APPENDIX K

CONCEPTUAL SITE MODELS FOR TYPICAL HAZARDS

Figure 4.23b	Generic Conceptual Site Model
Figure 4.24b	Group 1: Burial Ground Complex CSM
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Figure 4.26b	Group 2: Radiological Seepage Basins and Pits CSM
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INTRODUCTION

Conceptual Site Models (CSMS) for Soil and Groundwater Projects (SGP) and Deactivation and Decommissioning (D&D) Projects are intended to provide a visual presentation of SRS hazards (name of waste unit or facility and its location), the current status, risks (current and at the end state), hazard type, and technology to be used.

The following pages provide a text description of this information, followed by a visual model for a generic waste unit or facility. At the end of each section, a complete listing of waste units or facilities is provided with this information. This information is separated in this appendix with SGP text, models, and listing first; followed by the same types of information for D&D. Presented in this manner, each section can be considered "stand alone" for each of these two major types of end states.

SOIL AND GROUNDWATER CLOSURE

Hazards

SRS operations over the past 40 years have produced an accumulation of various amounts and types of waste materials. The accumulated wastes include hazardous, low-level radioactive, high-level radioactive, and nonhazardous, nonradioactive wastes. The waste management practices (past and present) have included the use of seepage basins for liquid wastes, pits and piles for solid wastes, tanks for high level radioactive and mixed wastes, and landfills for low-level radioactive and nonradioactive wastes. The major constituents of SRS wastes include volatile organic compounds (VOCs), heavy metals, radionuclides, and nonradioactive wastes.

Waste materials with almost identical physical and chemical characteristics were disposed of at a majority of these sites. Additionally, most of these sites have similar physical and hydrogeologic features. The sites with almost identical features and containing similar types of wastes can be grouped together for the purpose of evaluating treatment technologies. Consequently, the sites have been divided into eleven groups (or hazard types). The eleven groups (hazard types) are briefly described below:

Group 1: Burial Ground Complex (BGC) occupies approximately 195 acres in the central section of the SRS. The BGC is composed of several contiguous facilities that served as disposal locations for radioactive and hazardous wastes. It is divided into three distinct waste burial locations: the Old Radioactive Waste Burial Ground (ORWBG), Low-Level Radioactive Waste Disposal Facility (LLRWDF) and the Mixed Waste Management Facility (MWMF). Radioactive waste, mixed waste, and waste containing heavy metals and various organic constituents are the primary constituents of concern.

Group 2: Radiological Seepage Basins and Pits are unlined earthen basins that received process wastewater, or pits that contain radiologically contaminated debris. Radioactive waste, mixed waste, and waste containing heavy metals and various organic constituents are the primary constituents of concern.

Group 3: Coal Pile Runoff Basins and Ash Basins include sites that contain wastes associated with coal and/or ash and contain coal-related radionuclides, heavy metals and other inorganic constituents.

Group 4: Inactive Process Sewer Lines (and Sumps) are underground sewer lines that received various liquid wastes from a facility. Major contaminants include radionuclides, metals and organic constituents.

Group 5: Nonradiological Rubble Piles and Pits contain nonradioactive rubble, including building debris and scrap materials; metals and various organic constituents are the primary concern.

Group 6: Nonradiological Seepage Basins are unlined earthen basins that received nonradiological wastewater and contain primarily organic and/or inorganic hazardous constituents.

Group 7: Sludge Application Sites were used for land applications of municipal/sanitary sewage sludge and contain both organic and inorganic constituents.

Group 8: Acid/Caustic Basins received waste streams consisting of predominantly spent dilute sulfuric acid and sodium hydroxide (caustic) solutions from the regeneration of ion exchange units in the water treatment facilities that supported reactor operations. Major contaminants include radionuclides, metals and organic constituents.

Group 9: Miscellaneous Sites do not readily fall in the above groupings. Examples include spills, sandblast areas, outfalls, gunsites, etc. Since this is a broad category; wastes containing radiological material, as well as various organic and inorganic constituents may be found at these sites.

Group 10: Groundwater operable units have been separated from the surface units and consider the groundwater media only. Groundwater is depicted in each of the nine groupings indicated above; a separate conceptual site model for groundwater has not been developed.

Group 11: Integrator Operable Units (IOUs) are surface water bodies (e.g., site streams and the Savannah River) and associated wetlands, including the water, sediment, and related biota. SRS has six IOUs that correspond to the respective watersheds. A separate CSM for the IOUs has not been developed.

DESCRIPTION OF TECHNOLOGIES

OUTLINE

A. Remedial Actions for Soil
  - A.1 No Action
  - A.2 Institutional Controls
  - A.3 Cover Systems
  - A.4 Stabilization/Solidification
  - A.5 Bioremediation
  - A.6 Thermal Desorption/Incineration
  - A.7 Excavation and Disposal

B. Remedial Actions for Groundwater
  - B.1 No Action
  - B.2 Institutional Controls and Monitoring
  - B.3 Monitored Natural Attenuation Alternate Concentration Limits/Mixing Zone Concentration Limits with Groundwater Monitoring
  - B.4 Air Sparging
  - B.5 Soil Vapor Extraction
  - B.6 Enhanced Biodegradation
  - B.7 Air Lift Recirculation
  - B.8 Permeable Reactive Barrier
  - B.9 Ex Situ Technologies (Pump and Treat)
  - B.10 Phytoremediation

C. Remedial Action for Surface Water
  - C.1 No Action
  - C.2 Institutional Controls
  - C.3 In Situ Treatment
  - C.4 Ex Situ Treatment

DESCRIPTION OF TECHNOLOGIES

A. Remedial Actions for Soil

A.1 No Action

No action is not a treatment technology but is a general response action. Environmental Protection Agency (EPA) policy and regulations (40 Code of Federal Regulations [CFR] 300.430(e)(6) require the consideration of a no action alternative to serve as a baseline against which the other treatment technologies/alternatives can be compared.

Per regulatory requirements, the no action alternative provides a baseline for comparing other alternatives and is readily implemented. Because no remedial activities would be implemented with the no action alternative, long-term human health and environmental risks for the site essentially would be the same as those identified in the baseline risk assessment. This means all current and future risks would remain under the alternative. No action does not meet any applicable or relevant and appropriate requirement (ARARs). No action provides no reduction in toxicity, mobility, or volume of the contaminated soil or the groundwater.

A.2 Institutional Controls

Institutional controls are administrative measures taken to minimize the potential for human exposure. The institutional controls limit the public access to the waste site and warn site workers. The control includes deed restrictions and notification to inform the future developers or buyers of previous hazardous waste disposal activities at the site and limit the type of future activities that could be conducted on the property (e.g., restrictions on excavating the site and land use). Additional controls could include erecting a security fence, posting warning signs, and performing 5-year Record of Decision (ROD) reviews, if required.

Like no action, institutional controls are not a treatment and provide no control to the migration of the contaminant plume and further degradation of the groundwater. Also, institutional controls do not provide reduction of toxicity, mobility, or volume of the contaminated soil or the groundwater.

Institutional controls involve no construction activities except for possibly erecting a security fence with warning signs, when required. No additional risks are posed to the community, the workers, or the environment.

A.3 Cover Systems

A.3. Native Soil Cover/Low Permeability Cover

This technology/alternative consists of placing a 4-foot layer of Savannah River Site (SRS) clean soil (3-foot layer of compacted soil and 1-foot layer of loose soil to promote growth of a vegetative cover) over the contaminated soil. This layer of clean soil serves as a barrier to help prevent future receptors from becoming exposed to contaminants present within the contaminated soil. The thickness of the clean soil layer is determined by the characteristics of the contaminants present at the waste site and the future land use proposed for the waste unit.

The technology is effective in protecting both human health and the environment. The native soil cover prevents exposure to soil contamination by restricting the use of the land and relies on institutional controls to ensure its overall protectiveness.

A.3.2 Capping (Engineered Cap)

The technology involves construction of a multi-layered cover (cap) over the waste site. Generally, an engineered cap consists of a 2-foot thick low-permeability layer (compacted soil) at the bottom as a foundation layer covered by a ¼-inch thick geo-synthetic clay liner and 30-millimeter flexible membrane liner (FML). The additional layers include a 1-foot thick drainage layer; 1.5-foot thick soil vegetative layer on the top of the drainage layer; and 6-inch thick topsoil layer with a finished surface uniformly sloping on the sides. In between the soil vegetative layer and the drainage layer, the cover system has a thin geo-textile filter layer. The filter layer prevents migration of fine particles from the topsoil vegetative layer to the underlain layers and, thereby, inhibits clogging of the drainage layer.

Institutional controls, such as a security fence with warning signs, are implemented and maintained as a component of this system. Depending upon the type and degree of contamination present and risk associated with the waste site, groundwater is monitored periodically.

The engineered cap like the native soil cover is protective of human health and the environment since it provides a physical barrier to prevent direct human exposure to contaminated soil. Capping, like the native soil cover, does not involve any form of treatment that could reduce toxicity, mobility, or volume of the contaminants in contaminated media. However, capping would effectively reduce contaminant mobility by minimizing infiltration and potential for contaminant leaching, thereby reducing inherent risks associated with the soil contamination. Institutional controls such as a security fence with warning signs, and property deed restrictions/notification need to be implemented and are included as a component of this technology.

A.4 Soil Stabilization/Solidification (Grouting)

Grouting is an in situ stabilization/ solidification (S/S) technique. Grouting encapsulates the waste in a monolithic solid of high structural integrity. Solidification does not necessarily involve a chemical interaction between the wastes and the solidifying reagents but may mechanically bind the waste into the monolith. When solidified, contaminant migration is restricted by reducing the surface area exposed to leaching and/or by isolating the waste within an impervious capsule.

Cement-based and special processes utilizing proprietary additives as well as organophilic clays appear to be very promising in terms of binding organic wastes, radioactive wastes, and wastes containing polychlorinated biphenyls (PCBs). The S/S technology reduces mobility of the contaminants by stabilizing the contaminated material in a matrix where it cannot leach. However, this technology does not reduce contaminant toxicity or volume.

A.5 Bioremediation

Biodegration is an important environmental process that causes the breakdown of organic compounds into biomass and harmless byproducts of microbial metabolism such as CO, CH4, and inorganic salts. An enzyme manufactured by the microbes accomplishes the degradation.

In situ bioremediation is a highly attractive technology for remediation of VOCs because contaminants are destroyed in place, not simply moved to another location or immobilized, thus decreasing the costs, risks, and time, while increasing efficiency and public and regulatory acceptability.

A.6 Thermal Desorption/Incineration

Thermal desorption/incineration is a treatment method that uses high temperature oxidation under controlled conditions to degrade volatile and semi-volatile organic materials into products that generally include carbon dioxide, water vapor, sulfur dioxide, nitrogen oxides, other gases, and ash. This treatment generally involves removing the contaminated soil by excavation and passing it through a rotary kiln, which vaporizes the volatile and semi-volatile organics and sending the vaporization through an incinerator that pyrolytically decomposes the hazardous organics to previously mentioned harmless byproducts. The remediated soil can be returned for backfilling the excavated area.

A.7 Excavation and Disposal
Excavation and removal, followed by on-unit (SRS) disposal or treatment, are extensively performed in hazardous waste site remediation. There are several potential sites at SRS for disposal of waste materials including the E-Area Vaults (located at the SRS Burial Ground) and the E-Area Low Level Waste Disposal Facility.

Excavation and removal followed by offsite (non-SRS) disposal or treatment are also performed in hazardous waste site remediation. Two disposal facilities located outside SRS are potentially suitable for disposal of contaminated soils from SRS waste sites. The disposal facilities are the Department of Energy (DOE)-owned Nevada Test Site (NTS) in Nevada and the privately owned Envirocare facility in Utah.

There are no absolute limitations in the type of waste that can be excavated and removed from a waste site. However, worker health and safety weighs heavily in the decision to excavate certain hazardous wastes such as highly toxic or highly radioactive wastes. Other factors such as mobility of the wastes and cost of transport and disposal are also considered. A common practice at the hazardous waste site is to excavate and remove contaminant "hot spots" and to use in situ remedial action for less contaminated soils.

B. Remedial Actions for Groundwater

B.1 No Action
The No Action alternative for groundwater is the same as for soil.

B.2 Institutional Controls and Monitoring
The institutional controls are administrative measures taken to minimize the potential for human exposure to groundwater by limiting the public access to the waste site and the surrounding area. At SRS, drinking water is provided from controlled sources to prevent the use of groundwater from uncontrolled and monitored sources. These controls are generally the same as discussed in the soil section.

B.3 Monitored Natural Attenuation Alternate Concentration Limits/Mixing Zone Concentration Limits (MNA/ACL/MZCL) with Groundwater Monitoring
Generally, for the remediation of contaminated soils, this alternative is implemented in conjunction with the institutional controls or a remedial action such as a low-permeability cover.

Groundwater monitoring as part of a passive treatment, such as monitored natural attenuation (MNA), is used to support an alternate concentration limits/mixing zone concentration limits (ACLs/MZCLs) demonstration. MNA allows concentrations of contaminants in the groundwater (e.g., VOCs) to diminish by natural treatment process such as dispersion, volatilization, adsorption, and biodegradation. The process of natural attenuation is periodically monitored over time by analytical sampling of the plume from intermediate and compliance boundary wells. If contamination were to be detected above maximum contaminant limits (MCLs), further groundwater response actions would become necessary. Normally, the existing groundwater wells are used for sampling purposes.

The groundwater monitoring, or a passive in situ treatment, is applicable for contaminants such as VOCs that can be reduced simply by natural attenuation. Groundwater monitoring is also applicable for establishing and monitoring ACLs/MZCLs. However, this alternative does not remove, treat, or otherwise lesson the toxicity, mobility, or effective volume of the contaminated groundwater. Institutional controls are also required to restrict future land use until remedial action objectives (RAOs) are achieved.

B.4 Air Sparging

Air sparging removes VOCs from a contaminated aquifer by injecting compressed air at controlled pressures and volumes into the water table. The compressed air facilitates the removal of volatile organics from the groundwater through the physical process of volatilization. VOCs are transported through the mechanism of air channels or bubbles upward into the vadose zone.

B.5 Soil Vapor Extraction

Soil vapor extraction (SVE) removes organic chemicals (e.g., VOCs and semi-volatile organic chemicals [SVOC]s) from soil by withdrawing the gaseous phase chemical in the soil gas. SVE is an effective method for treating subsurface soils contaminated with VOCs and SVOCs. Monitoring wells are installed through the contaminated vadose zone soil immediately above the water table, and a vacuum is applied to the wells. Because of the pressure gradient created by the vacuum, volatile chemicals in the soil diffuse through the soil pore space to the wells.

B.6 Enhanced Biodegradation

The technology involves setting up a series of injection wells in the saturated zone, which would bubble air through the groundwater. These wells are used to inject air, methane, tributyl phosphate, or other nutrients, if needed, to enhance microbial activity degrading VOCs. The extraction wells would remove the resulting vapor stream and pass it through a carbon adsorption bed to ensure that the offgas met the limits of the air permit obtained for the remedial action.

This treatment process is very successful in removing the VOCs from the groundwater. If employed in combination with soil vapor extraction and carbon adsorption for offgas treatment, it can provide long-term/permanent treatment by reducing the toxicity and volume of VOCs.

B.7 Air Lift Recirculation

In-well vapor stripping is a technology for the treatment of groundwater contaminated with VOCs. The technology uses air injected into a groundwater well to strip contaminants from the water and to induce an upward flow of groundwater within the well. The treated groundwater that has been lifted upward in the well is then discharged directly back into the ground without ever leaving the well.

B.8 Permeable Reactive Barrier

The slurry cut-off walls are the most common subsurface barriers because they are a relatively inexpensive means of vastly redirecting groundwater flow in the consolidated earth materials. This technology can also be used for containing soil-borne contaminants since this technology decreases soil contaminant migration.

B.9 Ex Situ Technologies (Pump and Treat)

Ex situ treatment of contaminated groundwater involves the following steps: (1) groundwater pumping, (2) treatment of groundwater using various unit treatment processes, and (3) re-injection of treated water.

Because the contaminated groundwater is so diverse in volume, type and concentrations of contaminants, no single unit treatment process will be sufficient to treat the groundwater. Therefore, the unit treatment processes are frequently used in combination and with pretreatments if there is a prerequisite to effective use of each treatment process.

The unit treatment processes generally used in the treatment of groundwater include air stripping, activated carbon adsorption, ion exchange, reverse osmosis, precipitation/flocculation.

B.9.1 Extraction and Air Stripping
Air stripping is a mass transfer process in which volatile contaminants in water are transferred to gas. During this process, VOCs in groundwater are converted to vapor phase by being exposed to a large surface area in a column. The offgases are treated separately before they are released to the atmosphere.

Air stripping is used to remove volatile organics from aqueous waste streams. This includes such components as 1,1,1-trichloroethane, trichloroethylene, chlorobenzene, vinyl chloride, and dichloroethylene.

Air stripping is often only partially effective and must be followed by another process such as biological treatment of carbon adsorption. Combined use of air stripping and activated carbon can be an effective way of removing contaminants from groundwater. The air stripper removes the more volatile compounds not removed by activated carbon and reduces the organic load on the carbon, thus reducing the frequency and expense of carbon regeneration.

In recent years, air stripping has gained increasing use for the effective removal of VOCs from groundwater. It has also been used most effectively for treatment of low concentrations of VOCs as a pretreatment step prior to activated carbon.

B.9.2 Activated Carbon Adsorption
The process of adsorption onto activated carbon involves contacting a waste stream with the carbon, usually by flow, through a series of packed bed reactors. The activated carbon selectively adsorbs hazardous constituents by a surface attraction phenomenon in which organic molecules are attracted to the internal pores of the carbon granules.

Activated carbon is a well-developed technology widely used in the treatment of hazardous waste streams. It is especially well suited for removal of mixed organics from aqueous wastes.

Carbon adsorption is frequently used following biological treatment and/or granular media filtration in order to reduce the organic and suspended solids load on the carbon column or to remove refractory organics that cannot be easily biodegraded. Air stripping may also be applied prior to carbon adsorption in order to remove a portion of the volatile contaminants, thereby, reducing the organic load to the carbon column.

B.9.3 Ion Exchange

Ion exchange is a process whereby the toxic ions are removed from the aqueous phase by being exchanged with relatively harmless ions held by the ion exchange materials

Ion exchange is used to remove a broad range of ionic species from water including all metallic elements when present as soluble species, either anionic or cationic, inorganic anions such as halides, sulfates, nitrates, cyanides, etc., organic acids such as carboxylics, sulfonics, and some phenols, at a pH sufficiently alkaline to give the ions, and organic amines when the solution acidity is sufficiently acid to form the corresponding acid salt. Sorptive resins can remove a wide range of polar and non-polar organics.

Ion exchange is a well-established technology for removal of heavy metals and hazardous anions from dilute solutions. However, use of sorptive resins is relatively new and reliability under various conditions is not as well known.

B.9.4 Reverse Osmosis (RO)

Osmosis is a phenomenon of spontaneous flow of solvent (e.g., water) from a dilute solution through a semi-permeable membrane (impurities or solute permeates at a much slower rate) to a more concentrated solution. Reverse osmosis (RO) is the application of sufficient pressure to the concentrated solution to overcome the osmotic pressure and force the net flow of water through the membrane toward the dilute phase. This allows the concentration of solute (impurities) to be built up in a circulating system on one side of the membrane while relatively pure water is transported through the membrane. Ions and small molecules in true solution can be separated from water by this technique.

RO is used to reduce the concentrations of dissolved solids, both organic and inorganic. In treatment of hazardous waste-contaminated streams, use of RO would be primarily limited to polishing low flow streams containing highly toxic contaminants. In general, good removal can be expected for high molecular weight organics and charged anions and cations. Multivalent ions are treated more effectively than are univalent ions. Recent advances in membrane technology have made it possible to remove such low molecular weight organics as alcohols, ketones, amines, and aldehydes.

RO is an effective treatment technology for removal of dissolved solids presuming appropriate pretreatment has been performed for suspended solids removal, pH adjustments, and removal of oxidizers, oil, and grease. Because the process is so susceptible to fouling and plugging, on-line monitors may be required to monitor pH, suspended solids, etc., on a continuous basis.

B.9.5 Precipitation/Flocculation

Precipitation is a physiochemical process whereby some or all of a substance in solution is transformed into a solid phase. It is based on alteration of the chemical equilibrium relationships affecting the solubility of inorganic species over a certain pH range. Removal of metals as hydroxides or sulfides is the most common precipitation application in wastewater treatment. Precipitation is applicable to the removal of most metals from wastewater including zinc, cadmium, chromium, copper, fluoride, lead, manganese, and mercury.

Also, certain anionic species can be removed by precipitation, such as phosphate, sulfate, and fluoride. Precipitation is useful for most aqueous hazardous waste streams. However, limitations may be imposed by certain physical or chemical characteristic. In some cases, organic compounds may form organometallic complexes with metals, which could inhibit precipitation. Cyanide and other ions in the wastewater may also complex with metals, making treatment by precipitation less efficient.

Flocculation is used to describe the process by which small, unsettleable particles suspended in a liquid medium are made to agglomerate into larger, more settleable particles. The mechanisms by which flocculation occurs involve surface chemistry and particle charge phenomena. Flocculation is applicable to any aqueous waste stream where particles must be agglomerated into larger more settleable particles prior to sedimentation or other types of treatment. There is no concentration limit for precipitation or flocculation. Highly viscous waste streams will inhibit settling of solids.

B.10 Phytoremediation
This technology reduces the amount of contaminated water by performing a series or relatively simple, passive, surface water management actions. An irrigation system is used to pump water from a small pond to the adjacent natural forest. In this process, the trees and other plants take up tritium-contaminated water through their root system and release trace amounts of tritium to the atmosphere through their foliage, a natural process called transpiration.

C Remedial Actions for Surface Water

C.1 No Action
The no action alternative for surface water is the same as for soil/groundwater.

C.2 Institutional Controls and Monitoring
The institutional controls are administrative measures taken to minimize the potential for human exposure to surface water by limiting the public access to the waste site and the surrounding area. At SRS, drinking water is provided from controlled sources to prevent the use of surface water from uncontrolled and monitored sources. These controls are generally the same as discussed in the soil/groundwater section.

C.3 In Situ Treatment
Examples of potential in situ treatment technologies for surface water include aeration, or zero-valent iron technology.

C.4 Ex Situ Treatment
Ex situ treatment of contaminated surface water involves removal of the contaminated water and treatment at an appropriate facility.

Conceptual Site Models

The SRS typical CSMs are designed to communicate the hazard types and end state options. One end state CSM is shown for each hazard type. To comprehend the current state of each typical CSM, simply omit the imposed barriers

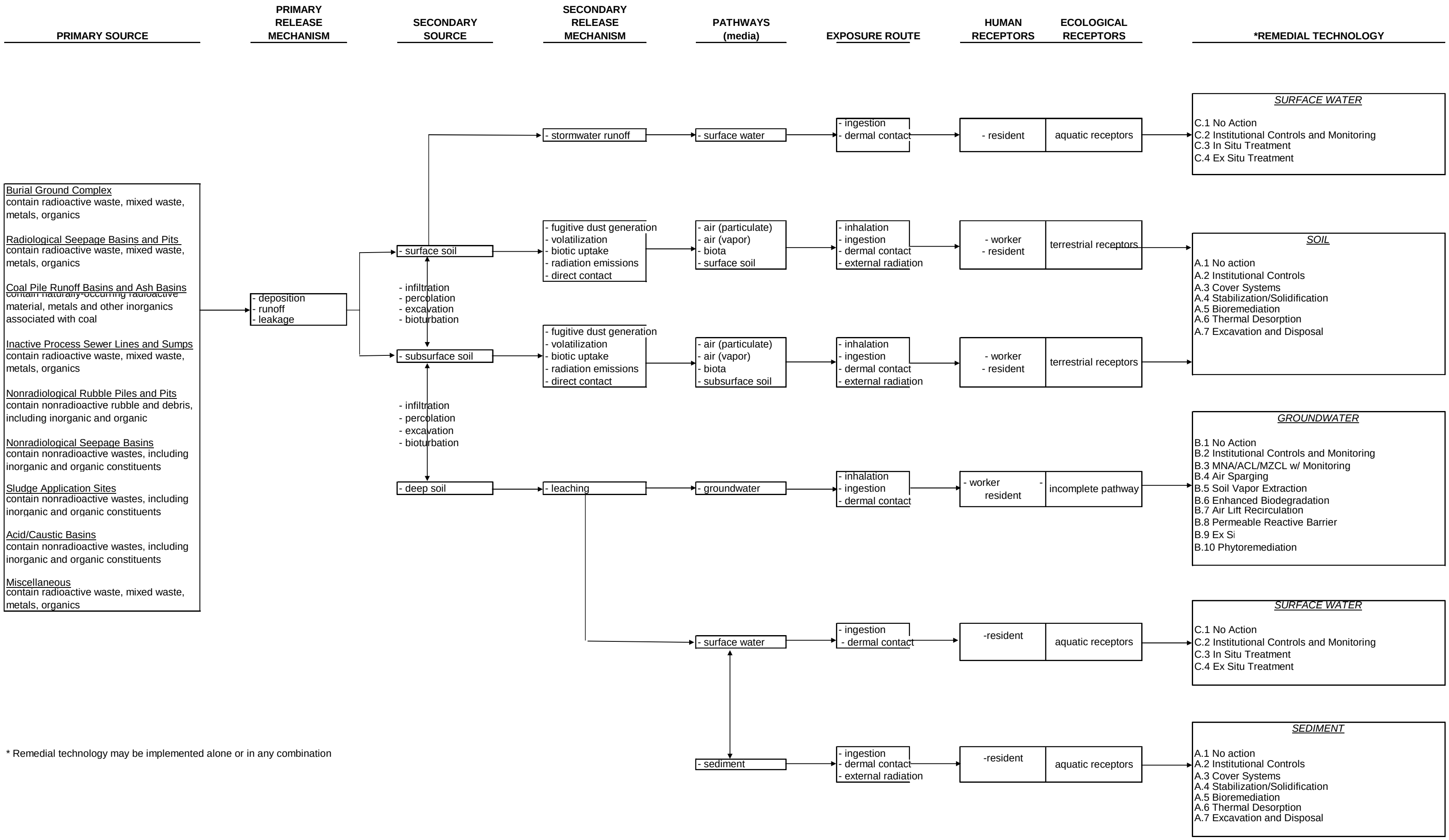


Figure 4.23b Generic Conceptual Site Model

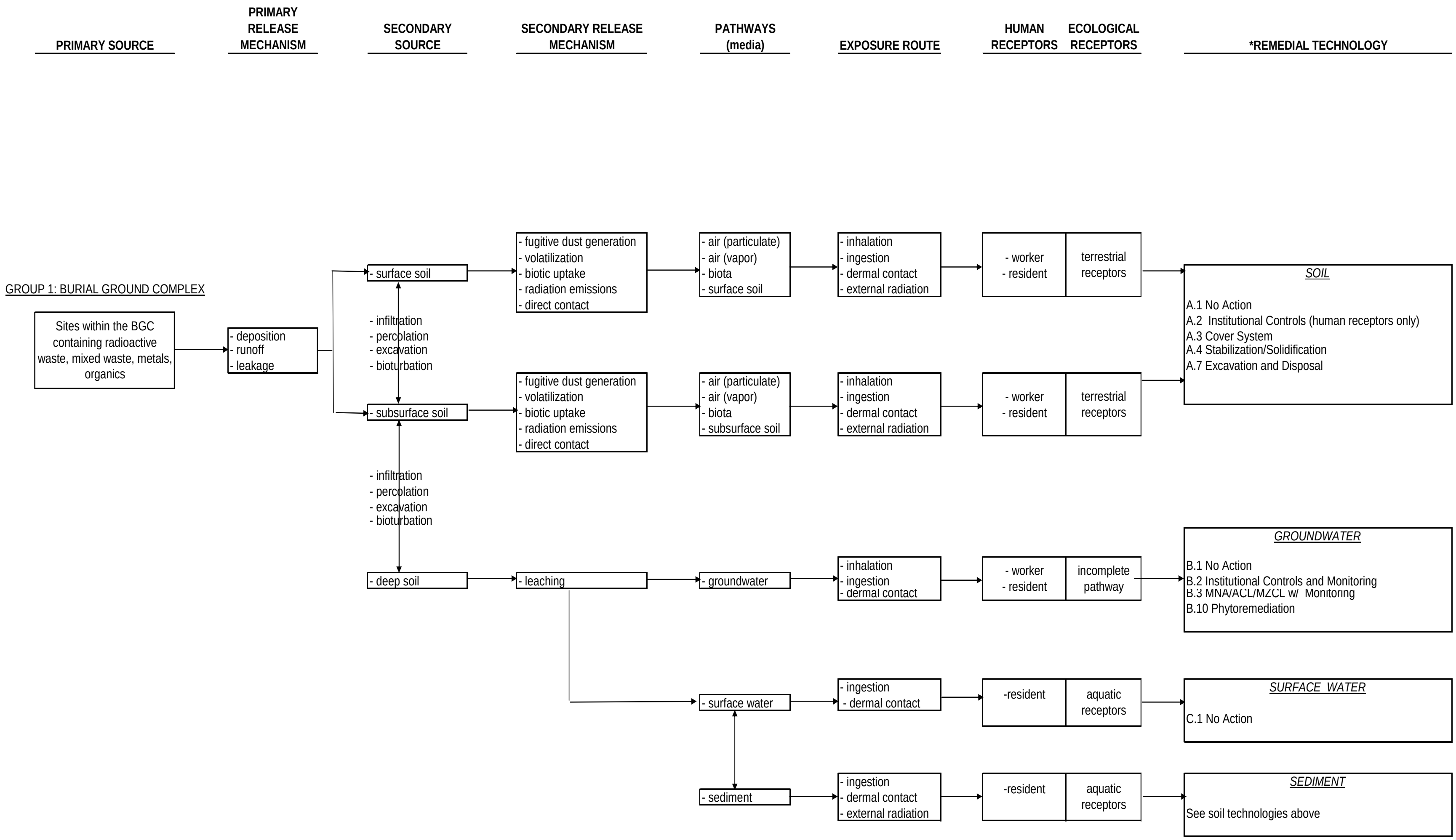


Figure 4.24b Group 1: Burial Ground Complex CSM

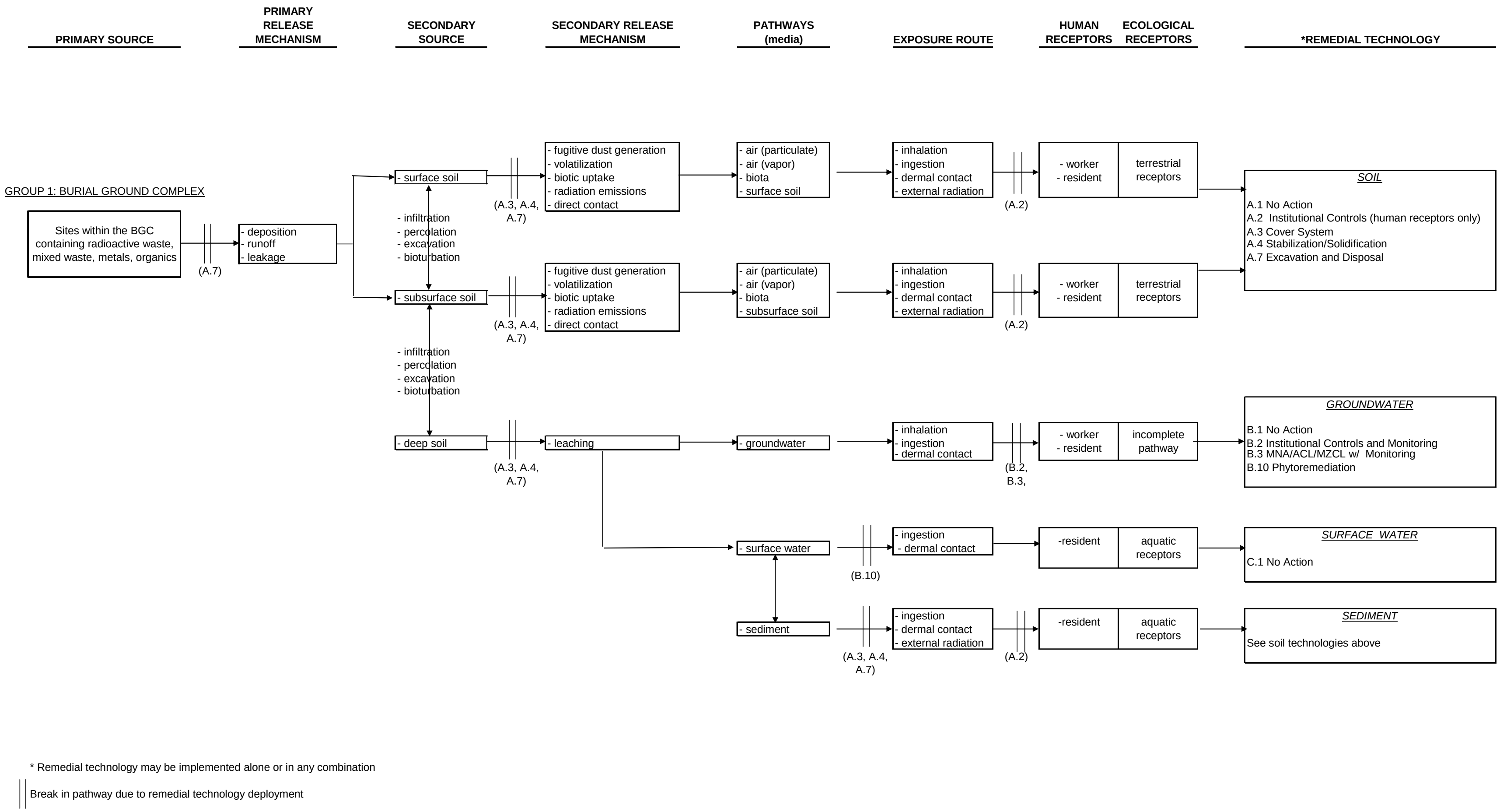


Figure 4.25b Group 1: Burial Ground Complex (continued) CSM

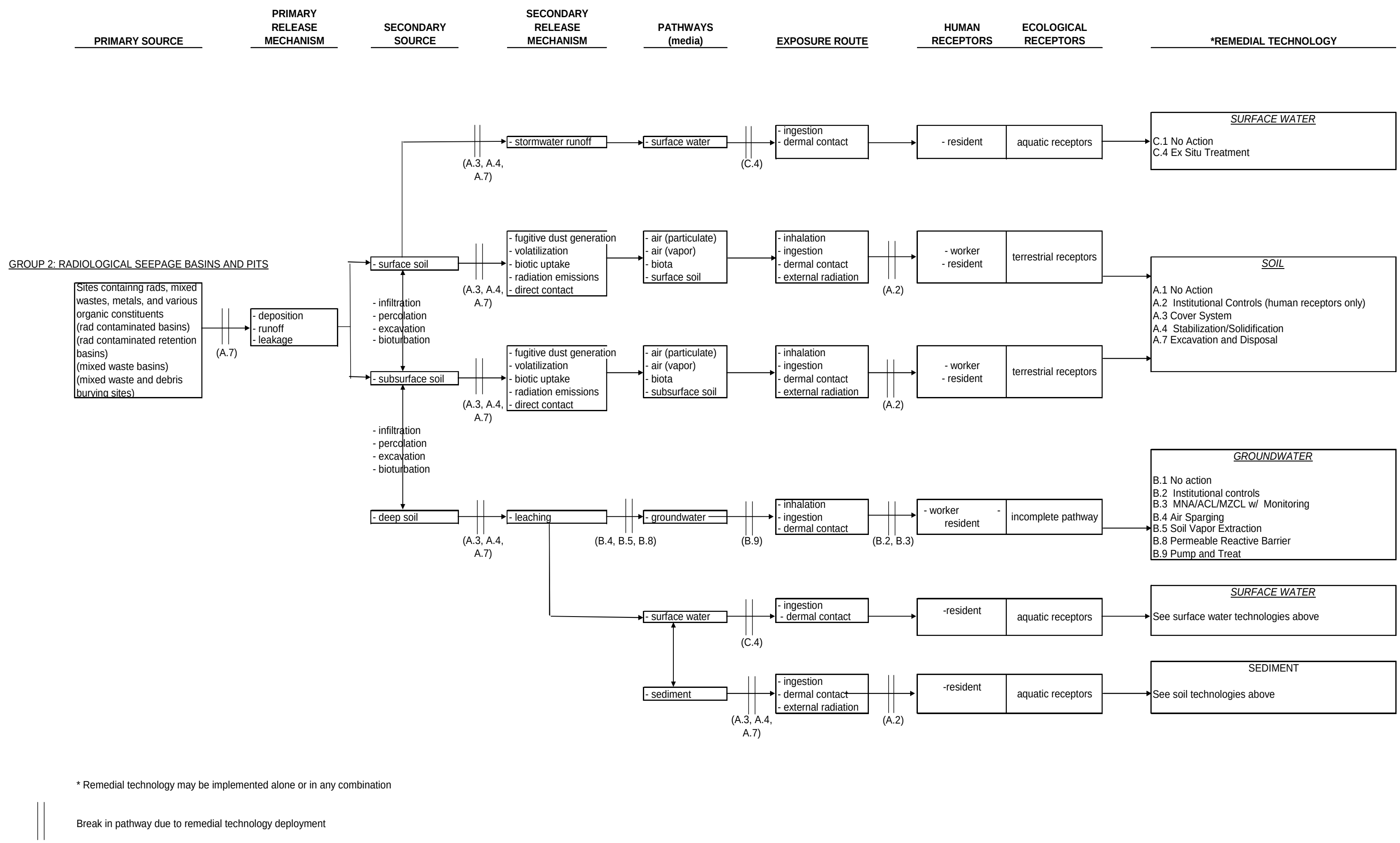


Figure 4.26b Group 2: Radiological Seepage Basins and Pits CSM

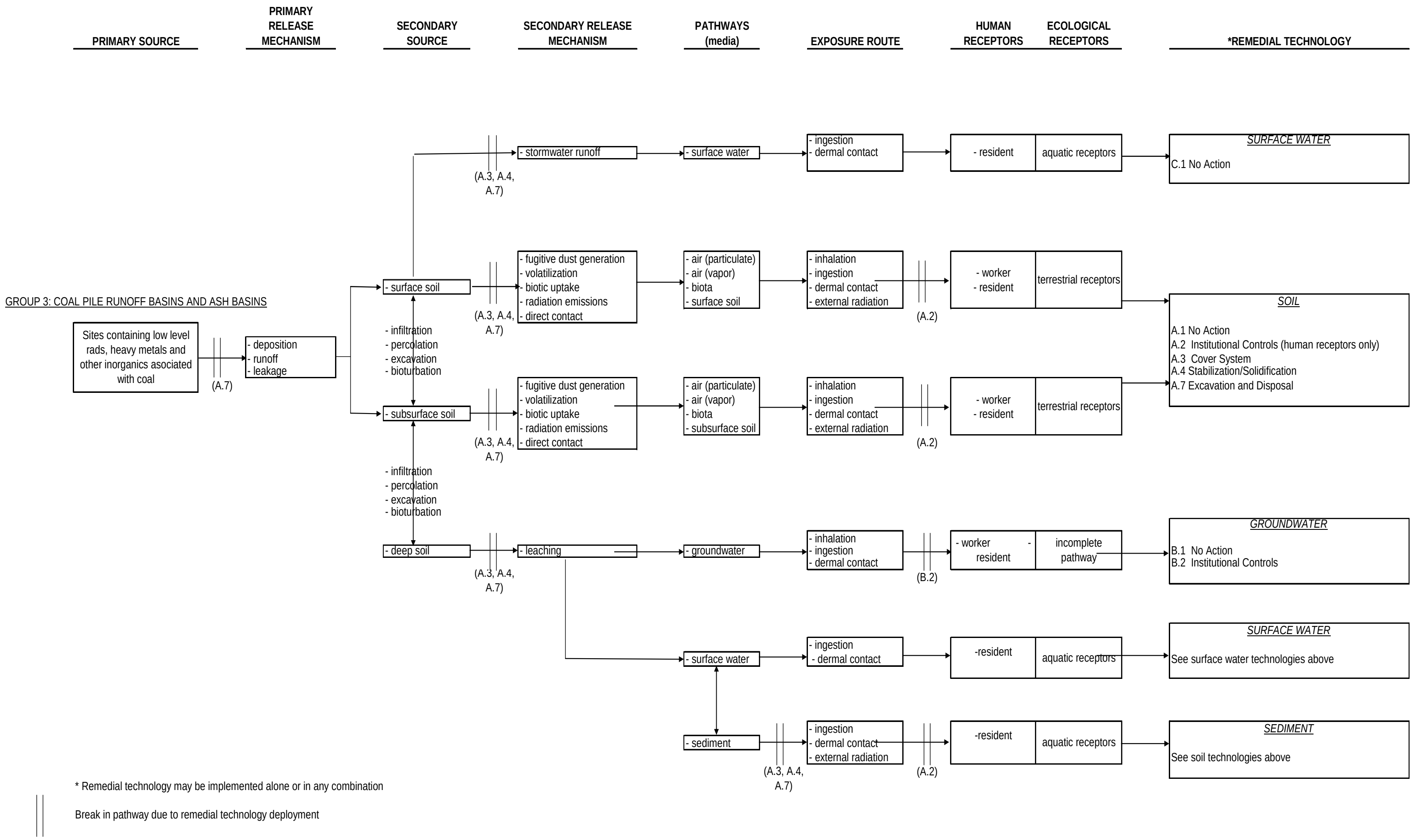


Figure 4.27b Group 3: Coal Pile Runoff Basins and Ash Basins CSM

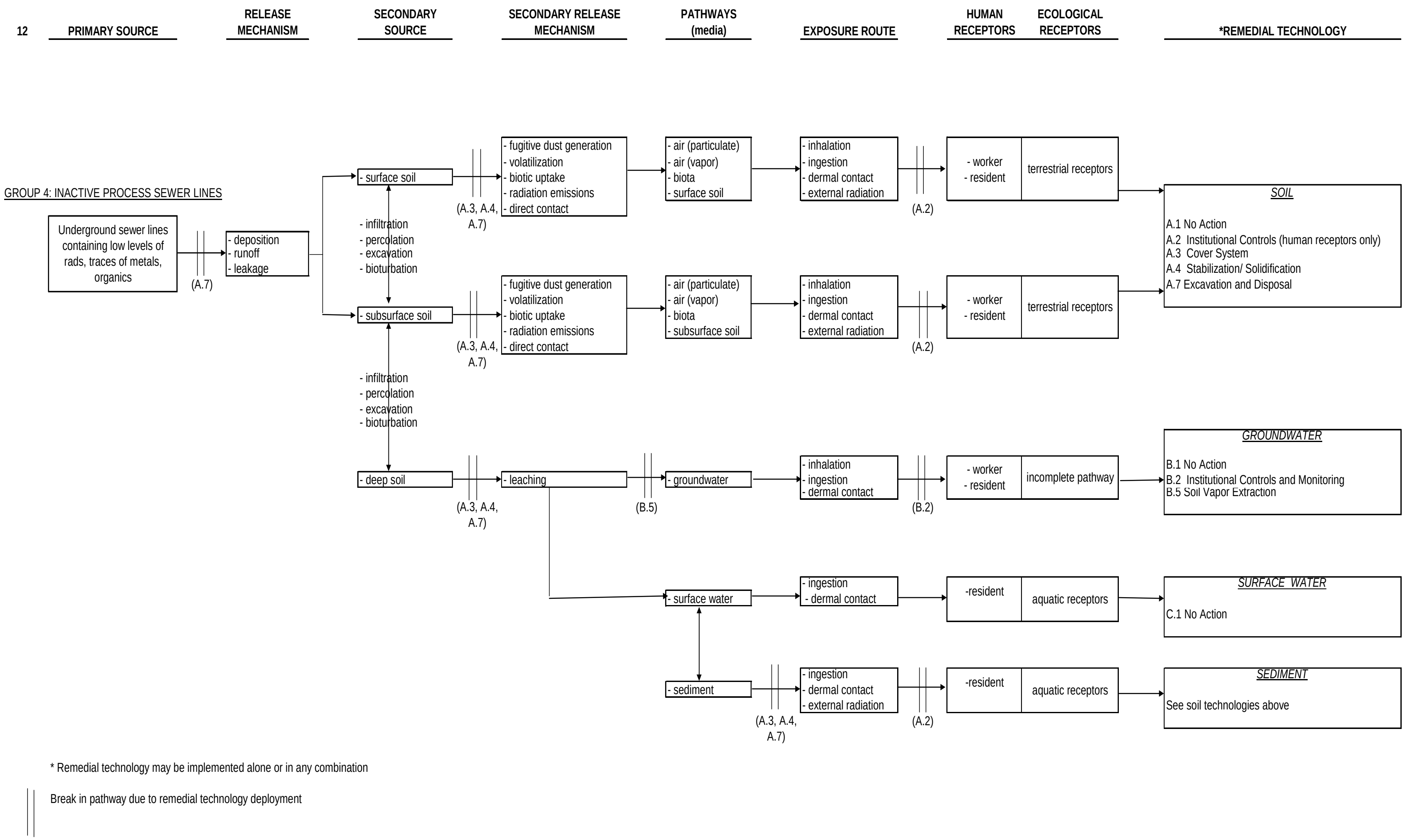


Figure 4.28b Group 4: Inactive Process Sewer Lines CSM

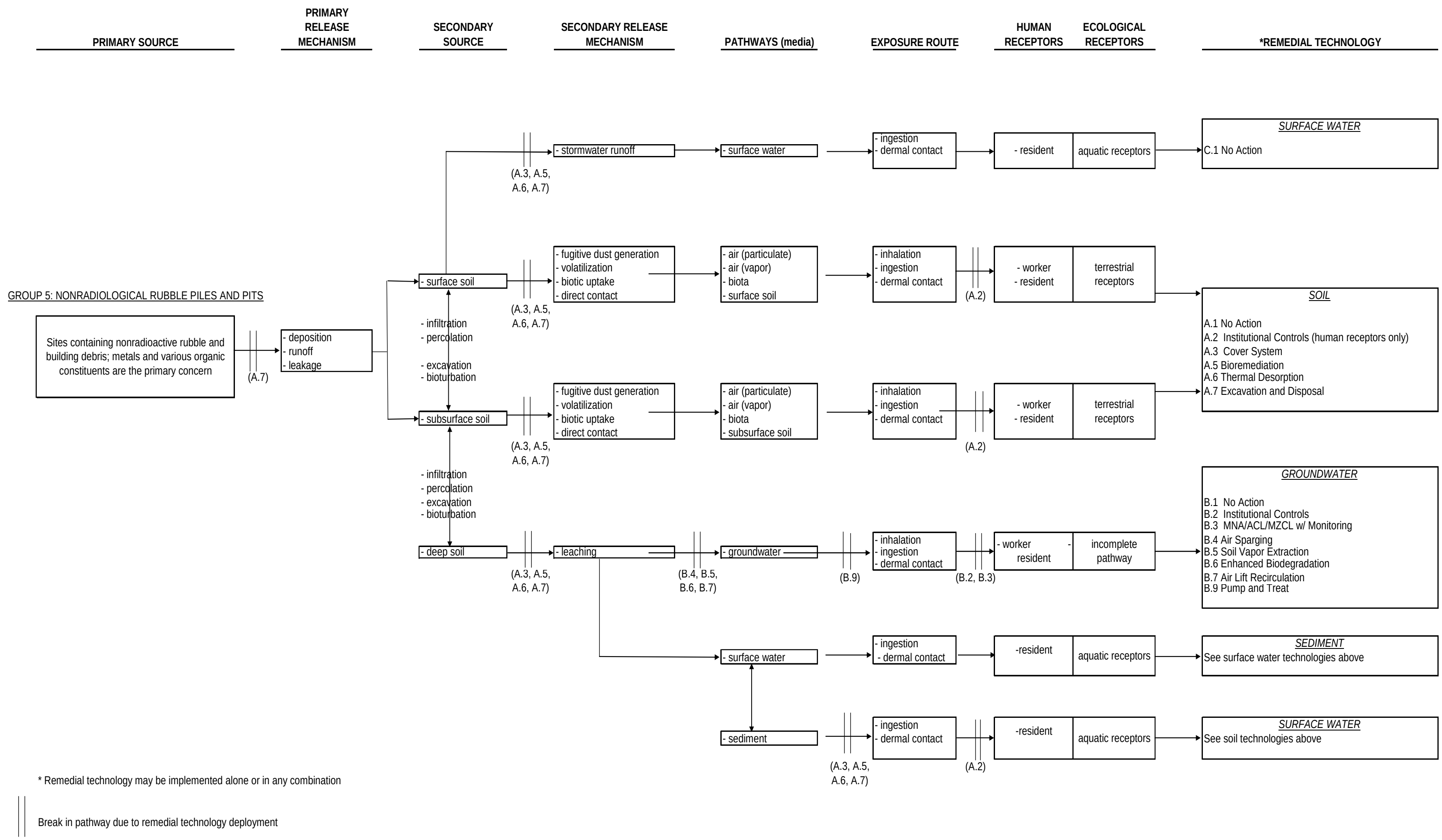
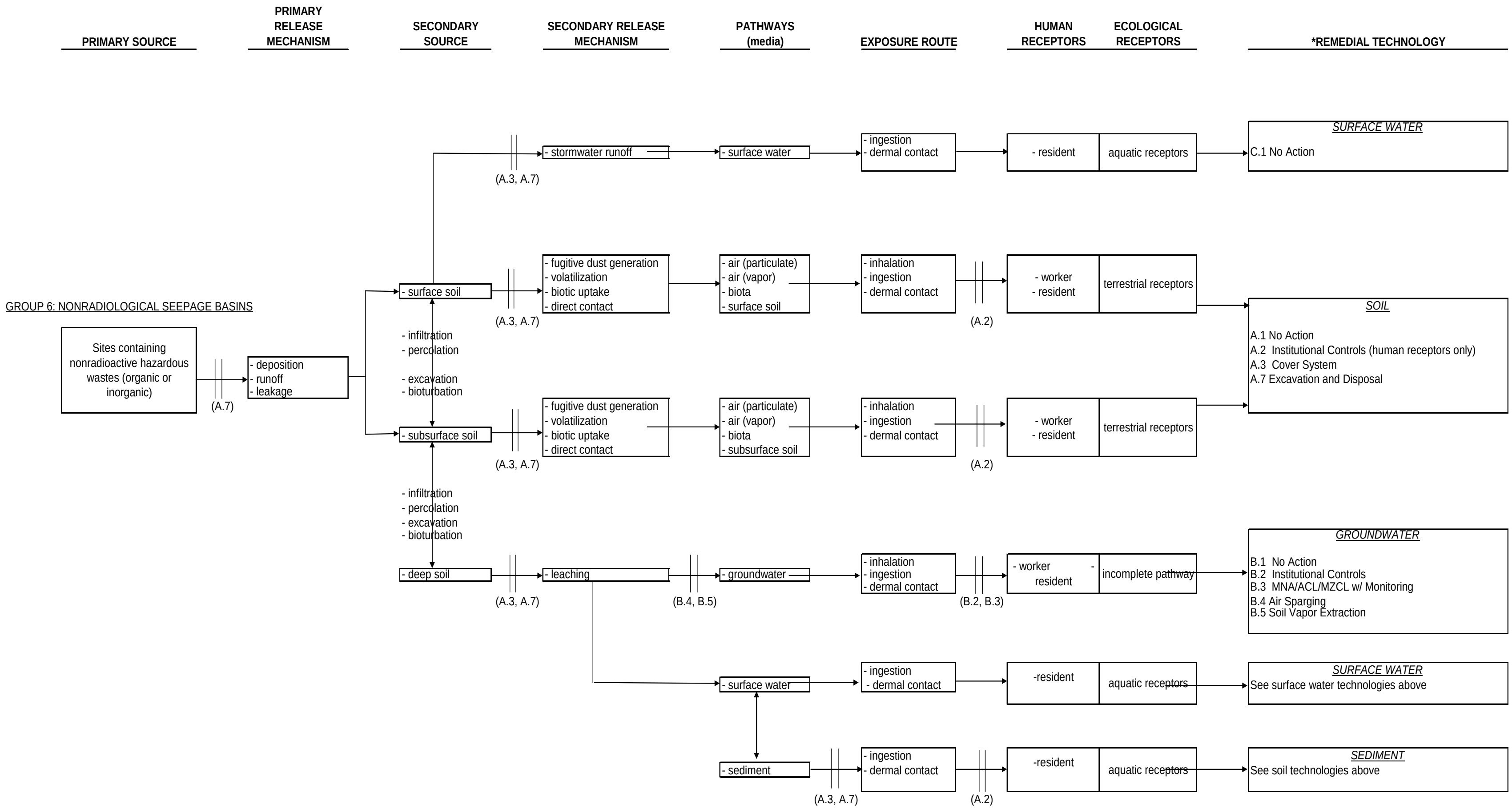


Figure 4.29b Group 5: Nonradiological Rubble Piles and Pits CSM



* Remedial technology may be implemented alone or in any combination

|| Break in pathway due to remedial technology deployment

Figure 4.30b Group 6: Nonradiological Seepage Basins CSM

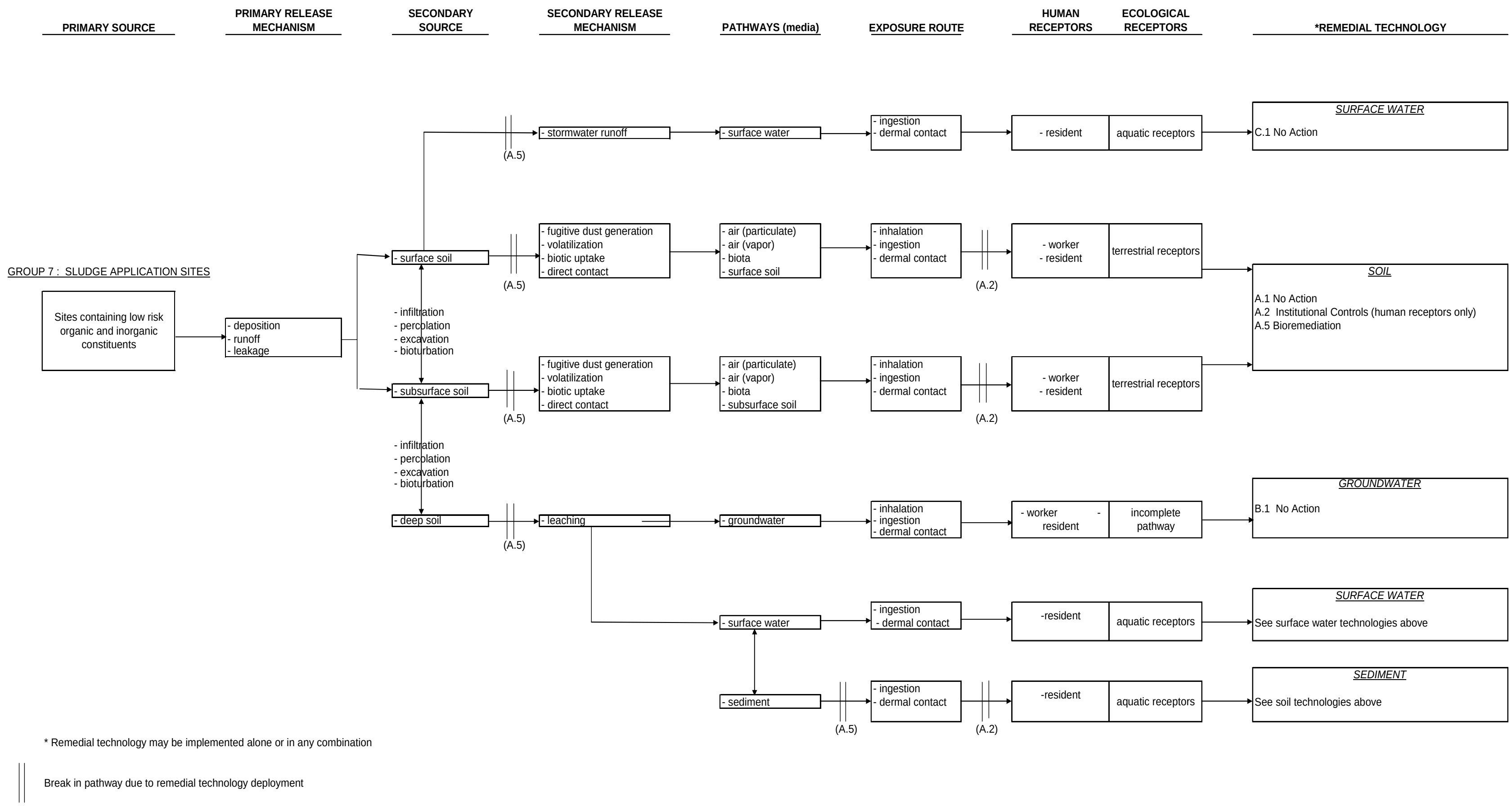


Figure 4.31b Group7: Sludge Application Sites CSM

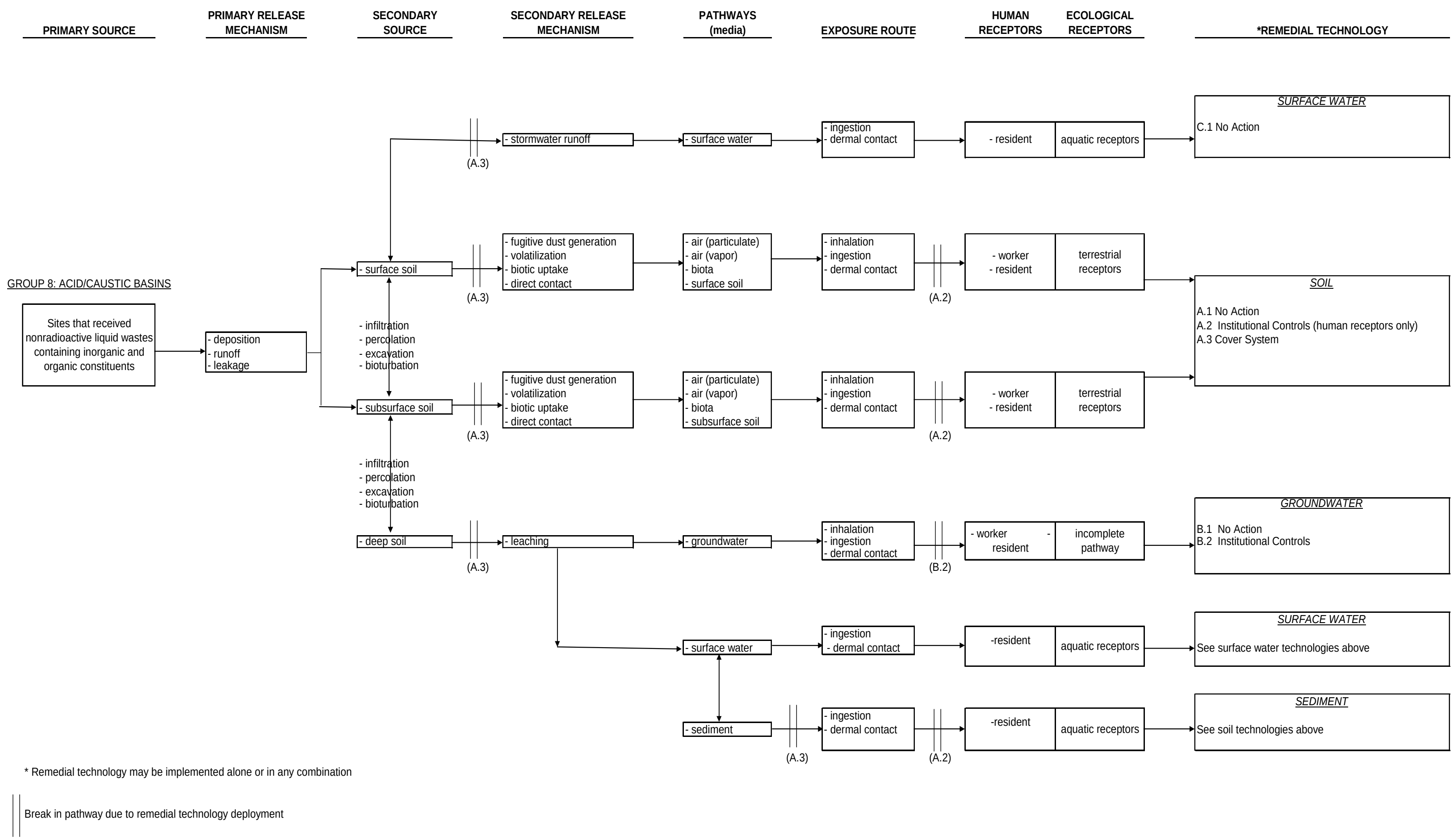


Figure 4.32b Group 8: Acid/Caustic Basins CSM

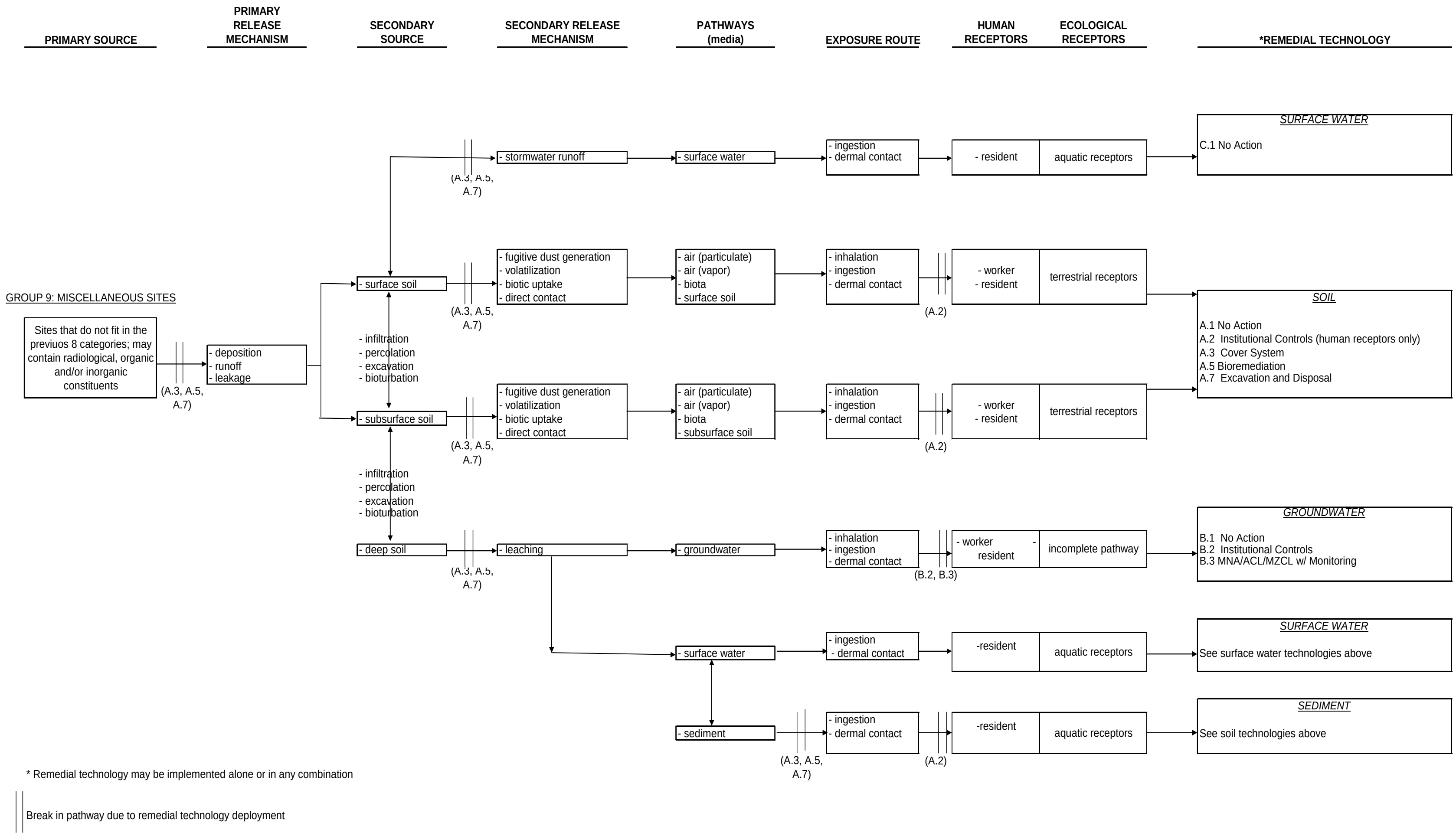


Figure 4.33b Group 9: Miscellaneous Sites

DEACTIVATION AND DECOMMISSIONING
Hazards

The integrated Deactivation & Decommissioning (D&D) plan addresses all significant SRS Environmental Management facilities, waste sites, and waste tanks. To ensure consistency and clarity in planning, documentation, and reporting; a controlled listing of SRS facilities for decommissioning, referred to as the Comprehensive Facility List (CFL), has been developed. In general, the criteria for inclusion in the controlled listing of facilities for decommissioning are:

- EM buildings that have been capitalized at $25,000 or greater value
- Other structures or facilities valued at $250,000
- Nuclear Hazard Category 1, 2, or 3, and Radiological Hazard facilities

EM facilities to be decommissioned are characterized in to six categories.

Nuclear (HC 2 or 3) – facilities that fall into one of two categories: Hazard Category 2 or Hazard Category 3, which are defined below.

- Hazard Category 2 – potential for significant on-site consequences.
- Hazard Category 3 – potential for only significant localized consequences.

Radiological – facilities below Hazard Category 3 but still contain quantities of radioactive material at or above the Reportable Quantity value listed in 40 CFR 302.4.

Chemical Low Hazard – facilities with radiological hazards below 40 CFR 302.4 thresholds, but with chemical hazards both below 29 CFR 1910.119 or 40 CFR 68 thresholds and at or above reportable quantities in 40 CFR 302.4

Other Industrial – facilities with all radiological and chemical hazards below 40 CFR 302.4 thresholds.

High Level Waste Tanks – tanks containing high-level radioactive waste from SRS chemical separations process that was generated in both solid and liquid forms.

Never Contaminated – facilities that never processed or stored bulk chemicals or radiological materials. Chemical storage was limited to industrial for cleaning purposes only.

Description of Technologies

An end state is the status of a facility or waste site after decommissioning and closure activities are complete. The selection of end states is very important to the planning process in that it dictates the required extent of facility decommissioning and site remediation. It also factors heavily into the cost, schedule, and work scope of the decommissioning project. The two possible end state alternatives applicable to SRS facilities are demolition and in-situ disposal (ISD).

Demolition – Demolition includes demolishing and removing the entire facility to grade, and decontaminating as necessary to meet established release criteria. There may be variations among individual residual conditions within this end state category. For example, some facilities may be removed in their entirety, while the sub-surface portions of others may remain in place after decontamination and removal of hazardous materials. In all cases, the end-state must be compliant with applicable regulations and with the goal of no new waste sites created at SRS.

In-Situ Disposal – ISD is the preferred end-state for some structurally robust facilities for which demolition would be both very expensive and unnecessary. In this case, radiological and other hazardous material is removed and the facility or waste tank is decontaminated to a level that meets established criteria, and additional barriers are in place as necessary. Also, some period of post decommissioning monitoring may be required. Again, the end-state must be compliant with applicable regulations and with the goal of no new waste sites created at SRS.

Conceptual Site Models

The next section shows the Conceptual Site Models for Deactivation and Decommissioning in chart form.

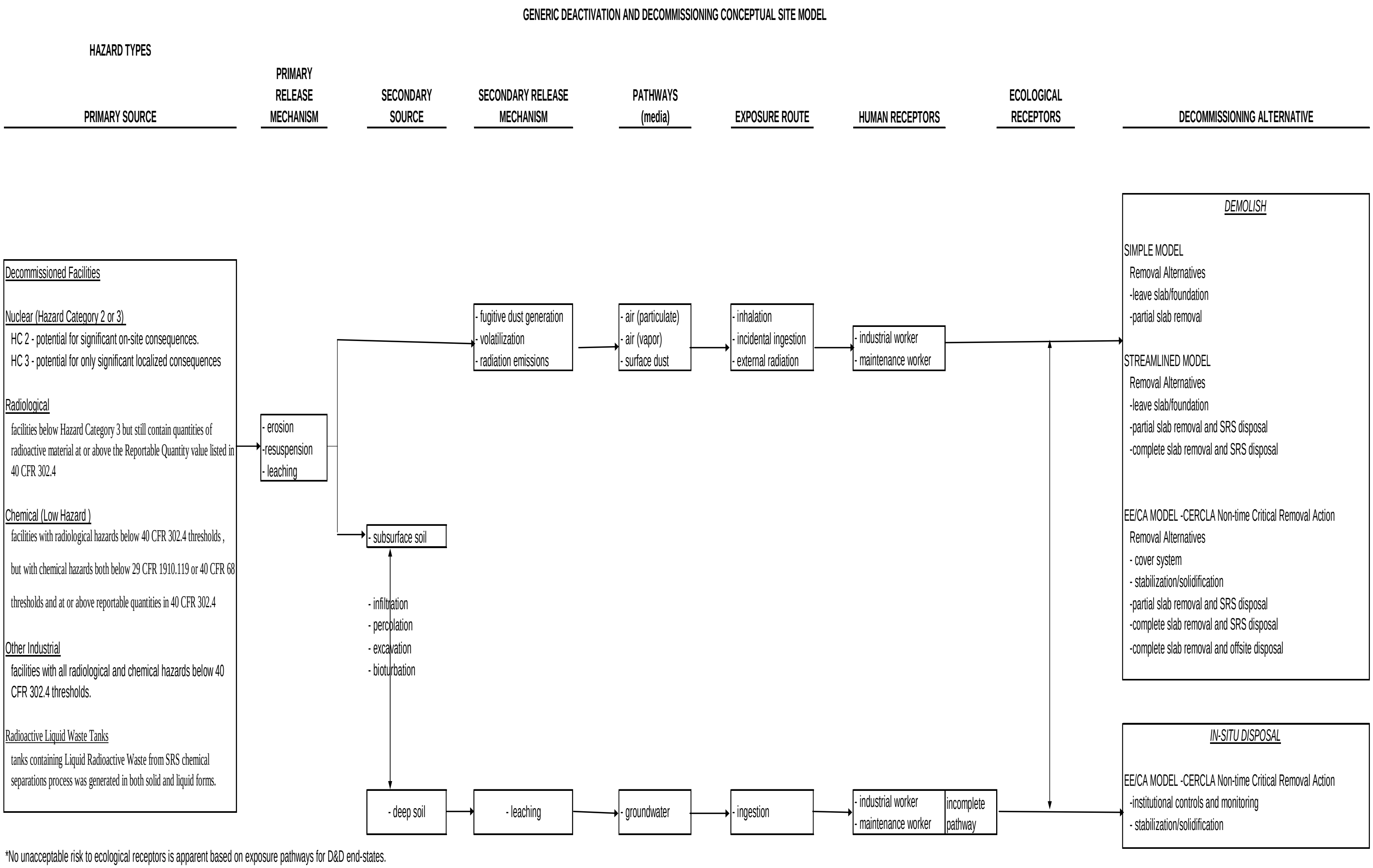


Figure 4.34b Decommissioned Facilities CSM

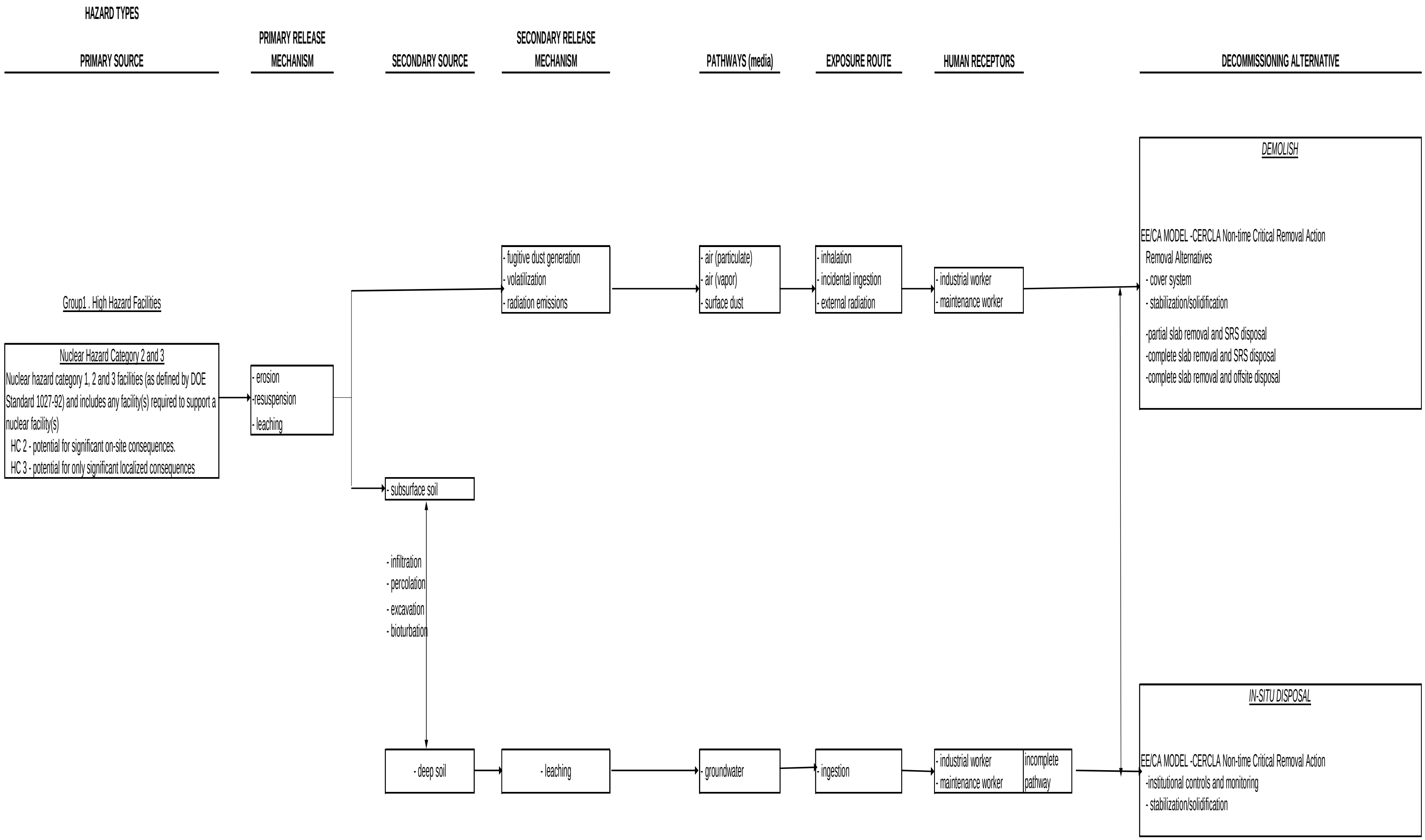


Figure 4.35b Group 1: High Hazard Facilities CSM

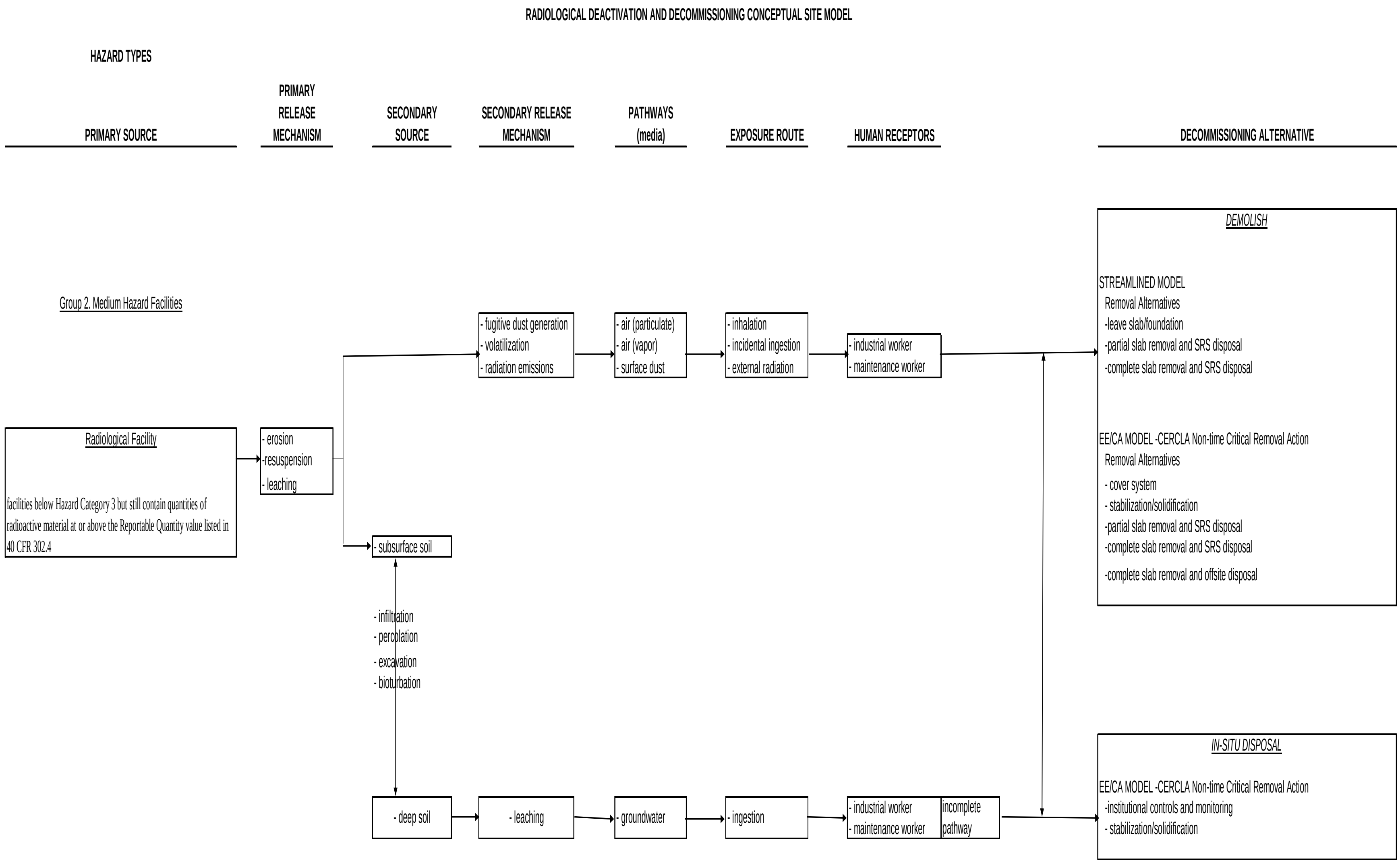


Figure 4.36b Group 2: Medium Hazard Facilities CSM

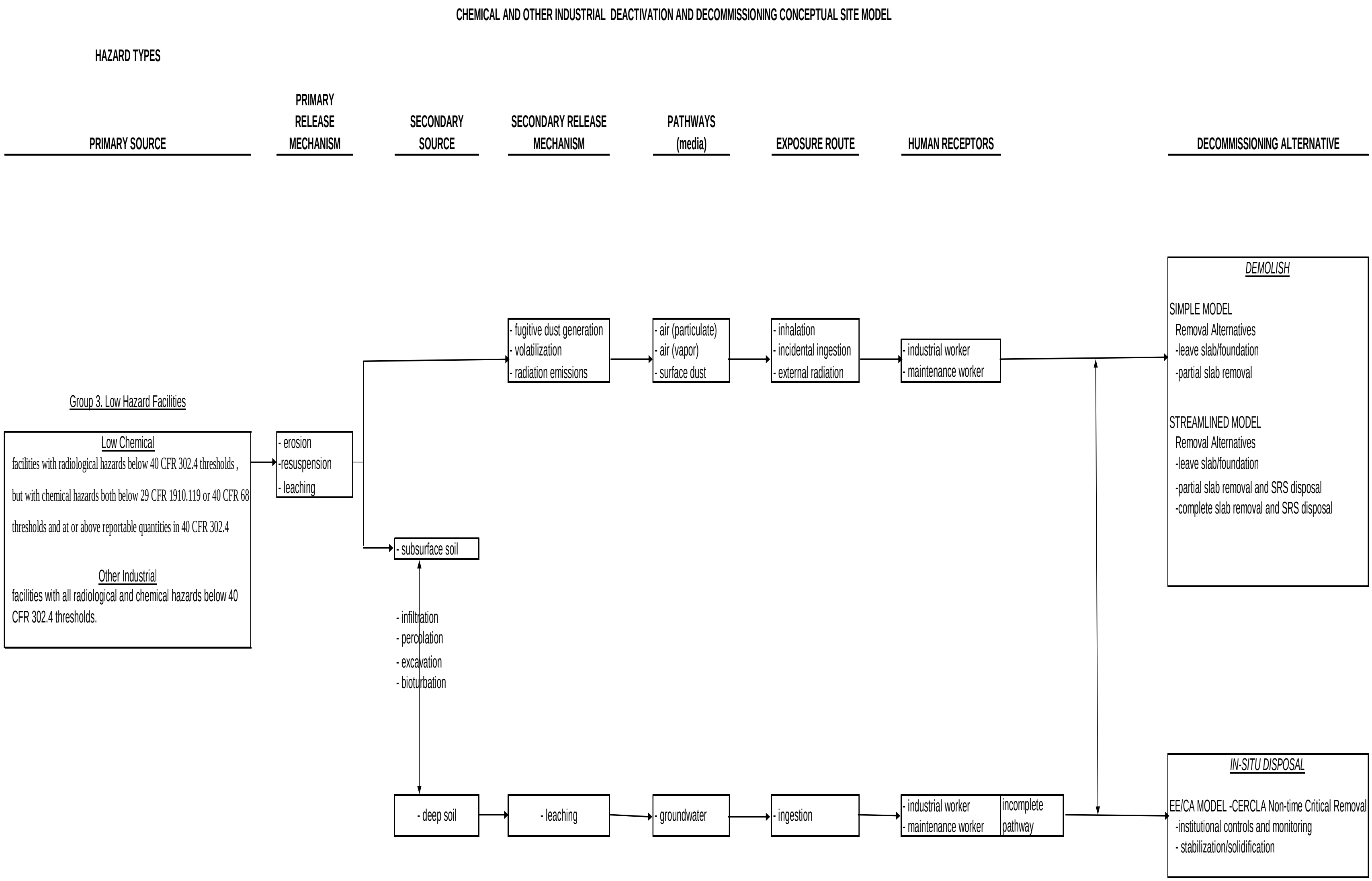


Figure 4.37b Group 3: Low Hazard Facilities CSM

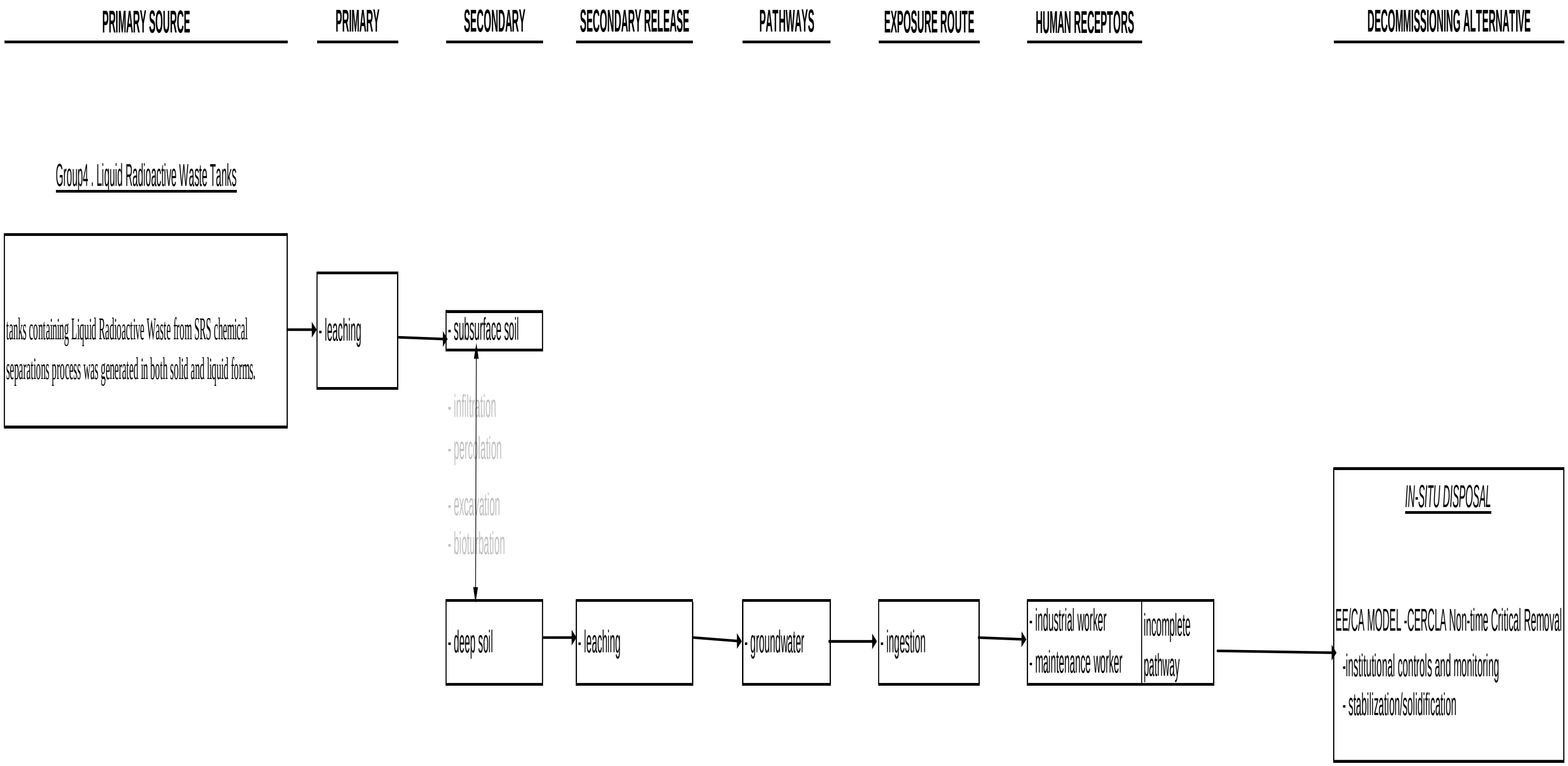


Figure 4.38b Group 4: High Level Waste Tanks CSM