

**Rocky Flats Environmental Technology Site**

**Integrated Monitoring Plan  
Background Document**

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**Interaction Between Media**

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**7.0 INTERACTIONS BETWEEN MEDIA**

**7.1 Overview**

Some monitoring is performed to characterize interactions between the various environmental media. Possible interactions are presented in Table 7-1, which represents a conceptual model of integrated monitoring at Rocky Flats Environmental Technology Site (RFETS or the Site). Some significant interactions that require decision making and data are presented below.

**Table 7-1  
Interactions Between Media, Significance at RFETS,  
and Monitoring to Evaluate Interactions**

<b>Interactions Between Media</b>	<b>Significance at RFETS</b>	<b>Monitoring to Evaluate Interactions</b>
Surface Water to Ecology	Potentially significant; surface water flow and contamination could impact local ecology. However, the local ecology has remained healthy during a variety of climatic and flow conditions.	Data from existing Site-wide surface water monitoring may be used to assess potential ecological impacts. The ecological monitoring program is also designed to detect ecological changes and assess general ecological health. In addition, project-specific evaluations are conducted to assess potential impacts.
Surface Water to Groundwater	Not significant; groundwater recharge from surface water is not significant.	No monitoring is necessary to characterize or assess groundwater impacts.
Surface Water to Air	Not significant; surface water quality will not significantly impact air quality (i.e., cause exceedances of air quality standards).	Any significant impacts on air or water quality will be detected by existing DOE, CDPHE, and project-specific monitoring.
Surface Water to Soil	Potentially significant; water in drainages and ponds will not significantly increase contaminant concentrations in soil; however, runoff could spread contaminants on surface soils and increase sediment concentrations.	Soil monitoring is conducted to determine the impacts of surface water runoff and the extent of required soil removal before, during, and after individual remediation projects. Results of the actinide migration studies will be used to determine whether existing soil monitoring needs to be modified or expanded.
Groundwater to Surface Water	Significant; most of the Site groundwater flows into Site surface water drainages.	Existing surface water monitoring will detect any impacts from groundwater. Data from Site-wide groundwater monitoring (Site-wide and project-specific) is also used to assess and predict potential surface water impacts.

**Table 7-1  
(continued)**

<b>Interactions Between Media</b>	<b>Significance at RFETS</b>	<b>Monitoring to Evaluate Interactions</b>
Groundwater to Ecology	Potentially significant; contaminated groundwater could indirectly impact ecological resources, as well as reduce groundwater flow.	Data from existing Site-wide groundwater monitoring may be used to assess and predict potential ecological impacts. The ecological monitoring program is also designed to detect ecological changes.
Groundwater to Air	Not significant; groundwater will not directly affect air quality.	Existing air quality monitoring will detect air quality degradation, and existing groundwater monitoring will detect groundwater contamination that could impact surface water quality.
Groundwater to Soil	Not significant; groundwater contaminants appear in surface water but are not likely to contaminate surface soils.	Results of the actinide migration studies will be used to determine whether existing soil monitoring needs to be modified or expanded.
Air to Soil	Potentially significant; point source and fugitive emission sources could deposit contaminants on soil.	Soil monitoring is conducted to determine the impacts of air emissions and disposition and the extent of required soil removal before, during, and after individual remediation projects. Results of the actinide migration studies will be used to determine whether existing soil monitoring needs to be modified or expanded. Also, any significant impacts on air quality will be detected by existing DOE, CDPHE, and project monitoring.
Air to Ecology	Potentially significant; point source and fugitive emissions could deposit contaminants on ecological resources.	The ecological monitoring program is designed to detect ecological changes. Also, any significant impacts on air quality will be detected by existing DOE, CDPHE, and project-specific monitoring.
Air to Surface Water	Potentially significant; point source and fugitive emission sources could degrade surface water quality.	Surface water monitoring (Site-wide and project-specific) will detect increases in contaminant concentrations. Also, any significant impacts on air quality will be detected by existing DOE, CDPHE, and project-specific air monitoring.

**Table 7-1  
(continued)**

<b>Interactions Between Media</b>	<b>Significance at RFETS</b>	<b>Monitoring to Evaluate Interactions</b>
Air to Groundwater	Not significant; contaminants in air will not directly impact groundwater quality.	Groundwater monitoring will track groundwater contamination, and air quality monitoring (Site-wide and project-specific) will detect degradation of air quality that could impact other media.
Soil to Surface Water	Significant; contaminants in soils are transported to surface water via runoff and surface water quality is degraded.	Site-wide and project-specific surface water monitoring will detect increases in contaminant concentrations. Soil monitoring is also conducted to determine the impacts of runoff and the extent of required soil removal before, during, and after individual remediation projects. Results of the actinide migration studies will be used to determine whether existing soil monitoring needs to be modified or expanded.
Soil to Ecology	Could be significant; contaminated soils could adversely impact local ecology.	The ecological monitoring program is designed to detect ecological changes. Results of the actinide migration studies also will be used to determine whether existing soil monitoring needs to be modified or expanded.
Soil to Air	Significant; contaminants in surface soil are resuspended and air quality is affected.	Any significant impacts on air quality will be detected by existing DOE, CDPHE, and project-specific monitoring. Results of the actinide migration studies also will be used to determine whether existing soil monitoring needs to be modified or expanded.
Soil to Groundwater	Significant; contaminants migrate from surface and subsurface soils to groundwater via percolation.	The existing groundwater well network is designed to detect increases in contaminant concentrations in groundwater. Results of the actinide migration studies also will be used to determine whether existing soil monitoring needs to be modified or expanded.

Notes:

- CDPHE = Colorado Department of Public Health and Environment
- DOE = Department of Energy
- RFETS = Rocky Flats Environmental Technology Site

## 7.2 Water and Ecological Health

As indicated in Table 7-1, there are interactions between surface water, groundwater, and the flora and fauna of the Site. Concerns have been expressed that changes in flow into and out of the Site could impact significant habitat and species of concern both on Site and downstream (e.g., the Preble's meadow jumping mouse on Site, and whooping cranes in Nebraska). For example, aggregate mining activities at the west-end of the Site may alter surface water flowing onto the Site and could impact species of concern on Site and downstream. In fact, water is one of the key abiotic components structuring some of the significant habitats. The Department of Energy, Rocky Flats Field Office (DOE, RFFO) could be held responsible for these impacts.

Site-specific relationships between water availability and ecological health are not known; therefore, it is not known what type of data are actually required. Additional data, currently uncollected, could be required (e.g., accurate information on purchased water, data on exfiltration and infiltration of underground pipes, and data on alluvial flow through the Buffer Zone habitats of concern).

The following preliminary decision rules have been proposed:

### *Preliminary Secondary Data Uses Could Include:*

- Determining the impact of mining on Rock Creek water quality and availability;
- Interpreting potential causes of declines in any of the valued habitats on Site;
- Supporting water management planning and Water Right issues;
- Evaluating cumulative impacts of all actions (on and off Site);
- Validating any predicted impacts of a selected alternative on downstream resources; and
- Supporting Site biological assessments and U.S. Fish and Wildlife Service (USFWS) biological opinions.

**Table 7-2  
Buffer Zone Flow Monitoring Stations**

<b>Station Identifiers</b>	<b>Locations</b>	<b>Monitoring in Addition to Flow</b>
GS01	Woman Creek/Indiana Street	RFCA and possible nutrient load monitoring; precipitation
GS02	Mower Reservoir/Indiana Street	
GS03	Walnut Creek/Indiana Street	RFCA and possible nutrient load monitoring; precipitation
GS04	Rock Creek at Highway 128	Precipitation
GS05	North Woman Creek at west boundary	Precipitation
GS06	South Woman Creek at west boundary	--
SW134	Rock Creek at west boundary (Gravel Pit)	(4 samples per year quarterly)
GS16	Antelope Springs	
SW118	Above Portal 3, north side of road	RFCA Source Location

Notes:

- IA = Industrial Area
- IM/IRA = Interim Measures/Interim Remedial Action
- NPDES = National Pollutant Discharge Elimination System
- RFCA = *Rocky Flats Cleanup Agreement* (DOE et al., 1996)
- RMRS = Rocky Mountain Remediation Services, L.L.C.
- SID = South Interceptor Ditch

*Inputs:*

- Drainage flow;
- Water level measurements; and
- Stream gain or loss.

*Preliminary Boundaries Include:*

*Spatial:* All surface waters entering and leaving the Site in the Rock Creek, Walnut, and Woman Creek drainages.

*Temporal:* Seasonal and yearly determinations of total water availability and basic water quality.

*Preliminary Decision Statement:*

- IF The seasonal average or yearly average water availability or quality entering Rock Creek, Walnut Creek, or Women Creek drainages diminishes below baseline due to off-Site activities—
- THEN The Site will notify Jefferson County and the USFWS to determine what actions, if any, should be taken to restore availability and/or quality to historical levels.
- IF Activities occurring within Site boundaries result in a depletion of the seasonal or yearly average natural flow greater than the historic baseline, or at rates that are determined to have a negative impact on downstream habitats or individual species—
- THEN The Site will determine what management actions should be taken to ameliorate this problem.
- IF Significant changes to alluvial groundwater availability in a wetlands habitat are determined—
- THEN Notify parties of potential impacts to the wetlands habitat and continue groundwater and ecological monitoring.
- IF A proposed action could adversely affect a listed species or its critical habitat—
- THEN The Site will enter into formal consultation with the USFWS.

*Preliminary Acceptable Decision Errors Include:*

- Confidence that Significant Events are Physically Sampled and Representative:
  - Flow will be continually monitored; seasonal composite samples will be taken to evaluate basic water chemistry. An effort will be made to gather a sample representative of conditions during the season.
- Acceptable Decision Error Rates for Statistical Sampling Design:
  - The function of this monitoring is to provide a watershed-level measure of water availability and quality to serve as an early warning that habitats reliant on these waters may be adversely impacted if changes continue. The Site is more concerned with failing to detect a decrease in water availability or quality over historical levels than mistakenly determining that a decrease has occurred. The precise change over time that is of concern has not been established because the water requirements of the

habitats are not fully understood. Therefore, no attempt has been made to establish quantitative limits on decision errors or to generate a statistical design.

- The integrated monitoring working group will continue to address water and ecology monitoring integration. The group needs to determine how to effectively use the Buffer Zone flow data or eliminate that monitoring altogether. The group also needs to determine if it would be cost-effective to collect additional data and how those data could be used to assess impacts on ecological health.

### 7.3 **References**

U.S. Department of Energy, Colorado Department of Health and Environment, and U.S. Environmental Protection Agency, 1996. *Final Rocky Flats Cleanup Agreement*, July.