

ABOUT THE HEI-ENERGY SPATIAL BIBLIOGRAPHY

MAP DESCRIPTION

Welcome to the HEI-Energy Spatial Bibliography. This searchable map displays the distribution of research on potential changes in environmental quality from the development of oil and gas from unconventional resources (UOGD) in the United States. The map originated from HEI-Energy's own planning for research about potential community exposures from UOGD. To support its planning HEI-Energy collected the studies summarized in this bibliography, which report levels of chemical agents such as benzene or non-chemical agents such as noise that were measured in the environment or in human biomonitoring studies and might be attributable to UOGD.

The bibliography includes journal articles and reports identified through four electronic databases using [search terms](#) and through reference lists in the articles and reports. The map is updated on a monthly basis. Studies are geolocated based on where the study authors reported measuring or modeling the levels of chemical agents or non-chemical agents in air, water, and other environmental media. A study may appear multiple times if it included levels of chemical agents or non-chemical agents in more than one location.

The complete HEI-Energy library with citations related to potential community exposures and health effects from UOGD can be found [on our website](#).

We welcome feedback on this map or notification of missing information or errors: energy@healtheffects.org.

USING THE MAP

Exploring the map

- Hovering over a state will display the number of studies in that state.
- Clicking on a state will generate a table that lists the citations of studies in that state.
- Clicking on the "All studies" button will generate a table that lists all of the citations included in the map.
- Clicking on the "Unmapped studies" button will generate a table of studies in our library that did not identify a monitoring or modeling location, are located in Canada, or have a national focus.

Downloading tables of citations

- You can download a table by clicking the "Download CSV File" button
- You can filter the table by study type using the buttons that appear above the table.

EXPLANATION OF TABLE VARIABLES

- **Study Type:** The bibliography includes studies that report levels of chemical agents or non-chemical agents that were measured, modeled, or both measured and modeled. The studies are subcategorized as follows:
 - Air Monitoring: The study reported original measurements of chemical concentrations in air (includes indoor air and outdoor air)
 - Air Modeling: The study reported modeled predictions of chemical concentrations in air (includes indoor air and outdoor air)
 - Air Both: The study reported both original measurements and modeled predictions of chemical concentrations in air (includes indoor air and outdoor air)
 - Water Monitoring: The study reported original measurements of chemical concentrations in water (includes groundwater, surface water, produced and flowback water)
 - Water Modeling: The study reported modeled predictions of chemical concentrations in water (includes groundwater, surface water, produced and flowback water)
 - Water Both: The study reported both original measurements and modeled predictions of chemical concentrations in water (includes groundwater, surface water, produced and flowback water)
 - Non-chemical: The study reported original measurements or modeled predictions of noise, odor, or light levels
 - Sediment: The study reported original measurements or modeled predictions of chemical concentrations in sediment or soil
 - Biomonitoring: The study reported original measurements chemical concentrations in human media (blood, urine, hair, nails, breast milk)
- **Basin/Shale:** The name of the shale(s) or basin(s) where the study occurred, if specified by the authors.
- **State:** The state(s) where the study occurred, if specified by the authors.
- **Publication Year:** The year the study was published electronically.
- **Chemical Groups:** The broad chemical groups measured or modeled by the investigators. This list includes chemicals of interest to the HEI-Energy program, including chemicals of potential health concern and chemicals that may be used as UOGD tracers.
- **Water Type:** For studies measuring or modeling chemical or non-chemical agents in water, this variable describes the type of water sampled or modeled.

DATA SOURCES

U.S. Energy Information Administration. Sedimentary basin boundaries in Lower 48 States. Updated March 11, 2016. Available: <https://www.eia.gov/maps/maps.htm>

U.S. Energy Information Administration. Low permeability oil and gas play boundaries in Lower 48 State. Updated October 8, 2019. Available: <https://www.eia.gov/maps/maps.htm>

ABOUT HEI-ENERGY

HEI-Energy is a nonprofit affiliate of the [Health Effects Institute](#) (HEI), chartered as an independent research organization to provide high-quality and impartial science about potential human [exposure](#) and health effects associated with onshore development of oil and natural gas from [shale](#) and other unconventional resources ([UOGD](#)) in the United States.

HEI-Energy anticipates [funding population-level exposure research](#) in multiple U.S. regions that is broadly useful to decision making by regulators, the oil and natural gas industry, environmental organizations, public health experts, communities, and other stakeholders.

HEI-Energy receives [funding](#) from the U.S. Environmental Protection Agency and the oil and gas industry. Other public and private organizations periodically provide support.

To learn more about HEI-Energy, please visit our website: <https://hei-energy.org/>