Work Order	Corporate Total	KPCo Total	Project Title	Project Description
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RDCP570001	102,242	3,683	Corporat Tech Program Mgt	Coordinate Corporate Technology program. Support Corporate Technology Council
RDDA513401	50,000	2,260	2011Ind.&Agri.CntrOfExcellence	EPRIs proposed Industrial Agricultural Center of Excellence will be established to encourage specific energy and technology related developments. Using EPRI, utility, and industry subject matter expertise the Center is expecting to support applications, demonstrations and commercialization of advanced efficient electric technologies and utilization methods. The Center of Excellence would additionally support members and their customers through testing, training, education, and outreach.
RDDA513501	124	6	GE-Develop&Test Meter Phase ID	Distribution data systems such as outage management, SCADA, and circuit modeling have increasing needs for accurate identification of the phase s that feed customer loads. Keeping the data systems in step with actual field conditions is challenging due to changes that occur in the field during routine and outage restoration work and the difficulties in communicating the changes to the data systems. Errors in meter associations with phases cause errors in outage prediction by the OMS system, require field checks to validate circuit models, and will have serious effects when SCADA systems are providing more automated control of system devices. This project is developing and testing a technology collaboratively with GE that will result in a product that will allow utilities to routinely update the accuracy of meter associations. AEP s participation is mostly consulting with GE on designs that will be acceptable to utilities and assisting with testing at Dolan Lab.
RDDA523701	50,000	2,260	Demand Response Ancillary Svcs	This project will perform research associated with emerging energy price and product messaging-protocol standards to take advantage of ubiquitous low-cost communication infrastructures that may be able to reliability perform automated demand response DR and Ancillary Services AS or fast DR functions. Project Benefit 1. Accelerate standards development of protocols to automatically manage loads for DR and AS. 2. Contributions to the development of standards and products that use the standards for DR and AS functions. 3. System and load performance and benefits analysis for demonstration host sites.
RDDA523801	50,000	2,253	Dist Mgmt Systems Control&Comm	This project will demonstrate an end to end communication link between distribution operators and distributed resources in several different field applications and environments. Experience gained from this project will help inform the standards making process for more active participation of distributed resources. Project Benefit: Enable higher penetration of PV systems without detrimental impact on distribution circuits and help with development of communication standards and protocols.
RDDA523901	50,000	2,269	Integratn-AMI To SubstnNetwork	Asset owners in the electric utility industry are testing the feasibility of using the advanced metering infrastructure AMI communication network to cost-effectively connect field equipment in geographically dispersed distribution systems to the substation to control the 2-way flow of electricity between the grid and the customer premises. Additionally, the energy usage, voltage, and phase data from smart meters could be used by the next generation of supervisory control and data acquisition SCADA applications to improve volt/var optimization and reduce line losses. The integration of AMI into the substation requires a thorough risk assessment to determine the vulnerabilities and new threat vectors that could arise from customer premises linked to the power systems control network that connects to a substation. The objective of this project is to develop this risk assessment and apply it to the design of a secure architecture for integrating AMI into substations for advanced grid control strategies. Reducing the risk of a cyber security incident on this type of architecture may benefit the public by making the AMI and SCADA applications less vulnerable to attack, thus decreasing the possibility of power disruption for end users. Project Benefits/Goals 1. Reduce the cyber security risk of delivering end-use load data to next generation SCADA applications to reduce line losses. 2. Reduce the cyber security risk of utilizing the existing communications infrastructure more efficiently for substation, customer equipment, and meters. 3. Develop security architecture for integrating AMI data into substations that can support a variety of technology-specific implementations.
RDDA524001	17,500	783	PQ Knowledge Devlpmnt&Transfer	Providing extensive resources to utility engineers on Power Quality PQ issues, and through research and case studies, finding new information on power quality subjects that electric service providers can use to cost effectively meet customer and internal demands. Project Benefit Enable AEP engineers to address and resolve system conditions and customer inquiries resulting from power quality issues.
RDDA524101	25,000	1,119	Grid Resiliency Initiative	The EPRI Grid Resiliency project is a 3 year effort researching construction, maintenance, and service restoration practices that will improve utilities ability to recover from major storms. As currently scoped, the Grid Resiliency project will study 1 Overhead structure hardening - how do structures behave during storm conditions 2 Vegetation management practices - what s best practices for line clearance 3 Undergrounding of overhead lines - what s total cost of ownership of overhead vs. underground 4 Grid Modernization - what impact does gridSmart have on storm restoration 5 Practices for Storm Response - what practices do different utilities use in responding to major storm outages 6 Prioritization of Distribution Resiliency Investments - what's the optimum cost alternative for grid resiliency Project Benefit Research results will enable AEP to take the effects of storm caused outages i.e. the effect of tree fall impact on structures into account when designing distribution systems; compare and contrast restoration practices between utilities; and better target efforts and spending on vegetation management, undergrounding of overhead lines and installing smart circuit technologies.

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RDDA524201	173,000	7,743	Electrification Productivity	Develop the strategic frameworks to evaluate electrification opportunities in their service territories, and the tactical tools to pursue program implementations with business customers. Project Benefit Improved productivity and competitiveness of end-use customers through advancements in overall energy efficiency, reduced costs, and improved throughput. Reduced on-site emissions at end-use customers facilities, which assists compliance with environmental regulations and fosters worker health and safety. Reduced net emissions to benefit society-at-large.
RDDA560101	1,146	52	Dist EPRI Annual Research Port	Coordination of AEP's: 1) Corporate Technology program and 2) Support the Corporate Technology Council Replaces work order RDCP200301
RDDA570101	289,808	12,971	Distribut EPRI Annual Portfol	Program 1B - PQ Knowledge-Base Service: The overall objective of this project set is to implement monitoring system advancements that will not only enhance benchmarking and reporting functions of the monitoring systems, but also provide the basis for advanced applications that can actually improve equipment and system reliability. This project set has three integrated project areas that complement each other. P1.005 û Integration of Data from Multiple Monitoring Systems: This project area helps increase the value of monitoring systems by integrating information from many different devices and equipment that may provide increased value to overall power quality data management and analysis applications. This can include a variety of IEDs that may be part of new system investments, as well as advanced metering systems that are used for many customers. Important topics to be addressed in the research include the following: ╖ Monitoring equipment considerations (accuracy, standards) ╖ Integration of data from different monitoring systems (relays, digital fault recorders, metering systems) ╖ PQDIF tools and support (PQDIF user group) ╖ PQDIF verification for monitoring systems ╖ COMTRADEùcontributions to next version of COMTRADE to make it more compatible with PQDIF (IEEE Relay Committee) ╖ Communications issues and capabilities The research priorities for this project are developed each year by a project advisory group. Prioritization of the specific equipment and interfaces to be evaluated allows for the most timely and useful deliverables to be provided to the members. P1.006 û Advanced Applications for Monitoring Systems: This project provides the technical basis for advanced applications that can be applied in monitoring systems to improve system reliability, equipment performance, and operations. The objective is to provide the basis for analyzing PQ trended data, transient disturbance data, fault data, and related system information to identify equipment and system problems that can be resolved in a more timely manner. Alarms and reports can then be integrated with system maintenance procedures and operations to more efficiently resolve problems and improve equipment reliability. The net effect can be a dramatic improvement in system reliability and a reduction in maintenance and operation expenses. Members will help prioritize important functions to be included in a power quality monitoring system that can provide operational and reliability improvement benefits. Important capabilities that are likely to be considered include the following: ╖ General processor for trended PQ data to identify abnormal conditions based on control chart theory, etc. ╖ Voltage regulator performance module ╖ Fault protection and coordination assessment module ╖ Automated power quality and reliability reporting methods ╖ Transformer loading and lifetime assessment, including harmonics ╖ Arrester performance for transient events Work will also begin on a database collection (library) of disturbance data for use in the development of advanced applications. P1.007 û Monitoring System Development and Management: This is the project where the advanced capabilities actually get implemented in power quality monitoring management systems. Application in actual software systems, such as PQView, allows utilities to realize the benefits of the research in P1.005 and P1.006. In 2007-2008, the work in this project set is also being coordinated closely with a large DOE-funded research project on fault analysis and fault location technologies that will complement the EPRI research and provide substantial added value for the members in this project set. Program Set 1D - PQ Knowledge-Base Service: The Power Quality Knowledge-Based Services program comprises an array of resources and tools. At the core of the program is a customer hotline offering round-the-clock power quality technical support. Complementing the hotline are the following: ╖ Five electronically distributed newsletters which regularly provide the latest information on power quality business, technical trends, educational opportunities, and project updates ╖ A detailed EPRI PQ Encyclopedia, a definitive reference and training tool for power quality ╖ Continued enhancement of the highly valued PQ case study library to supply customers with an essential and productivity-improving resource ╖ Access to the PQ Hotline for best-in-class problem-solving resources ╖ The PQ Hotline Database, an unparalleled archive of a range of solutions and industry experience ╖ Additional resources for the Power Quality Online Resource Center to further enhance its value ╖ Complimentary registration for one Power Quality Interest Group meeting, along with a registration discount on all PQA Conferences Project 30.003 û Manhole Event Risk Management Strategies: A number of utilities continue to experience gas-related explosions in underground structures such as manholes, service boxes, and vaults. Two root causes are needed for an event to occur: the buildup of explosive or combustible gases and the presence of an ignition source. These events can occur unexpectedly and can involve numerous explosions in adjacent structures. The financial and political consequences of such events can be significant. Explosions and related events in underground structures are rare, involving fewer than 1% of underground structures, and range from "smokers" with little effect, to "flyers" with very serious collateral damage, injury, and even death. Many causal factors are involved, and multiple events are possible. Predictability is very difficult. Damage can range from fire or smoke damage in "smokers" to collateral damage to external facilities or personal injury from flying manhole or vault covers in "flyers." In 1991, a utility experienced a fatal event. In 1995, Underwriters Laboratories (UL) issued a milestone report detailing the composition of evolved gases. A test facility was built in Lenox, Massachusetts, in 1994 with EPRI and Consolidated Edison (ConEd) co-funding. At some utilities approximately 1% of underground structures are involved in an event each year; with fewer than 0.01% involving collateral damage. During 1996-1998, milestone tests, funded by ConEd and EPRI, were conducted in Lenox involving "standard gas explosions" and mitigation approaches. Recently, many utilities have reported major events. No utility is immune from the prospect of underground explosions! EPRI's approach has taken several paths: research, construction of test facilities, and various workshops and rapid response meetings following manhole events. The research has been broad-based, involving full-scale tests, analytical studies, and computer modeling. Research

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				topics have included: explosion characteristics, electrical (fault) vs. gas explosions, type and composition of gases involved, explosion mitigation, cover restraints, cover design, root causes, and environmental factors. EPRI has also tapped into information and technologies in other industries that operate underground systems and may experience similar problems. 1.008 System Compatibility Research: This research area involves characterizing compatibility issues between end use equipment, power conditioning technologies and power system performance. It includes establishing evaluation criteria (e.g., testing protocols), evaluating failure mechanisms, and identifying solutions.
RDDA570201	119,224	5,348	CEA Membership & Projects	The CEA is a collaborative of companies that propose and fund research topics. These topics can range from asset management to automation. The purpose of this project is to allocate funding for topics of interest within the Distribution organization. Individual project descriptions will be presented in the comments area of this document when available. CEA = Canadian Electric Association Replaces work order RDDA570201
RDDA570401	190,456	8,549	NEETRAC Membership	The National Electric Energy, Testing, Research, and Applications Center (NEETRAC) was established in 1996 by the Georgia Tech Research Corporation (GTRC), a cooperative organization of the Georgia Institute of Technology. It is supported by a membership consisting of utility and industrial companies. The purpose of NEETRAC is research, development and testing in areas of interest to the membership and is funded by the Research and Development Baseline Budget from dues collected from that membership. The project selection generally is of a scope that is sufficiently broad as to be attractive to several Members, who are interested in sharing the resulting intellectual property. NEETRAC membership includes both collaborative and directed funding research. AEPÆs strategy is for NEEETRAC to complement the Dolan Technology CenterÆs (DTC) capabilities through research in such areas as cable life extension and other research or testing areas that the DTC is not directly involved in. AEP will be joining NEETRAC as a Corporate û Charter Member with voting rights on the selection and prioritization of projects. NEETRAC is a non-profit corporation. Replaces work order RDDA560301
RDDA571101	84,409	3,807	Grid of the Future Test Bed	Develop a Grid of the Future test facility at Dolan Technology Center that will enable the evaluation of technologies that support AEP's vision of the next generation Distribution network. For 2007: installation of a WiMAX network, demonstration of WiMAX compatibility with standard utility protocols, integration of Advanced Metering Infrastructure components, Distribution Automation components, and Asset Monitoring and Control components. The test bed will include an IP-based control network that will facilitate AMI, DA, and Asset Monitoring and Control testing. For 2008, the test bed will be extended to include the evaluation of back office solutions (Yukon, Enmac, others), Home Area Networks (HAN), advanced DA and Asset Monitoring and Control, Distributed Energy Resources including Distributed Generation and Storage Technology. The information generated from these evaluations will be used to support decisions on vendor acquisitions, systems compatibility, and overall architecture & system design. Once the utility to HAN interface has been defined, communications into the customer premises will then be evaluated for DSM, DR, and metering applications like real-time pricing, tamper detection, remote connect/disconnect, and outage management. Equipment from multiple vendors will be accommodated.
RDDA571201	(40,954)	(1,860)	AMI Test Bed Development	Develop an Advanced Metering Equipment (AMI) test facility at AEP that creates the in-house capability to evaluate current and future AMI equipment and their supported Distribution applications. The information generated from these evaluations will be used to support decisions on AMI vendor selection and system design. Compatibility of AMI with Distribution Automation equipment will be explored, and Distributed Intelligent Monitoring, Communication, and Control evaluations will be supported. Communications into the customer premises will be evaluated for DSM, DR, and metering applications. Equipment from multiple vendors will be accommodated.
RDDA581701	16,674	746	GRDSMRT-SolarWindEnergyStorage	The primary purpose of the project is to test and compare Greenfield Steam & Electric's concentrated photovoltaic (PV) technology prior to any large-scale deployment. The testbed will allow the concentrated PV performance to be easily compared to the performance of a commercially available PV system. The testbed will also be used to model a typical residential-size distributed energy resource installation. The integrated test bed will allow AEP to study the effects of residential-size wind and solar on the grid, as well as the interface and controllability it may have with a Home Area Network (HAN) and Advanced Metering Infrastructure (AMI)
RDDA581901	165,000	7,488	EPRI Demo - Smart Grid	In addition to controls on emissions from power plants, significant reductions in emissions of carbon dioxide can be achieved through contributions from energy efficiency, plugin hybrid electric vehicles, and distributed energy resources. Integration of these resources through the electric distribution system will require new communications and control technologies. This project will conduct several regional demonstrations to integrate distributed power generation, storage, and demand response technology into a demand-side virtual power plant. The demonstrations will take advantage of infrastructure investments that are being made across the industry and illustrate ways in which distributed resources can be integrated with system operations.
RDDA582101	42,926	1,947	PHEV Technlgy FutureStrategies	The primary purpose of the project is to prepare our business for the mass deployment of PHEVS across AEPS regulatory jurisdictions. Develop a strategy (in conjunction with R&D) that will have a positive impact on revenue and that leverages the capacity of our existing infrastructure.
RDDR560101	141	6	DR EPRI Annual Research Portfo	The Distributed Energy Resources (DR) EPRI Annual Research Portfolio includes: 1) Energy Storage Planning & Technology Assessment - Energy Storage has been recognized as a strategically important component of our future grid. Membership in EPRI 94.001 provides AEP with information on the state of utility-related energy storage technologies and their applications in the industry. 2) Strategic Planning for DER - AEP has just consolidated its distributed energy resources (DER) activities to better prepare its

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RDDR570001	36,244	1,649	DER Program Mgmt	Provide program management for the Distributed Energy Resources (DER) program.
RDDR570101	5,782	260	DER 2007 EPRI Annual Portfolio	Energy Storage has been recognized as a strategically important component of our future grid. Membership in EPRI 94.001 provides AEP with information on the state of utility-related energy storage technologies and their applications in the industry Distributed Energy Resources (DER) program.
RDDR570301	252	11	Micro-grid Test Bed/DOE Tests	To demonstrate, evaluate and document performance and protection measures designed in the CERTS Micro-grid Concept. During 2006, the CEC/CERTS Micro-grid Project Team constructed a microgrid test bed at AEPÆs Walnut Test Facility. This project continues in 2007 from work performed in 2006 and involves detailed protection tests on the CERTS Microgrid Test Bed, funded by Dept. of Energy (DOE) through a contract with the University of Wisconsin. In addition to conducting a full-range of detailed protection tests, according to an approved test plan, it involves analyzing protection test results and documenting the results in a Final Report.
RDES505201	20,000	451	Plant DecommissioningIntrstGrp	As older plants reach the end of their useful lives and the site is considered for repowering or other uses, demolition of the plant will be required. The project will provide guidance and checklists incorporating best practices for all steps in the plant closure, remediation, demolition, and redevelopment. It will also provide opportunities to exchange information with industry members and experts on related issues.
RDES505401	7,633	266	Vertical Flow Treatment Cells	Establish a pilot project at Quarrier landfill to determine the efficiency of in-ground stepped vertical flow treatment cells for removing trace metals from landfill leachate. The stepped design will allow for incorporation of these cells into difficult terrain situations. The project will test the effectiveness of yard waste compost in the vertical flow treatment cells and will test the effect of retention time on treatment. The development of low-cost biological treatment to meet NPDES limits can be a benefit to the electric utility industry. Information gained from the project could be used to design full-scale vertical flow treatment cells at other facilities.
RDES505901	12,500	485	PwrPlntParameterDerivationTool	The purpose of the software is to model the generator, excitation systems, and power system Stabilizers that will be required by NERC MOD-026.
RDES506501	1,306	47	Corrosion in Wet FGD Systems	The purpose of this project is to collect data on FGD units experiencing problems to determine the root cause(s) of the corrosion. Information on fabrication techniques, construction QA/QC and operating environments (chemistry, scaling, etc.) will be gathered at as many sites as possible. These data will be used to identify gaps in knowledge. Based on this analysis, missing data will be generated using laboratory and/or field corrosion tests for alloy 2205, welds, and alternative materials/coating systems. Repair strategies and other mitigation strategies will also be explored and documented if proven and widely applicable.
RDES506601	1,080	42	SOAPP Software	State of the Art Power Plant Software provides technical and economic data and analysis to support over all Gas Turbine Combined Cycle plant life cycle development.
RDES510301	45,041	1,582	2011 CEATI Membership	The scope of the Strategic Options for Sustainable Power Generation Interest Group SOIG is to develop, evaluate and demonstrate sustainable power generation technologies that will result in an increase in power supply capacity and a reduction in greenhouse gas emissions. Includes distributed generation, distributed resources, fuel advancements and advanced generation cycles.
RDES510401	36,645	1,091	Energy Sustainability Int Grp	The ESIG has identified the following priorities for 2011 identifying common and best practices of sustainability leaders; case studies of best practices in sustainability; continued focus on supply chain operations/sustainability; the next generation of sustainability reporting; sustainable technology development. This group represents a collaborative effort within the electric utility industry to advance sustainability within the industry. It is the only electric utility-specific group of its kind at this time.
RDES510501	37,500	1,670	TAG Generation Planning Info.	The EPRI TAG provides performance and cost information about most commercial generating technologies. As well as, critical performance and cost information on various environmental technologies. The TAG-Web is a database of generation technologies that provides users with customized technology selection based on specific situations. The product also includes regional variations in Capital & O&M cost and is hosted on the EPRI website. The data from this program provides a credible and economical source of performance and cost inputs for company models used in generation planning and scenario analyses.
RDES510601	2,000	67	Selenium Working/Interest Grp	The purpose of this project is to participate in a technical working group that brings together environmental professionals from industry, academic, and regulatory agency sectors. In 2003 the North American Metals Council formed a Selenium Working Group which was formed to coordinate industry action concerning selenium regulatory activities in Canada and the United States. The Working Group has funded a series of technical publications concerning selenium toxicity and chemistry. Funding is being requested for preparation and finalization of a final technical document re: treatment of selenium in wastewater. The Working Group meets twice per year to discuss latest research findings and pending regulatory initiative.
RDES510901	4,301	165	Static Liquefaction of CCP's	Study the effects of rapidly closing an ash pond and the potential for static liquefaction to occur, causing dam instability. The objective is to determine what a safe rate of closure is to allow gradual relief of pore pressure and to allow safe closure. Please see the end of this project charter for more detail.

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RDES511001	40,179	1,381	Mapping Ecosystem Svcs-Rockprt	EPRI will develop a GIS tool for the Rockport site that can be used for assessing current and future impacts to natural resources and associated ecosystem services. This approach will provide a strong scientific framework for optimizing AEP land management practices and help balance these decisions with other corporate priorities. The GIS tool will provide capability that will allow for a rapid, cost-effective, and comprehensive assessment of AEP land management decisions that will benefit/impact natural resources and associated ecosystem services wildlife, carbon storage, pollination, water purification, and others . Further investment in this approach will be subject to the success and value of this pilot application at Rockport. Part of this effort will include the development of instructional materials so that AEP staff can implement this approach on other properties.
RDES511301	30,000	1,170	Gr92 Steel Boiler&PipingCmpnts	Initial product testing has shown that very low ductility creep failure of base metal samples have occurred with significantly raises concerns over catastrophic fracture. Issues associated with creep failure of welds. It appears that creep failure can occur in the weld metal depending on the PWHT condition used. Project Benefit: Develop guidelines on how to ensure Gr.92 steel components are manufactured and welded to provide expected performance. Present a Life Management Strategy for Gr. 92 steel.
RDES511401	30,000	1,336	DetectHighTempDamage-CSEFSteel	Project will determine current industry NDE technology available to detect damage in CSEF materials. Due to the creep resistant nature of CSEF materials, thinner section components are fabricated resulting in less material and weight. These materials specifically Gr. 91 and 92 do not necessarily degrade with the same damage mechanisms as prior generation materials. Project Benefit: The target seeks to address the advantages and limitations of different NDE methods the expected sensitivity detection ability of the different methods; and which methods which should be applied, and when, for an effective plant program.
RDES511501	10,000	445	Weld Repair-Gr91Pipe&Cmponents	Develop criteria to ensure that the repair methods used on CSEF components are selected based on accurate technical understanding. Project Benefit: Understand how to remove damaged material efficiently and without introducing additional problems which could influence future performance. Develop the ability to make repairs in Gr. 91 steel, which will provide the required service life. Develop follow-up inspection and assessment requirements consistent with safe and reliable operation.
RDES511601	27,677	862	Stator End-Winding Monitoring	To perform long-term technical evaluation of using a combination of on-line end winding vibration monitoring, partial discharge, and electromagnetic interference analysis EMI for condition assessment of air and hydrogen cooled generators with end winding problems. Project Benefit: It is expected that increasing level of end winding vibration will be detected in sufficient time to avoid in-service failure of 3000 3600 RPM machines that have high 5 mils end winding vibration.
RDES511901	26,667	1,040	Evaluation - Acoustic Emission	The objectives of this project are to determine if acoustic emission can detect creep damage in low alloy piping materials, and at what stage of damage development any detection might occur. Project Benefit: The project seeks to address the advantages and limitations of acoustic emissions Detect creep damage in high energy piping systems Correlate damage accumulation with remaining life Estimate seam welded piping life Acoustic emission testing for creep
RDES512001	4,761	-	Gavin Hg Reduction: FGD Ponds	The purpose of this project is to evaluate the feasibility and cost-effectiveness of a treatment technology aimed to reduce the levels of mercury released from Gavin Plant s FGD landfill leachate ponds. Effluent limitations for mercury must be met at one of the ponds Pond 2 no later than 12 31 2012. The feasibility of using activated carbon and/or biochars to sequester mercury in pond sediments will be evaluated. Project Benefit: A successful demonstration of this treatment technology will provide greater certainty in achieving effluent limitations in a cost effective manner.
RDES512101	22,023	736	SuprcriticalWaterwalOxideGrwth	Supercritical waterwall cracking is one of the boiler tube failure mechanisms for supercritical units that were driven by heavy ID deposition. The deposition was due to corrosion of the condensate and feedwater piping and subsequent depositing of this corrosion product on the ID of supercritical waterwall tubing. It was believed that with the conversion of supercritical units to oxygenated feedwater treatment OT which drastically reduces the corrosion product transport from the condensate and feedwater cycle that this tube failure mechanism would go away. Unfortunately this mechanism has returned. EPRI has been working on this failure mechanism for the last several years and have come up with several different causes. One thing that has not been investigated fully is the difference between supercritical waterwall oxides prior to oxygenated feedwater treatment and after oxygenated feedwater treatment. Fortunately AEP Gary Wood has a library of tube samples from various supercritical units over the years. In particular he has a sample of a pre OT unit with very heavy deposits, and a sample of a typical pre OT unit. Couple this with samples from post OT units we will have the ability to look closer at these oxides to see what differences exist. Something that will be done for the first time on this type of deposit is the use of an ion milling tool which will allow us to see the oxide much better.
RDES512201	388,040	13,184	Demo of the SAP for Hg Control	Full scale demonstration project for the development of activated carbon AC for Hg control. EPRI system will be utilized for the on site production of activated carbon from on site fuel and supplied to the Sorbent Activation Process under existing EPRI patents.
RDES520301	65,000	-	Gas Turbine Rotor Life	Develop an objective technical approach for evaluating accumulated rotor damage. Develop materials degradation data and life prediction tools that can be used to safely extend rotor in-service life. Project Benefit: Results from this project will provide GT owners with procedures and technical information to objectively evaluate the condition of their GT rotors.

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RDES520401	25,000	698	WaterwalCircumferentialCrackng	Continue to deploy the advanced thermal mapping instrumentation installed, with additional, state-of-the-art fluidside instrumentation to potentially identify fluid imbalances and thermal impacts on circumferential cracking. Project Benefit: Project will provide an improved understanding of the operating conditions that result in circumferential cracking allow this cause of tube failure to be addressed and mitigated.
RDES520501	50,000	2,227	PlantWasteWaterTreatmnt Mgmt	Acceleration of the available advanced Waste Water Treatment WWT technologies û via a comprehensive R D program. Guide development of cost effective solutions û focus on Hg, Se, FGD WWT, Ash Contact Waters, ZLD technologies, nano Filtration, micro-filtration, co-precipitation of B and Se. Project Benefit Opportunity to guide industry s research effort into advance WWT technologies that will be required to deal with water discharge stream in near future.
RDES520601	37,500	1,670	Air Cooled Condensers	Air cooled condensers ACC are being installed to reduce water use in power plants. Unfortunately, significant iron corrosion product transport has been seen on numerous existing ACC which is not a function of the design of the ACC. At present AEP does not have any ACC s in its fleet but as environmental regulations tighten and AEP builds or purchases more assets the likely hood of having ACC s in the future is great. This project will improve the understanding of corrosion mechanism present in ACC s along with techniques to avoid or manage the corrosion issues moving forward. Project Benefit This information will be valuable to AEP and help us avoid corrosion issues with ACC s if and when we add them to our fleet.
RDES520701	25,000	1,114	Dev New Greenhouse Gas Offsets	This project will facilitate development of greenhouse gas GHG emissions offsets associated with activities to enhance management of biomass vegetation growing on high-voltage electricity transmission system rights of way ROW owned or managed by electric companies. Project Benefit: Reduce electric company costs to manage vegetation on transmission rights of way Demonstrate how to create financial value by implementing enhanced Integrated Vegetation Management on transmission rights of way Increase the suite of options available to electric companies to offset their GHG emissions and comply with potential future requirements to reduce company GHG emissions Reduce the potential costs to comply with future regulations that may require electric companies to reduce their GHG emissions.
RDES520801	25,000	561	CorrosionProduct Trnsprt&Cntrl	Two phase flow accelerated corrosion FAC of feedwater, deaerators, heater drains, and heater shells is a problem in the utility industry and within AEP. At present the only way to mitigate two phase FAC is by replacing damaged carbon steel material with material that has 1.5 chrome. There is also disagreement in the industry in regards to what impact cycle pH has on slowing down two phase FAC. Back in August AEP increased cycle pH for all AEP supercritical units due to concerns with the role pH plays on increasing the risk for two phase FAC. Even with this change, AEP as an organization is struggling on how to determine whether this pH change is impacting two phase FAC. The initial work performed was part of a TC project with EPRI using Rockport as a host site. The TC project had significant findings which showed a relationship between pH and two phase FAC. Because of the findings in this TC project we would like to continue the testing at Rockport for 6 additional months performing 4 more tests. These tests would be 1. Operating at a cycle pH of 8.6 with hp heater vents open 2. Operating at a cycle pH of 8.6 with hp heater vents closed 3. Operating at a cycle pH of 8.8 with hp heater vents closed 4. Operating at a cycle pH of 8.2 with hp heater vents closed EPRI has always preached that while operating on oxygenated feedwater treatment that vents on heaters need to be closed. The remaining testing above will prove or disprove this recommendation. This work will need to be performed as a supplemental project.
RDES520901	50,000	1,949	Risk Evaluation - Trace Metals	The purpose of this project is to prioritize trace metals undergoing recent or future regulatory review and develop dose-assessment values for these trace metals. Project Benefit Project will integrate available toxicology and health data for metals under current, or future, review by federal agencies to provide an increased understanding of options and risks associated with combustion related operations.
RDES521001	20,412	-	Water Use&Consumptn-TexasPlnts	The Electric Power Research Institute has developed significant information on water conservation technologies for power plants, including costs, performance and impacts under a wide variety of site characteristics. The purpose of this study is to apply these results to the Texas generation fleet and to consider the unique resource limitations, climate variations and regulatory constraints that Texas power generation providers must adhere to for water withdrawals and water consumption. Project Benefit: This study will provide a stable dataset that outlines water use, water consumption and water conservation within the Texas power generation sector, as well as a rigorous analysis of the water conservation options that are economically viable. This analysis will also illuminate how changing generation assets may impact water use intensity over the next 50 years. The study will provide the basis for a consistent and sound cooling water life-cycle comparison. The results can be applied to other geographic or hydrologic locations for the purpose of finding the lowest cost conservation options to achieve water sustainability. Public benefits are also derived from reduced power rates and reduced impacts of water availability to local economies.
RDES521101	40,130	1,444	Mercury Cycling ModelCaseStudy	The purpose of this project is to evaluate and test the predictive ability of an EPRI model Mercury Cycling Model that was recently upgraded to accommodate flowing water riverine environments. The model û which has been advocated by US EPA - will be calibrated and parameterized using data from a navigation pool in the Ohio River where AEP and OVEC coal fired power plants discharge to. The model will seek to apportion the many sources of mercury to the water body and thus will inform regulatory agencies on the relative contribution of power plant waste streams. Project Benefit: Demonstration of a predictive model that will assess the transport and fate of mercury in the Ohio River.

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDES521201	80,000	2,234	FGDGypsumPhosphorusRunoffCntrl	Proposed new federal guidelines for coal combustion by-product disposal in landfills and impoundments are expected to increase compliance costs. The more CCRs that can be used beneficially and within the new regulatory framework, the less of an impact that new disposal regulation would have on cost. The U.S. Department of AgricultureÆs DOA s interest in studying the use of FGD gypsum to control phosphorus in agricultural run-off coincides with AEP s interest in expanded beneficial uses of CCRs. This project will study further the use of FGD gypsum as a soil amendment to reduce soluble phosphorus in run-off from agricultural fields, a key to reducing non-point source water pollution to receiving streams. The purpose of this project is to develop the use of FGD gypsum as a best management practice to control nutrient loading in sensitive watersheds. Coal Combustion Residual CCR FGD flue gas desulfurization
RDES521301	20,000	771	Development-Shale Gas Reserves	The development of extensive shale gas reserves will continue drive an increased reliance on natural gas for electricity generation in the United States. Various environmental considerations have been identified related to shale gas production. The purpose of this project is to assess the scope and magnitude of these considerations so that related risks can more effectively be managed. Project Benefit The assessment of environmental risks from shale gas production will benefit AEP in identifying and managing related risks associated with the current and future reliance of fuel supplied from shale gas resources.
RDES521401	15,658	-	GeigerScreenImpingemntSurvival	The basic scope of this project is to further evaluate the impingement survival performance of the Passavant-Geiger Rotary Geiger Screen and will involve testing freshwater fish salt water in the flume presents numerous complicating engineering and permit problems . EPRI plans to evaluate 6 species representing a range of handling sensitivity exact species to be decided; however, they must be comparable to the 10 species EPRI evaluated in our 2006 Ristroph screen flume testing , 3 approach velocities, and one control per condition. Project Benefit EPA feels there is insufficient data for Geiger screens to support their inclusion in the BTA Best Technology Available category. There may be information on this in the long delayed EPA NODA Notice Of Data Availability and we will adjust accordingly if it is included. The proposed research will develop the requisite data to compare the Geiger screen s performance to EPRI s robust laboratory flume data set for Ristroph screens. Results may contribute to a BTA designation and preclude or greatly minimize extra screen monitoring during future compliance testing when the 316 b rule is finalized.
RDES521501	(73,680)	(2,425)	EPRI Catalyst Sample Testing	Provide bench scale tests at AEP DeNOx Catalyst Laboratory for ten 10 deactivated regenerated SCR catalyst samples, which include plate type, honeycomb type, and corrugated type, received from EPRI s member electric utilities. The test for each catalyst sample includes the bench reactor test to determine the catalyst DeNOx activity, SO2 to SO3 conversion rate, and pressure drop as well as X-Ray Fluorescence XRF analysis for the catalyst surface and bulk material composition. The tests are performed in accordance with the VGB guideline R302 H e. Benefit Long term performance of regenerated catalyst from different applications.
RDES521601	9,000	173	Cooling Water Intake Debris	The interest group will serve as a forum to exchange information on existing and emerging intake debris management issues. Project Benefit The interest group provides information to prevent or minimize intake blockages precluding plant outages or reduced operating efficiencies. Participants will benefit from experiences gained from other power companies best management practices and information on the state-of-technology on intake screen design and operation.
RDES521701	56,000	-	InSitu Stabilizatn-MGP Sedimnt	To evaluate the practicability and effectiveness of in-situ stabilization of Manufactured Gas Plant MGP contaminated sediments, along with other methods decided by the steering committee, like monitored natural attenuation and thin layer caps. Project Benefit If successful, the deliverable can be used to convince state regulators that an acceptable alternative exists to source removal, solidification and land disposal of MGP contaminated sediments. This could be useful in some future remediation of 23,000 cubic yards of contaminated sediments off shore of an AEP-owned property that was a former MGP site.
RDES521801	50,000	1,078	AssessmntTool-RegulatoryImpact	The primary objective of this project is to review benefits assessment methodology s, for PM Health Risks, in detail in order to generate alternative, potentially more realistic benefits estimates than those obtained by EPA using its methodology's and assumptions. Project Benefit The proposed project will generate improved tools for regulatory impact analyses, including estimation of health improvements and monetized benefits. Results will close a cap in scientific literature on health improvements and benefits from regulatory proposals.
RDES521901	50,000	-	Concrete Insp-HydropowerAssets	The purpose of the project is to demonstrate state of the art nondestructive concrete inspection technologies at hydro assets. Project Benefit To demonstrate the performance of emerging nondestructive concrete evaluation technology at hydro assets.
RDES522001	25,000	836	Air Quality Risk Assessment	The purpose of this project is to investigate key issues related to air quality risk assessment and communication with the goal of providing a more realistic picture of the risk of air pollution in society. Project Benefit: Evaluation of air quality risk, consideration of uncertainty, resolution of pollution threshold and tools to effectively communicate to the public.

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDES560101	1,212,311	33,513	EPRI Environmental Controls	Environmental Controls projects from the EPRI Annual Research Portfolio include: 1) Program 71 û Combustion Performance and NOx Control - AEP buys two projects from this program. Project 71.001, Mitigation of Fireside Corrosion and Waterwall Wastage in Low-NOx Systems, takes a three-pronged approach to understanding and resolving the costly consequences of accelerated fireside corrosion exacerbated by low-NOX operation, looking at coal quality, boiler design, and materials-based solutions. Purchase of t
RDES560201	4,488,798	124,193	EPRI Environmental Science	Environmental Science projects from the EPRI Annual Research Portfolio include: 1) Air Quality Programs - By providing credible scientific information and state-of-the-art assessment and management tools, EPRI's air quality programs support the development of effective and protective policies, standards, implementation plans, and compliance strategies. Programs within the Air Quality area include 42 û Air Toxics Health and Risk Assessment, 91 û Assessment Tools for Ozone, Particulate Matter and Haze, an
RDES561101	6,029	193	General Mercury Science & Tech	To better prepare AEP for compliance with the Clean Air Mercury Rule and other regulations on emissions of mercury by characterizing mercury emissions from various configurations of plant equipment and coal types, examining the effect of environmental controls on mercury emissions, helping in the development of cost-effective mercury monitoring systems, testing various types of mercury sorbents, participating in tests of control technologies at a Texas lignite plant and at the Rockport plant, and traveling
RDES570301	2,780	68		This study will evaluate the compliance risk of AEP wastewater discharges being subject to U.S. EPA's forthcoming fish tissue water quality criterion for selenium. While the criterion is not expected to be finalized until 2008 or 2009, some states
RDES570401	9,000	245	MANAGES Forum	Proposed new federal guidelines for coal combustion byproduct disposal in landfills and impoundments will increase compliance requirements, including data management and reporting, groundwater assessment, and, in some cases, remediation. The MANAGES Forum will provide continuing high level support for compliance managers in the form of software, training, webcasts and workshops, and an online groundwater monitoring and assessment guidance manual.
RDES580601	125,986	2,352	OhioRiverEcologicalResearchPrg	The objectives of the project are to 1) provide information on the effects of fish impingement, thermal discharges, and other power plant wastewater processes on fish populations in the Ohio River; 2) provide information useful in commenting on proposed ORSANCO, federal, and state water quality standards for the Ohio River; and 3) update existing data and refine fish population estimates to address USEPA 316(b) concerns. Schedule will include winter sampling, which has only been done once in the history of the program.
RDES582501	12,365	404	EPRI HG-SE FGDBlowdwnWtrTrtmnt	All flue gas desulfurization systems require periodic blowdown to limit the build-up of chlorides and other soluble products of the combustion process. Some constituents of the blowdown water will include trace elements that are subject to increasingly stringent control requirements. Two such elements are mercury and selenium. This project will evaluate promising technologies for treating emissions of those elements in the chloride purge stream.
RDES593101	64,076	2,692	Ohio River Basin Trading Prgrm	This project will design and implement a regional trading program in the Ohio River Basin for both water quality and greenhouse gas credits. Building on related EPRI work to quantify greenhouse gas (GHG) emission reductions for avoided fertilizer use, this project will develop an approach for creating GHG and water quality credits associated with reduced nitrogen fertilization on agricultural crop lands. This project also will build on EPRIs work to establish a WARMF watershed model of the entire Ohio River Basin. Properly designed and deployed, this trading program will reduce GHG emissions and nutrient discharges, such as nitrogen, and protect watersheds at lower overall costs. This project will be a first-of-its-kind regional trading program and represents a comprehensive approach to managing nitrogen, phosphorus and GHG emissions. This work is timely as existing challenges to meet nutrient discharge limits may be amplified by increased effluent discharges of nitrogen (due to operation of air pollution controls), coupled with more stringent water quality based limits for surface waters. In addition, the establishment of GHG credits due to avoided emissions improves AEPs ability to purchase local, ecologically defensible carbon offsets.
RDES593301	200,000	200,000	CarbonMgmt-UKResearchFndation	Per Kentucky Public Service Commission (KPSC) Order in Case No. 2008-00308, dated October 30, 2008, to establish a Regulatory Asset related to certain payments made to the Carbon Management Research Group (CMRP) and the Kentucky Consortium for Carbon Storage (KCCS) regarding the management of carbon and carbon dioxide associated with existing coal-fired electric generating facilities in Kentucky. Kentucky Power Company (KPCo) has agreed to provide up to 10 years of conditional funding of $200,000 annually. Payments are made to The University of Kentucky Research Foundation. Regulatory asset account 1823188 has been established to capture these costs.
RDES593801	363	14	Advanced Cooling Technology	Accelerate industry activities aimed at developing advanced cooling technologies to reduce overall water use for power production. Projects will focus on technology development and testing, but will also provide information on performance optimization, risk management, and economic impacts. The work will include an investigation of geographic and power plant-specific considerations including: Power plant siting Meteorological impacts on air-cooled condensers Indirect dry cooling Hybrid cooling designs Water recovery options Wet surface air coolers Advanced bottoming cycles Preserving once-through cooling option

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDGA260001	26,245	556	Adv. Generation Prog. Mgmt	This line item is used for the Advanced Generation R&D Program (AG) pre-project R&D development efforts and to track and manage misc. AG R&D projects less than $10K. The purpose of this charter is to document the scope, budget and costs (labor and non-labor) of those projects and efforts included in the Advanced Generation Management function. It is also used to track participation at general conferences and other trips associated with the Advanced Generation program. The scope of this charter includes:
RDGA260101	12,718	402	Adv Gen EPRI Annual Research	The Advanced Generation selection from the EPRI Annual Research Portfolio consists of Program 9: Technology-Based Business Planning Information & Services (aka Technology Assessment Guide, or TAG). The EPRI TAG provides performance and economic information about most generation technologies. The TAG-Supply« Database and Software currently covers 24 categoriesùincluding all major fossil and nuclear plant types, several energy storage technologies, small-scale generation options, renewable resource techno
RDGA260201	106,132	2,782	Coal Utilization Research Council	The Coal Utilization Research Council (CURC) was formed in 1997 as an ad-hoc group to act as an industry voice for R&D needs associated with the role of coal as a sustainable energy source for electric power generation as well as the transportation and chemical industries. CURC members include utilities, equipment suppliers, coal companies, universities, and other energy-related companies and consortiums. The CURC provides its members with a respected, influential forum in which they work to ensure the c
RDGA260601	141,848	4,480	Technology Assessment Guide	The EPRI Technology-Based Business Planning Information & Services (aka Technology Assessment Guide, or TAG) provides performance and economic information about most generation technologies. The TAG-Supply« Database and Software currently covers 24 categoriesùincluding all major fossil and nuclear plant types, several energy storage technologies, small-scale generation options, renewable resource technologies, and transmission and distribution facilitiesùwith nearly 100 distinct configurations of proce
RDGA260701	14,860	591	Geologic CO2 Sequestration P2	This is an on-going project (co-funded by the DOE and led by Battelle) that is investigating the feasibility of safely injecting and storing CO2 in deep salt water-laden rock formations. The project is located at AEPÆs Mountaineer plant in New Haven, WV.
RDGA281801	4	-	EPRI Demo-IGCC w CO2 Cap Strge	Integrated Gasification / Combined Cycle technology has been identified as one possible route to the capture of the greenhouse gas carbon dioxide. The purpose of this project is to provide information about the design, integrated operation, reliability and safety of IGCC systems with capture of carbon dioxide (IGCC/CCS). The demonstration project will allow the industry to evaluate the role that IGCC/CCS will play in meeting possible future carbon constraints.
RDGA281901	391	13	EPRIDemo-IonTrnsprtMbrneOxyPrd	The ability to provide a low-cost stream of pure oxygen is an enabling technology for two different methods of separating carbon dioxide from flue gas, IGCC with CCS and oxy-combustion. Current cryogenic methods of oxygen production are very expensive in terms of capital, auxiliary power consumption, and water usage. Air Products and the United States Department of Energy have worked to develop methods of oxygen production involving transport of oxygen ions through a ceramic membrane, and the technology has progressed to a point where a demonstration unit is possible. EPRIs role in the project will be to provide an electric utility industry perspective to the project to ensure the ability to employ the technology in actual power plants.
RDGA292101	2,007,596	78,229	IndustrialAdvisoryCmte-SthrnCo	AEP will participate in a partnership at the Carbon Research Center at Power Systems Development Facility (CRC at PSDF). The focus of the CRC is to conduct sufficient R&D to advance emerging CO2 control technologies to commercial scale for effective integration into either IGCC or advanced combustion processes. A primary objective of the CRC testing is to evaluate solvents, sorbents, membranes and other emerging technologies in various contacting devices at an appropriate scale with real syngas. As concepts proceed past the bench scale, a test under industrial conditions with real syngas is needed to provide a pathway to commercialization. For both new and existing power plants, post-combustion capture technology must be made more efficient and cost-effective. Many technologies are under consideration for post-combustion capture, but these technologies need to be proven and integrated in an actual power plant setting. A Flexible Pilot Test Unit test module will be designed and installed at an existing pulverized coal plant adjacent to the PSDF.
RDGA300001	100,447	3,350	Gen Asset Mgmt - Prog Mgmt	This line item is used for Generation Asset Management (GAM) pre-project R&D development efforts and to track and manage misc. GAM R D projects costing 10K. The purpose of this charter is to document the scope, budget and costs (labor and non-labor) of those projects and efforts included in the GAM function. It is also used to track participation at the general conferences associated with GAM especially EPRI conferences for the AEP EPRI Advisors.
RDGA300401	316	10	Optimum SMAW 91 Electrodes	Development of an optimized compositional range in grade 91 shielded metal arc welding SMAW electrodes based upon the phase transformational behavior, response to tempering and range of use. Development of predictive equations for the critical temperatures for the weld metal. Development of predictive charts for the response of grade 91 to tempering during postweld heat treatment.

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDGA320801	20,000	771	Tempering- Grades 23&24 Steels	Grades 23 and 24 steels are increasingly being used in new construction of power plants and heat recovery steam generators HRSGs . These alloys have been successfully used in the as-welded conditions for some applications, but in other cases they have been found to be prone to various cracking mechanisms. Project Benefit Clear guidance on when and how to post-weld heat-treat PWHT these alloys still is neededùspecifically, the heat-treatment response of these alloys and their weldments. In this supplemental project, transformation temperatures and tempering response will be determined for multiple heats different chemistries of Grades 23 and 24 and their weldments. The benefits of this work can include increased confidence in using these materials, outlining appropriate welding and post-weld heat treatment requirements, and aiding the industry in developing state-of-the-art repair strategies.
RDGA320901	37,500	-	Eval Gr23&24 SteelWeldCracking	Project Purpose To evaluate the effect of as-welded microstructure and chemical composition on the susceptibility to hydrogen assisted, hydrogen induced, and stress relief cracking in Grade T23 and T24 steel welds. Project Benefit This project will provide information to establish fabrication requirements for these steels or the necessary information to reject these materials from future HRSG purchases due to the cracking susceptibility already detected in Europe and the United States.
RDGA321001	7,500	251	NDE ProficiencyDemo-BoilerLife	Hold proficiency demonstrations on subject NDE technicians as requested by funding Utility members. Demonstrations to validate qualifications of NDE technicians in identifying and sizing flaws in material samples held by EPRI. Utility s request this service to validate NDE suppliers capability to perform code inspections on welded components according to ASME and NBIC standards Project Benefit Improve industry NDE capabilities and develop new NDE techniques and procedures for Utility members.
RDGA321101	6,008	201	Mercury Oxidation Measurements	SCR catalyst oxidizes the elemental mercury in the flue gas to oxidized mercury which is subsequently removed by the downstream FGD system. It is the co-benefit of SCR and FGD for mercury removal. The purpose of this project is to measure mercury speciation at SCR inlet, outlet and between catalyst layers and understand the performance of each catalyst layer with respect to mercury oxidation as flue gas condition changes from catalyst layer to catalyst layer. Project Benefit The understanding of mercury oxidation performance of each catalyst layer will help to improve catalyst management strategies for mercury control. AEP WILL BE REIMBURSED BY EPRI FOR THIS TESTING PROJECT.
RDGA370201	17,000	295	Fleet-Wide Monitor InterestGrp	The purpose of the project is to provide industry information relating to remote monitoring of generation assets and condition assessment of those assets to optimize reliability and performance from the information derived from the monitoring. Areas that are being initially emphasized are thermal performance monitoring, equipment condition assessment, document management, and maintenance planning. Another aspect is to evaluate the value of central monitoring. Donald Hubschman stated that Cardinal SHOULD NOT be billed for these charges.
RDGA380101	1,154,125	33,059	EPRI Annual Portfolio	Program 63 - This program develops technology and guidance that allows participants to safely manage boiler component life for high reliability and reduced O&M costs. Technology development efforts will focus on advanced inspection techniques to identify component damage early and accurately; analysis tools to predict component remaining life and in-service failure risk; decision support tools that allow AEP to balance risk and economic benefits under a variety of plant operating scenarios and conditions; and repair techniques designed to maximize component economic life. (EPRI = Electric Power Research Institute) Program 64 - Participation in this program provides the opportunity to access the EPRI knowledge base across the wide breath of this target. Program 87 - Acquire through EPRI membership in P87.001 and P87.002 the most current guides for material. Program 88 - The P88-HRSG Dependability program is to provide technology that will address chemical issue. Program 171 - Develop guidelines, materials, solutions and monitoring techniques in this Issue Program so.
RDGA380801	1,173	37	CreepStrength-G91FerriticSteel	The purpose of the project is to identify effective methods for locating and characterizing deficient G91and other Creep Strength Enhanced Ferritic(CSEF) steels; develop material specs and processing standards to assist utilities in procuring G91 and other CSEF steel components; assemble a guideline that provides the life assessment protocol for G91 and other CSEF steels.
RDGA390901	5,000	87	PRO User's Group	The Plant Reliability Optimization (PRO) User's Group will provide the opportunity to share information on PRO programs and practices. Additional benefits will be to develop members through technical workshops and identify and recommend solution paths for issues that need resolution.
RDLABACC01	(4,414)	(145)	Labor Accrual - R&D	To record research and development portion of labor accruals.
RDNU560101	1,380,290	-	EPRI Nuclear Annual Research	Collaborative R&D within the nuclear power industry ensures that nuclear power is an economically feasible option within the current and future generation mixes. To this end, EPRI develops cost-effective technology for safe and environmental friendly electricity generation that maximizes profitable utilization of existing nuclear assets and supports promotion and deployment of new nuclear technology. EPRI's Nuclear Power program centers on seven key business objectives.
RDRE520201	37,500	1,353	NRELNationalBiomassSupplyStudy	Deliver a comprehensive study of the impacts of competing demands on biomass resources for biofuels and bio-power applications. See notes from the July 2010 workshop for additional information. Project Benefit: Resource assessments, scenario modeling; understand the potential sustainable market for biomass and the marketÆs size relationship to cost.

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDRE520301	50,292	1,449	ManagingSpeciesIssues-Renewabl	The purpose of the project is to perform a population-level risk assessment on eagles with respect to wind farm development and siting using real world data and modeling. Project Benefit: To develop an understanding of population-level impacts of wind development on eagles for more informed siting decisions, risk management and mitigation of potential impacts. This will add certainty to long-term wind operations.
RDRE570001	19,760	659	Renewable R&D ProgramMgmt	This is used for Renewable Energy Resources Initiative (RERI) pre-project R&D development efforts and to track and manage misc. RERI R&D projects costing less than $10K. The purpose of this charter is to document the scope, budget, and costs (labor and non-labor) of those projects and efforts included in the Renewable Program Management function. It is also used to track participation at general conferences associated with Renewable Program Management, especially EPRI conferences in the AEP RERI area. Donald Hubschman stated that Cardinal SHOULD NOT be billed for these charges.
RDRE570101	305,094	10,172	EPRI Renewabl Annual Port	This project charter supports AEPÆs renewables involvement with EPRI, namely: PS 84.001 Renewable Energy TAG û provides a basic reference for technical and economic assessment of renewable energy generation technologies PS 84 D Biomass Energy û provides industry reference and contacts for renewable energy generation, most notably biomass co-firing Donald Hubschman stated that Cardinal SHOULD NOT be billed for these charges. EPRI = Electric Power Research Institute
RDRE590701	137	6	Impact of CoFiring on EnvEquip	To determine the combustion impacts of 10% biomass wood by heat on environmental control equipment, including catalysts, precipitators; also to evaluate corrosion on select equipment.
RDTA500301	8	-	HighEfficiencySubstatnTrnsfrmr	This project is expected to provide relevant information and learning on the economic benefits from the use of energy efficient transformers. Benefits may include reduced lifecycle carbon footprint, reduced losses and improved utilization of transmission system (i.e., more power/energy delivered per unit of generated). It may help to support the industry to adopt new technologies to improve system efficiency and utilization.
RDTA500401	2	-	Evaluation - ACSR/TW Conductor	This project is expected to provide relevant information and learning on the economic benefits from the use of TW conductors over conventional round wire conductors. Benefits may include reduced lifecycle carbon footprint, reduced losses and improved utilization of transmission system (e.g., more power/energy delivered per unit of generated). It may help to support the industry to adopt new technologies to improve system efficiency and utilization.
RDTA500501	2	-	Evaluation-EHVTransmissionLine	The objective of this project is to peer-review the study conducted by the Utility to assess the benefits of overlaying the system with new EHV transmission lines for improving transmission system efficiency and reducing carbon emissions.
RDTA500601	2	-	Eval-Cycling NonessentialEquip	The objective of this project is to provide relevant information and learning on the economic benefits from Switching or Cycling of Nonessential Equipment. Benefits may include reduced lifecycle carbon footprint, reduced losses and improved utilization of transmission system. It may help to support the industry to adopt new technologies to improve system efficiency.
RDTA500701	943	35	Equip Health Info-CntrlRoomOpr	This project intends to first make broad brush health information (red, yellow, and green) available for operators based upon analyses of historical parameters of individual pieces of equipment and/or classes of equipment. This would then lay the groundwork for augmenting historical assessment with improved asset condition information from real time asset condition assessment applications. Ultimately, we envision real time and forward looking equipment failure predictability being integrated into operations and planning. The project will be coordinated with EPRI projects focused on asset condition assessment as well as substation monitoring and data integration projects. The new learning in this project is focused around presentation of asset condition information for system operations applications. This project intends to provide electrical utilities, Regional Transmission Organization (RTO) and Independent System Operator (ISO) with the transformer health visualization tools to: Improve situational awareness Avoid damaging and costly wide spread blackouts of transmission grids Develop and demonstrate new applications to improve operation awareness and to schedule maintenance based on the performance and conditions of the equipment in order to improve system reliability and to reduce the maintenance costs
RDTA500801	34,436	1,290	AdvSensr-765kVSub-DataIntegrtn	The overall project objective is to deploy, demonstrate and further research a suite of advanced sensors for AEP 765kV Substations. The objective of this specific charter is to demonstrate application of Wireless Mesh, Backscatter Sensor, On-line FRA, and On-Line Infrared Technologies to continuously monitor and detect abnormally high arrester leakage current, acoustic emission of partial discharge activity in station equipment, transformer internal winding movement, and thermal performance of station equipment in an AEP 765kV station. The proposed activity generates substantial new learning on Advanced Sensors through the deployment and research of these sensors in a 765 KV substation environment. This new learning will be ultimately incorporated into the appropriate EPRI R&D program (in this case P37). The results are ultimately made available to the public or used for the benefit of the public through the publishing of EPRI reports. There is significant public benefit derived from the new learning and this public benefit relies on the field tests performed in AEP Substations.
RDTA500901	1	-	765kV Bundle Optimization	To confirm an optimal 765 kV bundle configuration and sub-conductor size through corona cage performance testing. Standard corona cage testing will be performed at EPRI Lenox to determine corona discharge levels from 765 kV bundle configuration s previously defined by AEP and EPRI acting as a consulting engineering firm to AEP. The parameters of the corona testing will be determined by AEP with EPRI support. The actual corona cage testing will be performed by EPRI.

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDTA510301	2,538	-	Oklaunion HVDC Converter Statn	A high level assessment of the Oklaunion HVDC converter station to determine and evaluate the remaining life expectancy of the major AC yard converter equipment and to increase the operational reliability of the existing HVDC installation. The objective of the project is to use the assessment data, decide on the scope of the refurbishment, and to issue the results, along with AEP HVDC specifications, to the vendors to solicit bids for Oklaunion HVDC refurbishment.
RDTA510401	50,850	1,872	GeoMagnetic Disturbance	Project Purpose Geomagnetic Disturbance GMD is not a new phenomenon, yet it is of rising concern to the North American electric power sector due to increasing awareness, grid complexity, understanding of intensity, location and orientation, and societal dependence on reliable electricity supply. GMD has the potential to cause system disturbances and equipment damage. In an extreme case, GMD may have the potential to cause wide spread electric disruption and destroy long-lead time equipment, such as transformers, vital to support the delivery of electricity. For the purposes of this project, an extreme event is characterized as being ten times 10X the magnitude of the solar storm that led to the collapse of the Hydro Quebec system in the early hours of March 13, 1989 centered at the 50th latitude, centered on at Fredericksburg, Virginia, and northward. Some scientists estimate that such an extreme event may result in a system collapse, hundreds of large autotransformers damaged or destroyed and an outage that will last for months rather than days. Other scientists anticipate that existing system protection schemes will adequately protect the system disconnecting transmission components with little or no equipment damage, and that after the storm, the system could be quickly restored. Specifically, this projects objective is to Determine the likely impact of an extreme event, as defined above, on the North American bulk power system, based on present system configuration, protection capability, and practices. Identify technologies available today (especially in operations), or in the near term, which can be used to mitigate equipment damage, reduce the extent of the interruption, and speed recovery. Identify technologies that can be developed to reduce the impact of the storm and at the same time lower the cost of protection. Project Benefit The understanding developed in this project is intended to help utilities prepare for large solar storms and to operate the grid through such events. This may improve bulk power system reliability by shortening customer interruptions as well as minimizing the risks of equipment damage. In addition it may identify gaps in forecasting and mitigation solutions, and give guidance on the economic feasibility of available mitigation technologies.
RDTA510601	9,055	333	Eval-Emerging Line Survey Tech	To obtain a fundamental understanding of the identified emerging T-line surveying technologies and to understand their accuracy and limitations. This research will help with documenting the performance of emerging line surveying technologies and aid in the specification and procurement of line surveys. Project Benefit: This will enhance Transmission s understanding of how these new surveying technologies may be applied to assist in conductor ratings and the meeting our regulatory requirements NERC.
RDTA520301	26,000	960	Sunburst Network	Project Purpose: Collect and share GIC data for continuing research studying the cause, effects and mitigation of GIC impacts on electrical power systems. Use the collected data for feedback into new prediction models that will serve as advance warnings Support an annual event where relevant scientists from the field of solar phenomena/space weather come together to discuss common issues and concerns related to GICs Project Benefit: This project will provide substantial new learning on how Geomagnetically Induced Currents progress during a solar storm û and how this data relates to prior observations from satellites or solar observations. The results from all Sunburst sites will help improve the prediction tools. With a deeper understanding of Space Weather impacts in the electric grid, steps can be taken to mitigate these effects. The resulting benefits would be in improved reliability of AEP grid. Know the level of geomagnetic effects so an appropriate response can be made Compare earth currents from many other sites to gain a perspective concerning the magnitude of any unfolding storm Provide data for new prediction models that can serve as advance warning for the effects of solar activity on power grid.
RDTA520401	30,000	1,108	HVDC Cable Interest Group	Participation in this interest group will focus on the following 1.Increase understanding about HVDC cable technology applications 2.Share the experience with other participants and learning from each other on HVDC cables 3.Identify technology R D needs in HVDC cables 4.Reduce the costs of power transmission, potentially reducing electricity rates to end-use customers 5.Increase overall system controllability, stability, and reliability 6.Make informed decisions based on technical and economic aspects of HVDC technologies 7.Learn about operational Experience of existing DC cables 8.Learn about the DC cable type selection, and economic choices 9.Increase knowledge about the VSC based DC applications 10.Learn about challenges and opportunities presented by cable technologies
RDTA520601	18,018	665	DaylightDischargeInterestGroup	The technology for viewing corona and arcing discharges in full daylight has been around for a number of years. AEP possess three DayCor cameras and applies the technology to evaluate electric discharges associated with new products designs and for operation and maintenance of transmission lines. One of the difficulties in fully applying this technology is the interpretation of the data or visual images. This is because arcing is often interpreted as corona and vice versa, and the location of the discharges and their effect are sometimes mis-diagnosed. This failure may lead either to unnecessary intervention or to equipment failure. An ongoing challenge is the improved understanding and diagnosis of the visual images taken from the camera. These benefits can ultimately translate into O M cost savings. Project Benefit: The objectives of this project are to move this technology forward by 1 Developing training material and updating existing material with new research findings 2 Undertaking fundamental research on UV IR inspection of transmission line components 3 Providing a hands-on workshop and training

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDTA520701	20,000	1,057	Cybr IncidntsElectSysReliablty	This project seeks to develop models that can be used to simulate the interaction between cyber incidents on the ICT and power distribution systems Understanding this interaction may be key to assessing the potential impact of cyber incidents on the resiliency and operation of the grid Project Benefit 1. By understanding impacts of the ICT on power distribution reliability, it may be easier to develop a more resilient power grid. 2. This may benefit the public by decreasing the risk of a cyber security incident leading to a reliability event on the electric grid. 3. Clarifying this relationship within the perspective of risk management processes that incorporate reliability and security in an all-hazards approach may be very valuable to the electric sector.
RDTA520801	20,000	1,057	Whitelisting-Energy Mngmnt Sys	This project intends to analyze the current state of vendor solutions for supporting application whitelisting in EMS environments and create implementation guidelines for deploying application whitelisting solutions. EMS Energy Management System Project Benefit: 1. Provide a current survey and test results of vendor solutions to help asset owners and operators select a whitelisting solution 2. Reduce the cost of deploying application whitelisting solutions by creating implementation guidelines 3. Reduce the possibility of a successful cyber attack that could cause an interruption to the operation of the power grid
RDTA520901	20,000	1,057	Cybr Security TabletopExercise	This project will seek to develop failure scenarios to be used in cyber security tabletop exercises. It also seeks to develop procedures for running the exercises and assessing the results. Project Benefit: 1. By running tabletop exercises, utilities may be able to assess their preparedness in the event of a cyber security incident. 2. In addition, utilities may use the results to identify gaps in cyber security procedures and policies that address cyber security incidents. 3. The goal is to increase the cyber security posture of a utility.
RDTA521001	20,000	1,057	Penetration Testing Tools	This project intends to develop and validate new penetration testing tools targeting transmission equipment. Project Benefit This project intends to provide the following benefits 1. Identification and application of existing penetration tools to gauge effectiveness and coverage with respect to testing electric sector transmission equipment 2. Development and validation of new and improved penetration testing tools and techniques targeted to transmission equipment
RDTA521101	12,500	540	OH UG PwrTransmissionComparisn	Identify major factors comparing overhead and underground transmission lines, develop procedures and an analytical framework for the comparisons especially for utilities in North America , and demonstrate results on representative applications. Project Benefit Provide objective information and evaluation methods for transmission planning and external constituencies to lead to a better understanding of the comparison of overhead and underground transmission alternatives.
RDTA521201	37,500	1,620	Modeling-Pwr Sys StabilityStdy	Improve understanding of aggregate load behavior under different system conditions and improve modeling for stability studies. Project Benefit: Comprehensive tools and test system to improve modeling of actual load characteristic behavior.
RDTA521301	2,500	108	Flicker IssuesIndustrlCustomer	Develop Workshop to study identify and study voltage fluctuations that can cause flicker of lighting for prolonged periods over a wide area of the system. Project Benefit: Consistent methods of applying the latest flicker standards and consistent methods for evaluating compliance with the standards.
RDTA521401	15,000	648	UnmannedAirVehicle-Trans.Lines	Identify applications and functional requirements for Unmanned Air Vehicle UAV inspection of transmission lines. Project Benefit Increased reliability of the transmission system through improved inspections and condition assessments at reasonable costs.
RDTA521501	17,500	756	Application Nano Tech. Coating	Enable transmission applications benefiting from the latest developments in material science by applying nano coatings to insulators and conductors. Project Benefit Improve the reliability and reduce the cost of transmission assets.
RDTA570001	47,063	1,735	Transmission RD&D Program Mgmt	The money allocated to this project will be used to fund new activities or projects that develop as the year 2007 progresses. This is to make sure that a lack of R&D funds would not stop valuable R&D activities that were not anticipated at the beginning of the 2007 budget cycle.
RDTA570101	863,168	31,807	Trans EPRI Annual Portfol	Integrated Monitoring & Diagnostics (P37.007) - The purpose of this project is to examine techniques for monitoring as many different components in a substation with as few sensors as possible, which is complementary to the projects examining inspection tools for specific components such as transformers or circuit breakers. The target of this project is to optimize applications of the sensors in substation. The concept of station-wide monitoring is to provide the low-cost screening tool that will trigger more detailed inspections at the component level. The unique focus of this project is on inspection tools that cover an entire substation, rather than at an individual component level. Life Extension of Existing HVDC Systems (P162.001) - This project will address the life extension of HVDC systems in a systematic method. Sharing experience and practices across utilities provides one of the most cost effective ways of ensuring that best-of- class field practices permeate across the global industry. The final goal of the project is to prepare ôLife Extension for HVDC System,ö which is expected to facilitate the process of refurbishing of existing HVDC equipment Polymer and Composite Overhead Line Components (P35.010) - Extend polymer and composite component life expectancy and avoid outages due to premature failure through improved selection, application, and inspection. (Ongoing work - EPRI Base project P35.007)
RDTA570201	20,036	737	CEA LCMSEA	CEA LCMSEA- CEA Life Cycle Management of Station Equipment and Apparatus Interest Group. This on going interest group is a low overhead collaborative effort focused on member driven station equipment, maintenance, tools, asset management techniques,benchmarking,diagnostics,and life extension . Projects are defined and contract awards made to investigate and deliver solutions, knowledge, tools, evaluation and techniques for defined issues. Projects are usually completed within 1 year. CEA = Canadian Electric Association

Work Order	Corporate Total	KPCo Total	Project Title	Project Description
RDTA570401	74,961	2,757	PSerc	PSerc (Power Systems Engineering Research Center) is an NSF sponsored university (13)ûindustry (38 members) consortium. Participation in PSerc provides AEP access to experienced university researchers in leading electric power programs across the U.S., results of collaborative member defined and approved low overhead R&D projects, and access to leading students for both intern and permanent employment positions. Participation in PSerc is a valuable element of a balanced portfolio of AEP internal and external R&D plays
RDTA570901	13,451	496	Phasor Tech: Plan & Ops Tools.	1) Develop tools and techniques to analyze data captured by AEP phasor monitoring units (PMUs) and apply the tools and techniques in planning (off-line) and operations (real time) environments. 2) Participate in the Eastern Interconnection Phasor Project (EIPP), which is facilitating development of a phasor data network in the Eastern Interconnection (EI). The vision of EIPP is to improve power system reliability through wide area measurement, monitoring and control.
RDTA571101	4,159	153	BPL Use for Data Transportatio	Explore the use of BPL (Broadband Power Line Carrier) technology for data transport to reduce the use of leased lines and associated O&M costs. Build on the knowledge gained from the 2006 BPL SCADA and Protective Relaying R&D project. Project elements likely will include: 1) further characterization of 46kV, 69kV and 138kV transmission lines as BPL communication channels; 2) performance comparison of single phase and multi-phase BPL coupling 3) optimization of AmperionÆs BPL system for internal utility data transfers to reduce cost and maximize distances between repeaters. 4) analysis of various options for powering BPL repeaters. 5) exploration of the use of BPL as a transmission line diagnostic tool. 6) through Amperion û Dolan Lab development and testing, qualify BPL components and system for 69kV and 138kV applications.
RDTA571301	244	9	Galloping Conductor Mitigation	Identify the possible use of Performed Air Flow Spoilers to limit/mitigate galloping on a selected 345kV span in Indiana. Summary of 2005/2006 Work: In 2005, two models (EHV and non-EHV) of the PLP (Preformed Line Products) Air Flow Spoilers were electrically tested at Dolan Technology Center for corona, audible noise and radio interference performance. Based on the test results, 25 units of non-EHV spoilers were installed on the bottom conductor of one of the double circuit Desoto Sorenson 345 kV circuits. Ground clearance of the conductor was measured and a stationary video camera was installed to record its motion as compared to that of the conductors with no spoilers installed. 2007 Project Scope: No galloping occurred in the fall of 2005 or on 2006 through December. Therefore, the project will extend into 2007 to monitor the galloping and mitigation results
RDTA571401	1,815	67	High Temp Superconduct Cable	This project has developed a high temperature superconducting, three phase, triax cable and is in the process of demonstrating its suitability for a high power substation underground retrofit application. AEP is hosting the demonstration at ColumbusÆ Bixby Substation as part of a $9M DOE Superconducting Partnership Initiative project. If successful, it will further DOEÆs objectives to accelerate the introduction of HTS cables into the utility grid. The cable is currently operating in real life conditions as the primary source to the Bixby 13.2kV bus and distribution feeders supplying electricity to industrial and residential users. Both closed loop pulse tube and open loop cryogenic cooling will be demonstrated. The project will answer userÆs questions regarding long length application, the triax cable design, cryogenics cooling systems, system reliability and O&M costs. The cable and support systems will be removed and the station restored after the 1-2 year demonstration is completed. Replaces work order RDTA561401
RDTA571501	51	2	HTS Matrix Fault Current Limi	SuperPower was developing a high temperature superconducting (HTS) fault current limiter for application at an AEP 138 kV station. However, due to aging problems with the superconductor elements, the project was put on hold from mid-2005 to mid-2006. With the viability of the second generation superconductors, the development has restarted. Presently, the Tidd 138 kV station is selected as the likely demonstraion site. If this technology is developed and successfully field-demonstrated, it will provide an alternative to breaker replacement at Tidd and some other stations, depending on the MFCL cost. In addition, successful demonstraion of this technology will provide a giant step in the application of superconductivity technology and it will add to the understanding of the voltage insulation charactersitics of liquid nitrogen. Replaces work order RDTA561501
RDTA590501	4,944	183	NanoCoatings T-Line Insulators	This is a current EPRI TC project that AEP is joining. Over the years fiberglass transmission line components have suffered from a range of failure and degradation modes. Nanotechnology based materials are currently being developed to address a wide range of industry applications. This project is to investigate the possibility of utilize existing nano coatings or to modify existing coatings to address the known problems stated above.
RDTA590701	17,754	663	InsulatorContaminationSeverity	The objectives and deliverables of this project are; 1) the revision of T-line and Station Insulator Specifications to support future capital projects of all transmission voltage classes located in known contaminated environments, 2) to purchase the necessary capital tools and equipment to collect insulator contamination data, and 3) to train AEP how to collect and interpret insulator contamination data to properly specify insulators for capital projects.
RDWM201001	59,062	2,791	DTC Walnut Maintenance	The Walnut Test Facility is owned by Columbus Southern Power. The facility is used by the corporate Utilities R&D program. As such, the expenses and results of work done at the facility are done for the benefit of multiple operating companies. This project / work order will allow for a mechanism to capture the annual costs of maintaining the facility, future investments, and other related annual expenses û e.g., depreciation of the assets that were transferred in accordance with the dissolution of AEP EmTech, LLC, etc. û and expensing them to the appropriate benefiting locations.