



METEOROLOGICAL AND AIR QUALITY SERVICES

STATEMENT OF QUALIFICATIONS

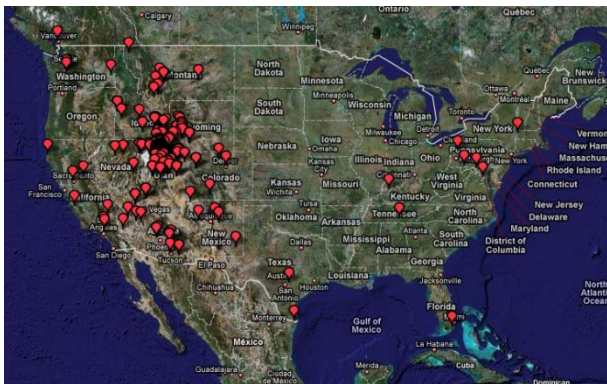
MSI

June 2008



COMPANY BACKGROUND

Meteorological Solutions Inc. (MSI) is an environmental consulting company comprised of dedicated professionals with a combined experience of over 150 years. Our core professional staff have worked together as a team since 1985 and founded MSI in 1996. We have developed a highly regarded reputation for quality and excellence in the field of air quality in the western United States and internationally. MSI is currently operating over 120 air quality, meteorological monitoring and applied meteorological projects in the United States and abroad. Gross sales have grown for ten straight years increasing an average of 30% per year. Our staff has also tripled over this time period.



Active Projects

Our Mission Statement:

"To be "the" preeminent air quality engineering firm in the western United States with focus on total customer satisfaction through innovation, while providing a stimulating and challenging work environment for our employees"

TECHNICAL STAFF

Meteorological Solutions Inc. staff experience covers a wide range of disciplines including emission inventories, air permitting, dispersion modeling, atmospheric tracers, air quality and meteorological monitoring, specialized monitoring, and data acquisition systems.

The technical staff at MSI is made up of meteorologists, air quality engineers, atmospheric scientists and computer programmers. We have two primary divisions at MSI, air quality and applied meteorology. Our air quality division provides meteorological and air quality monitoring, dispersion modeling and permitting services to a wide range of industries. This division also provides all installation services for both air quality and meteorological monitoring projects including initial land use permits, site selection, tower and/or monitoring shelter installation, ongoing data management and calibrations and reporting for Prevention of Significant Deterioration (PSD), Nuclear Regulatory Commission (NRC), and Wind Energy projects.

Our applied meteorological division provides computer programming support, data management, field research studies, instrumentation development, forecast services, climatological studies, expert testimony, forensic meteorology, detailed storm analyses including calibration of NEXRAD data to produce storm-specific isohyetal contours, and data reformatting for use with dispersion models such as ISCST, AERMOD and CALPUFF.

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AIR QUALITY SERVICES

Meteorological Towers

- Nuclear Regulatory Commission (NRC) Compliant Meteorological Towers
- NIST & A2LA Certified Audit and Calibrations Standards
- Prevention of Significant Deterioration (PSD) Compliant Meteorological Towers
- AERMOD-Ready Towers (New/Upgrades)
- Temporary or Permanent Wind Energy Towers
- Sensor/Telemetry/Datalogger Upgrades
- All Major Brands of Meteorological Sensors
- Very high data recovery (typically > 99%)
- Simple to Complex Datalogging Systems
- Complete Turn-key Installations
- Customized Real-time Display Software
- Tripods to Tall Multi-level Towers
- Phone Modems/Radio telemetry/Cell Phones/Satellite
- Calibration/Audit Services
- Single or Multi-station Networks

Meteorological Solutions Inc. staff has extensive experience in installing meteorological towers and related sensors. We can recommend and install the right meteorological tower, from a tripod to a free-standing or guyed 10-meter tower to a tall (100 m +) tower, or we can use an existing tower. We can also provide the datalogger and telemetry package to work at any location, including remote areas using solar panels and cellular phone or satellite communications. If you have an existing tower that needs to be upgraded to accommodate the required inputs for the AERMOD model, or need a new AERMOD tower, we can assist you.

Meteorological Solutions Inc. can also provide maintenance and calibration services to keep your station in top condition and collecting accurate data. MSI can offer our clients customized data acquisition and display software which can be tailored to match your exact specifications.

We have an inventory of tower sections available and can provide crank-up lifts if OSHA regulations prohibit climbing.

Our professionals provide the full range of meteorological monitoring services from design and setup to installations to ongoing calibrations. We install proven and reliable instrumentation and provide turn-key installations that are cost-effective and specifically designed to meet your monitoring requirements.

Depending on your application MSI can install sensors to record the following data:

- Wind Speed
- Wind Direction
- 2d/3d Sonic Anemometers
- Vertical Wind Speed
- Net Radiation
- Solar Radiation
- Evaporation
- Temperature/Delta-t
- Pressure
- Relative Humidity
- Stability
- Precipitation
- Soil Temperature
- Snow Depth
- Wind Chill





AIR QUALITY SERVICES

Wind Energy Meteorological Towers

- Installation of New 60 or 80 Meter Towers
- Repair/Upgrade of Existing Sensors/Telemetry/Towers
- Pole or Lattice Type Towers
- Permanent Free Standing Towers for Integration into Turbines
- Site Selection Activities
- Ongoing Data Management and Assessment of Site Wind Energy Potential
- All Major Brands of Meteorological Sensors
- Very high data recovery
- Simple to Complex Datalogging Systems
- Complete Turn-key Installations
- Customized Real-time Data Displays Available of Password-Protected Server
- Single or Multi-station Networks
- Project-Specific Quality Assurance Plans

Meteorological Solutions Inc. staff has extensive experience in installing meteorological towers and related sensors. We have been providing tower erection and meteorological data management services for over 20 years. MSI's knowledge of meteorological data and sensors is unmatched in the industry. If experience and knowledge are high on your contractor selection list, then MSI is your company!

We can recommend and install the right meteorological tower or we can lower and refurbish existing towers. We can also provide the datalogger and telemetry package to work at any location, including remote areas using solar panels and cellular phone or satellite communications.

Meteorological Solutions Inc. can also provide maintenance and calibration services to keep your station in top condition and collecting accurate data. MSI can offer our clients customized data acquisition and display software which can be tailored to match your exact specifications.

Meteorological Solutions Inc. has corporate contracts with several major cellular phone companies which allow us to configure unlimited data access accounts at very reasonable costs and provide our clients with access to their data via our password protected server. Our on-line data displays will provide not only the directly measured data, such as wind speed and direction, but will also provide real-time feedback on critical components such as wind shear, turbulence and wind power density. Our on-line server will also provide you access to site pictures, monthly reports, and graphics as well as raw data.

Depending on your application, MSI can install sensors that can record the following:

- Wind Speed
- Wind Direction
- Temperature
- Pressure
- Relative Humidity
- Precipitation

Calculated parameters include:

- Wind Shear
- Wind Power Density
- Turbulence
- Power Production





AIR QUALITY SERVICES

Ambient Monitoring

- Monitoring and Quality Assurance Plans
- Equipment Installation and Calibration
- Data Management and Validation
- Reporting in State and EPA Formats
- Air Toxics Sampling of Mobile, Industrial and Biogenic Sources using Canister VOC, Carbonyl Cartridge, and EPA TO Methods
- Remote Interrogation of Stations
- Continuous Monitoring of Criteria Pollutants and Particulate Matter (PM₁₀, PM_{2.5}, Course Fraction)
- Meteorological and Air Quality System and Performance Audits
- EPA-Approved Methods
- NIST/A2LA Traceable Reference Standards
- Automated Computer Programs for Data Evaluation and Validation

Our professionals provide a full range of monitoring services from design and setup to routine operations, data validation and reporting. MSI's goal is to offer you technically excellent, cost-effective monitoring systems designed to meet your specific requirements. We provide the latest customized software packages for data monitoring and retrieval. We recommend and install only proven and reliable instrumentation.

Meteorological Solutions Inc.'s QA/QC programs are designed to ensure that your monitoring data meet EPA and state requirements for completeness, representativeness, precision and accuracy. Our experienced auditors conduct meteorological and air quality performance and system audits using EPA guideline methods and NIST/A2LA-traceable reference standards. We offer customized software for automated data evaluation and validation to identify monitoring problems quickly and reduce data loss.

Often monitoring data is collected for the purposes of modeling the effect of pollutant emissions on the surrounding area. MSI's modeling staff has been assisting clients in applying dispersion models in the western United States and abroad for nearly 20 years. All MSI modelers are meteorologists and have the technical knowledge to perform modeling analyses for continuous, non-continuous, and accidental releases.



Audits and Calibrations

- Trace Level CO/SO₂/NO_y
- Ambient CO/SO₂/O₃/HC Analyzers
- Ambient NO/NO₂/NO_x Analyzers
- PM₁₀, PM_{2.5} Samplers
- PM Course Fraction
- Cylinder Gas Audits (CEMs)
- Wind Speed/Wind Direction
- Vertical Wind Speed
- Temperature/Relative Humidity /Dew Point
- Precipitation/Evaporation
- Solar and Net Radiation
- System Audits (data loggers & data management procedures)



AIR QUALITY SERVICES

Meteorological Solutions Inc. owns a complete inventory of auditing and calibration equipment for all major brands of meteorological and air quality equipment. All of our equipment is certified to A2LA and NIST-traceable reference standards to ensure precision and accuracy for all audits or calibrations. We also stock replacement parts for most meteorological sensors, allowing for in-field maintenance. Our experienced auditors conduct meteorological performance and system audits using the latest EPA and NRC guideline methods.



Meteorological Solutions Inc. can also provide audits of the data measurement and processing systems. These system audits start at the datalogger and track the data from collection to final storage. Data handling and processing procedures are reviewed to ensure that data accuracy and integrity are maintained. When formal audits are not needed, MSI can offer on-site calibrations and maintenance/repair of most meteorological sensors. This ensures that you can be confident in the data you are receiving from your weather station.

CALPUFF Modeling

- Near-Field Impacts
- Long-Range Transport
- Visibility Assessments (plume and haze)
- Class I and II Increment Analyses
- Secondary Pollutant Formation
- Deposition (wet and dry)
- PSD and AQRV Impacts

Meteorological Solutions Inc. staff have the critical combination of both extensive programming experience and exhaustive knowledge of meteorological data to provide our clients with unsurpassed modeling capabilities.

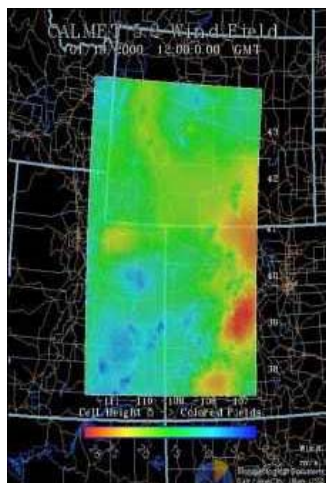
Meteorological Solutions Inc. has extensive CALPUFF/CALMET experience including three computer programmers on staff to reformat meteorological data files for use by CALMET. MSI also has six meteorologists on staff to quality assure the model input data. We have an in-house library of upper air and surface meteorological data and use the latest visualization software to compile and quality assure the extensive meteorological datasets. Our permitting staff have extensive experience interfacing with Federal Land Managers and the EPA, and have submitted and obtained approval of numerous modeling protocols.

Meteorological Solutions Inc. programming staff can prepare all needed input files for the CALMET preprocessor including:

- SURF. DAT
- GEO. DAT
- UP. DAT
- PRECIP. DAT
- Ozone. DAT
- MM5. DAT



AIR QUALITY SERVICES



Meteorological Solutions Inc. meteorologists and programmers can perform the arduous task of generating these files for you and at the same time provide the meteorological insight and quality assurance experience that will assure an accurate modeling simulation. We own 2001-2003 EPA approved 36 km resolution MM5 data for the entire continental United States for use with CALMET.

Data Management

- Complete Remote Data Management
- Full Data Reporting Services in State and EPA Formats
- Emergency Response Services
- Automated Computer Programs for Data Evaluation, Validation and Quality Assurance
- Meteorological and Air Quality System and Performance Audits
- Monitoring System Restoration and Modernization
- Site-specific Data Management and Display Software

Meteorological Solutions Inc. professionals can provide you with total remote data management capabilities. From our Salt Lake City office we can routinely interrogate and download your meteorological and air monitoring data, subject the data to a series of quality assurance checks, and quickly catch any system malfunctions.

Meteorological Solutions Inc. staff have the capabilities to provide fast and reliable emergency response services for all of your ambient monitoring equipment and data acquisition hardware. MSI owns a complete inventory of calibration instrumentation for all major brands of meteorological and air quality monitoring equipment.

Meteorological Solutions Inc.'s QA/QC programs are designed to ensure that your monitoring data meet EPA, NRC, and state requirements for completeness, representativeness, precision and accuracy. Our experienced auditors can conduct meteorological and air quality performance and system audits using EPA guideline methods, A2LA and NIST-traceable reference standards.





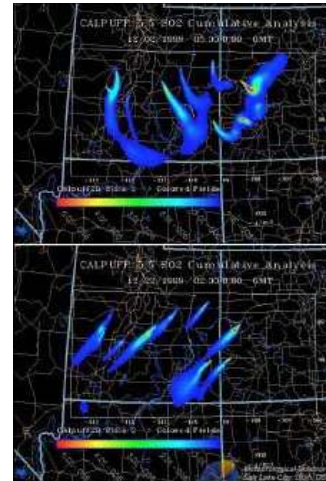
AIR QUALITY SERVICES

Meteorological Solutions Inc. can design software which displays your meteorological or air quality data in a meaningful, intuitive fashion. We can provide clients with software which will automate downloading of data from remote monitoring sites, perform quality assurance checks on the data, generate a quality assurance report, produce time parameter plots of the data, and archive the data for future reference. With our software packages we have been able to offer clients extremely high data recovery for their ambient monitoring projects.

Dispersion Modeling

- New Source Review
- Class I and II Impacts
- Compliance with NAAQS and PSD Standards
- Criteria, Non-Criteria, and HAPS
- CALMET/CALPUFF (all input files)
- ISCST/AERMOD
- 3-D Visualization Software
- Fugitive Dust
- Deposition Modeling
- Visibility Modeling
- Monitoring Network Design
- Simple, Intermediate, or Complex Terrain
- Tracer/Model Validation

Meteorological Solutions Inc. staff has been assisting clients in applying dispersion models in the western United States and South America for over 20 years. MSI modelers are meteorologists and have the technical knowledge to perform modeling analyses for continuous, non-continuous, and accidental releases. Our staff has designed numerous model validation field studies and in using the models has come to understand their limitations.



Meteorological Solutions Inc. modelers are equipped with Intel Core 2 Quad-CPU processor workstations to minimize run times and maximize "what-if" scenario times. MSI owns photographic quality color printers which are used to produce informative modeling graphics, including color LaserJet printers. MSI has over 10 terabytes of internal network storage and backup on RAID-5 servers. We are able to integrate model output with Google Earth graphics to show an aerial view of dispersion. All modeling data are archived on DVD's and two internal PowerVault storage units. For pictures of modeling graphics that MSI has created for prior projects, please visit our [project image page](#).

Gravimetric Weighing

- TSP/PM₁₀
- Concentration Calculations
- Standard 8X10 or 47 mm filters
- Pre- and Post-Weights
- Complete Chain-of-Custody
- Independent Balance Certification
- Gravimetric Analysis
- Glass Fiber, Quartz Fiber, Teflon Filters
- Source Testing Media
- Data Validation
- Data Reporting in State and EPA formats
- Additional Analyses Available



AIR QUALITY SERVICES

Meteorological Solutions Inc. personnel have been providing gravimetric services to numerous clients throughout the United States for over 15 years. All weighing activities are performed in accordance with the applicable EPA reference method. MSI provides NIST traceable measurements in an environmentally controlled laboratory. The analytical balance is calibrated daily with NIST traceable standards and is serviced at least once per year by an independent balance service. MSI's analytical balance has a minimum resolution of 0.1 mg and a precision of 0.5 mg.



Meteorological Solutions Inc. has strict quality assurance procedures in place to provide accurate weighing results. Filters are equilibrated in a climate-controlled enclosure for 24 hours. Variables, such as temperature and humidity, are controlled in the chamber to reduce their effect on the weight of the filters. Temperature and humidity conditions are verified daily to NIST or A2LA traceable standards. The balance is zeroed and calibrated prior to any weighing activities and is independently certified annually. At least ten (10) percent of all clean and exposed filters are audited. Complete laboratory weighing procedures are available upon request.

Air Permitting

- State and Federal Air permit Applications
- New Source Review
- Prevention of Significant Deterioration
- Title V Operating Permits
- Emission Offsets
- Emission Inventories
- LEAR, BACT, MACT, RACT, NSPS, and NESHAP Analysis
- Dispersion Modeling
- Federal and State Agency Negotiations
- Regulatory Review
- Facility Compliance Status Review
- SARA Title III
- Tier II

Since the promulgation of the original Clean Air Act, 1990 CAA amendments and various state requirements, many businesses are faced with complex air permitting issues. In order to simplify the preparation of an air permit application, the professionals at MSI have developed a streamlined yet comprehensive approach to preparing air permit applications. From the most routine air permit application to a complex Prevention of Significant Deterioration (PSD), Non-Attainment New Source Review, or Title V Operating Permit, MSI has the expertise and experience to assist you in preparing these permits.





AIR QUALITY SERVICES

Meteorological Solutions Inc. permitting staff has been assisting clients in preparing air permit applications in the western United States and the Midwest for over 20 years. Our staff has prepared permit applications for a wide variety of facilities including military bases; coal, gold, copper and beryllium mines; Portland cement facilities; international airports; hospitals; hazardous waste and medical incinerators; power generation facilities; oil and gas facilities and distribution terminals; pharmaceutical; aggregate; aerospace and mineral product facilities. Our staff has successfully obtained both federal and state PSD, attainment and non-attainment NSR, and Title V operating permits.

APPLIED METEOROLOGICAL SERVICES

Climatologies

- Site-specific Climatologies
- Wind Profiles For Wind Power Generation Projects
- Wind, Ice and Snow Loading
- On-site Data Management and Restoration
- Database Development
- Wind Rose Development
- 1 To 1000 Year Return Period Calculations
- Growing Seasons
- Severe Weather Occurrences

Meteorological Solutions Inc. has access to data from thousands of domestic and international weather reporting stations. These data encompass both surface and upper air measurements, and include temperature, precipitation, and wind information. Some stations also archive solar radiation, stability, cloud cover, humidity, and snowfall data. Through statistical techniques, reliable climatological information can be produced for almost any site-specific area, and weather parameter. MSI offers site-specific weather forecasts of most weather parameters.

Site-specific climatologies are our specialty. Wind, ice, and snow loading, extreme precipitation amounts and return periods for severe weather phenomena are a few of the parameters we can provide our clients.

Meteorological Solutions Inc.'s staff of meteorologists have considerable experience in investigating, compiling, and presenting historical weather information in graphical and tabular displays that can be quickly utilized by the client.



Climatology is used in many different aspects of business and science. Some of these uses include: seasonal forecasting of retail sales, determining water resource availability for land developers and geologists, determining wind patterns at different altitudes or locations for wind energy, and to determine solar energy potential.

Data Reformatting

- Customized Reformatting of Surface and Upper Air Data
- Develop Dispersion Modeling Upper-air Files (TD-6201)
- Develop Dispersion Modeling Surface Met Files (CD-144)
- CALMET/CALPUFF File Generation – SURF.dat, Up.dat, Geo.dat, Ozone.dat, Precip.dat



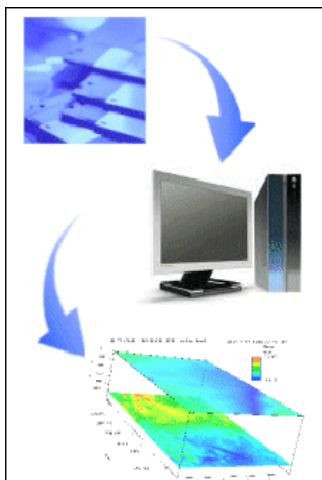
APPLIED METEOROLOGICAL SERVICES

- Site Climatologies, Return Period Estimates Using On-site Data
- Database Development from Electronic Records or from Hardcopy Using OCR Technology
- Near Real-time Surface and Upper-air Data Available
- Quality Checks on Raw Data
- Missing Data Estimates

Meteorological Solutions Inc. has a large up-to-date database of surface and upper-air data. This information can be easily accessed and reformatted to our clients' specifications. These data can then be used to develop climatologies by the client or through MSI's climatology services.

Dispersion models require a specific format of meteorological data for both surface and upper-air measurements. These files are developed using the appropriate locations and time periods as required by the client, state or federal agency.

Meteorological Solutions Inc. performs quality assurance data checks and fills missing data using data substitution techniques as outlined in the document, *Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models*.



Meteorological Solutions Inc.'s in-house software archives surface meteorological data on an hourly basis and upper-air data every 12 hours from the United States and international sites. This unique capability allows us to provide our clients with the most current meteorological data sets available anywhere.

In addition to data reformatting services our professionals can provide you with total remote data management capabilities. From our Salt Lake City office we can routinely interrogate and download your meteorological and air monitoring data, subject these data to a series of quality assurance checks and quickly catch any system malfunctions. We have several in-house meteorologists and air quality specialists who will examine your data carefully to assure accuracy and completeness.

Extended Forecasts

- Site-Specific Short to Medium-Range Forecasts (1 to 10 days)
- Output from Several Numerical Models Available (NAM, GFS, NGM, GEFS, HRW, many others)
- Client-defined Forecast Parameters and Locations
- Proprietary Interpolation Algorithms used for Increased Resolution
- FTP or Automatic E-mail Transfer of Customized Forecast Data
- Model Verification Tracked by In-house Meteorological Staff
- Tailored Forecasts to Meet Your Exact Needs
- Elevation Corrections for Site-Specific Temperature Forecasts
- Personalized Consulting Available



APPLIED METEOROLOGICAL SERVICES

The staff at MSI can provide site-specific weather forecasts. For any specified time duration MSI's experienced staff of meteorologists and computer programmers work together to offer our clients unique site-specific short to long range forecasts of numerous meteorological variables.



Numerous forecast parameters are available including:

- Minimum Temperature
- Maximum Temperature
- Cloud Cover
- Heating/Cooling Degree Days
- Probability of Precipitation/Snowfall
- Wind Speed (Surface And Aloft)
- Evaporation
- Solar Radiation
- Relative Humidity

Forecasting

- Site-Specific Forecasts
- Construction Forecasts
- Special Event Forecasts
- Recreation Forecasts
- Short- and Long-Term Forecasts

Meteorological Solutions Inc. develops specialized forecasts by working closely with our clients and listening to their needs and our experienced staff of meteorologists and computer programmers work together to offer our clients accurate site-specific forecasts. We continuously monitor incoming weather information, including the latest ambient conditions, computer models, NEXRAD radar and satellite images. With these data, our experienced meteorologists go through extensive quality assurance measures to provide timely, accurate site-specific weather forecasts for the clients customized needs.

Meteorological Solutions Inc. offers our clients short- or long-term forecasts covering the usual parameters of temperature, wind, and precipitation. In addition, MSI can produce forecasts for unusual parameters such as solar radiation, temperature and winds aloft, and inversions. Forecasts can be routed to our clients by phone, FAX, e-mail or from a password-protected FTP site.





APPLIED METEOROLOGICAL SERVICES

With two Certified Consulting Meteorologists and six forecast meteorologists on staff with extensive forecasting and climatological experience, MSI can provide information on specific past weather events. Meteorological information such as sunrise/sunset times, precipitation type and amount, temperature ranges, and wind speeds are available to recreate weather conditions during a specific event.

Event/Film Industry Forecasting

- Precise Site- and Time-Specific Forecasts
- Medium-Range (One- to Ten-Day) Forecasts
- Site Climatology Development for Long-Range Planning
- On-Site "nowcasting"
- Exact Sunrise/Sunset Data
- General Weather Consultations
- Forecasts can be issued via phone, fax, e-mail or FTP transfer

Meteorological Solutions Inc. staff offers the motion picture and television production industries accurate, site-specific, short-term forecasts tailored to a specific schedule. Specifically, MSI can provide 1 to 10 day forecasts which can be used for planning purposes. For periods beyond ten days, MSI can develop a climatology for any specific location to provide information on average weather conditions. To help make critical decisions, MSI also offers the option of an on-site meteorologist to provide "nowcasts" with the additional capability of providing an on-site portable weather station to obtain accurate, localized and live weather data. We are also available for consultation in weather matters as they relate to a film's story line.

If you are looking for specific weather conditions for your shoot (snow, fog, rain, etc), MSI can alert you to the time when these conditions will likely develop; correct decisions based on good weather information can save time and money. However the weather affects your schedule, MSI is able to help you prepare for, or make successful use of the predicted weather.



Meteorological Solutions Inc. meteorologists are professionals who are skilled in weather forecasting in the western United States. MSI will provide you with the most accurate and detailed site and/or time-specific weather forecasts available to allow you to make better, more informed decisions. Forecast costs are based on the number of forecast days and sites, not on the number of forecasts issued. Forecast parameters include temperatures; precipitation; winds; sky conditions; and many others. You can begin to receive forecasts four days in advance of the day(s) of interest. Forecasts can be sent via phone, fax, e-mail or FTP transfer.



APPLIED METEOROLOGICAL SERVICES

Micrometeorological Measurements

- High-resolution Data (Up To 50 Hertz)
- On-board Data Acquisition with Real-time Displays and GPS Location
- Three-dimensional Wind Measurements (U, V & W)
- Optional Measurements Such as Temperature (Delta-t), Solar and Net Radiation, and Pressure
- Optional Tracer (SF_6) Capabilities (10 ppt LDL)

Meteorological Solutions Inc. staff have over 20 years of experience in making micrometeorological field measurements in support of urban field programs and transport and dispersion studies. We have been involved with numerous model validation studies and atmospheric tracer programs.



Meteorological Solutions Inc. has conducted field measurements of meteorological variables in support of a wide range of micrometeorological studies. These data have been used in both federal and private concerns to assist with chemical and biological hazard research, and for transport and dispersion studies. Our field experience can support your project in the following ways:

- Project-defined sampling configurations (client can specify exact measurement needs);
- Quick field deployment times; and
- Logistical support (local permits, right-of-way access, interface with local officials)

Software Development

- Designed to Work with Meteorological and Ambient Monitoring Networks
- Real-time Displays
- Wind rose Displays
- Customer Defined Screen Displays
- AQS Reporting
- Dispersion Model Modules
- Historical Data Reviews
- Statistical Analysis
- Simple Configuration - Reads ASCII files
- Automated Alerts and Alarms
- Windows 9X/2000/XP/Vista

Commercially available software packages often do not contain features that are needed by our clients, or the required software may simply not exist. MSI can design specialized software tailored to your specific requirements. Applications include, but are not limited to, data acquisition, data management, database manipulation, quality assurance, and real-time graphical representations.



APPLIED METEOROLOGICAL SERVICES



Meteorological Solutions Inc. can design software which displays your meteorological or air quality data in a meaningful, intuitive fashion. We can provide clients with software which will automate downloading of data from remote monitoring sites, perform quality assurance checks on the data, generate a quality assurance report, produce time parameter plots of the data, and archive the data for future reference. With our software packages we have been able to offer clients extremely high data recovery for their ambient monitoring projects and the ability to view their data in exactly the manner they choose.

Tracer Studies

- Stack Plume and Fugitive Emissions Mapping
- Dispersion Model Validation
- Source Contribution Quantification
- Pollutant Concentration Estimates
- Destruction Rate Efficiency Testing
- Leak Detection Studies
- Building Airflow/Exchange Rates
- Indoor Air Quality
- Meteorological Investigations

- Assessment of Existing Monitoring Sites
- Placement of New Monitoring Sites
- Aircraft/Mobile Van/Stationary Sampling for tracer Gas

Meteorological Solutions Inc. scientists are recognized as world leaders in tracer study technology. Atmospheric tracer studies give an accurate, detailed database of the dispersion and movement of a released gas under specific meteorological situations. Tracer studies are used to validate dispersion models, quantify source contribution to ambient pollution concentrations, and to understand the dispersion of stack emissions. Tracer studies can also be used to examine air movement within a building, document building exchange rates, and determine if external emissions are accidentally being recirculated through ventilation systems.



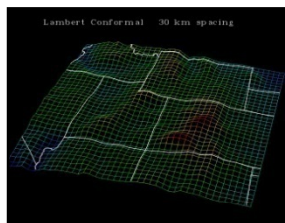
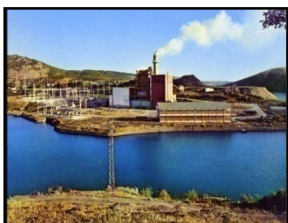
Meteorological Solutions Inc.'s staff has performed numerous tracer projects in the United States and abroad over the past 20 years. The extensive experience of MSI staff in the design and implementation of tracer studies assures our clients of successful field programs. MSI staff has performed model validation, monitoring site assessment, source apportionment, and transport and dispersion tracer studies.



OUR CLIENTS

Meteorological Solutions Inc. clients consist of a wide variety of industries such as:

- Aerospace Manufacturing
- Aluminum Manufacturing Facilities
- Coal-Fired Power Generation Facilities
- Coal, Gold, Copper and Beryllium Mines
- Computer Chip Manufacturing
- Cyanide Manufacturing Facilities
- Fertilizer Plants
- Hazardous Waste/Medical Incinerators
- Hospitals
- Indian Tribes
- International Airports
- Landfills
- Lime Plants
- Natural Gas Power Generation Facilities
- Nuclear Power Generation Facilities
- Pharmaceutical Facilities
- Portland Cement Plants
- Oil and Gas Fields
- Oil and Gas Refineries
- Remediation Sites
- State and Federal Government Agencies
- Steel Mills
- Titanium Manufacturing Facilities
- Wind Energy Development



Our clients have diverse needs and specific requirements that allow us to utilize our experienced staff and technical resources to provide customized solutions to their air quality and meteorological problems.

Meteorological Solutions Inc. maintains a client list consisting of projects that require our vision and experience, as well as our diligence to provide routine services with attention to detail.

Meteorological Monitoring

- Alcan Ingot
- Ash Grove
- Aspen Consulting
- ATI Wah Chang
- ATK Launch Systems
- Battle Mountain Gold
- Camp, Dresser, and McKee
- Cargill Salt
- CDL
- Chevron Mining
- Clean Harbors
- Coors
- Cyanco
- Encana
- EnergySolutions
- Envirocare of Utah
- Exxon Mobil
- Fire Science Academy
- FMC/Astaris
- FP&L
- Graymont
- Holcim
- Holnam
- Homestake Mining Company
- Indspec/Oxychem
- Intermountain Power Plant
- Kennecott
- Lafarge
- Laidlaw Environmental Services
- Louisiana Energy Services
- Micron Technology, Inc
- Molycorp
- Monsanto/P4 Production
- NEVCO
- Nucor
- PacifiCorp
- Panda Energy
- Safety Kleen
- Simplot
- Tooele County Emergency Management
- UniSea
- University of Utah
- URS
- Ute Tribe
- Washington Group International
- Williams Field Services
- Wyoming DEQ



OUR CLIENTS

Meteorological Performance Audits Clients

- Alcan Ingot
- Arizona Electric Power
- Arnold AFB
- Ash Grove
- Aspen Consulting
- ATI Wah Chang
- ATK Launch Systems
- Camp, Dresser, and McKee
- Cargill Salt
- Chevron Mining
- Clean Harbors
- Coors
- Cyanco
- Deseret (DG&T)
- Eaglewood Golf Course
- EnergySolutions
- Envirocare of Utah
- Exxon Mobil
- FMC/Astaris
- FP&L
- Graymont
- Holcim
- Holnam
- Homestake Mining Company
- Intermountain Power Plant
- Kennecott
- Lafarge
- Laidlaw Environmental Services
- Micron Technology, Inc.
- Molycorp
- Monsanto/P4 Production
- Naughton
- Naval Air Weapons Center
- NEVCO
- Northwest Shoshone
- Nucor
- PacifiCorp
- Panda Energy
- Safety Kleen
- Simplot
- Soil Conservation Service
- SunCrest

Meteorological Performance Audits Clients

- Tooele County Emergency Management
- UniSea
- University & Community College Sys of NV
- University of Utah
- URS
- Ute Tribe
- Volvo
- Washington Group International
- West Jordan
- Western Distribution
- Western Zirconium
- Williams Field Services
- Wyoming DEQ

Permitting Clients

- Andalex
- ATK Launch Systems
- Bannock County Landfill
- Bechtel Environmental Inc
- CAMDS
- Deseret (DG&T)
- Eco Engineering
- EnergySolutions
- Envirocare of Utah
- Fresenius
- Genwal
- High Desert Refining
- Holcim
- Hollycorp
- Holnam
- Intermountain Power Plant
- Johnson Matthey
- Lafarge
- Magnesium Corp of America
- Micron Technology, Inc.
- NEVCO
- Nucor
- Pacific States
- PacifiCorp
- Salt Lake City Airport Authority
- Staker Parson
- University of Utah Chevron
- US Gypsum



OUR CLIENTS

Dispersion Modeling Clients

- American Environmental Testing
- Andalex
- ATK Launch Systems
- Bechtel Environmental Inc
- British Nuclear Group
- Deseret (DG&T)
- DMK
- Eco Engineering
- Flying J Refinery
- FMC/Astaris
- Fresenius
- Genwal
- Graymont
- High Desert Refining
- Holcim
- Hollycorp
- Holnam
- Intermountain Power Plant
- Lafarge
- Magnesium Corp of America
- Metco
- Micron Technology, Inc
- NEVCO
- Nucor
- Pacific States
- Salt Lake City Airport Authority
- Staker Parson
- University of Utah Chevron
- US Gypsum

Field Study Clients

- CCI Environmental
- Environmental Sensors Inc
- Flying J Refinery
- Kennecott
- Metco
- Mission Research Corporation
- Montgomery Watson
- Newpark Environmental
- PacifiCorp
- Thiokol
- Wyoming DEQ

Applied Meteorology Clients

- Air Pollution Control Consulting
- American Environmental Testing
- ATK Launch Systems
- Auto Owners Association
- Bannock County Landfill
- Collision Forensics
- Critical Path
- DRI
- Ecology & Environment
- Eisenberg, Gilchrist & Morton
- Fillmore Spencer
- IDEQ
- Jacobs Engineering
- JMBM
- Kleinfelder
- KSL/SLOC/Eubank
- LA County Public Works
- Lehman College
- Manitoba Hydro
- Navajo Nation
- Navajo Tribe
- North American Weather Consultants Inc
- RES Environmental
- Salt Lake Organizing Committee
- Scalley & Reading
- Sheehan Pipeline
- Smith & Glauser
- SPAD
- St. George Steel
- Tetra Tech
- Twentieth Century Fox
- URS
- Utah Attorney General
- Utah Risk Management
- Utah State University
- Wasatch Winds
- Williams & Hunt
- WIPP
- XPEDX



Meteorological Tower Projects

[Client Name: PacifiCorp Lakeside Power Plant](#)

Meteorological Solutions Inc. is contracted by PacifiCorp to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station at the Lakeside Power Plant near Vineyard, Utah. The meteorological monitoring on a 50-meter tower consists of continuous measurements of wind speed, wind direction, vertical wind speed, sigma theta and sigma w at 10 and 50 meters, temperature at 2, 10 and 50 meters, delta temperature between the 2 and 10 meter and 2- and 50-meter levels, relative humidity, solar radiation and net radiation at 2 meters, and barometric pressure at 1.5 meters. Siting selection and a Quality Assurance Project Plan (QAPP) was approved by the Utah Division of Air Quality (UDAQ).

[Client Name: Williams Field Services Company](#)

Meteorological Solutions Inc. is contracted by William Field Services Company to install, calibrate, operate, perform remote data management, and quarterly reporting and auditing at a meteorological monitoring station in Opal, Wyoming. Meteorological monitoring is conducted on a 30-meter tower consisting of continuous measurements of wind speed and direction at 10 and 30 meters; vertical wind speed at 10 and 30 meters; sigma-theta of the wind direction (calculated) at 10 and 30 meters; solar and net radiation at 2 meters; delta temperature (SRDT) between 2, 10 and 30 meters to determine stability class; and barometric pressure at 1.5 meters. Siting selection and a (QAPP) was approved by the Wyoming Department of Environmental Quality (WDEQ) and the EPA.

[Client Name: Confidential](#)

Meteorological Solutions Inc. was contracted to select, procure, install, prepare a monitoring Quality Assurance Project Plan (QAPP), calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a 100 meter meteorological monitoring tower for a proposed Portland cement facility. The 100-meter tower continuously measured the following parameters: wind speed and direction at 10, 50, and 100 meters; sigma-theta of the wind direction at 10, 50 and 100 meters; motor aspirated temperature at 2 and 100 meters to derive delta-t; relative humidity at 2 meters; solar radiation at 2 meters; net radiation at 1 meters; precipitation at 5 feet; and barometric pressure at 5 feet.

[Client Name: Aspen Consulting and Testing](#)

Meteorological Solutions Inc. is contracted by Aspen Consulting and Testing to install, calibrate, operate, perform remote data management and quarterly reporting and auditing at a meteorological monitoring station near the Carpenter Creek coal mine in Musselshell County eight miles south of Melstone, Montana. Meteorological monitoring is conducted on a 10-meter tower consisting of continuous measurements of wind speed and direction at 10 meters; sigma-theta of the wind direction (calculated) at 10 meters; solar and net radiation at 2 meters; delta temperature (SRDT) between 2 and 10 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection and a QAPP was approved by the Montana Department of Environmental Quality (MDEQ) and EPA.



Meteorological Tower Projects

Client Name: Nucor Steel

Meteorological Solutions Inc. is contracted by Nucor Steel Utah to calibrate, operate, perform remote data management and quarterly reporting at a meteorological monitoring station near Plymouth, Utah. Meteorological monitoring is on a 50-meter tower consisting of continuous measurements of wind speed and wind direction at 10 and 50 meters; sigma-theta of the wind direction (calculated) at 10 and 50 meters; vertical wind speed at 10 and 50 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 50 meters to determine stability class; relative humidity at 2 meters; barometric pressure and precipitation at 1.5 meters. Siting selection and a QAPP was approved by the UDAQ.

Client Name: Unisea, Inc.

Meteorological Solutions Inc. is contracted by Unisea, Inc. to calibrate, operate, perform remote data management and quarterly reporting at a meteorological, air quality, and visibility monitoring station in the Dutch Harbor, Alaska area.

Client Name: Confidential Client

Meteorological Solutions Inc. was contracted to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station in southwest Idaho. The meteorological monitoring on a 70-meter tower meteorological tower consists of continuous measurements of wind speed and wind direction at 10 and 70 meters; temperature at 10 and 70 meters; relative humidity at 10 meters; barometric pressure at 1.4 meters; and precipitation near ground level. Siting selection, approval of meteorological instrumentation and a QAPP.

Client Name: Energy Solutions

Meteorological Solutions Inc. is contracted by Energy Solutions to provide meteorological station calibrations and/or verification of instrumentation on a 10-meter tower located at Clive, Utah, and to perform monitoring and quarterly reporting wind speed and direction; temperature; precipitation; evaporation; and solar radiation. All calibrations and/or verifications for the Energy Solutions meteorological instrumentation is performed in accordance with the EPA's Quality Assurance Handbook for Air Pollution Measurement Systems.

Client Name: MWH Americas, Inc.

Meteorological Solutions Inc. was contracted by MWH Americas, Inc. to provide meteorological station calibrations and/or verification of instrumentation on a 10-meter tower located near Libby, Montana, and to perform monitoring and quarterly reporting consisting of wind speed and direction; temperature; precipitation; and solar radiation. All calibrations and/or verifications for the MWH Americas, Inc. meteorological instrumentation was performed in accordance with the EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, and an MSI air quality technician is certified by OSHA-40 Hour Hazwoper Training course.

Client Name: Micron Technology, Inc.

Meteorological Solutions Inc. was contracted by Micron Technologies to operate and perform remote data management and quarterly reporting, and conduct performance audits for a meteorological and air quality monitoring stations at Micron's Lehi, Utah facility. The meteorological station was equipped to measure horizontal wind speed and direction at 10 meters, temperature at the 2 meter level, and precipitation.



Meteorological Tower Projects

[Client Name: Ute Tribe Air Quality Management](#)

Meteorological Solutions Inc. is contracted by the Ute Tribe Minerals and Energy Office and the U. S. Environmental Protection Agency to install and monitor meteorological stations to assess the impact on air quality due to the growth of the oil and gas industry on the Ute Indian Reservation, and to calibrate, operate, perform remote data management and quarterly reporting at a meteorological, air quality, and visibility monitoring station on the Ute Indian Reservation. The meteorological monitoring consists of visibility monitoring and meteorological monitoring on a 10-meter tower consisting of continuous measurements of wind speed and direction; solar and net radiation; temperature at two levels; relative humidity; barometric pressure; and precipitation. Siting selection and a QAPP was approved by UDAQ and EPA.

[Client Name: Ash Grove Cement Company](#)

Meteorological Solutions Inc. was contracted by Ash Grove Cement Company to calibrate, operate, perform remote data management and quarterly reporting at a meteorological monitoring station at the Leamington Plant in Leamington, Utah. The meteorological monitoring was conducted on a 50-meter tower consisting of continuous measurements of wind speed and direction at 10 and 50 meters; sigma-theta of the wind direction (calculated) at 10 and 50 meters; vertical wind speed at 10 and 50 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 50 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection and a QAPP was approved UDAQ.

[Client Name: Confidential Client](#)

Meteorological Solutions Inc. is contracted to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station in southwest Idaho. The meteorological monitoring on a 43-meter tower meteorological tower consisting of continuous measurements of wind speed and direction at 10 and 43 meters; temperature at 10 and 43 meters; relative humidity at 10 meters; barometric pressure at 1.4 meters; and precipitation near ground level. A meteorological monitoring and quality assurance plan in accordance with Nuclear Regulatory Commission Guidelines, was developed and approved for this project.

[Client Name: Confidential Client](#)

Meteorological Solutions Inc. was contracted to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station in western Wyoming. The meteorological monitoring on a 70-meter meteorological tower consisted of continuous measurements of wind speed and wind direction at 10 and 70 meters; temperature at 10 and 70 meters; relative humidity at 10 meters; barometric pressure at 1.4 meters; and precipitation near ground level. A meteorological monitoring and quality assurance plan in accordance with Nuclear Regulatory Commission Guidelines, was developed and approved for this project.



Meteorological Tower Projects

[Client Name: PacifiCorp Energy Naughton Power Plant](#)

Meteorological Solutions Inc. is contracted by PacifiCorp to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station at the Naughton Power Plant located near Kemmerer, Wyoming. The meteorological monitoring on a 50-meter tower consists of continuous measurements of wind speed and direction at 10 and 50 meters; sigma-theta of the wind direction (calculated) at 10 and 50 meters; vertical wind speed at 10 and 50 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 50 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection and a QAPP was approved by the WDEQ and EPA.

[Client Name: Graymont Western U. S., Inc.](#)

Meteorological Solutions Inc. is contracted by Graymont Western U. S., Inc. to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station at the Indian Creek plant located in Montana. The meteorological monitoring on a 50-meter tower consists of continuous measurements of wind speed and direction at 10 and 50 meters; sigma-theta of the wind direction (calculated) at 10 and 50 meters; vertical wind speed at 10 and 50 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 50 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection and a QAPP was approved by MDEQ.

[Client Name: PacifiCorp Energy](#)

Meteorological Solutions Inc. was contracted by PacifiCorp to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station at the Huntington Power Plant located in Emery County, Utah. The meteorological monitoring on a 50-meter tower consisted of continuous measurements of wind speed and direction at 10 and 50 meters; sigma-theta of the wind direction (calculated) at 10 and 50 meters; vertical wind speed at 10 and 50 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 50 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection and a QAPP was approved by UDAQ.

[Client Name: PacifiCorp Energy Jim Bridger Power Plant](#)

Meteorological Solutions Inc. is contracted by PacifiCorp to select, procure, install, calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a 50-meter meteorological tower located near the Jim Bridger Power Plant near Point of Rocks, Wyoming. Meteorological data collection consists of wind speed and direction at 10 and 50 meters, temperature at 2, 10 and 50 meters; relative humidity; solar and net radiation at 2 meters; precipitation; and barometric pressure at the base of the tower. Atmospheric stability was calculated using the solar radiation - delta temperature (SRDT), and sigma-theta (σ_θ) methods



Meteorological Tower Projects

[Client Name: PacifiCorp Hunter Power Plant](#)

Meteorological Solutions Inc. was contracted by PacifiCorp to select, procure, install, calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a 50-meter meteorological tower located near the Hunter power plant near Clawson, Utah. Meteorological data collection consisted of wind speed and direction at 10 and 50 meters; temperature at 2, 10 and 50 meters; relative humidity; solar and net radiation at 2 meters; precipitation; and barometric pressure at the base of the tower. Atmospheric stability was calculated using the solar radiation - delta temperature (SRDT), and sigma-theta (σ_θ) methods.

[Client Name: Graymont Western U. S., Inc.](#)

Meteorological Solutions Inc. was contracted by Graymont Western U. S., Inc. to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station located near the Cricket Mountain area. The meteorological monitoring on a 50-meter tower consisting of continuous measurements of wind speed and direction at 10 and 50 meters; sigma-theta of the wind direction (calculated) at 10 and 50 meters; vertical wind speed at 10 and 50 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 50 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection and a QAPP was approved by the UDAQ.

[Client Name: Graymont Western U. S., Inc.](#)

Meteorological Solutions Inc. is contracted by Graymont Western U. S., Inc. to calibrate, operate, and perform remote data management and quarterly reporting at a meteorological monitoring station at the Pilot Peak facility located near Wendover, Nevada. The meteorological monitoring on 50- and 100-meter towers consists of continuous measurements of wind speed and direction at 10, 50 and 100 meters; sigma-theta of the wind direction (calculated) at 10, 50 and 100 meters; vertical wind speed at 10, 50 and 100 meters; solar and net radiation at 2 meters; delta temperature (SRDT) at 2, 10 and 100 meters to determine stability class; relative humidity at 2 meters; barometric pressure at 1.5 meters, and precipitation at 1.5 meters. Siting selection QAPP was approved by the NDEP.

[Client Name: WDEQ](#)

Meteorological Solutions Inc. is contracted by the Wyoming Department of Environmental Quality to calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located in the Jonah oil and gas field in Sublette County, Wyoming. Meteorological monitoring on a 10-meter tower consists of continuous measurements of wind speed and direction at 10 meters; sigma-theta of the wind direction (calculated); solar radiation and delta temperature (SRDT) to determine stability class; temperature at 2 and 9 meters; solar radiation at 2 meters; barometric pressure at 2 meters; and precipitation. Siting selection and a QAPP was approved by the WDEQ.



Meteorological Tower Projects

[Client Name: Intermountain Power](#)

Meteorological Solutions Inc. was contracted by Intermountain Power Service Company to select, procure, install, calibrate, operate, perform remote data management and monthly reporting, and conduct quality assurance performance audits at a meteorological station located at their Delta, Utah power plant. Meteorological data collection consisted of wind speed and direction at 10 and 50 meters; vertical wind speed at 10 and 50 meters; temperature at 2, 10 and 50 meters; relative humidity; solar and net radiation at 2 meters; precipitation; and barometric pressure at the base of the tower. Atmospheric stability was calculated using the solar radiation - delta temperature (SRDT), sigma-theta (σ_θ), and sigma E (σ_E) methods. Monthly data reports were prepared as part of this contract. Quality assurance audits of the monitoring sites were performed to meet US EPA Prevention of Significant Deterioration (PSD) and UDAQ quality assurance requirements.

[Client Name: ATK Launch Systems](#)

Meteorological Solutions Inc. is contracted by ATK Launch Systems to conduct quality assurance audits of the M-245 meteorological monitoring station that is equipped to continuously measure wind direction; temperature; relative humidity; barometric pressure; solar radiation; and precipitation.

[Client Name: Fire Science Academy](#)

Meteorological Solutions Inc. is contracted to the University and Community College System of Nevada to select, procure, install, prepare monitoring Quality Assurance Project Plan (QAPP), calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a meteorological station for a period of two years at the University of Nevada, Reno's Fire Science Academy in Carlin, Nevada. The meteorological monitoring station consists of wind speed and direction at 10 meters; sigma-theta of the wind direction (calculated) to determine stability class; and temperature at 2 meters.

[Client Name: NEVCO Energy](#)

Meteorological Solutions Inc. was contracted by NEVCO Energy to select, procure, install, calibrate, operate, perform remote data management and monthly reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located near Sigurd, Utah. Meteorological data collection consists of wind direction and wind speed at 10 and 100 meters, vertical wind speed at 10 and 100 meters, temperature at 2, 10 and 100 meters, relative humidity, solar, and net radiation at 2 meters, precipitation and barometric pressure at the base of the tower. Atmospheric stability is being calculated using the solar radiation - delta temperature (SRDT), sigma-theta (σ_θ), and sigma E (σ_E) methods. Air quality data are also being collected consisting of PM₁₀ measurements. Monthly data reports were prepared as part of this contract. Quality assurance audits of the monitoring sites were performed to meet US EPA Prevention of Significant Deterioration (PSD) and State of Utah quality assurance requirements.

[Client Name: Ash Grove Cement Company](#)

Meteorological Solutions Inc. was contracted by Ash Grove Cement Company to select, procure, install, prepare QAPP, calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a meteorological monitoring station located near Moapa, Nevada. MSI utilized meteorological equipment and a 100-meter tower installation to continuously measure the following parameters: wind speed at 10, 50, and 100 meters; wind direction at 10, 50 and 100 meters; sigma-theta of the wind direction at 10, 50 and 100 meters; motor aspirated temperature at 2 and 100 meters to derive delta-t; relative humidity at 2 meters; solar radiation at 2 meters; net radiation at 1 meters; precipitation at 5 feet; and barometric pressure at 5 feet. The entire tower is solar powered and data collection on the first year was over 99%.



Meteorological Tower Projects

[Client Name: Holcim Cement](#)

Meteorological Solutions Inc. was contracted by Holcim to select, procure, install, prepare a QAPP, calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a 100 meter meteorological monitoring tower located near their Devil's Slide Portland cement facility. The 100-meter tower continuously measures the following parameters; wind direction at 10, 50 and 100 meters; sigma-theta of the wind direction at 10, 50 and 100 meters; motor aspirated temperature at 2 and 100 meters to derive delta-t; relative humidity at 2 meters; solar radiation at 2 meters; net radiation at 1 meters; precipitation at 5 feet; and barometric pressure at 5 feet.

[Client Name: EnCana Oil & Gas](#)

Meteorological Solutions Inc. was contracted by EnCana Oil & Gas to select, procure, install, calibrate, operate, perform remote data management, reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station at the Jonah Oil & Gas Field located in Sublette County, Wyoming. Meteorological monitoring consisted of wind speed and direction at 10 meters; sigma-theta of the wind direction (calculated); solar radiation and delta temperature (SRDT) to determine stability class; temperature at 2 and 9 meters; solar radiation at 2 meters; barometric pressure at 2 meters, and precipitation. Site selection and a QAPP was approved by WDEQ.

[Client Name: Wyoming Department of Environmental Quality - Air Quality Division](#)

Meteorological Solutions Inc. is contracted by the Wyoming Department of Environmental Quality to calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located at Murphy Ridge on the border of Utah and Wyoming in Uinta County, Wyoming. This site compliments a wet deposition site being operated as part of the National Atmospheric Deposition Program (NADP). Meteorological monitoring consisted of continuous measurements of wind speed and wind direction at 10 meters; sigma-theta of the wind direction (calculated); solar radiation and delta temperature (SRDT) to determine stability class; temperature at 2 and 9 meters; solar radiation at 2 meters; barometric pressure at 2 meters, and precipitation. Site selection had been approved by WDEQ.

[Client Name: FMC](#)

Meteorological Solutions Inc. was contracted by FMC to conduct quality assurance audits of the Pond and Pilot House meteorological monitoring stations to meet US EPA Prevention of Significant Deterioration (PSD) quality assurance requirements. Quality assurance performance audits of FMC's meteorological monitoring sites were conducted in accordance with EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. IV: Meteorological Measurements, and EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). The station was equipped to measure horizontal wind speed and direction at 10 meters; temperature at 10 and 2 meters; relative humidity; solar radiation; barometric pressure; and precipitation.



Meteorological Tower Projects

Client Name: Arizona Electric Power Company

Arizona Electric Power operates a 10-meter meteorological tower at their Apache Generating Stations located near Cochise, Arizona. Meteorological measurements consist of wind speed and direction at 10 meters; temperature at 2 and 9 meters; precipitation at 1.7 meters; relative humidity and solar radiation at 2 meters, and barometric pressure at 1.5 meters. MSI is contracted to conduct quality assurance audits of the monitoring sites to meet US EPA PSD quality assurance requirements.

Client Name: Molycorp Inc. /Chevron Mining

Chevron Mining operates the Mountain Pass Office and Fenceline meteorological stations. The Mountain Pass office station is equipped to measure horizontal wind speed and direction; temperature; relative humidity; barometric pressure; and precipitation. The Fenceline station is equipped to measure horizontal wind speed and direction. MSI is conducting quality assurance audits of these monitoring sites to meet US EPA PSD quality assurance requirements.

Client Name: Naval Air Warfare Center

The Naval Air Warfare Center (NAWC) at China Lake operates meteorological and air quality monitoring stations to characterize and record on-site meteorology and air quality and to understand the impacts of air pollution on operation and testing activities conducted at NAWC. MSI was contracted to perform remote data management and reporting of the meteorological and air quality parameters, and to conduct quality assurance audit of the meteorological monitoring equipment.

Client Name: SunCrest Development

Meteorological Solutions Inc. was contracted by SunCrest Development to install, calibrate, operate, and maintain a meteorological tower and instrumentation, to perform remote data management, quarterly reporting, and perform quality assurance performance audits on the meteorological sensors. The meteorological measurements consisted of wind speed and direction; temperature; relative humidity; solar radiation; precipitation; and snow depth. Quarterly data reports of meteorological data were generated, as well as six-month climatologies. The meteorological station was being operated to characterize local weather patterns at the ridge-top community. Quality assurance performance audits of the meteorological equipment were performed to meet project quality assurance requirements.

Client Name: City of West Jordan

The City of West Jordan operates two 2-meter meteorological stations at locations referred to as Jordan East and Jordan West. Annually MSI conducts quality assurance audits of the meteorological monitoring stations to verify equipment calibrations and that sensors were operating within recommended tolerances.

Client Name: Safety Kleen

Meteorological Solutions Inc. was contracted by Safety Kleen to conduct performance and system audits at a meteorological installation located at Grassy Mountain near Clive, Utah. The station is equipped to measure horizontal wind speed and direction; two-meter temperature and relative humidity; solar radiation; precipitation; and barometric pressure. Instrument performance audits at the Grassy Mountain station were conducted in accordance with EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. IV: Meteorological Measurements.



Meteorological Tower Projects

[Client Name: Coors Brewing Company](#)

Meteorological Solutions Inc. was contracted by Coors Brewing Company to repair and calibrate their meteorological station located at their facility near Burley, Idaho. The meteorological station was equipped to measure and record horizontal wind speed and direction; air temperature; solar radiation; and precipitation.

[Client Name: Western Zirconium](#)

Meteorological Solutions Inc. is contracted by Western Zirconium to install a meteorological station, perform remote data management and quarterly reporting, and conduct performance audits of the meteorological station at their northern Utah facility. Meteorological data collection consists of wind speed and direction at 10 meters; sigma-theta of the wind direction; temperature; relative humidity; and precipitation at 2 meters. The meteorological parameters measured provide information for determination of meteorology in the immediate area, and the meteorological data necessary for any subsequent air quality modeling and/or permit application activities. Meteorological performance audits at Western Zirconium are conducted in accordance with EPA's Ambient Monitoring Guidelines for PSD, Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. IV: Meteorological Measurements, and Utah Division of Air Quality's (UDAQ) Ambient and Meteorological Monitoring Requirements for Prevention of Significant Deterioration (PSD) and Additional Impact Analysis.

[Client Name: Alcan Aluminum](#)

Meteorological Solutions Inc. is conducting calibration verifications of instrumentation at a meteorological installation located at Alcan Ingot's facility near Henderson, Kentucky. The meteorological station is equipped to measure and record horizontal wind speed and direction; air and soil temperature; relative humidity; snow depth; soil moisture; precipitation; and barometric pressure data. Meteorological instrument calibration verification at the Alcan Ingot site is conducted in accordance with EPA's Quality Assurance Handbook for Air Pollution Measurement Systems.

[Client Name: Panda Energy International](#)

Meteorological Solutions Inc. was contracted by Panda Energy International to select, procure, install, calibrate, operate, perform remote data management and monthly reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located at near Mona, Utah. Data collection consisted of wind speed and direction and at 10 and 50 meters, temperature at 2, 10 and 50 meters; solar radiation at 2 meters; and barometric pressure at the base of the tower. Atmospheric stability is being calculated using the solar radiation - delta temperature (SRDT) and sigma-theta (σ_θ) methods. Monthly data reports were prepared as part this contract. Quality assurance audits of the monitoring sites were performed to meet US EPA PSD and UDAQ quality assurance requirements.



Ambient Monitoring Projects

[Client Name: Monsanto](#)

Meteorological Solutions Inc. is conducting quarterly calibration, audits and maintenance of sulfur dioxide (SO₂) instrumentation at two ambient air quality monitoring stations located at their facility in Soda Springs, Idaho.

[Client Name: J. R. Simplot Company](#)

Since 1999, MSI has been providing calibration, maintenance, auditing, and data management services for two ambient SO₂ and meteorological monitoring stations at the Don Plant located in Pocatello, Idaho. The meteorological stations consist of 10-meter towers measuring wind speed, wind direction, temperature, and relative humidity. In addition, on a quarterly basis, MSI is performing cylinder gas audits on the SO₂ and NO_x continuous emission monitoring systems.

[Client Name: Ute Tribe Air Quality Management](#)

Meteorological Solutions Inc. was contracted by the Ute Tribe Minerals and Energy Office and the U. S. Environmental Protection Agency to install and monitor meteorological stations to assess the impact on air quality due to the growth of the oil and gas industry on the Ute Indian Reservation, and to calibrate, operate, perform remote data management and quarterly reporting at a meteorological, air quality, and visibility monitoring station on the Ute Indian Reservation. The air quality monitoring consists of visibility; nitrogen oxides (NO_x); carbon monoxide (CO); sulfur dioxide (SO₂); and PM_{2.5} to PM₁₀. Siting selection and a Quality Assurance Project Plan (QAPP) will be approved by the EPA.

[Client Name: PacifiCorp Energy](#)

Meteorological Solutions Inc. was contracted by PacifiCorp to select, procure, install, calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at ambient SO₂ monitoring station located near the Jim Bridger Power Plant near Point of Rocks, Wyoming. Ambient SO₂ measurements were measured continuously with an API Model 100E analyzer to determine ambient SO₂ background concentrations.

[Client Name: PacifiCorp Hunter Power Plant](#)

Meteorological Solutions Inc. was contracted by PacifiCorp to select, procure, install, calibrate, operate, and perform remote data management and quarterly reporting, and conduct quality assurance performance audits at an air quality monitoring station located near the Hunter power plant near Clawson, Utah. Collocated PM₁₀ samplers were operated according to EPA's six day sampling schedule. In addition, continuous CO and meteorological measurements were collected at this site.

[Client Name: Intermountain Power Delta, Utah](#)

Meteorological Solutions Inc. was contracted by Intermountain Power Service Company to select, procure, install, calibrate, operate, perform remote data management and monthly reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located at their Delta, Utah power plant. Air quality data were also collected consisting of ambient SO₂ concentration and PM₁₀ measurements. Monthly data reports were prepared as part of this contract. Quality assurance audits of the monitoring sites were performed to meet US EPA PSD and UDAQ quality assurance requirements.



Ambient Monitoring Projects

[Client Name: WDEQ](#)

Meteorological Solutions Inc. was contracted by the WDEQ to calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located in the Jonah oil and gas field in Sublette County, Wyoming. The air quality monitoring consists of ambient nitrogen oxide (NO_x), Ozone (O₃) and continuous particulate (TEOM). Siting selection and a QAPP was approved by the WDEQ.

[Client Name: Micron Technology, Inc](#)

Meteorological Solutions Inc. was contracted by Micron Technologies to operate and perform remote data management and quarterly reporting, and conduct performance audits for an air quality monitoring stations at Micron's Lehi, Utah facility. The ambient monitoring station consists of NO_x, later CO, collocated PM₁₀, and PM_{2.5} samplers.

[Client Name: Fire Science Academy](#)

Meteorological Solutions Inc. is contracted by the University and Community College System of Nevada to select, procure, install, prepare monitoring Quality Assurance Project Plan (QAPP), calibrate, operate, perform remote data management and quarterly reporting, and conduct quality assurance performance audits at an air quality station at the University of Nevada, Reno's Fire Science Academy in Carlin, Nevada. A Rupprecht & Patashnick (R&P) TEOM Series 1400A is being utilized to measure concentrations of PM₁₀ in real-time.

[Client Name: Holnam Inc.](#)

Meteorological Solutions Inc. was contracted by Holnam, Inc. to procure and install oxides of nitrogen (NO/NO₂/NO_x) and ozone (O₃) analyzers at their Devil's Slide Morgan, Utah Portland cement plant. MSI operated the air quality station, managed and quality assured the monitoring data, and performed quarterly performance audits. Oxides of nitrogen and ozone air quality data were collected as 15-minute averages.

[Client Name: Holcim Cement](#)

Meteorological Solutions Inc., under contract to Holcim Cement collected wind measurements as well as PM₁₀ samples near Holcim's Devil's Slide Portland cement facility. MSI determined the location of the site and obtain approval from the UDAQ, prepared a monitoring and quality assurance project plan, procured, installed, and operated the meteorological and air quality monitoring station. Collocated PM₁₀ samples were collected in accordance with EPA's six-day sampling schedule.

In addition, under separate contract, MSI collected continuous PM₁₀ measurements (TEOM) as well as daily PM₁₀ samples (sequential Partisols) at the fenceline of Holcim's Devil's Slide Portland cement facility. A tripod meteorological station was also being run at the monitoring site. The location of the site was determined and approval from the UDAQ was obtained. Collocated PM₁₀ samples were collected in accordance with EPA's daily sampling schedule. In addition, MSI provided quarterly and semi-annual audits of the PM₁₀ samplers and meteorological sensors as well as routine site filter exchanges, data management and reporting.



Ambient Monitoring Projects

Client Name: Wyoming Department of Environmental Quality - Air Quality Division

Meteorological Solutions Inc. was contracted by the WDEQ to calibrate, operate, perform remote data management and quarterly reporting at an air quality monitoring station located at Murphy Ridge on the border of Utah and Wyoming in Uinta County, Wyoming. This site compliments a wet deposition site being operated as part of the National Atmospheric Deposition Program (NADP). The air quality monitoring consists of ambient nitrogen oxide (NO_x), sulfur dioxide (SO₂), Ozone (O₃), carbon monoxide (CO), and continuous particulate (TEOM).

Client Name: ATK Launch Systems

Meteorological Solutions Inc. was contracted by ATK Launch Systems to prepare a monitoring QAPP, install, and calibrate collocated PM₁₀ samplers at their Brigham City, Utah facility. In addition, MSI conducted quarterly quality assurance performance audits and prepared quarterly PM₁₀ data reports and associated statistics to assure that US EPA PSD and State of Utah quality assurance requirements are being met.

Client Name: EnCana Oil & Gas

Meteorological Solutions Inc. was contracted by EnCana Oil & Gas to select, procure, install, calibrate, operate, perform remote data management, reporting, and conduct quality assurance performance audits at a meteorological and air quality monitoring station located in the Jonah Oil and Gas Field in Sublette County, Wyoming. The air quality monitoring consists of ambient nitrogen oxide (NO_x), Ozone (O₃) and continuous particulate (TEOM). Site selection and a QAPP was approved by WDEQ.



Permitting Projects

Client Name: Asarco - Ray Complex

MWH/MSI team prepared the Title V renewal permit application for Asarco LLC (Asarco) Ray Complex – Ray Operations (Ray Complex) in accordance with Pinal County Air Quality Control District Code of Regulations §3-1-040 and 40 CFR Part 70. This permit renewal application addressed current operations at the Asarco Ray Complex, equipment or process changes to current operations at the Ray Complex since the last permit revision, as well as future equipment or process changes that will be implemented over the next five years. An exhaustive emission inventory was prepared for all air emission sources which included the calculation of maximum hourly and annual emission rates for existing and proposed sources and change in emissions since the last Title V permit application. Descriptions of the processes carried out and the products produced, alternate operating scenarios for processes at the facility, flow diagrams for all processes and all emissions related information was included in the permit application. Additional information that was prepared and submitted to Pinal County included descriptions and source parameters for the air pollution control equipment, compliance status and schedule as necessary, and compliance certification with respect to all applicable requirements.

Client Name: University of Utah/Chevron

Meteorological Solutions Inc. has been contracted by the University of Utah/Chevron to prepare a non-attainment area Notice of Intent for a proposed co-generation project. This project included the decommissioning of two dual-fuel boilers and the installation of a new gas turbine and associated waste recovery unit at the Universities lower campus hot water heating plant. The plant will be permitted through the Title V Operating Permit. The new gas turbine will generate approximately 5100 kW of electrical power. Netting and offset requirements were reviewed as part of this permit application.

Client Name: Confidential Client

A confidential client contracted MSI to prepare a PSD permit application for a proposed Portland Cement plant to be located in northern Utah. The plant proposed consisted of a state-of-the-art five-stage preheater/precalciner kiln system and produce approximately one million metric tons of cement annually. The PSD permit application contained a source description, emission calculations for all proposed sources, a regulatory review, a LAER/BACT review, offset determination, and PSD Class I and II concentration, visibility, and deposition modeling analyses.

The air quality analyses performed as part of this permit application consisted of near-field modeling utilizing the AERMOD model to determine ground-level pollutant concentrations out to 50 kilometers from the proposed facility, a PSD Class I full impact (cumulative) analysis consisting of the inclusion of addition sources within the radius of impact and a non-attainment area analysis. The results of the near-field and full impact analysis were compared against the PSD Class II increments and the National Ambient Air Quality Standards.

In addition, MSI performed all far-field modeling using the CALMET/CALPUFF/CALPOST modeling system to address the impact on PSD Class I increments, regional haze, and deposition. Three years of MM5 data as well as multiple surface stations were used by CALPUFF.

Client Name: Genwal Resources, Inc.

For Genwal Resources, MSI prepared a Notice of Intent that described coal mining operations and increased emissions due to introduction of longwall equipment and mine expansion activities. Emission calculations were prepared, BACT analysis was performed on the proposed equipment, regulatory review was conducted, and interaction with regulatory agencies was performed.



Permitting Projects

Client Name: NEVCO Energy

NEVCO Energy contracted MSI to prepare a PSD permit application for a proposed 270 MW coal-fired power plant to be located near Sigurd, Utah. The facility will feature circulating fluidized bed (CFB) coal-fired boilers, selective Non-Catalytic Reduction (SNCR), two circulating dry scrubbers with particulate collection equipment, a steam turbine generator and a zero discharge system design. The PSD permit application consisted of a source description, emission calculations for all proposed sources, a regulatory review, a BACT review, and PSD Class I and II concentration, visibility, and deposition modeling analyses. Interaction with the state and federal regulatory agencies was conducted.

An air quality analysis was performed as part of this permit application and consisted of near-field modeling utilizing the ISCST3 model to determine ground-level pollutant concentrations out to 50 kilometers from the proposed facility. A preliminary receptor grid, consisting over 36,000 receptors was utilized to estimate the location of ground-level concentrations. Based on on-site meteorological data collected for this project, proposed emissions of SO₂ had the furthest radius of impact. Other industries emitting SO₂ and which fell within the radius of impact were determined and emissions and source data from these facilities were obtained, entered into the model, and the model rerun. The full impact from the proposed source and outside sources of influence were compared against the PSD Class II increments and the National Ambient Air Quality Standards. The VISCREEN model was run to address plume blight at several PSD Class I areas in Utah.

In addition, MSI performed all modeling necessary to satisfy state and federal PSD requirements. Emissions from the proposed facility were modeled using the CALMET/CALPUFF/CALPOST modeling system to address the impact on PSD Class I increments, regional haze, and deposition. One year of MM5 data as well as multiple surface stations were used by CALPUFF.

Client Name: Holcim US,

Holcim US contracted MSI to update an emissions inventory and to perform SO₂ and PM₁₀ dispersion modeling to address proposed changes at the Devils Slide Facility. The proposed changes included: 1) elimination of the annual restriction on clinker production capacity; 2) modification to the clinker cooling operation; and 3) re-expression of the short-term Prevention of Significant Deterioration (PSD) avoidance limit for sulfur dioxide (SO₂) to an annual limit. The objective of the SO₂ dispersion modeling was to address the proposed re-expression of the short-term PSD avoidance limit for SO₂ limit to an annual limit and to demonstrate compliance with the SO₂ National Ambient Air Quality Standards (NAAQS). In addition, PM₁₀ modeling was conducted to demonstrate attainment with NAAQS and increment after the elimination of the annual Clinker limit.

Client Name: Anesta Corporation

Anesta Corporation is a research and development pharmaceutical company with laboratory and production capabilities used for the development of drug delivery products. Currently, Anesta Corporation is producing one million units of a man-made, opiate derived drug but will increase to 1 million units per day. Additional drugs are planned to be manufactured late in 2002 or 2003. After determining the emissions from the proposed expansion, a small source exemption was determined to be applicable. The appropriate forms were prepared and submitted to the UDAQ.

Client Name: W. R. White Company

Meteorological Solutions Inc. prepared a Notice of Intent (NOI) for a concrete batch plant and pipe production facility. In this permitting study, an emission inventory of fugitive dust from the concrete mixing and pouring facility, including the entrainment of dust from roads caused by trucks was prepared and the inventory showed that the facility was not emitting sufficient PM₁₀ to warrant dispersion modeling.



Permitting Projects

[Client Name: US Department of Army, Chemical Agent Munitions Disposal System \(CAMDS\)](#)

Meteorological Solutions Inc. was contracted by CAMDS to prepare five plans to demonstrate compliance with the requirements of 40 CFR 63 Subpart EEE, Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors. The standards implement Section 112 of the CAA that requires emissions standards for hazardous air pollutants be based on the performance of Maximum Achievable Control Technology. The plans written for CAMDS include a Feedstream and Analysis Plan, Operation and Maintenance Plan, Startup, Shutdown, and Malfunction Plan, and a Notification of Intent to Comply. In addition, a MACT Training and Certification plan was prepared for CAMDS personnel.

The Feedstream and Analysis Plan contained the following:

- 1) The parameters that will be analyzed for in each feedstream to ensure compliance with operating parameter limits,
- 2) how the analysis will be obtained (sampling or published data),
- 3) how the analysis will be used to document compliance with applicable feedrate limits,
- 4) the test methods used to obtain the analysis;
- 5) the sampling methods used to obtain a representative sample of each feedstream to be analyzed, and
- 6) the analysis frequency for each feedstream to ensure that the analysis is accurate and up-to-date.

The Operation and Maintenance Plan described all aspects of operation and maintenance for CAMDS incineration systems, air pollution abatement systems, and waste handling and feed systems.

The Startup, Shutdown, and Malfunction Plan describes in detail the procedures for operating and maintaining the incinerators operated at the Chemical Agent Munitions Disposal System (CAMDS) during periods of startup, shutdown, and malfunction and a program of corrective action for malfunctioning process and air pollution control equipment.

[Client Name: Fresenius USA](#)

Since 1995, MSI personnel have provided permitting and engineering analyses for Fresenius USA, a major pharmaceutical facility that manufactures peritoneal and hemodialysis products used by persons suffering from kidney failure. The most recent Notice of Intent covered the expansion of the facility which included the addition of two fiber spinning and dialyzer assembly lines, air pollution control equipment, electrical generating units and emergency generators. Emissions from the expansion were calculated, BACT analyses were conducted on the air pollutant scrubbing systems, a regulatory review and regulatory agency interaction was conducted.

[Client Name: Salt Lake Department of Airports](#)

Meteorological Solutions Inc. personnel have provided air consulting services to the Salt Lake City Department of Airports (SLCDA). These services include Notice of Intent (NOI) and Title V permit preparation, emission inventories (annual and ozone), and ambient and meteorological air quality services at the Salt Lake City International Airport (SLCIA). Due to rapid expansion and development at the SLCIA several Notices of Intent (NOI) have been prepared, submitted and approved by the Utah Division of Air Quality (UDAQ). These permits included the addition of emergency generators, fuel tanks, trash incinerators, and parking structures. In MSI prepared an engineering and economic analysis for the Federal Aviation Administration (FAA) demonstrating the differences in fleet emissions converting existing and proposed new vehicles from gasoline to natural gas. Other work includes a demonstration to the UDAQ that the SLCDA had no control over tenant operations and were not responsible for tenant emissions and reporting requirements. A NOI was written and an Approval Order (AO) obtained that removed all tenant operations and corresponding emissions that were previously included in SLCDA AO's and consolidated all SLCIA sources into one AO. Annual emissions are also calculated and compiled each March for the SLCDA. These emissions calculations include all stationary, mobile, and area sources controlled by the SLCDA which total over 100 sources.



Permitting Projects

[Client Name: EG&G Defense Materials, Inc.](#)

Meteorological Solutions Inc. personnel were contracted by EG&G Defense Materials, Inc. to conduct an emissions inventory of the Deseret Chemical Depot including the Tooele Chemical Agent Disposal Facility (TOCDF), CBDCOM sources, and Chemical Agent Munitions Disposal System (CAMDS) facility. These three activities are under command of the U. S. Army and are chartered to incinerate the chemical munitions stockpile at the south area of the Tooele Army Depot located 20 miles south of Tooele, Utah (approximately one hour from Salt Lake City). Under the Clean Air Act Amendments both facilities (TOCDF and CAMDS), and CBDCOM sources are considered “major” sources and require an operating permit. After completion of the emissions inventory a Title V Operating Permit application for the Tooele Army Depot South Area was prepared.

[Client Name: 3M Industrial Mineral Products Division](#)

Meteorological Solutions Inc. personnel prepared an emissions inventory for the purposes of Title V and Title III for 3M's minerals products plant in Riverside, California. A general description of plant operations includes the mining of a Basalt composition rock which is crushed and colored for used in asphalt shingles. Emissions from all mining and manufacturing processes, mobile sources, and fuel storage tanks were quantified.

[Client Name: USACAMDS](#)

Meteorological Solutions Inc. personnel was retained by USACAMDS to prepare a discussion and conduct a presentation to the Utah Division of Air Quality that would justify USACAMDS to be considered a separate source requiring its own Title V permit and not be included under the "umbrella" permit being prepared for all other activities at the Tooele Army Depot South Army.

[Client Name: Williams International](#)

Meteorological Solutions Inc. personnel prepared a NOI for this manufacturing facility that produces small gas turbine engines for civilian aircraft, cruise missiles, and drones. The emission inventory included the testing bays where engines are given QA inspection and run testing. The facility included many small vents and hoods where small quantities of solvents, degreasers, and oil fumes were emitted to the ambient air.

[Client Name: Utility Trailer, Inc.](#)

As Utility Trailer's business increased, it became important to add a fourth paint booth and increase line production of large, specialty semi-trailers. MSI personnel prepared an emission inventory from surface painting operations and the emissions of air toxics from a foam production facility. Process descriptions and control technologies were discussed.

[Client Name: Andalex Resources, Inc.](#)

Meteorological Solutions Inc. prepared a NOI which described the proposed mining operations and facilities; pollutant emissions were determined for all air pollution sources including roads, coal piles, conveyors, vehicular and heavy equipment exhaust, and a diesel generator.

[Client Name: Rollins Environmental Services, Inc.](#)

Preliminary dispersion modeling was performed to determine pollutant concentrations for a proposed hazardous waste incinerator. Complex 1, PTPLU2, and ISCST were used in this modeling study.



Permitting Projects

[Client Name: Andalex Resources, Inc.](#)

Meteorological Solutions Inc. personnel was retained by Andalex Resources, Inc. to prepare a permit application for a proposed coal mine to be located in Kane County, Utah. A Notice of Intent was prepared which described the proposed mining operations and facilities; pollutant emissions were determined for all air pollution sources including roads, coal piles, conveyors, vehicular and heavy equipment exhaust, and a diesel generator. In addition, a permit application was prepared for a proposed coal loadout facility to be located in Iron County, Utah. A Notice of Intent was prepared which described the proposed materials handling facility operations; pollutant emissions were determined for all air pollution sources including coal piles, conveyors, bins, stackers, and other related structures.

[Client Name: Andalex Resources, Inc.](#)

To satisfy a request from the Utah Division of Air Quality, MSI personnel was retained by Andalex Resources, Inc. to estimate emissions and perform dispersion modeling, using ISCST, of haul-truck emissions from three sections of public highway (four-lane and two-lane highway segments). Emissions of pollutants from haul-trucks were based on fuel consumption estimates; NO_x emissions were determined from Mobile5 data for forecast calendar year of 1996 and vehicular speeds of 50 miles-per-hour.

[Client Name: Jack B. Parsons Companies](#)

A Notice of Intent was prepared which described the rock crushing operations. Pollutant emission estimates were derived for PM₁₀ and control technology was discussed. Dispersion modeling using ISCST and COMPLEX-1 was performed to determine ground-level concentrations for comparison against National Ambient Air Quality Standards.

[Client Name: Valentiner Architects](#)

To prepare a permit application for a proposed hospital and special care center to be located in Salt Lake, Utah. A NOI was prepared which described the proposed hospital and care center operations; pollutant emissions were determined for boilers, emergency generators, and mobile sources. Dispersion modeling using ISCST was performed to determine ground-level concentrations for comparison against PSD increment and National Ambient Air Quality Standards.

[Client Name: Utah Power & Light](#)

Meteorological Solutions Inc. personnel were retained to prepare a NOI for a proposed coal blending and preparation facility at UP&L's Hunter Power Plant. The NOI described the facility description; pollutant emission estimates for PM₁₀ were derived, and control technology was discussed. Dispersion modeling using ISCST and COMPLEX-1 was performed to determine ground-level concentrations for comparison against National Ambient Air Quality Standards.

[Client Name: Central Weber Sewer District](#)

A NOI was prepared which included revised emission estimates due to the addition of two gas-fired generators. Dispersion modeling was performed to supplement the permit package. Ground-level concentrations were estimated by ISCST for NO₂, CO and HC from two gas fired generators to be operated at the Central Weber Sewer District Ogden Wastewater Treatment facility.



Permitting Projects

[Client Name: Andalex Resources, Inc.](#)

Meteorological Solutions Inc. Prepared an NOI which described the proposed materials handling facility operations; pollutant emissions were determined for all air pollution sources including coal piles, conveyors, bins, stackers, and other related structures.

[Client Name: Browning-Ferris Industries](#)

A Notice of Intent was prepared for a proposed medical waste incinerator to be located in Salt Lake County, Utah. The NOI described the proposed incinerator operations, process description, proposed control technology, and pollutant emission estimates for criteria and non-criteria pollutants.

[Client Name: W. W. Clyde](#)

A Notice of Intent was prepared for a Summit County, Utah rock crushing operation. Pollutant emission estimates were derived for PM₁₀ and control technology was discussed. Dispersion modeling using ISCST and COMPLEX-1 was performed to determine ground-level concentrations for comparison against National Ambient Air Quality Standards.

[Client Name: Park City Rock Products](#)

Objectives: To prepare a permit application for a proposed rock crushing and aggregate facility to be located in Summit County, Utah. A Notice of Intent was prepared which described the rock crushing operations; pollutant emission estimates were derived for PM₁₀, and control technology was discussed. Dispersion modeling using ISCST and COMPLEX-1 was performed to determine ground-level concentrations for comparison against National Ambient Air Quality Standards.



Dispersion Modeling Projects

[Client: ATK Launch Systems](#)

Meteorological Solutions Inc. has been retained by ATK Launch Systems Inc. to conduct dispersion modeling analyses for a proposed Prevention of Significant Deterioration (PSD) major modification at ATK Launch Systems Inc. Brigham City, Utah facility. ATK Launch Systems is planning to increase the number of allowable tests at its T-24 and T-97 rocket motor test facilities from three motors per year (4.2 million pounds of propellant) to five motors per year (7.0 million pounds of propellant). They are also asking to increase the T-24 testing capacity from 1.1 million-pound motors to 1.4 million-pound motors. Both the T-24 and T-97 test facilities are located at ATK's Promontory Plant in Box Elder County, Utah

ATK Launch Systems is allowed to test three (3) rocket motors per year, for a total combined propellant weight of 4.2 million pounds, at its T-24 and T-97 test facilities. In 2002, T-97 was modified to increase its test capacity from 1.1 million-pound motors, currently used by the NASA Space Shuttle, to 1.4 million-pound motors, which will be used by NASA's next generation manned vehicle, the Crew Launch Vehicle (CLV). The PSD analysis conducted in support of that modification examined the impact from increasing the per-test propellant amount from 1.1 million pounds to 1.4 million pounds, a 300,000 pound increase. ATK is preparing to conduct the same modification to T-24, and will repeat the impact analysis from burning an additional 300,000 pounds of propellant per test at T-24. Additionally, ATK will examine the annual impact from increasing the propellant total from 4.2 million pounds to 7.0 million pounds. The emissions from the resultant exhaust plume from the motor testing include particulate emissions in the form of total suspended particulate, PM_{10} and $PM_{2.5}$, hydrochloric acid (HCl), chlorine (Cl), carbon monoxide (CO), and nitrogen oxides (NO_x). Two types of modeling analyses were performed which consisted of a near-field analysis and a far-field analysis.

For the near-field modeling, PM_{10} and NO_x emissions were modeled to determine the air quality impact on the National Ambient Air Quality Standards (NAAQS), PSD Class II increments, and the impact on the Salt Lake and Utah County non-attainment area. Hazardous air pollutant emissions (HCl) were also modeled in the near-field only to determine the impact and compare against threshold screening values. For the far-field modeling, PM_{10} and NO_x emissions were modeled to determine the impact on PSD Class I increment, nitrogen deposition, and regional haze at Craters of the Moon National Monument in Idaho and Grand Teton National Park in Wyoming.

[Client: Bechtel/ASTARIS](#)

Meteorological Solutions Inc., under subcontract to Bechtel, performed a regional dispersion modeling study using the CALPUFF/CALMET modeling package for the ASTARIS plant located in Pocatello, Idaho. Emissions from the proposed LDR waste treatment plant were modeled to predict particle and vapor concentrations. The modeling results were used to provide deposition rates necessary to evaluate exposure pathways. The modeling study was a very comprehensive incorporating hourly surface meteorological data from eleven surface stations, upper air data from two NWS surface stations, prognostic three-dimensional meteorological data from the MM5 model, and precipitation data from 6 stations. The modeling domain covered 100 by 100 kilometers.



Dispersion Modeling Projects

[Client: Confidential Client](#)

Air quality analyses were performed as part of a PSD permit application for a proposed Portland Cement plant in northern Utah. These analyses consisted of near-field modeling utilizing the AERMOD model to determine ground-level pollutant concentrations out to 50 kilometers from the proposed facility, a PSD Class II full impact (cumulative) analysis consisting of the inclusion of addition sources within the radius of impact, and a non-attainment area analysis. The results of the near-field and full impact analysis will be compared against the PSD Class II increments and the National Ambient Air Quality Standards. The VISCREEN model was run to address plume blight. In addition, MSI performed using the CALMET/CALPUFF/CALPOST modeling system to address the impact on PSD Class I increments, regional haze, and deposition. Three years of MM5 data as well as multiple surface stations were used by CALPUFF.

[Client: URS Corporation](#)

Meteorological Solutions Inc. was retained by URS Corporation to prepare a five year meteorological data set to be used in ISCST3. Greenpoint data were merged with concurrent upper air data from Desert Rock. Missing soundings and surface data were interpolated and filled, as necessary.

[Client: URS Corporation](#)

Meteorological Solutions Inc. was retained by URS Corporation to prepare three (3) model-ready meteorological data files, in ISCST3 ASCII format, for use by the HotSpot Analysis and Reporting Program (HARP) model. These files consisted of surface data collected at Palmdale, California and coinciding upper air data collected at Miramar Naval Air Station in California. These data were used for a dispersion modeling project near Cajon Pass in southern California.

[Client: Staker Parson](#)

Air quality analyses are being performed in association with a PSD permit application for a proposed Portland Cement plant. These analyses consist of near-field modeling utilizing the AERMOD model to determine ground-level pollutant concentrations out to 50 kilometers from the proposed facility, a PSD Class II full impact (cumulative) analysis consisting of the inclusion of addition sources within the radius of impact, and a non-attainment area analysis. The results of the near-field and full impact analysis will be compared against the PSD Class II increments and the National Ambient Air Quality Standards. The VISCREEN model will be run to address plume blight. In addition, MSI is performing far-field modeling using the CALMET/CALPUFF/CALPOST modeling system to address the impact on PSD Class I increments, regional haze, and deposition. Three years of MM5 data as well as multiple surface stations were used by CALPUFF. PSD Class I areas reviewed included Capitol Reef, Arches, Bryce Canyon, Zion, and Canyonlands National Park.

[Client: Nucor](#)

Nucor purchased the assets of a scrap steel recycling facility (formerly North Star Steel) outside of Kingman, Arizona. At this facility, Nucor plans to re-shape steel into products to meet market demands for products such as re-enforcing bar used in concrete, light structural shapes used by a variety of manufacturers, or other finished steel products. Initially, per a request from the Arizona Department of Environmental Quality (ADEQ), MSI performed a dispersion modeling analysis, using EPA's SCREEN3 model, to determine ground-level concentration estimates from criteria pollutant emissions from the Reheat Furnace to compare against the National Ambient Air Quality Standards (NAAQS). A modeling protocol was developed and refined modeling was conducted following an approval of the protocol using AERMOD and five years of surface and upper air meteorological data collected by the National Weather Service.



Dispersion Modeling Projects

[Client: NEVCO Energy](#)

Dispersion modeling analyses were performed as part of a PSD permit application for a proposed 270 MW coal-fired power plant to be located near Sigurd, Utah. The facility will feature circulating fluidized bed (CFB) coal-fired boilers, selective Non-Catalytic Reduction (SNCR), two circulating dry scrubbers with particulate collection equipment, a steam turbine generator and a zero discharge system design. The modeling analyses consisted of near-field modeling utilizing the ISCST3 model to determine ground-level pollutant concentrations out to 50 kilometers from the proposed facility. A preliminary receptor grid, consisting over 36,000 receptors was utilized to estimate the location of ground-level concentrations. Based on on-site meteorological data collected for this project, proposed emissions of SO₂ had the furthest radius of impact. Other industries emitting SO₂ and which fell within the radius of impact were determined and emissions and source data from these facilities were obtained, entered into the model, and the model rerun. The full impact from the proposed source and outside sources of influence were compared against the PSD Class II increments and the National Ambient Air Quality Standards. The VISCREEN model was run to address plume blight at several PSD Class I areas in Utah.

Meteorological Solutions Inc. performed all modeling necessary to satisfy state and federal PSD requirements. Emissions from the proposed facility were modeled using the CALMET/CALPUFF/CALPOST modeling system to address the impact on PSD Class I increments, regional haze, and deposition. The PSD Class I areas reviewed included Canyonlands, Arches, Bryce, Capitol Reef, Zion, and Weminuche Wilderness Area. CALMET, one of the components of the CALPUFF modeling system, was utilized to develop three-dimensional time-varying fields of meteorological conditions for the modeling domain. Hourly surface observations were obtained from the National Weather Service (NWS) and Mesowest network stations. One year of MM5 data as well as multiple surface stations were used by CALPUFF. These data included 17 layers of data extending to 450 millibars.

[Client: Deseret Generation & Transmission](#)

Dispersion modeling analyses were performed as part of a PSD permit application for a proposed 110 MW waste coal-fired power plant to be located at the existing Bonanza Power Plant in eastern Uintah County, Utah. Dispersion modeling was performed to determine pollutant concentrations at the fence line and beyond for the proposed WCFU (near-field), from sources within and around the area of impact (Bonanza Unit 1), and at Class I areas (far-field).

Near-field modeling using the ISCST3 model was performed to address only the significant net emissions increase of regulated pollutants from the proposed WCFU. The pollutants with emission rates above the Prevention of Significant Deterioration (PSD) significant levels include carbon monoxide (CO), nitrogen oxides as (NO_x), sulfur dioxide (SO₂), particulate 10 microns or less (PM₁₀), sulfuric acid mist (H₂SO₄), fluorides (F), and beryllium (Be). In addition, the Building Profile Input Program (BPIP) was utilized to address downwash effects. Four years of on-site surface meteorological data, merged with concurrent mixing height information for Grand Junction, Colorado were utilized for input into ISCST3. A discrete receptor grid, consisting of over 18,000 receptors was utilized.

Meteorological Solutions Inc. performed all modeling necessary to satisfy state and federal PSD requirements. Emissions from the proposed facility were modeled using the CALMET/CALPUFF/CALPOST modeling system to address the impact on PSD Class I increments, regional haze, and deposition. One year of MM5 data as well as multiple surface stations were used by CALPUFF. The PSD Class I areas reviewed included Canyonlands, Capitol Reef, and Arches National Parks in southeastern Utah, High Uintah Wilderness Area in Utah, Flat Tops and Mt. Zirkel Wilderness areas and Colorado National Monument in western Colorado, and Fitzpatrick and Bridger Wilderness areas in eastern Wyoming. For Dinosaur and Colorado National Monuments in Colorado, SO₂ concentrations were reviewed against the PSD Class I increments, only. At the High Uintah Wilderness area and receptors within the Ute Tribe reservation, pollutant concentrations were compared against the PSD Class II increments.



Dispersion Modeling Projects

[Client: Holcim US, Devil's Slide Facility](#)

Holcim US contracted MSI to perform SO₂ and PM₁₀ dispersion modeling to address proposed changes at the Devils Slide Facility. The proposed changes included: 1) elimination of the annual restriction on clinker production capacity; 2) modification to the clinker cooling operation; and 3) re-expression of the short-term Prevention of Significant Deterioration (PSD) avoidance limit for sulfur dioxide (SO₂) to an annual limit. The objective of the SO₂ dispersion modeling was to address the proposed re-expression of the short-term PSD avoidance limit for SO₂ limit to an annual limit and to demonstrate compliance with the SO₂ National Ambient Air Quality Standards (NAAQS). In addition, PM₁₀ modeling was conducted to demonstrate attainment with NAAQS and increment after the elimination of the annual Clinker limit.

[Client: Holly Refining and Marketing Company](#)

Meteorological Solutions Inc. was retained by Holly Refining and Marketing Company (Holly) to conduct dispersion modeling analyses for an increase of sulfur dioxide (SO₂) emissions from a Sulfur Recovery Unit (SRU). The increase of SO₂ emissions (>100 tons) made this source subject to Prevention of Significant Deterioration (PSD) regulations which required the conduct of air quality impact analyses.

[Client: Ecoengineering Consultants](#)

Meteorological Solutions Inc. conducted dispersion modeling using AERMOD for the proposed MHTL AUM Complex at Point Lisas, Trinidad, West Indies. These data consisted of both surface and upper air data and are assumed to be representative of meteorological conditions within the modeling domain. Sources of sulfur dioxide, carbon monoxide, and oxides of nitrogen from the proposed ammonia plant, melamine plant, nitric acid plant, and utility facilities were modeled.

[Client: British Nuclear Group](#)

Meteorological Solutions Inc. was retained by British Nuclear Group (BNG) to conduct a plant-air dispersion modeling study to identify preferential D&D sampling areas at the Dungeness A Nuclear Power Plant, located on Dungeness point on the coast of the English Channel. Dungeness A consists of two gas-cooled 219 MW MAGNOX graphite reactors and entered decommissioning (D&D) in 2007. Dungeness B consists of two 600 MW pressurized water reactors. Although Dungeness A and B have unblemished safety records and no radiologically-contaminated soils or groundwater have been identified near the site, dispersion modeling was performed to identify areas in the near-plant environment that would be favored areas of high concentration for candidate point sources that have been identified as potential sources of airborne contamination. The modeling results, in combination with operating history and structural considerations, will be utilized in the pre-D&D characterization sampling approach.

[Client: United States Gypsum](#)

Meteorological Solutions Inc. was retained by United States Gypsum, a wallboard manufacturing company, to perform a dispersion modeling analysis, using the ISCST3 model, to determine ground-level criteria pollutant concentrations from operations conducted at the Sigurd facility. Emission sources include dust collectors, combustion sources such as kilns and board dryers, fugitive dust from roads, crushing, and storage piles. The results of the modeling were compared against the National Ambient Air Quality Standards and PSD Class II increments.



Dispersion Modeling Projects

[Client: Pacific States Cast Iron Pipe Company](#)

Meteorological Solutions Inc. was retained by Pacific States Cast Iron Pipe Company to conduct preliminary nitrogen oxide (NO_x) dispersion modeling for emissions from the Cupola Baghouse, Annealing Oven, and Pipe Drying Boiler. The ISCST3 model was used with three years of meteorological data collected at North Provo combined with concurrent mixing heights from Salt Lake City. The results of the modeling indicated that the 1 µg/m³ NO_x significance level was exceeded which triggered additional analyses.

[Client: High Desert Refining](#)

Meteorological Solutions Inc. was retained by High Desert Refining to conduct a dispersion modeling analysis of emissions from a proposed hydroprocessing facility located near Green River, Utah. This facility, while not a full refinery, will be dedicated to processing local reserves of “black wax” crude oil. Dispersion modeling will be performed for sulfur dioxide (SO₂) and particulate matter 10 microns or less (PM₁₀). Pollutant concentrations will be determined at the facilities property boundary and beyond, using the AERMOD model and five years of meteorological data, to define the significant impact area (SIA) and quantify the maximum impact. The results of the modeling will be compared against the National Ambient Air Quality Standards and PSD Class II increments.

[Client: Flying J Inc.](#)

Meteorological Solutions Inc. personnel conducted dispersion modeling analyzes for PM₁₀ and NO₂ emissions from a petroleum refinery in Salt Lake City, Utah. In addition, dispersion modeling of sources within a 100 km range from the site were also modeled to determine the impact on NAAQS, PSD increments, and on non-attainment areas in Northern Utah.

[Client: Southern Peru Copper](#)

Meteorological Solutions Inc. personnel recently conducted a dispersion modeling analysis for a copper smelter expansion for Southern Peru Limited. This included the dispersion modeling of various control scenarios and a comparison of modeled emissions versus actual tracer results. Atmospheric tracer data from 18 experiments which consisted of secondly data from aircraft measurements and over 10,000 ground-based samples were used in this model validation study. Dispersion model results were compared against US and Peruvian standards. Model performance was quantified and over-prediction adjustment factors were derived.

[Client: Ecoengineering Consultants](#)

Meteorological Solutions Inc. conducted dispersion modeling using the ISCST model of highway emissions in the vicinity of the Julien School in Trinidad, West Indies. Meteorological data from Piarco International Airport for 2004 was also used in the model. These data consisted of both surface and upper air data and are assumed to be representative of meteorological conditions within the modeling domain. The highway was simulated using 14 area source road segments that extended approximately 500 meters. Emissions were evenly distributed over the 14 roads segments in the model. Traffic count estimates for 2010 and 2020 were provided by Eco Engineering and were used to derive emission estimates for these two future periods. The United States Environmental Protection Agency (EPA) document AP-42 and EPA's Mobile 6. 2 model was used to develop criteria pollutant emission rates. A discrete receptor grid of a width of 340 meters, a height of 410 meters and a receptor spacing of 10 meters was used for this modeling effort. Additional receptors with 5 meter spacing were placed along the edge of the road.



Dispersion Modeling Projects

[Client: Deseret Generation & Transmission Co-operative](#)

Meteorological Solutions Inc. personnel performed dispersion and visibility modeling for a proposed SO₂ emissions increase for Unit 1 located at the Bonanza Power Plant. The purpose of this study was to determine, through EPA approved dispersion (ISCST2 and COMPLEX-1) and visibility modeling methods (VISCREEN), the impact from increases SO₂ emissions on PSD Class I and II Increments, on NAAQS, and on visibility at Arches and Canyonlands National Parks, and Flat Tops Wilderness Area in Colorado. This report updates all PSD modeling contained in the original permit application.

[Client: Micron Technology](#)

Meteorological Solutions Inc. conducted a dispersion modeling study of nitrogen dioxide (NO₂) emissions from their Lehi, Utah facility. Two modeling scenarios were conducted. The first scenario was to assess NO₂ emissions from the facility on a planned road alignment on the western edge of Micron's property; the second scenario was to remodel NO₂ emissions to assess off-site concentrations. The second task was performed to update earlier modeling performed by Micron in 1995 by using the latest property boundary information and on-site meteorological data .

[Client: Tenneco Minerals, Inc.](#)

To assist in the preparation of a Notice of Intent for three beryllium mines located northwest of Delta, Utah. Dispersion modeling was performed to determine ground-level concentrations for comparison against PSD increment and National Ambient Air Quality Standards.

[Client: West Ridge Resources](#)

In conjunction with a NOI dispersion modeling analysis for a proposed coal mine located northwest of Sunnyside, Utah in Carbon County was performed by MSI. Fugitive dust (PM₁₀ and TSP) from mining operations and carbon monoxide (CO), nitrogen dioxide (NO_x), sulfur dioxide (SO₂), and hydrocarbons (HC) in the exhaust gases from the proposed heavy equipment to be utilized on-site were the expected air emissions from the mine site.

[Client: Circle Four Farms](#)

Dispersion modeling and expert testimony regarding downwind dispersion of odors from a pig farm was provided by MSI. A EPA approved dispersion model was used to predict ammonia and hydrogen sulfide concentrations at numerous receptors. Modeled concentrations were compared against Threshold Limit Values (TLVs) for the two gases. A general climatology of the area was developed to describe the frequency of occurrence of meteorological conditions conducive to poor dispersion conditions.

[Client: Fresenius, USA](#)

Dispersion modeling was performed by MSI to estimate ground-level concentrations of dimethylacetamide (DMAC), NO₂, and VOC. Pollutant concentrations were compared against the eight-hour threshold (TLV) values for DMAC; NO₂ and VOC concentrations were compared against the annual standard for NO₂ and the one-hour ozone standard.



Dispersion Modeling Projects

[Client: Andalex Resources, Inc](#)

Meteorological Solutions Inc. prepared a permit application for a proposed coal mine to be located in Kane County, Utah. A Notice of Intent was prepared which described the proposed mining operations and facilities; pollutant emissions were determined for all air pollution sources including roads, coal piles, conveyors, vehicular and heavy equipment exhaust, and a diesel generator. Dispersion modeling using the EPA approved dispersion models was performed to determine ground-level concentrations for comparison against PSD increment and National Ambient Air Quality Standards.

To satisfy a request from the Utah Division of Air Quality, retained by Andalex Resources, Inc. to estimate emissions and perform dispersion modeling of haul-truck emissions from three sections of public highway (four-lane and two-lane highway segments). Emissions of pollutants from haul-trucks were based on fuel consumption estimates; NO₂ emissions were determined from Mobile5 data for forecast calendar year of 1996 and vehicular speeds of 50 miles-per-hour.

[Client: Intermountain Power Service Company](#)

Meteorological Solutions Inc. performed preliminary dispersion modeling using the ISCST3 model to compare the estimated ground-level pollutant concentrations from the proposed Unit III stack to the ambient monitoring significance levels. Fugitive emissions were not modeled in this analysis. Based on the preliminary modeling results, SO₂ and PM₁₀ monitoring were required by the UDAQ to satisfy pre-construction monitoring criteria.



Field Study Projects

[Client: WDEQ –Ozone Study](#)

During the Winters of 2005/2006 and 2007/2008, 8-hour ozone concentrations at three monitoring stations operated in or by the Jonah Gas Field were measured above the 8-hour ozone standard. Since elevated ozone concentrations are not thought to be common during wintertime months, MSI personnel participated in a preliminary ozone review to formulate ideas to why these ozone excursions were occurring. Oxides of nitrogen, ozone, meteorological data (surface and upper air), and summa canister were compiled and analyzed and conclusions were presented and recommendations made to further evaluate the causes of high wintertime ozone.

[Client: Utah Division of Air Quality](#)

Meteorological Solutions Inc. personnel conducted ground-based and airborne meteorological and air quality measurements during high ozone episodes in the vicinity of Salt Lake City. These data were obtained for use by UDAQ toward air quality model development and evaluation, specifically the Urban Airshed Model. Measurements were made from three primary measurement systems, a mobile van equipped for air quality and meteorological measurements, a similarly configured twin engine aircraft and a rawin-ozonesonde atmospheric measurement system. Atmospheric soundings, including vertical ozone distribution, were conducted from a central location in Salt Lake City at three-hour intervals during study periods, coordinated with the routine twice-daily National Weather Service meteorological soundings. Outlier programs, visual inspection of data traces and observer notes were utilized to apply data (quality) flagging to files from all data acquisition systems. A custom data playback software package was developed and delivered to UDAQ to assist in analysis and interpretation of the large data files from the van and aircraft systems. The playback software is usable with the level zero and flagged data files, providing a host of options for the analyst's convenience.

[Client: Mission Research Corporation](#)

Meteorological Solutions Inc. was contracted by Mission Research Corporation to collect urban meteorological data in support of the Defense Threat Reduction Agency (DTRA) Winter 2000 measurements program. The purpose of this program is to collect urban meteorological data suitable for determining, at a minimum, the mean and variance properties of the urban winds. To accomplish this, sonic anemometers were placed on a mobile platform outfitted with a 10-meter meteorological tower and meteorological measurements were made at several locations with the urban environment of Washington D. C. The monitoring specialist drove MSI's instrumented van to predetermined locations, parked the vehicle, prepared the mobile platform for meteorological sampling, and commenced sampling. A mast, containing sonic anemometers and temperature sensors was mounted at approximately 33 and 14 feet above street level. Wind information in 3-dimensions (U, V, and W), temperature and delta temperature measurements were obtained from the mast. Barometric pressure was also obtained inside the van; solar radiation was recorded at approximately ground-level. Sonic anemometer output wind vectors for the 3 axes (U, V, and W) and sampled and recorded at 20 hertz.

[Client: Texas Natural Resource Conservation Commission \(Texas Air Control Board\)](#)

Urban and industrial area air toxics measurements were collected for the TNRCC. Intensive study period measurements included automated multi-channel VOC canister and carbonyl cartridge sampling from network air quality monitoring stations. Source characterization studies included ambient upwind/downwind VOC canister, carbonyl cartridge, and tenax sampling for vehicle, biogenic, and industrial plant emissions. Vehicle emission measurements included a tunnel study, "cold start" and "hot soak" parking lot scenarios, and roadside sampling.



Field Study Projects

[Client Name: MWH Americas](#)

Meteorological Solutions Inc. prepared estimates of precipitation at 5-minute intervals during a heavy rain event that occurred on July 27, 2006 at a mine site located near Miami, AZ. These precipitation estimates were derived using National Weather Service NEXRAD radar data from Phoenix, Arizona. Software, developed by MSI, was used to process the reflectivity data for the closest grid point. The Marshall Palmer Index was used to develop rainfall rates (R) in relation to the reflectivity (Z). A best fit equation was determined using the known precipitation accumulation and length of time of accumulation with the reflectivity from each five minute scan. The best fit equation was then used to calculate the estimated amount of rainfall for each of the five minute periods.

[Client: Lake Michigan Air Directors Consortium](#)

Urban air quality measurements from four aircraft and four boat platforms in Lake Michigan and surrounding region were collected for the Lake Michigan Air Directors Consortium. Measurements included ozone, nitrogen oxides, volatile organic compounds (VOC), and carbonyls (formaldehyde and acetaldehyde). Also measured from the aircraft platforms: ambient temperature, winds aloft (INS), location (Loran), air speed, cabin conditions, altitude, and sample pressure. Grab samples were collected in stainless steel canisters and in Tedlar bags (for later transfer to DNPH cartridges). Aircraft fly three flights per intensive study day, collecting data for each variable once every two seconds. Data were processed into 10-second averages to represent the actual response time of the analyzers selected from this study.

[Client: San Joaquin Valley Joint Powers Agency](#)

Meteorological Solutions Inc. personnel performed air quality measurements and sampling from five aircraft platforms plus one backup aircraft throughout the San Joaquin Valley. Measurements included ozone and oxides of nitrogen, light scattering coefficient, temperature, dew point, altitude, air speed, position, and canister grab samples of air for VOC and carbonyl species.

[Client: San Diego APCD](#)

Meteorological Solutions Inc. personnel performed air quality measurements and sampling from five aircraft platforms plus one backup aircraft throughout the San Joaquin Valley. Measurements included ozone and oxides of nitrogen, light scattering coefficient, temperature, dew point, altitude, air speed, position, and canister grab samples of air for VOC and carbonyl species. Flight operations were based in Fresno, California.

[Client: San Diego APCD](#)

Meteorological Solutions Inc. personnel installed both routine and special air quality and meteorological measurement systems, and operate the network to prepare input data files for UAM assessments of the County Ozone SIP. Included two air quality aircraft and a boat. Tracer studies were included as part of the total model validation program.

[Client: Bay Area AQMD](#)

Meteorological Solutions Inc. personnel conducted urban air quality measurements from one aircraft platform to provide boundary condition input for the Urban Airshed Model. Measurements included ozone, nitrogen oxides, VOCs carbonyls, and atmospheric variables.

[Client: NOAA](#)

Meteorological Solutions Inc. personnel assisted in the placement of samplers on designated towers throughout the midwest as part of the Across North America Tracer Experiment (ANATEX). Two perfluorocarbons were released in significant quantities from sites in Glasgow, Montana and St. Cloud, Minnesota. Sampling sites were located in Tulsa, OK, Columbia, MO, Peoria, IL, Madison, WI and Green Bay, WI. In addition to detection at the selected sampling sites, the perfluorocarbons tracers were eventually detected on the west coast of the United States after circling the globe.



Field Study Projects

[Client: Southern Peru Copper Corporation](#)

Meteorological Solutions Inc. personnel performed an eleven week site investigation study to review the current ambient monitoring network at Southern Peru Copper's Ilo Smelter and to make recommendations to upgrade the existing ambient monitoring network and data collection system. Eighteen tracer experiments were conducted over the 11 week period collecting over 12,000 ground-based air samples. In addition, six instrumented aircraft flights were performed to document the atmospheric conditions above ground level.

[Client: Central Weather Bureau, National Taiwan University](#)

To document the mechanical mixing and transport associated with a sea-breeze a ground based point source was tracked with a research aircraft outfitted with an SF₆ analyzer, Global Positioning System (GPS), external temperature probe and data acquisition system. An array of ground sampling sites were also used.

[Client: Utah Division of Water Resources/NOAA](#)

A study of transport and diffusion of ground-based releases of silver iodide upwind of a mountain barrier utilizing SF₆ to simulate the silver iodide plumes were conducted by MSI personnel. In all field efforts, aerial sampling for the SF₆ plume was conducted. The field effort, conducted by MSI personnel, logged in excess of 300 flight hours of transport and dispersion and cloud physics data. Mobile ground and syringe sampling for the SF₆ plume was also performed.

[Client: Bureau of Reclamation](#)

To determine the feasibility of ground-based cloud seeding in an area, a ground point source was tagged with SF₆ and tracked with a research aircraft outfitted with a continuous SF₆ analyzer and complete cloud physics instrumentation.

[Client: NOAA](#)

The objective of this study was to evaluate the effectiveness of an operational cloud seeding program and refine hail reduction techniques. The study represents the first real time SF₆ sampling used to study in cloud, near cloud entrainment, detrainment and mixing processes. Enhancements to the program have been made each field season. Three aircraft were outfitted with continuous SF₆ analyzers (MSI personnel equipped two of these aircraft), and simultaneous cloud penetrations were made.

[Client: California Department of Water Resources](#)

Study of transport and diffusion of ground based releases of propane (as a cloud seeding agent) using SF₆ to tag the propane plume were conducted by MSI personnel. Aircraft measurements for the SF₆ plume were performed. A mobile sampling van was used and was outfitted with a continuous SF₆ analyzer, Global Positioning System, external temperature and relative humidity probes, elevation sensor and complete data acquisition system. All field efforts have utilized ground-based syringe samplers.

[Client: Southern California Edison](#)

Study of transport and diffusion of ground based releases of silver iodide upwind of a mountain barrier utilizing SF₆ to simulate the silver iodide plumes were conducted by MSI personnel. Mobile ground sampling for the SF₆ plume was conducted. Syringe samplers were also used.



Field Study Projects

[Client: Lake Michigan Air Directors Consortium](#)

The tracer study was performed to simulate the interaction of land based emissions with the Lake Michigan air mass; specifically in the vicinity of the lake front convergence zone. Recirculation and northward transport of the tracer plume was documented by both the aircraft and mobile ground-based tracer units.

[Client: EG&G](#)

As part of ongoing requirements to anticipate and model accidental releases of potential hazards to the atmosphere, EG&G required tracer studies to demonstrate actual dispersion characteristics of the winds under a variety of meteorological conditions. The case studies will be used to validate model runs for these conditions. A mobile sample van contained a continuous SF₆ analyzer, Global Positioning System, external temperature and relative humidity probes and a data acquisition system. A helicopter was used to measure for the tracer gas aloft and contained an identical system as the mobile van. Sequential syringe samplers were deployed in an extensive array for each of the 12 tracer experiments. One hundred and fifty syringe sampling sites produced over 1300 samples for each experiment and over 16,000 samples for the entire field project.

[Client: Kennecott Utah Copper Company](#)

Tracer experiments were conducted to demonstrate long-term fate of emissions from Kennecott's main tall stack (350 meter) and from volume source emissions from the smelter. Dual perfluorocarbons were released and tracked throughout the valley. Sampling sites were placed at over two dozen locations from close to the facility to over 70 kilometers from the tracer release point

[Client: Hidroelectrica Espanola](#)

Meteorological Solutions Inc. personnel participated in a field research program to assess the current and future impacts of a coal-fired power station and its future expansion on the small villages near Guardo, Spain. The study included SF₆ tracer releases with real-time tracking of the tracer with fast response SF₆ analyzers and SO₂ analyzers. MSI personnel fielded two mobile vans equipped with full instrumentation to collect data every second during a release and dispersal of the tracer. Global positioning systems were used to accurately record the position of the SF₆ plumes. An array of 30 ground bag sampling sites was used on each of the 14 experiments conducted.

[Client: San Diego Air Quality Control District](#)

Tracer studies were conducted to provide data on the transport and dispersion of a urban plume inland with the local sea breeze. An aircraft was used to document the plume interaction with the marine and land air masses while a sampling van was used to document the transport of the plume at ground levels. The SF₆ plume was tracked in excess of 80 miles. Several grab samples were taken and later analyzed with the continuous analyzer

[Client: Rockwell International](#)

An extensive tracer study was conducted to provide data for the validation testing of the TRAC dispersion model developed by Rockwell International to model sudden pollutant releases at ground level. SF₆ was tracked using an aircraft which was flown at low flight altitudes during various meteorological situations. A mobile sampling van and a network of ground-based syringe samplers were also used.



Field Study Projects

Project Name: Petrochem/Ekotek

The MWH/MSI team conducted air monitoring and sampling activities conducted in conjunction with the remedial actions performed at the Petrochem/Ekotek Site. Phase I air monitoring and sampling included a documentation of baseline conditions before remedial excavation and the meteorological and air quality conditions during buried debris and hot spot excavation. Real-time monitoring was performed to alert on-site remediation workers of conditions requiring health and safety protection upgrades and/or implementation of additional control measures to limit emissions of contaminants of concern, nuisance odors, and visible particulate matter. Health and safety monitoring consisted of continuous and passive monitoring of select pollutants in the active work zone. Continuous monitoring included monitoring of Volatile Organic Compounds (VOCs) using a Photoionization Detector (PID), monitoring of Hydrogen Sulfide (H₂S) using an explosimeter, and monitoring of inhaleable dust using a miniRAM. Passive monitoring with dosimeter badges for VOCs was conducted during the buried debris and hot spot excavation and removal. In addition, Draeger tubes for select VOCs were available if the PID monitor indicated an exceedance of the action level for total VOCs.

Site perimeter monitoring included downwind baseline monitoring of inhaleable dust, opacity, VOCs, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDD/PCDF), and metals, continuous upwind and downwind monitoring of inhaleable dust using personal DataRAMs during remedial actions, periodic simultaneous upwind and downwind monitoring for VOCs, SVOCs, PCBs, PCDD/PCDF, and metals during intrusive remediation activities, and periodic downwind opacity monitoring if dust plumes were present at the perimeter. Meteorological data were also collected to document on-site meteorology.

Client Name: MWH Americas W. R. Grace Libby Superfund Site Meteorological and Ambient Air Sampling

The MWH/MSI team conducted meteorological monitoring and ambient air sampling as part of the Phase I remediation activities performed at the W. R. Grace Libby Montana Asbestos Superfund Site. Historic mining, milling, and processing of vermiculite at the site have caused releases of vermiculite and asbestos to the environment and the inhalation of asbestos associated with the vermiculite is known to have caused a range of adverse health effects in exposed individuals. Starting in 2000, EPA began taking a range of cleanup actions at the site to eliminate sources. The sampling conducted was conducted in and around the former vermiculite mine so that long-term average concentration values could be estimated. Ambient air samples were collected using low-flow (2 L/min) stationary air monitors over an extended period of time (e. g. , 5 days). Samples were collected using 25-mm diameter, 0.8 µm pore size MCE filter cassettes. All samples will be collected at a height approximately 6 feet above ground level. All air samples collected during Phase I sampling were submitted for asbestos analysis using transmission electron microscopy (TEM) in accord with the International Organization for Standardization (ISO) 10312 method (ISO 1995) counting protocols. In addition, meteorological measurements were collected at station that was equipped to measure horizontal wind speed and wind direction at 10 meters, temperature at 2 and 10 meters, relative humidity, barometric pressure, and solar radiation at 2 meters. Phase II sampling which will consist of additional asbestos measurements is anticipated to be conducted Spring/Summer 2008.



Field Study Projects

[Client Name: United States Air Force/MWH Americas Hill Air Force Base Operable Unit 12 Air Monitoring Activities](#)

Outdoor air monitoring activities were conducted to screen for suspended asbestos fibers that could potentially migrate from the Operable Unit 12 (OU12) Aspen Avenue Disposal Area (AADA) at Hill Air Force Base (AFB) Utah. Two sampling events were conducted – the preliminary and main sampling events.

The preliminary event provided information about sample dust loading in the study area and formed the basis for adjustments to sample flow rate and analytical detection limit. During the preliminary event, two stations were sampled – one for 12 hours and one for 24 hours. The main sampling event included ten stations that were sampled continuously for four consecutive days. Sample cartridges were changed every 24 hours. Sample pumps with integral rechargeable batteries were changed approximately every eight hours. Flow rates were checked and recorded for each pump at the beginning and end of an eight-hour period. Samples were analyzed using the ISO 10312 method.



Applied Meteorological Projects

Client: ATK Thiokol Propulsion

Meteorological Solutions Inc. personnel are currently providing forecasting support to ATK Thiokol Propulsion during periods when test firing of rocket motors is being done. Forecasting support consists of daily surface maximum and minimum temperatures, wind speed and direction at 1000 foot levels from 6000 to 14000 feet, and precipitation probabilities and likelihood of lightning. Mr. Dan Risch is the primary meteorologist on this project

Client: Salt Lake Olympic Committee

Meteorological Solutions Inc. personnel provided daily forecasts in support of ski racing activity occurring at the ski area during the winter months in the years prior to and during the 2002 Winter Olympics. This support includes information on temperatures, pressure, precipitation, humidity, cloud cover and wind speed and wind direction. Frequent updates to forecasts are required during actual race periods. Mr. Dan Risch is the primary meteorologist on this project.

Client: Los Angeles County Department of Public Works Water Resources Division

Meteorological Solutions Inc. provided weather forecasts and monitored weather conditions on a daily and continuous basis during the months of October through April for flood control purposes. Forecasts consisted of five-day forecasts, daily weather forecasts, special service forecasts during storm periods, quantitative precipitation forecasts, and long-range forecasts. Weather conditions were monitored continuously during storm periods and forecasts were updated as necessary to reflect changing weather. Oral briefings were given twice a week and more frequently during storms. An Internet web-based system was used for this project. Mr. Dan Risch was the primary meteorologist on this project.

Client: Los Angeles County Department of Public Works Water Resources Division

Forecasting for weather modification operations in the San Gabriel Mountains during the winter seasons (October to April) of 1991-92, 1992-93 and 1996-97. Support to this project included forecasting weather conditions over the San Gabriel Mountains suitable for weather modification activities, advising the County on when to operate the cloud seeding equipment, and monitoring the weather closely during the storm periods. Mr. Dan Risch working for a different company at the time was the primary meteorologist on these projects.

Client: California Edison

Supplied daily forecasts for points in the Sierra Nevada's of interest to the client. Information provided to the client included a general forecast with details on expected precipitation, winds and temperatures. Mr. Dan Risch working for a different company at the time was a staff meteorologist on this project.

Client: California Department Of Water Resources

February through April 1989. The State of California sponsored a drought relief weather modification project for the drainages above Lake Oroville and other nearby smaller drainages. Decisions to operate weather modification equipment were based on weather forecasts developed for the projects mountain region drainages and supported with intense monitoring of the weather during storm periods using the project radar. Mr. Dan Risch working for a different company at the time was co-manager on this project.



Applied Meteorological Projects

[Client: Various County Governments](#)

Weather modification projects operated during winter months from 1986 through 1996. These weather modification projects covered most of the mountains of Utah. Forecasts in support of weather modification operations were prepared daily, with intense monitoring during storm periods when operations were on-going. Information from radar, satellite and local observations were used to develop and continually update forecasts of temperatures at the surface and aloft as well as wind speed and direction and precipitation probabilities. Mr. Dan Risch working for a different company at the time was a staff meteorologist on this project.

[Client: Various State and Local Water Agencies](#)

Weather modification projects operated during winter months from 1993 through 1995. These weather modification projects covered parts of the mountainous regions of southeast and northeast Idaho as well as the Boise Mountains in west central Idaho. Forecasts in support of weather modification operations were prepared daily, with intense monitoring during storm periods when operations were on-going. Information from radar, satellite and local observations were used to develop and continually update forecasts of temperatures at the surface and aloft as well as wind speed and direction and precipitation probabilities. Mr. Dan Risch working for a different company at the time was a staff meteorologist on this project.

[Client: Various State and Local Water Agencies](#)

Weather modification projects operated during winter months from 1990 through 1995. These weather modification projects covered mountainous drainages in north central Colorado above Lake Grandby and the West Elk Mountains and the Grand Mesa in Western Colorado. Forecasts in support of weather modification operations were prepared daily, with intense monitoring during storm periods when operations were on-going. Information from radar, satellite and local observations were used to develop and continually update forecasts of temperatures at the surface and aloft as well as wind speed and direction and precipitation probabilities. Mr. Dan Risch working for a different company at the time was a staff meteorologist on this project.