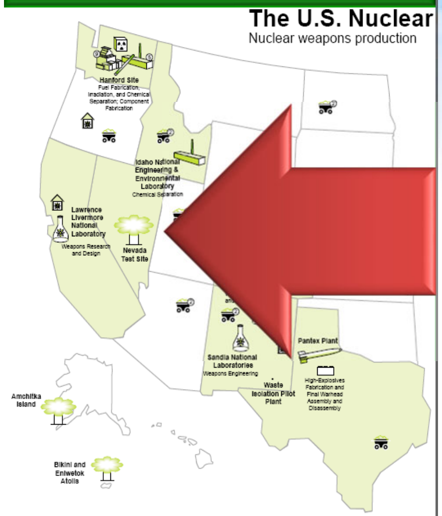
Dispose out west



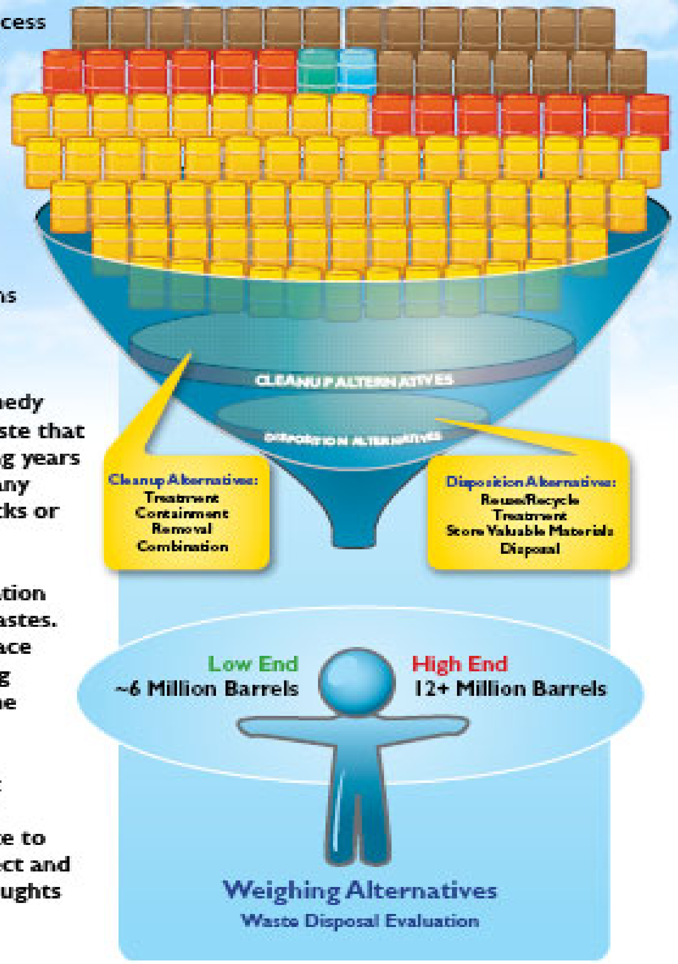
Waste Disposal Evaluation

The planning process has begun on projects that will generate a significant amount of waste for disposal, even after treatment and recycle. In addition, the demolition of buildings when USEC determines it no longer needs them to support enrichment plant operations will generate significant waste.

Depending on the final remedy selected, the amount of waste that may be generated in coming years may be enough to fill as many as 130,000 semi-trailer trucks or 31,000 rail cars.

DOE is beginning an evaluation of what to do with these wastes. This evaluation will take place over time and we are asking for your help in weighing the possible options.

There will be several public meetings in the upcoming months to give you a chance to learn more about the project and provide DOE with your thoughts and questions.



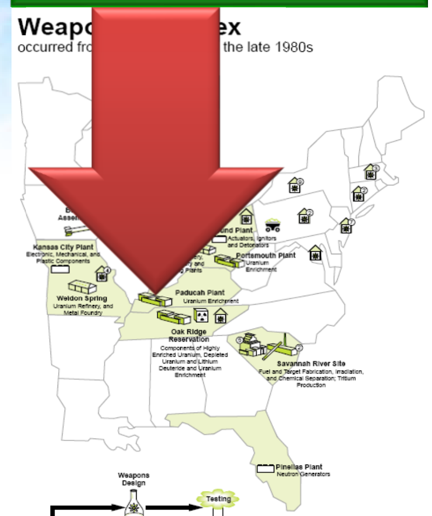
Public Involvement Opportunities

January 2009 - Project Overview

February 2009 - Factors to consider in off-site and on-site disposal

For additional information, please call 270.441.5000.

Dispose on site



History

December 1950	U.S. government selects former Kentucky Ordnance Works site in Paducah for new uranium enrichment plant.
December 1950	U.S. officials name Carbide and Carbon Chemicals Co. (now Union Carbide) to operate plant.
September 1952	First production cells go "on stream."
Mid-1960s	Plant shifts from military mission to commercial focus, supplying enriched uranium to electric utilities operating nuclear power plants.
January 1975	Nuclear Regulatory Commission (NRC) and the Energy Research and Development Agency (ERDA) assume AEC functions. NRC takes over regulatory oversight of nuclear power plants and ERDA assumes responsibility for uranium enrichment.
October 1977	Government transfers ERDA functions to newly- created Department of Energy (DOE).
April 1984	Martin Marietta Energy Systems, Inc. takes over Union Carbide's operating contract for plant.
1988	Kentucky Radiation Health Branch discovers Technetium-99 in off-site residential drinking wells north of the PGDP
1988	USEPA issues Administrative Consent Order to DOE for PGDP
1988	DOE establishes Water Policy to provide drinking water to those impacted by groundwater contamination

History

May 1991	USDOE and KY sign Agreement in Principle
August 1991	USEPA and KY issue RCRA permit for PGDP
October 1992	Energy Policy Act creates USEC to take over government's uranium enrichment enterprise.
July 1993	USEC assumes responsibility for Paducah, Kentucky, and Portsmouth, Ohio, uranium enrichment plants. DOE retains responsibility for environmental restoration and waste management activities resulting from its operations at the site.
November 1993	Federal Facilities Oversight Unit (FFOU) is created at the University of Kentucky to conduct scientific investigation and provide regulatory support to the KY Division of Waste Management
1993	Northwest Plume Interim ROD signed – pump and treat facility installed
May 1994	PGDP placed on EPA's National Priority List under CERCLA
June 1995	Lockheed Martin Corp. forms after merger of Lockheed and Martin Marietta corporations. Lockheed Martin Utility Services, Inc. (LMUS) continues operation of USEC's Paducah and Portsmouth plants.
1995	Northeast Plume Interim ROD signed – pump and treat facility installed
1997	Dr. Wes Birge with UK Biological Sciences begins monitoring of Bayou and Little Bayou Creeks in support of KY DWM AIP activities
March 1997	Regulatory oversight of enrichment plants officially transfers from DOE to NRC.

History

July 1998	USEC is privatized, becomes USEC Inc., an investor-owned corporation.
1998	USEPA, KY, and USDOE sign Federal Facilities Agreement
May 1999	USEC takes over direct operation of Paducah and Portsmouth GDPs.
May 1999	KYEPC DWM consolidates non-rad activities of UK-FFOU back into KY DWM – rad activities continue to be supported through Radiation Health Branch of KY CHFS
1999	North South Diversion Ditch ROD issued – Removal of contaminated sediments
June 2000	USEC announces plan to consolidate all enrichment activity at Paducah by June 2001.
March 2001	NRC amends operating certificate for the Paducah plant, permitting it to enrich uranium at levels up to 5.5% uranium-235.
April 2001	USEC completes Paducah assay upgrade program, enabling Paducah plant to enrich uranium at levels up to 5%.
2001	UK Superfund Basic Research Program
February 2002	DOE completes top-down review of the Environmental Management Program – recommends an accelerated risk-based cleanup strategy
June 2002	USEC completes consolidation of transfer and shipping operations at Paducah.

History

2002	Uranium Disposition Services awarded contract to design, construct, and operate depleted uranium hexaflouride conversion plant at PGDP
2003	DOE signs Letter of Intent with Commonwealth of Kentucky that includes completion milestones for groundwater (2010), soils (2015), surface water (2017) and burial grounds (2019)
October 2003	The Kentucky Consortium for Energy and Environment is created through a $5 million earmark to the University of Kentucky for use in supporting the cleanup efforts at the PGDP – program results in 22 separate projects.
July 2003	DOE issues Policy 455.1: Use of Risk-Based End States
2003	DOE issues: Development of Risk-based End State Visions Guidance Document
February 2004	DOE develops draft Risk-Based End State Vision for the PGDP
August 2005	C-400 Building ROD issued – Electrical resistance heating (ERH) for TCE removal
	C-746-U Landfill begins to receive waste
2006	Scrap Yard Removal Action completed – 30,500 cubic yards of contaminated metal
2006	DOE notifies KYDEP and EPA of the existence of 93 soil piles and 29 rubble piles on DOE property that has been licensed to KY Fish and Wildlife as part of the KYWMD since 1953
2007	Energy Communities Alliance issues: *The Politics of Cleanup*
April 2007	DOE issues Community Relations Plan for PGDP

History

2007	DOE completes removal of inactive incinerator
October 2008	PGDP CAB develops planning scenario for future uses for the GPDP site
2008	DOE completes removal of inactive smelter
September 2008	UK KRCEE receives $2.5M to provide an additional two years of technical support
April 2007	UK KRCEE receives supplemental funding to complete PGDP Land Study Report
April 2009	UK KRCEE initiates PGDP Stakeholder End State Vision Project
April 2009	PGDP targeted to receive $79 million in stimulus funds for cleanup

Recent DOE Administrative History

- DOE Top-to-Bottom Review (2002)
  - Recognition that clean up was taking more time and resources than initially envisioned
  - Accelerated cleanup
- Risk Based End State Process (2003)
  - Directs sites to define risk-based end states that are sustainably protective of human health and the environment.
  - RBES are derived from appropriate land uses and their associated exposure scenarios.
  - Addresses all contaminants of concern.
  - With RBES, cleanup efforts can be focused so they are both cost effective and protective.
  - DOE must still comply with all applicable laws, regulations and agreements.
  - End state vision must be formulated in cooperation with all stakeholders.
  - RBES Vision documents are not decision documents.
- Politics of Clean-Up (2007)
  - Based on a review of previous clean-up experiences
    - Oak Ridge
    - Mound
    - Rocky Flats

RBES Guiding Principles

- The Department will comply with the requirements of the nation's environmental laws and regulations. However, the requirement to develop and achieve risk-based end states will drive the Department's compliance strategy.
- End states, including the selected remedies, must be based on an integrated site-wide perspective (including the current and future use of surrounding land), rather than on isolated operable units or release sites.
- End states must be focused on protecting the relevant receptors based on the intended land use. Sites must document the final anticipated risk-based condition that drive a cleanup decision or activity.
- Sites must consider the interim risks to the public, workers, and the environment in the selection of actions required to achieve risk-based, end states. Ecosystem health should not be endangered nor should workers be put at risk by requiring them to take actions that result in little or no reduction in risk to the public or the environment.
- Where contaminants are expected to persist but can be isolated, risk concepts should include effective and transparent institutional controls to maintain isolation. Long term monitoring and surveillance methods must be designed to assure that the contaminants remain sequestered and human health and the environment are protected.
- Stakeholders and regulators must be consulted in the actions needed to develop and achieve risk-based, end-states
- End states must address how we are to manage the impacts of future risks and vulnerabilities, including the creation of contingency plans in the event that site conditions change after clean up is completed.

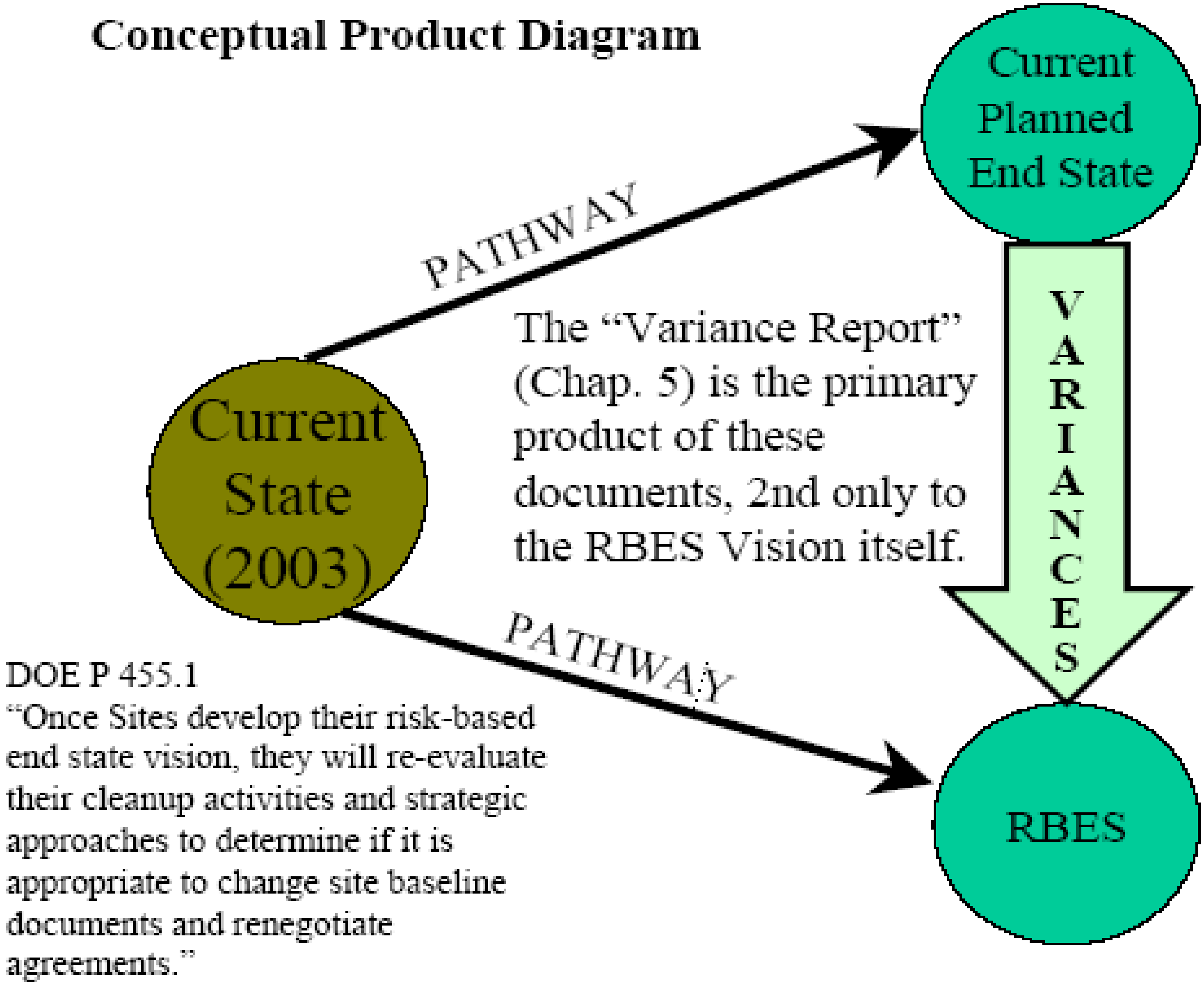


Fig. 1.1 Conceptual product diagram for the RBES report

Site Characterization by Hazard Areas

- Groundwater Operable Unit (GWOU)
- Surface Water Operable Unit (SWOU)
- Burial Grounds Operable Unit (BGOU) (Group1)
- Surface Soils Operable Unit (SSOU)
- Permitted Landfills
- Burial Grounds Operable Unit (BGOU) (Group 2)
- Legacy Waste and DMAs
- Cylinder Yards and DUF6 Conversion Facility
- GDP Facilities

Hazard Area Descriptions

- Hazard Area 1: This hazard area is composed of the GWOU. It encompasses both the sources of contamination to groundwater and the three dissolved phase plumes. Sources considered are those below the C-400 Cleaning Building located in the center of the industrialized area of PGDP, two burial grounds located in the west central portion of the industrialized area of PGDP, the C-720 Building located in the southern part of PGDP, and an oil landfarm.

- Hazard Area 2: This hazard area is composed of the SWOU. It encompasses the sources of surface water contamination found within the industrialized portion of PGDP, the plant ditches and outfalls found inside the industrialized portion of PGDP; the NSDD, a portion of which is located outside the industrialized portion of PGDP; and Bayou and Little Bayou Creeks, which are found outside the industrialized area and run both on and off DOE property.

- Hazard Area 3: This hazard area is composed of three areas included in the burial grounds OU that contain buried waste and/or soil that are not believed to serve as a source of groundwater contamination, but for which the current planned end state and RBES differ. These burial grounds are located in the northwestern part of the industrialized area of PGDP.

Hazard Area Descriptions

- Hazard Area 4: This hazard area is composed of units that make up the SSOU. It encompasses all areas containing contamination that does not impact the GWOU or SWOU. As depicted later in this chapter, this hazard area includes all areas inside the industrialized portion of PGDP that are not part of other hazard areas, including those that are part of Hazard Area 9.

- Hazard Area 5: This hazard area is composed of two permitted, closed landfills, the currently operating permitted landfill, and, under future conditions, a potential "CERCLA Cell" that would be used to dispose of debris and other materials generated during GDP D&D. The two closed landfills and the operating landfills are located in the north-central portion of PGDP, outside the industrialized area. The site of the potential CERCLA Cell has not been determined at this time.

- Hazard Area 6: This hazard area is composed of four areas included in the BGOU that contain buried waste and/or soil that are not believed to serve as a source of groundwater contamination, but for which the current planned end state and RBES do not differ. These include a landfill located to the southwest of the industrialized portion of PGDP, adjacent to Bayou Creek, and three burial grounds located in the northwestern part of the industrialized area of PGDP.

Hazard Area Descriptions

- Hazard Area 7: This hazard area is composed of legacy waste found at storage locations at PGDP and potentially contaminated debris, surfaces, and soil found in DMSAs located throughout PGDP.
- Hazard Area 8: This hazard area is composed of the cylinder yards that contain DUF_6 and a facility currently being planned to convert the DUF_6 to more stable uranium oxides before off-site shipment. The cylinder yards are located throughout the site, and the largest yard is in the southeast corner of the industrialized area of PGDP. The planned conversion facility will be located adjacent to this yard.
- Hazard Area 9: This hazard area is composed of the GDP facilities and infrastructure that will undergo D&D as part of either the D&D OU strategic initiative (see Chap. 1) or the final GDP D&D. This hazard area also encompasses any sources to groundwater and surface water not addressed in other hazard areas.

Hazard Area 1 - GWOU

- C-720 Maintenance and Storage Building
- C-400 Cleaning Facility
- SWMU 1: C-747-C Oil Land Farm
- SWMU 2: C-749 Uranium Burial Ground
- SWMU 4: C-747 Contaminated Burial Ground
- SMWU 201: Northwest Groundwater Plume
- SWMU 202: Northeast Groundwater Plume
- SWMU 210: Southwest Groundwater Plume
- Little Bayou Creek Groundwater Plume Seeps

Hazard Area 2 – Surface Water Operable Unit

- SWMUs 60, 61, 62, 63, 66, 67, 68, 69, 168, and 526: Internal plant ditches and outfalls
- SWMUs 58 and 59: NSDD
- SWMU 64: Little Bayou Creek
- SWMU 63: Bayou Creek
- SWMU 179: Storm sewer systems
- SWMUs 13, 14, 15, 16, and 520: Scrapyards

Hazard Area 3 – Burial Ground Operable Unit (Group 1)

- SWMU 3: C-404 Low-level Radioactive Waste Burial Ground
- SWMU 6: C-747-B Burial Ground
- SWMU 145: Residential/Inert Landfill Borrow Area (and old NSDD Channel)

Hazard Area 5 – Permitted Landfills

- SWMU 9: C-746-S Residential Landfill
- SWMU 10: C-746-T Inert Landfill
- SWMU 208: C-746-U Landfill

Hazard Area 6 – C-746-K Landfill

- SWMU 5: C-746-F Burial Ground
- SWMU 7: C-747-A Burial Ground
- SWMU 8: C-746-K Landfill
- SWMU 30: C-747-A Burn Area

Hazard Area 7 – Legacy Waste DMSAs

C-746-A	C-746-V	C-310	C-337
C-746-B	C-746-M	C-331	C-752-A
C-746-H3	C-752-C	C-333	C753-A
C-746-Q	C-733	C-335	

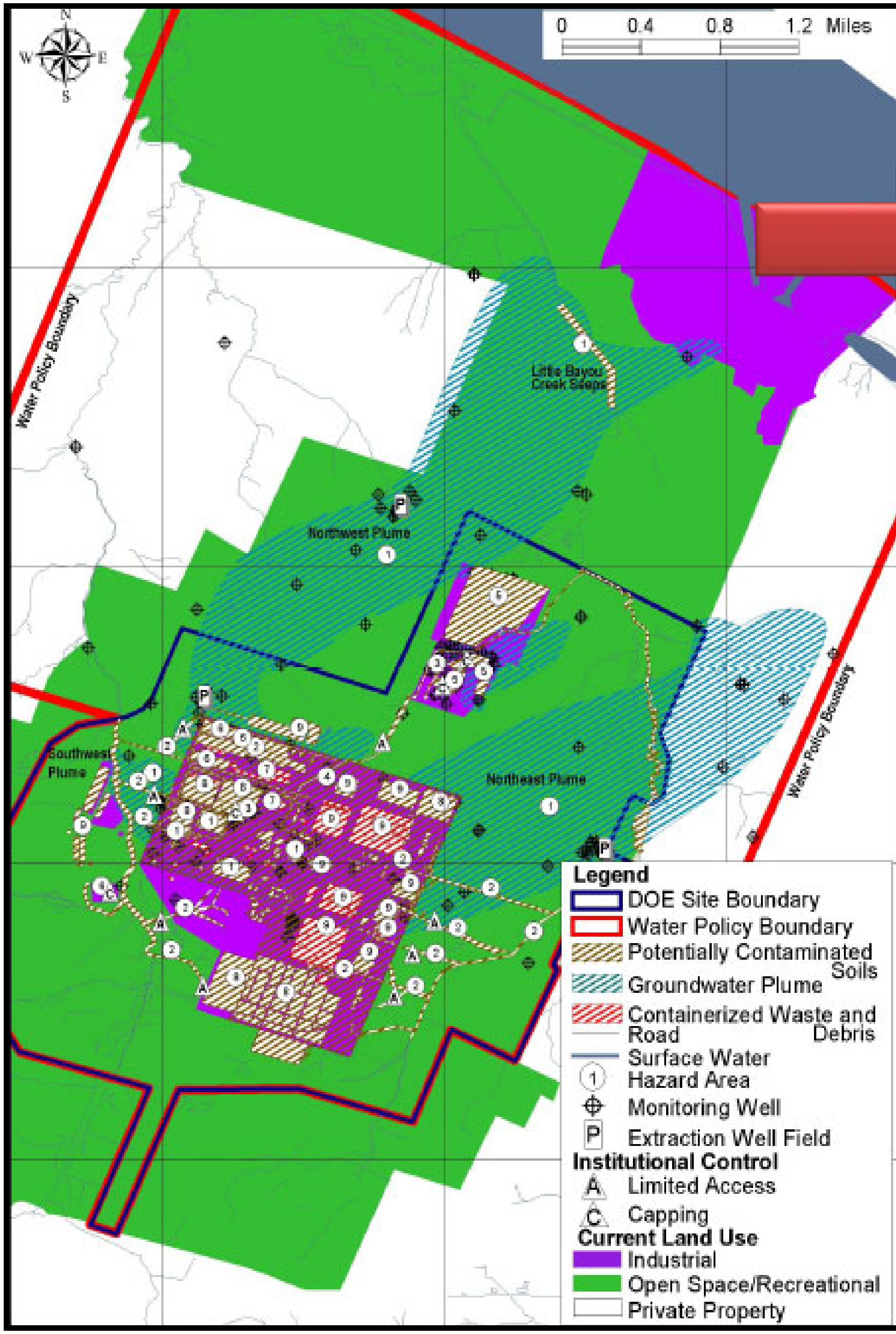
Outside-Locations 1-18	C-333-Locations 1-43	C-409-Locations 1-2
C-310-Locations 1-5	C-333-Locations 1-45	C-720-Locations 1-4
C-331-Locations 1-24	C-400-Locations 1-8	

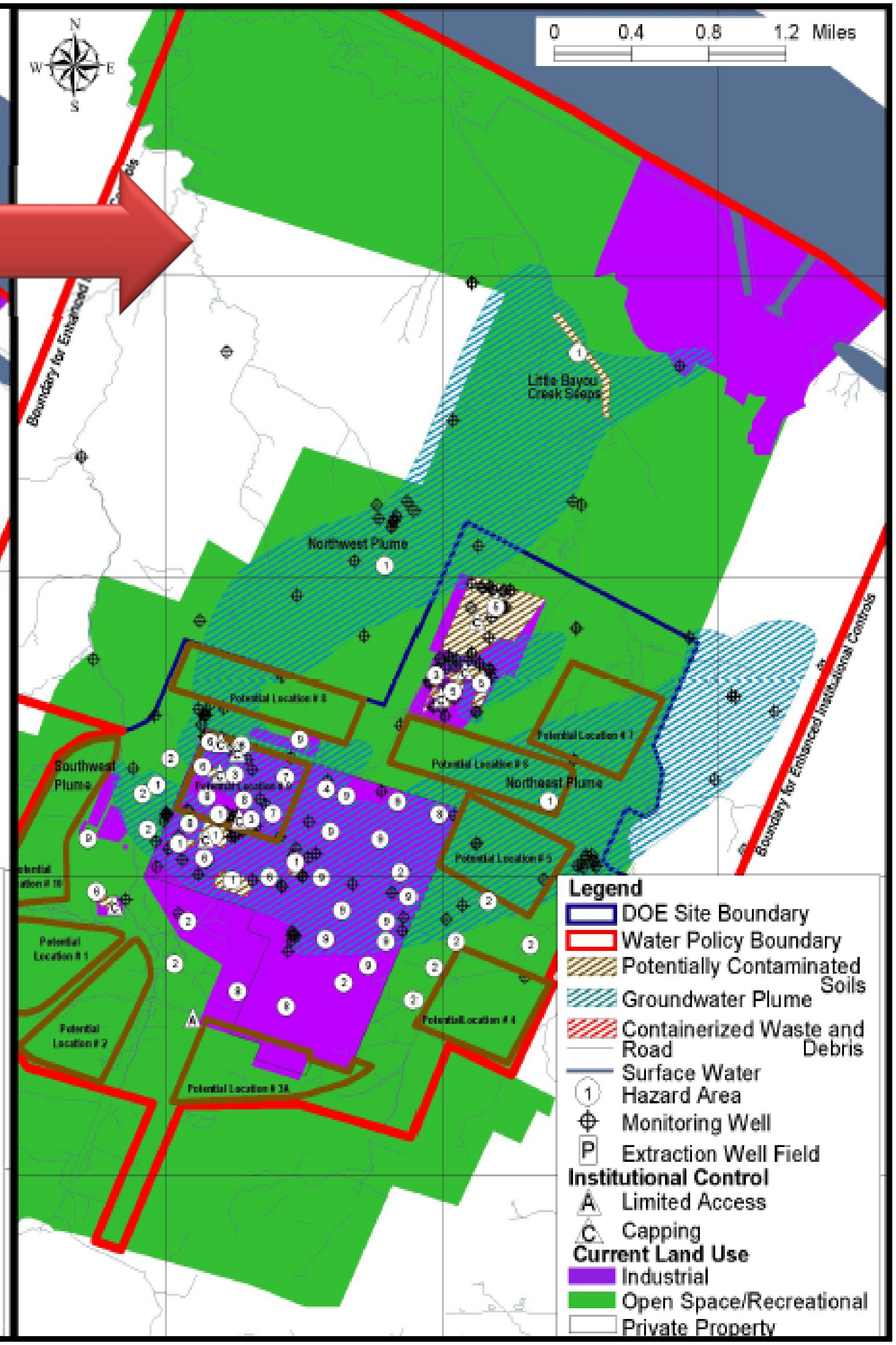
Hazard Area 9 – GDP Facilities

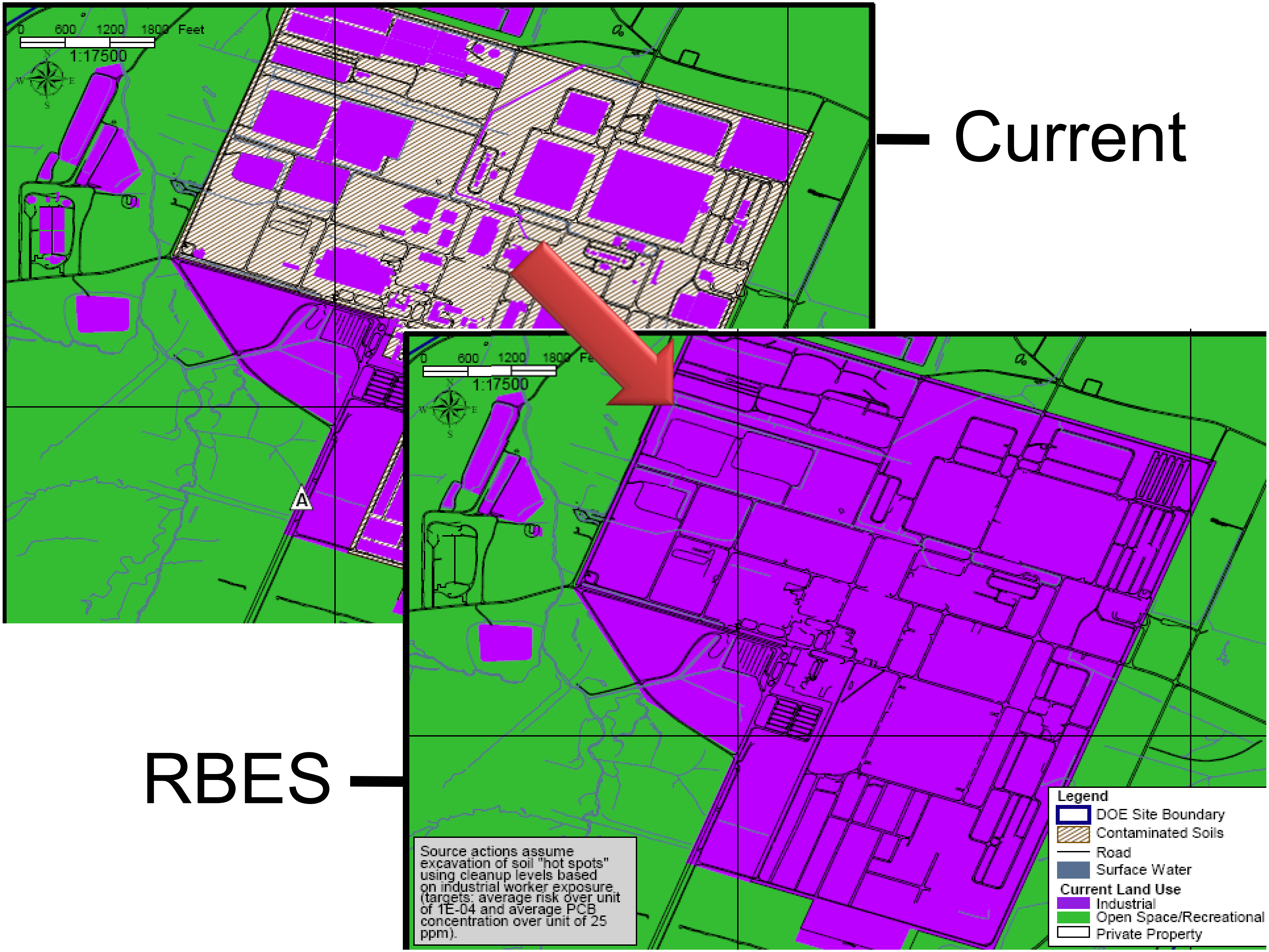
- C-331, C-333, C-335, and C-337 process buildings and associated switchyards and cooling towers
- C-710 Technical Service Building
- C-720 Building
- C-724/725 Paint Shop
- Sewage Treatment Plant
- Water Treatment Plants
- C-400 Cleaning Building

State Characterization

- Map
- Narrative Summary
  - Sources
  - Exposure pathways
  - Projected risk levels
- Conceptual Site Model
  - A description of the hazard area of concern
  - Primary and secondary sources of contamination
  - Current and potential future release, transport, and exposure mechanisms
  - Current and potential future receptors believed to be at risk
  - Current and planned barriers or mechanisms (e.g. removal) that will prevent or limit potential exposure to at-risk receptors
- Treatment Train


0 0.4 0.8 1.2 Miles
Water Policy Boundary
Little Bayou Creek Seeps
Northwest Plume
Southwest Plume
Northeast Plume
Legend
DOE Site Boundary
Water Policy Boundary
Potentially Contaminated Soils
Groundwater Plume
Containerized Waste and Debris
Road
Surface Water
Hazard Area
Monitoring Well
Extraction Well Field
Institutional Control
Limited Access
Capping
Current Land Use
Industrial
Open Space/Recreational
Private Property


0 0.4 0.8 1.2 Miles
Boundary for Enhanced Institutional Controls
Little Bayou Creek Seeps
Northwest Plume
Southwest Plume
Northeast Plume
Legend
DOE Site Boundary
Water Policy Boundary
Potentially Contaminated Soils
Groundwater Plume
Containerized Waste and Debris
Road
Surface Water
Hazard Area
Monitoring Well
Extraction Well Field
Institutional Control
Limited Access
Capping
Current Land Use
Industrial
Open Space/Recreational
Private Property


Current
RBES
0 600 1200 1800 Feet
1:17500
0 600 1200 1800 Fe
1:17500
Source actions assume excavation of soil "hot spots" using cleanup levels based on industrial worker exposure (targets: average risk over unit of 1E-04 and average PCB concentration over unit of 25 ppm).
Legend
DOE Site Boundary
Contaminated Soils
Road
Surface Water
Current Land Use
Industrial
Open Space/Recreational
Private Property

Risk Assessment Summary

Table 4.1 Risk assessment summary[a] for residential exposure to groundwater drawn from the RGA at a point within the off-site Northwest and Northeast Plumes and for recreational exposure to groundwater discharged to the surface at seeps along Little Bayou Creek

Location[b]	Land Use	Risk[c]	Risk Scenario[d]	Contaminant Description	Representative Concentration	Baseline Risk Level[e]	PRG[f]	Basis for PRG[g]	Actual or Expected Post Cleanup Concentration[h]
NW Plume Offsite	Residential	Y	Residential	TCE	1.39 mg/L	ELCR = 1E-03 HI=120	0.005 mg/L	MCL	NA
				Cadmium	0.0161 mg/L	ELCR = 6E-04 HI = 2	0.005 mg/L	MCL	NA
NE Plume Offsite	Residential	Y	Residential	TCE	0.754 mg/L	ECLR = 5E-04 HI = 64	0.005 mg/L	MCL	NA
				1,1-DCE	0.006 mg/L	ELCR = 6E-04 HI = NA	0.007 mg/L	MCL	NA
Seeps (1997 data)	Recreational	N	Recreational	TCE	0.051 mg/L (maximum)	18 of 88 results (1 location) exceeded no action level	0.0218 mg/L	Risk-Based	NA
				Cadmium	0.026 mg/L (maximum)	1 of 39 results exceeded no action level	0.00457 mg/L	Risk-Based	NA
Seeps (2000 data)	Recreational	N	Recreational	TCE	0.44 mg/L (maximum)	49 of 71 results (12 locations) exceeded no action level	0.0127	Risk-Based	NA
				Antimony	0.0035 mg/L (maximum)	1 of 15 results exceeded no action level	0.00312	Risk-Based	NA

[a] Results for Northwest and Northeast Plumes are taken from DOE 2001a. Results for seeps are from an unnumbered information sheet entitled, *Seeps Along Little Bayou Creek, Northwest Groundwater Plume,* dated July 2001. Risks presented are "unmitigated" or baseline risks, which assume exposure with no barriers.

[b] Contaminant concentrations used for the assessment were the upper 95% confidence limit on the average concentrations of all groundwater results collected from wells in the off-site areas of the Northwest and Northeast Plumes.

[c] "Y" indicates the result came from a baseline risk assessment. "N" indicates the result came from a screening level risk assessment.

[d] Residential scenario considered lifetime (40 year) exposure by a resident to groundwater used in the home as drinking water, while showering, and for general household uses. Recreational scenario considered direct exposure to water while wading.

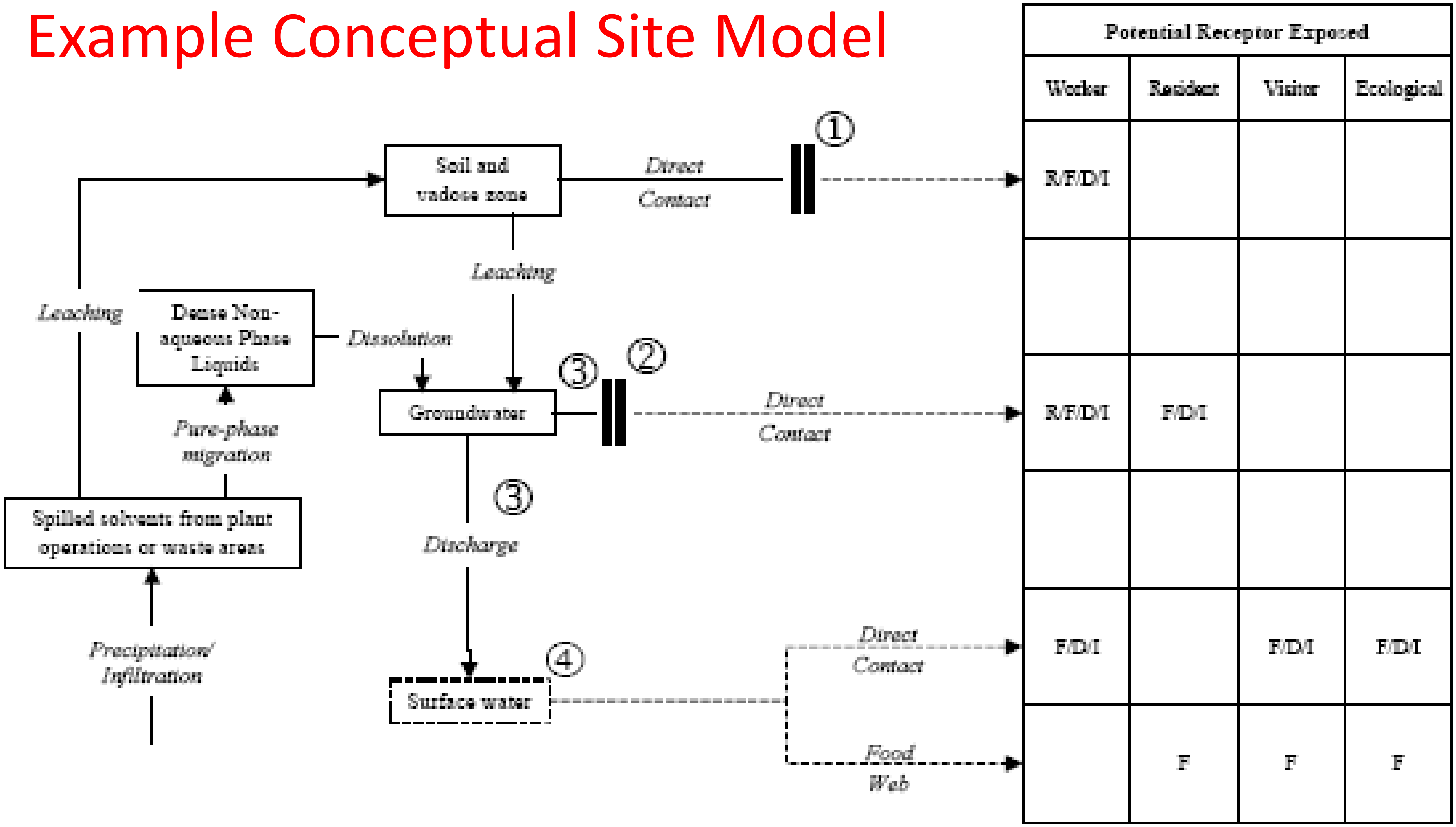
[e] "ELCR" is the excess lifetime cancer risk level. Values from E-06 to E-04 are within EPA's acceptable risk range for site related exposures. "HI" is the hazard index, a measure for potential systemic toxicity. Values greater than 1 indicate that a deleterious health effect is possible.

[f] "PRG" is the preliminary remediation goal used when considering potential response actions.

[g] "MCL" = maximum contaminant level. "Risk-Based" = value derived using a scenario appropriate to the land use and a target risk of either 1E-06 (cancer) or 1 (hazard).

[h] Under RBES, the potential action is monitored natural attenuation; therefore, no values are available at this time.

Example Conceptual Site Model



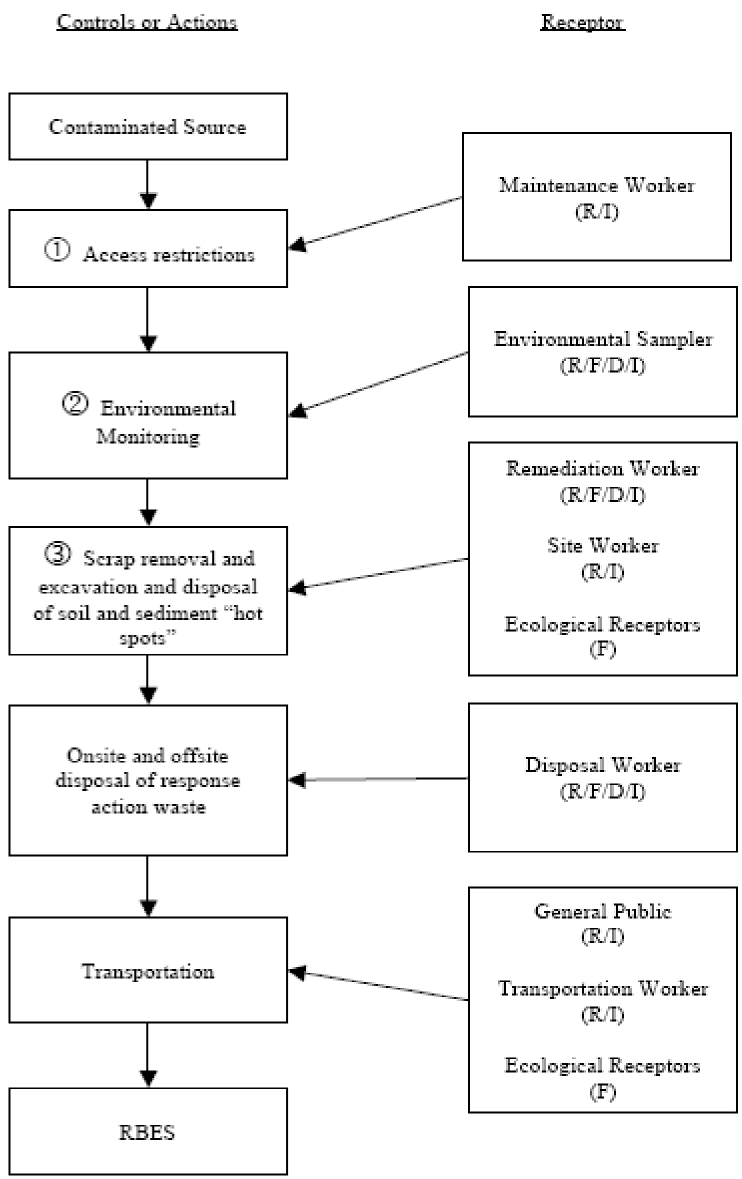
Current Controls or Actions
① Access and excavation restrictions.
② PGDP Water Policy.
③ "Hot spot" pump and treat.
④ Attenuation.

Receptor Key
Worker – includes workers exposed during inside and outside activities, including the remediation worker.
Resident – includes residents engaged in all but recreation activities.
Visitor – includes recreational users, intruders, and trespassers.
Ecological – includes on- and offsite aquatic and terrestrial ecological receptors.

Exposure Route Key
R = External Exposure
F = Ingestion
D = Dermal
I = Inhalation

Fig. 4.1a2. Hazard Area 1: Groundwater OU CSM – current state.

Treatment Train



Current Planned Actions

- Continued access and institutional controls (e.g., capping, controls on groundwater use)
- Response actions to reduce the concentration of TCE and other solvents in subsurface areas that act as sources of groundwater contamination
- Response actions to reduce TCE concentrations in the dissolved phase plumes
- Monitored natural attenuation of sources of groundwater contamination (TCE source areas) and the dissolved phase plumes following completion of response action to reduce TCE concentrations
- Active measures to reduce TCE concentrations in groundwater discharged to surface water
- Construction of sediment control basins
- Excavation and off-site disposal of surface and subsurface soil and sediment to attain a target risk of 1E-06 for hypothetical residents and an average PCB concentration of 1ppm within exposure units in industrial and recreational areas
- Excavation and off-site disposal of wastes from burial grounds
- On-and off-site disposal of debris from D&D of facilities and infrastructure

Proposed RBES Actions

- Continued access and institutional controls (e.g., capping, controls on groundwater use)
- Monitored natural attenuation of sources of groundwater contamination (TCE source areas) and the dissolved phase plumes with continued access and institutional controls
- Excavation and on and off site disposal of contaminated surface soil and sediment to attain a target risk of 1E-04 to receptors consistent with current and future land use and an average PCB concentrations within exposure units of 25 ppm in industrial areas and 1 ppm in recreational areas
- Characterization and off site disposal of legacy waste
- On-and off-site disposal of debris from D&D of facilities and infrastructure

Variance Analysis

RBES Actions ⟷ Current Planned Actions

RBES Actions		Current Planned Actions
1) Enhanced institutional controls to limit groundwater	VS	Contamination of PGDP Water Policy to limit groundwater use—affects Hazard areas 1,6, and 9
2) Monitored natural attenuation for groundwater source areas, with either enhanced institutional controls or continuation of the PGDP Water Policy	VS	Active treatment of groundwater source areas using heating technologies, with continuation of the PGDP Water Policy—affects Hazard Areas 1 and 9
3) Monitored natural attenuation for groundwater source areas, with either enhanced institutional controls or continuation of the PGDP Water Policy	VS	Excavation of groundwater source areas (burial grounds), with continuation of the PGDP Water Policy—affects Hazard Area 1
4) Monitored natural attenuation for the dissolved phase groundwater plumes, with either enhanced institutional controls or continuation of the PGDP Water Policy	VS	Active treatment for the dissolved phase plume using oxidation technologies, with continuation of the PGDP Water Policy—affects Hazard Area 1
5) Continued monitoring of discharges of groundwater to surface water	VS	Actions to reduce contaminant levels in groundwater discharged to surface water—affects Hazard Area 1
6) Cleanup levels for soil and sediment in industrial areas set at targets of 1E-04 (under an industrial scenario) and PCBs of 25 ppm and cleanup levels for soil and sediment in recreational areas set at targets of 1E-04 (under a recreational scenario) and PCBs of 1 ppm	VS	Cleanup levels for soil and sediment in industrial and recreational areas set at targets of 1E-06 (under a residential scenario) and PCBs of 1 ppm—affects Hazard Areas 2,4,8, and 9
7) Continued monitoring of contaminant levels in surface water at outfalls	VS	Construction of sediment control basins to reduce contaminant migration in surface water—affects Hazard Area 2
8) Capping of certain burial grounds	VS	Excavation of certain burial grounds—affects Hazard Area 3
9) Construction of potential CERCLA Cell	VS	No construction—affects Hazard Area 5
10) Cleanup levels for soil and/or decontamination of surfaces in industrial areas set at targets of 1E-04 (industrial) and PCBs of 25 ppm	VS	Targets of 1E-06 (residential) and PCBs of 1 ppm—affects Hazard Area 7

Transition Assessment

(for each hazard area)

Table 5.1 Variance report by hazard area

ID. No.	Description of Variance	Impacts	Barriers in Achieving RBES	Recommendations
Hazard Area 1: Groundwater Operable Unit				
V-1.1	**Current Planned End State**: Continuation of PGDP Water Policy **RBES**: Enhanced institutional controls	Scope: The current planned end state includes continuation of the current PGDP Water Policy[a]. The RBES includes enhanced institutional controls[b], which would supercede the current PGDP Water Policy. Under both end states, the goal would be to reduce risks to residents from exposure to groundwater to *de minimis* levels[c]. Cost: The cost variance has not been determined to date. The current PGDP Water Policy costs range from $70,000 to $100,000 per year. Depending upon the specific enhanced institutional controls, the cost variance of the enhanced institutional controls could include some cost avoidance (if the PGDP Water Policy is terminated). However, the implementation of enhanced institutional controls would include costs for acquisition of rights to restrict groundwater use and continued monitoring to ensure continued long-term effectiveness of the enhanced institutional controls. Schedule: The PGDP Water Policy is currently in place. Implementation of the enhanced institutional controls would be a future planned CERCLA response action. Risk: The expected risk variance is zero under both the PGDP Water Policy and enhanced institutional controls because each would prevent exposure to contaminated groundwater, resulting in no risk. Enhanced institutional controls, however, would be more sustainable and, therefore, would result in greater long-term effectiveness because they would involve legally enforceable property restrictions and deed notices. (The agreements with landowners under the PGDP Water Policy do not restrict groundwater use, but only commit DOE to provide municipal water to replace the groundwater in return for the property owner's commitment not to use the groundwater. Thus, current or future property-owners could return to using groundwater in the home, completing this exposure pathway, and potentially raising risk from *de minimis* levels[c].)	DOE policy may limit options available under the enhanced institutional controls.	Initiate further discussions with the public and regulators. Revisit DOE policy.