Coal Combustion Products - Environmental Issues - Program 49

Program Overview

Program Description

Management options for coal combustion products (CCPs) are continuously evolving as tighter air emissions standards and new fuel blends change CCP characteristics and increase CCP volumes. New by-products are also being generated from advanced generation technologies such as integrated gasification combined cycle (IGCC) and increased coburning of “green” fuels such as biomass. Due to several recent highly publicized releases, the potential for environmental impacts associated with various CCP management practices has captured the attention of the public as well as legislative and regulatory bodies at both the state and federal levels. Environmental standards and test methods for trace constituents such as mercury, arsenic, and selenium continue to trend downward. This changing landscape highlights the need for new and updated information on the composition and leaching characteristics of CCPs, management methods, groundwater protection and remediation requirements, and risk assessment data for CCP storage, disposal, and use.

The CCP Environmental Issues Program provides scientific data, engineering knowledge, restoration methods, and other tools for cost-effective soil and groundwater protection associated with fossil fuel-fired power plants and CCP storage, disposal, and use. Research currently focuses on the effects of new control technologies for mercury, sulfur oxides, and nitrogen oxides on CCP management options; disposal guidelines being developed by the U.S. Environmental Protection Agency (EPA); ash pond management and closure; groundwater remediation associated with older management sites; large-volume land application uses; risk assessment; and by-products associated with the new generation of power plants.

Research Value

Program research provides fundamental data on environmental management of CCPs. Collaborative efforts with other organizations, including EPA and the U.S. Department of Agriculture (USDA), specifically address pressing needs with respect to CCP disposal and new large-volume uses for increased quantities of flue gas desulfurization (FGD) gypsum. The program provides pivotal studies on leachability, groundwater transport, and mitigation of CCP constituent releases, as well as cost-effective and environmentally protective landfill/pond designs and closures. In addition, the program provides clear communications on the environmental risks associated with CCP management and a strong scientific voice on technical issues. Annual disposal costs for the industry under nonhazardous regulations can exceed $1 billion; hazardous waste regulation would increase that cost by more than ten times and eliminate many current beneficial use alternatives. This research investigates whether or not:

- costs associated with disposal can be reduced,
- options for utilization can be increased, and
- technology options for treatment and remediation can be enhanced.

Approach

This program is a mature research area with extensive data and experience from which to draw, enabling it to shape research to specific customer needs and work on specific problems of interest. The program coordinates research activities with other industry groups such as the American Coal Ash Association and the Utility Solid Waste Activities Group, as well as with federal regulatory and research agencies. This program delivers

- a robust CCP characterization database,
- guidelines for the management and monitoring of disposal facilities,
- remediation technologies specifically designed for CCP constituents,
- data to investigate large-volume beneficial use,

- health and ecological risk assessments associated with CCP disposal and use, and
- groundwater transport models and other assessment tools and data.

Accomplishments

This program builds on years of EPRI research evaluating environmental issues associated with CCP use and management. EPRI collaborates with governmental and nongovernmental organizations to educate regulatory agencies, policymakers, engineers, and the public on the environmental and engineering benefits of using CCPs. EPRI also works closely with EPA on research questions to provide technical support on regulatory matters affecting disposal, groundwater remediation, and large-volume land application uses. Work in this program is very closely coordinated with the CCP Use Program (P78) in EPRI's Generation Sector, which focuses on beneficial use of CCPs. Program accomplishments include

- compilation and analyses of twenty years of research, provided to and used by EPA and state regulatory agencies to inform the Bevill regulatory determinations and state disposal regulations.
- collection of a robust database that investigated leaching and volatilization of mercury from coal fly ash; analysis of this data later revealed that leaching and volatilization are not significant under typical disposal and land application conditions.
- coordination with EPA on development and appropriate use of a new leaching protocol for CCPs.
- laboratory and field data on geochemistry and speciation of arsenic, selenium, chromium, and mercury speciation in leachate that can be used to more accurately evaluate ground water transport and health and ecologic risks.
- compilation and screening evaluation of groundwater remediation options that are most applicable for constituents found at CCP sites.
- preparation of comprehensive compilations of data on the occurrence, groundwater transport, treatment, and health effects for several key constituents (boron, arsenic, thallium, beryllium) at CCP and coal pile sites for use in permitting, groundwater evaluations, and risk assessments at CCP and coal pile management sites.
- organization of a consortium including utilities, EPA, USDA, the agricultural industry, and academia to advance understanding and further use of FGD gypsum and other FGD solids in agricultural applications.
- assessment of risks associated with radionuclides in CCP solids and leachate.

Current Year Activities

Program R&D for 2010 will focus on CCP characterization, ash pond management, groundwater remediation, health and ecologic risks, and technology transfer. Research on ash ponds will be coordinated with EPRI Environment Program 56, Effluent Guidelines and Water Quality Management, which is examining options for water treatment of ash pond discharges. Specific efforts will include

- developing data and tools for assessing changes in CCP characteristics and impacts on disposal and use, focused on sulfur trioxide controls (e.g., trona, sodium carbonate, lime) and mercury, and resultant impacts on disposal and use;
- ensuring the appropriate use of the data from new leaching protocols being developed by EPA and others;
- developing and/or evaluating effective groundwater treatment and remediation methods for key constituents at CCP disposal and use sites and at coal piles;
- updating CCP disposal guidelines, focusing on ash pond management and closure;
- completing several demonstrations of FGD gypsum use as an amendment intended to improve crop growth in various soils;
- enhancing understanding of whether or not land application uses of CCPs, such as ash in roadways and structural fills, can be conducted in an environmentally safe manner;
- investigating potential uses or needed disposal practices for solid products generated by emerging advanced generation technologies, such as IGCC and biomass cofiring;
- continuing to develop chemical profiles for key constituents associated with CCPs (selenium, molybdenum, antimony);

- evaluating health and ecologic risks associated with mercury, arsenic, selenium, and other trace constituents in CCP disposal and use settings; and
- monitoring the long-term effectiveness of site restoration activities at CCP release sites.

Estimated 2010 Program Funding

$3.0M

Program Manager

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Summary of Projects

Project Number	Project Title	Description
P49.001	Environmental Assessment and Risk	Research is focused on assessment and evaluation of the human health and ecologic risks associated with the specific inorganic constituents that are commonly found at power plant facilities.
P49.002	Management of Coal Combustion Products	This project uses a mix of laboratory information, field studies, and engineering evaluations to assess and develop environmentally sound and cost-effective CCP management practices.
P49.003	Characterization of Coal Combustion Products	This research provides laboratory and field information on CCP characteristics and how they behave in environmental settings.
P49.004	Remediation and Site Restoration	Research provides bench-scale treatability data specifically to address constituents commonly encountered at power plant sites, plus field tests to refine selection and implementation of remediation technologies.
P49.005	Communications and Outreach	A variety of outreach and communication vehicles, including short articles, technical briefs, oral presentations, workshops, and other methods will be used to convey research results from CCP research in a format that can be broadly disseminated to and understood by both technical practitioners and the general public.

P49.001 Environmental Assessment and Risk (058343)

Key Research Question

The need for environmental risk assessments at CCP disposal facilities and other power plant sites is expected to grow as monitoring requirements increase and EPA guidelines for new sites are enforced. Groundwater assessment costs alone can exceed $1 million per site, and surface water and air (dust) impacts have not been fully characterized. In many cases, detailed risk assessments will be required to determine the need for further action and to select the optimum long-term plan for a site. Communication of the actual risk to the public and to regulators is critical to ensuring appropriate response actions. In the past few years, releases of either ash or dissolved constituents from a handful of CCP management sites have significantly heightened public and legislative interest in potential environmental risks associated with these facilities. The terms "toxic" or "hazardous" ash have recently become a standard part of the media and public lexicon. Scientific data, analysis tools, and objective evaluation are required to provide a fundamental basis for minimizing environmental impacts and for delineating real risk, as opposed to perceived risk.

Approach

Research is focused on the specific inorganic constituents that are commonly found at power plant facilities and are most likely to drive human health and ecologic risk. Chemical profiles are developed for inorganic constituents of interest at power plants, providing comprehensive information on occurrence, geochemistry, attenuation, potential health effects, and remediation and treatment. The chemical profiles are supplemented by laboratory and field studies on chemical transport and potential exposure. This research also provides tools, such as groundwater models, for assessing and managing long-term risks associated with environmental releases. A key component includes outreach to communicate the research results and potential risks to the public and the regulatory community.

Impact

This project provides power companies with the information and tools to assess and communicate the risks and impacts associated with CCP management sites and other power plant facilities. The research results provide

- tools and data developed specifically for addressing groundwater issues unique to power plant facilities,
- risk assessment methodologies to facilitate assessment of potential liabilities and selection of cost-effective management strategies,
- significant cost savings realized with expedited groundwater investigations, and
- wide-ranging information from EPRI and literature sources on key constituents at CCP and coal pile sites.

How to Apply Results

The information and tools developed under this project will assist power companies in evaluating and communicating risk and compliance at CCP management sites and other power plant facilities. Compliance managers can use assessment techniques to identify and define issues and to evaluate the significance and long-term ramifications of impacts. Summary compilations for specific constituents will provide companies with concise compendiums of information that will allow remediation and waste specialists to perform site-specific risk assessments and groundwater modeling, and to select appropriate response actions. Groundwater data assessment tools can be used to establish efficient compliance programs for collecting, managing, and analyzing the large volumes of data that will accompany increased monitoring and compliance requirements at disposal sites.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
Chemical Profiles: Information for evaluating the transport and fate of key constituents at power plant sites is assembled into individual reports, or chemical profiles. These data include power plant source concentrations, other potential sources, geochemistry, attenuation coefficients, treatment/remediation technologies, and health and ecologic effects. Key constituents identified to date include arsenic, boron, beryllium, thallium, selenium, molybdenum, and antimony.	12/30/10	Technical Report
Risk Assessment: The need for remediation at CCP sites and power plant facilities is a function of human health and ecologic risk posed by facility releases. This product will describe the information and modeling tools used to develop an overarching framework that participants can use to evaluate risks to groundwater, surface water, and air (inhalation) for their facilities under various management and release scenarios. Focus topics include mercury, radionuclides, and trace metals.	12/30/10	Technical Update

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Deep-Well Injection of Wastewater: FGD wastewater systems are required to treat high-dissolved-solids-content blowdown, and EPA is considering revisions to the effluent guidelines for steam electric plants that could require treatment of more constituents. One option being employed by utilities is deep-well injection of wastewater. This project will assess potential impacts on groundwater aquifers at injection sites and the potential for migration of injected constituents.	12/30/11	Technical Update
Natural Attenuation of Metals: Natural attenuation of metals in the subsurface can often significantly reduce the potential for groundwater impacts from releases from coal storage and CCP management facilities. Natural attenuation is an integral component of any groundwater assessment and remediation plan. This research will develop field and laboratory data on the attenuation characteristics associated with key inorganic constituents at power plant facilities.	12/30/11	Technical Update
Groundwater Quality Signatures: Electric power companies are increasingly faced with monitoring multiple potential sources of groundwater contamination at power plant sites, including coal piles, ash ponds, ash landfills, and FGD management facilities. Distinguishing between on-site sources as well as potential off-site sources and background levels for compliance/remediation purposes can be difficult. This research will develop methodologies for establishing unique signatures for groundwater quality monitoring programs, including isotopes.	12/30/11	Technical Update
Coal Storage Piles: This research will track innovative groundwater restoration technologies for inorganic chemicals, such as reactive walls and geochemical barriers. Treatability studies will be used to assess individual constituents and mixtures commonly encountered at power plant sites. Promising technologies will be further developed as appropriate for use at CCP management sites and coal piles.	12/30/12	Technical Report
Chemical Profiles: Information for evaluating the transport and fate of key constituents at power plant sites is assembled into individual reports, or chemical profiles. These data include power plant source concentrations, other potential sources, geochemistry, attenuation coefficients, treatment/remediation technologies, and health and ecologic effects. Key constituents identified to date include arsenic, boron, beryllium, thallium, selenium, molybdenum, and antimony.	12/30/12	Technical Report
Risk Assessment: The need for remediation at CCP sites and power plant facilities is a function of human health and ecologic risk posed by facility releases. This research will develop information and utilize modeling tools to develop an overarching framework that participants can use to evaluate risks to groundwater, surface water, and air (inhalation) for their facilities under various management and release scenarios. A key component of the research is development of communication pieces to convey risk information to the public. Focus topics include mercury, radionuclides, and trace metals.	12/30/12	Technical Report

P49.002 Management of Coal Combustion Products (058342)

Key Research Question

Disposal facilities are often subject to stringent design and management standards that do not recognize the unique characteristics and generally low toxicity of coal ash and flue gas desulfurization (FGD) products, along with the limited mobility of their chemical constituents in groundwater. Federal and state regulatory agencies are considering development of more-stringent requirements for all disposal facilities. Land-application beneficial uses (engineered fills, mine fills, agricultural amendment) are also at risk. These actions have the potential to significantly increase CCP disposal costs and decrease options for beneficial use, and they will certainly increase groundwater monitoring and compliance requirements at CCP management facilities. Management of CCPs has become a focal issue of state and federal legislative and regulatory bodies as a result of a few high-profile environmental releases in recent years. EPA is currently evaluating federal regulation for CCP disposal, including the possibility of hazardous waste requirements. Ash ponds in particular have come under increased scrutiny; proposed options could range from liners and groundwater monitoring, to closure and complete phase-out of all ponds. At the same time, the Office of Surface Mining is developing regulations on placement of CCPs in mines. These actions will also put at immediate risk continued land-application beneficial use, such as engineered fills and use of FGD gypsum in agriculture.

Approach

This project uses a mix of laboratory information, field studies, and engineering evaluations to assess and develop environmentally sound and cost-effective CCP management practices. The objective is to predict and control environmental impacts at CCP disposal and beneficial use facilities. The research explores options for fixation of trace metals in CCPs to reduce the potential for leaching and release, evaluates improvements and innovation in liners and caps, conducts research on the use of FGD gypsum in agriculture, and develops assessment tools for structural fill and roadbed applications. The information will be used to update the EPRI CCP disposal manuals for coal ash and FGD solids. A current research focus is design, operation, closure, and monitoring of ash ponds due to the pressures imposed by the recent intense public and regulatory/legislative interest.

Impact

Disposal requirements for CCPs will almost certainly change over the next few years in response to recent events. Research under this project will provide technical information to inform the regulatory process, as well as provide power companies with options for disposal and beneficial use that reduce long-term environmental liability in a cost-effective manner. The research results help to

- reduce CCP management costs,
- improve risk-based decision making associated with environmentally sound management practices,
- inform EPA rulemakings on management standards for CCP sites and mine placement,
- develop cost-effective closure methods for ash ponds, and
- ensure the ability for continued beneficial use options.

How to Apply Results

EPRI will use the broad information generated in this project to help inform EPA's rulemaking process on management of CCPs. Utility engineers and scientists can use the manuals and research results to ensure environmentally protective and cost-effective design and maintenance of disposal facilities using proven methods. Environmental data can be used by CCP managers to make risk-based decisions on the environmental suitability of land applications, providing a high-volume beneficial use alternative to disposal.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
Ponds and Landfills: Design, operation, monitoring, and closure of CCP disposal facilities are addressed. Work in 2010 will likely focus on ash pond management and closure. EPRI's disposal manuals, last revised in the mid-1990s, will eventually be updated to incorporate recent advances in engineering design and changes in regulatory requirements.	12/30/10	Technical Update
Use of FGD Gypsum and Other FGD Products in Agricultural Applications: FGD products will increase substantially in volume over the next ten years. Research will evaluate the environmental efficacy of using FGD gypsum and other FGD products for agricultural crops and related large-scale land applications, using a combination of laboratory tests and field plots in diverse geographic areas. Key environmental issues will be addressed, including the fate of mercury and other metals. This work is being closely coordinated with USDA and EPA.	12/30/10	Technical Update
Fixation of Metals in CCPs: CCP disposal and beneficial use options are often limited by leachable constituents determined from standard laboratory test data. This research will evaluate physical and chemical characteristics of CCP mixtures and CCPs with additives designed to control and minimize leaching.	12/30/10	Technical Update

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Use of FGD Gypsum and Other FGD Products in Agricultural Applications: FGD products will increase substantially in volume over the next ten years. Research will evaluate the environmental efficacy of using FGD gypsum and other FGD products for agricultural crops and related large-scale land applications, using a combination of laboratory tests and field plots in diverse geographic areas. Key environmental issues will be addressed, including the fate of mercury and other metals. This work is being closely coordinated with USDA and EPA.	12/30/11	Workshop, Training, or Conference
Engineered Fill Applications: Structural fills and roadbase applications offer high-volume use opportunities for ash that does not meet specifications for use in concrete, as well as a sustainable alternative to virgin materials. This research will develop risk-based approaches to evaluating the long-term risks and benefits, including life-cycle societal benefits, associated with these applications.	12/30/11	Technical Report
Mine Reclamation: Placement of CCPs in surface or underground mines offers several potential benefits, including highwall stabilization, land reclamation, subsidence control, and acid mine drainage mitigation. This research will evaluate the use of fly ash, bottom ash, FGD gypsum, and fixated scrubber sludge in mine reclamation. Engineering properties and environmental effects will be assessed.	12/30/12	Technical Update

Product Title & Description	Planned Completion Date	Product Type
Use of FGD Gypsum in Agriculture and Land Applications: FGD products will increase substantially in volume over the next ten years. Research will evaluate the environmental efficacy of using FGD gypsum and other FGD products for agricultural crops and related large-scale land applications, using a combination of laboratory tests and field plots in diverse geographic areas. Key environmental issues will be addressed, including the fate of mercury and other metals. This work is being closely coordinated with USDA and EPA.	12/30/12	Technical Report
Ponds and Landfills: Design, operation, monitoring, and closure of CCP disposal facilities are addressed. Work in 2010 will likely focus on ash pond management and closure. EPRI's disposal manuals, last revised in the mid-1990s, will eventually be updated to incorporate recent advances in engineering design and changes in regulatory requirements.	12/30/12	Technical Report

P49.003 Characterization of Coal Combustion Products (Q55327)

Key Research Question

Management options and environmental assessments for CCPs are driven largely by CCP physical and chemical characteristics. New and changing air emissions controls and advanced generation technologies substantively change the character of the by-products generated and their environmental behavior. Air emissions controls that impact CCPs from conventional coal-fired plants include nitrogen oxides (NO_x) reduction, mercury (Hg) control, and sulfur trioxide (SO_3) mitigation. Fuel blends include use of nondomestic coals and increased use of biomass coburning. Integrated gasification combined cycle (IGCC) will generate a new class of by-products over the next decade. CCP radioactivity is under consideration again in light of technologically enhanced naturally occurring radioactive materials (TENORM) regulation. CCP characteristics drive regulatory decisions, as well as selection of appropriate management alternatives and long-term risk evaluations. In particular, several recent highly publicized events have reopened the question of the regulatory status of CCPs under the Resource Conservation and Recovery Act (RCRA), again raising the specter of some form of hazardous waste designation. In addition, EPA is introducing new leaching protocols for evaluating the environmental behavior of CCPs. Complete characterization data and critical evaluation of that data are an ongoing need to support development of environmentally sound and cost-effective management strategies.

Approach

This research provides laboratory and field information on CCP characteristics and how they behave in environmental settings. The current focus is on changes to CCP characteristics due to mercury and SO_3 controls, coburning of biofuels, radionuclides, and by-products derived from IGCC. EPRI is working in parallel with EPA on development and interpretation of laboratory leaching methods and geochemical models for CCPs. Research in this area contributes technical results to inform the regulation of CCPs and allows power companies to make informed decisions on the risks and benefits associated with various CCP management options.

Impact

Research in this project provides core data touching all facets of CCP disposal and use. The information is used to provide technical underpinnings for regulation, management strategy, risk assessment, and remediation. The research results

- allow power companies to evaluate the impacts of plant modifications, such as fuel changes, air emissions controls, and flue gas additives;
- inform the regulatory deliberations on management of CCPs as nonhazardous under RCRA;

- support permitting, compliance, and groundwater assessment at CCP disposal sites;
- facilitate risk-based decision making considering the long-term behavior of CCPs in the environment; and
- support regulatory and public communications on environmental risks.

How to Apply Results

Engineers and scientists can use these data and tools to support a wide range of permitting and compliance activities at CCP management sites. A comprehensive database of CCP characteristics can be used as part of an overall risk-based management approach for CCPs. Reports on various air emissions control technologies and their impacts on CCPs can be used by CCP managers to make decisions on disposal and use alternatives. Summary brochures can be used to communicate those decisions to the public on sensitive issues. In addition, EPRI will facilitate broader use and awareness of the results by briefing key stakeholders, including EPA; developing materials for the trade press/media; and continuing service on various advisory panels.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
CCP Composition and Leaching: Laboratory characterization studies will investigate and document the impact of evolving air emissions controls, such as enhanced Hg capture and SO_3 mitigation on fly ash and FGD solids. The effect of coal blends, biofuels, and nondomestic coal sources on ash quality also will be considered. Emphasis will be on development of a database and assessment of how changes in characteristics affect CCP disposal and use options.	12/30/10	Technical Update
Metals Leaching Model: Detailed geochemical studies will be used to evaluate the long-term leaching characteristics of CCPs, using alternative laboratory leaching methods, field data, and geochemical modeling. The objective is to elucidate mechanisms controlling leaching and develop predictive tools. The focus is on oxyanions (e.g., arsenic, selenium, antimony, molybdenum, and chromium).	12/30/10	Technical Report

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Mercury in CCPs: Research on mercury releases from CCPs will be updated as more control systems are phased in at generating facilities. This work will address both volatilization and leaching. Mercury release potential in sensitive CCP use settings (e.g., wallboard and agriculture) will be also be assessed.	12/30/11	Technical Update
IGCC and Advanced Generation By-Products: IGCC and other advanced coal-fired power plants are likely to become a growing part of the new electric generation fleet over the next several decades. This project will describe and characterize the residues produced from these advanced generation technologies and provide the basis for environmental management and use. Characterization work will initially rely on pilot facilities in advance of full-scale units.	12/30/11	Technical Report
Metals Leaching Model: Research on a metals-leaching model will focus on development of an advanced leachate characterization protocol and decision support tool for evaluating long-term leaching characteristics. Leachate modeling will be used as input to a framework for assessing disposal and use options. This work is being done cooperatively with EPA.	12/30/12	Technical Update

Product Title & Description	Planned Completion Date	Product Type
CCP Composition and Leaching: Laboratory characterization studies will investigate and document the impact of evolving air emissions controls, such as enhanced Hg capture and SO_3 mitigation on fly ash and FGD solids. The effect of coal blends, biofuels, and nondomestic coal sources on ash quality also will be considered. Emphasis will be on development of a database and assessment of how changes in characteristics affect CCP disposal and use options.	12/30/12	Technical Report

P49.004 Remediation and Site Restoration (069271)

Key Research Question

The need for soil and groundwater remediation at power company sites is expected to grow as new monitoring requirements are instituted at CCP management facilities, particularly ash ponds, and as older sites are closed. Legacy groundwater impacts will increase in importance over the next decade, as a result of heightened awareness and changing water quality standards. Groundwater remediation costs can easily exceed $10 million for a single site. Much of the research on development of groundwater remediation technologies in the United States centers on organic chemicals, while the suite of chemicals unique to the CCP and coal storage piles consists largely of inorganic chemicals such as boron, sulfate, arsenic, selenium, chromium, thallium, antimony, molybdenum, and vanadium. Retired power plant properties also provide potential liabilities that require some level of site restoration to ensure environmental integrity prior to property transactions or development. New or increased groundwater monitoring requirements will likely result in additional sites requiring remediation over the next five to ten years. The universe of remediation options for inorganics is limited, and there has been little research on the specific mixtures of inorganic constituents commonly found at power plant CCP management facilities. Research is needed to provide data on the effectiveness and cost for a range of options, to tailor existing treatment and remediation methods to power plant sites, and to develop new technologies.

Approach

This project provides bench-scale treatability data specifically to address difficult-to-treat constituents such as boron and selenium. Field tests will be used in collaborative projects with power companies to refine the remediation technologies. At retired power plant sites, a combination of soil and groundwater investigations, targeted remediation, and land use planning will be used to develop cost-effective site restoration strategies.

Impact

Soil and groundwater remediation are generally high-cost endeavors, and often the long-term outcome is uncertain. The research results from this project are designed to lower the costs and increase the effectiveness of targeted remediation and restoration at power plant sites.

- Remediation methods are evaluated and developed specifically to address the mix of constituents commonly found in soil and groundwater at power plant sites.
- Significant cost savings can be realized with prescreening of available technologies and targeted remediation.
- Site restoration research provides a database for closure and revitalization of retired properties.

How to Apply Results

The information and tools developed under this project will assist power companies in effectively addressing groundwater remediation and site restoration projects. Bench-scale laboratory data can be used by remediation teams to screen groundwater remediation technologies and select those most appropriate. Field demonstrations will provide remediation engineers with implementation data that will allow selection and design of appropriate remediation methods.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
Groundwater Remediation: This report will evaluate innovative groundwater restoration technologies for inorganic chemicals, with emphasis on in situ methods such as reactive walls and geochemical barriers. Promising technologies will be further developed with field implementation under collaborative projects at CCP management sites and coal piles.	12/30/10	Technical Update
Groundwater Treatability: This report will provide bench-scale treatability data for the inorganic constituents found at CCP facilities and other power plant sites. These data provide the basis for pilot-scale or field-scale tests of groundwater remediation and surface water treatment. Focus is on removal of boron and oxyanions (arsenic, selenium, molybdenum, vanadium), with applicability in both above-ground and in situ applications.	12/30/10	Technical Update

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Site Restoration: The research includes field studies associated with the restoration and development of former power plant properties. Projects are performed largely under collaborative agreements with utilities and include soil and groundwater assessment, excavation and capping, and evaluation of suitable development plans.	12/30/11	Technical Update
Groundwater Treatability: This project provides bench-scale treatability data for the inorganic constituents found at CCP facilities and other power plant sites. These data provide the basis for pilot-scale of field-scale tests of groundwater remediation and surface water treatment. Focus is on removal of boron and oxyanions (arsenic, selenium, molybdenum, vanadium), with applicability in both above-ground and in situ applications.	12/30/11	Technical Report
Coal Storage Area Closure: Coal piles can be a source of contaminated runoff and groundwater release of inorganic constituents. This is particularly true for eastern bituminous coal piles, which can produce acidic leachates that mobilize trace metals such as beryllium, cadmium, and nickel. This research includes laboratory and field studies on the closure and remediation of soil and groundwater contamination associated with coal piles.	12/30/12	Technical Update
Groundwater Remediation: This research will track and evaluate innovative groundwater restoration technologies for inorganic chemicals, with emphasis on in situ methods such as reactive walls and geochemical barriers. Promising technologies will be further developed with field implementation under collaborative projects at CCP management sites and coal piles.	12/30/12	Technical Report

P49.005 Communications and Outreach (069225)

Key Research Question

Research results are only of value if utility technical staff, regulators, and the public have ready access to them in a convenient form. Outreach efforts—user-focused briefing papers, conference presentations, and sometimes personal visits—can provide a means of communicating key research findings to CCP managers and their regulators to help support economically sound and environmentally safe management practices.

Approach

Effective communication of EPRI research on CCP issues is essential for the results to be considered and applied by the policymaking and regulatory communities. Communications activities under this program inform decision making and support the development of scientifically sound environmental policy through effective dissemination of significant research results to EPRI members, policymakers, regulators, scientists, and the public at large. These results are communicated via

- succinct descriptions of key EPRI research findings and their implications on a timely basis;
- presentations, briefings, and testimony to key stakeholders;
- detailed summary papers on EPRI research and analysis on major issues; and
- critical reviews of external studies published in technical reports or technical papers.

Impact

EPRI's outreach efforts could enable power companies to

- better communicate with government entities and the public,
- control disposal costs, and
- enhance beneficial use opportunities and revenues.

How to Apply Results

Environmental compliance and CCP management staff can use the technical briefs to show their community, potential CCP users, and local regulatory authorities that CCPs can be managed in an environmentally, technically, and financially sound manner.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
CCP Research Summaries: This research will develop an annual set of technical briefs and presentations describing the research results, focused on issues of most interest during the year.	12/31/10	Technical Resource

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
CCP Research Summaries: This research will develop an annual set of technical briefs and presentations describing the research results, focused on issues of most interest during the year.	12/31/11	Technical Resource
CCP Research Summaries: This research will develop an annual set of technical briefs and presentations describing the research results, focused on issues of most interest during the year.	12/31/12	Technical Resource