

The Climate Registry General Reporting and Verification Protocols

a. Client:	The Climate Registry Jill Gravender, Vice President of Policy 523 W. 6 th Street, Suite 445, Los Angeles, CA 90014 (213) 891-6920
b. Contract Duration:	9 months; 09/2007 to 06/2008
c. Geographic Areas Served:	The 58 members include U.S. and Mexican states, Canadian provinces, and Native Sovereign Nations in North America
<p>SAIC helped prepared TCR's General Reporting Protocol and General Verification Protocol. The General Reporting Protocol outlines the steps and procedures to be followed by corporate and other participants when estimating their GHG emissions and reporting to TCR. It provides guidance to reporters on such issues as defining organizational boundaries using both equity share and control-based (operational and financial) approaches, classifying emissions by direct vs. indirect and by scope, defining facility boundaries, defining <i>de minimis</i> emissions, and updating base year emissions to reflect acquisitions and divestitures. The General Verification Protocol provides the principles and procedures for third-party verifiers in evaluating and verifying the reports of TCR participants. <i>Accomplishments include:</i></p> <ul style="list-style-type: none"> • Completed a comprehensive, 100-plus page first draft of the <i>General Reporting Protocol</i> within 3 weeks of contract initiation. • Completed a comprehensive, 60-plus page first draft of the <i>General Verification Protocol</i> within 3 weeks of initiation of a contract extension awarded to SAIC on the basis of our performance on the preparation of the <i>General Reporting Protocol</i>. • Provided recommendations on defining "facility" in the case of mobile sources, assigning mobile source emissions to state and national jurisdictions, and defining quantitative criteria for identifying conflicts of interest among third-party verifiers. • Supported TCR in addressing >1,000 public comments on the Reporting Protocol within an aggressive (2-month) schedule. 	

CCAR General Reporting and Certification Protocols

a. Client:	The Climate Registry Jill Gravender, Vice President of Policy 523 W. 6 th Street, Suite 445, Los Angeles, CA 90014 (213) 891-6920
b. Contract Duration:	2 months; 06/2002 to 08/2002
c. Geographic Areas Served:	California (though U.S. entities without California emissions may participate)
<p>SAIC helped the California Climate Action Registry (CCAR) prepare its <i>General Reporting</i> and <i>Certification Protocols</i>, based on technical guidance prepared by the California Energy Commission and drawing on the GHG protocols developed by WRI/WBCSD. In the development of both protocols SAIC relied heavily on specific accounting examples to clarify the approach for reporters. Our goal was to develop a guidance document that would communicate complex terms in an easily accessible manner that would be useful to reporters with all levels of inventory experience. <i>Accomplishments include:</i></p> <ul style="list-style-type: none"> • Completed draft general reporting and certification protocols in less than two months. • Reviewed CEC guidance and brainstormed with registry staff on design of the protocol to increase participant accessibility. • Incorporated comments by registry staff and other stakeholders that modified the level of emissions reporting to include facilities, clarified the determination of materiality, added optional reporting for non-CO₂ gases and non-California operations in years one and two, and added a protocol revision policy. 	

EIA GHG Emissions Program and 1605(b) Voluntary Reporting Support

a. Client:	U.S. Department of Energy, Energy Information Administration Stephen Calopedis 1000 Independence Ave., SW, Washington, DC 20585 (202) 586-1156
b. Contract Duration:	15 years, 1 month; 11/1993 to 01/2009
c. Geographic Areas Served:	U.S.
<ul style="list-style-type: none"> • Since 1993, SAIC has supported EIA in all phases of the development, implementation, and operation of the 1605(b) Voluntary Reporting of Greenhouse Gases Program for GHG emissions and emission reductions. Toward this end, SAIC has reviewed more than 12,000 emission reduction project reports covering electricity supply, energy end-use, transportation, methane 	

EIA GHG Emissions Program and 1605(b) Voluntary Reporting Support

recovery, and carbon sequestration. SAIC has also reviewed entity-wide emission reports from more than 300 distinct entities. SAIC also provides technical assistance to active reporters or prospective participants about how to analyze and report their commitments and achievements, and about participation in the voluntary program in general. SAIC operates a toll-free hotline, manages the program web site, and produces a program newsletter three times each year.

- SAIC supported DOE in preparing technical guidelines for the enhanced 1605(b) Voluntary Reporting of Greenhouse Gases Program. In February 2002, President Bush announced a program to improve the accuracy, reliability, and verifiability of voluntary reporting. An element of this program is the development of a set of technical guidelines advising reporters on methods for estimating emissions from common sources. The measurement guidelines perform three functions: 1) explaining to reporters how to calculate their emissions; 2) defining what methods are deemed adequate for reporting purposes; 3) a mechanism to provide an ordinal rating of estimation techniques for assessing the overall accuracy of an emissions report. SAIC prepared three draft chapters for the technical guidelines, covering transportation emissions, industrial process emissions, and indirect emissions (electricity & steam). Specific services provided by SAIC included 1) identifying a list of relevant GHG emission sources to be covered from each individual sector, 2) preparing a list of emission estimation techniques for each of the listed sources, using relevant authorities, 3) rating multiple emission methodologies for accuracy, and 4) drafting chapters describing major sources and ranks in descending order of accuracy for up to three approved methods for each emissions source. In addition to developing the general framework for calculating reductions, such as selecting reduction calculation methods, defining subentities, choosing base periods, and calculating base values, SAIC developed action-specific methods for calculating reductions from coalmine methane gas recovery, landfill methane recovery, capture of methane from anaerobic digestion at wastewater treatment facilities, capture of methane from anaerobic digestion of animal waste, geologic sequestration, transmission and distribution improvements, recycling of fly ash, and combined heat and power (CHP) Generators.
- SAIC is assisting EIA with the overhaul of the 1605(b) system. SAIC has performed a number of tasks investigating what current reporters want to see and learning from the lessons of others: 1) Reviewed all comments submitted by interested stakeholders in 2002, 2) Prepared an Access database to assist with analysis of the stakeholder comments, 3) Participated in four regional workshops, summarizing stakeholder positions and investigating common positions, 4) Researched efforts undertaken and proposed to handle reporting of GHG emissions throughout the states and the world, preparing a searchable CD-Rom to access relevant information, 5) Investigated work on intensity metrics worldwide, identifying likely measures of physical output that could be used by 1605(b) reporters, 6) Designed forms and instructions to operationalize the Technical Guidelines prepared by the Office of Policy, 7) Developed the Simplified Emissions Inventory Tool (SEIT) and 30 source-specific emissions calculation worksheets 8) Designed and is developing a web-based reporting system for participants in the enhanced 1605(b) Program. As part of this effort, SAIC developed spreadsheet-based reduction calculation tools and reduction addenda on revised Form EIA-1605 for the estimation of action-specific emission reductions (including reductions from coalmine methane gas recovery, landfill methane recovery, geologic sequestration, transmission and distribution improvements, combined heat and power (CHP) generators, and others), avoided emission reductions, emissions offsets, and carbon sequestration projects.

Development of a Performance Standard for Manure Management Projects

a. Client:	California Climate Action Registry Sam Hitz 523 W. 6 th Street, Suite 445, Los Angeles, CA 90014 (213) 891-1444
b. Contract Duration:	5 months; 08/2006 to 01/2007
c. Geographic Areas Served:	U.S.

SAIC developed a manure management protocol to quantify GHG emission reductions associated with projects that capture and control fugitive methane emissions from large, confined animal facilities (CAF) in California and the U.S. The project protocol will provide guidance for operators of cattle and swine CAFs to determine project eligibility, establish project boundaries, satisfy additionality, set a GHG baseline, select emissions measurement and monitoring methods, mitigate leakage, and verify project performance. To this end, SAIC developed a performance standard of manure management practices in California and the U.S. to satisfy CCAR's additionality requirement. This includes identifying and characterizing manure management practices in the state, reviewing regulations and barriers affecting their implementation, identifying common practices, and recommending relevant baseline options.

EPA Climate Leaders Program Support

a. Client:	U.S. EPA, Climate Protection Partnership Division Bella Tonkonogy 1200 Pennsylvania Ave., NW , Washington, DC 20460 (202) 343-9183
b. Contract Duration:	9 months; 02/2008 to 11/2008
c. Geographic Areas Served:	U.S.

As part of a task managed by SRA Consulting, SAIC is supports EPA's Climate Leaders program in updating existing portions of the Inventory Guidance, finalizing drafts of different reporting modules, creating new reporting guidance, and developing a GHG reporting and calculation tool for small businesses. SAIC will also support Climate Leaders in reviewing new GHG offsets methodologies proposed by Climate Leaders participants.

Accomplishments in 2008 will include:

- Preparation of quick-turn around briefings, issue papers, and memos analyzing GHG reporting trends in support of the EPA mandatory GHG reporting rule.
- Updating and revising Climate Leaders' inventory reporting Design Principles Guidance document.
- Updating modules for Stationary Combustion, Mobile Sources, Electricity Purchases and Refrigeration/AC equipment.
- Revising Sector Specific Core Modules: Cement Production, Refrigeration/AC Equipment Manufacturing, Iron and Steel production, Municipal Solid Waste Landfilling, Aluminum Production and Pulp and Paper Production.
- Develop other Modules, including a protocol for Conference Events.
- Updating three Optional Modules: Product Transport, Employee Commuting, and Business Travel.
- Development of GHG offsets reporting guidance and review of new proposed offsets methodologies.

Climate Change and Stratospheric Protection Program Support

a. Client:	U.S. EPA Office of Atmospheric Programs (OAP), Climate Change Division (CCD) Maurice LeFranc 1200 Pennsylvania Avenue, NW, Washington, DC 20460 (202) 343-9375
b. Contract Duration:	5 years, 7 months; 10/2002 to 06/2007
c. Geographic Areas Served:	U.S.

As a subcontractor to Stratus Consulting, SAIC supported EPA's Climate Change Division by: 1) developing a Web-based database of several hundred federal and state government voluntary programs relating to climate change; 2) compiling disparate baseline and monitoring offsets methodologies into a single standardized document that describes offset methodologies at the project level; 3) developing guidelines and methodologies for defining GHG project boundaries; 4) creating a document outlining how non-Annex I Parties could better report their GHG mitigation and adaptation projects in their national communications to the UNFCCC; 5) preparing two quick turn-around papers on the state-of-the-art Integrated Gasification Combined Cycle (IGCC) technology for electricity generation; 6) writing a state-of-the-art report on geologic sequestration in the context of enhanced oil recovery (EOR) efforts; 7) developing reports on best practices to implement greenhouse gas reduction activities at the state and local level for Maryland, Minnesota, and California; and 8) preparing case studies of innovative efforts to address climate change at the state and local levels.

Accomplishments:

- Prepared recommendations for how to establish GHG, accounting and temporal boundaries for offset projects and developed project boundaries for potential project types, including electricity generation from cofiring coal with biomass, hybrid diesel and natural gas buses, afforestation of land used for crop cultivation, conversion of a boiler to natural gas, landfill gas capture, coal mine methane, manure management with an anaerobic digester, and the retrofit of dry cement kilns.
- Compiled nine non-uniformly developed baseline and monitoring methodologies into a single standardized document that describes offset methodologies at the project level. Wrote a guidance paper on how to prepare a standardized GHG offset methodology from scratch, including instructions for how to develop a performance standard and analyze available datasets; developed a performance standard for an industrial boiler project proposing the use of a technology-based additionality test; and compiled and updated eight existing offset project methodologies into a new standardized EPA format. The project types include: 1) efficiency improvements at commercial boilers; 2) installation of a methane recovery

Climate Change and Stratospheric Protection Program Support

and flaring system at a landfill; 3) improved efficiency in iron and steel production through Greenfield mini-mill or retrofit; 4) transit bus conversion to hybrids; 5) conversion to more efficient cement production processes; 6) coal mine methane recovery; 7) manure management; and 8) sulfur hexafluoride emission reduction from the power industry. General guidance applicable to all project types was also provided. It addressed: 1) the general approach to identifying sources of leakage and potential approaches for quantifying leakage; 2) more focused guidance on criteria for selecting the appropriate baseline lifetime; and 3) a more general discussion of the two-step approach to quantifying emission reductions (e.g., passing a performance threshold and calculating the baseline).

- Analyzed options for using eGRID data to develop performance standards for offset projects in the electricity sector; reviewed and suggested improvements to an existing offset methodology for coal mine methane recovery projects; prepared performance standards and monitoring methodologies for different types of end uses of methane captured from landfills and manure management projects; and updated an existing methodology for reducing SF₆ emissions from circuit breakers based on new research and monitoring guidance provided by EPA.
- Developed a briefing presentation, which framed key questions involved in preparing an offset methodology for an EOR project, covering project identification, boundary development, eligibility, performance threshold, emission baseline, and monitoring. SAIC further applied this approach to an EOR Clean Development Mechanism (CDM) project in Vietnam and prepared a memo with a methodological summary and technical comments focusing on boundaries, ownership, and monitoring.
- Wrote two papers on IGCC for EPA's Keystone State Clean Energy and Environment Technical Forum—a background paper on technology description, coproduction capabilities, advanced IGCC R&D, barriers to deployment, application benefits, environmental benefits, economic benefits, commercialization initiatives; wrote a policy paper that addressed federal and state incentives for the early commercial deployment of IGCC and geologic sequestration.
- Summarized previous EOR-geologic sequestration inventory work, including past methodologies for accounting for emissions of CO₂. SAIC also discussed needed improvements to accounting and monitoring methodologies, including those that may have been overlooked in current methodologies.

Baseline and Monitoring Measurement Methodologies for a Transportation Project

a. Client:	U.S. EPA Market Policy Branch (MPB) of the Clean Air Market Division (CAMD) Maurice LeFranc 1200 Pennsylvania Avenue, NW, Washington, DC 20460 (202) 343-9375
b. Contract Duration:	11 months; 04/2004 to 03/2005
c. Geographic Areas Served:	U.S.

On behalf of EPA, SAIC prepared a standardized procedure for estimating and monitoring GHG emission reductions from a transit fleet project. The task involved selecting a project type, developing the a performance standard for identifying 'better than average' performing bus fleets, and evaluating and recommending monitoring methods for tracking GHG reductions from the vehicle fleet projects.

- Developing and framing the project type (in this case a transit fleet project) considering the applicable vehicle technologies, project boundary, relevant GHG emissions, and existing legislation affecting the project.
- Using EPA's step-by-step methodology for developing performance standards for GHG offsets projects, SAIC reviewed relevant data sets and developed a performance standard for transit fleets.

Assessed monitoring methodologies according to generic categories; determined risk, cost, and uncertainty of selected monitoring methods; and prepared a monitoring methods protocol for transit fleet projects.

Voluntary Offsets Market Issues and Due Diligence

a. Client:	Confidential (Fortune 500 Financial Institution)
b. Contract Duration:	5 months; 09/2007 to 02/2008
c. Geographic Areas Served:	US and International

Voluntary Offsets Market Issues and Due Diligence

SAIC reviewed four voluntary offset providers for a large US financial Institution's credit card in Europe and developed a comprehensive list of screening criteria (for a carbon RFP) for offset credits as a key component of the client's overall green marketing strategy. The client had been looking at the possibility of partnering with an offset company to launch an endorsed card. The program will work as follows: 1) Cardholder makes a retail transaction on the card, and 2) A certain % of that retail spend would be donated to carbon offset funds through the offset partner. The client had had initial exploratory talks with 4 offset companies; Climate Care, Carbon Clear, CO2balance.com, and Carbon Neutral. SAIC and its Subcontractor, WSP Environmental, provided in-depth input into the development of the client's RFP document. This RFP document was sent to the 4 potential offset partners to gauge their appropriateness to meet the client's goals. SAIC (and WSP) then evaluated the completed responses from the offset partners and developed a final evaluation report that detailed which of the bidders could best meet the client's offset standards developed at the outset of the project, considering the needs and desires of cardholders, the client's business model, and possibilities for press/public/NGO feedback.

In addition, SAIC reviewed a number of manure management projects registered with CCX and advised the client on the advisability of purchasing the credits generated by these projects. SAIC reviewed the CCX reduction volumes with results using other methodologies – namely CCAR, EPA Climate Leaders, and Alberta's Offset System. SAIC provided the client with a detailed description of the differences in the results obtained by using the different methodologies and recommended an appropriate discounting factor for the client to use when obtaining the CCX manure management offsets. More recently, SAIC advised the client on a number of projects registered with the Voluntary Carbon Standard (VCS), consisting mainly of so-called pre-registration CDM reductions, but also included pending JI biomass reductions. SAIC also advised the client on price and risk issues associated with CCAR registered reductions under the forestry protocol and are now assisting to procure some of these offsets.

Nebraska Public Power District GHG Emissions Inventory

a. Client:	Nebraska Public Power District Hope Hasenkamp-Gibbs 1414 15th Street, PO Box 499, Columbus, NE 68602-0499 (402) 563-5168
b. Geographic Areas Served:	Nebraska
c. Period of Performance:	5 months; 08/2007 to 01/2008

For the Nebraska Public Power District (NPPD), SAIC prepared a corporate GHG inventory.

Accomplishments:

The effort involved a requirements-gathering phase to determine the purpose of the inventory, which is to document their emissions, determine their risks and potential liabilities, and identify energy and emission-reducing opportunities. In addition to these benefits, the inventory will allow NPPD to participate in a GHG registry and reductions programs. SAIC identified, analyzed, and summarized the relevant costs and benefits to NPPD of potentially participating in the many programs in which NPPD is eligible. This included summarizing the scope of the most relevant U.S. GHG programs that may benefit NPPD, and providing detailed information describing each of these programs.

Next, the SAIC team provided recommendations on the key elements required to develop an inventory for NPPD, including selecting a base period of emissions; selecting years to be included in the inventory; establishing entity boundaries; setting organizational boundaries; setting operational boundaries; GHG data management; data collection methods; data quality assurance; calculating emissions; assessing uncertainty; verification of emissions; and reporting of emissions. SAIC provided a written summary of the technical requirements and level of effort for inventory preparation required based on the variables of the various GHG programs.

The second phase of the inventory preparation included data collection, review and processing. The 2-part data collection approach included (1) development of a custom-made NPPD GHG inventory spreadsheet tool, and (2) a site-visit at NPPD of an SAIC team member (GHG inventory analyst) to conduct in-person data collection and cleansing in collaboration with NPPD staff. SAIC developed a spreadsheet-based GHG inventory tool tailored for NPPD to provide the foundation for the data collection approach.

Finally, SAIC completed quality assurance and quality control (QA/QC); the SAIC project manager conducted a final review site

Nebraska Public Power District GHG Emissions Inventory

visit; and SAIC submitted the inventory to GHG Reporting Program(s) selected by NPPD.

Oklahoma Gas and Electric Corporate GHG Emissions Inventory

a. Client:	Oklahoma Gas and Electric Company (OG&E) Melody Martin P.O. Box 321, Oklahoma City, OK 73101-0321 405-553-3297
b. Geographic Areas Served:	Oklahoma and Texas (Mainly)
c. Period of Performance:	4 months; 07/2008 to 11/ 2008

SAIC is preparing a corporate Greenhouse Gas (GHG) Inventory for Oklahoma Gas and Electric (OGE). This project will encompass the entire organization, including more complex sources from their natural gas subsidiary Enogex. Enogex has 8 gas processing plants and more than one hundred compressor stations. The stations range in size from a few tanks to numerous engines, tanks and other equipment including Glycol dehydrators associated with reservoir storage (combustion emissions), process vents from equipment that vent natural gas as part of their normal operation, as well as from maintenance activities, or from emergency releases, and fugitive emissions from pressurized equipment handling natural gas.

This project includes determining the purpose of the inventory, documenting emissions, determining risks and potential liabilities and identifying emission reduction opportunities. SAIC has identified and summarized the requirements, benefits, and costs of potentially participating in the many GHG registries or programs to which OGE is eligible. SAIC has provided OGE with the key elements for developing an inventory, including selecting a base year of emissions, data years to be included in the inventory, entity boundaries, data collection methods, emission source identification, emission calculation methodologies, quality assurance, and technical assistance. SAIC will conduct a site visit to OGE to assist in the data gathering efforts, focus the questions to efficiently target appropriate data, and help identify potential data gaps or anomalies that may need editing or correcting. SAIC created a data management and inventory calculation tool for OGE. The tool incorporates the key elements specific to OGE and will be used to finalize the emissions inventory. Once the inventory is finalized, SAIC will conduct a quality assurance and quality control analysis of the tool and all the data, as well as assist OGE in reporting their data to the selected GHG programs and registries.

IPAMS/WRAP Phase III Oil and Gas Emission Inventory

a. Client:	Independent Petroleum Association of Mountain States (IPAMS) Kathleen Sgamma 410 17th Street, Suite 1920, Denver, CO 80202 (303) 623-0987 x226
b. Contract Duration:	10/07-12/08
c. Geographic Areas Served:	Western U.S.

Following the development of two Western U.S. regional emissions inventory efforts developed by the Western Regional Air Partnership (WRAP) focusing on oil and gas emissions sources, the Independent Petroleum Association of Mountain States (IPAMS) sponsored the development of a third, or Phase III, regional inventory. IPAMS members represent many of the oil and gas operators in the Rocky Mountain States of New Mexico, Colorado, Wyoming, Utah, North Dakota, and Montana. This ongoing effort is focused on updating emissions of the criteria pollutants – NOx, CO, VOCs, PM and SOx – for the most current baseline year of 2006, from all oil and gas point and area sources in these states. The work will also include revised projections to future years to be used for modeling purposes by WRAP, state and federal environmental agencies, or other interested parties. This work will create a detailed mechanism for oil and gas production companies to annually report information on activity and equipment in order to be able to easily update and improve any future inventory.

This effort is comprised of building highly-detailed and highly spatially-resolved inventories of baseline emissions from all oil and gas point and area sources (representing both exploration & production, and midstream sources). There are two primary data sources for this information: (1) detailed surveys distributed to the major oil and gas companies operating in each geologic basin considered in this work; and (2) analysis of permit data from state and federal agencies. The survey effort builds on ENVIRON's

IPAMS/WRAP Phase III Oil and Gas Emission Inventory

previous projects that included surveying and communicating with the oil and gas companies. The surveys ask for detailed information on equipment, activity, usage, processes, configurations and emissions factors for all operations of each company on the basin level. The survey responses are used to create average or representative data and must then be scaled up to represent basin-level emissions. This is done by incorporating various scaling surrogates derived from extensive database analysis of oil and gas production statistics using the IHS Database. This includes well-level information on well counts, spud counts, gas production, condensate production, oil production and water production from all well types in both tribal and non-tribal land within each basin. Finally these basin-level inventories incorporate all state or federal permit data, which generally includes emissions from point sources such as compressor stations and gas processing plants. The end results of this effort are very detailed emissions inventories for all major exploration & production, and gathering/transmission processes for all basins covered in this work. These inventories account for regional variations in production and in product, including varying gas compositions, VOC content of gas, levels of liquid production (oil and condensate) and the incorporation of information specific to CBM wells. The regional variations can be captured at the county- or even field-level, depending on the nature of the activities. In contrast, previous efforts have overlooked variations in oil and gas production activities within regions by using broad-based assumptions and input data. Thus the Phase III baseline inventories represent the most accurate emissions inventories to date for this industry.

The final step in this work is to prepare detailed activity projections for use in scaling emissions to future years. This process is accomplished by projecting forward oil and gas production statistics based on historical data analysis, but also incorporating information directly from the major production companies in each field, county and basin on their planned activities. Previous analyses have relied on EIS documents on specific developments, but have defaulted to broad-based growth projections. The Phase III work will create more detailed and reliable projections through incorporation of industry information on planned activities, and these projections will have the ability to track declines and new growth in various basins.

CENRAP Oil and Gas Emissions

a. Client:	CENRAP Annette Sharp 1005 S. Pennsylvania, Suite C, Oklahoma City, OK 73159 405-378-7377
b. Contract Duration:	04/08-10/08
c. Geographic Areas Served:	CENRAP States

The purpose of this oil and gas area sources emissions inventory improvement project is to develop for CENRAP a new set of input data for CENRAP states to use in updating their base year and future year emissions inventories for oil and gas area sources. This work consists of researching and developing methodologies to conduct consistent basin-level emissions estimates for the top oil and gas area source categories, and developing a database of input data to be used in these emissions estimates, including engine populations, emissions factors, activity data and information on venting and flashing sources. The work also includes a significant database analysis of each state's oil and gas production statistics and activity, including estimating active well counts, oil production, condensate production, gas production and spud counts on the basin level. ENVIRON will also be recommending methods for generating 2018 future year projections for oil and gas area source emissions based on historical activity and production data, and anticipated future trends.

WRAP Phase II Oil and Gas Emission Inventory

a. Client:	Western Regional Air Partnership (WRAP) Tom Moore 1515 Cleveland Place, Suite 200, Denver, CO 80202 (303) 623-9378
b. Contract Duration:	9/06-9/07
c. Geographic Areas Served:	Western U.S.

This work built upon ENVIRON's previous work for the Western Regional Air Partnership (WRAP) in which we developed and implemented uniform procedures for estimating emissions from oil and gas production operations across the western states. The purpose of this study was twofold. First, this study included efforts to improve the previous estimates of emissions from oil and

WRAP Phase II Oil and Gas Emission Inventory

gas production for the years 2002 and 2018. Where appropriate, the additional work that ENVIRON conducted in New Mexico was used to improve the original WRAP emissions estimates. To improve estimates, questionnaires were sent to producer that identified the type of equipment, activity level and emission factors. Specific categories of oil and gas production were identified where additional efforts led to a more accurate emissions inventory – this included estimates of sulfur dioxide (SO₂) and particulate matter (PM) emissions from certain operations. Second, this study assessed the sources in the 2018 inventory that had significant potential for reducing emissions through various control methods and technologies, and the potential emissions reductions from the most promising controls were evaluated for each western state.

NMED Ozone Precursors Study

a. Client:	New Mexico Environment Department Gail Cooke 2048 Galisteo St., Santa Fe, NM 87505 505-955-8022
b. Contract Duration:	1/06- 6/07
c. Geographic Areas Served:	New Mexico
<p>NMED Ozone Precursors Study - After the original WRAP oil & gas emissions work was completed, ENVIRON developed improvements to oil and gas area source emissions in two counties in northwest New Mexico (San Juan and Rio Arriba) under contract to the New Mexico Environment Department (NMED). Emissions estimates for these counties were improved from the WRAP Phase I work by conducting a survey of producers to gather detailed information on drill rigs, compressors, salt water disposal pumps and artificial lift devices. Additional information on other categories was also gathered from the producers.</p>	

WRAP Phase I Oil and Gas Emission Inventory

a. Client:	Western Regional Air Partnership (WRAP) Lee Alter 1515 Cleveland Place, Denver, Colorado (520) 628-3173
b. Contract Duration:	10/04 – 12/05
c. Geographic Areas Served:	Western U.S.
<p>This work was the first effort to develop a regionally consistent emission inventory for oil and gas sources across the Western states. As part of this effort, ENVIRON developed methodologies for estimating 2002 and 2018 oil and gas area source emission inventories. The emphasis of this study was placed on estimating emissions of pollutants with the potential to impair visibility near Class I areas in the west, in particular oxides of nitrogen (NO_x). Some emissions estimates were also provided for SO₂ from drill rigs and VOC from some wellhead processes. In developing the methodology, considerable resources were devoted to incorporating the insights and guidance of a variety of stakeholders, as well as integrating the point source emissions estimates previously developed by the states.</p>	

Wyoming Oil and Gas

a. Client:	Wyoming Dept of Environmental Quality Lee Gribowicz 122 W. 25th Street, Cheyenne, WY 82002 (307) 777-6993
b. Contract Duration:	12/03-9/05
c. Geographic Areas Served:	Wyoming
<p>For the Wyoming Department of Environmental Quality, ENVIRON developed a comprehensive statewide emissions inventory for 2002. The inventory included all criteria and visibility-related pollutants, as well as air toxics, to help Wyoming address regional haze and air toxics issues. ENVIRON developed the comprehensive county-level emissions for all area, on-road, and off-road emissions source categories. These inventories were generated “bottom up”, using local activity data. In particular, oil and gas sources (including coal bed methane) were accounted for using production data from the WY Oil and Gas Conservation</p>	

Wyoming Oil and Gas

Commission. This inventory represented the first ever comprehensive oil and gas area source inventory in the western states.

Four Corners Air Quality Task Force Mitigation Strategy Modeling

a. Client:	State of New Mexico Environment Dept. Rita Trujillo 2048 Galisteo St., Santa Fe, NM 87505 505-827-1494
b. Contract Duration:	5/23/07-11/30/07
c. Geographic Areas Served:	Four Corners States

The Four Corners Air Quality Task Force (FCAQTF) Cumulative Effects (CE) Workgroup was charged with preparing estimates of the impacts of potential mitigation strategies applied to sources of air emissions in the Four Corners area. Impacts on criteria pollutants and air quality related values (visibility and deposition) were evaluated for nearby Class I areas and surrounding Class II areas. For this effort, ENVIRON developed current year and future year base case emission inventories for the Four Corners region. These inventories were used in CAMx to prepare an annual O3 and PM modeling simulation. Mitigation strategies developed by the FCAQTF were then applied to the future year base case inventory and simulated with CAMx to quantify the impact on ozone and PM concentrations, visibility, and acid deposition.

Moxa Arch Gas Infill Development

a. Client:	SWCA Environmental Consultants Jon Kehmeier 295 Interlocken Blvd., Broomfield, CO 80021 303-487-1183
b. Contract Duration:	03/01/2008 – 12/31/2008
c. Geographic Areas Served:	Southwestern Wyoming

ENVIRON is performing the air quality impact assessment for the Moxa Arch Infill Development Natural Gas Project EIS in southwestern Wyoming. ENVIRON will use the CAMx photochemical grid model to quantify air quality, deposition and visibility impacts at nearby Class I and sensitive Class II areas due to the Moxa Arch Project as well as other regional sources. ENVIRON will develop a detailed emission inventory for each of the Moxa Arch Project alternatives that will include estimates of GHG emissions. The CAMx model will use a new comprehensive regional oil and gas emission inventory developed for southwest Wyoming by Sage Consulting with extensive input from BP and other operators. The WRAP Phase III oil and gas emission inventories for the Denver-Julesberg, Uinta, and Piceance Basins developed by ENVIRON for IPAMS will also be used, ensuring that the modeling is performed with the most detailed and recent emission inventory available. The photochemical grid modeling approach to assessing environmental effects of projected emissions from oil and gas production on air quality (including ozone), visibility, and deposition supersedes the previous EIS CALPUFF far-field modeling approach and provides an integrated, one-atmosphere approach that will provide policy-makers with a state-of-the-science impact assessment.

Continental Divide Creston Gas Development Project

a. Client:	BP America Production Company Gordon Reid Smith 501 Westlake Park Blvd., Houston, TX 77079 281-366-7515 (cell 281-384-3583)
b. Contract Duration:	04/01/2007 – 12/31/2008
c. Geographic Areas Served:	Southwestern Wyoming

ENVIRON is performing the air quality impact assessment for the Continental Divide-Creston (CD-C) Natural Gas Development Project EIS in southwestern Wyoming. ENVIRON will use the CAMx photochemical grid model to quantify air quality, deposition and visibility impacts at nearby Class I and sensitive Class II areas due to the Continental Divide Project as well as other regional sources. The CAMx model will use a new comprehensive oil and gas emission inventory developed for southwest Wyoming by

Continental Divide Creston Gas Development Project

Sage Consulting with extensive input from BP and other operators. The WRAP Phase III oil and gas emission inventories for the Denver-Julesberg, Uinta, and Piceance Basins developed by ENVIRON for IPAMS will also be used, ensuring that the modeling is performed with the most detailed and recent emission inventory available. ENVIRON will process these inventories with the SMOKE emissions model to generate a model-ready regional inventory that will be used in the CD-C modeling as well as for several other proposed oil and gas E&P project EIS. Recent 8-hour ozone measurements in southwest Wyoming have exceeded the new EPA 8-hour ozone standard of 75 ppb and the region may be declared an ozone nonattainment area in the future. The CD-C ozone modeling analysis therefore takes on increased importance and will be comprehensive, detailed, and of "SIP quality".

Hiawatha Gas Development Project

a. Client:	SWCA Environmental Consultants Jon Kehmeier 295 Interlocken Blvd. Suite 300 Broomfield, CO 80021 303-487-1183
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b. Contract Duration:	03/01/2008-12/31/2008
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c. Geographic Areas Served:	Southwestern Wyoming/Northwestern Colorado
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ENVIRON is performing the air quality impact assessment for the Hiawatha Regional Energy Development Plan Natural Gas Project EIS on the border between southwestern Wyoming and northwestern Colorado. ENVIRON will use the CAMx photochemical grid model to quantify air quality, deposition and visibility impacts at nearby Class I and sensitive Class II areas due to the Hiawatha Project as well as other regional sources. ENVIRON will develop a detailed emission inventory for each of the Hiawatha Project alternatives that will include estimates of GHG emissions. The CAMx model will use a new comprehensive regional oil and gas emission inventory developed for southwest Wyoming by Sage Consulting with extensive input from BP and other operators. The WRAP Phase III oil and gas emission inventories for the Denver-Julesberg, Uinta, and Piceance Basins developed by ENVIRON for IPAMS will also be used, ensuring that the modeling is performed with the most detailed and recent emission inventory available. The photochemical grid modeling approach to assessing environmental effects of projected emissions from oil and gas production on air quality (including ozone), visibility, and deposition supersedes the traditional EIS CALPUFF far-field modeling approach and provides an integrated, one-atmosphere approach that will provide policy-makers with a state-of-the-science impact assessment.