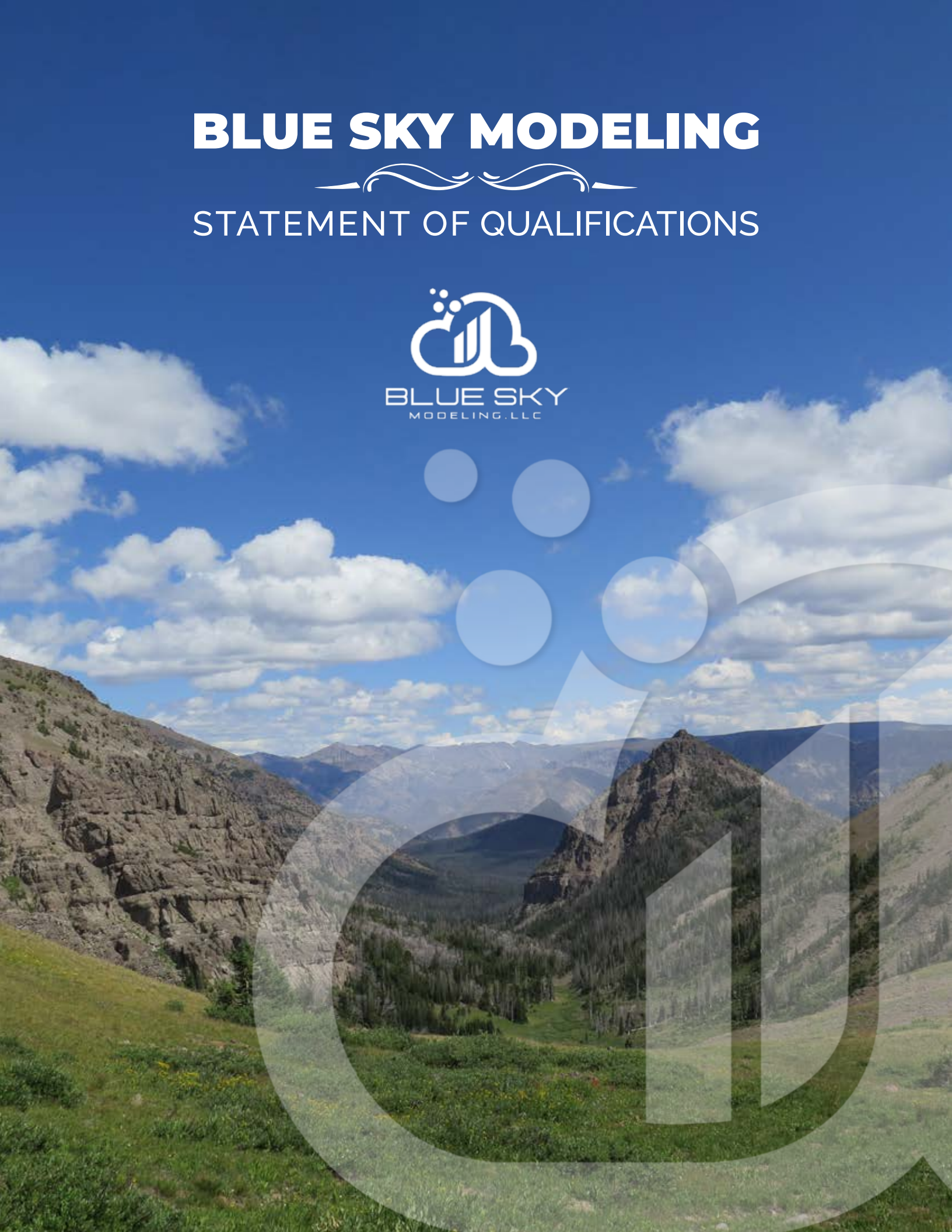
BLUE SKY MODELING

STATEMENT OF QUALIFICATIONS

BLUE SKY
MODELING.LLC



Blue skies smilin' at me
Nothing but blue skies, do I see
Blue days all of them gone
Nothin' but blue skies from now on

- Irving Berlin

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INTRODUCTION

Blue Sky Modeling, LLC (BSM) is a unique air dispersion modeling company.

Our innovative approach to business combines the reach of a large firm with the flexibility of a small firm. This enables us to provide our clients with decades of experience in the air dispersion modeling world while minimizing costs and maximizing our responsiveness.

At its core BSM provides air dispersion modeling services, primarily using traditional models such as AERMOD and CALPUFF. In most cases, we conduct modeling in support of permitting or regulatory review, ranging from Prevention of Significant Deterioration (PSD) permitting to State Implementation Plans (SIPs). In addition to traditional air dispersion modeling, we also conduct both accidental release and noise modeling.

Beyond modeling we also perform various services that support air modeling exercises, including the development of emissions inventories, the processing of meteorological data, and analyzing ambient monitoring data.

Unlike most air dispersion modelers, BSM is not a small part of a larger consulting firm—we are a company focused on air dispersion modeling. Because of that focus we are exceptionally nimble in how we partner with our clients, both in terms of responsiveness and budget. Ultimately, BSM has the experience and the know-how to best represent our clients' interests to ensure that the modeling analyses we conduct for them support their business objectives.

BMS is not part of a larger consulting firm - we are completely focused on air dispersion modeling.

OVERVIEW

BLUE SKY MODELING, LLC

BSM was formed in 2021 for the express purpose of providing technically robust, responsive, and cost-effective solutions to air dispersion modeling.

BSM was deliberately built to be streamlined to create an environment with bare minimum overhead. This allows us to be exceptionally competitive from a cost standpoint and our responsiveness is second to none. BSM staff have been conducting air quality modeling for the past three decades with our projects taking us throughout North America, South America, Africa, Europe, and Asia. We have negotiated modeling strategies with air quality regulators, taught air dispersion modeling courses, and provided expert testimony on modeling issues. We have modeled every type of source imaginable, including, but not limited to, steel, oil and gas, smelting, power generation, cement, and chemical.

BMS handles all aspects of air dispersion modeling for our clients, from strategizing to emissions inventory development to model setup to negotiating with regulators.

SERVICES PROVIDED

AIR DISPERSION MODELING

BSM has conducted modeling analyses in a variety of contexts. In the United States BSM staff have supported PSD permitting (both Class I and Class II analyses), we have addressed NAAQS compliance associated with SIPs, and we have demonstrated compliance with State Air Toxics programs. In addition, we have conducted what we call "Fatal Flaw" modeling, which identifies modeling issues associated with a specific location or plant configuration that might pose a hindrance to the permitting of a potential project. Outside of the United States our modeling analyses are typically in support of a permitting activity, often as a part of an Environmental Impact Assessment.

Because we have worked with many different dispersion models over the years, we understand the strengths and weaknesses of each model. Not all models work in all situations, and sometimes multiple models are needed for the same situation—and we advise our clients accordingly.

A vital part of our modeling efforts is identifying and supporting our clients' objectives. During the project this takes the form of understanding our clients' operations such that we can craft the modeling analysis in a manner that supports their business. We keep this perspective through the final report and any presentations we give to the regulators, ensuring that what we present is sufficient for the reviewing agency to properly do its job while not offering superfluous information that can cloud the review process and delay issuance of a permit. Modeling is technical, but it also an art.

BMS understands that modeling is both an art and a science, and we craft our modeling solutions accordingly.

Our modeling efforts can be divided into "traditional" and "accidental release" modeling.

Traditional Modeling

Traditional dispersion models refer to models that describe the dispersion in the atmosphere of lighter-than-air releases. AERMOD, the workhorse of these models, is applied throughout the United States and across the world.

BSM's experience dates back more than 30 years and, as such, includes models that are rarely used these days. The models that BSM runs most frequently today are AERMOD and CALPUFF.

Traditional Models BSM has run	
➤ ISC3	➤ BLP
➤ DEGADIS	➤ PLUVUEII
➤ VISCREEN	➤ SCREEN3
➤ COMPLEX1	➤ CTSCREEN
➤ TSCREEN	➤ VALLEY
➤ AERMOD	

Accidental Release Modeling

Accidental release modeling addresses accidental or emergency releases of chemicals. Because these chemicals are typically denser than air, they disperse in the atmosphere differently than pollutants usually addressed with a model like AERMOD. As a result, they require the use of a different kind of model.

Accidental release models can assess impacts from incidents such as a jet of chemicals emitting from a punctured vessel or a pool/puddle of a chemical that is evaporating. BSM works with its clients to fully understand their operations and potential emergency release scenarios so that we can utilize the appropriate model to characterize potential impacts from accidental releases. Our clients who typically utilize this kind of modeling include facilities that manufacture or store hazardous chemicals, with the analyses often requested by safety managers or people involved in emergency response.

Accidental Release BSM has run
➤ SLAB
➤ ALOHA
➤ DEGADIS

EMISSIONS INVENTORY DEVELOPMENT

The development of an emissions inventory for modeling addresses not only the emission rate to be modeled but also how the source is represented in the modeling. BSM works with its clients to ensure that each source is characterized in a technically-justifiable way that best meets the objectives of the modeling.

METEOROLOGICAL DATA SELECTION AND PROCESSING

An air modeling analysis must use meteorological data that are representative of the area being modeled. BSM has extensive experience identifying appropriate data and then demonstrating their representativeness to regulatory agencies. BSM has modeled using data from an onsite meteorological tower, data from airports, and prognostic data.

In addition to meteorological data for analyses that we conduct we also develop data for other consultants who are modeling but cannot create the data themselves.

AMBIENT MONITORING DATA

Air dispersion modeling analyses often include "background concentrations" of air pollution, which are typically developed using data collected from air pollution monitors. These background concentrations are added to model-predicted concentrations to obtain a total pollutant concentration which is then compared to an air quality standard such as a NAAQS.

BSM helps its clients site monitors to gather these data and is also well-versed in analyzing the data such that they can be used most effectively in a modeling analysis. For example, BSM staff have used procedures put forth by EPA in its Guideline on Air Quality Models to develop background concentrations that account for the presence of nearby industries by excluding monitor values that were influenced by those nearby sources.

In addition to developing background concentrations for use in modeling analyses, BSM has also examined ambient monitoring data to determine if the data were collected in a manner consistent with applicable regulations. Through those types of reviews BSM clients have been successful in getting EPA to reverse a proposed nonattainment designation.

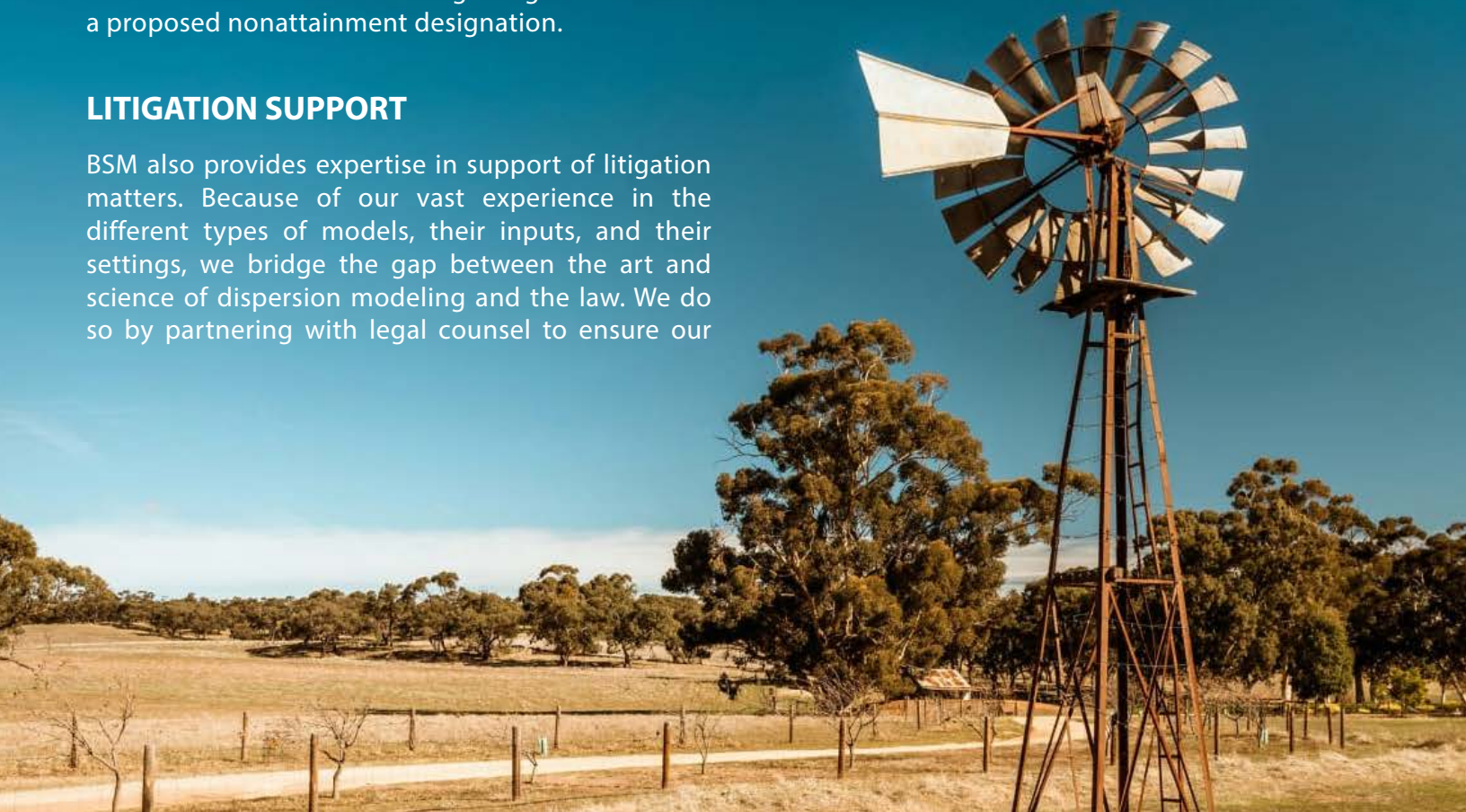
LITIGATION SUPPORT

BSM also provides expertise in support of litigation matters. Because of our vast experience in the different types of models, their inputs, and their settings, we bridge the gap between the art and science of dispersion modeling and the law. We do so by partnering with legal counsel to ensure our client's legal position is well-supported by science and the regulatory framework for the model. As part of that process we objectively critique our own analysis/position, as well as the analyses of other modelers, to identify potential weak points and plan accordingly.

TRAINING

One of the strengths of BSM is our ability to clearly communicate the technical world of air dispersion modeling to non-modelers, regardless of whether those non-modelers have technical backgrounds. BSM has prepared and presented educational materials on modeling for its clients, ranging from brief, high-level overviews of dispersion modeling for management to multi-day, in-depth air dispersion modeling courses.

Visit the BMS blog:
www.blueskymodeling.com/blog
to keep up with the latest in the air dispersion modeling world.



EXPERIENCE

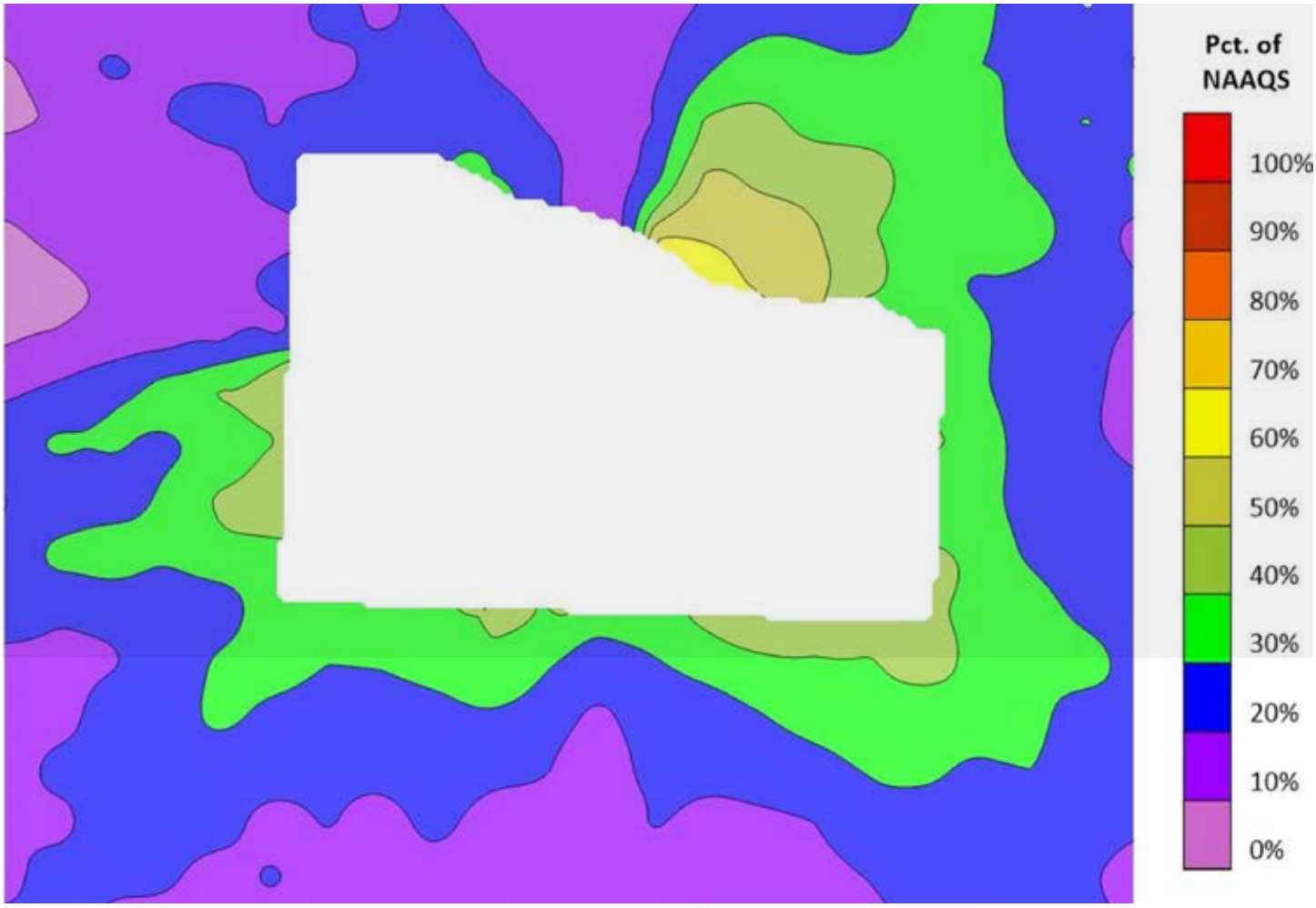
BSM staff have been modeling since the early 1990s. During that time we have gained vast experience ranging from where we have modeled to who and what we have modeled. We have modeled from coast to coast of the United States, and on five of the seven continents (North America, South America, Europe, Africa, and Asia).

BSM staff have conducted air dispersion modeling analyses for both industrial and governmental clients. For industrial clients we typically contract directly with the company; however, in some cases we have served as a subcontractor to another consulting firm that does not have an in-house air modeling capability.

A brief representation of clients for whom BSM staff have worked over the years is below.	
AMBIT	Asarco
Bethlehem Steel	Berks Hollow Energy Station
Buzzi Unicem	Cambria Cogen Co.
Colver Power Project	Ebensburg Power Company
Greenville Energy	Hercules Cement
Hess Oil Virgin Islands Corporation	Lehigh Cement Company
Keystone Cement	Northampton Generating
Nucor Steel	Perdue Farms
Red River Environmental Products	Underwood Environmental Products
Jorden Hiser & Joy	Stock and Leader
Sher Garner	5 Capitals
Brown and Caldwell	Haley and Aldrich
Jensen Hughes	Liberty Environmental
Louis Berger	Osman Environmental Solutions
Toeroek	NeemTech
U.S. EPA	Dubai Municipality

PROJECT DESCRIPTIONS

The following are examples of several projects that BSM staff have conducted that, collectively, provide a good representation of the kinds of modeling projects BSM engages in.



CONFIDENTIAL STEEL CLIENT

United States

PSD "Fatal Flaw" Modeling

AERMOD Modeling

BSM conducted air dispersion modeling for a confidential steel client to identify any potential "fatal flaws" associated with a location under consideration for a new steel mill. This modeling, conducted using AERMOD, addressed emissions of NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$.

Modeled sources included stacks, storage piles, volume sources, and fugitive dust generated by truck traffic (simulated as volume sources). Modeled parameters were developed using several different sources, including similar steel mills, with worst-case/ conservative assumptions made whenever possible.

Because the location under consideration was not close to a nearby airport, BSM used prognostic meteorological data based on WRF model output at a 4 km x 4 km resolution.

For the sake of conservatism BSM used background concentrations from a monitor located in an area far more urbanized than the location under consideration.

Based on this modeling BSM advised its client that should this mill be permitted, a full PSD modeling analysis (for both Class II and Class I) would be required; however, all indications were that a mill at this location would be able to meet the NAAQS and that there would not be any impediments to obtaining the necessary air quality permits with respect to air dispersion modeling.

UNDERWOOD ENVIRONMENTAL PRODUCTS

Underwood, ND

Class I Modeling
CALPUFF Modeling

BSM staff managed and conducted a Class I air quality analysis for the proposed Underwood Environmental Products, LLC (UEP) facility in Underwood, North Dakota, an activated carbon manufacturing plant. The modeling analysis addressed impacts at the Theodore Roosevelt National Park, the Lostwood National Wildlife Refuge, the Medicine Lake National Wildlife Refuge, and the Fort Peck Indian Reservation.

CALPUFF was used to conduct the Class I modeling. The modeling domain was approximately 450 km by 600 km, extending over three states and into Canada. The meteorological data were processed using observational data from 41 surface stations, 5 upper air stations, and 93 precipitation stations. The prognostic wind data consisted of hourly RUC-2 data, written into MM5 format.

Numerous discussions were held with the North Dakota Department of Health, with a Modeling Protocol and ultimately a Final Report being submitted to them. Predicted impacts of SO_2, PM_{10}, and NO_2 were found to be below the Class I Significance Levels at all Class I areas. Following the initial visibility analysis, more refined visibility modeling was conducted using CALPOST Method 6, with the natural background scattering coefficients being based on the best 20% visibility days. This refined visibility modeling demonstrated that UEP did not cause any perceptible change to visibility at any Class I area.

Artists' Rendering of UEP

ASARCO, LLC

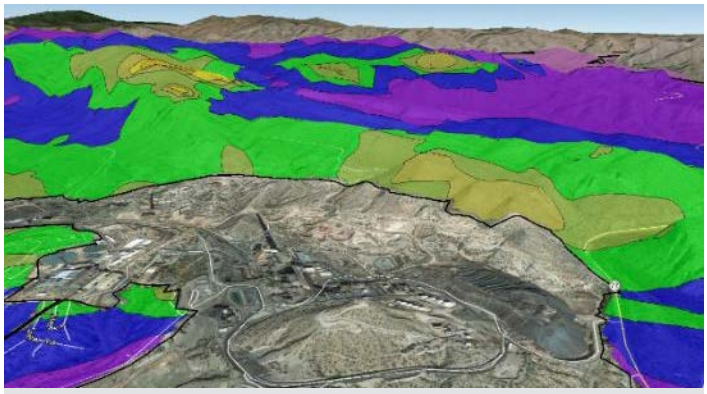
Hayden, AZ

Lead and SO_2 Nonattainment Issues
AERMOD and BLP Modeling

Since 2009 BSM staff have worked on a multitude of air quality issues for the Asarco, LLC (Asarco) copper smelter in Hayden, Arizona, ranging from Lead, PM_{10}, and SO_2 modeling in support of State Implementation Plans (SIPs) to ambient monitoring issues.

Since the promulgation of the 2010 1-hr SO_2 NAAQS, BSM staff have worked with Asarco to conduct air dispersion modeling to demonstrate that its proposed modification would result in the 1-hr SO_2 NAAQS being attained. This modeling required addressing numerous complicated issues, beginning with making the case to the Arizona Department of Environmental Quality that meteorological data from a station 100 km away were indeed representative of conditions in the Hayden nonattainment area. The characterization of emissions from roof vents has been a critical point in this modeling as well.

Following the promulgation of the 2008 Lead NAAQS, EPA proposed to designate the Hayden area as nonattainment for Lead. BSM staff reviewed the monitoring data on which EPA was basing its designation and found those data were, in fact, invalid according to 40 CFR 50, Appendix R. As a result, EPA withdrew its proposed nonattainment designation of the Hayden area.



Predicted SO_2 Concentrations

LEHIGH CEMENT

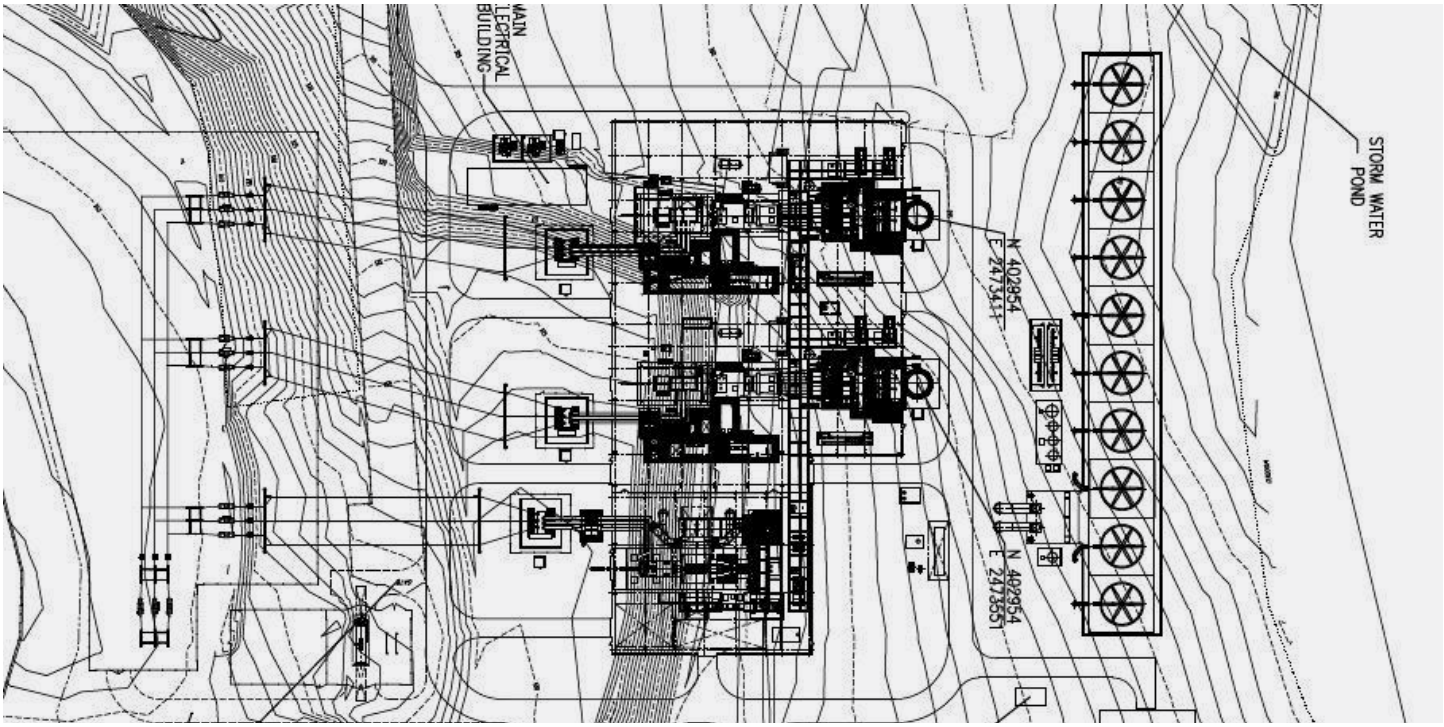
Mason City, IA

PM_{10} SIP Issues
AERMOD Modeling

BSM staff have conducted air quality dispersion modeling at Lehigh's Mason City, IA plant since the 1990s, primarily in support of the PM_{10} State Implementation Plan (SIP) for the Mason City area.

Modeling was originally conducted using ISC3, switching to AERMOD in the late 1990s. During the history of this modeling the representation of the fugitive dust from truck traffic has been a challenging issue, being reworked per the EPA's Haul Road Workgroup memo in 2012. To develop the emission factors from various roadway fugitive dust souces, BSM staff spearheaded a site-specific silt loading analysis.

BSM staff have negotiated many nuances of the modeling with Iowa Department of Natural Resources staff over the years, including the derivation of a representative 24-hr PM_{10} background concentration. Because Lehigh is adjacent to another cement plant the PM_{10} background concentration was calculated (per 40 CFR 51, Appendix W) accounting for whether or not a given PM_{10} monitor value was being impacted by either of the two cement plants. This was accomplished by considering hourly wind directions over the course of a day and discounting those values which were deemed to be impacted by emissions from the two cement plants.



BERKS HOLLOW ENERGY STATION

Berks County, PA

PSD Modeling

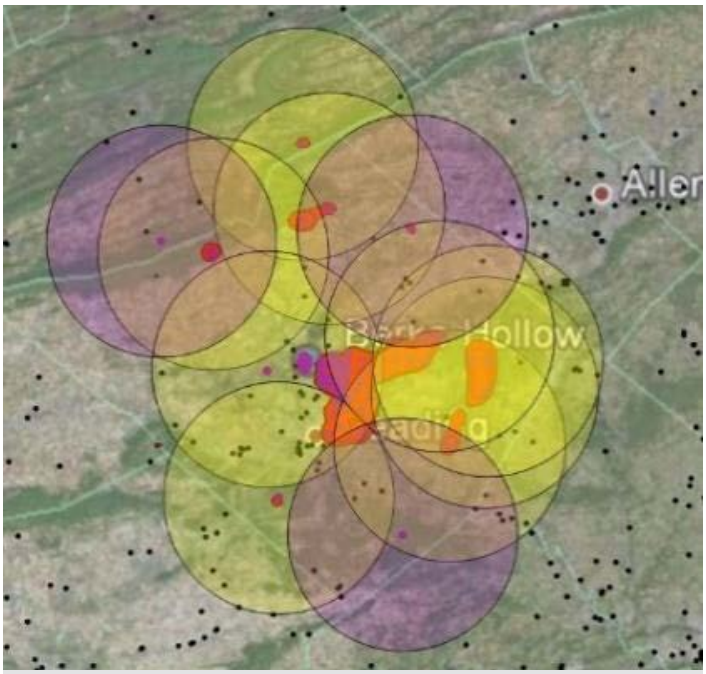
Negotiating with PADEP

BSM staff managed and conducted an air quality analysis performed in support of a Plan Approval application for the Berks Hollow Energy Station (BHES), a natural gas-fired combined cycle power plant to be located in Berks County, Pennsylvania.

The NO_2 modeling was the most challenging aspect of the analysis, particularly with regards to demonstrating compliance with the 1-hr National Ambient Air Quality Standard (NAAQS). After negotiations with the Pennsylvania Department of Environmental Protection (PADEP) the use of the Plume Volume Molar Ratio Method to address 1-hr NO_2 impacts was approved. This approach considers the conversion of NO to NO_2 in the presence of ozone, and typically results in lower predicted NO_2 concentrations.

Another unique feature of this project was the development of the offsite emissions inventory. BSM staff developed an innovative procedure to compile a manageable emissions inventory while still being consistent with EPA NO_2 modeling guidance.

Ultimately the modeling analysis was approved, and BHES received its PSD permit.



Offsite Inventory Development

CONFIDENTIAL CLIENT

Ohio River Valley

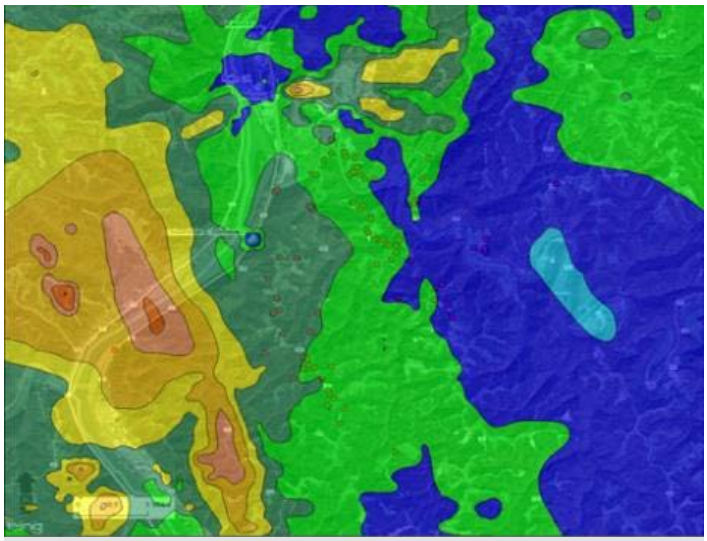
Litigation Support
AERMOD and CALPUFF Modeling

BSM staff managed and conducted dispersion modeling for a Confidential Client along the Ohio River. In response to a lawsuit alleging pollutant impacts from nearby industries, this modeling was conducted to ascertain the client's impacts in relation to impacts from other local sources.

The modeling was conducted using both AERMOD and CALPUFF. Processing the meteorological data for CALPUFF required considerable care given the complicated topography along the Ohio River. Data from several 100 m onsite meteorological towers (with SODAR) along with MM5 prognostic output were processed.

Emissions over a 15-year period were modeled to identify trends in air quality, accounting for various industries installing controls and/or shutting down over that time. A performance assessment of both models was conducted, comparing predicted concentrations against nearby air quality monitoring data.

A key goal of this project was to distill the very complicated modeling results into simple, easy-to-understand graphics which could be used in a trial. This was accomplished through close consultation with the legal team.



Predicted Concentrations

KING ABDULLAH ECONOMIC CITY

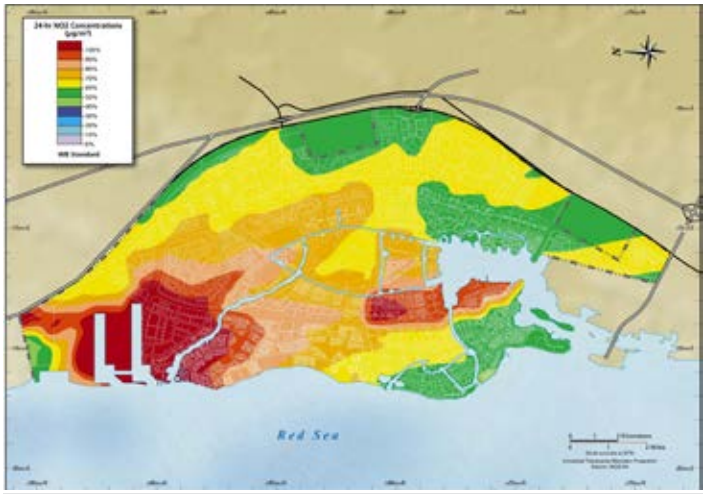
Saudi Arabia

Strategic Environmental Assessment
AERMOD Modeling

BSM staff managed and conducted dispersion modeling in support of an air quality analysis performed for a Strategic Environmental Assessment for the King Abdullah Economic City (KAEC), an $80 billion project located on the Red Sea in Saudi Arabia.

Modeling was conducted using AERMOD. More than 250 sources were addressed in the analysis, including industrial facilities being built at KAEC as well as a nearby cement plant, petrochemical plant, and the largest fossil fuel-fired power plant in the world. Developing the emissions inventory was a challenge as there was a very limited amount of information readily available for many of the nearby industries. Predicted impacts of SO_2, NO_2, and PM_{10} were compared against both Saudi Arabian and World Bank air quality standards.

The results of this modeling analysis were presented to Emaar and SAGIA, the developers of KAEC, to enable them to incorporate sound environmental policies in the development of KAEC's Master Plan.



Predicted NO_2 Concentrations

PORT LEKKI

Lagos, Nigeria

AERMOD Modeling
Ambient Monitoring

BSM staff managed and conducted an air quality analysis performed in support of an Environmental Impact Assessment for Port Lekki, slated to be the largest seaport in Nigeria. The air quality analysis consisted of baseline ambient air quality and noise monitoring, along with air dispersion modeling to assess impacts from the Port.

BSM staff led the monitoring team to Nigeria to deploy the ambient monitoring network, with security and power being the most challenging issues. To ensure the success of the monitoring program the cooperation of local villagers was negotiated.

The modeling analysis was conducted using AERMOD. Compiling the meteorological dataset for use in the modeling was a challenge as data collection in Africa is often quite poor, particularly regarding upper air data. To address this, upper air observations from three different stations were combined, taking advantage of the fact that all three stations were in the Intertropical Convergence Zone, thus ensuring similar meteorological conditions.

The modeling results were compared against Nigerian air quality standards as well as World Health Organization Guideline Values. The total concentrations compared against the standards (modeled plus monitored) were mostly driven by the monitored values, which were determined to be adversely impacted by open burning being conducted in the nearby village during the monitoring program.

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STATEMENT OF QUALIFICATIONS

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