Glenda Wiles

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Sent: Friday, July 25, 2014 3:23 PM
To: dan@rpa-hln.com; Steve.Engebrecht@faa.gov; dave.stelling@faa.gov; Glenda Wiles
Subject: Comments on RCA Revised EA
Attachments: Airport Comments Final.docx

Attached you will find the comments submitted by ICAARE and Chuck DeWitt individually. A second email will follow with several attachments.

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The finest hour I have ever seen
Is the one that comes between
The edge of the night and the break of day
It's when the darkness rolls away.

Kate Wolf - "The Great Divide"

To:
Dave Stelling, Steve Engebrecht (Responsible FAA Official)
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From:
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And Chuck DeWitt, an individual

Copied: Peccia and Associates; Ravalli County Commissioners

Date:
July 25, 2014

Subject:

ICAARE's Comments on the FAA's Ravalli County Airport Final Draft Revised Environmental Assessment

ICAARE is a Montana non-profit corporation whose purpose is to inform citizens about issues related to the Ravalli County Airport (RCA) and to advocate for a safe and reasonable design that protects homeowners and the environment while serving the reasonable needs of the flying community. ICAARE's interest is to have a safe airport that satisfies the design requirements of the FAA, however, the solution should not encourage nor promote more and larger jets landing at the Hamilton Airport.

ICAARE believes the Revised EA is inadequate, and that the FAA must prepare an Environmental Impact Statement before making a decision on the project. There are a number of specific areas, discussed below, where the EA is lacking in information and/or analysis. Furthermore, this project meets the criteria for requiring an Environmental Impact Statement. Finally, the preferred alternative fails to meet a number of other statutory, regulatory and policy requirements of the FAA.

We reference a number of scientific studies and government documents, including the previous EAs for this project. We don't want to burden the FAA with hundreds of pages of documents and assume the FAA has access to all of these, and that they will be part of the administrative record for this matter. We will be happy to provide copies of any of them if requested.

These comments were developed by ICAARE, with assistance on the legal section from its attorney. They are submitted by ICAARE as an organization and also by Chuck DeWitt, a resident of Ravalli County who is personally affected by this project, as an individual.

I. Legal Background.

The following background comments establish the proper legal framework for NEPA and other applicable laws.

1. NEPA in general.

NEPA establishes a "national policy [to] encourage productive and enjoyable harmony between man and his environment," and was intended to reduce or eliminate environmental damage and to promote "the understanding of the ecological systems and natural resources important to the United States." 42 U.S.C. § 4321. *Public Citizen v. U.S. Dept. of Transp.*, 124 S.Ct. 2204, 2209 (2004). Congress thereby declared a national policy which will encourage productive and enjoyable harmony between man and his environment. 42 U.S.C. § 4321. Our national policy is effectuated through the requirement that an agency prepare an EIS for any "major Federal action[] significantly affecting the quality of the human environment." *Id.* The EIS informs both the federal agency and the public of environmental impacts and alternatives to the proposed action. The twin goals of informing both government agencies and the public of environmental impacts before a project is approved lie at NEPA's heart. *Methow Valley*, 490 U.S. at 349-50; *Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1149 (9th Cir. 1997).

NEPA's requirement that a detailed statement (now known as an EIS) be prepared before an agency can proceed reflects Congress's determination that federal agencies must look before they leap. As the Supreme Court explained in *Methow Valley*, NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the dye otherwise cast. *Methow Valley*, 490 U.S. at 349 (citing *Kleppe v. Sierra Club*, 427 U.S. 390, 409 (1976)). NEPA "emphasizes the importance of coherent and comprehensive up-front environmental analysis to ensure informed decision

making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct." *Churchill County v. Norton*, 276 F.3d 1060, 1072-73 (9th Cir. 2001). NEPA imposes a high burden on federal agencies to take a "hard look" at the environmental impacts of federal projects. Because NEPA is procedural, rather than substantive, the "hard look" is often the only check that ensures NEPA's Congressional mandate of environmental protection is fulfilled. Armed with knowledge about impacts, agencies are more likely to choose less environmentally damaging courses of action and will impose more protective mitigation. Absent the "hard look," agencies defeat Congressional intent to carry out a national policy of environmental protection. Here the FAA failed to take the required hard look at this proposal and thus cannot make an informed decision.

NEPA imposes specific requirements on federal agencies under the Council of Environmental Quality Regulations, whether the agency prepares an EIS or EIS. These requirements inure to the FAA like they do all other federal agencies. ICAARE provides the following overview of these specific requirements.

2. Cumulative Impacts.

The cumulative impacts requirements are set forth at 40 C.F.R. § 1508.7. NEPA requires a cumulative impacts analysis analyzing the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. *Te Moak Tribe of Western Shoshone of Nevada v. U.S. Dept. of Interior*, 608 F.3d 592, 603 (9th Cir. 2010). The NEPA document must start with the existing baseline, and include an analysis of other related past present and foreseeable impacts of the same type. The minimum scope of the cumulative impacts analysis must include the entire Bitterroot Valley, but may extend beyond. For example, as discussed in detail below, air quality impacts must include not only the pollution caused by the airport, but its relation to other presented and anticipated sources of air pollution in the Bitterroot Valley. Cumulative impacts must be projected over a reasonable time line, again for air quality, 30-40 years into the future since the FAA is making projections about supposed increases in use of the airport over that time frame.

3. Thorough Disclosure of Environmental Consequences.

"An EIS may be found inadequate under NEPA if it does not reasonably [set] forth sufficient information to enable the decision maker to consider the environmental factors and make a reasoned decision." *Half Moon Bay Fishermans' Mktg. Assn.*, 857 F.2d 505, 508 (9th Cir. 1988), citing *Or. Envtl. Council v.*

Kunzman, 817 F.2d 484, 493 (9th Cir. 1987). For an agency to address the environmental impacts of its actions, some level of "quantified or detailed information is required." *Neighbors of Cuddy Mountain,* 137 F.3d at 1379. NEPA requires both direct and indirect impacts be assessed. Without quantified, site-specific information, "neither the courts nor the public . . . can be assured that the [government] provided the hard look that it is required to provide." *Id.* Under CEQ regulations, the EA must discuss direct and indirect impacts.

As discussed below, the EA lacks specific information about impacts in a number of areas, such as the true costs of the project, air and noise pollution impacts. "[T]he very purpose of NEPA's requirement that an EIS be prepared for all actions that may significantly affect the environment is to obviate the need for speculation by insuring that available data is gathered and analyzed prior to the implementation of the proposed action." *Id.* (quoting *Found. for N. Am. Wild Sheep v. U.S. Dept. of Agric.*, 681 F.2d 1172, 1179 (9th Cir. 1982). The current EA does not contain enough specific, accurate and complete information to allow either the public, the County Commissioners or the FAA to make an informed decision.

4. Disclosure of All Data

NEPA requires that federal agencies provide the data upon which it bases its environmental analysis. *Idaho Sporting Congress*, 137 F.3d at 1150 ("allowing the Forest Service to rely on expert opinion without hard data either vitiates a plaintiff's ability to challenge an agency action or results in the courts second guessing an agency's scientific conclusions"). As an example of data that has not been disclosed, and as presented in the Verified Statement of Phyllis Bookbinder, the FAA has refused to disclose key data about airport usage upon which it bases its justification for the project.

5. Stale data is not permitted.

In order for an agency to fulfill its NEPA duties, it cannot rely on outdated information. In *Lands Council v. Powell, Lands Council v. Powell*, 395 F.3d at 1031, the Ninth Circuit found an EIS unreliable because of outdated data. The fish count surveys discussed in the EIS were at least 6 years old. *Id.* The court explained: "We do not suggest that all data relied upon by the agency be immediate, but here the data about the habitat of the Westslope Cutthroat Trout was too outdated to carry the weight assigned to it. We conclude that the lack of up-to-date evidence on this relevant question prevented the Forest Service from making an accurate cumulative impact assessment of the Project on the habitat and population of the Westslope Cutthroat Trout." *Id.* In *Klamath-Siskiyou Wildlands*

Center v. *U.S. Forest Service,* the District Court held that the Forest Service's EA had relied on "incomplete and outdated information" concerning the effects of the timber harvest/watershed improvement project on the northern spotted owl population. *Klamath-Siskiyou Wildlands Center*, 373 F.Supp.2d at 1081. The Court explained that "the Forest Service relied on ten year old data that, in all likelihood, dramatically misrepresents the number and location of owls within the project area." As an example of stale data relied upon by FAA, we note that the bull trout surveys for Gird Creek were conducted in 2003, and that there are no current surveys that have been conducted when bull trout might spawn in the creek.

6. NEPA Requires Scientific Integrity.

NEPA requires scientific integrity, whether an EA or EIS is prepared. Under 40 C.F.R. 1502.24, "[A]gencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements." This requirement means that the FAA must use scientifically sound methods and accurate data in all of its analysis of impacts. Scientific integrity requires that the agency use relevant scientific studies and not rely unsupported conclusions, assumptions etc. As discussed below, the discussion of both noise and air pollution impacts fails to meet this requirement. NEPA also requires that the document is readable – that its contents can be understood by members of the public. Parts of the EA such as the Forecasting Report appear jumbled and are hard to understand, as discussed below.

7. EIS is Required When the Significance Factors Are Triggered.

NEPA requires the FAA to evaluate the "significance factors" before it can conclude that an EA is acceptable because its action causes no significant impacts. Under § 1508.27, "*Significantly,*" as used in NEPA, requires considerations of both context and intensity. These regulations are critical for understanding why this project, even when the above deficiencies are addressed, still requires a full EIS. They are worth quoting in relevant part.

"(a) *Context.* This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance

would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.
(b) *Intensity.* This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity."

ICAARE lists the "significance" factors that are relevant to the airport decision:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
(2) The degree to which the proposed action affects public health or safety.
(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.
(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Any one of these "significance factors" is enough to trigger an EIS. Here, the combination of several of them demand one.

8. State law requirements

The EA is being prepared for the Ravalli County Board of Commissioners. While the EA must meet the NEPA requirements imposed by federal law, it also must comply with the requirements imposed by state law. Because this matter directly involves the Ravalli County Board of Commissioners, the EA that they, and the public, will rely upon also implicates that Montana Constitution. Article II sections 8 and 9 requires that government entities provide for meaningful public

participation throughout the decision-making process and also that government records and documents be disclosed. Meaningful participation in this case requires an adequate NEPA document, with all relevant data, because the NEPA document is the foundation for the County's and the public's informed consideration of the matter. Therefore all of the shortcomings in the EA highlighted herein are also shortcomings under the public's constitutional right to participate in the decision for approval or disapproval of the project. For example, and not by way of limitation, the lack of adequate information about the cost, about air and noise pollution, about zoning requirements and so forth means that it is impossible for citizens to lobby their elected officials regarding the airport expansion. It also means that any decision made by the Commissioners based on this EA is inherently flawed and unlawful.

The foundation for the duty to participate comes from the plain language of the 1972 Montana Constitution, which states in Article II, section 8: "The public has the right to expect governmental agencies to afford such reasonable opportunity for citizen participation in the operation of the agencies prior to the final decision as may be provided by law." The right to participate is a fundamental constitutional right. During the course of Montana's 1972 Constitutional Convention, the Bill of Rights Committee described the underpinnings of this fundamental right as follows:

> "The Committee adopted this section in response to the increased public concern and literature about citizen participation in the decision-making processed of government. The provision is in part a Constitutional sermon designed to serve notice to agencies of government that the citizens of the state will expect to participate in agency decisions prior to the time the agency makes up its mind. In part, it is also a commitment at the level of fundamental law to seek structures, rules or procedures that **maximize** the access of citizens to the decision-making institutions of state government."

Montana Constitutional Convention, Vol. II, Committee Reports, p. 630-631; *see also* Vol. V., Verbatim Transcript, p. 1651 (emphasis added).

Pursuant to the mandate of Article II, section 8 of the Montana Constitution, the Legislature enacted the Public Participation Act, MCA 2-3-101, et. seq., which implements the public's constitutional right to participate in the decision making process before a final decision is reached. The statutes confirm the Board's clear legal duties.

For example, MCA 2-3-103 requires that government agencies shall develop guidelines, procedures and policies for permitting, encouraging and facilitating public participation, stating, "The procedures **must** ensure adequate notice and assist public participation before a final agency decision is taken that is of significant interest to the public" (emphasis added). MCA 2-3-103 further requires government agencies to include in their agenda for regularly scheduled meetings "an item allowing public comment on any public matter that is not on the agenda of the meeting and that is within the jurisdiction of the agency conducting the meeting...the agency may not take action on any matter discussed unless specific notice of that matter is included on an agenda and **public comment has been allowed** on that matter. (emphasis added)." MCA 2-3-111 further requires that government agencies' "Procedures for assisting public participation **must** include a method of affording interested persons reasonable opportunity to submit data, views, or arguments, orally or in written form, prior to making a final decision that is of significant interest to the public (emphasis added)." Finally, MCA 2-3-201 states, "The legislature finds and declares that public boards...in the state exist to aid in the conduct of the people's business. It is the intent of this part that actions and deliberations of all public agencies **shall be conducted openly.** The people of the state do not wish to abdicate their sovereignty to the agencies which serve them. Toward these ends, the provisions of the part shall be liberally construed (emphasis added)." These statutes, by their use of the words "shall" and "must" create mandatory duties on all state agencies, including the Board.

Together these statutes establish a mandatory duty to permit meaningful public participation, a duty that the Montana Supreme Court has consistently upheld. The Supreme Court of Montana has affirmed again and again government agencies' clear legal duty not only to *permit* and *afford* citizens' reasonable opportunity to participate in government decision-making processes, but to *secure* and *encourage* the public's exercise of this most fundamental constitutional and statutory right by establishing procedures that *assist* and provide adequate notice of meetings to citizens who wish to share their views before the government makes a final decision. Mont. Const. Art II sec 8; MCA 2-3-101 et seq; *Bryan v. Yellowstone County Elementary School Dist. No. 2,* 312 Mont. 257, 60 P.3d 38 (Mont. 2002); *Board of Trustees v. Board of County Commissioners of County of Yellowstone*, 606 P.2d 1069 (Mont.1980).

Until the County and the FAA have prepared a document that fully informs the public of all of the potential impacts of the Proposed Action, citizens of Ravalli County, including ICAARE, cannot effectively participate in the decision.

Federal Law Requirements

The FAA's governing statute, 49 U.S.C. 47107 provides the assurances that FAA must receive. We presume these will be discussed in the decision-document. However, required assurances regarding the need for the protection of air space and zoning under 49 USC 47107 (9) and (10) need to be addressed in the EA as they create impacts on the human environment. The need for zoning, and the resulting impacts on use and enjoyment of private property and the loss of value to existing property need to be addressed. In addition, required assurances about the sources of funding for the County's share of the cost need to be discussed, and to the extent there are promises of private "dark money" sources, those need to be disclosed.

II. Lack of Reasonable Justification for Purpose and Need.

The FAA now claims that it must build a 5200 foot runway to accommodate the safety needs of the flying public. Revised EA at 2-4 and 2-5. The Purpose and Need for the Preferred Alternative is driven by this determination. However, the need for a 5200 foot runway is driven by false assumptions and lack of data. Moreover, the FAA fails to adequately explain how in 2010, a 4200 foot runway was acceptable, but now only a much longer one will be safe and that earlier forecasts for increased growth have never panned out.

In 2010, the FAA's EA stated the following:

"In summary, the purpose of this project is to insure that RCA complies with minimum FAA design standards for runway to taxiway separation and runway length for small aircraft forecast to use the airport during the next twenty years. This project will require a relocation and phased lengthening of Runway 16-34; expansion of aprons, taxiways; and acquisition of at least 78 acres of land. Alternative 2A satisfies these requirements and has been selected as the preferred alternative for this project."

EA at p. 3. Nothing has changed, except the composition of the Board of County Commissioners, that would obviate the conclusion reached in 2010. FAA fails to provide an adequate basis for its new found purpose and need. As discussed below, the EA is woefully deficient in a number of areas.

Operations

FAA Circular 150/5325-4b and the FAA 2014 EA state that a minimum number of 500 annual operations by B-II or larger aircraft are required to trigger a federally funded improvement of the RCA.

In order to determine the number of annual (November 2010-October 2011) B-II operations occurring at RCA, the FAA Engineer utilizes a flight tracking service, Flight Aware, to tabulate IFR flights. To account for VFR flights, the Engineer utilizes "hand written fuel sales records" purporting to be actual jet fuel sales transacted by the FBO, North Star Aviation. The 2014 EA claims 494 total qualifying flights but does not reveal that the total # of confirmed operations by an independent entity, Flight Aware, is less than 400 operations and far short of the 500 operations needed to legally justify the airport improvement project. It should be noted that 1) despite the fact that the number of B-II operations is essential to

demonstrate the legal justification of this project, the 2014 EA reveals no attempt to use inexpensive, readily available technology to empirically track operational numbers 2) despite the fact that 25% of the vital data establishing the very minimum threshold required to legally justify the airport improvement project was provided by the FBO, a known, vociferous, public advocate and potential financial beneficiary of airport expansion; the EA Engineer provides no mention of any effort to audit or authenticate the "handwritten fuel sales records." ("The handwritten records for the jet fuel sales were tabulated into a spreadsheet." RCA, Forecasting Report, Airport Operations 2.4.2 Fuel Sales). Moreover, as discussed in the statement of Phyllis Bookbinder, FAA has resisted all attempts by ICAARE to obtain these records. NEPA requires that they be provided and that the data be independently verified.

A competent and responsible audit or review of a project of this size, using data supplied by a source with a potential financial interest, would necessarily involve not only a review of the source documents i.e. the handwritten records but an audit of the supporting documents such as concomitant credit card or bank deposit records.

Moreover, multiple attempts by ICAARE and Counsel to obtain these "handwritten records" have been rebuffed by the RCC and the FBO. In June, 2013, the FBO refused an apparent direct request from the then Chairman of the RCC to provide these records to ICAARE.

The hubris and naiveté of the Engineer is noted in the RCA Forecasting Report, 3.7.4 Design Group II and Larger Forecast, Flight Aware and Jet Fuel Sales Minimum wherein he labels the collection techniques as a "method to establish an undisputable minimum number of design group II operations." Also, apparently desperate to cover the shortfall of 494 (or 6 fewer than the required 500 operations), the Engineer speculates that the Flight Aware listed " blocked flights" (i.e. people who do not want their flight plan to be public) must be "high profile" people who have "large/sophisticated airplanes." "Therefore it can be concluded the design group II operations are certainly over the 500 operations." NEPA does not permit such conclusory statements or rank speculation without any data to back it up.

In summary, FAA but does not provide sufficient, authenticated evidence to legally justify its claims that RCA is a B-II airport in need of upgrading (2014 EA, Purpose and Need 2014 EA 2.3).

FORECAST

Falling short of the required B-II operations (even including the unaudited operations) the EA Engineer resorts to optimistic forecast(s) to provide legal justification for the airport. Knowing (presumably), that the historical records are contrary to the preferred hypothesis, the Engineer resorts to indirect methodologies such as national trends, numbers of based aircraft, local economy, census data, etc all of which have historically produced spectacular, forecast failures.

In 1977, the FAA Engineer, Carter Burgess, forecasted that by 1995 RCA would have 3,520 B-II operations while the actual number reported by the FAA in a 1995 was less than 1000.

Morris Mairle Engineer, Mr. Munger stated in a public meeting on September 14, 2001 "that the FAA likes to look at immediate numbers and projects that in the year 2005 there will be 2047 operations of B-II aircraft at RCA." Yet according to the 2008 EA, the FAA reports only 1,224 B-II, C-1 operations. (Note: there is no evidence that these numbers were ever authenticated).

The 2004 EA forecasted 1,366 B-II, C-I operations by 2010 whereas the 2014 EA claims less than 500 B-II operations (less than 400 confirmed) in the October, 2010-November, 2011 time period.

Facing unfavorable historical trends not to mention a history of large magnitude forecast(s) failures, the FAA endeavors to utilize the RCA portion of a national inventory of based aircraft to justify optimistic forecasts and current (2012), suspect operations numbers. The National Based Aircraft Inventory Program is a loosely defined list composed of "airworthy" aircraft which are claimed by the owner to be "typically" based at XYZ airport for a "majority" of the year. As the RCA data provided below attest, the list is a worthless tool as it is ill defined, interpreted and maintained by local officials aided/ thwarted by self-reporting Pilot/owners who; aviation blogs reveal, tend to both over and under-report. The bias of the Owners/Pilots seems to vary as to whether they are trying to avoid personal property taxes or acquiesce to local Airport Managers who are deviously endeavoring to qualify for FAA grants. Despite these well-known limitations of the Inventory, the FAA Engineer applies factors to the FAA, RCA Based Aircraft Inventory to predict an optimistic picture of increasing B-II operations and provide the legally required justification for a federally funded airport upgrade.

A cursory exam of the RCA Based Aircraft Listing (Appendix B) corroborates

the inherent flaws in this so called inventory and further undermines the FAA Engineer's claim of sufficient 2012 B-II operations and predictions of future growth. In fact, using the Engineer's inferential methodologies, one should conclude that the RCA is indeed shrinking. Of the 5 B-II aircraft listed as basing at RCA; one aircraft (N125AR) is actually a B-I aircraft with 0 FlightAware operations during the relevant time period. Three of the remaining 4 are registered out of state by the FAA Aircraft Registry (a database that is actually responsibly maintained) and averaged only 16 operations during the study time period . Given the fact that the RCA is a two season airport and that RCA FBO reported fuel sales plummet during winter months, it is unlikely that expensive aircraft that are not registered at the RCA are mothballed here for the "majority" of the year.

Airport fuel sales as reported to the County by the FBO tax reports indicate that jet fuel sales have remained relatively flat for the past several years.

In summary, FAA's own historical documents demonstrate a dramatic decline in B-II operations by reporting a high of 1580 operations in 2001 to a low of less than 400 confirmed operations for the most recent 2010-2011 time frame (the 2014 EA). Despite the diminishing operations numbers and serial triple digit percentage forecasting errors, the FAA incredulously, continues to forecast future B-II growth at RCA. These assertions are not credible or justified and the legal basis for providing federal funds for the upgrade of the RCA is not established (Purpose and Need). The EA does not even clearly document the continued over-estimating of airport use and explain why the 2012 Forecast Report will fare any better, in light of the actual long term trends. Wasting tax payer resources on such faulty assumptions is not in the FAA's or the public's interest. NEPA requires full that decisions be based on data with integrity, not overly-optimistic speculation.

III. The FAA approved previous actions to predetermine the outcome here.

The FAA now points to a new hanger which is currently too close to the runway for safety as one of the reasons for moving the runway. This hanger construction was initially started in 2008. The FAA gave their approval to this hanger's plans and allowed its construction. The FAA had to have known the hanger placement was too close to the existing runway, but approved it because they fully intended to proceed with their EA's proposed actions - building a mile-long runway in a different location. The Revised EA fails to disclose this predetermining course of action by the FAA.

The NEPA CEQ's place stringent limitations on actions during the NEPA process:

40 C.F.R. 1506.1 - (a) Until an agency issues a record of decision as provided in 1505.2 ... no action concerning the proposal shall be taken which would: (1) Have an adverse environmental impact; or, (2) Limit the choice of reasonable alternatives.

In this case, it appears the FAA approved the new hanger construction knowing it would have an adverse impact, (being too close to existing runway), and thereby would limit the choice of reasonable alternatives to their proposed alternative. In so doing, they knowingly disregarded the NEPA's legal requirements at 40 C.F.R. 1506.1, et seq.

IV. Noise

The discussion of noise and its impacts at RCA can be divided into two parts. The first considers the situation as described in the EA dated 2008. Part two of the discussion will address the new, major problems not discussed is the current EA. Note many of the inadequacies from the previous EA still exist in the 2014 EA

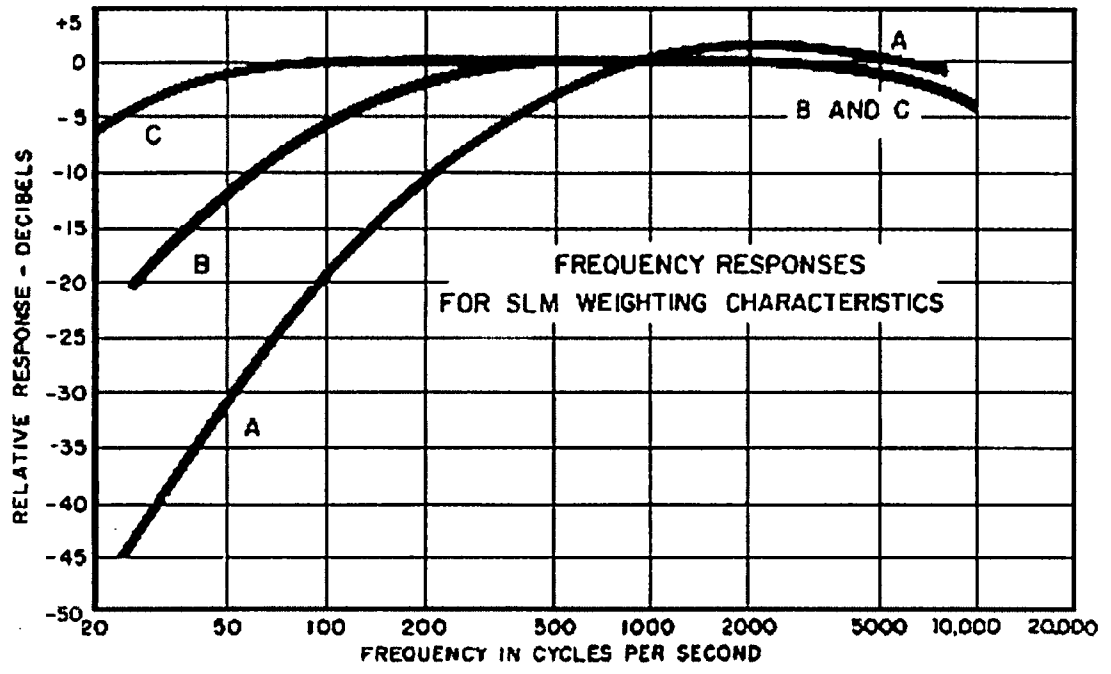
The 2014 EA addresses the noise issue in a completely misleading, indeed unacceptable, and incomplete manner; as did the 2008 EA. The results give little indication of the huge noise problem the airport already creates, and will worsen if the expansion is approved. Nor does it address the health problems associated with the current and future noise levels. The results law suits could well break the County financially. *The results given below call for a full EIS and full disclosure of the potential impacts of the proposed new airport.*

PART 1 The 2008 EA is misleading and not valid

First of all, the EA states that the timing (April/May) and length (23-period) of the acoustic monitoring performed is not statistically significant... " *The authors refute their own work as unsound. This criticism carries over to the 2014 EA. We need a full EIS with sound measurements covering the entire year!*

The cover up

The 2008 EA goes on to mislead the reader regarding the actual noise that can be expected. They do this in the name of FAA regulations. They state that they will measure noise in the so-called dBA units. This allegedly focuses on the part of the noise spectrum human hears best. It is generally used in studies of music while the alternate dBD measure is the one suggested by EPA! The frequency response of the dbA is given below. One is already down 10 dB (a factor of 10) db at 200Hz. But it is well documented that humans can hear down to 20 Hz, especially if the lower frequency is loud, i.e. during the take of a jet aircraft. *By using the dbA scale, the EA is immediately ignoring a substantial part of the LTO noise....effectively making things appear quieter than they really are.*



The measurement of ALL the noise generated by aircraft is given by Effective Perceived Noise or PN. This scale was developed originally by K.D.

Karter in 1959 to attempt to measure the perceived noisiness of jet aircraft by observers on the ground. The relation between the dBA and PNdB is given below. *The scale has been adopted by the International Standards Organization for international use.* Typically, PNdB=dbA+12 db. *So the sound measured and perceived is much louder than the dbA sound level for the same event by over a factor of 10!!* (K.D. Kryter, "The Meaning and Measurement of Perceived Noise Level," *Noise Control* 6:5, Sept.-Oct., 1960, pp. 12-17; K.D. Kryter, "Scaling Human Reaction to Sound from Aircraft," *Journal of the Acoustical Society of America,* vol. 31, 1959, p.1415; I.S.O. Recommendation No. R507). We ask that FAA examine these references and use them in its analysis for comparative purpose so the public can understand the potential for all noise impacts.

The 'fix'

The EA next completely buries any noise problems, again using FAA procedures, in something called community Noise Levels (CNEL). A good example of how they completely mislead goes as follows. In principal, they count the intensity of the loudest sound in a one minute sample. They do this for every minute of every day (1440min/day) for an entire year (365 days/yr). You can see the limited measurement period noted above is totally inadequate to make this calculation. In ideal circumstances, this procedure produces 526,600 samples over the year. Here is where the fix comes in...they average all 526,600 of the noise values into a single number. If the number is below 65 dBA they deem the aircraft noise is harmless. Remember that dBA is a factor of 10 less than the total sound you will experience.

Here's how it would work. Suppose RCA had, say, 5 jet take offs/day for 200 days out of every year. They last a little less than a minute and reach, say, 90 dBA. That would yield 1000 spike values/year. Without other noise, this means that peak sound events exist only 0.19% of the time in the data set. The averaging reduces the overall noise number to approximately 65 dB, and would be accepted. But note that the basic sound is not only10-12 dB higher using the PN measure, but the averaging has smudged out and effectively erased each sound event. In fact, if you were at Hamilton High School you would hear for every takeoff a PNdB signal closer to 80-85 dB....something on the order of what being up and close to a food blender might sound like. The same holds true as the aircraft pass over head of homes to the south of the RCA at an altitude of approximately 2000 feet.

What we really need is an analysis of the so-called Single Event Noise Exposure Level (SENEL). Local homeowners need to know how bad that noise can get. This measure is the one you would awaken to as one of the jets took off in the middle of the night. Here are some facts from actual noise observations near Newport Beach (CA) to illustrate the point. Instruments installed by the county at a Back Bay monitoring station, designated as RMS-6, recorded an around-the-clock average 57 decibel CNEL. But, whenever planes go over, the instrument's readings jump. Data shows that FedEx A310 cargo planes produce 88 decibels of SENEL. American Airlines MD-80's produce 91 decibels, SENEL. These SENELs are equivalent to the smaller, but just as noisy, mid-sized jets that want the expansion. *Clearly, the EA writers are trying to pull the wool over our eyes.*

Part 2 2014 EA

The current EA repeats virtually all the problems noted above. Worse, they note the criticisms note above and repeat them anyway, e.g. use of the dBA noise metric. They also add and/or allow to remain additional problems.

They hired another company to do their noise estimate (BSA). Their 'new' results are the same as obtained before...and are deeply flawed. For instance, the numerical modeling is based on a set of assumed flight uses at RCA. The traffic table they use (TABLE 4.6) in their calculations is totally incompatible with early information and assumed flights used in the rest of the report! Their results are meaningless, or contradictory at best.

The modeling activity apparently assumes, as did the 2008EA, that the area under consideration is flat. It is not. In fact, the current airport occupies a geographic niche such that the runway is largely acoustically isolated by the surrounding hills to the west and south of the current RCA. So the closely located High School, City of Hamilton to the west and the region to the south of the current airport are sheltered from excess noise.

Moving the run way as per option 4B, will largely remove the topographic barrier and so the High School and Hamilton proper will get the full brunt of landing and take offs. The serious physical problem that accompany the proposed new airport are discussed below. Suffice it to say, Hamilton High School will now have a direct line of sight to about 50% of the entire runway. The noise distraction so incurred will have an unknown deleterious impact on the

school. The same additional problems will face the eastern edge to Hamilton also.

A final issue has to do with the reasonableness of the results from the modeling study. Note they place the 65dBA line to the west of the runway, approximately over the FOB. The argument is that this noise level here would be tolerable and cause no physical health problems. The maximum distance between the runway and FOB, says around 400-500 feet (it could be less as it is hard to scale this number from their maps). Now ask yourself the question: How would you like to live and/or work all day with jets and other large aircraft taking off and landing within, say, 400 feet of your home or place of business. Of course no one would put up with this for long. Those required to be closer will surely fall victim to some of the health issues note below.

In 2002, the FAA compiled a list of all aircraft and the noise associated with their take off and landings (FAA AC 36-34,-3H). This report shows a listing for both measured and modeled noise levels during both takeoff and landing at fixed points. The takeoff landing point was 6500m from the beginning of the runway and 2000m from runway end for landings. T the cross runway value represent noise at 450m . Considering a Cessna 560 class aircraft the T/O noise level is 84.9 while landing it is 88.9 units of dPNB. Side values typically was 94.6. Even after converting these values to units of dBA, it is clear they are all larger than the values given in the EA. So official FAA noise estimates are not in accord with the results of the current analysis. This plus, the exposure change in runway/Hamilton High School aspect ratio send a clear message that the suggested airport runway is unacceptable from a noise pollution standpoint.

Noise kills

There is one more thing the EA mentions, but in a brief, conclusory fashion without data or analysis: Human health issues. We need, no demand, a whole EIS on this issue alone, complete with necessary measurements of noise in the airport area over a full annual cycle.

Why? Consider, the 1993 study by Meecham and Shaw that showed that noise around LAX caused the following:

• cardiovascular disease to increase 18% for people over 75 • suicides to double for people between 45 and 54 • accidental deaths to increase 60% for those over 75. • Overall, approximately 60 more people died each year due to aircraft noise.

One of the nice things about noise impact analysis is that the lay person can use common sense drawn from real life experience. Ask yourself, how did you feel and what were the after-effects on you of the following when they occurred in the middle of the night?

• a loud sound system at a neighborhood party • a neighborhood dog barking incessantly all night long • your baby had colic throughout the night • a neighbor's car security alarm went off • some yo-yo wound up his ninja motorcycle engine racing down the street

It becomes obvious after thinking about noise impacts on a common sense basis that , despite its ominous findings, the LAX study did not even analyze all potential impacts, including the following:

• infant awakenings and distress, leading to parental awakenings and health damage • non-lethal accidents the next day for people who work with potentially dangerous machinery and who did not get enough sleep.

Rosenlund and colleagues (2001) report that people exposed to average aircraft noise levels of 55 decibels or higher were 60% more likely to report having been diagnosed with high blood pressure. Those with exposures exceeding 72 decibels were 80% more likely to report a high blood pressure diagnosis. The findings suggest that exposure to loud noise is associated with high blood pressure, which in turn suggests aircraft noise could increase heart disease risk (Rosenlund, et al, 2001, Occupational and Environmental Medicine 2001;58:761, 769-773).

Consider also the sleep deprivation issue. One study found that 45% of people will be awakened and not able to go back to sleep at noise levels of 70dBA. You can imagine how that might affect the students of Hamilton High. Or someone working heavy equipment the day after a sleepless night. (EPA, 1974).

This list of potential health problems is by no means complete and we could belabor the subject at length as the literature on this subject is indeed

voluminous. Yet the 2008 EA does not even consider the matter and the 2014 is little better.

The price

Forgetting the health aspect of the noise issue for a moment. There is one additional message for the County Commissioners to consider. It is common for the airport authority whose operations put people at noise risk, to pay to acoustically insulate the homes, offices and business of impacted people. This means that if noise levels, SENELs say, are judged to above a threshold, the County could be on the hook for a huge expense. There are many examples of where this has been done, so there is ample legal precedent to support such demands.

V. Air Pollution

This part is divided into two sections. The first is ICAARE's "lay person" comments on the air pollution issue. The second is a summary of Dr. Sahu's expert report, which is submitted in its entirety and incorporated herein. We ask that you fully consider and respond to both. In the event that you find a discrepancy between the two, please respond to Dr. Sahu's report.

The proposed airport expansion will expose the City of Hamilton, including Hamilton High School, to pollution levels that are harmful to human health. The pollution will come from exhaust emissions from current and increased use of the Ravalli County Airport (RCA) by larger and larger jets. The most damaging emissions will be from nitrous oxide (NOx) and increased particulate matter (PM). Hamilton is already in violation of EPA maximum PM limits. EPA action on this non-compliant situation is currently under consideration. These two situations are considered below.

Note the EA does not even address the problem of air pollution associated with the proposed expansion. The EA simply states that air pollution impacts need not be addressed at all because the number of flights falls below some predetermined threshold. The EA states, without any hard data or analysis:

"However, as the analysis in section **5.2** of this chapter shows, existing and forecasted operations at RCA are far below the threshold established by the FAA that indicates a potential for air quality impacts. Past, present and future development, both at RCA and in the greater Hamilton area has and will likely

resulted in increased emissions of air pollutants. However, the incremental increase in emissions from the proposed airport improvements and its projected future use, when added to the emissions sources in the area would be unlikely to produce a significant cumulative impact on air quality."

EA at 5-50-51.

As we shall see it is a huge problem. Not only is there no data, cumulative impacts are not assessed. Serious increases in NOx, PM2.5 and lead both from construction and long-term operation will occur and it is FAA's responsibility to provide the data. *This omission in the EA also means we need a full EIS to clarify what appears to be a hazardous situation.*

Perhaps it is best to start with an outline of the National Environmental Policy Act (NEPA). There are fundamental NEPA requirements that are to be followed, but largely ignored by the EA. They are:

- Affected Environment (40 CFR sec 1502.15) – The EA or EIS must "succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration." 40 CFR sec 1502.15.

- Environmental Consequences (40 CFR sec 1502.16) – discussion of environmental consequences in the EA or EIS shall include the environmental impacts of the alternatives, including the proposed action and any adverse environmental effects which cannot be avoided, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented. This section shall include discussion of: a) direct effects and their significance; b) indirect effects and their significance; c) possible conflicts between the proposed action and the objectives of Federal, regional, State and local land use plans, policies and controls for the area concerned; d) the environmental effects of the alternatives including the proposed action; e) energy requirements and conservation potential of various alternatives and mitigation measures; f) natural and depletable resource requirements and conservation potential of various alternatives and mitigation measures; g) urban quality, historic and cultural resources; h) means to mitigate adverse environmental impacts.

Once the agency receives comments they should respond by modifying its alternatives; development and evaluating reasonable alternatives that were not given due consideration in the draft EA, and should supplement, improve or modify the impact analyses and explain why particular comments do not warrant further response. 40 CFR sec 1503.4(a)(1)-(5).

The RCA in its Environmental Assessment (EA) has not "succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration." 40 CFR sec 1502.15 NEPA Title 1 Sec. 101 {42 USC § 4331 (a), (b), (c):] Sec 102 [42 § 4332 A, B, C, D, E, F, G H, I] or adequately satisfied this section of NEPA, where it states:

> (C) Include in every recommendation or report on proposals for legislation and other Federal Actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on –
>
> (1) The environmental impact of the proposed action,
>
> (2) Any adverse environmental effect which cannot be avoided should the proposal be implemented,
>
> (3) Alternatives to the proposed action,
>
> (4) The relationship between the local short-term uses of man's environment and the maintenance and enhancement of the long-term productivity. And
>
> (5) Any irreversible and irretrievable commitment of resources, which would be involved in the proposed action....

The questions of air pollution and health consequences are brushed aside in the current EA. Remember the NEPA requirements are mandated by Congress and defined by the binding Council on Environmental Quality regulations, not the FAA's interpretation of them. Further, EPA is the nation's delegated authority on air pollution. No FAA arm wave can allow the EA authors to neglect air quality and associated health issues based on a FAA policy or other justification. We show below that air quality is already an issue at RCA and it will only become more dangerous if the proposed expansion goes through.

NOx

A mid-sized business jet, say a Gulfstream G350, is typical of what we can

expect to use an expanded RCA. These planes have two Rolls Royce Tay Mk 611-8c engines that provide nearly 28,000 pounds of thrust (source: www.gulfstream.com/g350/). *These engines are already in violation of international standards for CAEP/6 Limit NOX emissions.* During a single Landing and Takeoff (LTO) the amount of NOX emitted is approximately 5628g. (source: ICAO engine exhaust emissions data bank, Oct, 2007 update, see attached work sheet).

Are these NOX emissions a significant pollutant? To answer this we compare the air plane emission with those from a light duty truck which are 0.4g NOx per driving mile (Dept Transportation, RITA, cf. Fed Reg, vol 65, no. 28, pg 6851-6858). In these terms **each LTO is equivalent to driving 14,070 miles.**

There were allegedly 791 LTO equivalents in 2007 at RCA of BII and CI operations; a little over 2/day. This equates to over 11 million driving miles! This is equivalent, in turn, to the addition of 741 cars to the Hamilton area, with each car driving about 15,000 mile/yr (a typical value). We already have a problem. With expansion, the EA estimate doubles the numbers given above.

To make matters worse, the strong atmospheric inversions that visit the Valley in winter and summer hold the pollution close to the ground. Stagnant air conditions do not allow for the atmosphere to mix the pollution away. So the pollution will stay in the vicinity of where it was emitted....the airport region and Hamilton. Especially impacted will be Hamilton High School, about ½ mile from the airport.

There is another way to look at the impact that the high levels of airplane generated NOx. The total NOx put into the air from BII and C class aircraft ops is 5628 x 791=4,452,000g/yr. Suppose that there are, say, 20 days per year when the inversion is so strong that emitted NOx stays largely within 1-2 kilometer of the RCA and within 100 m of the ground. This distance includes the high school and the eastern edge of the City of Hamilton. This equates to an average exposure, during strong inversion episodes, to adults and children in the 1-2 km zone of approximately 100 micro grams/m**3. This is the upper limit of tolerable annual average NOx exposure human can take according to the US National Ambient Air Quality Standards (www.epa.gov/air/criteria.html). Doubling the amount of jet operations at RCA, as suggested in the EA, raises that level to 200 micro grams/m**3....two times the maximum allowable exposure. The airport and vicinity thus become a 'dead zone' so to speak.....spend much time there and you run risk of serious health hazards. This

danger zone is not static but will shift in size, shape and orientation depending on local wind speed and direction.

It is clear that even the current use of mid-sized jets at RCA is a clear and present danger to the population of Hamilton. More than doubling the number of planes will open the population to increased respiratory problems of all types, and open the County to legal action for deliberately putting the airport project above the health and well fare of the people they are supposed to look after.

PM

We used the engine characteristics noted above and the methods of Wayson et al (2005) and Pehrson (2005) to arrive at a value for PM per LTO of 111.6g or 88 kg of PM/year when the number of BII/C aircraft LTO are considered. Referring to auto emission allowances one LTO emits as much PM as driving a light truck 1395 miles. This adds up to just over 1,000,000 driving miles per year when all the LTOs are counted.

Remember Hamilton just missed being put on the EPA non-compliance list in 2007 due to higher than allowed PM. Governor Schweitzer requested in 2007 that Ravalli be put on the non attainment list. The documentation regarding this serious matter needs to be disclosed and discussed in the EA. FAA needs to disclose the factors that have led to a significant increase in PM pollution. Ravalli County is clearly at the brink with respect to being labeled a non attainment zone. The planes will only make it worse!! And once they start, only the FAA will have control of airport ops, so the County couldn't legislate pollution reduction if it wanted to.

The health risk to Hamiltonians from the jets is especially onerous. This is due to the fact that laboratory studies have shown that most of the PM emitted by jet airplanes has typical dimension of less than 1.5 microns. This makes them even more hazardous than the larger PMs, e.g. PM2.5, since their small size allows them to penetrate more deeply in people's lungs (Boyle, 1996). It is also the case that the larger PMs settle to the ground where they can remain until re-mixed into the atmosphere by wind, passing car or someone simply walking by their location.

Ravalli County has serious PM problems aside from the airport: wood burning stoves, dust from construction and agricultural operations, vehicle traffic especially from the creation of the new 4-lane for US 93 that now runs the length of the valley, sanding operations. These sources are not discussed nor are they

quantified. FAA needs to provide all of the current data and make reasonable projections about anticipated future increases in the context of a proper cumulative impacts analysis. Ravalli County has been one of the fastest growing in the state (and for a while in the nation) and a large percent of the valley is subdivided and slated for development. Thus air pollution problems will only increase. These present and reasonably foreseeable impacts on air quality need to be quantified and disclosed.

Lead pollution is an additional concern that is not addressed. We attach a number of current studies about lead. Aviation fuel contains lead, and current and anticipated uses of the airport will increase lead pollution, especially in the vicinity of homes and the high school. Lead is a very serious health risk for mental and physical development. Children are especially susceptible to lead poisoning; there are no "safe" levels. FAA needs to do baseline testing of lead from past and current operations and evaluate future lead pollution impacts from the increased use that FAA anticipates. The burden here is on FAA to undertake a full disclosure of lead pollution.

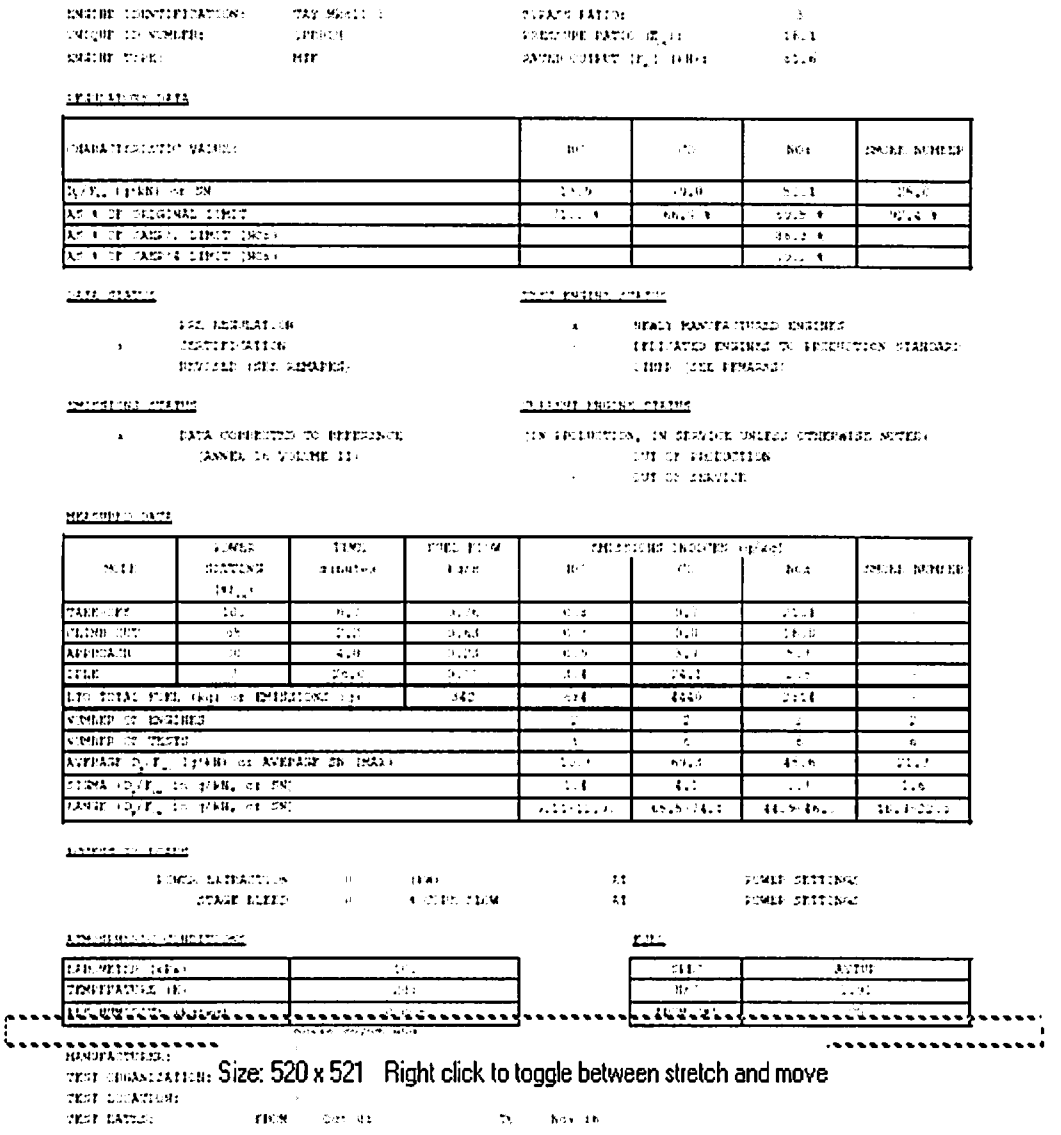
SUMMARY – ICAARE's comments

The bottom line is that detailed calculations of the emissions from jet aircraft at Hamilton, MT show the current levels of jet aircraft activity are a definite health hazard NOW. **Air pollution issues are not even discussed in the EA as required by NEPA, but rather cavalry brushed aside citing an FAA rule (for which there is no data or analysis done).** Increasing traffic is akin to playing Russian roulette with a fully loaded revolver. So when people get asthma or other respiratory disease they ought to have a good chance in legal action against the County Commissioners since they would, by voting for the airport expansion, be putting the special interests of a few wealthy individuals above that of the health of the rest of the population. Note these people spend the vast majority of their time away from Hamilton and so have a low exposure to the pollutants they generate. But they are leaving them behind for the rest of us. Health issues related to air pollution are not even discussed in the EA!

APPENDIX ICAO Worksheet

ICAO ENGINE EXHAUST EMISSIONS DATA BANK

SUBSONIC ENGINES



Dr. Sahu provides an expert report that confirms the inadequacy of the EA on the subject of air pollution. He explains that FAA has not even used proper protocol or guidance. Dr. Sahu provides detailed evidence that PM 2.5 is already a serious pollutant in Ravalli County and that the airport will make it worse, causing health impacts on the local citizens that are not even disclosed. His entire report and all references are incorporated herein. His conclusion is worth repeating:

Based on all of the above, it is my opinion that: (a) the avoidance of a proper air quality analysis associated with the proposed RCA expansion project is not justified and fatally flawed, and (b) that it should be remedied by conducting such an analysis, using current methods and tools, in consultation with all local, state, and federal agencies, as well as local stakeholders to satisfy the requirements of NEPA.

VI. Costs

The EA is not accurate in its disclosed costs of the proposed project. Accurate cost data is vital here because the County taxpayers will have to pay a pro-rata share of those costs. The County needs to disclose an accurate estimate of the County's share of the costs before it can decide whether to approve the project.

In the 2004 RCA EA (page 10-11) the engineering company and the FAA predicted a total cost of a project almost identical to the proposed 4B as having a total cost of $21,937,245. This was a 5,200 foot runway X 75 feet moved 400 feet to the east. (We realize that moving the runway 1,500 feet to the north will decrease costs slightly due to Daly ditches and the snowplow building was included in the estimate) In the 2008 EA Table-2 Development and cost breakdown total project cost was $17,155,253. This was also a 5,200 ft. X 75 foot runway in almost the identical position as 4B being proposed today. The cost of 4B in the 2014 EA suggest that the cost will be only $7,480,000. The cost for a complete project must be presented in the EA to allow the owner (the citizens' ultimately) to make an intelligent decision as to what should be done. There are many projects that would be required by the FAA to meet all of the requirements of the FAA that would be a part of the project. The sponsor and the citizens of Ravalli County should know the total cost of the project prior to making a decision to go forward.

The EA discusses the benefits of 4B as suitable for adding "more apron space east of the existing aprons and developing large hangars adjacent to the west side of the existing runway" and "expansion of other facilities". The EA mentions increasing the hangar space and increasing tie down capacity. These are listed as benefits of 4B however they are not included in the cost. The 2004 EA lists the following costs which represents the finished product: North Apron Reconstruction $1,896,190, interior and south apron reconstruction $1,647,362,

parallel taxiway extension and ladder "A" $1,058,780, Misc. taxilane construction $1,176,036 and taxi lane construction at a later date of $2,469,675. TOTAL: $8,248,043 in costs that are not included in what the sponsors have been told is the cost but are listed as reasons to do 4B. We realize that there may be some crossover on misc. taxi lane but because of the very limited cost breakdown in the 2014 EA absolute comparison could not be made. If one adds to the above the cost of 4B as stated in the EA" runway relocation, cost of land acquisition, wetland mitigation, partial parallel taxiway, wildlife fencing, runway lighting, taxi stubs, wind cone, segment circle and two PAPi's with a cost of $7,480,000 the total cost of the project will be well over 15 million.

Table 1

2014 EA 5,200 ft. runway 75 ft. wide moved 400ft to east. Total cost : $7,480,000

2008 EA 5,200 ft. runway 75 ft. wide moved 400 ft to the east. Total cost: $17,155,000

2004 EA 5,200 ft runway 75 ft. wide moved 400 ft to the east. Total cost: $ 21,937,000

The dfference between 2014 costs of project and 2008 costs is $ 8,200,000 and that is not adjusted for inflation.

Item listed as "the recommended projects " in the 2004 EA (page 10-11) and 2008 EA (page 4) but not included in the 2014 EA are some of the following:

1. North Apron Reconstruction,
2. interior and south apron reconstruction,
3. parrallel taxiway extention (this is absolutely necessary for safety needs)
4. Misc. taxilane construction
5. Taxi lane construction

None of these cost are included in the 2014 EA. However their benefits are included in purpose and need.

The difference is that the 2014 EA does not include the costs of completion of the project as the 2004 and 2008 EA's have done. It is only a partial cost and not even close to what is being proposed.

EA Cost estimates for runway relocation, cost of land etc. $7,480,000

Recommended projects cost in addition to above. $8,248,043

Total cost of runway relocation and associated recommended projects for completion of airport. $15,728,043

This is similiar to the 2008 EA that estimated a cost of $ 17,000,000 We realize that some of taxi land construction may be a cross over but this total is very representative of the cost of completion of the "Recommended Projects and Runway Relocation" .

The fact that the 2014 EA represents the cost of the project as being $7,480,000 is completely misleading and false. The engineer in late 2012 distributed the following document titled:"5-year Capital Improvement Plan for Ravalli County (Hamilton) Airport." In it they listed the 5 year plan for the improvement of the airport. They total each year and the give a grand total for year 2013-2018 of $7, 855,000. However, when you add the total for each year the total exceeds what is disclosed in the EA by more than 5.5 million dollars.

2013 $265,000
2014 $3,325,000
2015 $3,000,000
2016 $1,000,000
2017 $ 340,000
2018 $5,450,000

Total 2013-2018 $13,380,000 not $7,855,000. The

FAA's own regulations require a minimum capital improvement plan of five years. Thus EA neglects to do this rendering the EA incomplete. This is yet another example of incomplete and inaccurate information to the public and commissioners.

According to Report to Congress National Plan of Integrated Airport Systems (NPIAS) 2013-2017 "FAA requires benefit-cost analysis (BCA) to demonstrate the merit of capacity projects for which airport sponsors are seeking AIP discretionary funds. BCAs are required for capacity projects exceeding $10 million in Discretionary funds over the life of the project". This EA is incomplete in its total cost projections over the life of the project and as a result the sponsor has been misled as to total project costs. It is clear that the cost of

the project exceeds 10 million dollars. A benefit cost analysis must be done according to the FAA's own regulations as well as under NEPA. The cost issue is critical because Ravalli County has to pay a significant cost of the project – 10%. This means that taxpayer's must have complete and accurate cost information to understand what debt they are incurring. Otherwise their right to "meaningful participation" is taken away. NEPA regulations require the use of accurate data and this EA is not presenting accurate data or even following their own regulations. An EIS needs to be done.

VII. The EA does not discuss zoning issues

Part of the Proposed Action is to "acquire or rezone up to 113 acres of land for incompatible land use (for the 65 DNL boundary outside of the minimum required land acquisition)". Revised EA section 1.2. These 113 acres are a residential development for which there are no funds available for acquisition through condemnation. So the only option the FAA has is to have Ravalli Count rezone the land to meet the requirements imposed by federal and state law for airport "Airport Influence Areas." The FAA needs to clearly and candidly disclose to homeowners the fact that the use of their property will be seriously and permanently restricted.

However, Ravalli County does not have a growth policy, the same being rescinded by a county-wide vote in 2008. Under Montana law, a valid growth policy must be in effect before zoning can be initiated.

76-2-201. County zoning authorized. (1) For the purpose of promoting the public health, safety, morals, and general welfare, a board of county commissioners that has adopted a growth policy pursuant to chapter 1 is authorized to adopt zoning regulations for all or parts of the jurisdictional area in accordance with the provisions of this part.

The EA does not adequately disclose and explain that the lack of a growth policy means that the County Commissioners cannot zone the land. Yet the FAA perpetuates the myth that the Proposed Action includes acquiring or rezoning the land near the airport, both of which are impossible to achieve because of current constraints. Yet the FAA requires that the Airport Affected Area be subject to land use controls "including zoning" that will meet its safety standards. 49 U.S.C. 47107 (a) (10).

Furthermore, the EA fails to disclose that Ravalli County has not properly designated an Airport Affected Area as required by state law. The EA conflates the old statute, with its Airport Influence Zone and the new statute with its Airport Affected Area. ("Required by state law and encouraged by the FAA and the Montana Aeronautics Division, the Airport Influence Area (or Airport Affected Area...."). The new statute enacted in 2005, at MCA 67-7-101 et seq, has specific requirements that the County has not met. The EA needs to disclose the County's obligation so that affected homeowners understand what is to come.

XIII. The EA Does Not Disclose How FAA will Meet its Required Assurances.

Title 49 of the U.S. Code requires the FAA to assure that certain Congressionally-mandated requirements are met before the project can proceed. We attached FAA's "Required Assurances" document that embodies them. The EA does not discuss how these will be met. Discussing it in the Decision Notice or Record of Decision is too late – at that point the decision has already been made. While this issue is raised here in the context, for example, of zoning and costs, the EA itself needs to address all of the "required assurances and explain what they entail, what they will cost, what legal actions are necessary and what impacts will accrue. Both NEPA and the Montana Constitution require it. Otherwise citizens and the Commissioners are left in the dark about how this matter will proceed.

XIV. Fisheries Impacts.

We also submit the expert statement of James Rokosh, a fisheries and aquatics expert. A portion of it is excerpted below. The Summary of Impacts in the 2014 Draft EA claims the Proposed Action will have no significant impact on any species designated as "Threatened" or "Endangered" under the federal Endangered Species Act.

Simply put, such a claim is absurd, as the existing scientific data and level of analysis contained in the EA, particularly regarding the federally listed "Threatened" Bull Trout is grossly inadequate to make such a claim. My professional opinion as an aquatic biologist and water resource specialist for over 30 years is that the present version of the 2014 Draft EA should be considered incomplete, inaccurate and insufficient in its entirety, as it has not meaningfully described the population structure and composition of Gird Creek population to the main-stem Bitterroot River

population, nor has it assessed any probable impacts on these populations due to any aspect of the Proposed Action. Such probable impacts include degradation of water quality due to increased loading of harmful chemical constituents, increased loading of the nutrients nitrogen and phosphorous, increased sedimentation, and increased water temperatures.

X. Failure to Disclose Impacts on Property Values

Airport facilities are typically included with landfills and animal production facilities as the three most incompatible land uses with residential developments. While the property values (and tax base) of the all the residential properties located in the central Bitterroot valley could be adversely effected by airport expansion due to the physical characteristics of the valley, the plight of the homeowners located at the south end of the runway is particularly vexing.

These homeowners reside on a bench i.e. ridge looking down on an airport situated in a three sided depression surrounded by mountain chains on the east and west. In fact, a gap must be excavated in a bench to the north in order to allow for runway expansion (that too is not thoroughly addressed in the EA). The current neighborhood association recognizes that they purchased their homes knowing to expect the routine noise of a small general aviation airport and smaller aircraft whose size was limited by the 4,200' runway. They also knew that most of the private pilots would be VFR rated recreation pilots flying during the daytime for 2-3 seasons of the year.

The conundrum facing these homeowners is that the current 2014 RCA EA which is required to disclose to them future plans for airport expansion is silent with respect to the size, and scope of the future airport expansion. Most importantly to them is the future number and size of the largest aircraft expected to operate at this airport and the time(s) of day they would be allowed to operate. Further, airport facilities by their very nature generate noise and the amount of noise – intensity/volume is also dependent on the size and number of future aircraft facilitated by the extended runway.

The residents recognize that this information would determine not only their potential loss of amenities and enjoyment of their property but the potential loss of property values. The FAA implicitly recognizes its potential liability by requiring the local jurisdiction to create an Airport Affected Area (de facto zoning) forbidding those property owners negatively affected from seeking financial recourse for damages caused by airport externalities. This airport

zoning further diminishes property values by requiring a special permitting process for various uses and requiring homeowners/Real Estate Agents to apprise a potential buyer of the existence of the special airport zone.

There are a series of studies reflecting that property values are reduced when airports are made larger so additional airplanes and larger planes can use the facility. And the FAA and County are liable for this diminution of value because it is their "taking" of the incremental value of peaceful enjoyment. The 2014 EA is silent on this issue.

In 1994 the consulting firm of Booz-Allen & Hamilton, Inc. prepared a report titled *The Effect of Airport Noise on Housing Values: A Summary Report* for the Federal Aviation Administration. The report describes a methodology for evaluating the impact of noise on housing values. The methodology essentially compares market prices in similar neighborhoods that differ only in the level of airport-related noise. In pilot studies using this method, Booz-Allen found that the effect of noise on prices was highest in moderately priced and expensive neighborhoods. In two paired moderately priced neighborhoods north of Los Angeles International Airport, the study found "an average **18.6 percent** higher property value in the quiet neighborhood, or 1.33 percent per dB of additional quiet." (See Bibliography: Impacts of Noise on Property Value.)

A 1996 study funded by the Legislature of the State of Washington used a somewhat similar methodology and found that the proposed expansion of Seattle-Tacoma Airport would cost five nearby cities $500 million in property values and $22 million in real-estate tax revenue. The study of single-family homes -- all in "very good" condition, with three or more bedrooms and two or more baths, and excluding the most expensive and inexpensive units to provide more representative comparisons -- found that "a housing unit in the immediate vicinity of the airport would sell for **10.1 percent** more -- if it were located elsewhere."

The Washington study also concluded: "all other things remaining equal, the value of a house and lot increases by about 3.4% for every quarter of a mile the house is farther away from being directly underneath the flight track of departing/approaching jet aircraft." (Details can be found in Sections 9.01 - 9.07 of the study.)

In 1997 Randall Bell, MAI, Certified General Real Estate Appraiser, licensed real estate broker, and instructor for the Appraisal Institute, provided the results

of his own professional analysis to the Orange County Board of Supervisors. Comparing sales of 190 comparable properties over six months in communities near Los Angeles International Airport, John Wayne Airport, and Ontario Airport, Bell found a diminution in value due to airport proximity averaging **27.4 percent**. (See the full report.) Bell has also developed a list of over 200 conditions that impact real estate values -- airport proximity is categorized as a "detrimental condition."

FAA undoubtedly has confronted this issue before. What studies does FAA have about property value impacts? These studies need to be addressed in the EA.

Regardless of existing information, a site-specific evaluation of property value impacts is needed for Ravalli County and then full disclosure must occur through the NEPA process.

XI. The EA Needs to Disclose "Dark Money" Funding Sources.

It is reported that a source, so far anonymous, has offered to pay Ravalli County's share of enlarging RCA. First, we find it objectionable that our government is relying on anonymous funding sources. This is contrary to the letter and spirit of open government. Second, we do not know what conditions may be placed on such funding. Does the County find itself forever in the debt of this funding source and thus feel obliged to grant special, extra-legal favors? Third, given the totally misleading character of the discussion on expected costs, is the funding source prepared to pay the County's 10% share of all cost overruns? Fourth, is it to be a loan or a grant? This "agreement," which we suspect is not reduced to written contract form, is vital to the taxpayers of Ravalli County. It needs to be fully disclosed in the County's EA and open to public scrutiny.

The Airport Safety Foundation, a pro-expansion group, has already paid for at least a portion of the revised EA. The County needs to disclose how much was paid and what individuals actually paid for it. If the Foundation intends to pay for the costs of expansion, then its funding for that must be made known. It appears that self-interested individuals, by funding the EA and perhaps the expansion, are influencing the outcome.

XII. Historic Hangar

The 2014 EA states in regards to the Hayward Hangars "SHPO determined that

the two structures located on the historic property were eligible for the NRHP under criterion A for their association with Mr. Hayward". The positioning of the flight path and the very close proximity of the south end of the runway to the Daly Ditch offices will result in damage of these historic structures have not been addressed in the EA. It is a well-established fact that vibrations from aircraft landing and taking off can cause damage to building and these historic buildings which are even more vulnerable due to their age.

The 2014 EA states " 4B would have no adverse effect on the Daly Ditch Irrigation District Buildings because no project activities would occur on the lands associated with the site and the historic hangars would remain in place." The employees of Daly Ditch would be significantly affected as they will be well within the 65 DNL on an 8 hour daily exposure to the extreme noise. In addition to this the historic hangars will be damaged as a result of vibration. There are public meeting and employee at the facility and the EA states 5-1 "Currently , they are being used by the Irrigation District primarily for equipment and material storage" There are employees on the premises' 5-6 days a week 52 weeks out of the year and in excess of 8 hours a day. For the engineer and FAA to make the above statement demonstrates a total lack of research on the project. There has been no communication with the Daly Ditch company in this process

XII. Failure to Address Prior Decision to Approve 4200 foot Runway.

The EA fails to address the fact that the previous EA and proposed decision approved a 4200 foot runway as meeting the "purpose and need" of improved safety and expansion of the airport. That decision was based on extensive and thorough analysis. The statement of former Commissioner Grandstaff, attached hereto, substantiates that process. The failure of this EA to discuss and disclose its prior actions, and to provide a clear and fully-supported explanation as to why that decision is now apparently not adequate, is required in this EA. Again, the public participation and disclosure requirements of NEPA and the Montana constitution mandate it.

XIII. Alternatives.

The 2014 RCA EA fails to develop a reasonable range of alternatives (40 C.F.R. 1502.14). There was no alternative developed which took a hard look at just widening the separation of runway/taxiway by the necessary distance with

no extension of runway length from 4,200 feet.

The earlier RCA EA released in 2004 contained such an alternative, which in turn garnered some support from the concerned and interested publics. But years later, the FAA's EA drops any pretext of developing a reasonable range of alternatives by adding a 1,000 foot runway extension component to all five of the "action" alternatives put forth.

It appears this performance between EA drafts (all 'action' alternatives in the 2014 EA 'built' a 5,200 foot runway too), clearly demonstrates the FAA's bias towards a major runway extension project - and the agency's adamant refusal to consider any other potentially valid options.

Considering the location of the runway in wet lands area, the complications of Gird Creek and the potential Bull Trout issue, the fact that the present runway is surrounded by a bench to the north and residential areas to the south that are significantly higher that the runway creating safety issues for both residents and pilots the engineer should have give more consideration to the complete relocation of the runway to a different site. This was not done in this EA. The 2014 EA (3-2) states "The concept of developing a replacement airport at another location was not investigated in the 2012 Forecasting Report or in this EA". This is a clear violation of NEPA requirements.

CEQ regulations also require that: "Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency action, rather than justifying decisions already made." 40 C.F.R. 1502.2(g).

XV. Hazardous Materials, Spills, Remediation

Despite the fact that the RCA is located on a very shallow water table, surrounded by wetlands and located in a valley that is situated on and served by an aquifer through commercial and domestic wells, the 2014 makes no mention of planning for future hazardous, liquid storage/handling or catastrophic spills containment or remediation for an expanding airport. Groundwater table information for the entire site, and connectivity to surface water needs to be included; such information is readily available.

Moreover, because future phases (after Phase I) are alluded to but not specified , planning for expanded airport operations and subsequent liquid hazardous materials is not specified in the 2014 EA e.g. more fuel deliveries

(from distributor), more, larger aircraft fueling, more tanks, more farms, more types of liquids, more spent liquid disposal. Stating that the employees of the FBO at a seasonal airport are responsible for the health and maintenance of the valley's aquifer is cavalier. The statement in 5.8.1.2 (Paragraph 2). "Activities associated with typical GA airport operations generally have a low potential for contamination of surface and groundwater" has little meaning when the water table is extremely close to the surface and the areas surrounded by wetlands, and there is a known history of spills, such as the 4,500 gallon fuel spill in 2008. The EA needs to develop the information about the groundwater and then evaluate potential spill impacts.

The known and potential cumulative adverse impacts from past, present and future spills in and around an expanded airport is completely disregarded by the 2014 RCA EA.

XVI. Inadequate Discussion of the Alleged "Benefit" to Firefighting.

The EA lists as a benefit of the expansion the supposedly improved firefighting capability. This assertion is not documented and contrary to the evidence. Lengthening the runway will cause at best a very minor change in Forest Service's firefighting capability.

The incident regarding the SEAT aircraft "dumping his load" at the north end of the runway was a result of a pilot that was inexperienced in flying out of the RCA. Hundreds of flights with this aircraft have safely landed and taken off with that load. There has even been some speculation that this may have been a staged event. The Interagency Single Engine Air Tanker Operations Guide states that the SEATs load capacity is more dependent on elevation of the airstrip that they are taking off from and the elevation of the terrain that they will be flying in. This aircraft is used all over the United States at a variety of altitudes from a few hundred feet to areas like Ravalli county. Quoting from the SEAT Operations Guide "carrying an average of 700 gallons". This is the average. An analysis of the loads taken out of RCA and Missoula over a one year period with information provided by BLM SEAT headquarters in Boise, ID was done. It is well known in the industry that the SEAT aircraft have a problem if loaded to 800 gallons.

The AT-802 flying out of Missoula using a 4,612 ft runway at an elevation of 3,200 ft carried an average of 661 gallons. The same aircraft for the same period of time flying out of RCA with a 4,200 ft. runway at an elevation of 3,600 ft.

carried and average of 650 gallons. That is less than a 1.5% decreased load and the primary reason for that is the higher elevation of the RCA. To pretend that lengthening the runway to improve the fire-fighting capacity of this aircraft is a significant misrepresentation of the facts. The establishment of an airstrip in a location such as Connor or Sula would be a much more significant enhancement of the fire- fighting capacity than lengthening the runway.

5-YEAR CAPITAL IMPROVEMENT PLAN FOR RAVALLI COUNTY (HAMILTON) AIRPORT

FY-2013

Project Description (by Funding Year in Priority Order)	FEDERAL FUNDS			LOCAL FUNDS	
	St. Apmnt	NPE	Discretionary	Other	Total $
Planning - Conduct Environmental Assessment (Phase IV)		54,000.00		6,000.00	60,000.00
Planning - Conduct Airport Master Plan - ALP		54,000.00		6,000.00	60,000.00
Apron - Rehabilitate Apron - Design Only		90,000.00		10,000.00	100,000.00
Apron - Expand Apron - Design Only		18,000.00		2,000.00	20,000.00
Taxiway - Rehabilitate Taxiway - Design Only		22,500.00		2,500.00	25,000.00
TOTAL FY 2013	$0.00	$238,500.00	$0.00	$26,500.00	265,000.00

FY-2014

Project Description (by Funding Year in Priority Order)	FEDERAL FUNDS			LOCAL FUNDS	
	St. Apmnt	NPE	Discretionary	Other	Total $
Apron - Rehabilitate Apron	1,220,000	400,000		180,000.00	1,800,000.00
Apron - Expand Apron	180,000			20,000.00	200,000.00
Taxiway - Rehabilitate Taxiways	225,000			25,000.00	250,000.00
Land - Acquire Land for Development & Approaches			900,000	100,000.00	1,000,000.00
TOTAL FY 2014	$1,625,000.00	$400,000.00	$900,000.00	$325,000.00	$3,250,000.00

FY-2015

Project Description (by Funding Year in Priority Order)	FEDERAL FUNDS			LOCAL FUNDS	
	St. Apmnt	NPE	Discretionary	Other	Total $
Land - Acquire Land for Development & Approaches & Noise Compatibility			2,700,000	300,000.00	3,000,000.00
TOTAL FY 2015	$0.00	$0.00	$2,700,000.00	$300,000.00	3,000,000.00

FY-2016

Project Description (by Funding Year in Priority Order)	FEDERAL FUNDS			LOCAL FUNDS	
	St. Apmnt	NPE	Discretionary	Other	Total $
Taxiway - Rehabilitate Taxiways	600,000	300,000		100,000.00	1,000,000.00
TOTAL FY 2016	$600,000.00	$300,000.00	$0.00	$100,000.00	1,000,000.00

FY-2017

Project Description (by Funding Year in Priority Order)	FEDERAL FUNDS			LOCAL FUNDS	
	St. Apmnt	NPE	Discretionary	Other	Total $
Runway - Construct Runway - Desing Only	105,000.00	75,000.00		20,000.00	200,000.00
Taxiway - Construct Taxiway - Design Only	51,000.00	75,000.00		14,000.00	140,000.00
TOTAL FY 2017	$156,000.00	$150,000.00	$0.00	$34,000.00	340,000.00

FY-2018

Project Description (by Funding Year in Priority Order)	FEDERAL FUNDS			LOCAL FUNDS	
	St. Apmnt	NPE	Discretionary	Other	Total $
Construct Access Road	225,000.00			25,000.00	250,000.00
Runway - Construct Runway	1,180,000.00	150,000.00	2,000,000.00	370,000.00	3,700,000.00
Taxiway - Construct Taxiway	1,350,000.00			150,000.00	1,500,000.00
TOTAL FY 2018	$0.00	$0.00	$0.00	$0.00	5,450,000.00

TOTAL FY 2013-2018	$2,381,000.00	$1,088,500.00	$3,600,000.00	$785,500.00	7,855,000.00

SPONSOR SIGNATURE AND DATE	

Comments

on the Air Quality Assessment Provided in the Draft Environmental Assessment (DEA)[1]
Prepared for the Proposed Expansion of the Ravalli County Airport (RCA), Hamilton, Montana

by

Dr. Ranajit (Ron) Sahu
Consultant

I have reviewed the relevant sections in the above DEA related to air quality assessments associated with the proposed RCA airport expansion (including the various alternatives considered in the DEA). It is my opinion, based on the reasons provided below, that the DEA is fatally flawed with regards to its (lack of) assessment of likely air pollution impacts associated with the proposed airport expansion. It is my recommendation that a proper air quality assessment be conducted in order to meet the minimum requirements of the environmental assessment and the National Environmental Policy Act (NEPA).

I have over 24 years of air pollution consulting experience for clients ranging from industry, various municipalities, various states, the US EPA, the US Department of Justice, and numerous public interest groups. This includes experience in stationary sources as well as mobile sources including emissions from aircraft, ground support equipment, and associated indirect emissions associated with airports – both civilian and military. A copy of my resume is provided in Attachment A to this report.

First, I note at the outset that the DEA provides no quantitative analysis whatsoever of air quality emissions from the proposed project and the preferred alternative.[2] It contains no

[1] Raalli County Airport Environmental Assessment Draft prepared for the Ravalli County Commission in cooperation with the Federal Aviation Administration (FAA) and the Montana Department of Transportation, by Robert Peccia and Associates, May 2014.

[2] The sum totality of the air quality "analysis" in the DEA is contained in Section 4.2, 5.2, 5.18.2.1, and brief mentions in Section 5.4.1 and 5.4.2. Taken all together, including titles and subtitles, it consists of 1,074 words.

quantification whatsoever of the emissions increases that will be associated with at least the following sources and activities – covering both the operational and construction phases:

- Increased emissions (of many pollutants such as NO_x, CO, PM_{10}, $PM_{2.5}$, SO_2 hydrocarbons, various toxics or hazardous air pollutants, as well as greenhouse gases such as CO_2, N_2O and others[3]) from aircraft tailpipes, associated with fuel combustion at least during the landing and take-off cycle.
- Increased tailpipe emissions (again, numerous pollutants, such as those listed above) due to increased or additional ground-support equipment that will be needed to support the proposed expansion.
- Increased tailpipe emissions due to increase vehicular traffic to and from the airport associated with the airport expansion including passengers, airport workers, and workers/customers associated with increased vendors and other businesses at the airport.
- Increase hydrocarbon and associated air toxic emissions associated with increased fuel storage and handling to support the airport expansion. This includes increases in jet, gasoline, and diesel fuels.
- Increased air pollution from episodes such as fuel-dumping associated with aborted take-offs, which are inevitable at any airport but more so a smaller general aviation airports, with significant numbers of new or relatively inexperienced pilots.
- Increased air pollution from episodes such as potential fuel or ground fires associated with airport operation.

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[3] Fuel combustion in aircraft engines will result in emissions of various types including criteria pollutants such as NO_x, VOCs (both also precursors of ozone), CO, and most importantly particulate matter or PM of various sizes including fine particulate matter or $PM_{2.5}$ and lead; so-called hazardous air pollutants including various organics such as the carcinogens benzene and formaldehyde and diesel particulate matter, and greenhouse gases such as CO_2, CH_4, and N_2O. Various tool are available to quantify such emissions including the FAA's Emissions and Dispersion Modeling System (EDMS) as well as emission factors and tools from EPA. I note that the FAA EDMS does not quantify all pollutants including even more important ones such as $PM_{2.5}$. For that, EPA methods should be used. Nonetheless, any competent air quality professional should be able to quantify emissions from the activities listed above. See, for example, http://www.epa.gov/otaq/aviation.htm for further details.

I specifically object to the DEA's observation that "[W]ithin Ravalli County, particulates and CO are the most notable air pollutants." (see Section 4.2 of the DEA). That may well be but is no justification to avoid the analysis of the many other pollutants that will be emitted as a result of this action, should it proceed forward – including, for example, $PM_{2.5}$, diesel organics, and lead.

- Increased air pollution from construction equipment tailpipe emissions associated with fuel combustion, including toxic fine particulate matter from diesel combustion.
- Increased air pollution due to construction worker transportation to and from the airport.
- Increased air pollution due to earth moving and other similar activities leading to entrainment of fugitive dust (which can contain many different types of pollutants).

The list above is not meant to be comprehensive and includes only the more obvious sources and activities that are associated with any airport expansion including that at RCA. A proper air quality analysis should start by developing such a list tied to the various facets of the proposed project.

It matters little if one or more of the sources/activities above is expected to result in small increases of emissions of one or more pollutants. Setting aside the fact that even small increases in the mass of certain pollutants (say, diesel particulate matter, fine particulate matter or $PM_{2.5}$, or lead, etc.) can have major adverse environmental consequences – particularly for nearby receptors such as children at the school nearby or the elderly who live in the vicinity of the airport - a major purpose of any environmental assessment is as a communication tool so that all stakeholders, including members of the lay public who will potentially be affected by the proposed project are made aware of the various impacts due to the project. Without a most basic assessment of the air emissions (or a justification of why there cannot and will not be any increase in such emissions – a claim that is obviously not sustainable in this case) due to all of the activities listed above, the proposed DEA is <u>fatally compromised as an analytical tool and as a communication tool</u>.

In addition, the lack of such analysis simply does not comport with either the requirements or the spirit of NEPA, pursuant to which, the EA, presumably has been prepared. Plainly, not only did the "analysis" not take a "hard look"[4] at this important environmental impact, it is clear that what is presented in the EA is "hardly any look" at the issue.

[4] NEPA requires that a federal agency "consider every significant aspect of the environmental impact of a proposed action" and "inform the public that it has indeed considered environmental concerns in its decision-making process." (See Kern v. U.S. Bureau of Land Mgmt., 284 F.3d 1062, 1066 (9th Cir. 2002). NEPA does not contain substantive

Second, the (one and only) reason provided in the DEA to justify avoiding any air quality analysis is simply erroneous as I discuss below.

The DEA states

> "FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures* and the FAA *Air Quality Procedures for Civilian Airports & Air Force Bases* (known as the Air Quality Handbook) outline procedures for determining when airport-related projects require an air quality analysis and what level of analysis may be necessary. According to these guidelines, if a general aviation airport is not in a non-attainment area and has less than 180,000 general aviation and air taxi operations forecasted annually, an air quality analysis is not required. Since RCA meets both of these requirements, an air quality analysis was not conducted."[5]

I agree that, at the present time, the area around the airport and Ravalli County in general has not been classified as non-attainment. I discuss this in a little more detail later in my comments. But, the reliance by the authors of the DEA on the aforementioned FAA Air Quality Handbook to avoid analysis does not pass muster.

One, as stated in the reference section of the DEA, the authors apparently relied on this document by the FAA which was issued in 1997 – or over 14 years ago. Clearly, this older and dated document cannot possibly account for the many changes in even the National Ambient Air Quality Standards (NAAQS) that have occurred since – including new standards for fine PM or $PM_{2.5}$, lead, ozone, NO_x and SO_2.[6] NAAQS for all of these have been revised after 1997. In fact, a cursory examination of the 1997 Air Quality Handbook shows no mention of $PM_{2.5}$ whatsoever.

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environmental standards but instead establishes procedural requirements designed to ensure that agencies take a "hard look" at the environmental consequences of their actions. (*Id.*)

[5] DEA, Section 4.2.

[6] See, for example, http://www.epa.gov/air/criteria.html

More glaringly, the FAA itself updated the 1997 Handbook in 2004 (which, itself, is now 10 years old). [7] The DEA makes no mention of this update/addendum. Nonetheless, while still dated, this 2004 addendum contains the following relevant statements:

> "Section 2.1.5....It should be noted that all areas of the U.S. must comply with the NAAQS and that demonstration of conformity with these standards is not just reserved for maintenance and non-attainment areas."
>
> ....
>
> "Section 2.1.7 HAPS.... (new section)"
>
> ....
>
> "Section 2.3 (Screening Thresholds)....The information (i.e. project and analysis types and thresholds contained in Figure 3 (*Air Quality Analysis Gudelines and Thresholds* on pg. 17 of the Handbook are provided for guidance purposes only. The actual types and extent of analyses needed is determined on a case-by-case (or project-by-project) basis in consultation with federal, state and local agencies."

Thus, the FAA notes that an assessment of the NAAQS compliance is not just reserved for non-attainment areas as the DEA states. The FAA recognizes pollutants such as hazardous air pollutants (HAPS), which find no mention in the DEA. And, the FAA explicitly states the obvious – namely that the Air Quality Handbook is mere guidance. It states that the "types and extent" of the analysis are determined on a project-by-project basis because a national handbook cannot possibly account for the site-specific conditions at every airport in the country. And, that there should be consultation with "federal, state, and local" agencies. The DEA contains no discussion that any such consultations took place – at least with the local state agency responsible for air quality – the Montana DEQ – on matters related to emission inventory, modeling, etc.

As if the above were not sufficient, there is yet one additional (and fatal) flaw in the DEA's reliance on (even) the 1997 version of the FAA Air Quality Handbook to justify its lack of analysis. It pertains to the 180,000 operations threshold stated in the DEA's Section 4.2 justification to avoid analysis.

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[7] See, for example, http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/

I quote the relevant (and complete) section from the 1997 FAA Handbook relating to the 180,000 threshold value below:

> "2.3.4 NAAQS Assessment - General
>
> A comparison of the actions' resulting air quality with NAAQS should be considered if pollutant levels are likely to exceed the NAAQS. The number of passengers at larger commercial airports and the level of general aviation and air taxi operations at smaller airports are likely to be good indicators of potential pollutant concerns. For airports, a main pollutant of concern from an air quality standpoint is CO. Cars and aircraft (especially GA) emit moderate amounts of CO while they are idling or taxiing, respectively. Significant road congestion or airport ground delays could potentially cause CO emissions to approach the NAAQS. Actions that would not increase airport capacity, lead to increased congestion of roadways or airfields, or relocate aircraft or vehicular activity closer to sensitive receptors are not likely to exceed the NAAQS for CO. For deciding whether or not a NAAQS assessment should be considered, the total number of airport passengers and general aviation/air taxi operations should be evaluated. If the level of annual enplanements exceeds 1,300,000 (or 2.6 MAP), the level of general aviation and air taxi activity
>
> exceeds 180,000 operations4 per year or a combination thereof, a NAAQS assessment should be considered. These levels were estimated based on a parametric analysis of concentrations produced by aircraft and other airport sources. The relation between these two factors is incorporated into Equation 1 (Illustrated in Figure 4). The equation can be used as a guide for determining whether a NAAQS assessment should be considered.
>
> 3.5 - (1.346 x Million Annual Passengers + 0.0194 x General Aviation & Air Taxi LTOs) < 0
>
> Equation 1: Dispersion Modeling Threshold
>
> If the above equation is not true, a NAAQS assessment does not have to be considered. Otherwise, a NAAQS assessment (including dispersion modeling) should be considered. To determine if a NAAQS assessment should be performed, the nature of the project should be considered in consultation with state or regional air quality regulatory staff. The nature of the project must be considered since special project concerns and characteristics or high background levels of CO may suggest that a NAAQS assessment is indicated at lower activity levels or not at all."

A plain and cursory reading of the above section from the FAA's 1997 Handbook makes it clear that to the extent that the 180,000 threshold is relevant at all – it is so just for one pollutant,

namely CO or carbon monoxide. There is no discussion at all as to how or why that may apply to any other pollutant.

Yet, the DEA, with no discussion of the context of the 180,000 threshold, simply mis-applies it to avoid analysis for any and all pollutants, including, glaringly $PM_{2.5}$.

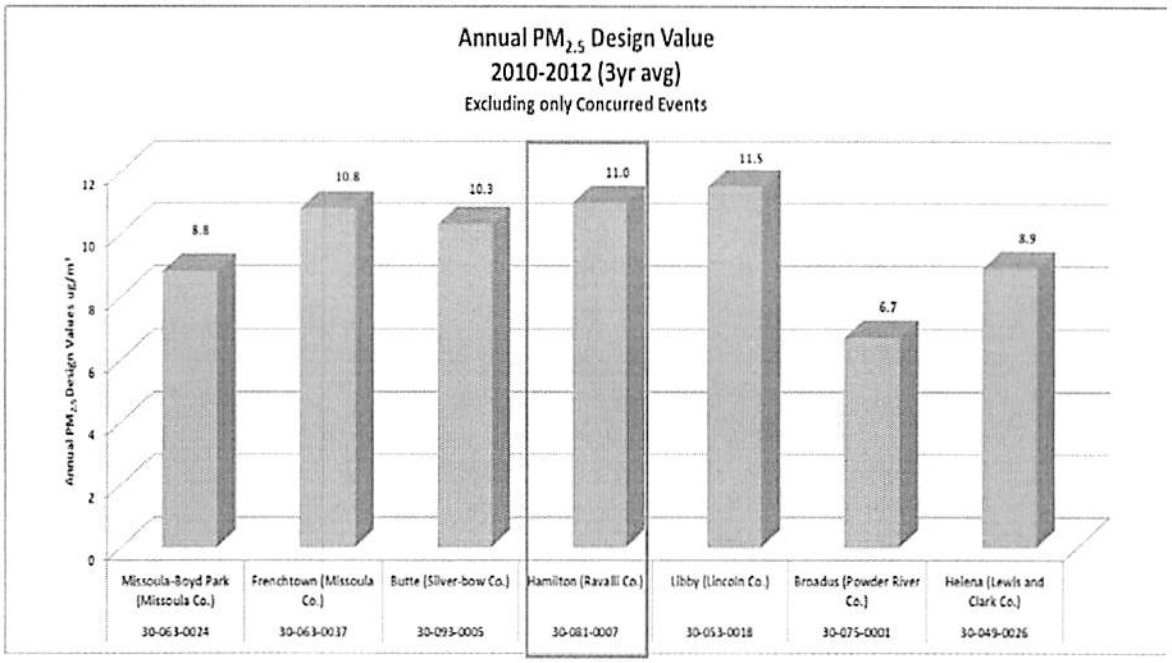
Based on the above, it is clear that the DEA's states justification for not conducting even the most rudimentary air quality analysis associated with the project, is, at best an error (albeit fatal) and at worst, a blatant misrepresentation of the FAA Handbook (and its Addendum), notwithstanding the latter's increasing irrelevance due to its age.

Third, I provide more context for the issue of $PM_{2.5}$ non-attainment in Ravalli County.

There are two numerical $PM_{2.5}$ NAAQS – an annual level of 12 micrograms per cubic meter (ug/m^3) and a short-term 24-hour level of 35 ug/m^3. Both are statistical. $PM_{2.5}$ concentrations are monitored in Hamilton by the MDEQ. I have reviewed the daily $PM_{2.5}$ monitored data, which I obtained from the MDEQ from 2011 through the present. The data are provided in Attachment B.

I agree, as the DEA states, that formally, at the present time, Ravalli County has not been designated as non-attainment for $PM_{2.5}$. However, based on my review of the data and my discussions with the MDEQ it is clear that the area is not significantly lower than the NAAQS. Shown below is a chart taken from a recent MDEQ document[8] showing the "design" value that is compared with the NAAQS is making attainment/non-attainment decisions.

[8] Technical Support Document, Montana Initial Designations 2012 Revised Annual PM2.5 National Ambient Air Quality Standards, available at http://www.deq.mt.gov/PublicComment/ARMB/2012%20PM2.5%20NAAQS%20Designation/2012_pm25_ini-designation.pdf.



In fact, based on the $PM_{2.5}$ "design" value of 11 ug/m^3 shown above, which is only slightly below the NAAQS, the Montana Department of Environmental Quality (MDEQ) considers Ravalli County to be "at risk" of $PM_{2.5}$ non-attainment.[9]

It is important to note that attainment/non-attainment designations involve not only statistical analyses but also the ability to exclude data such as impacts due to wildfires etc. that can affect monitored data. Thus, Ravalli County's "attainment" status for $PM_{2.5}$ relies heavily on exclusion of high concentrations of $PM_{2.5}$ from the actual monitored record due to so-called "exceptional" event such as fires etc. Yet, from a standpoint of an air breather in Ravalli County, it matters little that actual concentrations were due to a fire or some other "exceptional" cause. The air breather does not have any option other than to inhale air – regardless of whether the air contains elevated levels of $PM_{2.5}$ from any specific source.

As an example, see the concentrations of $PM_{2.5}$ just a few days ago at the Hamilton station, taken from the MDEQ's real-time website.

[9] Personal communications, MDEQ staff, July 21-23, 2014.

Hourly Data Report

Hourly Conditions		Cumulative Exposure	
Date Hour Ending	1-Hour Avg	8-Hour Avg	24-Hour Avg
7/19/2014 0:00	63	31	18
7/19/2014 1:00	107	43	22
7/19/2014 2:00	114	55	26
7/19/2014 3:00	102	66	30
7/19/2014 4:00	82	73	33
7/19/2014 5:00	84	78	36
7/19/2014 6:00	71	83	39
7/19/2014 7:00	66	86	41
7/19/2014 8:00	62	86	43
7/19/2014 9:00	60	80	46
7/19/2014 10:00	53	72	47
7/19/2014 11:00	28	63	48
7/19/2014 12:00	24	56	49
7/19/2014 13:00	27	49	50
7/19/2014 14:00	28	43	50
7/19/2014 15:00	32	39	50
7/19/2014 16:00	21	34	50
7/19/2014 17:00	11	28	50
7/19/2014 18:00	13	23	50
7/19/2014 19:00	17	22	50
7/19/2014 20:00	13	20	50
7/19/2014 21:00	11	18	48
7/19/2014 22:00	7	16	47
7/19/2014 23:00	8	13	46
7/20/2014 0:00	11	11	44

All data in µg/m³

The red designation denoted "unhealthy" levels as designated by MDEQ.

Thus, the practical significance is simply that, as the monitored data show, high concentrations of $PM_{2.5}$ are common at Ravalli County now. And, with the proposed project these concentrations will increase even more. Thus, avoiding analysis by relying on the formal lack of non-attainment designation for $PM_{2.5}$ is not only misleading and incompatible with NEPA but simply unconscionable and fatally flawed as to the overall purpose of doing the EA itself – namely to present all stakeholders with the complete set of facts.

As if all of the above were not sufficient, I note also that, specifically, for $PM_{2.5}$, the scientific record is now clear that this is a dangerous pollutant, even at levels below the NAAQS – affecting not just the respiratory system but, more ominously, the cardiovascular system. The consensus is that there is no "safe" level for $PM_{2.5}$. As a relatively recent and comprehensive (as of its writing) review on this subject notes, "[T]he $PM_{2.5}$ concentration– cardiovascular risk relationships for both short- and long-term exposures appear to be monotonic, extending below 15 ug/m^3 (the 2006 annual NAAQS level) without a discernable "safe" threshold."[10] The annual $PM_{2.5}$ NAAQS when this article was published was 15 ug/m^3. While the annual NAAQS level was reduced to the present 12 ug/m^3, the finding that there is no "safe" threshold for $PM_{2.5}$, is still valid.

Based on all of the above, it is my opinion that: (a) the avoidance of a proper air quality analysis associated with the proposed RCA expansion project is not justified and fatally flawed, and (b) that it should be remedied by conducting such an analysis, using current methods and tools, in consultation with all local, state, and federal agencies, as well as local stakeholders to satisfy the requirements of NEPA.

[10] Brook, R.D., et. al., Particulate Matter Air Pollution and Cardiovascular Disease: An Update to the Scientific Statement From the American Heart Association, Circulation, June 2010.

ATTACHMENT A – RESUME

RANAJIT (RON) SAHU, Ph.D, QEP, CEM (Nevada)

CONSULTANT, ENVIRONMENTAL AND ENERGY ISSUES

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EXPERIENCE SUMMARY

Dr. Sahu has over twenty three years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

Specifically, over the last 20+ years, Dr. Sahu has consulted on several municipal landfill related projects addressing landfill gas generation, landfill gas collection, and the treatment/disposal/control of such gases in combustion equipment such as engines, turbines, and flares. In particular, Dr. Sahu has executed numerous projects relating to flare emissions from sources such as landfills as well as refineries and chemical plants. He has served as a peer-reviewer for EPA in relation to flare combustion efficiency, flare destruction efficiency, and flaring emissions.

He has over twenty one years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public. Notably, he has successfully managed a complex soils and groundwater remediation project with a value of over $140 million involving soils characterization, development and implementation of the remediation strategy including construction of a CAMU/landfill and associated groundwater monitoring, regulatory and public interactions and other challenges.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past twenty three years include various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in over 44 states, numerous local jurisdictions and internationally.

In addition to consulting, Dr. Sahu has taught numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management) for the past seventeen years. In this time period he has also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.) public sector (such as the US Department of Justice) and public interest group clients with project management, air quality consulting, waste remediation and management consulting, as well as regulatory and engineering support consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.

Parsons ES, **Manager for Air Source Testing Services.** Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer.** Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1984 M. S., Mechanical Engineering, Caltech, Pasadena, CA.

1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

"Thermodynamics and Heat Transfer," Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

"Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

"Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.

"Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, since 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2011.

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C.Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R.Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

"From Puchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada," with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Annex A

Expert Litigation Support

1. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:

(a) In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

2. Matters for which Dr. Sahu has have provided affidavits and expert reports include:

(b) Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.

(c) Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the United States in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(d) Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the United States in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(e) Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the United States in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (Middle District of North Carolina).

(f) Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the United States in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (Southern District of Ohio).

(g) Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.

(h) Expert Report and Deposition (10/31/2005 and 11/1/2005) on behalf of the United States in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc.*, 5:04-cv-00034-KSF (Eastern District of Kentucky).

(i) Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

(j) Expert Report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

(k) Expert Report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.

(l) Expert Report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.

(m) Expert Report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.

(n) Expert Testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).

(o) Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.

(p) Expert Report and Deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (Western District of Pennsylvania).

(q) Expert Reports and Pre-filed Testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.

(r) Expert Report and Deposition (October 2007) on behalf of MTD Products Inc., in connection with General Power Products, LLC v MTD Products Inc., 1:06 CVA 0143 (Southern District of Ohio, Western Division)

(s) Experts Report and Deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.

(t) Expert Reports, Affidavit, and Deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.

(u) Affidavits (May 2010/June 2010 in the Office of Administrative Hearings))/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

(v) Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy et al., v Duke Energy Carolinas, LLC. in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).

(w) Declaration (August 2008) on behalf of the Sierra Club in the matter of Dominion Wise County plant MACT.

(x) Expert Report (June 2008) on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis.

(y) Expert Report (February 2009) on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas.

(z) Expert Report (June 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

(aa) Expert Report (August 2009) on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina).

(bb) Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.

(cc) Expert Report (August 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(dd) Expert Report and Rebuttal Report (September 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(ee) Expert Report (December 2009) and Rebuttal reports (May 2010 and June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(ff) Pre-filed Testimony (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(gg) Pre-filed Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(hh) Expert Report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.

(ii) Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the United States in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (US District Court for the Eastern District of Michigan).

(jj) Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.

(kk) Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(ll) Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(mm) Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nn) Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, November 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of Plaintiffs v. Public Service Company of New Mexico (PNM), Civil No. 1:02-CV-0552 BB/ATC (ACE). (US District Court for the District of New Mexico).

(oo) Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(pp) Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(qq) Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Case No. 5:10-cv-00156-DF-CMC (US District Court for the Eastern District of Texas, Texarkana Division).

(rr) Pre-Filed Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ss) Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.

(tt) Expert Report (March 2011), Rebuttal Expert Report (Jue 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).

(uu) Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority,* Civil Action No. 4:11-cv-00791 (US District Court for the Southern District of Texas, Houston Division).

(vv) Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(ww) Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(xx) Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club, Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P.,* Civil Action No. A-08-CA-648-LY (US District Court for the Western District of Texas, Austin Division).

(yy) Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.,* Case No. 3:10-cv-747 (TJM/DEP) (US District Court for the Northern District of New York).

(zz) Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association,* Case No. 11-417-MJP (US District Court for the Western District of Washington).

(aaa) Expert Report (March 2012) and Supplemental Expert Report (November 2013) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.,* Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).

(bbb) Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency,* Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).

(ccc) Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment,* Case No. 11-105,493-AS (Holcomb power plant) (Supreme Court of the State of Kansas).

(ddd) Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality,* Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261st Judicial District).

(eee) Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) on behalf of the states of New Jersey and Connecticut in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.,* Civil Action No. 07-CV-5298 (JKG) (US District Court for the Eastern District of Pennsylvania).

(fff) Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project

(ggg) Expert Report (August 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC,* 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.

(hhh) Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.

(iii) Expert Report (October 2012) on behalf of the Appellants (Robert Concilus and Leah Humes) in the matter of Robert Concilus and Leah Humes v. Commonwealth of Pennsylvania Department of Environmental Protection and Crawford Renewable Energy, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2011-167-R.

(jjj) Expert Report (October 2012), Supplemental Expert Report (January 2013), and Affidavit (June 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(kkk) Pre-filed Testimony (October 2012) on behalf of No-Sag in the matter of the North Springfield Sustainable Energy Project before the State of Vermont, Public Service Board.

(lll) Pre-filed Testimony (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(mmm) Expert Report (February 2013) on behalf of Petitioners in the matter of Credence Crematory, Cause No. 12-A-J-4538 before the Indiana Office of Environmental Adjudication.

(nnn) Expert Report (April 2013), Rebuttal report (July 2013), and Declarations (October 2013, November 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(ooo) Expert Report (May 2013) and Rebuttal Expert Report (July 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(ppp) Declaration (August 2013) on behalf of A. J. Acosta Company, Inc., in the matter of A. J. Acosta Company, Inc., v. County of San Bernardino, Case No. CIVSS803651.

(qqq) Comments (October 2013) on behalf of the Washington Environmental Council and the Sierra Club in the matter of the Washington State Oil Refinery RACT (for Greenhouse Gases), submitted to the Washington State Department of Ecology, the Northwest Clean Air Agency, and the Puget Sound Clean Air Agency.

(rrr) Statement (November 2013) on behalf of various Environmental Organizations in the matter of the Boswell Energy Center (BEC) Unit 4 Environmental Retrofit Project, to the Minnesota Public Utilities Commission, Docket No. E-015/M-12-920.

(sss) Expert Report (December 2013) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(ttt) Expert Testimony (December 2013) on behalf of the Sierra Club in the matter of Public Service Company of New Hampshire Merrimack Station Scrubber Project and Cost Recovery, Docket No. DE 11-250, to the State of New Hampshire Public Utilities Commission.

(uuu) Expert Report (January 2014) on behalf of Baja, Inc., in Baja, Inc., v. Automotive Testing and Development Services, Inc. et. al, Civil Action No. 8:13-CV-02057-GRA (District of South Carolina, Anderson/Greenwood Division).

(vvv) Declaration (March 2014) on behalf of the Center for International Environmental Law, Chesapeake Climate Action Network, Friends of the Earth, Pacific Environment, and the Sierra Club (Plaintiffs) in the matter of Plaintiffs v. the Export-Import Bank (Ex-Im Bank) of the United States, Civil Action No. 13-1820 RC (United States District Court for the District of Columbia).

(www) Direct Prefiled Testimony (June 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17319 (Michigan Public Service Commission).

(xxx) Expert Report (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

(yyy) Declaration (July 2014) on behalf of Public Health Intervenors in the matter of EME Homer City Generation v. US EPA (Case No. 11-1302 and consolidated cases) relating to the lifting of the stay entered by the Court on December 30, 2011 (US Court of Appeals for the District of Columbia).

3. Occasions where Dr. Sahu has provided oral testimony in depositions, at trial or in similar proceedings include the following:

(zzz) Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill.

(aaaa) Trial Testimony (February 2002) on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

(bbbb) Trial Testimony (February 2003) on behalf of the United States in the Ohio Edison NSR Cases, *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(cccc) Trial Testimony (June 2003) on behalf of the United States in the Illinois Power NSR Case, *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(dddd) Deposition (10/20/2005) on behalf of the United States in connection with the Cinergy NSR Case. *United States, et* al. *v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (Southern District of Indiana).

(eeee) Oral Testimony (August 2006) on behalf of the Appalachian Center for the Economy and the Environment re. the Western Greenbrier plant, WV before the West Virginia ????.

(ffff) Oral Testimony (May 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) re. the Thompson River Cogeneration plant before the Montana Board of Environmental Review.

(gggg) Oral Testimony (October 2007) on behalf of the Sierra Club re. the Sevier Power Plant before the Utah Air Quality Board.

(hhhh) Oral Testimony (August 2008) on behalf of the Sierra Club and Clean Water re. Big Stone Unit II before the South Dakota Board of Minerals and the Environment.

(iiii) Oral Testimony (February 2009) on behalf of the Sierra Club and the Southern Environmental Law Center re. Santee Cooper Pee Dee units before the South Carolina Board of Health and Environmental Control.

(jjjj) Oral Testimony (February 2009) on behalf of the Sierra Club and the Environmental Integrity Project re. NRG Limestone Unit 3 before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(kkkk) Deposition (July 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

(llll) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coleto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(mmmm) Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nnnn) Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(oooo) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

(pppp) Oral Testimony (November 2009) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(qqqq) Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(rrrr) Oral Testimony (February 2010) on behalf of the Environmental Defense Fund re. the White Stallion Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(ssss) Deposition (June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(tttt) Trial Testimony (September 2010) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (Western District of Pennsylvania).

(uuuu) Oral Direct and Rebuttal Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(vvvv) Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions*, No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(wwww) Oral Testimony (October 2010) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(xxxx) Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(yyyy) Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(zzzz) Deposition (December 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(aaaaa) Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(bbbbb) Oral Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ccccc) Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).

(ddddd) Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(eeeee) Oral Testimony at Hearing (March 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(fffff) Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(ggggg) Oral Testimony at Hearing (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(hhhhh) Deposition (March 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(iiiii) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(jjjjj) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(kkkkk) Deposition (February 2014) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(lllll) Trial Testimony (February 2014) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).

(mmmmm) Trial Testimony (February 2014) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(nnnnn) Deposition (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

ATTACHMENT B – MONITORING DATA FOR $PM_{2.5}$ FROM THE HAMILTON STATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: NDM

RAW DATA REPORT

Report Request ID: 1235273 Report Code: AMP350 Jul. 22, 2014

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	30	081	0007	88101	3						

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
ALL			

SELECTED OPTIONS

Option Type	Option Value
RAW DATA EVENTS	INCLUDE EVENTS
DAILY STATISTICS	MEAN
UNITS	REPORTED
MERGE PDF FILES	YES
INCLUDE NULLS	YES
AGENCY ROLE	PQAO

SORT ORDER

Order	Column
1	STATE_CODE
2	COUNTY_CODE
3	SITE_ID
4	PARAMETER_CODE
5	POC

DATE CRITERIA

Start Date	End Date
2011 01 01	2014 03 31

APPLICABLE STANDARDS

Standard Description
CO 1-hour 1971
Lead 3-Month 2009
Lead 3-Month PM10 Surrogate 2009
Lead Quarterly 1978
NO2 Annual 1971
Ozone 1-hour Daily 2005
PM10 24-hour 2006
PM25 Annual 2013
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1068
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JANUARY 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	20.6	19.9	20.6	17.2	25.5	20.6	27.2	34.6	31.6	31.1	27.9	16.7	25.3	21.9	18.4	17.7	17.7	41.6	35.8	41.6	32.4	37.8	57.5	38.3	24	28.31
2	38.0	36.3	36.5	30.6	42.9	34.8	42.1	33.8	34.8	35.8	29.9	29.9	28.4	18.7	22.1	15.4	18.9	22.9	20.9	27.7	41.4	33.4	27.6	31.7	24	30.60
3	40.9	65.6	30.9	42.6	51.9	43.8	33.6	53.9	45.8	64.1	39.7	34.1	20.6	19.4	20.7	19.0	16.2	27.2	40.7	38.2	46.5	34.3	30.9	38.7	24	37.47
4	42.4	56.0	27.9	50.6	26.7	42.9	35.5	38.2	36.8	33.6	43.1	29.9	22.6	16.5	13.7	22.4	20.9	21.4	27.0	19.9	43.1	28.7	37.0	23.1	24	31.66
5	32.2	30.9	24.3	21.9	18.2	16.2	8.7	18.2	20.4	17.0	16.5	25.5	32.9	17.5	24.1	22.4	19.5	19.7	4.8	7.9	10.8	9.9	7.0	3.6	24	17.92
6	7.4	8.9	7.0	9.9	7.2	.9	1.6	4.1	AT	4.6	2.4	-.1	2.1	3.8	1.1	1.1	2.6	4.3	10.1	17.5	13.3	7.9	5.5	11.1	23	5.84
7	19.7	9.4	8.4	10.6	13.5	10.1	9.1	12.1	13.5	24.6	17.7	15.7	19.0	12.8	13.3	12.1	10.4	11.4	24.6	16.5	16.2	5.5	9.9	21.9	24	14.08
8	21.1	18.0	2.4	2.6	.4	-.6	1.6	.4	-.3	-.1	.4	1.6	.4	-.3	1.9	4.1	1.9	1.1	2.6	2.1	3.8	8.4	10.4	6.2	24	3.75
9	7.2	9.6	4.8	6.5	9.4	6.0	8.7	8.4	5.0	5.3	3.8	4.1	5.0	5.5	4.1	1.4	-.1	.4	3.3	3.1	1.6	2.8	1.3	.6	24	4.49
10	3.3	3.5	2.3	2.8	1.6	1.3	1.6	1.8	6.0	7.7	8.7	7.4	3.3	4.3	5.3	2.6	.1	6.0	16.7	18.0	39.5	20.9	14.9	23.8	24	8.48
11	18.7	25.3	12.8	33.8	23.1	15.2	12.8	13.0	30.4	29.2	23.6	16.5	12.1	11.3	10.4	11.6	13.5	22.6	36.5	40.7	29.2	42.1	30.9	28.7	24	22.67
12	31.1	25.0	38.0	23.6	30.7	30.7	26.9	18.2	5.7	6.0	4.1	3.1	4.1	1.6	1.4	3.3	3.3	3.8	4.1	3.1	6.0	4.1	-1.1	-.6	24	11.51
13	.1	.4	-.6	.9	1.6	1.1	.6	3.3	5.5	3.8	3.1	2.1	.9	.9	1.4	AY	AY	2.6	3.6	2.1	3.1	4.6	4.8	2.1	22	2.16
14	-.8	1.4	.4	-.1	2.6	1.9	1.4	1.9	3.1	2.6	.6	2.4	3.3	4.8	5.0	1.6	2.1	.1	.6	6.5	5.3	2.1	1.6	1.1	24	2.15
15	1.6	3.8	1.1	.2	1.6	.6	.4	-.3	1.1	2.4	.6	1.4	2.4	.9	-.1	.2	.9	3.1	8.4	15.5	7.7	5.8	5.3	2.6	24	2.80
16	.9	2.3	.6	.9	-.1	-.1	1.1	.9	2.6	3.3	1.9	1.4	1.4	.4	.4	2.1	3.3	3.6	2.6	2.4	4.3	4.1	4.3	4.1	24	2.03
17	1.4	1.9	3.8	3.1	1.6	2.9	3.3	.9	.2	-1.3	-.3	2.6	1.1	-.6	.7	.9	.4	1.1	2.4	.6	-.1	2.9	4.6	2.1	24	1.51
18	-.3	2.1	1.1	-1.0	1.1	1.6	-.1	1.1	2.4	1.1	.4	.4	1.9	3.6	5.8	4.1	3.3	7.5	5.0	3.6	6.0	4.3	2.9	4.1	24	2.58
19	1.9	-.6	.1	.1	-.4	.4	3.6	3.1	.1	1.4	4.1	4.3	4.6	3.1	-.3	.9	1.6	1.6	3.6	6.5	10.1	11.3	17.7	9.6	24	3.68
20	8.2	5.3	3.1	.1	-1.3	.6	1.8	2.6	1.3	.4	2.4	1.8	.6	3.6	6.5	3.3	1.9	4.1	5.0	4.6	2.4	5.7	10.1	20.2	24	3.93
21	1.1	2.4	2.6	2.4	2.6	1.6	2.1	2.9	4.3	6.7	9.6	8.9	2.4	-.3	-.8	.2	-.2	1.1	4.1	2.6	3.3	6.0	4.3	.9	24	2.96
22	.4	2.6	2.1	-.3	1.6	2.4	.4	1.4	7.5	9.6	4.8	4.3	8.5	9.4	4.8	1.4	-1.0	2.1	3.6	1.1	5.5	7.2	5.8	5.8	24	3.79
23	1.6	-1.8	-.3	-.3	-1.1	.6	3.8	4.1	3.8	3.6	3.6	3.6	.9	1.1	3.1	2.9	1.6	-.1	4.1	7.0	18.2	43.9	19.2	13.0	24	5.67
24	12.3	8.7	7.7	7.9	6.2	6.9	5.0	3.6	4.5	4.3	1.9	4.6	11.3	12.8	11.8	10.4	8.9	10.1	11.1	11.8	11.8	11.3	21.4	8.7	24	8.96
25	11.6	22.1	19.2	21.4	5.8	6.2	18.2	25.5	14.2	13.3	17.5	17.7	23.4	16.5	15.7	8.7	10.6	16.7	25.5	36.3	30.4	31.4	19.9	42.1	24	19.58
26	30.7	7.9	8.4	7.4	2.6	.4	1.9	1.4	.6	.6	2.4	1.6	-.6	2.9	5.0	2.1	3.1	8.9	8.0	8.2	4.6	2.9	3.8	2.4	24	4.88
27	5.3	7.0	4.6	2.1	5.3	3.6	1.4	4.6	4.1	2.6	3.6	6.0	7.2	7.0	4.8	1.2	2.9	8.9	12.3	7.0	1.6	1.4	.7	-.6	24	4.36
28	.1	.6	-.8	1.9	6.2	8.7	8.4	5.5	6.7	7.2	4.6	1.6	.4	1.4	3.6	5.1	4.3	3.1	5.1	9.2	6.7	3.1	1.4	1.1	24	3.97
29	1.6	1.9	4.1	3.6	-.1	-1.3	1.4	3.6	.6	.6	3.4	4.3	3.4	1.6	3.1	2.4	2.4	4.3	6.0	9.4	12.6	12.1	19.0	17.5	24	4.90
30	13.3	20.2	3.3	3.6	4.3	3.8	.4	-1.1	.6	3.3	4.3	2.9	1.6	2.4	3.3	4.1	3.6	-.8	-.6	3.8	3.6	2.3	4.1	6.0	24	3.85
31	4.3	2.8	5.7	7.2	4.3	5.7	7.2	6.4	7.9	6.9	3.8	2.6	4.5	6.9	6.7	5.5	6.0	8.2	6.5	3.3	4.8	7.9	7.4	15.9	24	6.18
NO.:	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31		
MAX:	42.4	65.6	38.0	50.6	51.9	43.8	42.1	53.9	45.8	64.1	43.1	34.1	32.9	21.9	24.1	22.4	20.9	41.6	40.7	41.6	46.5	43.9	57.5	42.1		
AVG:	12.19	12.88	9.11	10.12	9.53	8.69	8.76	9.94	10.03	10.69	9.36	8.35	8.23	6.82	7.00	6.34	6.02	8.66	11.10	12.19	13.73	13.10	12.58	12.45		

MONTHLY OBSERVATIONS: 741 MONTHLY MEAN: 9.92 MONTHLY MAX: 65.6

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: FEBRUARY 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	31.6	14.4	25.3	12.8	10.3	10.6	17.0	22.4	16.7	26.2	10.6	7.7	7.4	11.3	8.9	6.2	6.9	6.9	15.2	25.5	13.2	23.8	30.2	22.4	24	15.98
2	24.8	20.6	17.4	25.5	14.2	15.9	24.3	14.9	24.3	23.3	27.4	AT	8.9	9.4	11.8	11.1	6.5	7.9	17.5	18.2	39.0	31.6	22.6	20.7	23	19.03
3	33.1	36.5	39.5	40.7	22.4	19.2	30.2	23.6	24.1	23.3	17.7	13.3	17.2	12.3	16.7	15.0	17.0	14.2	15.2	16.2	17.0	15.5	15.0	17.5	24	21.35
4	19.4	22.1	22.1	15.5	17.7	17.2	19.2	23.9	21.6	24.4	18.5	30.0	9.6	7.0	2.6	.4	-.1	.9	1.9	1.4	2.4	3.3	3.8	2.4	24	11.97
5	1.6	2.1	-.3	-.3	.6	.9	2.9	6.2	4.8	1.1	2.4	2.9	.4	2.6	4.3	3.8	.9	-.1	3.6	3.8	2.9	2.9	18.0	6.7	24	3.11
6	7.7	11.1	16.2	13.0	12.8	13.0	12.1	12.1	13.7	15.0	5.7	6.2	5.8	5.3	6.7	5.8	4.1	3.8	4.8	6.0	6.5	7.2	8.9	7.7	24	8.80
7	4.3	1.4	1.1	3.6	6.2	5.8	4.8	5.0	3.8	4.3	4.3	.2	-1.3	.2	.7	.9	.7	.4	3.6	5.0	1.6	1.1	-.3	-2.0	24	2.31
8	-1.8	-.3	.6	-.1	1.3	1.9	.4	.9	2.1	5.5	4.1	3.1	4.6	2.1	1.4	1.1	1.1	3.1	5.5	9.9	10.3	8.9	10.4	8.9	24	3.54
9	8.4	10.6	12.5	11.1	11.1	10.6	9.1	11.6	16.7	13.0	11.8	9.9	6.5	7.0	12.6	14.0	13.0	12.6	22.9	31.9	20.7	30.7	24.8	17.5	24	14.61
10	8.9	7.4	4.3	3.6	4.5	3.3	1.6	1.9	1.6	2.6	3.1	4.3	5.5	3.8	AY	1.9	-.1	-.1	.6	4.3	5.8	2.9	3.1	2.9	23	3.38
11	2.4	1.6	-1.3	.9	2.4	1.9	.4	-.1	2.6	3.6	5.8	3.8	2.1	2.4	-.1	-.1	.4	-.6	-.8	-.3	1.6	2.9	3.3	2.1	24	1.54
12	.9	-.8	-.6	.1	.1	.6	1.6	1.9	2.6	1.4	.4	1.9	1.4	.4	-1.0	-1.0	.7	2.4	3.1	-.1	-3.2	-1.0	.9	1.6	24	.64
13	2.9	4.1	2.4	2.1	1.6	-.6	-.1	1.9	1.6	.9	2.1	2.1	1.9	1.1	.7	.4	.9	1.6	5.5	7.2	4.6	3.8	5.3	3.6	24	2.40
14	1.1	1.6	1.6	3.8	6.5	3.1	1.9	1.6	BA	.4	1.9	3.8	7.2	6.3	7.7	8.0	3.6	1.9	1.6	3.3	3.1	1.1	1.4	1.1	23	3.20
15	-1.3	.1	2.4	1.4	.2	.4	2.4	1.4	1.1	1.1	-.3	-.1	.4	.7	-1.5	-1.3	1.2	2.6	3.6	5.5	4.6	1.4	1.4	2.1	24	1.23
16	.1	-.6	.4	.9	2.6	2.6	1.6	2.6	3.3	2.6	3.6	2.4	-.3	-.3	1.1	-.1	.6	2.9	7.5	7.9	5.3	6.5	-1.5	-3.2	24	2.02
17	4.1	4.6	2.4	-.6	-2.8	-2.0	3.6	3.1	1.4	1.6	1.1	2.1	-.3	-2.5	-1.8	-.8	.4	-.3	-.8	.9	1.1	3.6	8.4	7.4	24	1.41
18	5.5	7.2	8.7	10.1	8.7	5.8	6.0	7.0	5.0	4.3	5.3	4.6	4.1	2.4	1.4	3.1	3.8	.6	-.1	1.9	8.2	16.5	15.7	15.7	24	6.31
19	8.9	6.2	3.1	4.3	5.5	6.7	5.0	1.9	2.8	2.6	3.8	4.3	4.1	7.0	7.5	7.7	7.4	3.8	4.6	4.8	4.1	4.6	3.8	3.6	24	4.92
20	2.3	2.1	3.1	3.8	2.8	2.1	2.4	1.1	.1	2.8	5.0	5.0	5.0	4.3	4.1	3.1	2.6	5.3	6.7	7.7	11.6	23.4	26.7	27.7	24	6.70
21	23.4	30.6	19.2	9.6	17.2	13.0	13.2	15.7	16.7	18.2	14.5	14.0	11.3	11.6	13.8	12.8	11.1	10.1	11.1	32.2	42.9	18.5	-1.1	.4	24	15.83
22	4.1	3.6	-1.1	-.8	-1.3	-1.3	.4	2.1	2.8	-1.1	-1.3	1.9	2.4	2.4	2.1	-.8	-1.3	-.3	.9	2.4	2.1	2.1	3.3	5.5	24	1.20
23	6.5	4.8	2.1	1.1	1.4	4.6	5.5	2.8	1.4	-.1	.6	2.4	1.4	-1.1	-1.5	-1.3	-2.0	-.8	2.4	6.2	6.5	7.4	7.0	3.6	24	2.54
24	4.3	3.1	2.3	.4	-1.8	-.4	2.6	2.8	.6	-.4	-.6	1.1	4.8	4.6	2.4	4.8	4.1	3.3	4.8	22.9	36.0	23.3	18.7	15.4	24	6.63
25	14.0	22.1	16.2	8.6	7.9	4.8	4.8	3.8	1.4	2.8	5.0	AY	4.0	4.1	4.3	4.1	4.6	2.6	8.4	20.2	20.9	11.3	53.4	15.4	23	10.64
26	12.0	9.6	5.5	4.8	3.0	5.5	10.3	11.3	10.6	10.8	9.1	7.7	6.7	4.3	5.5	5.0	5.5	8.4	9.4	10.3	11.3	10.8	11.6	20.2	24	8.72
27	17.7	18.7	23.4	14.7	15.7	7.7	4.0	3.8	4.3	1.6	.9	-.8	1.6	3.3	2.1	2.4	2.9	2.9	3.6	3.3	2.3	3.6	3.1	1.4	24	6.01
28	2.9	2.8	1.4	.4	-2.3	-1.1	2.1	2.4	4.3	3.8	1.6	.6	-.1	-.1	1.1	.9	1.1	1.9	.1	3.1	3.8	.4	1.9	.4	24	1.39
29																									0	
30																									0	
31																									0	
NO.:	28	28	28	28	28	28	28	28	27	28	28	26	28	28	27	28	28	28	28	28	28	28	28	28		
MAX:	33.1	36.5	39.5	40.7	22.4	19.2	30.2	23.9	24.3	26.2	27.4	30.0	17.2	12.3	16.7	15.0	17.0	14.2	22.9	32.2	42.9	31.6	53.4	27.7		
AVG:	8.92	8.83	8.21	6.82	6.02	5.42	6.76	6.77	7.11	6.99	5.86	5.17	4.37	4.00	4.21	3.83	3.49	3.50	5.80	9.34	10.26	9.58	10.71	8.17		

MONTHLY OBSERVATIONS: 668 MONTHLY MEAN: 6.68 MONTHLY MAX: 53.4

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1068
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MARCH 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-.6	-.3	-.8	.6	.9	-.1	.9	2.1	2.4	.4	.4	5.5	4.1	2.6	2.6	3.1	4.1	5.8	7.2	9.6	20.9	26.3	26.7	26.5	24	6.29
2	18.9	9.6	8.4	10.1	10.6	7.9	7.2	8.2	8.4	6.7	6.3	4.6	4.6	2.4	-.8	-.5	1.4	2.4	.7	4.1	6.5	6.5	6.3	5.0	24	6.06
3	3.3	2.6	1.9	-.8	-3.2	-1.5	.6	2.4	3.8	2.1	1.1	AT	-.4	1.1	2.6	.9	-.1	1.8	1.8	3.8	16.7	13.2	10.8	7.2	23	3.12
4	5.5	4.8	2.8	.4	.9	3.1	4.0	3.8	5.2	6.4	4.8	4.5	5.7	5.5	5.0	7.7	8.6	15.9	9.1	10.1	12.5	24.3	26.5	23.1	24	8.34
5	17.9	20.9	21.9	19.4	6.7	4.8	1.6	.1	.9	3.1	4.3	5.3	8.2	8.7	5.3	.4	.1	.4	-.1	3.3	5.0	15.7	19.7	5.0	24	7.44
6	4.0	3.1	2.6	2.8	3.1	3.3	2.8	3.6	5.3	7.2	7.4	3.3	1.6	-.6	-2.3	1.9	.9	-.1	4.3	6.5	7.4	15.7	24.6	18.7	24	5.30
7	21.6	14.7	22.4	11.3	10.3	11.1	13.7	10.1	4.0	3.1	7.4	8.7	4.3	3.3	1.6	1.1	3.3	5.0	3.8	5.0	11.1	17.7	12.3	12.3	24	9.13
8	11.1	8.9	6.7	4.3	2.6	.8	.6	2.1	3.3	4.5	6.0	5.7	2.4	-1.1	-.8	.9	.9	-1.6	-3.2	-.6	4.0	5.0	3.1	1.8	24	2.81
9	1.4	-.1	-1.6	.9	1.8	.1	.4	1.1	1.6	.1	-.4	.6	1.9	2.8	3.1	3.3	3.8	4.8	4.8	3.3	1.1	2.1	3.3	2.1	24	1.76
10	2.8	3.3	2.8	3.3	2.3	-1.1	-1.3	2.8	4.8	4.5	1.6	.6	4.3	4.6	1.4	.1	.6	.4	2.3	3.1	.6	.1	.1	-.4	24	1.82
11	-1.1	-.1	.6	-.4	-1.6	-1.8	-.6	.6	1.8	.9	2.8	2.8	2.6	AY	3.1	.6	-.6	2.1	4.0	2.6	6.2	15.4	3.8	6.9	23	2.20
12	9.1	4.6	3.8	5.0	1.8	1.1	3.1	4.0	2.8	1.6	3.5	5.0	5.7	5.3	2.4	1.1	.9	.9	3.1	5.7	5.0	2.8	1.6	-.4	24	3.32
13	2.6	4.5	.6	1.1	1.6	.1	.6	2.8	5.0	4.0	4.0	2.6	2.8	4.1	.9	-1.3	-.6	1.6	1.9	4.5	8.4	5.5	1.6	.9	24	2.49
14	1.1	-.4	-2.8	-4.2	-2.8	-3.0	-2.1	-.9	-.4	3.6	3.3	1.6	.1	-1.6	-1.3	.4	2.4	.9	-1.8	1.8	6.5	6.7	2.3	1.1	24	.44
15	4.3	3.3	3.3	3.8	3.3	3.6	2.8	6.0	11.3	9.4	5.3	19.7	2.1	.6	1.4	2.8	1.8	1.1	1.8	2.1	2.1	.1	.1	.6	24	3.86
16	-.8	1.6	1.4	-1.6	-1.8	-.1	1.6	1.3	-.1	1.1	.4	-2.0	-2.8	-.6	1.1	1.6	1.1	.1	.1	-.4	.1	3.1	4.8	.9	24	.42
17	-1.1	-2.1	-3.0	-1.6	-1.8	.1	4.0	3.3	2.3	1.1	-.1	3.6	4.0	2.6	2.8	.6	-2.0	-2.3	-1.1	.9	17.7	14.2	13.2	15.9	24	2.97
18	13.7	11.6	8.2	7.4	6.0	6.9	5.2	7.4	19.4	14.7	13.2	10.1	7.9	8.2	7.5	6.0	6.7	8.2	8.4	7.7	10.6	14.0	12.3	9.4	24	9.61
19	8.9	7.9	15.4	13.0	9.6	7.2	8.4	8.9	9.4	9.4	15.2	10.1	14.9	4.3	3.6	1.6	.9	-1.1	.1	4.3	8.4	15.9	13.2	7.7	24	8.22
20	1.8	1.8	.1	-2.8	-.4	1.3	-1.1	-1.1	.1	2.3	.8	-.9	2.1	3.6	2.3	1.1	.6	2.1	4.3	4.0	5.7	21.9	14.9	11.3	24	3.16
21	10.3	11.3	13.7	12.5	11.3	7.9	6.2	10.8	10.4	5.2	2.3	3.3	4.8	4.5	5.3	5.7	6.2	5.5	6.5	19.2	6.0	6.7	10.1	11.1	24	8.20
22	8.6	6.0	2.8	4.8	4.8	2.1	2.6	5.0	4.0	2.1	1.1	-.8	-.1	2.6	3.1	-.1	.1	1.6	2.1	2.1	5.0	9.4	16.2	4.5	24	3.73
23	3.5	-2.1	-2.1	2.3	.4	.6	2.8	7.7	12.5	10.6	6.5	4.3	4.5	1.6	-1.5	.6	.6	-.6	-.8	3.6	9.9	9.9	6.7	6.0	24	3.65
24	7.7	11.8	14.0	11.1	8.1	6.0	6.2	17.2	9.5	8.4	9.9	6.0	2.6	3.1	5.5	6.0	3.1	3.1	7.2	8.4	6.5	4.1	1.8	.6	24	6.83
25	4.1	8.4	7.4	3.8	3.8	5.2	6.5	7.4	4.5	.9	.4	3.1	2.1	-.6	.9	.9	.9	1.1	2.4	4.3	7.0	8.9	8.6	7.4	24	4.14
26	2.8	1.1	4.0	4.0	2.3	2.3	3.1	8.9	10.3	6.7	4.5	.1	-2.5	-2.7	-2.5	-2.0	-.8	-.6	-.8	-.1	3.8	3.8	.1	.4	24	1.93
27	3.1	5.5	5.0	6.2	6.9	4.3	3.3	6.2	4.5	.6	.1	-1.3	-1.6	-1.1	-3.0	-1.3	1.6	3.1	5.2	6.0	3.1	2.1	4.5	9.4	24	3.02
28	10.6	5.0	2.8	2.8	4.0	5.7	5.2	6.2	5.0	2.3	1.4	-1.8	-3.2	3.1	5.7	3.1	.9	-.6	-2.5	-4.2	-1.6	1.1	2.1	1.6	24	2.28
29	1.3	1.8	7.7	6.0	-.9	-.6	-1.8	-.1	2.6	5.2	5.0	.9	-.1	AY	AY	2.3	2.3	-.8	-1.6	-1.1	-.1	2.6	.4	.8	22	1.45
30	2.1	-.8	.4	.6	-1.3	-.9	-.1	.9	-1.1	-2.3	-.1	2.1	4.3	2.4	.9	1.1	.1	-.8	-1.1	-1.3	-2.3	-1.6	1.6	3.8	24	.28
31	2.6	.4	.4	3.3	3.3	1.1	-.6	2.1	AT	4.5	2.1	4.1	.9	-2.0	2.4	1.9	-1.5	-.6	-2.0	-.8	3.1	1.1	-1.6	-.8	23	1.02
NO.:	31	31	31	31	31	31	31	31	30	31	31	30	31	29	30	31	31	31	31	31	31	31	31	31		
MAX:	21.6	20.9	22.4	19.4	11.3	11.1	13.7	17.2	19.4	14.7	15.2	19.7	14.9	8.7	7.5	7.7	8.6	15.9	9.1	19.2	20.9	26.3	26.7	26.5		
AVG:	5.84	4.80	4.86	4.17	2.99	2.50	2.77	4.55	4.98	4.21	3.89	3.71	2.83	2.30	1.94	1.66	1.56	1.90	2.13	3.79	6.35	8.85	8.13	6.46		

MONTHLY OBSERVATIONS: 739 MONTHLY MEAN: 4.06 MONTHLY MAX: 26.7

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158869
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: APRIL 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-.1	.1	.6	2.3	3.6	5.0	5.7	5.0	5.7	5.0	2.1	-.1	.4	-.1	-.8	-.3	.7	-.1	.9	5.5	6.0	2.6	1.1	1.1	24	2.16
2	-.1	-.4	-2.1	-1.6	1.3	3.3	4.8	4.5	5.0	4.5	1.3	-1.1	-.6	-.6	-.1	1.6	1.1	.1	.4	-1.1	-1.3	5.0	3.8	-1.8	24	1.08
3	-.4	.4	-.4	-2.8	-5.2	-4.0	.6	.9	1.6	-1.1	-1.1	3.8	3.1	2.4	3.3	2.6	-.8	-2.0	-1.3	.1	1.6	2.1	3.3	3.1	24	.41
4	1.8	4.0	5.0	2.6	1.1	.8	-.4	.9	3.1	4.3	3.3	2.8	4.5	1.9	-.6	-.6	-.8	.9	-1.8	-3.3	-.1	-.3	-3.0	-2.5	24	.98
5	.4	.6	.6	1.8	1.3	.1	.8	2.8	1.3	.9	.4	-.1	.6	-.1	-1.6	-.1	-2.3	-4.2	-1.8	-1.6	-1.8	-1.3	-.1	.4	24	-.13
6	2.1	3.3	2.8	1.8	1.3	1.6	1.6	1.3	2.6	1.6	-.1	-.6	-1.6	.6	3.8	3.6	2.8	2.3	2.1	1.3	.9	1.8	3.3	4.0	24	1.84
7	3.0	3.5	4.3	3.1	3.8	3.1	5.7	9.6	8.2	7.7	9.6	8.4	7.9	9.6	8.9	7.9	7.4	6.9	6.5	6.2	6.0	4.3	4.0	4.0	24	6.23
8	3.8	3.8	3.8	5.7	6.7	6.0	4.5	2.8	2.3	2.3	AY	5.7	6.9	4.3	5.5	5.5	2.1	3.6	5.7	5.5	5.7	6.7	7.7	7.7	23	4.97
9	8.6	9.8	11.3	9.8	7.2	8.4	8.9	5.2	3.6	4.8	3.3	3.1	2.3	1.4	2.3	4.5	3.6	.4	.4	2.3	4.8	5.2	5.5	5.7	24	5.10
10	6.7	6.7	4.5	2.1	2.3	2.3	5.2	5.7	4.8	7.7	6.2	5.0	2.8	.4	1.9	2.1	.4	-.1	-.4	-5.0	-3.8	3.1	5.2	6.2	24	3.00
11	4.5	2.8	5.0	4.8	4.5	5.7	4.3	.6	2.1	4.3	1.1	1.9	3.6	1.6	.1	-2.8	-2.3	1.1	.6	-3.3	-4.0	-1.3	3.3	4.8	24	1.79
12	.4	1.6	3.1	.9	3.1	4.8	2.8	4.5	5.7	1.1	1.3	6.2	4.6	1.1	1.9	.9	1.6	1.9	2.8	4.3	3.5	7.7	16.7	11.3	24	3.91
13	8.2	4.0	4.5	6.2	6.2	3.8	3.8	7.7	8.2	4.8	2.8	3.1	4.1	5.3	7.7	8.7	6.5	5.3	5.3	4.8	4.3	4.5	5.0	1.8	24	5.28
14	-1.1	-.6	-2.5	-5.2	-2.5	.4	.1	1.3	2.3	.6	-1.8	2.1	4.8	4.5	4.6	3.6	2.4	-3.7	-4.0	3.6	6.9	4.8	2.3	6.9	24	1.24
15	7.4	4.5	3.5	5.2	5.9	3.8	3.1	3.1	2.6	2.8	1.1	4.5	11.8	8.7	4.6	7.2	10.6	12.6	14.7	12.5	11.6	11.1	9.6	7.2	24	7.07
16	7.2	7.4	4.0	2.1	4.3	2.3	.4	4.3	4.0	-.4	-.6	.4	1.4	1.4	.9	1.4	2.6	2.4	1.8	4.3	2.8	1.1	.1	.1	24	2.32
17	3.3	5.0	6.5	7.7	5.7	4.8	5.3	3.6	.4	-.1	.1	-.1	.1	1.6	3.8	4.1	3.3	4.8	6.5	5.2	3.8	3.1	2.3	2.1	24	3.45
18	2.3	3.8	3.5	1.3	1.1	3.1	4.5	4.3	4.3	6.0	5.0	2.8	BA	4.3	6.0	5.5	3.3	2.1	2.3	2.8	.8	-1.3	-.4	.1	23	2.93
19	-2.8	-1.3	3.5	2.6	1.1	1.1	1.6	3.8	4.8	3.8	4.0	4.8	3.3	3.3	3.1	5.5	2.8	.1	1.6	.1	-1.8	3.0	6.4	2.6	24	2.38
20	3.5	5.2	3.1	2.6	3.8	2.6	3.8	4.5	5.3	6.0	3.6	1.1	4.5	5.8	2.1	1.9	3.1	3.3	4.1	4.8	4.5	3.6	3.3	4.0	24	3.75
21	5.5	3.1	1.6	2.1	3.3	2.6	2.8	2.3	1.6	1.8	3.5	6.2	6.5	5.5	2.3	-1.1	.8	1.6	-1.1	-2.3	-2.1	-1.8	2.1	5.0	24	2.16
22	1.8	2.1	3.3	.6	3.3	3.5	.1	1.8	3.3	3.8	4.5	4.8	1.3	1.4	4.0	.9	.6	1.4	-.4	2.3	4.0	7.9	11.8	6.9	24	3.13
23	6.4	5.7	.8	-.1	2.1	3.1	1.1	2.6	7.7	9.1	7.2	2.1	.4	1.4	1.4	3.6	.1	.6	3.8	2.6	3.5	18.2	8.4	8.9	24	4.20
24	5.7	4.5	5.5	4.5	3.1	3.0	5.7	5.2	3.6	2.1	1.9	1.4	2.9	4.1	2.6	1.1	1.6	2.9	4.1	3.8	4.8	7.7	6.5	3.8	24	3.84
25	4.5	5.5	3.1	4.5	4.8	3.8	2.3	-.4	2.1	2.8	.9	2.8	1.9	2.1	4.8	3.1	.6	2.8	4.0	2.6	2.8	4.0	3.3	.1	24	2.87
26	.4	1.6	-.1	-1.6	-2.1	-1.6	.3	.1	-1.3	-.4	-.8	-1.1	-.9	.4	2.1	AY	1.8	1.6	1.1	-1.1	-1.3	4.8	6.7	4.3	23	.56
27	2.6	2.1	4.3	.6	-1.3	2.1	3.3	3.3	4.8	5.2	4.5	3.3	.7	-1.1	-.1	2.4	1.9	-.6	-1.1	1.4	1.6	3.1	5.0	3.1	24	2.13
28	3.1	2.6	2.1	3.6	2.8	.9	.4	.1	1.8	4.0	3.6	2.3	4.0	3.6	.4	-1.1	-.6	1.8	2.6	1.8	3.1	4.5	3.5	4.0	24	2.29
29	4.3	2.6	3.5	2.8	.4	1.3	2.3	1.8	1.8	1.8	.1	-1.1	.6	1.1	-1.6	-1.3	2.1	.6	-1.6	-.6	2.8	5.0	1.6	1.1	24	1.31
30	2.8	3.3	4.8	4.3	4.3	5.5	6.4	7.2	3.1	-.4	3.3	6.0	5.3	1.9	.1	2.9	5.0	3.1	.4	1.1	1.3	2.1	3.1	5.2	24	3.42
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	30	29	30	29	30	30	29	30	30	30	30	30	30	30	30		
MAX:	8.6	9.8	11.3	9.8	7.2	8.4	8.9	9.6	8.2	9.1	9.6	8.4	11.8	9.6	8.9	8.7	10.6	12.6	14.7	12.5	11.6	18.2	16.7	11.3		
AVG:	3.19	3.24	3.12	2.48	2.58	2.77	3.06	3.35	3.55	3.21	2.42	2.68	3.01	2.59	2.45	2.53	2.07	1.78	1.94	2.02	2.36	4.03	4.38	3.71		

MONTHLY OBSERVATIONS: 717 MONTHLY MEAN: 2.86 MONTHLY MAX: 18.2

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158869
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MAY 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	5.0	4.5	5.5	3.0	.1	2.8	6.0	6.5	4.5	3.3	5.8	6.7	6.3	5.3	3.1	4.1	3.6	1.1	1.9	-.8	-2.3	2.6	6.0	6.0	24	3.78
2	5.0	4.0	4.3	4.3	3.3	3.6	4.0	4.3	3.6	6.5	10.6	7.5	2.4	3.6	3.3	1.1	1.9	2.6	3.1	.9	2.4	.9	-4.0	-2.3	24	3.20
3	1.8	3.1	2.6	1.8	1.1	.9	.4	1.4	1.9	2.6	2.1	.6	.9	1.4	2.4	3.6	2.6	-.1	-3.3	-2.8	1.4	3.6	2.8	1.8	24	1.44
4	2.6	3.3	3.1	1.8	1.6	3.3	4.3	5.0	5.3	2.1	.6	1.9	3.6	5.8	6.3	4.6	2.9	4.1	4.6	2.9	-.3	-1.3	1.4	2.3	24	2.99
5	4.0	7.2	5.3	3.1	2.6	3.1	7.2	9.6	10.6	9.9	4.6	1.9	3.8	3.4	3.6	1.1	AT	AT	1.9	5.8	3.3	3.3	4.8	5.3	22	4.79
6	4.0	3.3	2.6	3.6	7.4	8.7	10.1	10.8	10.1	8.2	5.5	2.1	2.1	1.4	1.2	3.3	5.5	4.3	2.6	4.1	4.3	3.8	5.0	3.8	24	4.91
7	1.8	3.1	2.8	2.1	1.8	3.6	3.6	3.1	2.8	3.1	4.8	4.8	4.1	1.2	1.1	3.6	3.4	3.4	2.1	.4	1.4	.1	-.3	2.8	24	2.53
8	3.1	2.6	2.8	4.8	6.0	4.3	1.9	3.6	4.8	-.8	-2.7	1.1	2.9	2.1	1.9	2.4	2.4	1.6	.4	-.8	.9	2.1	2.8	2.1	24	2.18
9	1.1	1.1	.6	-.6	-1.5	2.8	5.0	2.4	2.1	2.6	1.6	1.1	2.9	2.9	1.6	4.3	4.8	4.6	3.8	-.6	.2	3.4	3.6	2.4	24	2.18
10	.9	5.3	6.0	3.1	3.3	3.8	5.5	7.2	8.7	7.2	3.1	1.9	2.9	3.6	5.1	3.4	1.4	5.1	7.0	3.1	2.9	7.2	6.5	3.6	24	4.49
11	1.4	.4	1.9	1.4	2.8	3.6	3.3	6.2	8.9	7.2	4.8	4.4	4.6	6.0	2.6	.2	2.4	2.4	1.6	4.1	4.4	1.6	1.1	3.1	24	3.35
12	3.3	3.8	2.9	1.4	.4	2.1	5.8	4.8	5.0	15.5	8.5	8.7	7.5	6.3	7.0	6.3	4.3	4.1	4.1	5.5	7.0	5.0	-1.5	-2.8	24	4.79
13	2.6	3.6	4.3	3.6	1.6	3.1	6.7	7.7	4.8	4.8	10.4	11.4	6.3	3.4	3.6	AY	4.1	7.0	8.7	8.0	4.8	3.8	5.8	3.3	23	5.37
14	.6	2.4	5.7	6.5	6.2	6.0	6.0	8.4	11.6	8.7	5.1	4.6	3.6	4.1	6.8	7.7	5.6	3.9	5.1	3.6	.9	1.9	2.6	3.6	24	5.05
15	3.1	2.1	.4	-.6	.6	1.4	2.1	1.9	3.4	3.6	2.4	4.1	4.6	5.3	2.9	.9	5.3	5.0	2.6	3.4	2.9	3.6	4.6	1.6	24	2.80
16	.4	4.6	5.8	2.8	1.1	2.6	4.1	3.8	1.4	.2	.9	-.8	-.5	.2	-1.8	1.1	2.6	.7	1.9	2.1	.4	.4	.1	.1	24	1.43
17	1.4	.6	-1.3	-.3	.6	-.6	-.6	1.1	3.3	3.6	2.6	2.1	1.9	3.1	3.1	2.9	2.1	2.6	2.9	3.6	4.6	2.8	2.6	3.6	24	2.01
18	5.8	3.8	1.9	6.2	35.8	1.6	1.9	3.6	4.1	3.6	3.8	2.6	2.1	2.1	-.8	-.3	2.9	3.6	3.6	3.6	3.1	5.0	7.4	5.3	24	4.68
19	3.8	4.3	2.8	.6	3.8	6.5	6.2	9.4	9.6	9.7	9.2	6.7	4.6	3.1	2.6	4.1	7.7	6.5	4.6	4.1	4.3	8.0	7.2	4.3	24	5.57
20	2.4	-1.8	-.4	4.1	7.7	8.9	5.8	6.2	7.5	9.7	12.4	8.5	5.8	5.1	2.4	3.6	9.4	8.7	4.1	5.3	10.6	10.4	5.8	3.3	24	6.06
21	2.4	6.5	9.1	8.9	6.0	7.0	10.9	10.6	9.2	8.4	8.5	6.0	3.8	3.6	5.3	4.6	5.5	5.5	5.3	7.7	8.5	9.9	8.7	5.1	24	6.96
22	6.7	8.7	4.3	2.1	4.6	4.3	4.6	7.7	7.5	5.8	6.8	6.3	5.6	3.8	3.6	5.1	2.9	1.9	3.1	2.9	1.6	1.9	5.8	5.5	24	4.71
23	.4	.4	5.3	6.5	3.6	1.4	2.6	6.5	7.9	6.5	4.6	2.6	2.4	3.6	3.9	4.1	2.6	.9	2.1	4.6	5.3	5.8	6.0	3.8	24	3.89
24	4.1	5.0	5.8	6.7	5.5	3.1	-.6	.4	1.1	1.6	1.6	-.8	.6	1.1	-1.1	-.1	5.0	4.1	5.3	8.2	5.5	6.7	5.3	5.0	24	3.30
25	5.5	4.3	2.6	3.8	3.8	2.1	4.1	3.4	6.3	8.2	3.4	1.4	1.4	-.3	.0	2.2	5.6	3.9	2.9	2.7	2.9	5.1	5.5	4.1	24	3.54
26	5.7	6.5	4.3	2.6	.4	.6	3.1	2.9	-.6	-.6	.1	2.1	3.1	2.6	1.4	2.6	2.4	-1.5	1.2	3.6	1.1	.4	2.8	4.6	24	2.14
27	3.6	1.6	1.6	1.9	2.1	3.1	1.6	1.4	2.9	1.9	2.6	3.1	.4	.2	1.5	AY	3.1	4.1	3.1	2.4	3.1	3.1	2.6	3.1	23	2.35
28	2.8	2.1	4.8	3.8	.6	1.9	2.4	4.1	4.6	1.4	1.9	3.1	2.1	-.1	-2.2	.7	3.4	1.9	1.2	3.1	2.6	1.4	1.9	1.1	24	2.11
29	1.6	1.6	.9	3.3	4.3	3.1	5.0	4.1	2.6	4.3	5.5	4.6	2.9	1.4	3.1	4.6	2.9	3.6	4.1	2.1	1.4	.6	1.6	.6	24	2.91
30	.4	2.6	3.3	3.1	3.8	3.3	2.6	2.8	1.1	1.6	2.4	3.6	3.6	3.1	2.9	.7	-1.0	-.1	2.1	2.6	1.6	3.8	1.9	-1.8	24	2.08
31	1.4	3.6	3.8	2.8	2.8	5.5	5.8	2.6	1.4	4.6	6.0	6.7	6.0	3.6	3.6	3.9	2.7	4.3	8.7	7.5	6.0	2.4	1.9	4.1	24	4.24
NO.:	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	29	30	30	31	31	31	31	31	31		
MAX:	6.7	8.7	9.1	8.9	35.8	8.9	10.9	10.8	11.6	15.5	12.4	11.4	7.5	6.3	7.0	7.7	9.4	8.7	8.7	8.2	10.6	10.4	8.7	6.0		
AVG:	2.86	3.36	3.40	3.17	3.99	3.47	4.24	4.95	5.10	5.00	4.50	3.89	3.36	2.97	2.58	2.98	3.67	3.33	3.30	3.32	3.12	3.53	3.49	2.85		

MONTHLY OBSERVATIONS: 740 MONTHLY MEAN: 3.60 MONTHLY MAX: 35.8

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JUNE 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6.5	9.9	9.9	7.7	7.0	7.9	8.2	9.4	7.2	5.5	6.7	5.1	3.6	3.4	3.6	4.4	6.5	7.7	8.5	9.2	6.5	4.6	4.1	4.6	24	6.57
2	6.0	4.6	2.9	4.3	3.1	.9	2.1	2.1	-.6	-.1	3.1	3.1	2.6	2.1	1.9	.2	1.4	4.6	.2	-.1	1.4	.4	1.6	2.4	24	2.08
3	.9	-.3	1.1	.1	-.8	1.6	4.1	1.4	.4	.6	.6	3.8	9.4	9.2	3.4	.2	.7	2.7	2.9	1.9	-1.5	-.6	4.1	7.2	24	2.21
4	5.8	6.0	6.5	2.1	1.6	1.1	1.4	1.4	.4	5.3	9.9	8.9	4.6	2.9	4.8	4.3	3.8	4.8	4.6	5.1	8.0	11.9	11.6	6.3	24	5.13
5	1.4	1.1	6.0	6.2	3.1	1.9	5.3	9.9	10.9	6.3	2.9	4.8	5.3	5.5	5.9	5.6	6.5	5.6	5.6	7.5	7.0	17.0	8.5	7.5	24	6.13
6	7.7	9.4	8.7	7.0	7.7	8.2	6.0	6.0	6.5	6.8	6.3	5.3	7.0	6.3	3.8	2.4	4.6	AV	8.2	6.3	3.1	2.9	3.1	4.6	23	6.00
7	5.8	4.1	5.3	7.0	7.2	7.5	6.7	6.3	5.3	4.6	6.0	7.0	6.0	4.6	3.1	5.8	AT	AT	6.8	11.4	9.2	4.3	6.0	7.9	22	6.27
8	8.9	8.4	6.5	8.2	8.7	3.3	1.1	3.1	5.1	2.1	-1.8	.6	6.2	7.7	4.1	2.7	2.9	5.5	4.8	3.4	2.9	2.1	5.5	6.2	24	4.51
9	4.8	3.3	1.9	3.6	2.4	1.9	4.6	3.6	6.3	2.6	-.8	3.6	5.3	4.6	5.3	9.0	7.3	3.9	1.9	.9	.2	.2	4.6	5.0	24	3.58
10	2.6	3.3	3.3	3.6	4.8	5.3	5.5	7.0	8.5	8.2	6.0	6.3	4.4	.7	1.7	2.1	.9	1.7	3.1	3.4	3.8	4.6	5.8	5.5	24	4.25
11	6.0	6.0	4.8	3.6	4.6	5.8	7.7	5.0	3.1	5.8	4.6	4.4	5.5	4.6	2.7	2.4	2.9	4.1	3.1	.9	-1.0	1.9	4.8	2.6	24	4.00
12	2.9	4.1	3.8	3.4	5.5	5.8	3.4	2.9	5.1	5.6	5.3	6.0	4.6	4.8	5.3	4.8	4.4	2.9	3.1	5.3	3.6	2.1	AM	4.8	23	4.33
13	3.3	3.8	4.1	3.3	4.6	6.7	8.7	6.3	2.1	4.1	7.2	9.0	7.3	2.4	-.3	-1.5	-.3	3.4	4.1	3.6	3.4	3.8	1.1	-4.2	24	3.58
14	-.8	4.1	4.8	5.5	5.5	5.3	3.6	3.1	5.3	8.7	15.3	9.2	6.5	5.6	4.6	.7	1.4	1.7	.2	2.4	2.7	2.4	2.9	-2.3	24	4.10
15	.6	6.5	3.3	1.9	4.8	7.0	6.7	7.7	5.5	4.6	7.5	5.3	2.4	1.9	1.9	2.6	3.1	3.8	2.9	1.6	.7	-1.5	-2.0	2.4	24	3.38
16	4.3	3.6	4.6	3.3	1.6	5.3	9.2	5.5	-.3	3.3	4.6	-1.0	-1.5	.2	1.2	1.2	.9	.9	.7	.2	.9	2.1	2.9	3.1	24	2.37
17	3.3	3.8	1.9	2.4	2.6	2.6	2.6	1.9	6.7	4.6	1.6	4.3	3.4	3.6	5.1	2.9	1.9	3.1	2.9	3.6	5.5	8.2	5.8	3.1	24	3.64
18	3.8	2.8	5.0	9.2	6.5	5.5	7.2	8.9	8.5	6.3	7.0	7.5	7.7	6.0	6.0	4.8	3.6	4.1	4.6	3.6	.2	-1.8	2.1	4.1	24	5.13
19	5.8	5.0	1.6	1.4	2.9	1.4	.4	4.3	2.6	2.6	4.8	4.4	3.4	-.3	-.5	1.7	.7	.7	1.9	2.9	4.1	5.3	1.1	-1.0	24	2.38
20	.1	2.9	8.9	6.7	2.4	5.8	6.7	8.2	12.7	AY	7.2	3.4	5.6	4.8	4.8	4.4	2.7	1.7	1.9	1.6	2.1	4.8	7.2	6.2	23	4.90
21	.9	.2	3.6	6.5	7.0	4.1	6.5	15.7	8.7	6.5	5.3	6.8	6.0	5.5	4.6	4.8	5.1	4.6	6.3	5.8	4.6	4.8	3.9	4.8	24	5.53
22	5.5	5.8	6.2	3.3	3.3	4.6	4.8	8.9	10.4	6.8	5.8	6.5	6.3	5.9	4.9	3.0	.8	.5	5.1	5.6	3.9	3.9	2.9	4.6	24	4.97
23	4.1	3.4	4.4	4.6	4.8	5.3	6.3	6.3	4.8	3.1	2.4	3.2	5.3	4.8	4.1	4.3	3.4	4.4	5.8	6.5	3.6	1.2	3.6	3.1	24	4.28
24	3.4	4.3	2.4	1.1	2.6	4.8	5.0	9.4	9.4	3.1	2.9	5.3	5.3	3.4	3.9	3.9	2.1	3.4	3.4	3.4	3.9	3.4	3.8	4.3	24	4.08
25	3.8	.9	1.1	1.1	2.1	6.7	5.8	6.5	7.2	3.4	.7	.4	2.1	1.9	2.1	3.6	3.4	2.7	2.6	1.9	2.4	5.1	4.3	3.6	24	3.14
26	5.5	4.8	2.6	-.1	-.6	4.3	6.2	15.2	5.3	2.7	.9	3.1	2.4	2.6	2.9	.4	2.4	3.4	.7	2.6	4.8	5.5	4.6	.6	24	3.45
27	1.6	3.3	4.1	3.8	2.4	.9	1.4	4.8	10.2	10.2	5.8	4.6	6.5	5.8	2.9	2.7	1.7	1.4	2.7	4.4	7.0	7.7	9.4	8.7	24	4.75
28	8.7	8.9	6.5	6.5	5.8	3.3	4.8	8.0	6.0	6.0	6.3	6.0	AT	8.5	8.1	4.5	5.0	5.7	6.6	6.3	6.3	7.5	6.5	7.7	23	6.50
29	9.2	8.7	9.4	7.7	8.0	8.2	6.3	8.0	9.2	10.2	8.2	5.3	5.1	7.7	6.8	2.7	2.2	.9	.9	2.7	2.1	3.4	3.4	1.2	24	5.73
30	1.9	-.1	1.2	1.1	-.1	.4	-1.3	3.6	7.3	7.8	6.8	2.9	1.2	1.2	.0	-.5	.7	1.4	1.4	1.9	3.6	3.6	.2	-3.0	24	1.80
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	29	30	30	29	30	30	30	29	28	30	30	30	30	29	30		
MAX:	9.2	9.9	9.9	9.2	8.7	8.2	9.2	15.7	12.7	10.2	15.3	9.2	9.4	9.2	8.1	9.0	7.3	7.7	8.5	11.4	9.2	17.0	11.6	8.7		
AVG:	4.14	4.42	4.55	4.20	4.04	4.45	4.90	6.35	5.99	5.08	4.97	4.84	4.81	4.26	3.62	3.00	2.85	3.26	3.58	3.86	3.50	4.03	4.25	3.72		

MONTHLY OBSERVATIONS: 714 MONTHLY MEAN: 4.28 MONTHLY MAX: 17.0

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JULY 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	.6	4.6	3.6	6.2	5.3	2.9	3.1	AY	7.5	13.1	10.4	8.2	5.1	2.7	5.6	6.0	3.9	3.9	3.6	3.1	3.1	3.9	3.6	3.1	23	4.92
2	.4	.6	4.1	4.1	4.1	4.3	4.8	7.2	10.0	6.8	5.6	5.3	4.1	2.9	5.1	5.1	5.4	5.2	3.5	3.5	6.5	8.2	7.5	8.2	24	5.44
3	9.7	9.7	7.2	5.8	3.1	7.2	13.3	11.6	8.9	7.0	7.5	9.7	8.7	7.8	7.1	6.4	6.9	5.4	5.4	6.1	6.3	26.3	25.6	13.1	24	9.41
4	15.0	9.4	7.5	4.8	6.0	7.2	8.9	12.4	16.3	9.9	8.9	8.2	5.8	4.1	5.6	6.6	6.9	8.6	10.5	11.5	18.3	35.1	75.0	36.6	24	14.13
5	14.3	13.8	11.9	9.2	8.7	10.1	11.6	19.0	18.8	14.5	14.5	11.4	9.5	11.2	11.2	9.3	7.4	7.4	7.4	3.5	3.4	6.3	7.5	10.9	24	10.53
6	8.7	5.6	6.8	5.8	5.3	7.7	10.2	12.6	17.0	11.9	11.9	11.6	8.8	5.4	6.4	7.4	6.2	5.7	7.7	8.1	5.9	1.9	3.6	6.3	24	7.85
7	4.8	6.0	7.7	6.0	2.6	1.4	5.3	19.7	10.4	10.9	10.9	8.8	9.7	9.9	8.2	8.5	8.0	7.7	6.3	4.8	6.0	8.7	8.2	7.5	24	7.83
8	9.4	8.2	5.1	5.6	5.6	3.9	4.1	4.1	5.1	5.8	6.0	6.3	5.5	4.6	4.3	2.1	.4	.9	.7	1.4	1.2	.0	2.4	3.8	24	4.02
9	-.8	.6	3.8	3.1	4.1	5.0	3.8	7.2	12.4	8.0	6.3	6.0	4.8	3.7	1.7	2.9	3.7	2.2	1.5	1.9	4.6	6.3	6.3	4.4	24	4.31
10	2.9	5.0	5.8	5.3	2.9	1.9	6.5	11.6	11.9	9.4	7.0	4.8	4.8	4.4	4.9	5.4	6.3	9.3	7.8	6.1	9.2	12.8	9.7	5.8	24	6.73
11	9.9	9.4	7.2	8.9	6.2	4.8	7.5	9.9	11.9	11.4	15.0	3.9	7.5	10.5	9.0	10.0	9.3	4.9	3.5	5.4	5.3	5.1	6.5	8.9	24	8.00
12	10.6	12.4	13.3	12.6	12.3	9.6	9.6	17.5	13.8	10.9	10.4	9.2	7.8	11.0	10.3	8.6	7.6	8.3	8.3	6.5	8.5	11.4	13.3	11.7	24	10.65
13	10.2	9.2	9.2	9.0	9.7	10.2	11.4	14.0	15.8	12.1	17.0	13.6	12.1	11.4	12.4	12.6	9.9	7.0	9.0	10.2	9.5	10.7	9.0	6.8	24	10.92
14	8.5	8.5	5.5	5.5	4.3	7.0	8.5	6.3	8.7	10.7	17.5	8.2	9.7	9.7	8.0	7.5	8.2	7.0	7.3	8.7	8.0	8.0	9.2	8.7	24	8.30
15	6.7	3.8	6.3	10.2	7.7	7.0	6.8	15.7	AY	5.1	4.6	3.9	4.8	3.9	3.9	5.6	3.4	3.4	4.4	3.2	4.4	10.2	12.4	10.7	23	6.44
16	10.7	9.9	9.2	6.5	5.8	5.8	4.3	5.1	7.3	5.1	4.1	6.3	3.1	1.5	4.7	5.1	3.4	3.4	3.9	6.3	5.6	4.8	8.0	8.0	24	5.75
17	4.1	1.1	1.9	6.3	7.2	6.5	8.2	10.6	17.0	10.7	9.0	6.5	4.6	4.7	6.4	6.2	2.8	3.0	5.0	4.7	7.3	11.4	11.6	10.9	24	6.99
18	10.7	9.4	9.2	9.4	8.7	8.0	8.5	11.4	12.1	11.1	11.2	8.5	8.6	11.5	9.8	5.3	3.8	5.5	7.7	9.6	10.5	11.4	11.1	8.9	24	9.25
19	16.5	11.1	11.9	11.4	17.5	14.3	14.0	13.8	14.5	12.4	12.1	10.4	3.9	2.5	3.0	1.7	5.3	8.5	6.3	4.1	-.8	-1.8	1.2	1.2	24	8.13
20	2.1	1.9	2.4	5.5	7.0	6.0	4.6	5.1	5.1	7.5	8.9	7.5	7.0	3.4	1.7	2.1	2.4	.7	.7	1.4	1.6	3.6	4.6	2.6	24	3.98
21	-1.0	.6	3.6	4.3	5.7	5.5	5.3	8.9	18.3	9.7	7.5	4.8	4.3	4.8	3.1	2.9	2.9	3.7	5.1	4.8	4.1	4.6	5.3	3.4	24	5.09
22	121.9	4.3	3.1	2.9	3.9	2.1	.2	-.6	3.4	16.0	2.4	2.1	2.4	2.7	1.4	.4	2.4	3.6	3.9	3.4	.9	1.9	1.9	-3.2	24	7.64
23	-3.0	-.1	.6	5.0	5.8	2.4	3.1	4.1	2.6	8.2	11.6	8.5	6.3	4.1	6.0	5.6	3.1	2.4	5.6	7.0	2.9	5.3	8.2	5.5	24	4.62
24	4.6	6.3	6.0	5.5	5.5	5.0	7.9	8.7	5.8	7.5	9.4	9.9	10.7	9.2	5.6	3.0	3.8	5.0	3.1	3.3	6.8	9.4	9.4	9.2	24	6.69
25	8.7	7.0	6.5	6.0	8.2	10.2	11.6	17.8	13.1	11.4	11.4	12.6	12.2	10.5	11.5	10.3	8.1	9.6	8.4	7.8	7.8	7.7	6.8	9.4	24	9.78
26	8.9	6.8	8.0	7.0	6.5	7.2	8.7	8.7	8.0	6.8	4.1	3.6	6.8	4.6	2.9	2.9	5.6	6.8	3.6	4.6	2.9	2.7	2.9	4.4	24	5.63
27	6.0	2.6	-2.3	-3.0	2.6	5.5	6.7	8.9	17.3	10.2	6.5	2.6	2.9	4.9	6.1	4.4	6.3	10.2	6.6	3.9	5.3	2.9	3.4	7.0	24	5.31
28	4.3	2.9	4.1	5.5	6.5	4.8	7.7	8.9	10.2	12.6	BA	AT	19.2	11.1	7.5	4.4	5.2	7.1	7.1	7.0	6.3	6.0	6.5	7.2	22	7.36
29	7.5	3.6	3.6	3.8	3.6	6.0	9.4	11.9	24.6	AY	10.6	9.2	8.7	6.3	3.2	2.8	3.3	3.5	4.0	5.2	4.9	4.6	4.8	4.1	23	6.49
30	4.6	6.0	5.5	4.6	3.1	7.9	12.1	12.4	21.7	11.6	11.4	11.6	9.2	7.0	8.7	8.5	6.3	5.6	4.6	5.4	9.9	11.9	11.1	10.6	24	8.80
31	10.6	9.4	8.9	6.8	7.0	8.2	6.5	10.2	10.2	7.7	9.0	9.0	8.6	7.9	5.7	3.8	5.8	6.2	4.0	2.5	3.4	4.1	5.1	7.0	24	6.98
NO.:	31	31	31	31	31	31	31	30	30	30	30	30	31	31	31	31	31	31	31	31	31	31	31	31		
MAX:	121.9	13.8	13.3	12.6	17.5	14.3	14.0	19.7	24.6	16.0	17.5	13.6	19.2	11.5	12.4	12.6	9.9	10.2	10.5	11.5	18.3	35.1	75.0	36.6		
AVG:	10.58	6.12	6.04	6.12	6.21	6.31	7.55	10.49	12.26	9.87	9.42	7.74	7.33	6.45	6.16	5.59	5.29	5.54	5.36	5.32	5.79	7.92	9.73	7.83		

MONTHLY OBSERVATIONS: 739 MONTHLY MEAN: 7.36 MONTHLY MAX: 121.9

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: AUGUST 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6.5	5.5	7.0	8.2	5.8	7.5	9.4	8.7	9.7	9.2	8.9	9.4	7.7	5.8	6.4	7.3	5.4	3.5	3.0	3.0	4.4	4.8	3.9	5.8	24	6.53
2	7.0	6.8	7.2	7.5	4.8	3.6	5.3	19.0	10.2	18.3	11.9	10.9	10.5	7.1	5.9	6.6	5.7	5.7	5.2	4.2	5.4	6.5	4.1	5.1	24	7.69
3	5.8	5.8	8.0	8.2	8.0	5.8	2.1	7.2	12.8	7.5	5.6	24.9	8.3	6.9	8.1	9.1	5.7	4.8	6.0	6.7	4.4	3.4	7.7	8.9	24	7.57
4	7.7	8.0	7.5	6.5	5.8	5.3	5.3	9.2	12.6	7.5	7.5	10.0	6.6	5.9	7.1	6.6	5.4	4.4	4.1	4.6	2.9	3.4	6.3	7.0	24	6.55
5	6.3	6.8	8.7	7.3	6.5	5.6	4.6	6.3	8.0	7.7	7.2	8.0	4.1	1.7	1.2	3.2	3.9	2.9	4.8	4.6	5.6	5.3	5.3	6.0	24	5.48
6	5.3	5.8	3.3	3.6	4.1	4.6	8.0	7.5	15.2	7.0	10.2	10.7	7.8	7.3	8.8	7.9	4.7	4.5	4.7	5.9	7.0	7.0	7.7	7.0	24	6.90
7	5.5	6.3	7.7	8.5	8.5	5.5	3.4	7.2	11.1	9.7	6.3	7.0	6.6	3.5	3.0	3.5	4.0	2.5	1.5	2.0	1.2	2.9	5.5	4.1	24	5.29
8	2.1	3.1	2.9	1.6	1.1	4.1	6.5	8.2	12.1	13.1	9.7	8.0	8.3	5.4	4.5	6.6	4.7	3.3	5.4	3.7	.4	-.3	1.9	4.6	24	5.04
9	6.3	4.1	4.1	4.8	3.1	.6	-1.3	2.9	18.5	8.9	6.3	4.4	2.4	1.0	4.2	4.5	3.0	2.8	1.5	3.7	4.8	4.8	7.2	6.8	24	4.56
10	4.3	4.1	2.4	1.6	2.1	5.0	6.0	5.5	20.2	6.0	5.8	5.5	6.8	7.0	4.9	5.4	6.1	6.8	5.8	3.4	6.0	8.2	7.0	5.5	24	5.89
11	7.2	7.7	6.3	5.8	4.1	3.3	7.5	11.1	17.5	11.6	10.9	8.5	3.9	3.2	4.1	3.9	3.2	2.5	2.7	.9	.2	1.9	2.9	2.6	24	5.56
12	1.1	.4	3.8	4.1	2.6	4.6	5.8	6.0	6.7	10.4	12.1	11.1	10.4	7.5	5.1	3.9	3.9	4.7	4.9	2.2	3.1	4.6	5.1	4.8	24	5.37
13	4.1	5.0	4.1	4.1	5.3	6.0	5.3	8.2	10.6	15.5	10.4	11.1	9.7	8.8	6.9	3.5	3.8	3.3	6.2	9.0	10.7	7.5	4.1	7.0	24	7.09
14	8.5	7.2	5.6	7.3	8.0	8.0	7.5	9.2	10.9	8.0	9.4	11.9	10.5	7.6	4.2	4.7	5.2	4.5	3.0	4.5	6.8	15.5	20.9	10.2	24	8.30
15	19.7	16.5	15.7	13.1	13.1	12.1	9.7	11.1	13.8	9.9	AY	3.6	2.9	6.8	8.0	6.3	5.3	5.1	6.0	7.2	2.9	2.4	7.5	5.5	23	8.88
16	.9	1.9	4.6	5.8	5.3	5.3	6.5	6.5	5.3	5.5	8.5	7.0	7.0	10.6	11.2	7.8	3.2	1.4	1.9	1.2	2.4	3.1	2.1	2.1	24	4.88
17	2.9	4.8	4.8	4.6	3.6	1.1	4.3	8.5	8.0	7.0	10.2	12.8	10.2	7.6	4.2	3.3	4.5	4.5	4.5	4.9	3.9	3.4	3.1	3.1	24	5.41
18	5.3	6.3	5.3	2.6	4.6	8.9	8.9	9.9	10.6	11.9	12.4	9.7	6.6	5.9	3.7	3.0	2.8	.8	3.0	3.7	3.6	3.4	5.1	2.1	24	5.84
19	-1.5	.1	1.9	6.5	7.7	6.9	8.4	7.9	7.5	9.7	11.1	9.7	5.5	3.6	4.4	4.1	2.7	2.2	2.2	2.4	4.6	5.8	5.8	6.5	24	5.24
20	6.0	6.0	7.0	7.7	6.7	7.0	10.8	12.1	17.0	19.0	13.5	15.2	8.5	10.2	11.0	10.7	12.2	9.8	6.4	8.3	8.2	7.5	8.9	9.7	24	9.98
21	9.2	6.0	5.8	7.9	9.2	9.4	7.7	7.0	18.0	20.0	15.7	13.1	13.4	12.7	10.3	7.2	6.9	8.2	7.4	8.4	9.2	8.2	6.0	5.3	24	9.68
22	5.8	8.0	9.7	9.4	10.2	9.9	7.2	9.4	23.1	14.3	14.7	16.6	14.1	13.9	12.0	9.9	8.9	6.5	7.6	6.6	3.0	2.9	5.8	7.0	24	9.85
23	4.8	5.5	5.3	5.1	8.0	8.5	9.2	12.8	22.4	27.0	15.5	6.3	6.3	5.9	3.8	3.8	6.2	5.5	6.2	30.1	11.4	12.1	12.3	11.1	24	10.21
24	15.0rt	14.5rt	11.4rt	9.9rt	17.0rt	12.3rt	23.6rt	28.2rt	33.2rt	68.8rt	42.9rt	49.3rt	50.8rt	27.4rt	9.3rt	7.4rt	5.0rt	6.0rt	10.1rt	12.7rt	13.6rt	17.3rt	16.3rt	16.5rt	24	21.60
25	16.0	23.2	15.2	21.4	20.7	20.9	13.3	13.5	13.5	13.5	AT	12.2	6.9	4.5	2.8	4.0	6.0	6.5	5.5	4.7	6.1	5.3	5.3	2.6	23	10.59
26	3.6	6.3	5.5	8.7	12.1	10.4	16.3	16.5	23.7	30.5	31.5	15.5	12.7	16.4	14.2	12.6	12.3	14.0	12.3	11.3	11.7	10.7	11.6	10.9	24	13.80
27	7.7	10.2	12.6	12.6	11.4	11.8	21.6	22.2	24.1	41.0	41.0	32.0	25.2	20.1	15.1	5.7	6.2	5.8	4.8	5.2	6.4	6.3	5.8	3.4	24	14.93
28	4.1	9.9	11.9	10.7	10.2	11.6	11.6	11.4	15.0	16.5	13.8	19.7	27.8	14.6	15.8	12.7	12.2	10.3	8.8	9.3	8.8	7.0	5.6	6.0	24	11.89
29	7.2	8.0	10.9	10.4	8.5	10.7	23.7	13.8	11.6	12.1	12.8	8.2	8.0	10.4	9.5	5.9	4.4	4.4	4.9	7.0	6.3	6.8	7.7	4.8	24	9.42
30	6.8rt	8.7rt	5.5rt	8.2rt	12.6rt	14.0rt	16.7rt	28.5rt	47.3rt	58.3rt	41.9rt	33.0rt	19.3rt	16.1rt	13.4rt	13.2rt	12.0rt	11.5rt	25.0rt	24.5rt	18.0rt	21.2rt	22.2rt	22.9rt	24	20.87
31	19.5rt	21.7rt	18.5rt	19.2rt	17.2rt	17.5rt	13.5rt	16.2rt	15.7rt	11.8rt	12.6rt	16.2rt	20.9rt	19.0rt	13.1rt	13.3rt	12.1rt	9.7rt	7.0rt	7.2rt	7.7rt	6.8rt	3.1rt	-1.3rt	24	13.26
NO.:	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31	31	31		
MAX:	19.7	23.2	18.5	21.4	20.7	20.9	23.7	28.5	47.3	68.8	42.9	49.3	50.8	27.4	15.8	13.3	12.3	14.0	25.0	30.1	18.0	21.2	22.2	22.9		
AVG:	6.80	7.55	7.43	7.84	8.00	8.25	9.30	11.35	15.67	16.68	14.49	13.60	11.28	9.17	7.62	6.70	6.05	5.43	5.88	6.87	6.15	6.64	7.22	6.57		

MONTHLY OBSERVATIONS: 742 MONTHLY MEAN: 8.84 MONTHLY MAX: 68.8

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: SEPTEMBER 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-1.8	4.3	9.2	6.2	3.1	.6	2.1	5.8	6.3	7.2	8.2	6.0	4.8	4.4	3.9	.7	1.7	6.5	6.3	5.8	5.5	7.0	9.2	10.6	24	5.15
2	15.5	12.6	11.6	10.9	12.1	14.0	13.5	18.2	14.7	9.2	2.9	1.6	1.9	2.9	3.9	6.8	4.8	.2	.9	2.6	3.8	3.3	1.6	.9	24	7.10
3	2.4	4.1	2.6	2.8	4.6	4.8	7.0	8.2	9.9	22.9	7.5	7.0	19.7	12.1	11.6	19.5	21.2	14.5	12.8	12.8	23.1	22.6	11.6	12.8	24	11.59
4	12.1rt	9.9rt	9.4rt	10.4rt	12.5rt	14.0rt	19.2rt	18.9rt	22.1rt	26.0rt	36.3rt	33.9rt	29.0rt	31.5rt	30.8rt	19.8rt	18.1rt	15.8rt	16.6rt	13.5rt	11.6rt	11.4rt	11.8rt	15.0rt	24	18.73
5	14.2rt	14.2rt	14.2rt	18.0rt	19.9rt	30.4rt	13.0rt	13.7rt	24.1rt	38.1rt	42.4rt	48.2rt	48.5rt	40.5rt	32.3rt	25.9rt	7.6rt	6.6rt	9.0rt	9.7rt	5.8rt	2.9rt	5.1rt	10.6rt	24	20.62
6	11.6rt	10.9rt	11.6rt	16.5rt	19.9rt	16.2rt	15.0rt	19.2rt	30.0rt	42.6rt	90.1rt	71.2rt	59.1rt	58.8rt	34.0rt	15.1rt	15.6rt	16.4rt	14.8rt	15.5rt	6.0rt	15.2rt	14.0rt	14.0rt	24	26.39
7	15.2rt	14.5rt	19.4rt	21.6rt	28.2rt	26.5rt	24.8rt	33.6rt	47.5rt	54.2rt	63.2rt	79.6rt	101.2rt	82.1rt	77.2rt	62.5rt	56.2rt	43.5rt	47.3rt	23.4rt	39.8rt	42.7rt	42.2rt	44.6rt	24	45.46
8	57.1rt	59.5rt	59.2rt	57.8rt	53.4rt	64.6rt	53.2rt	57.3rt	57.8rt	59.0rt	68.8rt	75.7rt	80.1rt	83.6rt	71.0rt	85.3rt	76.7rt	67.9rt	65.2rt	56.6rt	49.2rt	36.1rt	23.9rt	28.7rt	24	60.32
9	29.2rt	35.8rt	34.3rt	39.7rt	46.8rt	52.7rt	56.1rt	69.0rt	66.1rt	75.7rt	81.8rt	48.0rt	45.9rt	49.3rt	41.5rt	30.5rt	35.0rt	14.1rt	16.0rt	21.7rt	4.6rt	23.4rt	33.7rt	37.3rt	24	41.18
10	34.8rt	29.7rt	38.5rt	37.5rt	41.4rt	43.1rt	45.6rt	50.7rt	51.2rt	43.4rt	44.6rt	53.7rt	50.2rt	34.0rt	11.7rt	13.1rt	17.9rt	12.0rt	21.2rt	11.4rt	11.6rt	10.6rt	16.0rt	17.2rt	24	30.88
11	20.7rt	22.4rt	20.4rt	22.1rt	24.1rt	22.9rt	18.2rt	25.0rt	44.6rt	46.8rt	67.6rt	76.1rt	58.1rt	71.8rt	54.0rt	48.3rt	47.1rt	49.3rt	53.7rt	46.3rt	41.9rt	40.2rt	33.9rt	38.1rt	24	41.40
12	40.2rt	47.5rt	52.7rt	53.7rt	60.9rt	60.2rt	47.7rt	41.4rt	59.3rt	62.7rt	63.4rt	83.6rt	80.9rt	72.5rt	27.6rt	28.6rt	25.9rt	28.9rt	30.3rt	23.2rt	23.2rt	16.5rt	25.6rt	19.5rt	24	44.83
13	22.2rt	21.7rt	26.5rt	22.1rt	23.9rt	30.7rt	40.9rt	42.4rt	45.3rt	54.2rt	47.8rt	57.1rt	66.4rt	45.7rt	21.8rt	16.4rt	18.6rt	16.9rt	15.6rt	17.6rt	21.0rt	12.6rt	11.4rt	12.3rt	24	29.63
14	15.5rt	18.5rt	16.5rt	13.3rt	18.5rt	17.2rt	18.2rt	20.9rt	18.7rt	18.0rt	13.3rt	24.2rt	36.1rt	31.0rt	35.9rt	63.5rt	43.5rt	57.4rt	52.0rt	40.2rt	44.6rt	36.8rt	32.2rt	27.7rt	24	29.74
15	29.2rt	28.0rt	28.2rt	28.5rt	30.2rt	30.7rt	29.7rt	38.8rt	46.1rt	40.7rt	39.0rt	44.6rt	52.9rt	53.0rt	52.2rt	50.7rt	52.0rt	47.3rt	49.0rt	49.7rt	35.6rt	32.9rt	23.6rt	23.6rt	24	39.01
16	17.2rt	18.0rt	24.6rt	17.5rt	16.7rt	11.6rt	15.2rt	14.5rt	12.1rt	10.6rt	AY	16.8rt	16.8rt	4.6rt	4.4rt	4.4rt	5.1rt	7.0rt	7.7rt	7.7rt	3.8rt	-.3rt	3.6rt	6.2rt	23	10.69
17	6.5	7.5	8.9	9.2	7.9	8.9	11.1	13.3	14.0	11.6	10.9	10.9	7.2	5.3	4.1	4.1	1.2	-.8	3.6	6.3	3.4	1.9	5.3	6.0	24	7.01
18	4.6	4.8	3.6	3.1	3.3	3.1	2.4	2.6	3.3	4.8	5.8	4.8	2.6	-.3	.2	2.4	4.1	3.1	3.4	2.7	.4	2.4	3.8	5.0	24	3.17
19	4.1	2.4	2.4	.9	3.1	4.8	1.4	.9	1.6	2.1	4.3	6.3	5.5	2.6	3.1	2.9	.7	.4	.7	-1.5	-1.3	2.6	3.3	1.6	24	2.29
20	1.9	.6	-.3	.4	1.1	.4	.4	3.1	3.6	6.7	16.5	6.5	5.8	6.5	6.5	5.8	4.8	2.9	5.3	4.6	3.3	5.5	5.5	4.8	24	4.26
21	4.8	6.5	5.7	1.6	1.6	2.6	2.9	3.6	2.1	5.0	10.9	10.6	10.4	11.4	11.9	14.3	9.9	5.6	.4	.4	4.8	5.5	7.4	6.2	24	6.08
22	4.6	3.8	1.9	3.1	5.0	5.3	4.8	4.3	7.0	10.9	12.8	15.7	13.5	23.7	7.3	6.9	3.7	4.0	6.3	5.5	.9	1.6	4.8	3.1	24	6.69
23	2.6	1.6	4.3	3.6	3.6	6.0	7.0	7.0	4.8	7.5	9.9	15.0	18.0	20.3	9.8	6.6	3.8	2.8	4.7	5.8	4.4	2.4	2.6	3.6	24	6.52
24	6.0rt	8.2rt	7.7rt	7.0rt	7.7rt	8.9rt	8.7rt	9.4rt	9.1rt	26.0rt	34.1rt	22.2rt	22.7rt	26.6rt	22.3rt	20.6rt	12.2rt	12.0rt	10.0rt	9.2rt	7.7rt	8.2rt	8.5rt	6.5rt	24	13.40
25	7.5	6.0	4.3	7.2	8.4	8.7	7.2	4.6	8.7	11.1	10.9	15.0	12.4	13.1	13.8	12.2	9.2	10.0	13.1	11.4	9.7	10.2	9.4	7.0	24	9.63
26	3.6	2.9	2.4	2.6	2.9	2.4	3.8	3.6	3.6	5.1	4.1	5.3	11.1	14.3	8.0	3.2	3.4	2.7	4.1	3.1	3.1	3.1	4.3	6.7	24	4.56
27	7.2	5.5	3.6	5.1	2.6	2.1	5.3	5.3	6.5	11.9	16.3	12.4	11.4	7.8	6.1	7.8	7.6	6.1	6.1	6.5	4.8	5.8	9.2	8.5	24	7.15
28	6.0	5.5	5.5	4.1	4.1	3.9	2.4	.4	.4	.4	.7	1.2	2.7	1.7	.4	2.9	4.1	2.7	3.1	4.3	5.0	8.2	7.0	3.8	24	3.35
29	6.5	8.4	4.1	2.8	4.8	4.1	5.3	5.5	4.3	3.3	4.3	AT	9.9	12.8	12.6	17.5	13.1	10.1	9.2	9.9	9.9	15.0	13.0	13.0	23	8.67
30	23.6rt	14.0rt	9.9rt	9.9rt	16.2rt	11.6rt	10.8rt	26.5rt	14.5rt	24.1rt	22.1rt	27.0rt	32.9rt	23.7rt	18.8rt	22.0rt	15.5rt	15.3rt	11.6rt	11.9rt	11.1rt	12.1rt	11.8rt	8.4rt	24	16.89
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	30	30	30	30	30	30	30		
MAX:	57.1	59.5	59.2	57.8	60.9	64.6	56.1	69.0	66.1	75.7	90.1	83.6	101.2	83.6	77.2	85.3	76.7	67.9	65.2	56.6	49.2	42.7	42.2	44.6		
AVG:	14.16	14.31	14.76	14.64	16.28	17.10	16.43	18.92	21.31	24.73	28.98	30.35	30.59	28.24	21.29	20.68	18.01	16.04	16.67	14.59	13.28	13.28	13.14	13.44		

MONTHLY OBSERVATIONS: 718 MONTHLY MEAN: 18.77 MONTHLY MAX: 101.2

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: OCTOBER 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	4.8	4.8	8.7	9.4	7.9	8.9	7.2	31.4	28.7	34.4	32.9	35.6	31.7	35.1	25.6	22.2	25.3	25.6	21.4	9.2	24.4	24.2	9.7	40.7	24	21.24
2	20.2rt	22.2rt	15.0rt	11.8rt	11.1rt	8.9rt	9.9rt	11.3rt	11.6rt	17.2rt	19.5rt	18.2rt	23.9rt	15.3rt	13.1rt	11.2rt	9.0rt	11.7rt	11.9rt	10.2rt	9.2rt	4.6rt	2.9rt	4.8rt	24	12.70
3	7.5rt	9.6rt	9.6rt	7.2rt	5.0rt	9.6rt	11.4rt	10.4rt	19.5rt	21.7rt	27.3rt	22.4rt	21.4rt	25.3rt	23.9rt	19.7rt	17.8rt	20.2rt	17.0rt	17.5rt	17.0rt	14.7rt	13.8rt	13.5rt	24	15.96
4	13.7rt	16.0rt	12.3rt	13.5rt	13.3rt	11.8rt	16.5rt	20.4rt	13.3rt	21.9rt	AY	25.1rt	21.4rt	19.7rt	19.0rt	21.2rt	17.7rt	16.5rt	22.1rt	20.4rt	20.2rt	19.7rt	9.6rt	9.6rt	23	17.17
5	11.1	11.6	9.9	8.4	6.5	8.4	11.4	8.4	5.5	9.7	12.6	12.8	10.6	8.2	10.6	11.6	16.3	12.8	8.2	3.4	1.4	-1.5	-.3	1.9	24	8.31
6	1.9	.9	.2	-.1	-1.0	-2.5	-3.0	-.3	1.1	3.6	1.4	-3.5	-1.3	1.4	1.1	1.9	1.1	-.1	3.6	7.9	6.5	2.6	2.9	3.3	24	1.23
7	.4	.2	.4	-2.3	-2.5	-.6	.4	-.3	.9	1.1	.4	.7	-.1	-1.1	.4	2.6	2.4	1.1	5.5	7.7	6.7	5.5	5.0	4.6	24	1.63
8	2.4	2.4	2.1	1.4	.4	.1	.6	-.8	-1.3	2.4	3.6	.9	.6	1.4	1.7	1.4	2.1	2.4	2.6	4.8	4.8	5.0	6.7	6.7	24	2.27
9	3.8	2.9	3.6	2.8	1.6	.4	1.9	5.3	4.8	3.6	6.2	4.3	4.1	17.5	9.9	6.5	3.6	8.0	10.6	4.1	3.6	5.3	5.0	8.2	24	5.32
10	7.2	5.7	3.9	4.6	6.5	7.0	6.5	5.7	15.7	12.1	12.6	11.1	11.1	11.6	8.0	4.6	3.1	1.6	1.4	1.1	.6	1.1	1.4	.6	24	6.03
11	-.3	-1.3	-1.8	-.1	1.1	1.6	1.1	.9	.6	-.1	-.6	.1	3.1	3.1	.9	-2.5	-3.7	-1.3	.9	-.8	-1.5	.9	2.1	.4	24	.08
12	2.9	2.9	2.9	3.6	1.1	-.1	.4	1.9	2.4	3.6	3.1	1.6	3.6	2.4	3.1	7.0	9.7	5.5	3.8	6.5	9.9	10.4	6.0	5.3	24	4.15
13	3.8	2.4	2.4	2.9	4.3	5.5	5.8	6.2	4.8	6.2	8.4	8.2	8.9	8.0	9.4	12.1	10.6	4.6	7.0	13.3	11.8	7.7	7.9	8.4	24	7.11
14	8.7	10.6	8.2	7.2	7.0	6.5	8.9	8.7	8.2	9.6	11.8	10.6	7.5	9.9	15.2	18.0	9.4	3.6	4.6	15.0	16.3	12.3	13.3	12.1	24	10.13
15	11.3	13.0	11.8	10.1	9.6	7.7	7.5	7.0	2.9	.1	1.1	2.9	5.0	6.2	4.3	3.8	6.0	6.0	17.0	19.4	13.5	16.2	11.8	9.6	24	8.49
16	7.0	6.0	4.5	3.6	5.0	6.0	5.0	4.8	4.3	4.8	4.1	3.1	4.6	4.8	2.6	4.3	4.1	3.1	9.9	11.6	7.9	9.9	9.2	5.8	24	5.67
17	6.0	5.5	AV	AV	-4.7	-2.5	-.3	3.1	7.7	8.9	7.0	7.2	8.9	7.0	8.4	8.9	7.2	10.6	26.5	16.0	19.7	10.9	9.6	7.9	22	8.16
18	5.8	5.0	5.7	5.8	6.5	8.9	8.9	9.9	11.8	12.8	11.8	8.9	9.4	11.1	11.1	9.4	8.7	10.1	10.1	9.6	18.7	13.5	11.6	9.6	24	9.78
19	12.1	11.6	8.4	7.9	7.2	8.9	8.7	9.1	10.4	9.4	8.7	9.6	12.6	12.8	12.6	11.8	17.5	13.3	27.2	20.9	28.2	16.0	21.7	22.1	24	13.70
20	20.7	13.0	17.0	13.3	12.6	13.0	13.3	19.7	12.1	AY	18.5	15.7	17.0	23.1	15.2	15.2	9.7	9.7	5.5	15.5	15.2	9.9	10.6	10.6	23	14.18
21	9.9	8.4	6.5	5.5	5.3	7.2	9.4	15.0	16.2	21.9	13.0	13.7	11.6	10.9	12.1	11.6	12.3	12.8	8.9	4.1	4.1	4.3	3.6	2.6	24	9.62
22	2.6	1.6	1.1	2.9	2.9	2.6	3.8	3.6	1.6	1.1	1.9	1.4	2.1	8.9	10.2	4.8	1.6	-.3	.2	-.8	2.4	6.7	3.6	2.1	24	2.86
23	2.4	3.6	4.8	3.6	1.1	-.8	-.3	2.9	1.9	.4	-2.0	-3.0	.4	5.1	3.9	-.5	-.5	.9	1.6	-1.1	-.6	3.3	4.6	6.2	24	1.58
24	6.0	2.6	2.1	3.3	1.4	.9	2.4	1.1	4.3	7.2	.4	-2.0	1.6	2.4	2.6	3.1	2.6	1.6	3.8	6.2	10.1	11.6	8.9	7.7	24	3.83
25	6.5	6.7	5.7	3.6	.9	4.1	6.5	5.3	4.5	3.8	4.1	3.8	2.1	.4	-.1	2.6	3.1	5.0	11.3	17.2	28.7	10.8	10.1	8.7	24	6.48
26	9.1	8.2	5.5	6.7	7.4	6.5	2.6	1.6	3.8	BA	3.8	1.4	.4	-1.6	-2.0	.6	2.4	3.8	5.5	8.2	7.9	6.2	7.7	7.7	23	4.50
27	4.1	.9	1.1	2.4	1.9	1.4	3.1	3.1	3.1	1.9	1.4	2.6	AT	1.4	3.8	4.1	1.9	3.1	9.1	16.7	20.7	13.7	18.0	5.0	23	5.41
28	5.0	5.0	4.5	5.5	4.3	3.8	6.7	9.9	10.8	7.2	8.9	12.1	11.3	9.4	7.4	7.4	15.2	20.4	25.3	18.0	8.2	5.5	2.1	3.6	24	9.06
29	4.6	3.3	2.6	1.9	.4	-1.3	-1.8	-.1	1.9	2.8	4.8	2.8	1.6	3.6	5.3	4.6	2.4	2.4	17.7	26.7	17.2	15.4	12.3	9.1	24	5.84
30	4.5	3.1	3.6	5.5	7.9	10.8	10.6	15.9	13.5	8.9	4.3	4.3	4.1	16.3	4.3	2.6	.9	1.9	3.6	4.1	2.1	-.6	1.1	3.6	24	5.70
31	2.4	-.3	1.1	2.9	1.6	-.8	-3.7	-2.7	-1.3	.4	.4	1.1	2.4	-.1	-3.5	-3.5	-1.3	2.6	5.0	6.5	16.2	14.2	8.7	5.8	24	2.25
NO.:	31	31	30	30	31	31	31	31	31	29	30	31	30	31	31	31	31	31	31	31	31	31	31	31		
MAX:	20.7	22.2	17.0	13.5	13.3	13.0	16.5	31.4	28.7	34.4	32.9	35.6	31.7	35.1	25.6	22.2	25.3	25.6	27.2	26.7	28.7	24.2	21.7	40.7		
AVG:	6.71	6.07	5.44	5.16	4.31	4.58	5.21	7.05	7.27	8.23	7.71	7.54	8.05	9.02	7.75	7.36	7.04	7.07	9.96	10.29	11.33	9.03	7.75	7.99		

MONTHLY OBSERVATIONS: 738 MONTHLY MEAN: 7.42 MONTHLY MAX: 40.7

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: NOVEMBER 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	7.2	3.8	2.3	2.6	2.4	2.6	5.0	2.6	1.4	6.0	5.0	.1	-.1	2.4	4.1	6.7	3.6	1.9	8.2	12.5	13.0	9.9	7.4	7.2	24	4.91
2	6.5	4.5	4.0	4.3	5.3	6.9	6.5	6.2	5.5	5.0	4.8	3.8	2.1	3.6	6.2	5.0	3.3	3.1	4.3	3.6	3.1	3.6	2.8	3.3	24	4.47
3	2.6	1.9	2.8	.9	-.6	-.3	.1	-.4	-.8	-.1	1.4	.4	1.1	1.4	-1.5	.4	3.6	8.4	12.1	22.1	25.0	20.4	11.8	10.4	24	5.13
4	17.5	11.6	16.2	15.2	8.7	8.4	19.4	19.2	24.1	9.1	10.4	12.1	12.8	12.1	11.6	10.6	10.1	15.9	19.2	27.2	20.9	20.9	25.3	25.0	24	15.98
5	21.4	15.2	19.0	19.9	16.7	14.0	12.3	10.1	9.1	6.7	6.0	5.3	4.3	3.6	3.3	3.1	3.6	5.3	2.8	5.5	11.3	12.8	11.6	26.7	24	10.40
6	9.1	5.3	4.5	7.7	8.4	5.7	8.2	12.5	22.4	13.3	11.1	8.2	6.7	2.8	3.3	4.1	-.3	1.6	15.9	13.0	27.2	21.9	29.9	23.1	24	11.07
7	7.9	5.7	4.3	5.2	2.8	.1	1.1	5.0	6.0	AY	5.5	3.8	1.6	1.9	2.4	4.1	5.5	3.3	4.3	8.9	11.1	16.5	6.2	5.3	23	5.15
8	2.4	2.1	1.4	.4	3.6	3.3	2.1	5.0	7.2	2.6	-.6	1.1	2.3	2.3	2.8	2.4	.6	5.0	10.4	16.5	11.8	11.1	11.3	12.5	24	4.98
9	12.3	11.1	7.4	3.6	3.8	4.1	8.7	14.9	15.9	18.9	13.2	9.4	7.7	6.2	3.3	4.1	6.0	18.9	15.9	24.6	38.0	40.0	43.9	34.6	24	15.27
10	33.1	20.2	17.0	16.2	14.7	14.0	14.0	9.4	2.6	2.8	4.6	2.1	15.2	19.2	11.9	8.2	5.0	5.5	8.2	11.1	28.4	33.1	7.4	5.5	24	12.89
11	3.6	4.8	3.3	2.1	3.6	2.6	2.1	5.5	4.8	2.6	4.3	3.6	1.9	1.6	.9	-.8	4.6	6.5	.9	-.3	.9	1.1	1.6	1.6	24	2.64
12	.9	2.8	2.6	1.1	-.6	-1.8	-1.6	-.8	.1	2.1	3.6	2.3	.4	-2.5	-2.0	1.1	.9	.9	2.8	3.3	1.4	-.1	-1.3	-2.5	24	.55
13	-3.0	-.4	.9	-3.0	-3.2	-1.1	.6	2.1	1.6	.1	-1.1	-.8	.4	.4	1.4	3.1	1.6	2.1	1.4	-.1	-1.8	-2.3	.1	1.8	24	.03
14	1.1	-.8	-.8	-3.0	-2.5	-.6	1.1	2.1	-1.8	-2.5	.6	.4	.6	-.1	-1.1	1.9	1.8	-.4	2.1	4.8	4.1	-.1	.1	1.1	24	.34
15	-2.0	-3.2	-3.7	-1.1	2.3	4.1	4.6	3.3	4.8	7.0	4.1	1.6	1.9	.1	-2.1	-1.1	.1	1.4	3.1	1.8	3.1	8.2	9.6	9.9	24	2.41
16	7.4	3.1	3.6	4.0	2.6	2.3	2.3	2.6	4.0	3.3	2.3	-.6	.6	8.2	8.9	6.5	5.2	6.9	9.4	15.9	13.5	15.4	6.9	5.0	24	5.80
17	3.3	2.1	.4	-.4	.6	1.3	.6	-1.1	-1.6	.6	2.3	3.1	.9	-2.5	-1.1	2.8	2.1	1.1	1.8	4.8	8.9	7.2	5.3	2.1	24	1.86
18	.6	.1	.4	1.8	.1	-.4	.1	-.4	-.6	.6	2.1	2.6	1.1	2.6	4.8	5.0	5.7	8.9	10.6	10.4	8.6	15.7	4.0	6.9	24	3.80
19	10.6	9.4	8.9	9.1	6.9	5.7	10.1	13.7	12.5	15.7	13.3	13.2	12.1	9.9	17.2	9.1	7.7	7.4	9.9	13.0	12.5	9.6	11.6	16.9	24	11.08
20	17.7	15.4	18.0	12.3	19.7	17.5	18.2	18.4	13.0	21.6	6.9	4.8	4.0	2.6	2.4	7.9	10.4	27.2	31.9	33.4	42.9	20.2	26.7	21.1	24	17.26
21	26.5	24.3	31.1	28.7	26.5	24.8	23.8	30.4	39.0	36.5	28.2	27.9	22.1	21.4	.1	-.8	-.6	-.6	-.4	1.8	3.1	1.8	1.8	4.3	24	16.74
22	3.8	2.8	3.1	2.8	1.1	-1.1	-1.3	-.8	-.4	.9	.1	-1.1	.4	2.4	AY	AY	1.8	1.6	3.1	.9	.1	2.6	.6	1.6	22	1.14
23	3.1	1.6	-.1	-2.8	-3.7	-2.8	-2.0	-2.0	.6	2.6	-.3	-1.5	.4	1.9	.9	-.6	-1.6	.1	1.4	2.8	5.7	4.3	2.4	1.4	24	.49
24	-.3	1.4	1.6	1.9	2.6	.6	-1.8	-2.0	3.3	7.9	4.3	-1.6	-1.8	-.6	-1.1	-.8	-1.1	1.8	7.2	5.7	4.8	5.3	3.1	2.3	24	1.78
25	1.1	-.1	-.4	-.3	-1.3	-1.8	-1.3	-3.5	-3.3	-1.3	-2.3	-.1	1.6	-1.1	-2.3	-.6	-.6	-.8	3.1	4.0	5.0	9.9	8.2	5.5	24	.72
26	3.1	.6	1.6	.6	-1.3	-.6	1.8	.4	-1.3	1.6	.4	-2.5	-2.8	-2.5	-1.6	-.6	3.1	5.5	7.4	11.8	19.4	15.2	11.1	11.6	24	3.42
27	13.2	14.0	13.7	8.4	2.8	7.4	11.6	12.1	11.8	7.9	-.1	-2.8	2.6	4.8	3.6	3.6	3.3	3.1	3.8	1.6	2.4	3.6	.9	-1.6	24	5.49
28	-2.1	.1	-.4	-.6	-1.3	-1.8	-.1	2.1	6.2	9.6	4.3	.4	1.1	-1.1	1.1	4.1	6.7	25.0	15.9	15.7	37.5	32.6	28.7	17.2	24	8.37
29	11.8	8.9	3.3	2.1	8.9	11.8	8.2	4.8	2.1	3.6	2.8	2.8	3.3	2.6	8.9	10.8	10.1	27.9	16.5	25.3	12.5	7.4	4.5	15.7	24	9.03
30	2.8	-1.1	-4.5	-2.5	-1.3	-1.6	-.8	-.1	1.1	.6	-.8	.6	.9	1.6	2.6	5.7	7.2	4.5	4.5	5.0	6.2	6.5	6.7	10.6	24	2.27
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	29	30	30	30	30	29	29	30	30	30	30	30	30	30	30		
MAX:	33.1	24.3	31.1	28.7	26.5	24.8	23.8	30.4	39.0	36.5	28.2	27.9	22.1	21.4	17.2	10.8	10.4	27.9	31.9	33.4	42.9	40.0	43.9	34.6		
AVG:	7.44	5.57	5.38	4.57	4.28	4.11	5.12	5.71	6.31	6.39	4.55	3.29	3.51	3.51	3.07	3.62	3.65	6.63	7.92	10.22	12.69	11.81	9.67	9.54		

MONTHLY OBSERVATIONS: 717 MONTHLY MEAN: 6.20 MONTHLY MAX: 43.9

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: DECEMBER 2011

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	11.3	10.3	10.8	8.4	6.0	4.3	4.3	5.7	5.0	2.1	.1	.6	1.8	-.1	-.4	1.6	4.8	9.9	35.3	25.5	3.8	3.3	2.6	3.3	24	6.68
2	2.6	1.6	1.4	-.6	-.8	-.6	.4	1.1	1.1	-1.8	-2.5	-.6	-.4	3.8	4.3	-.1	1.1	8.9	16.7	25.3	19.9	26.5	25.3	11.8	24	6.02
3	7.4	7.9	7.9	3.6	2.6	-.6	-1.3	.1	3.3	3.8	-.6	-.8	1.6	2.6	4.3	3.6	1.8	3.3	5.3	6.0	4.3	1.8	.8	3.1	24	2.99
4	2.8	2.6	4.3	5.7	6.7	6.2	3.8	2.8	2.1	3.8	3.6	-.6	-.4	1.4	1.6	.6	1.6	2.1	29.9	9.4	8.4	6.2	5.2	6.4	24	4.84
5	6.0	2.8	-.4	-1.8	-1.3	-1.3	-1.1	-.4	3.5	7.4	3.8	-.4	.9	3.6	4.0	2.1	5.0	23.6	20.9	21.4	11.1	8.2	9.9	12.5	24	5.83
6	11.8	13.0	11.8	10.3	8.1	6.0	9.8	17.7	34.6	17.7	10.3	11.6	8.9	7.2	7.9	6.4	17.9	28.4	39.2	52.4	56.0	58.0	41.6	32.1	24	21.61
7	20.9	24.8	33.8	28.9	36.0	17.4	22.1	27.4	25.3	22.1	29.4	19.4	15.7	15.1	AT	17.7	27.7	39.7	42.6	32.4	42.1	45.1	44.8	29.2	23	28.68
8	29.9	19.9	13.2	9.6	7.4	7.7	8.9	30.6	24.1	6.7	5.0	2.8	2.1	2.1	1.6	2.6	4.0	5.7	7.9	6.0	6.9	15.7	18.2	21.6	24	10.84
9	14.0	18.9	23.6	14.2	11.3	15.4	24.1	24.1	35.8	46.7	25.9	9.8	10.8	9.4	AY	6.2	8.6	16.9	23.3	26.9	39.0	30.9	34.8	44.3	23	22.39
10	31.6	35.0	51.9	21.4	23.6	38.7	27.9	33.1	22.6	35.0	16.2	14.9	18.7	13.7	13.0	10.3	6.7	26.7	28.4	44.6	45.3	49.4	41.6	36.5	24	28.62
11	29.9	45.8	36.5	29.9	31.1	26.4	39.7	31.4	34.3	54.6	22.6	24.6	13.9	15.9	12.0	12.8	20.6	19.2	33.6	32.1	43.3	41.4	35.3	20.4	24	29.47
12	18.9	25.5	30.4	30.9	28.7	26.9	19.9	21.6	30.4	24.3	18.4	16.2	15.4	8.2	10.8	8.9	5.5	10.6	24.1	27.9	15.9	20.6	8.6	9.6	24	19.09
13	12.5	17.2	12.0	10.8	16.5	7.2	4.8	4.8	10.1	8.6	2.1	2.1	4.5	6.0	4.3	5.0	9.1	9.4	19.2	26.9	12.8	25.7	27.0	35.1	24	12.24
14	28.2	18.2	22.4	20.6	19.4	27.9	24.1	20.2	27.2	28.4	32.1	20.2	23.6	21.1	14.2	13.5	16.7	35.8	48.9	45.3	44.1	50.4	54.6	41.9	24	29.13
15	58.7	34.6	11.6	5.5	-.6	-.6	6.7	20.9	22.8	25.5	30.7	6.7	5.5	3.3	1.4	.4	1.1	2.1	3.3	3.1	1.8	1.3	6.2	15.2	24	11.13
16	11.3	8.4	3.8	.9	-.1	.1	.4	3.3	4.5	2.8	3.6	4.5	3.1	1.1	2.1	2.1	1.6	1.1	4.1	8.4	6.7	4.8	4.5	2.4	24	3.56
17	.6	-.6	.4	2.6	2.4	1.4	-1.3	-2.3	-.8	-.1	-.1	.9	3.1	7.2	6.7	3.6	1.6	-.1	1.8	2.3	2.3	1.1	1.3	2.1	24	1.50
18	1.3	1.3	.6	1.3	1.8	6.0	6.5	6.0	10.8	12.3	9.4	9.1	9.9	7.9	8.9	11.8	17.0	18.9	15.2	24.3	27.2	12.5	20.9	14.0	24	10.62
19	12.8	12.1	10.3	8.4	9.6	10.1	8.2	25.3	13.0	8.4	2.8	1.3	1.8	2.1	1.8	1.1	5.3	12.3	29.7	26.5	38.0	36.5	19.2	9.9	24	12.77
20	10.1	10.6	22.8	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	3	14.50
21	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	0	
22	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	0	
23	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AY	19.0	14.0	13.0	16.0	23.0	27.0	47.0	40.0	42.0	36.0	29.0	11	27.82
24	30.0	28.0	31.0	27.0	22.0	22.0	23.0	16.0	23.0	15.0	14.0	15.0	13.0	13.0	15.0	17.0	18.0	15.0	33.0	30.0	31.0	31.0	31.0	36.0	24	22.88
25	38.0	45.0	49.0	57.0	37.0	37.0	37.0	37.0	21.0	22.0	28.0	29.0	29.0	22.0	25.0	16.0	24.0	18.0	3.0	1.0	-1.0	3.0	4.0	1.0	24	24.25
26	.0	.0	1.0	1.0	-2.0	-2.0	-2.0	-4.0	-4.0	2.0	4.0	3.0	2.0	.0	1.0	1.0	5.0	17.0	34.0	17.0	28.0	34.0	39.0	30.0	24	8.54
27	19.0	28.0	26.0	15.0	10.0	6.0	.0	.0	2.0	2.0	1.0	-1.0	-1.0	.0	-2.0	.0	2.0	1.0	3.0	4.0	1.0	1.0	4.0	.0	24	5.04
28	-4.0	-2.0	.0	.0	2.0	1.0	.0	.0	2.0	5.0	1.0	1.0	1.0	-1.0	-1.0	1.0	4.0	2.0	-1.0	-1.0	2.0	3.0	2.0	1.0	24	.75
29	2.0	3.0	5.0	3.0	1.0	1.0	AM	-2.0	.0	2.0	.0	-2.0	-2.0	2.0	5.0	.0	.0	2.0	7.0	8.0	3.0	3.0	1.0	.0	23	1.83
30	-1.0	-2.0	-3.0	-3.0	-1.0	-1.0	.0	2.0	1.0	1.0	4.0	3.0	4.0	3.2	4.2	7.3	5.8	8.0	7.8	6.1	5.8	3.4	.7	-.7	24	2.32
31	-1.0	.7	1.2	-1.2	-2.4	-1.7	-1.2	-4.1	-5.3	-3.1	.5	2.4	2.5	2.2	1.5	.2	3.4	6.6	4.6	4.6	7.3	17.5	16.3	17.3	24	2.87
NO.:	28	28	28	27	27	27	26	27	27	27	27	27	27	28	26	28	28	28	28	28	28	28	28	28		
MAX:	58.7	45.8	51.9	57.0	37.0	38.7	39.7	37.0	35.8	54.6	32.1	29.0	29.0	22.0	25.0	17.7	27.7	39.7	48.9	52.4	56.0	58.0	54.6	44.3		
AVG:	14.49	14.66	14.98	11.46	10.19	9.66	10.18	11.79	12.94	13.12	9.83	7.14	7.00	6.86	6.20	5.92	8.43	13.11	19.56	20.12	19.50	20.62	19.16	16.61		

MONTHLY OBSERVATIONS: 659 MONTHLY MEAN: 12.70 MONTHLY MAX: 58.7

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158869
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
POAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JANUARY 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	14.3	9.2	4.9	5.8	3.2	.5	.7	3.9	6.1	4.9	7.0	8.5	6.3	4.6	3.4	3.5	3.9	6.8	25.5	18.3	12.9	28.2	15.7	24.6	24	9.28
2	21.4	20.9	14.5	24.3	20.7	20.2	18.3	19.0	26.0	25.8	26.2	19.5	15.3	13.1	15.2	17.8	15.0	11.9	13.1	19.0	1.7	7.8	16.5	21.9	24	17.71
3	1.0	.3	.5	-.7	-1.0	-2.6	-3.6	.5	.3	2.2	3.2	-1.0	2.5	7.8	AY	4.9	1.2	5.4	8.7	23.6	15.0	4.6	6.6	AN	22	3.61
4	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	0	
5	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AT	5.4	1.7	-.2	1.4	.5	-.5	3.4	7	1.67
6	2.9	.0	-1.9	-3.1	.6	3.7	4.1	8.2	6.1	1.2	2.4	2.9	5.3	5.1	3.9	4.9	3.7	6.1	21.4	26.7	16.0	14.5	41.8	34.8	24	8.78
7	21.7	13.8	16.8	16.0	14.7	20.9	21.4	11.9	14.8	18.7	11.6	10.7	6.3	5.6	5.4	3.2	4.2	6.3	10.7	20.2	10.7	20.0	12.8	10.2	24	12.86
8	4.4	1.2	.5	2.7	2.2	.0	.0	.2	2.9	3.9	4.9	6.8	6.3	7.5	6.8	2.7	2.7	20.7	20.2	36.5	50.3	40.6	33.1	34.6	24	12.15
9	32.6	33.9	19.7	22.1	22.4	22.4	18.0	30.7	35.1	38.2	13.3	21.7	16.0	18.0	8.7	6.6	8.0	25.5	37.0	46.2	37.8	3.4	3.9	6.8	24	22.00
10	4.1	-1.4	-1.7	.2	1.7	2.2	-1.0	-1.0	4.4	3.4	-.7	-2.4	-.2	.5	-1.9	-2.2	-2.2	-1.0	-.5	-4.3	-4.4	-3.4	-.7	2.2	24	-.43
11	1.2	1.2	.0	-1.0	-1.2	-.3	2.2	5.6	7.0	9.7	9.9	8.0	5.8	4.1	3.4	2.0	3.4	7.8	17.5	15.2	9.4	9.2	9.9	11.4	24	5.89
12	11.1	11.1	18.5	14.3	13.1	9.2	3.6	5.6	19.0	14.7	8.5	8.2	5.8	4.6	4.9	6.1	8.0	7.8	21.9	41.1	35.1	26.0	22.2	14.0	24	13.93
13	26.0	27.7	25.8	18.7	22.6	25.5	13.1	32.6	26.7	21.9	14.5	14.3	19.2	13.8	12.1	10.9	12.6	16.3	32.9	19.5	30.7	47.2	44.5	35.8	24	23.54
14	-.5	-1.2	2.9	24.4	19.7	21.9	3.4	2.0	15.7	19.2	19.0	14.3	9.2	3.2	2.0	.5	.0	1.5	7.0	8.3	6.3	4.4	1.2	1.2	24	7.73
15	3.4	3.2	2.2	.2	-1.2	.0	-2.4	-1.7	.7	2.2	2.2	3.2	4.2	2.4	3.4	6.6	3.4	3.9	8.0	3.4	.7	20.0	20.2	21.2	24	4.56
16	22.6	16.0	6.5	8.2	7.0	6.3	6.3	1.2	.0	.2	1.2	3.9	3.7	1.2	.0	.7	1.4	1.7	.7	1.5	5.1	4.1	3.9	4.6	24	4.50
17	.5	-1.2	-.5	-.7	-1.5	1.5	2.9	1.9	-.5	AM	-3.1	.2	3.4	1.5	AY	2.0	5.1	4.4	2.9	1.9	3.2	2.2	1.7	3.4	22	1.42
18	1.7	2.0	2.5	2.7	3.2	2.5	2.2	1.8	.0	-1.0	1.0	1.0	.7	1.2	1.2	1.5	.5	3.9	7.5	6.5	7.8	4.2	3.2	8.3	24	2.75
19	6.3	5.1	4.1	2.4	4.9	4.9	5.8	4.6	2.9	3.9	3.4	3.7	2.9	1.2	2.4	2.9	3.4	3.4	2.2	3.2	2.4	2.4	2.5	1.7	24	3.44
20	5.3	7.0	5.8	7.8	8.0	8.7	11.6	10.4	9.0	15.5	19.2	13.1	8.7	5.4	4.9	3.4	15.0	16.5	31.7	43.1	7.3	3.4	.7	.7	24	10.93
21	1.0	1.7	2.2	2.7	-.2	-1.9	-.7	.2	2.0	2.9	7.0	9.5	5.8	.5	-.5	.5	.7	3.2	1.7	2.7	4.2	2.7	3.7	2.7	24	2.26
22	.0	-.7	3.4	1.7	-1.2	2.2	.7	-.5	4.2	6.5	.2	-1.0	4.4	5.8	2.5	-.7	-.5	2.2	4.4	2.2	2.0	3.7	2.9	2.2	24	1.94
23	-.7	-3.9	-1.0	2.2	1.0	.2	1.0	1.7	1.7	-.7	-1.9	.2	2.7	2.0	1.5	1.5	.5	4.1	20.9	7.0	7.3	9.2	10.9	4.6	24	3.00
24	-.7	.5	.2	-.5	.7	.9	.7	.0	-.5	1.7	5.1	5.6	2.4	1.0	1.0	-1.4	-1.7	1.2	5.1	4.6	1.7	2.2	2.2	2.2	24	1.43
25	1.0	.7	.7	-.5	-.5	.3	1.7	1.7	2.0	2.7	2.2	2.2	.2	.7	2.7	2.5	3.7	3.9	2.5	.7	-.5	2.2	1.2	-1.2	24	1.37
26	4.4	6.1	1.2	.2	.0	1.2	2.7	2.2	1.2	1.5	3.4	4.4	2.2	-.2	-3.6	-3.3	1.0	2.5	3.2	.7	1.0	.5	-1.7	-1.4	24	1.23
27	-1.4	.2	2.9	1.2	-1.2	-2.4	-.5	2.7	2.4	3.9	2.7	1.0	1.0	2.9	4.2	1.7	.0	-.3	6.1	9.0	5.1	4.1	5.1	3.9	24	2.26
28	1.4	.0	1.2	2.4	.7	-.3	1.9	1.7	.9	2.4	3.9	4.6	3.7	3.7	3.2	3.7	4.9	7.8	9.0	5.8	3.4	2.2	5.8	7.0	24	3.38
29	3.2	1.7	1.2	-.5	1.5	2.9	.2	.7	2.7	1.7	1.0	.5	.5	3.2	2.2	1.2	1.7	1.5	-1.0	2.5	5.8	4.9	3.7	-.2	24	1.78
30	.7	2.5	2.2	-.7	.5	2.2	2.2	.5	-1.0	-.2	-.2	2.0	2.9	.5	-.7	-2.2	-2.2	.5	-.2	-1.2	-1.4	-2.6	-.7	2.5	26	.25
31	.3	1.0	-.2	-3.1	-1.4	-1.7	-1.7	1.0	.0	-.5	1.2	-.7	.5	1.0	-.7	-.5	1.2	3.9	5.6	4.9	2.2	2.5	1.7	.2	24	.70
NO.:	29	29	29	29	29	29	29	29	29	28	29	29	29	29	27	29	29	30	30	30	30	30	30	29		
MAX:	32.6	33.9	25.8	24.4	22.6	25.5	21.4	32.6	35.1	38.2	26.2	21.7	19.2	18.0	15.2	17.8	15.0	25.5	37.0	46.2	50.3	47.2	44.5	35.8		
AVG:	6.52	5.67	4.66	5.15	4.77	5.21	3.96	5.15	6.61	7.38	5.80	5.69	5.09	4.20	3.24	2.79	3.40	6.16	10.91	12.29	9.34	9.03	9.13	9.08		

MONTHLY OBSERVATIONS: 699 MONTHLY MEAN: 6.33 MONTHLY MAX: 50.3

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (**) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: FEBRUARY 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-1.2	-2.2	1.5	4.6	2.7	2.5	3.4	4.2	6.8	8.5	8.0	8.3	6.8	4.6	6.8	9.2	9.9	10.7	18.8	13.8	10.2	3.9	3.4	8.3	24	6.40
2	9.9	4.2	1.5	3.4	2.9	1.5	2.5	4.4	7.0	8.5	2.7	-1.9	-.7	2.9	4.2	5.4	4.6	1.7	6.1	33.1	17.8	9.5	11.4	22.4	24	6.88
3	29.2	20.0	24.8	28.9	26.2	14.3	7.8	2.2	5.8	9.9	9.2	4.1	2.9	3.4	3.9	4.6	1.2	4.1	7.0	19.0	16.0	14.3	11.4	15.2	24	11.89
4	5.6	5.3	2.7	1.5	.0	1.0	2.7	4.1	10.4	10.4	5.6	5.8	5.8	5.4	5.8	4.6	4.6	4.6	28.0	20.5	22.9	33.4	18.7	13.1	24	9.27
5	24.6	6.1	14.8	6.8	8.5	9.0	10.4	11.1	11.4	15.7	11.1	10.9	12.4	11.9	10.2	10.7	9.7	4.9	21.9	22.2	33.4	29.2	30.7	34.1	24	15.49
6	32.6	24.1	19.7	15.5	14.2	12.8	11.4	11.6	9.4	5.8	8.5	10.9	10.2	12.6	AY	AY	13.8	13.5	18.3	30.0	33.6	19.2	15.0	13.8	22	16.20
7	12.6	10.2	8.2	8.0	5.8	4.6	6.5	6.5	8.5	8.0	8.7	10.9	10.9	8.5	AT	3.9	4.2	7.5	17.0	19.0	9.7	8.2	7.3	5.6	23	8.71
8	4.6	4.9	3.7	6.3	6.1	4.9	8.2	31.7	30.9	16.8	12.4	9.9	14.8	10.0	7.8	6.3	8.5	6.6	5.8	26.2	24.8	17.0	16.0	16.5	24	12.53
9	17.0	19.5	15.0	13.5	16.8	15.7	11.9	20.2	20.9	16.0	16.3	15.0	17.3	7.5	5.1	3.2	2.2	1.7	5.4	11.4	13.5	15.0	13.3	35.1	24	13.69
10	32.6	24.6	24.6	8.0	8.5	11.6	19.2	15.8	15.0	17.0	10.2	11.2	11.6	9.5	8.0	6.1	5.1	6.3	6.6	7.5	26.5	15.5	30.9	25.8	24	14.90
11	8.3	8.0	7.5	9.0	8.0	4.6	4.9	7.8	9.7	9.2	6.3	5.1	7.5	7.3	4.7	5.6	8.3	9.5	8.7	9.5	12.6	14.8	15.3	30.0	24	9.26
12	15.5	17.8	19.2	17.0	16.8	12.4	15.2	17.3	17.5	22.2	21.9	17.3	13.1	13.1	11.7	11.2	10.7	7.8	16.5	15.0	15.5	26.0	28.0	31.4	24	17.09
13	41.6	27.0	25.8	16.0	6.8	7.8	19.0	12.4	17.3	15.7	17.0	12.8	11.7	11.6	12.4	10.9	7.5	5.8	30.2	35.8	34.3	27.7	28.5	26.7	24	19.26
14	.7	2.5	3.7	-1.0	-1.7	.0	.3	5.3	11.4	8.7	2.0	-.2	-.7	AY	AY	-.5	2.0	5.3	7.0	7.5	11.2	24.4	25.1	10.2	22	5.60
15	12.4	16.3	7.0	6.3	4.4	3.2	2.2	.7	1.0	1.5	3.2	2.0	1.2	2.7	.7	-.7	.7	1.0	2.2	4.6	5.6	10.0	13.3	11.9	24	4.73
16	10.9	7.8	3.4	3.4	2.7	-.2	-.5	1.0	-.2	-2.4	-1.4	1.7	6.1	7.0	5.0	3.9	3.7	4.2	3.9	4.4	7.8	12.4	15.3	11.9	24	4.66
17	8.3	5.4	6.1	5.8	5.1	4.2	5.4	9.5	9.9	7.0	8.5	9.7	10.0	6.6	.5	.8	2.7	2.5	3.9	7.5	16.0	12.1	11.9	9.9	24	7.05
18	6.3	6.1	7.5	4.6	1.5	-1.0	-1.4	-1.2	.0	3.7	1.7	-1.2	-1.0	-.7	-1.4	-2.6	.0	1.2	1.7	5.1	5.8	2.9	1.5	2.9	24	1.75
19	-.3	-1.7	.0	1.0	3.2	.7	-.2	.0	1.7	2.2	-.7	1.2	.7	-1.4	.5	-.2	-1.0	-1.4	-.5	7.0	9.5	5.8	3.9	1.9	24	1.33
20	1.7	1.9	-.5	-1.2	-3.1	-1.7	.5	-.5	-.3	.2	-.3	.0	-1.0	-.5	1.0	-.2	-.5	1.7	2.9	6.8	9.2	6.1	4.4	3.2	24	1.24
21	1.0	.7	.7	-1.7	-.5	.0	-1.7	-2.7	.5	1.5	1.2	3.2	.7	-2.4	-1.0	1.5	2.2	1.0	-1.4	-1.4	.5	2.7	2.9	.0	24	.31
22	-.5	-1.9	-3.1	-1.4	-1.4	.0	.7	-1.2	-1.4	2.0	1.2	-2.4	-1.4	-1.4	-.7	3.2	3.4	2.9	2.0	1.2	1.0	1.5	.7	.0	24	.13
23	1.7	2.7	1.7	.0	-2.4	-3.9	-1.4	-.5	1.2	4.2	2.5	-1.0	1.7	BA	3.9	-.2	-2.2	-.2	.7	.5	.0	.7	1.0	-.7	23	.43
24	-.5	1.7	2.5	1.2	1.5	2.7	.2	-.7	.5	3.4	3.7	1.7	2.5	1.5	.0	-3.4	-2.9	.3	-1.2	-1.9	.5	-.5	-.5	-.2	24	.50
25	-.2	-.7	-2.6	-2.6	-1.7	-1.2	-3.1	.2	2.7	5.1	6.3	2.0	-.2	.5	.2	.5	.5	-.2	2.9	2.5	1.2	1.2	-.7	1.2	24	.58
26	2.4	2.9	.7	-1.9	-.5	1.7	2.0	.0	-.5	3.4	4.6	.0	-1.4	.7	1.7	2.5	2.5	2.0	4.6	6.3	7.0	5.8	7.3	3.9	24	2.40
27	-1.0	1.5	3.7	3.9	2.2	2.9	4.9	5.1	5.4	4.4	1.5	.2	1.0	2.2	.3	-1.2	-.2	1.2	1.7	2.9	6.5	22.2	12.1	12.1	24	3.98
28	9.0	4.6	3.4	4.1	3.2	.5	.5	2.2	.5	2.7	3.7	4.2	6.3	3.4	2.2	2.9	2.5	1.7	3.4	32.9	12.1	21.9	34.1	19.0	24	7.54
29	18.7	4.1	8.0	16.5	16.3	6.1	1.7	.0	3.9	2.7	1.2	1.7	2.2	1.0	-2.2	-1.2	AY	2.0	2.4	7.0	8.5	4.4	1.7	-1.4	23	4.58
30																									0	
31																									0	
NO.:	29	29	29	29	29	29	29	29	29	29	29	29	29	27	26	28	28	29	29	29	29	29	29	29		
MAX:	41.6	27.0	25.8	28.9	26.2	15.7	19.2	31.7	30.9	22.2	21.9	17.3	17.3	13.1	12.4	11.2	13.8	13.5	30.2	35.8	34.3	33.4	34.1	35.1		
AVG:	10.47	7.70	7.28	6.05	5.24	4.02	4.59	5.74	7.13	7.38	6.10	4.93	5.21	4.72	3.51	3.10	3.70	3.79	7.81	12.27	12.87	12.67	12.55	12.54		

MONTHLY OBSERVATIONS: 689 MONTHLY MEAN: 7.18 MONTHLY MAX: 41.6

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CRITER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MARCH 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	.2	3.4	5.6	5.4	4.2	2.5	-.7	0	2.2	2	2.2	2.9	5.1	5.3	4.4	2.7	1	4.2	6.8	4.4	1.2	1.2	2	4.4	24	3.0
2	4.6	2.2	1.2	.2	-.5	-.5	.7	5.3	5.4	2	3.2	2.5	1.2	1.7	1.7	2.2	2.9	2	-2.9	-2.4	2.2	3.2	3.2	1.5	24	1.8
3	.7	2.5	.5	-.5	.2	1	1.7	3.2	2.9	3.9	4.9	5.6	4.4	.7	1	2.2	1.7	-.5	-1	2.5	4.9	3.4	1.2	.7	24	2.0
4	1.5	2.9	4.4	2.2	-1.7	0	2.7	3.9	3.2	3.2	6.1	6.1	2.5	2.5	1.5	-.4	.5	-1.4	-1.4	5.9	9	6.6	5.6	4.2	24	2.9
5	3.2	1.7	-.9	-1.2	-.7	1	2.7	.7	-.7	1.7	3.4	2.2	1.7	2	2.2	2.7	3.2	3.2	4.6	4.6	3.2	2.2	6.8	12.1	24	2.6
6	4.2	-2.9	-2.6	-1.9	-.5	.5	1.5	.5	1.7	3.4	2.5	3.2	1.7	1.7	2	2.9	2	.2	1	1	3.4	4.4	22.2	16.3	24	2.8
7	3.7	3.2	-1	.5	5.1	3.4	1.7	1.2	4.9	7	6.1	4.9	.2	-.2	1.7	1	.5	-1.9	-3.6	3.9	9	6.3	7.8	7.5	24	3.0
8	5.8	6.6	8	6.8	2.7	2.7	4.4	3.4	1.2	1.7	3.4	4.1	6.8	7.8	7.3	9.2	12.2	23.7	13.6	28.7	23.6	25.5	19.2	6.8	24	9.8
9	8.5	5.1	.3	4.2	16.5	12.4	9.2	15	4.6	8.5	10.9	AT	7.6	5.2	3.2	.8	-.7	.5	1.7	7.8	12.6	7.8	3.9	3.7	23	6.5
10	3.2	2.5	3.2	2	-.7	2.5	5.8	6.3	6.1	4.9	7.8	9.2	9	4	-.9	1	1.3	3.5	3	3.4	18.8	21.4	14.5	11.7	24	6.0
11	9.5	10.2	9	7.8	7.8	7.3	5.8	3.9	7.3	15	8.7	5.1	-1.7	-1.9	.8	1.7	1.7	-.2	-2.4	-1	2.9	2.7	1.5	1.7	24	4.3
12	-.2	.7	2.9	1.2	-1	1	2.5	-.2	-.5	2	4.4	4.9	6.1	6.3	3.9	2.2	1.7	-.9	-.7	1	.3	.5	1.5	3.4	24	1.8
13	1.7	-.2	.3	1	2.2	1.2	1.5	5.1	5.4	3	3.2	2.5	AV	.3	-.5	-1.2	1.5	2.5	5.1	5.6	1.2	-.5	-3.1	1.2	23	1.7
14	5.1	-.5	-1.2	2	2.5	1.2	1	2.9	2.7	3.2	4.9	5.1	5.6	9.5	8.5	4.6	4.4	5.8	4.4	1.5	3.2	3.4	3.4	1.2	24	3.5
15	1.5	2.9	.7	1.5	1	-1	1.5	3.7	.7	.7	4.2	1.2	0	1.5	-.2	-1.2	-.9	-.9	1	3.7	6.1	8.5	7.3	1	24	1.9
16	-1.7	-.7	-1.2	-1.9	-.9	1.7	1.5	1.5	2	2.5	17.3	7.1	5.1	3.9	3	1.2	.5	.7	6.1	7.8	4.2	7	14.8	15	24	4.0
17	29.2	12.6	15.5	7.5	8.7	9.7	8.3	9.5	12.9	13.1	11.2	9.7	9.2	7.5	9.7	10	5.8	7.5	7.5	5.1	5.4	7.1	6.6	8.3	24	9.9
18	4.9	-.5	.7	.7	2	2	.7	1.2	1.5	1.5	.5	-1.2	-1.7	.5	2.9	-1.4	-1.9	3.4	3.4	2.2	5.1	7	3.2	2	24	1.6
19	2.7	1.5	1.7	1.2	1.2	2.5	2.7	2	2.9	4.4	4.2	1.2	1	2.2	2.5	4.2	1.2	-.5	1.5	2.5	4.4	7.8	8.5	4.9	24	2.9
20	3.9	6.1	4.1	.5	.2	2	1.5	-.5	1.2	2	2.2	.5	.7	1.5	.7	1	1.5	0	-.7	1	3.7	3.9	3.9	6.6	24	2.0
21	3.4	2	3.2	3.2	2	-.7	-.7	2.2	2.9	1.5	2.7	5.6	8	6.6	6.6	6.1	4.9	8.8	8.3	9.2	17	12.6	9.7	17.5	24	5.9
22	13.1	17.3	15.5	16.3	21.2	3.7	1.7	-1	1.5	4.9	4.9	3.4	1.7	2.5	3	2.2	3	2.5	1.5	.7	1	3.4	16.5	17.5	24	6.6
23	6.1	4.4	2.7	2.5	2.2	5.6	7.5	8.5	10.4	6.8	2.7	4.9	6.8	6.1	7.1	6.3	3.9	5.8	5.6	4.2	6.1	7.8	7	49.1	24	7.5
24	18.7	21.4	15	11.6	8.3	4.1	6.1	11.6	13.6	16.5	4.2	3.9	4.2	4.9	3.9	3.9	5.4	4.6	5.6	8	26.3	21.4	40.4	26	24	12.1
25	22.4	13.1	12.1	17.8	9.2	8.5	9	8	4.4	3	4.2	6.1	7.1	8.1	6.1	AV	5.6	7.8	9.5	11.2	13.3	18.8	9.2	9.5	23	9.7
26	9.7	9.5	6.3	5.6	7.8	5.3	3.2	5.4	7.5	8.7	8.5	8.5	11.2	10.2	4.7	2.7	2.2	1	3.9	3.9	3.2	5.6	5.8	2.9	24	6.0
27	1.7	2.7	.7	-.5	-1.4	-1.9	.7	2.5	2.7	2.5	.7	.7	2.2	2	-.2	0	2	1.3	.8	4.2	8.7	11.4	11.6	11.2	24	2.8
28	15.5	6.8	8.3	8.7	7.8	6.6	7.3	5.4	3.2	3.2	1.7	.7	.3	1.5	.7	-.2	2	3.2	.3	3.2	5.8	6.1	6.3	4.2	24	4.5
29	2.7	1.5	2.5	2.7	.2	-.3	1.2	2.7	1	-.2	.2	-.5	0	.3	-1.9	-1.4	2	2.2	0	-1.4	0	.7	1.7	2.2	24	.8
30	2.2	1.5	.7	2	1	-2.9	-3.9	-2.2	.5	2.7	1.7	2	AV	6.6	5.4	1	0	-.9	3.2	4.2	.7	1.2	2.5	2.7	23	1.4
31	2.7	.7	-.5	-1.4	-.5	2.2	2.2	1.7	.2	.7	4.2	8.8	10.7	5.6	4.2	5.6	5.2	4.9	5.2	4.4	3	3	3.4	.3	24	3.2
NO.:	31	31	31	31	31	31	31	31	31	31	31	30	29	31	31	30	31	31	31	31	31	31	31	31		
MAX:	29.2	21.	16.	18.	21.	12.	9.	15.	14.	17.	17.3	10.	11.	10.	10.	10.	12.	24.	14.	29.	26.	26.	40.	49.		
AVG:	6.14	4.5	3.8	3.5	3.4	2.7	2.9	3.7	3.7	4.4	4.74	4.0	4.0	3.8	3.1	2.4	2.5	3.0	2.9	4.5	6.8	7.1	8.0	8.3		

MONTHLY OBSERVATIONS: 740 MONTHLY MEAN: 4.3 MONTHLY MAX: 49.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: APRIL 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-2.8	-1.6	1.4	3.9	2.4	.9	1.4	1.7	0	1.2	1.4	-2.1	-1.6	.2	-1.1	-3.3	-2.1	.9	1.4	1.7	-.2	-.2	1.4	.7	24	.2
2	.4	.2	2.2	1.2	.2	.9	1.2	0	-.4	1.7	1.4	-.2	1.7	5.1	7	6.1	3.4	3.4	.2	-2.1	6.3	10.1	5.1	5.1	24	2.5
3	6.5	5	3.1	4.3	3.4	1.9	2.2	2.6	5.1	10.9	9.7	3.4	.5	0	.2	2.5	3.9	1.5	3.2	6	26.2	18	3.1	5.8	24	5.4
4	8.2	8.9	7.5	5.3	7	9.4	14.7	9.9	9.7	9.4	8	5.6	4.1	1.7	3.2	4.6	.5	-2.1	-1.9	-.9	0	2.2	2.4	3.1	24	5.0
5	4.6	3.4	5.3	5.8	3.1	2.2	2.9	4.1	5.3	4.6	3.6	2.4	.2	.2	1.5	2.5	2	2.2	3.1	2.7	-.4	-.7	3.1	2.4	24	2.8
6	1.7	4.1	3.6	1.4	1.9	1.2	-1.4	-.7	-.4	0	1.9	1.2	1.7	6.3	6.5	.9	.9	1.2	.7	2.4	5.5	11.1	14	10.6	24	3.2
7	14.7	8	6.3	3.1	.4	-.4	1.7	.9	-1.9	.2	.7	0	3.4	6	8.5	8.5	1.4	1.4	3.9	1.7	8.2	12.8	10.1	9.4	24	4.5
8	6.7	7.2	20.2	5.3	7.7	8.4	6.7	5	2.9	3.6	5.8	6.3	5.6	7	9.4	6.3	2.9	2.2	2.4	3.9	8.7	7	6.3	11.6	24	6.6
9	10.6	10.4	10.1	11.6	13.3	18.5	12.1	9.9	7.7	9.9	16.3	9	8	6.1	8	10.7	10.4	10.6	10.9	11.6	18	33.6	16.7	7.7	24	12.2
10	8.7	11.1	9.9	7.7	8.4	8	7.2	8.9	8.4	9.2	10.2	7.8	6.5	7.3	AY	AY	6.8	9.5	15.8	19.7	25.5	7.2	8.7	11.6	22	10.2
11	6.3	17	7.5	7.7	7	5.5	7.5	10.1	7.5	5.3	8.2	10.2	9	8.3	8.1	8.1	4.7	1	5.8	7.3	4.9	5.6	7.8	6.3	24	7.4
12	1.4	3.9	7	6.8	5.3	5.3	4.1	2.9	.7	.2	AZ	3.9	2.7	2.2	3.4	2.9	2.7	1.5	1.7	1.9	1.2	2.2	5.8	9.4	23	3.4
13	7.7	6.3	8	6	4.8	7	4.8	4.8	7.2	4.4	1.2	2.5	4.6	4.9	5.1	4.4	4.9	4.9	5.6	6	3.9	8.7	16.2	9.6	24	6.0
14	11.4	10.4	4.1	3.1	5.5	5.8	7.5	6	33.8	6.8	5.8	4.4	2.9	4.1	3.4	1.5	.7	1	4.1	4.4	4.4	4.4	5.3	6.3	24	6.1
15	4.1	5.5	6.7	6.3	5.1	4.3	5.8	4.6	3.6	5.3	3.9	1.7	1.9	0	3.1	4.4	2.7	4.4	1.4	-1.1	2.6	5.8	5.8	3.4	24	3.8
16	1.2	1.4	4.8	5.5	3.1	3.4	2.6	3.4	7	5.5	5.3	4.6	1.9	3.2	2.7	1.7	-.4	1.5	3.4	1.7	.2	2.2	3.8	1.7	24	3.0
17	2.2	2.4	1.2	.2	-.2	1.4	2.2	0	-.2	2.2	2.9	6.3	6.5	1.4	1.5	2.7	2	2.2	3.1	3.4	5.1	7	6.3	4.6	24	2.8
18	7.5	7.5	2.9	3.1	5.3	4.4	2.6	1.4	3.1	.9	-2.1	1.7	1.7	.9	2.7	1	-.4	-.9	0	1.4	2.4	2.9	.9	1.9	24	2.2
19	3.1	3.4	4.1	2.2	.7	2.6	5.3	6	5.3	4.1	3.6	6.3	7.8	5.3	4.6	2.2	0	3.4	4.6	3.9	3.1	5.3	5.3	1.6	24	4.0
20	4.3	5.1	5.3	4.6	7.2	6.7	2.4	4.1	8.5	8.2	7	9.2	9	7	7.5	6.3	4.4	6.5	7	5.1	5.6	6	6.3	5.3	24	6.2
21	6	6	5.3	8.7	11.1	9.9	8.2	8.7	20.9	15.7	11.4	11.4	10.2	5.6	2.3	3.5	4.5	4.2	4.5	5.9	7	6.8	4.1	1.2	24	7.6
22	4.1	7.5	7.7	7	5.8	6.7	6.3	6.3	11.1	14	11.6	6.6	6.1	11	8.6	5.5	5.3	4.3	4.1	5.2	7.3	5.8	3.7	7.3	24	7.0
23	11.6	8.7	7.5	5.8	3.6	6.8	9.7	9.2	9	8.3	6.3	8.5	8	5.6	4.2	1.6	3.3	5.5	6.2	6.7	4.2	3	4.2	4.9	24	6.4
24	2.5	1.2	0	2.2	6.8	5.1	2.9	5.3	5.3	3.2	2.7	4.4	7.6	6.9	4.2	2.2	1.2	.2	1.2	3.6	4.8	4.6	6.3	6	24	3.8
25	7.7	7.7	3.1	5.6	8	5.6	5.3	8.5	10.6	7	2.9	3.9	4.9	5.2	6.9	7.1	5.7	5.9	6.6	6.3	7.3	8.3	7.8	6.5	24	6.4
26	8.7	9.4	6.5	6.3	8.5	8.9	7.5	6.8	7	7	3.6	2.5	4.1	6.3	5.3	1.7	.5	1.5	1.7	1.2	4.6	2.7	-1.4	.2	24	4.6
27	1.9	2.4	1.2	-.4	.2	.7	.7	.9	1.9	1.4	.2	.7	3.4	6.1	AY	3.9	.5	-2.4	.2	2.9	-.2	-.2	-.2	1.2	23	1.17
28	1.7	1.2	2.9	3.1	2.2	1.9	4.1	4.6	2.2	2.7	7.5	8.2	5.3	6.1	4.6	2.2	3.7	4.4	3.4	2.4	2.7	3.1	3.9	5.5	24	3.73
29	5.1	4.1	4.4	5.1	5.8	4.6	4.1	5.8	8	7	8.2	8.2	7	6.3	4.4	4.9	5.1	5.3	3.9	2.4	7.5	8.9	5.1	5.8	24	5.7
30	5.1	5.8	6	6	7.5	4.6	2.9	6	6.3	5.6	7	6.3	3.9	3.9	4.1	2.2	-.4	1	3.4	.9	2.7	4.4	3.4	4.6	24	4.3
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	30	29	30	30	30	28	29	30	30	30	30	30	30	30	30		
MAX:	15.	17.	20.	12.	13.	19.	14.7	10.	34.	16.	16.	11.	10.	11.	9.	11.	10.	11.	16.	20.	26.	34.	17.	12.		
AVG:	5.4	5.8	5.5	4.8	5.0	5.1	4.84	4.9	6.5	5.5	5.4	4.8	4.6	4.7	4.6	3.8	2.7	2.9	3.7	3.9	6.0	6.6	5.7	5.4		

MONTHLY OBSERVATIONS: 716 MONTHLY MEAN: 4.9 MONTHLY MAX: 34.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MAY 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	3.6	2.9	2.2	1.2	1.2	2.6	3.6	1.7	.7	1.7	2.4	2.7	2.7	1.9	1	4.9	4.1	1.7	1.2	.9	4.1	6.5	8.7	6	24	2.9
2	4.8	5.1	3.1	2.6	3.9	3.9	4.6	3.6	3.8	4.3	2.9	1.4	.7	1.4	1.2	.7	.7	0	1.2	4.3	5.3	6.3	6.7	7.5	24	3.3
3	6.5	6.3	4.3	3.6	6	4.8	5.1	16.7	6	4.1	4.1	8.5	7.5	5.8	7	7.5	8	7.7	6.5	6	5.8	8	11.1	11.3	24	7.0
4	9.2	6.8	7	7.2	7.2	5.8	5.5	3.6	3.2	6.8	9.4	7.5	5.8	5.8	4.6	4.8	4.4	1.9	1.4	.7	.9	3.9	4.8	2.4	24	5.0
5	2.2	2.2	3.1	3.4	4.8	6.5	4.8	3.4	3.1	4.8	4.4	2.2	2.2	2.2	2.2	2.9	.5	-.2	2.2	4.8	7.5	8.2	5.8	7.5	24	3.78
6	8.4	9.9	9.6	3.8	3.1	5.5	7.2	5.1	2.9	3.4	4.8	5.6	7.7	7.8	6.1	6.8	7	6.3	6.1	4.4	3.6	6.3	6.8	7.5	24	6.1
7	9.7	8.2	6.3	5.8	4.6	4.3	5.5	6.3	6.7	6.5	8.2	10.7	11.4	12.6	10.7	6.8	7.6	7.6	3.9	5.1	6.3	2.2	2.9	7	24	7.0
8	8.9	9.6	11.6	10.1	8	10.6	11.6	9.9	11.1	15.5	9.7	8.7	8.3	7.3	5.7	6.2	6.4	4.8	6.4	7.6	6.3	5.6	4.4	5.1	24	8.3
9	5.3	9.4	17.7	13.7	16.2	12.6	12.3	11.1	11.6	10.9	9.7	AT	AT	8.8	4.3	4.5	7.1	7.4	6.1	6.3	7.3	7.5	7.8	8	22	9.3
10	7	6.3	5.6	4.4	3.7	2.9	3.4	2.4	2.4	3.6	2.9	3.4	2	1.2	2.7	4.2	5.6	4.9	4.6	3.9	3.9	5.1	4.1	4.6	24	4.0
11	4.1	3.1	2.7	1.9	4.1	5.8	7.3	8	7	7.5	7.5	7.8	6.6	4.9	6.8	7.1	4.4	3.4	5.4	5.1	3.4	5.3	6.8	4.4	24	5.4
12	3.9	5.8	6.5	4.6	4.1	5.8	5.1	4.8	9.4	12.4	15.5	6.3	8.8	7.5	4.7	4.9	4	3.5	4.2	5.1	7.5	6.6	2.2	1	24	6.0
13	1	1.7	2.9	3.6	2.7	3.1	5.3	5.8	7.8	9.5	8	6.3	5.7	4.7	5.7	4.8	3.1	3.3	3.1	3.5	4.9	7.8	9.9	6.5	24	5.0
14	4.4	3.6	3.6	3.6	2.2	4.6	7	10.2	10.9	6.8	5.4	6.1	6.9	AY	6.2	5	7	7.2	7.4	7.1	5.6	8.3	8	4.9	23	6.2
15	5.6	5.1	6.5	8.7	8.7	9.2	6.8	8.5	10.2	8.5	9	11.2	11.4	10.2	9.2	9.7	13.1	12.9	10.2	9.5	15	10.2	8.5	8.3	24	9.4
16	9	7.7	15	7.5	10.7	13.3	11.9	10.9	15.5	13.3	11.9	9.5	9.2	8	5.6	7.8	8	7.5	7.3	7.1	8	7.3	7.8	9.2	24	9.5
17	8	7.3	9	8.7	8	9.9	11.9	10.4	10	9.5	10.5	14.8	7.3	6.6	7.8	7.8	5.6	4.6	4.4	6.1	5.3	5.8	4.4	1.2	24	7.7
18	4.4	6.1	3.9	5.1	4.6	4.6	7.8	6.8	8.5	10.9	9	7.6	8.3	6.8	4.9	4.2	5.6	6.6	6.1	4.7	2.9	3.9	3.4	4.6	24	5.9
19	6.3	5.3	3.9	5.1	5.3	3.9	5.8	8.5	10.2	9	8.3	8.8	6.6	5.6	5.4	3.7	3.9	7.1	8.5	6.3	6.8	9	9.7	8.7	24	6.7
20	7.3	7.5	7.8	7.8	8.5	7	5.3	5.6	5.3	5.6	6.3	7.8	7.8	7.1	5.4	3.9	5.9	6.8	4.4	4.9	8.5	8.5	7.3	9	24	6.7
21	8.3	7	7.8	7	6.3	5.3	4.4	6.8	7.5	6.6	6.8	5.9	5.4	5.4	5.1	5.6	7.5	7.8	7.8	8	6.8	7.5	7.3	4.9	24	6.6
22	2.9	.7	.2	3.9	4.4	4.1	4.4	3.2	2.7	2.9	1.5	2	2.5	1.2	1.5	0	2	3.9	3.2	2.2	1	0	.7	2.9	24	2.3
23	2.9	1.9	1.4	1.2	1.7	2.7	3.4	2.4	1	1	2	2.5	2	-1.8	-1.1	2.2	1.2	.7	1.7	3.2	1.9	1.9	2.4	2.2	24	1.7
24	2.4	0	-.6	0	.7	1.2	1.5	1.7	1.7	3.4	3.9	0	-1.1	1.5	2	1.5	2	1	-.6	0	1.9	3.2	2.4	2.9	24	1.4
25	1.7	.2	.7	.2	.2	.2	-.2	2.2	3.6	4.1	4.4	4.6	3.9	1.7	1.2	2.7	3.9	2.7	1	1.9	4.4	4.4	.7	-.4	24	2.1
26	1.5	1.5	0	.2	-1.6	.7	5.6	4.6	2.2	1.5	1.5	1.2	2.2	1.7	1	3.2	3.2	1.2	1.7	2.4	2.2	2.5	1.9	3.4	24	1.9
27	5.1	2.4	-.2	1	.7	-1.1	.5	.2	1.9	4.4	1.9	-.4	1.7	2.4	2	2.5	3.2	3.4	3.4	3.2	2.9	4.9	6.5	5.6	24	2.4
28	2.9	4.1	6.8	6.3	4.6	3.4	4.4	5.6	6.8	6.8	6.8	6.3	4.2	2.2	2.5	5.1	4.4	2.2	4.7	5.4	4.6	5.1	2	2.9	24	4.6
29	3.9	2.7	3.4	5.8	6.1	6.1	6.8	6.8	7.3	6.5	7.8	8.5	8.8	9	7.3	6.1	6.4	6.6	6.6	7.3	4.7	2.7	4.6	6.1	24	6.2
30	4.9	3.4	5.1	6.1	4.1	4.1	7	8.5	6.6	4.4	3.2	3.5	AY	AY	3	1.7	2.7	4.4	4.7	2.7	.5	1.2	3.4	1.7	22	4.0
31	2.9	4.4	3.4	2.5	2.2	4.6	4.9	6.1	7	4.4	3.7	2.5	2.2	2.7	2.5	3	2.7	4.9	5.6	3.5	3.9	4.4	6.3	7.5	24	4.1
NO.:	31	31	31	31	31	31	31	31	31	31	31	30	29	29	31	31	31	31	31	31	31	31	31	31		
MAX:	10.	10.	18.	14.	16.	13.	12.	17.	16.	16.	16.	15.	11.	13.	11.	10.	13.	13.	10.	10.	15.	10.	11.	11.		
AVG:	5.1	4.8	5.2	4.7	4.7	5.1	5.8	6.2	6.3	6.5	6.2	5.8	5.5	4.9	4.3	4.6	4.9	4.6	4.5	4.6	5.0	5.5	5.5	5.3		

MONTHLY OBSERVATIONS: 739 MONTHLY MEAN: 5.2 MONTHLY MAX: 18.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JUNE 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	7.3	6.1	3.4	1.2	2.2	5.6	7	7.3	4.4	2.7	2.2	2	2.2	1	2.5	2.5	.8	2	3.5	2.5	2	4.2	4.2	2.7	24	3.4
2	5.6	5.4	2.5	2	3.7	5.6	4.9	4.2	5.8	8.5	6.6	6.4	7.1	3.7	1.2	0	.3	2.7	3.9	2.2	.7	1.7	2.9	2.2	24	3.7
3	1.7	2.5	4.4	4.9	5.1	3.9	2	3.4	4.2	2.9	3.4	5.1	4.9	4.2	5.6	6.8	7.6	7.8	6.8	5.4	4.9	7	7.8	6.5	24	5.0
4	7	5.8	5.3	4.9	5.8	9.2	7.5	3.7	4.9	6.1	7.1	4.9	3.5	5.4	7.6	8.5	7.3	10.2	8.5	5.6	6.6	8	8.5	5.8	24	6.6
5	5.8	5.4	2.7	1.2	-1.1	-2.1	-.6	0	-.6	.5	1.7	1.2	.7	2.7	4.2	2.7	3.7	3.2	1.7	3.9	4.2	3.2	3.9	2.5	24	2.1
6	1	0	1.5	2.2	2	2	1.2	1	1.5	-.7	AM	AT	AT	AM	7.8	9.3	7.3	4.4	4.7	3.2	3.4	4.2	1.2	1.7	20	2.9
7	5.8	8	7	5.3	4.9	2.2	3.4	4.1	2.7	7.6	11	8	3.9	2.5	.7	1.2	4.4	3.7	1.5	3.4	5.1	6.3	8.1	6.1	24	4.9
8	3.7	3.9	4.7	4.2	5.6	5.4	2.4	1.2	2.7	2.5	1.5	2.5	3.4	5.1	AY	6.3	4.4	1.7	1.7	2	2.2	1.5	1	-.3	23	3.0
9	-2.8	.8	3.7	3.9	1.7	.5	3.2	2.9	1.5	4.6	4.4	.5	.7	-1	.1	1	-2.3	-2.2	.7	1.2	2.2	1.5	-2.8	-2.5	24	.9
10	-.3	-1.5	-2.5	.5	1.7	.5	.5	-.1	.3	.7	-1.1	-2.5	-.6	3.2	4.2	3.9	4.2	2	-.1	1	2.7	-.1	.2	4.6	24	.9
11	5.8	4.4	3.4	4.6	4.4	1.9	2.4	5.6	5.8	4.4	6.6	6.6	4.7	6.3	6.1	4.2	3.7	4.9	5.4	7.1	6.1	3.7	7.8	8	24	5.2
12	4.6	2.5	.7	1.9	5.1	5.3	4.1	3.9	7.3	10.5	9.3	6.6	4.9	4.2	5.6	5.9	1.5	-2	.3	1.5	2.7	5.1	4.9	5.4	24	4.2
13	3.5	1.7	3.2	4.2	1.5	-.8	1.5	6.1	6.8	3.7	.2	0	1.5	1	-.3	1	3.9	2.5	1	-.8	-1	3.4	4.4	2	24	2.1
14	-.6	-1.8	.8	3.4	1.9	1.4	1.2	1.7	7.1	11.4	6.6	2.5	1.5	2	3.7	1.7	1.7	1.5	2.2	2.7	.5	.7	1.7	2.5	24	2.4
15	3.7	4.9	4.4	5.2	5.4	2.2	-1.3	2.2	5.9	4.2	4.7	3.9	2.9	2.5	3.4	5.1	4.2	2.2	.2	1	1.5	1.2	2.5	3.4	24	3.1
16	2	.2	2.4	3.7	1.2	2.4	3.9	3.7	3.9	4.4	7.8	8.5	7.3	7.3	3.2	.5	2.5	2	0	1	3.4	6.6	5.9	5.1	24	3.7
17	4.2	2.7	2.5	2	2.4	2.9	4.4	4.2	2	1.7	3	2.7	2.7	4.7	5.4	3.7	1.7	1	2.9	1.2	.5	3.9	3.9	4.2	24	2.9
18	1.2	-.3	2	4.4	3.7	3.2	1.2	.3	3.4	18.8	3.2	1	.7	1.2	.2	1.5	2	1.2	-.6	-.8	-1.3	-1.5	-.3	-1.8	24	1.8
19	-3.7	.5	2.7	1.2	1.7	-.6	-.6	1.4	2.2	1.2	.2	1.7	AT	AT	AM	2.5	.2	-.1	1	1.2	.7	.7	.5	-.6	21	.7
20	-.6	-.3	2.7	4.6	5.1	4.6	4.4	4.4	3.9	4.4	2.4	1.7	3.7	5.4	6.1	5.8	4.6	3.4	4.4	5.9	4.4	8.5	8.5	3.4	24	4.23
21	3.2	2.5	.5	-1	.3	2.9	4.9	7.1	7.8	4.2	3.9	6.1	4.4	3.9	5.1	.7	.1	2	2	3.2	4.2	7.8	9.5	9.3	24	3.9
22	8.3	7.1	5.9	6.1	6.3	4.2	3.9	4.2	1.7	5.1	7.1	5.6	6.6	3.9	3.9	5.6	4.9	4.7	4.9	2.7	3.9	5.9	5.8	4.2	24	5.10
23	3.9	7.8	8.5	5.9	4.7	7.1	8.6	7.6	5.6	4.7	4.7	5.4	6.6	8.1	9	10	9	8.3	10	11.7	8.6	3.7	8.1	10.5	24	7.4
24	8.3	10.3	9.8	8.1	7.8	7.1	8.8	15.8	14	12.7	11.2	12.7	12.9	12	10	5.8	5.9	5.6	5.4	8.3	7.3	5.6	6.4	6.9	24	9.1
25	5.6	7.1	8.5	7.8	8.1	7.6	7.8	7.1	5.6	7.1	8.3	9.8	10.3	8.8	7.3	4.7	5.1	4.4	3	4.2	4.2	5.9	6.1	4.2	24	6.6
26	4.7	3	3	5.4	6.6	8.3	8.5	7.3	7.3	4.7	1.2	.7	2.7	1.7	.1	-.1	1	1.7	.5	.1	-.1	.3	1	-1.8	24	2.8
27	-4.5	-1	.1	-.8	-1.3	-.6	-.3	1	3.5	4.2	4.2	6.3	5.4	3.4	3.2	1	1.7	3	1.5	1.2	1	1.5	2	1.5	24	1.6
28	3.7	2.7	1	1.5	1.9	2.5	2.5	2.2	6.4	9	7.3	5.1	2	3	3.9	2.2	3	5.4	6.8	3.2	1.2	5.6	7.1	5.4	24	3.9
29	6.1	7.1	6.9	6.1	2.5	.3	3.5	6.6	4.9	6.1	7.3	4.4	3.7	5.9	9.3	9.5	6.6	5.1	7.8	6.1	2.5	3.5	5.2	5.9	24	5.54
30	6.1	8.1	11.2	8.8	6.6	7.1	6.1	7.3	9.3	8.3	5.9	5.2	5.9	6.4	5.1	3.9	1.5	2	3.9	4.2	5.9	4.9	4.7	8.3	24	6.1
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	30	29	29	28	28	28	30	30	30	30	30	30	30	30	30		
MAX:	8.	10.	11.	9.	8.	9.	9.	16.	14.	19.	11.	13.	13.	12.	10.	10.	9.	10.	10.	12.	9.	9.	10.	11.		
AVG:	3.3	3.5	3.8	3.8	3.6	3.4	3.6	4.2	4.7	5.5	4.9	4.3	4.2	4.2	4.4	3.9	3.4	3.1	3.2	3.2	3.0	3.8	4.4	3.8		

MONTHLY OBSERVATIONS: 712 MONTHLY MEAN: 3.9 MONTHLY MAX: 19.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.150889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JULY 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	8.1	5.1	6.1	7.1	5.9	5.1	3.9	3.2	3.7	2.5	1.7	4.2	5.6	5.4	3.5	4.2	7.3	6.1	2.5	2.5	3.5	3.7	3.7	4.7	24	4.55
2	4.2	3.9	6.6	6.6	3.9	2	5.6	9.5	8.3	8.1	7.1	5.9	6.1	8.5	5.4	2.5	4.7	3.4	3.2	5.1	4.9	5.2	6.1	4.2	24	5.5
3	3.9	6.4	4.4	3.9	7.1	7.3	5.6	7.1	8.1	6.4	6.6	5.1	5.1	5.8	5.6	4.7	6.1	5.9	3.2	4.4	4.2	4.2	4.4	5.1	24	5.44
4	5.6	2.7	1	-1.3	-.6	2.2	4.1	4.4	15	10	7.3	5.4	6.6	6.1	2.7	.7	1.5	4.4	5.4	.7	2	29.7	59.9	21.2	24	8.2
5	16.5	9	7.3	3.2	1.5	1.9	3.4	6.6	10	14.8	10.5	8	5.6	5.1	2.7	2.2	6.1	6.8	3.4	3	4.6	7.6	11.5	8.8	24	6.7
6	2.7	2.7	5.4	6.1	5.1	5.1	8.3	10.3	9.3	8.1	9.8	10.7	8.1	7.8	10.5	9	7.3	6.6	5.2	6.8	6.1	6.6	8.8	6.8	24	7.2
7	6.6	8.6	8	7.6	6.8	7.1	8.8	10.3	9.8	10	11	11.2	11	9.3	9.5	8.1	2.7	2.7	7.6	9	8.5	9.3	9.7	9	24	8.4
8	8.8	9	10.7	10.7	10	10.5	9	10.7	11.5	9.8	10.7	11	10.3	10.5	10.7	6.6	3	4.9	7.6	6.6	7.1	8.1	6.8	8.6	24	8.9
9	9.3	6.6	5.9	7.6	8.5	9.3	12	13.6	15.8	17.3	14.8	12.5	AY	12.7	9.3	5.9	AM	14.3	15.5	13.5	9	7.3	10.7	11.5	22	11.0
10	9.8rt	17.1rt	15.8rt	15.3rt	13.8rt	16.6rt	19.8rt	16.1rt	21.2rt	21.2rt	20.7rt	25.1rt	22.5rt	19.8rt	15.5rt	18.3rt	17.8rt	12.2rt	18.8rt	12.7rt	17.3rt	15.3rt	17.3rt	18.3rt	24	17.43
11	18.5rt	16.6rt	14.5rt	19.3rt	16.8rt	24.9rt	21.5rt	24.4rt	23.7rt	19.3rt	20.8rt	9.8rt	11.7rt	13.6rt	11.2rt	9.8rt	15.5rt	14.8rt	16.1rt	15.3rt	16.3rt	12.5rt	16.3rt	15.5rt	24	16.61
12	11.2rt	14.8rt	15rt	16.8rt	16.3rt	14rt	15.5rt	19rt	19.3rt	AT	19rt	16.1rt	18.5rt	16.1rt	13.3rt	10.1rt	12.9rt	11.2rt	10.5rt	17.6rt	14.8rt	18.1rt	14.5rt	15rt	23	15.5
13	14.5rt	14.1rt	15rt	14.8rt	20rt	19.3rt	18.1rt	21.7rt	28.5rt	17.3rt	13.3rt	12rt	10.7rt	12.7rt	13.6rt	16.8rt	18.8rt	15rt	19.3rt	20.5rt	17.8rt	19.8rt	20.7rt	21rt	24	17.3
14	25.4rt	28.7rt	25.4rt	22.7rt	23.2rt	18.5rt	21rt	16.6rt	14rt	12rt	10.5rt	12.7rt	15.8rt	16.3rt	15.3rt	11.8rt	12.7rt	12.9rt	13.4rt	11.5rt	8.6rt	10.3rt	10.3rt	9.1rt	24	15.8
15	9.5	8.3	5.9	4.9	5.4	6.1	4.9	4.7	4.2	5.2	7.1	5.4	4.7	5.6	7.1	5.6	2.7	4.4	5.4	4.7	6.6	11	11.7	10.5	24	6.3
16	9.8	9.8	8.8	7.1	7.8	7.8	8.5	8.3	10.3	11	10	12	11.5	10	8.1	5.9	3.7	6.1	8.3	5.6	6.8	7.1	5.4	7.1	24	8.2
17	8.8	7.8	8.8	9.8	7.6	7.1	8.8	9.5	7.6	6.4	6.6	5.9	4.9	3.2	3.2	3.9	3.9	5.6	5.9	4.2	4.2	7.6	8.3	6.1	24	6.49
18	9	8.5	6.6	8.3	8.8	7.6	6.1	6.9	9.8	8.3	6.8	9.3	9.3	6.8	7.1	5.9	5.9	8.6	8.3	6.4	6.9	10	10.3	7.8	24	7.8
19	8.3	9	8.3	7.3	8.1	8.8	9.5	11.7	13.2	13.3	12.7	13.3	14	12.2	8.3	7.1	9	8.8	7.1	7.1	9.3	10.3	9.5	10.5	24	9.9
20	10.5	11	10.3	10	10.7	11.2	10.7	10.5	10.3	10.5	16.3	13.6	12.2	7.8	5.4	3.9	1.7	.8	2.7	4.9	8.1	8.6	7.1	9.3	24	8.7
21	11	10	7.3	8.8	10.5	9.8	9.1	9.3	9	8.6	9	8.8	8.6	10.7	8.6	6.6	22	5.6	6.1	6.6	8.6	6.8	4.7	9.5	24	9.0
22	11.5	9	7.6	7.3	5.9	4.9	5.4	7.1	8.6	10	10.5	7.6	7.1	6.1	4.4	6.4	6.6	5.4	5.9	4.9	6.6	8.1	8.5	7.3	24	7.2
23	3.7	2	2.2	3.7	6.4	6.4	8.3	11.5	11.2	9.1	8.8	6.1	6.4	7.6	4.7	4.9	5.2	4.9	4.4	5.6	5.4	4.9	5.9	4.7	24	6.0
24	2.2	2.5	2.7	2.5	3.2	3.9	5.1	5.1	17	7.8	8.3	7.1	5.9	3.9	1.5	1.2	2.5	5.1	3.4	5.1	10.2	9.3	7.8	6.1	24	5.4
25	4.2	5.9	5.4	4.9	1.2	-1.3	2	5.1	8.3	8.3	9.3	8.1	4.7	4.2	4.7	4.4	6.8	8.5	7.6	6.4	5.6	5.9	5.6	8.1	24	5.6
26	8.5	7.3	5.9	5.4	4.9	6.1	7.8	8.5	11.5	13.3	12.9	9.8	7.1	9.5	10.2	6.8	6.3	7.1	8.3	9.3	8.1	8.3	9	7.6	24	8.3
27	5.6	6.3	8.8	8.8	6.6	8.3	7.3	4.9	5.9	8.1	8.6	9	8.3	8.5	7.3	5.1	8.3	9.1	8.1	7.8	7.6	6.8	5.1	6.4	24	7.4
28	5.9	4.2	6.4	6.4	7.8	7.8	4.2	5.9	9	10	10	9.8	10	8.3	6.6	7.3	6.6	4.7	5.2	5.2	3.7	3.7	3.2	5.4	24	6.6
29	7.8	7.1	4.9	6.8	9.3	7.6	7.8	8.8	10	10.3	8.1	10	10.8	10.3	8.3	5.6	5.6	5.4	9.5	10	6.4	6.8	10.5	11.2	24	8.3
30	11.7rt	13.3rt	12rt	12.5rt	12.9rt	11rt	15.5rt	13.6rt	14rt	13.1rt	11.7rt	11.5rt	11.5rt	12.2rt	9.3rt	6.4rt	8.1rt	9.3rt	9rt	10rt	10.8rt	8.6rt	6.4rt	5.9rt	24	10.8
31	6.1	8.6	9.5	6.4	6.1	10	13.3	11.2	17.3	9.8	10	10.5	9	6.6	7.3	8.3	8.6	8.3	7.6	7.1	7.6	7.8	6.8	6.8	24	8.8
NO.:	31	31	31	31	31	31	31	31	31	30	31	31	30	31	31	31	30	31	31	31	31	31	31	31		
MAX:	25.	29.	25.	23.	23.	25.	22.	24.	29.	21.	21.	25.	23.	20.	15.5	18.	22.	15.	19.	21.	18.	30.	60.	21.		
AVG:	9.0	8.9	8.5	8.4	8.4	8.6	9.4	10.2	12.1	10.7	10.7	9.9	9.5	9.1	7.77	6.9	7.7	7.4	7.9	7.7	8.0	9.3	10.5	9.3		

MONTHLY OBSERVATIONS: 741 MONTHLY MEAN: 9.0 MONTHLY MAX: 60.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: AUGUST 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	7.3	8.3	9.1	7.8	9.5	10.5	9.5	11	11.7	11.5	9.3	8.1	10	10	7.3	7.1	5.9	5.6	6.8	8.1	8.6	9.8	11	9	24	8.9
2	7.8	6.6	6.1	8.1	9.8	10.5	11	10.5	9.5	11.2	AY	12.2	8.6	5.6	6.1	6.1	8.1	7.8	7.8	10.7	8.3	6.1	6.4	8.1	23	8.4
3	7.1	4.9	3.7	3.7	5.4	3.2	4.9	6.8	6.4	7.8	8.1	6.6	4.2	6.9	8.5	5.6	6.6	7.1	3.5	2.7	2	1.7	3.7	4.2	24	5.2
4	4.4	4.2	5.2	6.1	4.2	1.2	-1.3	2.5	4.4	4.7	9.8	7.8	3.9	6.1	8.1	3.7	2.5	4.2	4.7	4.2	4.7	7.1	8.1	7.3	24	4.91
5	8rt	7.6rt	6.8rt	6.9rt	5.2rt	7.6rt	7.8rt	5.6rt	6.8rt	7.8rt	15rt	13.8rt	11.2rt	8.3rt	9.5rt	11.7rt	11rt	15.5rt	12.9rt	12.7rt	16.1rt	16.5rt	14.1rt	14rt	24	10.5
6	14.1rt	13.8rt	13.8rt	15rt	15.3rt	13.3rt	13.6rt	16.6rt	16.3rt	20rt	19.3rt	25.8rt	16.1rt	20rt	21.5rt	25.6rt	14.5rt	14.6rt	16.8rt	17.1rt	14.5rt	18.8rt	16.6rt	18.5rt	24	17.1
7	14rt	12.5rt	12.7rt	12.9rt	12.5rt	12.7rt	13.1rt	19.3rt	16.3rt	20.3rt	20.5rt	21rt	19rt	20.3rt	22.2rt	17.1rt	14.3rt	14.8rt	16.8rt	17.1rt	18.3rt	19.3rt	23rt	21.2rt	24	17.1
8	16.8rt	19.3rt	20.5rt	21.7rt	18.3rt	19.3rt	26.3rt	22.2rt	24rt	22.7rt	24rt	26rt	23.7rt	23rt	32.2rt	29.5rt	39rt	AV	AV	AV	AV	AV	37.6rt	36.6rt	19	25.4
9	37.6rt	39.5rt	38.7rt	38rt	38.1rt	38.7rt	38.7rt	40.9rt	37.4rt	41.7rt	39.7rt	23.2rt	19.8rt	23.2rt	30rt	33rt	23.5rt	AT	22rt	29.2rt	24.9rt	26.5rt	27rt	25.6rt	23	32.0
10	26rt	22.7rt	19.8rt	23rt	18.1rt	19.5rt	20rt	18.8rt	16.8rt	15.5rt	9.3rt	16.6rt	11.2rt	10.3rt	7.8rt	9.5rt	12.9rt	13.6rt	13.2rt	13.3rt	19.1rt	17.6rt	19.8rt	22.7rt	24	16.5
11	25.4rt	21.7rt	22.2rt	17.6rt	22.5rt	20.8rt	17.1rt	19.8rt	21.5rt	14rt	13.3rt	12.5rt	11.5rt	8.8rt	9.3rt	10.5rt	8.3rt	8.3rt	10rt	11.2rt	15rt	12.5rt	18.3rt	22.5rt	24	15.6
12	15.8rt	23.5rt	19.3rt	16.3rt	18.6rt	16.8rt	18.8rt	20rt	20rt	19.8rt	21.3rt	18.8rt	18.6rt	13.3rt	12.9rt	12.2rt	12.7rt	13.6rt	14.8rt	15rt	20.8rt	20.7rt	AM	AM	22	17.4
13	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	38.7rt	38.3rt	37.3rt	39.2rt	38.3rt	44.4rt	73.8rt	110rt	102.4rt	82.2rt	70.7rt	66.5rt	36.1rt	35.6rt	14	58.1
14	26.5rt	29.8rt	24.7rt	33.7rt	33.9rt	31.7rt	31.2rt	33.4rt	33.7rt	36.4rt	29.7rt	21.2rt	17.6rt	16.8rt	17.3rt	AY	26.7rt	45.6rt	30.2rt	34.4rt	45.8rt	28.7rt	32.7rt	30.2rt	23	30.08
15	41.9rt	41.8rt	41.9rt	AM	AM	AM	AM	AM	3.2rt	3rt	5.4rt	7.1rt	6.4rt	7.6rt	8.3rt	8.3rt	9.3rt	8.3rt	5.6rt	3.9rt	3.5rt	4.2rt	2.7rt	3.7rt	19	11.4
16	6.6rt	8.1rt	7.6rt	5.6rt	3.7rt	2.9rt	3.4rt	6.6rt	10.7rt	11.7rt	11rt	11rt	10rt	8.8rt	10.3rt	16.1rt	18.5rt	24.9rt	20.8rt	23rt	26rt	25.8rt	24.7rt	32.2rt	24	13.8
17	27.7rt	23.5rt	23.2rt	25.4rt	18.8rt	24rt	27.7rt	35.9rt	36.8rt	37.1rt	30.2rt	23.7rt	19.3rt	26.5rt	19.3rt	24rt	33.7rt	18.8rt	23.2rt	20.5rt	24rt	26.3rt	21.7rt	18.3rt	24	25.4
18	17.6rt	17.3rt	17.8rt	18.3rt	21.7rt	20.7rt	16.3rt	28.2rt	33.7rt	20.5rt	22rt	19.3rt	12.9rt	11.5rt	8.8rt	6.6rt	7.1rt	9.5rt	12.2rt	11.2rt	16.6rt	12.7rt	17.8rt	14.3rt	24	16.4
19	13.8rt	12.2rt	10.7rt	10rt	15.3rt	11rt	12.7rt	13.8rt	12.5rt	15.5rt	21.7rt	18.1rt	21rt	21.3rt	39.9rt	24.7rt	24.9rt	32rt	39.7rt	31.5rt	34.6rt	33.9rt	39.2rt	33.9rt	24	22.7
20	24.2rt	32.4rt	31.2rt	32rt	39.7rt	41.4rt	40.4rt	48.5rt	51.9rt	47.3rt	54.8rt	50.2rt	55.1rt	76.2rt	68rt	58rt	48.2rt	32.9rt	49.9rt	26.5rt	25.4rt	23.7rt	24.2rt	24rt	24	41.9
21	23.2rt	27rt	24.4rt	25.1rt	29rt	28rt	23.7rt	26.5rt	27.5rt	23.2rt	28.2rt	28rt	28.2rt	30.5rt	33.2rt	33.9rt	25.4rt	19.1rt	21.5rt	20.3rt	21.7rt	22.5rt	27rt	26.8rt	24	26.0
22	23.5rt	26.3rt	27rt	27.5rt	31rt	31.2rt	27.3rt	33.4rt	34.2rt	33.9rt	36.9rt	40.2rt	33.2rt	24rt	19.8rt	13.6rt	12.9rt	15.3rt	58.7rt	73.3rt	74.1rt	50.4rt	50.9rt	59.4rt	24	35.8
23	53.4rt	46rt	46rt	45.1rt	45.6rt	41.4rt	41.9rt	51.2rt	55.5rt	56.8rt	51.3rt	48rt	45.3rt	38.8rt	32.9rt	32.5rt	39rt	53.8rt	80.7rt	75.3rt	81.2rt	80rt	88rt	81.2rt	24	54.6
24	62.4rt	43.6rt	42.1rt	51.1rt	60.4rt	44.6rt	29.7rt	18.3rt	33.4rt	19rt	7.8rt	16.1rt	13.8rt	12rt	11.5rt	15rt	15.3rt	32rt	33.7rt	23rt	25.6rt	24rt	23rt	19.3rt	24	28.2
25	19.8rt	38.6rt	50.2rt	45.5rt	45.8rt	43.6rt	47rt	48.2rt	48.9rt	50.9rt	48.7rt	42.6rt	48rt	51.9rt	46rt	28.5rt	28.7rt	23.2rt	16.8rt	21rt	22.7rt	21.2rt	24.9rt	30.2rt	24	37.2
26	32.9rt	29rt	28.2rt	31.2rt	34.6rt	38.5rt	39.5rt	41.4rt	39.9rt	42.9rt	44.1rt	40.9rt	35.9rt	37.4rt	39rt	41.6rt	44.1rt	40.4rt	45.6rt	50.4rt	56.3rt	69.2rt	90.9rt	96.4rt	24	45.4
27	94.2rt	64.2rt	58rt	51.1rt	43.4rt	33.9rt	42.1rt	51.6rt	45.3rt	34.6rt	34.2rt	21.2rt	20.3rt	26.5rt	31.2rt	27rt	22.7rt	20.3rt	27.5rt	26.5rt	25.6rt	31rt	26rt	28.7rt	24	37.0
28	32.7rt	35.6rt	33.4rt	38.7rt	50.2rt	39.7rt	40rt	31.2rt	41.4rt	51.6rt	52.6rt	48.5rt	54.1rt	43.9rt	39.2rt	40.4rt	43.6rt	36.6rt	45.8rt	40.7rt	46.3rt	61.1rt	64.3rt	58.7rt	24	44.6
29	57.7rt	72.1rt	71.9rt	73.8rt	88.2rt	91.4rt	150.4rt	142.1rt	93.9rt	97.4rt	35.1rt	35.4rt	46.8rt	47.7rt	78.5rt	77rt	69.2rt	61.1rt	38.1rt	145.5rt	124.3rt	109.4rt	117.5rt	91.7rt	24	84.0
30	90.2rt	74.6rt	61.1rt	47.7rt	48rt	48rt	55rt	55.1rt	55.5rt	57.2rt	66.2rt	56.8rt	59.5rt	74.3rt	56rt	AY	41.9rt	43.6rt	42.6rt	47rt	44.1rt	48rt	45.6rt	59.2rt	23	55.5
31	59.2rt	53.6rt	54.3rt	58.7rt	67.2rt	65.5rt	77.4rt	83.1rt	88.7rt	93.1rt	89.7rt	83.4rt	68.5rt	61.9rt	62.6rt	67rt	41.9rt	25.8rt	21.5rt	40.2rt	43.1rt	66.2rt	53.9rt	58.7rt	24	61.9
NO.:	30	30	30	29	29	29	29	29	30	30	30	31	31	31	31	29	31	29	30	30	30	30	30	30		
MAX:	94.	75.	72.	74.	88.	91.	150.	142.	94.	97.	90.	83.	69.	76.	79.	77.	74.	110.	102.	146.	124.	109.	118.	96.		
AVG:	29.7	28.7	27.7	27.5	29.4	28.0	30.5	32.5	31.3	31.0	29.9	27.2	25.5	26.2	27.0	25.2	25.4	26.2	28.2	31.3	32.1	32.0	33.2	33.1		

MONTHLY OBSERVATIONS: 718 MONTHLY MEAN: 29.1 MONTHLY MAX: 150.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditionn

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: SEPTEMBER 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

HOUR																											
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	53.6rt	47.7rt	50.6rt	53.9rt	60.9rt	61.1rt	66.2rt	67rt	70.4rt	70.2rt	80.4rt	69.7rt	106.1rt	43.4rt	26.5rt	33.9rt	53.8rt	52.9rt	53.6rt	119.7rt	162.3rt	136.2rt	126.9rt	114.3rt	24	74.2
2	83.4rt	57.2rt	56rt	54.8rt	58.7rt	49.9rt	49.2rt	64rt	59.2rt	62.8rt	74.8rt	63rt	45.8rt	41.9rt	46.8rt	25.8rt	21.7rt	36.1rt	61.4rt	147.7rt	142rt	102.2rt	101.9rt	74.3rt	24	65.9
3	53.4rt	53.6rt	57.9rt	57rt	57.5rt	57.7rt	59.4rt	59.4rt	60.1rt	55.5rt	74.3rt	74.8rt	55.3rt	43.4rt	38.7rt	30.7rt	28.5rt	34.2rt	58.7rt	87.5rt	84.9rt	76.7rt	64.2rt	58.2rt	24	57.6
4	65rt	71.1rt	72.8rt	73.3rt	67.2rt	70.1rt	68.4rt	63.1rt	67.2rt	57rt	35.1rt	43.1rt	43.9rt	65rt	86.8rt	106.1rt	92.4rt	88.7rt	97.3rt	99.3rt	80.7rt	75.7rt	68.7rt	55.3rt	24	71.4
5	74.1rt	82.9rt	74.6rt	71.9rt	60.9rt	63.6rt	68.7rt	71.6rt	67.9rt	67.5rt	59.4rt	24.2rt	34.9rt	41.4rt	26.5rt	27rt	30.7rt	22.5rt	68.2rt	89.4rt	80.9rt	76.2rt	62.6rt	62.1rt	24	58.7
6	61.6rt	72.6rt	72.1rt	66.7rt	68.2rt	63rt	54.3rt	66.5rt	29.9rt	AT	15.3rt	9.1rt	16.1rt	9.3rt	11rt	13.6rt	18.6rt	14.5rt	11.2rt	6.4rt	4.4rt	6.4rt	7.1rt	3.7rt	23	30.5
7	4.7rt	8.5rt	9.2rt	15rt	9.3rt	10.7rt	12.4rt	13.4rt	16.1rt	14.5rt	14.8rt	14.8rt	15.5rt	24.9rt	20.5rt	14.5rt	16.8rt	20rt	25.6rt	19.8rt	18.8rt	24.4rt	24.9rt	22.5rt	24	16.3
8	22.2rt	23.7rt	24.2rt	29.2rt	27rt	33.4rt	36.1rt	39rt	42.6rt	60.6rt	50.6rt	49.9rt	50.6rt	48rt	45.1rt	42.9rt	36.9rt	35.9rt	38rt	43.6rt	41.2rt	51.1rt	73.1rt	77.4rt	24	42.6
9	85.3rt	84.1rt	89.9rt	90.9rt	97.6rt	92.4rt	102.9rt	99.1rt	102.6rt	106.8rt	95.4rt	91.7rt	80.9rt	73.8rt	71.6rt	63.7rt	67.5rt	78.5rt	85.1rt	104.8rt	106.1rt	111.2rt	104.6rt	102.2rt	24	91.20
10	95.9rt	80.4rt	79.7rt	110.2rt	123.1rt	125.5rt	128.9rt	125.8rt	112.9rt	106.8rt	109.7rt	122.3rt	275.5rt	130.9rt	111.2rt	122.8rt	139.3rt	150.1rt	102.7rt	95.9rt	44.9rt	74.6rt	193.9rt	180.1rt	24	122.63
11	131.4rt	57rt	39rt	61.6rt	50.9rt	35.1rt	33.9rt	65.7rt	67.4rt	32.2rt	40.2rt	66.7rt	65.7rt	45.8rt	AY	47.7rt	42.1rt	51.3rt	47.3rt	64.2rt	60.9rt	75.5rt	113.1rt	141.5rt	23	62.4
12	187.1rt	201.6rt	173.4rt	185.7rt	112.9rt	74.3rt	76.4rt	74.1rt	75.3rt	73.1rt	60.9rt	40.9rt	20.5rt	32.4rt	56.5rt	41.4rt	77.7rt	69.9rt	77.2rt	125.2rt	79.9rt	109.9rt	116.7rt	162.7rt	24	96.07
13	82.4rt	95.8rt	90.9rt	107rt	116.5rt	124.3rt	130.8rt	140.8rt	151.1rt	175.8rt	179.9rt	181.1rt	161.8rt	162.8rt	185rt	190.2rt	189.5rt	191rt	184.7rt	185.9rt	175.8rt	170rt	157.2rt	148.9rt	24	153.3
14	150.6rt	174.1rt	174.8rt	209.1rt	231.1rt	238rt	249.9rt	228.6rt	164.8rt	202.8rt	200.9rt	212.9rt	229.2rt	226.4rt	205rt	199.7rt	197.1rt	204.3rt	203.3rt	206.5rt	199.7rt	252rt	300rt	354.7rt	24	217.2
15	284.4rt	244.7rt	243.5rt	210.9rt	232.1rt	234.8rt	197.7rt	254.7rt	237.7rt	269.6rt	276.6rt	266.5rt	264.7rt	284.4rt	242.8rt	244rt	246.7rt	238.4rt	243.6rt	214rt	237.8rt	201.8rt	153rt	145.7rt	24	236.3
16	126.4rt	108rt	102.9rt	111.4rt	113.8rt	120.8rt	121.8rt	126.6rt	111.7rt	124rt	127.2rt	122.8rt	116.7rt	109.7rt	102.6rt	81.2rt	73.8rt	75.7rt	77.9rt	83.4rt	81.7rt	91.9rt	90.6rt	76.2rt	24	103.3
17	61.6rt	65rt	68.2rt	74.8rt	76.9rt	87.3rt	89.4rt	91.1rt	92.6rt	86.3rt	80.4rt	93.6rt	76.4rt	43.4rt	40.9rt	51.3rt	56.3rt	59.2rt	54.8rt	96.4rt	138.6rt	140.1rt	140.5rt	98.1rt	24	81.8
18	93.9rt	94.1rt	105.1rt	109.9rt	121.8rt	135.9rt	144.5rt	131.8rt	115rt	122.1rt	131.8rt	142.8rt	133.8rt	125.5rt	110.2rt	94.6rt	96.4rt	91.9rt	110.7rt	129.6rt	133.8rt	127.6rt	121.3rt	117.9rt	24	118.4
19	92.4rt	96.9rt	99.8rt	102.4rt	96.8rt	102.9rt	99.3rt	101.7rt	100.5rt	92.9rt	79.5rt	81.7rt	85.8rt	86.3rt	83.4rt	78.9rt	73.8rt	82.7rt	86.8rt	125.3rt	147.7rt	149.4rt	167.5rt	125.3rt	24	101.65
20	121.6rt	119.9rt	125.3rt	121.8rt	125.5rt	131.3rt	132.5rt	130.8rt	133.7rt	129.1rt	126.7rt	126.2rt	134.7rt	141.1rt	129.6rt	117.2rt	108.7rt	108rt	112.4rt	115.3rt	109.4rt	119.6rt	111.9rt	107.5rt	24	122.5
21	102.9rt	111.2rt	118.4rt	130.1rt	139.8rt	149.1rt	156.4rt	165.8rt	164.6rt	167.6rt	167.8rt	188.6rt	176.3rt	136.2rt	120.4rt	101.2rt	112.7rt	110.7rt	107.5rt	112.7rt	102.2rt	104.1rt	98.1rt	90.4rt	24	130.62
22	85.8rt	91.2rt	91.4rt	101rt	106.3rt	114.3rt	122.8rt	117.2rt	121.8rt	109.9rt	122.6rt	112.2rt	102.4rt	85.1rt	92.2rt	83.4rt	73.3rt	80.2rt	80.9rt	79rt	83.6rt	97.8rt	125.9rt	149.6rt	24	101.2
23	137.2rt	143.3rt	156.2rt	139.1rt	125.7rt	158.6rt	182.5rt	170.7rt	142.8rt	162.8rt	172rt	160.6rt	151.5rt	133.5rt	91.7rt	70.4rt	60.4rt	65.7rt	72.1rt	87.5rt	144.6rt	125.5rt	138rt	158.2rt	24	131.3
24	175.1rt	178.2rt	191.9rt	197.1rt	189.8rt	195.6rt	208.2rt	201.1rt	201.4rt	191.9rt	191rt	199.7rt	190.2rt	186.7rt	179.4rt	165.4rt	163.7rt	169rt	165.1rt	172rt	161.3rt	159.9rt	159.4rt	175.4rt	24	182.0
25	176.5rt	169.5rt	180.1rt	167.5rt	156.7rt	154rt	153.5rt	143.3rt	147rt	145rt	142.8rt	142.3rt	145rt	124.8rt	73.6rt	58rt	54.3rt	55.5rt	55.1rt	52.1rt	57rt	64.3rt	67.5rt	58.7rt	24	114.3
26	60.9rt	54.3rt	57.5rt	70.1rt	74.1rt	92.1rt	96.1rt	84.6rt	84.6rt	76.3rt	81.4rt	77.2rt	AY	AY	AM	58rt	56rt	55.1rt	56rt	55.1rt	55.3rt	60.9rt	50.9rt	49.7rt	21	67.0
27	47.3rt	52.6rt	50.7rt	55rt	52.3rt	53.6rt	53.6rt	58.9rt	64rt	62.3rt	65rt	67rt	60.6rt	54.8rt	56.5rt	56.8rt	58rt	54.3rt	56.5rt	55.6rt	56.5rt	54.6rt	67.7rt	56.5rt	24	57.1
28	52.6rt	52.9rt	67.2rt	70.4rt	68.9rt	74.6rt	72.8rt	73.1rt	74.3rt	82.2rt	89.4rt	80.4rt	73.8rt	69.4rt	66.5rt	65rt	67rt	68.5rt	66.7rt	74.4rt	68.2rt	49rt	25.6rt	11rt	24	65.2
29	10.7rt	14.8rt	15.5rt	10.5rt	14.8rt	18.3rt	17.6rt	19.8rt	15.5rt	17.3rt	15.8rt	16.1rt	20rt	24.7rt	24.7rt	24.2rt	23.8rt	27.7rt	23.5rt	31.2rt	26.5rt	27.7rt	28.7rt	19.8rt	24	20.4
30	24.4rt	26.3rt	29.5rt	15.8rt	22rt	21rt	20rt	17.5rt	17.3rt	23rt	21.7rt	20.3rt	23rt	32.2rt	46.8rt	49rt	47rt	53.1rt	53.6rt	51.6rt	53.1rt	51.1rt	42.1rt	49rt	24	33.8
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	29	30	30	29	29	28	30	30	30	30	30	30	30	30	30		
MAX:	284.	245.	244.	211.	232.	238.	250.	255.	238.	270.	277.	267.	276.	284.	243.	244.	247.	238.	244.	214.	238.	252.	300.	355.		
AVG:	93.5	91.1	92.3	95.8	95.3	98.1	100.2	102.2	97.1	101.7	99.4	98.7	102.0	90.6	85.4	78.6	79.5	81.5	84.6	97.6	98.0	98.9	103.5	101.6		

MONTHLY OBSERVATIONS: 715 MONTHLY MEAN: 94.5 MONTHLY MAX: 355.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: OCTOBER 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	36.8rt	29.7rt	28.2rt	23.4rt	26.7rt	24.6rt	31.4rt	29.7rt	29rt	29.5rt	32.9rt	35.4rt	28.2rt	30.7rt	23.5rt	32.9rt	48.2rt	60.6rt	50.9rt	41.6rt	33.9rt	34.9rt	33.2rt	41.9rt	24	34.1
2	39.5rt	38.7rt	30rt	22rt	21rt	20.7rt	18rt	24.9rt	30.7rt	26.7rt	16.8rt	24.2rt	27.7rt	27.7rt	33.4rt	36.1rt	38.5rt	31.5rt	33.4rt	30.5rt	26.8rt	16.3rt	18.8rt	32.7rt	24	28.1
3	24.2	22.7	13.5	20.5	14.7	26.7	13.6	12.2	8.5	6.3	6.1	5.4	4.9	6.3	6.8	6.8	5.4	4.2	5.8	5.8	4.4	5.6	8	11.2	24	10.4
4	10	4.6	4.1	4.1	4.4	6.1	9.5	7.8	4.4	4.4	4.2	AT	AT	19.8	6.4	3.9	1.2	3.7	3.4	1.7	.6	5.4	10.2	8	22	5.8
5	10.7	11	9.5	7.8	4.6	5.8	10.5	11.2	9.7	8	8.8	10.3	8.5	8.8	5.9	4.2	5.1	4.4	5.9	3.9	5.1	10.2	7.5	4.1	24	7.6
6	6.6	10	9.3	7	8.3	9.3	7.1	4.9	5.1	9.5	12.2	11	10.5	8.1	5.6	4.4	3.7	7.3	12.2	13.4	11.7	8.8	16.5	6.6	24	8.7
7	7.3rt	7.8rt	6.3rt	5.1rt	9.7rt	12.2rt	8.5rt	9.5rt	17.8rt	10.2rt	10rt	5.9rt	5.9rt	15.3rt	18.5rt	20.5rt	24.4rt	29.7rt	39rt	55.1rt	58.5rt	72.3rt	82.4rt	101.2rt	24	26.4
8	84.8rt	77.7rt	77.2rt	74.8rt	75.3rt	83.1rt	77.4rt	75.8rt	72.6rt	68.7rt	68.9rt	67.7rt	63.3rt	53.8rt	53.9rt	55.8rt	50.4rt	54.1rt	59.4rt	61.9rt	64.2rt	59.7rt	59.6rt	53.1rt	24	66.38
9	51.6rt	54.3rt	48.9rt	49.7rt	45.1rt	51.2rt	50.4rt	49.4rt	42.1rt	46.5rt	25.6rt	10.5rt	17.1rt	23rt	22.7rt	26rt	18.5rt	30rt	30rt	26.3rt	21rt	32.9rt	33.6rt	43.1rt	24	35.4
10	38.8rt	41.4rt	47rt	51.8rt	49.2rt	54.3rt	65.9rt	75.8rt	69.4rt	63.1rt	58.5rt	50.6rt	50.6rt	47.7rt	AY	41.6rt	40.7rt	42.9rt	55.3rt	47rt	45.8rt	45.3rt	49.7rt	49.2rt	23	51.4
11	49.9rt	47.2rt	49.9rt	49.7rt	55.8rt	58.7rt	61.6rt	72.1rt	56rt	41.6rt	26.7rt	24rt	16.6rt	23.5rt	27.5rt	34.6rt	31.2rt	38rt	40.7rt	33.7rt	31.2rt	36.3rt	34.6rt	33.9rt	24	40.6
12	33.7	32.4	51.6	73.6	75	68.2	75	78.7	52.6	43.6	38.7	37.1	30.3	26.8	26.3	42.6	97.1	52.4	42.1	48.7	77.7	68.2	74.6	77.9	24	55.2
13	62.4rt	55.3rt	67.5rt	63rt	62.6rt	59rt	74.8rt	74.8rt	54.1rt	36.8rt	24.4rt	16.3rt	12.7rt	9.8rt	5.6rt	8.8rt	11rt	8.8rt	8.6rt	22rt	23.2rt	17rt	13.8rt	14.3rt	24	33.6
14	12	7.8	5.6	7.8	7.3	4.4	6.1	4.9	3.7	5.4	5.6	6.6	3.7	3.2	7.6	6.1	3.5	6.4	6.6	6.1	8.8	9.8	6.9	3.9	24	6.2
15	4.7	6.4	4.9	2	1	4.2	7.8	7.1	5.4	5.4	6.9	6.4	2.5	-.3	.5	2.7	3.7	4.7	6.4	6.1	4.9	1.5	.1	.8	24	4.0
16	.8	1.5	1.5	3.5	2.7	1.3	3.9	2.5	2.2	0	AQ	2	2	2.3	3.2	3.9	1.7	1.5	4.7	2.7	2	2.9	1.3	1.1	23	2.2
17	3.7	3.4	1.3	2.2	2.5	2.5	3.4	3.9	1.3	1	2	1.1	1.2	1.5	3.2	3	2.2	4.2	6.8	6.8	6.8	AQ	AQ	AQ	21	3.0
18	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	7.3	10.5	18.5	13.8	13.8	9.1	4.9	6.6	4.9	17.1	8.6	10.2	15.8	12.7	8.3	15	10.81
19	4.4	2.5	.5	3	3.2	2.5	5.1	7.1	5.4	3.7	3.7	3	3	2.5	3.9	4.2	1.2	3.2	2.7	2.2	3.7	3.9	6.6	3.2	24	3.5
20	2	6.8	5.4	2.2	1.3	.6	1.1	3	4.4	1.7	-1	2.2	4.4	.8	1	2.2	2.2	4.9	6.4	5.9	2.5	7.1	12	24.9	24	4.3
21	4.9	5.1	5.8	5.6	3.4	3.7	4.9	6.6	9	6.6	1.7	3.2	4.7	3.5	2.2	1.3	3.9	5.4	6.1	7.3	16.8	20.2	11.7	9	24	6.4
22	7.3	5.6	2.2	2.4	5.6	15.3	17	17.3	12.9	10.7	11.2	23.7	16.5	20.7	15.5	11.9	11.9	18	15	17.3	14	21.5	17	17.5	24	13.7
23	13.9	14	12	9.5	10.5	13.1	14.3	15	13.1	8	6.4	11.2	11.2	AY	AY	AM	7.3	6.1	23.2	24.4	17	23.2	28.7	28	21	14.8
24	24.9	8.3	6.8	5.1	15	15.5	17	21.5	14.3	9	2.7	4.7	4.9	3.4	4.9	4.7	5.4	16.8	19.5	22.9	31.7	23.9	15.8	15.8	24	13.1
25	11.9	12.7	18.5	17	17.3	14.5	13.8	12.2	12.7	15.5	12.9	15	16	12.2	16.3	9.3	7.6	6.8	10	13.1	14	12.4	16.5	12.7	24	13.4
26	19	14.5	13.9	10.5	4.9	4.2	5.1	5.8	9.5	10.5	8.3	9	9.7	10.5	9.7	6.8	4.4	2.9	5.4	6.3	4.9	5.1	7.3	5.8	24	8.1
27	3.7	5.6	4.9	1.7	2.2	6.3	7.8	5.4	7	6.3	3.4	4.6	8.8	9.7	7.8	7.6	5.1	4.9	8.3	7.6	3.7	3.2	2.7	1.7	24	5.4
28	2.4	2.5	1	-.1	1.3	1.7	2	2	1	1.7	4.2	3	3.4	3.9	1.5	1	2.7	5.6	6.1	4.9	3.4	1.5	.3	1.5	24	2.4
29	1.3	2.7	3.7	3.4	4.9	3.7	1.7	1	3.4	8	7.8	8	9.5	6.1	4.2	4.2	2.7	1.5	3.2	5.1	5.8	4.7	2.5	6.4	24	4.4
30	6.8	2.7	1.1	.1	1.7	2.2	2.2	1.7	2.7	4.9	4.2	AT	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	11	2.75
31	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
NO.:	29	29	29	29	29	29	29	29	29	30	29	28	28	28	27	28	29	29	29	29	29	28	28	28		
MAX:	85.	78.	77.	75.	75.	83.	77.	79.	73.	69.	69.	68.	63.	54.	54.	56.	97.	61.	59.	62.	78.	72.	82.	101.		
AVG:	20.0	18.4	18.3	18.2	18.5	19.8	21.3	22.2	19.3	16.7	14.6	15.0	14.0	14.1	12.1	14.0	15.4	16.0	18.4	18.9	19.1	20.3	20.9	22.1		

MONTHLY OBSERVATIONS: 688 MONTHLY MEAN: 17.8 MONTHLY MAX: 101.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: NOVEMBER 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
2	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
3	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
4	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
5	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	9.8	7.1	3.9	2	.8	3.2	6.1	7.1	15.3	17.3	8.5	8	10	13	7.6
6	9.5	7.3	9.3	9.7	8.1	8.3	6.3	5.6	5.4	6.6	7.6	3.9	2.5	3.2	3.2	2.5	2.5	6.6	9.5	6.6	3.5	3.7	5.6	4.4	24	5.89
7	1.7	1.5	2	1.2	2	2.9	4.9	7.8	6.6	5.1	10	9.7	3.7	.8	1	2.7	2.5	4.2	6.6	6.1	4.2	3.2	2.7	5.6	24	4.1
8	7.8	7.3	6.8	6.8	10.5	12.6	12.2	10	10	10.7	10.2	9.5	11	12.7	9.7	4.4	5.1	9.7	10	8.8	11.7	15.5	31.4	13.4	24	10.7
9	9.5	4.9	4.1	4.4	5.4	6.3	5.8	14.8	8	8.8	7.5	5.1	5.4	6.6	AY	AY	AH	8	8	5.3	4.9	3.4	3.2	4.9	21	6.4
10	5.6	4.4	3.2	2.9	2.4	2.2	2	2.2	3.9	7.1	6.1	14.7	6.6	6.1	2.7	4.4	9.2	9.5	6.5	5.8	9.7	21.7	21.2	7.8	24	7.0
11	8.5	10.2	11.9	14.7	16	10.9	12.6	12.2	10	11.2	11.9	16	3.7	7.3	8.7	4.9	4.9	23.4	28.7	36.3	17.8	13.8	10.9	10.4	24	13.2
12	11	7.3	6.1	5.3	4.4	4.1	5.6	8.8	10.2	8	16	7.5	9.5	12.7	13.8	13.1	12.6	18.5	5.8	7.8	9.5	11.4	11.2	8.5	24	9.5
13	7.5	7.5	5.6	5.4	5.8	4.4	4.9	5.6	4.6	5.6	9	9.2	8	7.6	9	11.2	6.8	22.9	18.3	8.5	8.3	8.8	9.7	9	24	8.5
14	7.3	3.9	3.2	4.7	2.9	2.9	5.1	3.2	3.1	3.1	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	6.8	24.4	11.2	12.7	11	15	7.0
15	9	7.5	6.8	11.4	10.5	9	8.5	6.8	8	7.5	7.5	7.1	7.1	7.1	6.6	3.4	4.2	7.1	6.1	4.6	5.1	6.8	5.8	3.9	24	7.0
16	1.3	2.9	6.8	8	8.7	10.5	10.7	11.2	12.4	11.7	10.5	11.5	14.8	8.8	9.7	9.5	7.5	15.8	34.1	17.3	31.7	25.8	42.3	43.8	24	15.3
17	18.8	24.9	20	15.3	18.8	20.5	22.4	26.5	30	22.7	16.8	17.5	11.5	12.7	8.5	2.9	3.9	21.7	20.3	5.8	5.6	3.4	2.5	3.4	24	14.9
18	2.2	3.2	1.5	-1.3	-2.3	-1.3	1.7	3.4	5.6	6.6	5.4	2.7	2.7	2.9	2.4	2.9	3.4	15.3	11.2	7.3	5.4	5.6	3.4	1.1	24	3.79
19	.5	3.4	4.6	2.7	1.7	.8	-.3	.1	1	.3	-.1	2	2.9	1.2	.3	1.5	1.7	1	.5	-1	1.7	5.4	5.8	4.6	24	1.8
20	5.3	5.8	3.2	1.3	1	.1	.8	2.7	-.3	2	2.7	.1	2.9	AY	3	2.2	3	2.7	4.9	8	8.8	5.1	2.2	2.7	23	3.1
21	2.7	1.7	3.9	3.7	.8	1	1.7	3.7	4.6	4.6	2.7	2.2	3.4	3.7	3.7	2.7	1.5	2.2	7.8	9.2	8.5	7.5	5.6	5.1	24	3.9
22	2.7	.8	1.3	5.1	5.4	2.9	1.7	2.9	6.3	7.3	6.3	5.4	4.2	4.2	3.4	3.7	4.6	8.3	10.9	10.7	9.5	8.5	11.9	11.7	24	5.82
23	10.7	11.2	12.7	15.2	11.2	8.7	8.5	9.5	21.2	13.4	11.2	10.7	11.5	12.2	8.3	5.6	10	25.3	24.9	22.7	36.6	43.3	35.1	24.6	24	16.8
24	16.1	26.9	18.5	17.3	16.5	-2.8	-2.5	-.8	2.7	3.9	2.7	2.5	1.7	.8	.8	1.7	2.4	7.6	11.9	11.4	17.3	22.2	23.7	28	24	9.6
25	12.4	25.6	22.7	12.2	9.2	3.9	2.5	3.2	3.9	4.9	1.5	1.2	4.9	2.7	.3	2.7	3.7	6.6	8.5	17.8	36.6	12.9	7.8	3.9	24	8.82
26	6.6	7.1	7.1	2.7	2.7	7.3	5.1	3.2	5.8	6.6	4.4	5.6	6.6	5.1	3.7	4.1	6.6	18.3	28.7	24.2	34.6	32.2	24.6	23.2	24	11.50
27	27.2	32.6	19	16.8	16	16.8	30.7	27.2	41.6	16	19.7	18.5	19.2	19.7	18.3	15.2	16.3	34.1	24.4	44.3	41.4	52.8	63.1	43.6	24	28.1
28	45.3	46.7	24.6	29.7	31.7	33.6	37.3	37.1	47.7	46.2	33.9	29.4	24.9	24	21	22.4	20.7	27	35.8	28	25.4	38	30.2	30.9	24	32.1
29	35.3	42.8	36.6	23.7	37.6	39.7	43.1	38.3	36.3	36.1	38	35.3	7.8	8.5	6.1	6.8	11.9	35.1	10.2	10	8.8	8.5	7.3	5.8	24	23.7
30	7.6	6.3	4.1	3.7	6.1	10.7	11	7.1	5.6	7.5	10	10.5	7.1	4.2	2.2	.5	2.5	24.2	21.5	19.8	29.5	33.4	22.9	19.3	24	11.6
31																									0	
NO.:	25	25	25	25	25	25	25	25	25	25	24	25	25	24	24	24	24	25	25	26	26	26	26	26		
MAX:	45.	46.7	37.	30.	38.	40.	43.	38.	48.	46.	38.	35.	25.	24.	21.	22.4	21.	35.	36.	44.	41.4	53.	63.	44.		
AVG:	10.9	12.15	9.8	8.9	9.3	8.6	9.7	10.1	11.8	10.5	10.5	9.9	7.6	7.4	6.2	5.49	6.3	14.4	14.5	13.4	16.07	15.9	15.8	13.1		

MONTHLY OBSERVATIONS: 600 MONTHLY MEAN: 10.8 MONTHLY MAX: 63.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: DECEMBER 2012

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	15.3	17	16.3	4.4	3.7	2.9	2	.3	.8	.8	.8	3.4	4.2	4.2	4.2	7.6	10.5	11.2	8.3	18.8	5.1	6.8	10	8.5	24	7.0
2	5.6	8	8.5	9.3	8.5	4.6	5.8	5.6	5.6	9.5	11.2	8.8	6.3	7.3	9	5.1	2.5	7.8	9.8	5.6	5.1	4.7	1.5	1.5	24	6.6
3	1.5	.6	.5	2.2	1	-.3	2.7	4.2	1.7	.8	3.7	4.6	4.2	3.7	3.2	2.9	4.4	6.8	6.3	8.5	17.5	13.1	16.8	9.7	24	5.0
4	10.5	9.7	4.2	3.2	4.4	1	1	2.5	2.2	.8	1	2.2	.8	.8	2.2	1.7	3.7	3.4	1.5	3.7	3.4	1.9	4.2	1.7	24	3.0
5	-.1	2.7	2.7	2	.5	-.1	2	5.1	5.1	2.9	1	.8	1	1.4	AT	6.3	7.8	4.7	6.3	9.2	7.8	8	7.8	8.3	23	4.1
6	10.7	10.5	12.4	13.1	12.4	13.1	13.1	13.4	17	26.3	8.8	6.8	5.3	6.8	6.8	7.3	8.5	8.8	19	11.9	10.7	8.5	6.3	1.9	24	10.8
7	1.3	4.4	1.9	-1.8	-.3	2.6	4.9	7.3	7.8	5.8	3.9	2.7	2.9	3.9	AY	5.3	8.1	8.5	7.1	6.3	8	9	5.6	6.1	23	4.8
8	5.8	2.9	2.7	.8	.1	1.7	4.2	1.7	3.9	8.8	8.5	5.6	1.7	2.2	5.8	6.5	5.4	3.9	7.5	13.4	11.2	6.1	3.6	4.1	24	4.92
9	4.6	3.4	3.4	3.2	1.3	1.3	2	2.2	5.1	7.8	6.5	4.9	4.4	3.9	6.1	9	9.2	8	16.3	4.4	4.2	8	7.5	2.4	24	5.4
10	3.4	3.6	6.8	5.8	2.2	4.9	8	15	8.5	5.4	19	6.1	6.3	6.6	5.1	4.4	4.4	4.4	4.4	7	9.2	5.8	25.8	7.8	24	7.5
11	6.3	4.9	2.9	3.9	3.9	.5	1	3.4	3.6	3.2	1.7	1.7	3.4	2.9	4.6	16.3	2.2	2.7	5.3	6.6	4.6	4.1	3.2	3.2	24	4.0
12	4.6	2.9	1.4	2	2.9	3.7	3.2	4.1	15.2	11.7	13.1	11	6.1	4.6	1.5	2.2	8.8	10.2	10.7	23.2	11.5	11.5	10.5	6.8	24	7.6
13	4.1	3.4	2.9	2.9	2.9	1.7	1.9	3.2	3.4	1.5	.5	4.2	4.6	2.4	2.2	1.5	3.9	14.8	33.4	26.3	10.5	11	9.7	7.3	24	6.7
14	6.1	6.6	6.1	7.8	9.7	15.8	8.5	6.8	9.7	10.5	5.8	6.1	8.8	8.5	5.3	5.6	5.8	5.6	8.5	17.8	7.8	15.8	20.5	19.5	24	9.54
15	19.8	31.5	25.1	27	15.5	18.8	18	20	23.7	26.3	15.8	15.7	8.8	9.5	10.5	11.7	17.8	11.9	25.1	34.6	42.4	28.4	20.5	-2	24	19.9
16	-1.3	.8	2.5	2.7	1.5	.3	.8	1.4	1.7	2	3.9	2.2	.8	1.2	3.2	5.6	4.6	3.9	5.8	7	5.4	2.7	2.7	2.9	24	2.7
17	-.1	-.1	3.9	4.2	2.4	1.3	.3	2.7	3.9	3.2	2.7	2.9	1.5	1.5	1.5	.1	2.5	7.1	8.8	5.1	3.4	4.2	17.3	2.2	24	3.44
18	6.8	8.1	2.4	2.7	4.9	1.7	2.7	4.9	4.9	4.6	2	2.9	5.6	3.2	.8	1.2	1.9	5.6	23.9	3.7	3.4	8.5	7	3.7	24	4.9
19	5.6	4.9	2.2	1.7	3.4	2.9	2.2	2.4	2.7	.3	1.9	5.4	7.3	9	7.8	6.8	7.3	5.6	5.4	3.4	3.9	5.6	1.9	2.2	24	4.2
20	2.5	3.4	4.1	2.7	3.7	2.7	4.4	6.6	7.5	8.8	5.8	3.2	3.2	4.6	3.7	2.7	5.6	5.8	3.4	2.7	2	3.4	25.1	18	24	5.7
21	32.9	18	22.7	3.7	5.1	4.2	2	1.5	2.9	3.4	2	.8	1.9	3.2	3.7	9.3	10	15.5	8.1	9	7.5	16.8	17	7.5	24	8.7
22	16.3	10	6.1	1.2	3.4	4.6	3.9	6.8	6.6	5.8	8	9	5.6	3.4	15	7.1	5.1	4.6	4.6	2.7	5.1	7.3	5.6	5.4	24	6.4
23	6.3	6.3	5.1	3.2	-.1	.5	1.3	2.7	5.4	5.3	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	10	3.60
24	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
25	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
26	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
27	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
28	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	BA	21.2	25.1	16	13.4	7.5	5.6	11.7	19	23.2	11.7	9.5	7.8	9.2	13	13.9
29	6.1	0	3.7	3.7	2.7	4.6	3.6	7.3	8	6.1	7.3	8.3	8	9.3	8.5	10.9	9.5	8	26.7	32.4	28.7	13.8	24.2	26.3	24	11.2
30	48.9	21	23.2	10.2	8.5	7.8	8	10	10	8.5	8.3	8.3	10	9.2	6.8	5.8	4.2	6.1	15.5	10	10	18.3	19.7	21.2	24	12.9
31	15.2	18.8	15	15.5	20	15.5	6.6	6.3	7.3	20	10.9	10.9	10.5	8.3	6.8	7.5	8.3	11.2	20	38.8	44.8	43.6	15.5	23.4	24	16.7
NO.:	26	26	26	26	26	26	26	26	26	26	25	26	26	26	24	26	26	26	26	26	26	26	26	26		
MAX:	48.9	32.	25.	27.	20.	19.	18.	20.	24.	26.	19.	21.	25.	16.	15.	16.	18.	16.	33.	39.	45.	44.	26.	26.		
AVG:	9.18	7.8	7.3	5.3	4.8	4.5	4.4	5.7	6.7	7.3	6.2	6.1	5.7	5.3	5.7	6.1	6.4	7.6	12.0	12.9	11.0	10.6	11.4	8.0		

MONTHLY OBSERVATIONS: 621 MONTHLY MEAN: 7.4 MONTHLY MAX: 49.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JANUARY 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	10.9	10.9	10.9	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	3	10.90
2	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	BA	8	4.9	3.9	4.9	8.7	12.6	22.2	17.8	11.5	12.7	15	30.7	12	12.7
3	16.8	14	11.2	9	6.1	5.3	9.2	11.2	21.4	26.9	18	16	3.2	6.8	11	11	10.5	19	32.2	28.4	34.1	40.6	37.3	33.6	24	18.0
4	41.6	35.1	26.5	16.8	21.4	21.4	17.5	24.2	28.2	23.4	25.6	22.7	21	21.2	23.4	20.5	17.5	25.1	22.9	29.5	28	22.9	33.4	39	24	25.4
5	45.5	38.5	44.6	30.2	42.1	41.9	42.3	40.6	47.2	42.8	36.6	48.7	38	31.9	31.9	27	27.2	31.4	46.7	45.8	76	70.4	66.7	57	24	43.8
6	58.4	46.7	41.1	34.6	36.6	41.1	38.7	30	37.1	44.6	33.4	27.9	28.9	30.4	27.5	22.4	25.3	30.2	42.1	58	46.2	31.4	18.5	24.2	24	35.6
7	15.5	1.7	2.9	5.4	4.1	2.2	.8	-.6	2.4	3.2	2.9	2.7	1.4	2.6	2.5	2	3.9	2.2	1	2.9	3.2	5.4	5.6	3.9	24	3.3
8	3.2	2.7	4.4	4.2	1.7	2.4	5.6	5.4	4.2	5.8	5.4	4.2	6.6	6.3	4.2	4.9	3.9	5.4	7.5	4.2	4.1	7.1	7.5	6.8	24	4.90
9	5.6	5.6	3.4	1.2	1	1.5	2.2	4.2	4.2	-.3	-1.3	AT	1.7	2.7	1.2	2.2	4.9	6.1	5.1	16.8	18.8	9.7	12.2	7.1	23	5.0
10	1.7	3.2	.8	-1.5	.1	1	1	3.4	3.2	2.2	2.2	-.3	1.3	3.9	2.5	1.7	1.3	3.4	4.4	2.9	1.7	2.7	2.5	2.4	24	2.0
11	3.4	2.2	.1	2.4	7.3	6.8	6.1	5.8	4.2	5.3	5.3	2.7	2.9	2.9	1.9	2.7	4.9	4.9	6.3	10.9	15.3	7.5	8.8	10	24	5.4
12	9	8.5	9	7.5	5.3	5.1	4.6	6.6	7	3.9	3.2	2.7	3.4	5.6	6.8	6.3	5.8	15.5	26.3	44	34.6	30.4	26.1	19.7	24	12.4
13	10.7	7.3	6.3	9	8.5	5.6	5.4	3.2	2.2	5.6	18.5	13.4	13.4	7.3	2.9	4.1	7	27.4	33.1	38.3	20.9	26.1	30.9	22.7	24	13.7
14	28.4	16.8	23.4	15.2	18	2.2	5.1	4.9	3.7	5.8	3.4	3.9	4.6	2.4	3.6	4.1	6.6	8.3	8	8.3	8.7	15	20.9	24.4	24	10.2
15	44.6	27.9	10.2	31.9	23.2	25.3	22.4	26.3	15.2	16.8	19	16.5	18.5	16.5	18.5	12.7	17.3	27.7	38.8	57.4	63	74.1	59.4	70.4	24	31.4
16	64.5	49.1	20.7	28.9	31.4	33.9	23.4	21.2	23.7	23.7	26.1	27.5	26.7	23.2	24.6	18.7	14.7	25.6	44.3	23.2	49.4	53.3	42.9	49.2	24	32.08
17	63.3	48.4	51.6	57.7	40.2	40.1	24.9	33.9	37.1	39.7	20	23.7	25.6	21	13.5	13.4	14.8	26.5	28.5	29.5	56	32.7	41.6	30.2	24	33.9
18	32.6	36.3	32.4	.3	2.4	2.7	24.2	15.7	2.4	1.7	1.4	2.7	5.3	4.9	2	2.2	.8	2	2.7	7.6	9	7.8	11.9	8.3	24	9.1
19	7.3	15.8	18	7.8	10	5.6	2.9	6.1	16.5	9.7	10.2	17	12.4	15	18.8	13.8	14.7	32.6	32.9	46	38.3	30.9	34.1	35.6	24	18.8
20	42.6	29.2	7	3.2	.5	3.9	16.3	5.8	8.3	11.7	13.1	16.8	7.6	10	17.3	19.3	18	27	45.3	44.3	47	66.2	86.8	80.4	24	26.2
21	27.4	9.2	27.7	21.7	25.1	25.1	16.3	18.5	20.5	22.9	19.7	20.5	27	26.5	17.3	14.5	15	20.5	43.1	64.2	53.8	75.3	66.4	59.2	24	30.7
22	53.8	41.6	44.8	29.4	18	25.6	23.9	46.7	49.4	72.3	24.9	29.4	24.2	26.5	19.8	23.4	23.9	28.9	45.5	57	47	74.1	34.3	55.7	24	38.3
23	63.8	38.3	37.1	36.1	41.9	22.2	37.1	37.1	32.7	41.4	28.2	AY	AY	35.3	25.6	23.4	27	27.9	30.4	39.7	34.1	33.9	46	2.4	22	33.7
24	1.4	2.7	3.4	1.5	1	1.3	.5	.8	1.9	3.9	4.6	3.2	.6	-.6	.3	.6	2.2	6.6	17.5	16.3	33.9	32.2	10.2	23.4	24	7.1
25	19.2	2.4	1.7	-.1	-.1	2.7	6.1	5.1	3.2	4.4	4.1	2.7	2.7	2.9	1	1	2.2	1.7	1.9	4.2	3.9	.8	.6	-1	24	3.1
26	-.8	3.4	2	1	2	1	2.5	2.2	2.2	1.3	.8	1.9	3.4	3.4	2.4	1.5	.5	3.2	15.5	19.3	20.2	26.1	16.5	21.7	24	6.4
27	13.8	13.1	9.7	16.8	8.3	7.3	4.4	4.4	5.6	4.4	3.2	1.4	2.2	1.7	1.3	4.4	3.6	-.6	2.7	8.5	20.7	14.8	6.8	4.4	24	6.79
28	3.4	2.7	-.4	-.8	-.6	-.1	-.8	-.4	1.3	1.7	2.7	2.2	1.5	1.3	1.3	3.6	4.9	3.4	3.7	2.4	1.2	2.7	2.2	.5	24	1.65
29	1.4	2.7	1.4	3.2	3.9	1.7	2.4	1.3	1.7	5.1	2.4	3.7	5.1	2.4	2.7	1.9	1.5	6.3	10.7	10.5	15.3	7.3	4.4	2.5	24	4.23
30	3.4	4.4	4.4	2.9	2.5	.8	1.7	7.8	7.5	5.4	4.9	3.6	1.7	1.3	2.9	.3	.6	1.7	-.1	1.7	3.4	2.5	1.5	1.3	24	2.84
31	1.7	1.7	1	1.5	1.7	2.2	3.2	3.9	8.3	11.2	7.3	3.4	3.2	2.9	1.7	4.6	6.1	15	1.5	1.7	7.5	8.8	4.4	4.6	24	4.5
NO.:	30	30	30	29	29	29	29	29	29	29	29	27	29	30	30	30	30	30	30	30	30	30	30	30		
MAX:	65.	49.	52.	58.	42.	42.	42.	47.	49.	72.3	37.	49.	38.	35.	32.	27.	27.	33.	47.	64.	76.	75.	87.	80.		
AVG:	23.1	17.4	15.2	13.0	12.5	11.6	12.1	12.9	13.9	15.40	11.9	11.9	10.4	10.8	9.8	9.1	9.8	14.9	20.8	24.7	26.9	27.5	25.2	24.3		

MONTHLY OBSERVATIONS: 708 MONTHLY MEAN: 16.1 MONTHLY MAX: 87.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: FEBRUARY 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	5.4	4.9	3.4	2.9	2.2	2.4	1.9	-.1	2.5	7.1	3.9	.6	1.2	.1	AY	2.9	4.7	4.6	4.4	1.7	5.8	12.2	18.5	8.5	23	4.42
2	6.3	17.8	.5	1.3	1.3	.8	4.7	5.6	.5	2.4	4.4	3.4	4.6	5.1	6.6	6.6	7.6	7.8	9.5	19.2	10.7	12.7	11.9	11	24	6.8
3	10	5.4	6.6	12.2	9.7	9.5	15.7	11.7	19.2	7.8	8.5	9	10.2	8.5	5.4	4.1	.8	-.1	3.2	4.1	3.9	16.8	21	13.6	24	9.0
4	10.5	3.7	1.3	2.5	2.4	2.5	3.2	.3	-.6	1.5	1.3	AT	3.6	5.6	3.7	.5	.1	2.5	19.7	8	22.2	7.3	8.3	6.8	23	5.1
5	2.2	2	2.7	-1.3	-2.5	-.6	1.4	2.4	1.3	2.9	3.7	2	1.7	2.4	4.1	3.4	.5	.6	5.4	7.1	6.8	4.6	1.5	2.9	24	2.4
6	5.1	5.8	4.9	6.1	5.1	2.2	3.7	5.1	2.7	.3	.5	.5	-.8	-1.5	-1.3	.1	1.5	3.2	16.3	16.8	22.2	12.7	9.5	6.3	24	5.29
7	5.6	16	5.1	4.9	6.1	6.3	5.8	8	11	10	7.5	7.8	8	7.8	7.8	9	7.3	7.6	24.6	15.3	16.5	25.1	22.9	18.8	24	11.0
8	15.5	24.6	18	11.5	12.2	10	10	23.2	20.5	17.3	15	11.7	8.3	4.6	4.6	5.4	4.6	3.9	1.3	.5	1.4	4.4	20.2	31.4	24	11.7
9	16.3	7.8	29.2	10	11.2	11.2	9.7	8.5	15	7.8	7.1	5.4	4.4	3.7	2.4	1.7	2	2.2	3.2	3.9	3.2	1.7	1.9	2.7	24	7.2
10	5.1	6.1	3.6	6.6	8	10.2	13.4	15	7.5	7	5.6	4.9	6.6	5.6	2.2	1	1.9	1.4	3.9	10.2	11.7	8.5	7.5	7.5	24	6.7
11	4.9	1.9	.5	.3	1.4	2.7	2.9	.5	3.4	7.3	5.8	5.8	4.1	3.9	3.7	3.2	2.4	1.7	4.1	18.3	15.2	24.4	21	6.3	24	6.1
12	6.3	4.4	.3	.8	3.9	3.2	2.7	3.9	5.1	4.9	4.9	4.4	4.2	5.8	AY	5.1	4.2	2	6.6	12.4	10.5	9	7.8	7.3	23	5.2
13	4.9	1.3	1.5	2.2	-.6	-1.1	.8	4.4	4.4	2	4.9	5.1	2.2	2.9	3.2	2.7	2.2	-.1	2.2	1.3	1.7	4.6	4.1	6.1	24	2.6
14	4.9	2.2	4.4	7.3	7.5	5.4	3.9	5.6	9.5	10.7	7.8	3.2	4.2	5.8	2.2	.1	1.3	5.1	3.2	2.9	7.8	7.3	10.7	9.7	24	5.53
15	7.8	16	9.5	9.2	8.5	6.8	5.6	8	8.5	3.7	3.9	7.8	7.5	7.5	8.8	9.3	7.1	2.5	2.5	7	11.7	8.3	15.2	8.5	24	8.0
16	7.1	7.5	8.3	8.8	9.5	9.5	11.4	11.9	16	10.7	6.6	1	.1	.8	1.5	1	.5	1.2	6.6	9.5	10.5	8.3	1.7	-.3	24	6.2
17	-.6	2.9	2.9	-.3	-.6	1	.6	-.3	.8	.8	.5	1.3	.8	1.7	.3	-1.5	-.8	-.1	2.5	3.4	4.1	3.9	2.4	1.9	24	1.2
18	2.2	1.3	.3	1.9	.5	1.7	3.2	1.4	1.9	2.7	.1	-2	-.8	-.1	-2.3	-1.8	-.8	-1.3	3.4	6.3	1.4	2	9	11.2	24	1.7
19	7.8	6.6	10.2	10.2	9	6.8	5.3	8.5	14.7	24.9	9.5	7.5	2.9	2.4	2.9	1	1.4	1.7	2.4	3.2	4.6	9.2	9.5	7.5	24	7.1
20	7.8	5.8	3.9	2.2	1.3	2.7	1.4	1.5	4.2	6.3	5.8	4.4	AZ	4.1	1.9	-.3	-1.1	1	3.4	5.4	9.5	6.8	6.3	9	23	4.1
21	8	7.3	6.3	6.3	1.7	-2.3	1	3.2	-.3	1.9	4.1	1.7	.3	-.8	1.9	3.4	.3	.1	1.3	.5	.3	1.7	6.1	8.8	24	2.6
22	9.5	9	4.4	2	2.4	1.9	-.3	-.6	1.7	1	0	2.9	1.9	.5	2.2	1	-.1	1.7	2.2	.5	1	1.5	2	1.3	24	2.1
23	.3	.8	1.9	3.4	1.7	6.3	8.5	2.5	3.4	4.2	3.7	2.5	1	2.4	1.3	-.6	-.1	.5	2.2	7.3	11.7	17.8	22.2	12.9	24	4.9
24	9.7	5.8	5.3	4.1	1	-1.8	-2	1.9	5.3	4.9	6.6	8.3	5.6	5.1	6.1	5.6	4.6	2.7	6.8	10.7	11.2	11.9	7.8	3.7	24	5.5
25	3.4	3.4	3.6	3.2	2.4	1.7	.3	-1.5	-1.5	1.7	1.9	.3	1.3	.5	.8	3.2	2.7	1.7	2.2	3.4	3.9	2.7	2.4	2.2	24	1.91
26	1.3	.5	1	.3	-2.1	-.3	2.2	4.2	4.2	3.7	7.5	10	3.2	1.4	4.1	3.4	3.2	3.9	4.4	16	22.4	10.7	6.3	5.3	24	4.9
27	7	6.1	4.9	2.7	1	0	1	1.9	3.9	6.1	5.3	4.4	5.3	5.8	5.8	3.9	-.1	-1.1	5.8	13.6	27.7	24.9	17.8	21.4	24	7.3
28	.8	1	3.7	6.8	9.5	8.8	5.3	7.8	7.3	3.2	2.7	3.9	4.9	4.9	7.3	7.1	1	.5	3.7	5.1	4.9	4.4	8.8	7.3	24	5.0
29																									0	
30																									0	
31																									0	
NO.:	28	28	28	28	28	28	28	28	28	28	28	27	27	28	26	28	28	28	28	28	28	28	28	28		
MAX:	16.	25.	29.	12.	12.	11.	16.	23.	21.	25.	15.	12.	10.	8.5	8.8	9.	8.	8.	24.6	19.	28.	25.	23.	31.		
AVG:	6.3	6.4	5.3	4.6	4.1	3.8	4.4	5.2	6.1	5.9	5.0	4.4	3.6	3.45	3.35	2.9	2.1	2.1	5.61	7.6	9.4	9.5	10.2	8.6		

MONTHLY OBSERVATIONS: 668 MONTHLY MEAN: 5.4 MONTHLY MAX: 31.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MARCH 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

	HOUR																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	2.4	2.5	15	9.5	5.8	6.3	6.6	2.7	4.7	5.6	8	8.3	3.2	3.7	4.9	5.9	5.4	3.7	4.7	6.4	7.1	6.8	6.1	6.6	24	5.9
2	6.6	3.2	2.5	2.7	2.9	3.9	2.5	2.2	5.3	6.1	5.1	5.9	7.1	6.8	7.1	6.8	5.9	7.8	19	.6	3.9	7.6	9	10	24	5.9
3	17	4.2	6.3	8.8	6.6	.8	-1.8	-.1	1.7	2.7	2.7	2.2	2.9	.5	-.3	1.5	1	2.5	4.2	2.2	1.7	1.9	4.9	16.8	24	3.8
4	8.8	2.9	-2.3	-.6	2.4	3.4	3.4	5.6	7.8	7.8	7	6.1	5.8	9.7	12.9	11.7	6.8	4.2	8	16	20.7	28.5	15	15	24	8.6
5	8.5	8	27.5	10.7	17.8	14.5	13.6	13.6	13.4	15	14.3	13.8	12.7	10.2	AY	9.7	11.7	10.7	10.9	27.2	25.3	29.2	37.1	30.9	23	16.8
6	31.9	23.4	25.6	16.5	10.8	15.2	10	16.3	14	12.2	AT	7.1	9	32.9	9.3	9.7	9.3	6.1	6.1	5.4	5.4	6.8	10.3	-2.5	23	12.8
7	-.1	1.9	1.7	.1	-1.1	-1.8	-.8	3.2	2.9	2.7	3.4	1.7	2.7	4.4	3	2	1.7	-.3	1.9	5.4	3.6	6.3	10.3	21.9	24	3.5
8	11.9	15.5	17.8	5.8	34.6	28.2	7.1	5.6	3.2	3.4	5.6	4.9	3.4	2.7	1.5	2.2	2.7	1.7	3.9	9.5	12.7	19	32.9	17.8	24	10.6
9	8	6.8	6.8	5.1	4.6	16	6.3	3.7	1.3	5.6	10.5	8.8	7.3	7.5	6.6	3.5	1.7	3.7	4.9	6.1	28.2	19	9.5	10	24	8.3
10	16.3	8.8	8	5.8	3.2	2.4	2.4	5.6	6.3	2.9	2.4	8	11	9.3	7.6	4.9	3.7	1.2	1.5	3.4	2.2	4.6	4.1	1.4	24	5.3
11	3.9	6.6	6.8	6.8	6.6	5.8	7.1	7.8	7.1	4.6	5.8	10	6.8	5.4	4.7	2.9	2.5	1.2	2.9	4.4	4.4	6.1	9.7	11	24	5.9
12	7	4.4	5.8	5.6	5.1	6.3	9	9	8	7.8	5.3	1.4	1.7	4.4	1.2	-2	1	3.4	1	-.3	1	2.4	3.7	1.3	24	3.9
13	1.9	2.9	3.6	4.9	3.7	3.9	2.4	3.6	3.7	2.7	7.3	8	5.6	5.1	5.6	5.4	3.2	2.5	2.7	4.2	7.6	6.3	1.5	3.9	24	4.3
14	9	11.9	12.2	8	4.6	4.6	7.3	16.3	11.7	12.9	10.7	5.6	4.2	AY	4.7	3.7	4.2	4.7	5.1	7.8	8.1	6.8	5.6	5.8	23	7.6
15	6.1	5.4	6.8	6.3	2.7	2	3.9	4.6	4.9	4.4	23	-2	.7	4.2	3.4	1.7	.1	.5	1.7	3.4	9	18.8	11.7	12.4	24	5.7
16	8.8	4.6	5.4	6.1	4.4	3.2	5.8	5.1	7.5	6.3	3.2	4.6	3.4	3.9	3.7	5.1	4.4	2.2	3.4	5.6	7.5	6.1	4.6	4.6	24	4.98
17	3.4	-1.3	-4.5	-4.2	-2.8	-1.5	-.8	.8	-1.3	1	3.4	1	1.7	1.7	0	-1.3	2.2	5.1	3.4	5.1	6.1	4.4	5.1	3.4	24	1.3
18	-.1	-.1	-.8	1	1	-1.3	1	2.2	.8	.8	3.7	6.8	7	5.1	2.7	.5	.1	-.8	.8	3.7	2.9	4.9	8	5.1	24	2.3
19	3.7	5.1	1	1	2.4	2.4	5.1	5.4	4.6	8.8	11.4	9.7	11.9	AY	AM	AM	18.8	10.7	9.7	15	22.9	23.7	11.9	11.5	21	9.4
20	19.7	18.3	12.4	12.9	10.3	13.1	11.7	6.3	2.2	2.5	2.2	2.9	5.1	4.2	2.2	.8	3.9	6.4	3.7	2.2	.5	1.3	2	1.1	24	6.5
21	2.4	1.5	.5	-.3	.5	2.2	.3	.8	1.3	.3	2.4	2.2	2.9	5.1	2.7	.5	1	2.9	1.7	-.3	1.4	22.2	7.3	5.6	24	2.8
22	3.4	3.4	4.9	3.9	1.7	.5	-.1	3.7	5.3	2.9	3.4	2.9	2.2	3.7	4.2	2.4	3.4	6.6	5.1	1.7	5.4	34.8	20.5	21.7	24	6.15
23	10.5	12.4	10	5.4	3.6	5.1	9	7	3.2	4.6	6.3	8.5	11.5	11.7	5.8	1.5	3.4	2.9	1.9	2.9	3.2	15.2	17	12.2	24	7.3
24	13.1	10.7	8.3	4.9	2.7	5.4	7	8.8	7	4.4	6.1	8.5	9	8	7.5	6.8	6.3	6.1	6.1	5.8	15.7	36.6	17.5	10	24	9.3
25	10.7	10.7	9	5.8	1.9	1	2.7	4.4	5.8	7.3	16.3	5.6	1	-.3	4.4	5.6	2	.7	1.7	1.9	21.2	11.4	16	14.5	24	6.7
26	16.8	13.4	11	8.5	8.3	9.2	18.5	11.7	10.9	7.8	3.4	.5	1.5	.3	1.5	1.7	-1.5	-.3	1.5	5.4	10.5	11.2	7.8	6.1	24	6.9
27	7.5	6.1	4.9	4.4	4.1	4.9	5.3	5.1	3.2	3.2	3.2	3.9	4.7	5.6	4.4	1.7	1.5	2.5	2.7	4.2	6.8	7.8	7.1	6.6	24	4.64
28	4.6	5.6	7.5	4.4	1.5	3.4	7.1	7.5	6.8	8	9.2	10	7.3	2.7	2.5	1.7	1.2	2.2	1.7	-.3	2	3.7	2.2	5.6	24	4.5
29	5.4	2.7	3.2	4.4	4.7	4.9	4.9	5.3	8.8	16	15.5	9.7	7.8	5.1	2	-1.3	-1.5	2	4.4	5.1	6.3	5.1	3.2	8.5	24	5.5
30	11.2	8	6.6	4.4	4.4	3.4	3.2	4.4	3.4	7.1	11.5	8.8	4.9	4.2	5.9	6.8	6.4	6.4	5.1	2.7	5.6	7.8	4.1	4.9	24	5.9
31	6.6	4.4	2.4	2.4	4.4	5.1	23.9	14.5	12.7	9.3	8.1	6.8	4.2	2.5	3.7	3.9	4.9	4.7	6.1	16.3	12	11.5	10.5	8.5	24	7.9
NO.:	31	31	31	31	31	31	31	31	31	31	30	31	31	29	29	30	31	31	31	31	31	31	31	31		
MAX:	32.	23.	28.	17.	35.	28.	24.	16.	14.	16.	23.	14.	13.	13.	13.	12.	19.	11.	19.	27.	28.	37.	37.	31.		
AVG:	8.6	6.9	7.3	5.2	5.8	5.6	6.2	6.2	5.7	6.0	7.3	5.9	5.5	5.2	4.3	3.5	3.8	3.7	4.4	5.8	8.7	12.2	10.7	9.7		

MONTHLY OBSERVATIONS: 738 MONTHLY MEAN: 6.4 MONTHLY MAX: 37.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210099
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: APRIL 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	7.3	7.3	5.4	3.4	3.9	4.6	2.9	3.7	4.9	5.1	3.2	4.4	6.6	3.7	5.6	7.8	5.1	4.4	6.6	10.5	14.8	4.2	4.7	5.1	24	5.63
2	5.1	4.4	4.6	6.3	5.6	4.2	5.6	7.3	7.3	7.3	6.8	7.3	AY	AY	7.6	8.1	6.8	5.9	5.1	6.4	9	6.4	4.4	10.3	22	6.4
3	9.7	7.1	6.8	7.1	8	8	7.6	9	11.7	AT	AT	19.3	7.4	4.7	3.5	4.7	4.2	3.4	4.7	8.1	19.8	13.3	12	10.2	22	8.7
4	8.8	7.3	5.6	5.9	7.3	7.5	8.5	6.8	5.1	4.9	6.4	7.1	6.4	6.4	3.4	4.4	5.2	2.5	2.7	3.7	2.7	1.5	3.2	4.9	24	5.34
5	3	2.2	-.6	-1.8	1.7	.8	-.8	1	2.9	3.9	3.7	3.2	2.7	1.5	2.5	1.2	.7	2.2	.6	.3	2.7	3.2	1.7	2.9	24	1.7
6	2.7	.8	2.2	2.2	-.8	-.3	2.2	4.2	5.6	4.4	1.9	-.5	1.5	2.7	.6	1.1	.3	1.5	3	1.5	1.3	.6	2.2	3.7	24	1.9
7	4.4	5.1	3.7	1.5	1.7	4.4	3.9	2.7	2	1.3	2.2	1.7	2	.6	-2	.8	.8	-.3	-.3	-2.3	-1	1.9	1.7	2.2	24	1.6
8	3.4	4.4	2.7	.3	.3	.1	1	-.3	.1	2	.3	0	1.5	.6	-.1	.6	.3	1.3	1.7	1.3	.5	1.7	3.7	2.4	24	1.2
9	1.7	1.3	1	1.2	4.9	5.8	8.3	9.5	5.1	3.4	5.8	6.6	5.4	5.6	9.3	9.3	5.9	2.7	2.2	5.8	8.5	15.2	11.9	8.7	24	6.1
10	6.6	7.8	9	6.3	4.4	5.1	5.8	8	7.3	6.6	3.9	1.2	2.5	2.5	.7	-.1	-.3	.3	-.1	.6	2.9	3.2	2	1	24	3.6
11	.8	2	4.2	2.5	-.6	1.5	3.2	3.2	4.4	3.4	2	1.5	0	-.8	2.5	3.2	.1	1	4.4	5.4	5.1	2.7	2.2	2.9	24	2.4
12	1.7	3.2	3.9	4.1	3.4	3.7	5.6	4.6	3.7	4.6	3.7	2.9	4.2	3.7	-.1	-1	2.7	3.2	1.7	3.7	4.2	2.5	1.7	1.5	24	3.0
13	1.5	1.9	.1	-.6	.3	-.3	.5	1.7	1.7	1.3	1	1.3	2.7	2	1	1.9	1.5	.5	2.2	4.1	4.1	1.7	-.4	0	24	1.3
14	1	3.4	4.4	-.6	.8	4.2	.8	.5	-.3	-.1	1.5	.3	1.3	1.5	.1	2	3.2	-.1	-.6	.3	-.3	1.9	.5	-2.3	24	1.0
15	1.5	5.3	4.4	1.7	1.7	3.2	3.4	4.4	4.6	2.7	1.7	1.5	1.9	4.9	3.9	2.5	3.9	1.4	.3	2.2	3.4	2.7	0	.8	24	2.7
16	1.9	-.6	-.6	.5	3.9	5.8	7	8.5	6.1	3.9	3.2	AY	4.9	6.1	5.1	5.8	6.6	1.3	-.6	2.2	3.6	3.9	4.1	5.6	23	3.8
17	8.5	11.2	9	4.6	7.3	20.2	13.4	8.8	6.3	6.8	3.6	3.2	5.6	6.3	5.6	6.3	8.5	6.8	4.9	4.1	5.1	17.8	21.5	8.3	24	8.5
18	7	5.8	5.8	6.1	5.8	4.9	5.6	4.6	4.4	5.6	4.1	6.8	9.3	8.5	7.1	5.4	3.7	1.2	1	-.6	-.8	3.6	5.4	5.3	24	4.8
19	8.5	7.3	3.9	4.6	6.3	5.8	3.9	2.2	2	3.2	1.5	-.3	.5	1.7	1	.1	-.1	-.5	2.2	4.4	3.2	1.9	1	1	24	2.7
20	1	1.5	4.4	3.9	1.9	1.9	-.3	-.6	-.8	-1.1	-.8	-.8	1.2	.7	1	2.7	.8	-1	.1	2.5	1.3	-.1	3.7	7.3	24	1.3
21	6.6	4.6	3.7	3.2	2.2	1.7	.1	.6	1.3	.8	.1	.6	1	.7	-.3	-.3	2	3.5	1.5	.3	-.3	-.1	3.2	6.3	24	1.8
22	2.7	-.1	4.2	3.7	2.5	4.9	5.8	5.8	7.8	8.3	7.1	3.9	3.4	4.9	4.4	4.2	2	1.5	5.8	7.6	4.6	4.9	7	15.3	24	5.1
23	6.8	7.3	8.3	6.3	4.9	5.4	3.9	2.7	3.9	5.8	7.8	10.5	9	7.6	7.8	6.1	5.6	3.4	1.7	2.5	3.4	7.8	11.9	10	24	6.3
24	5.1	5.1	6.1	5.4	5.8	5.1	2.7	2.2	5.1	9.2	9.3	10	8.8	3.7	6.1	5.6	4.9	5.6	4.7	5.6	4.9	5.9	7.1	7.3	24	5.9
25	7.5	6.8	6.3	6.1	6.1	7.1	6.6	5.8	5.1	4.6	5.4	5.1	3	2.2	2.7	1.5	1	1	2	1.5	3.7	4.7	4.7	5.6	24	4.4
26	4.6	5.1	2.9	2.9	4.6	3.4	6.4	9.3	10.5	11.7	8.8	5.4	5.1	3.4	2.7	1	1.2	3.9	4.4	5.2	2.5	3	5.6	5.6	24	5.0
27	5.6	5.1	2.5	.6	3.4	5.8	3.4	3.2	6.3	2.5	2.2	3.9	3.7	5.1	4.4	3.4	2.5	4.2	3.9	4.2	5.4	2.7	1.5	1.7	24	3.63
28	.7	2.7	4.7	1.5	-.1	3.7	4.9	3.2	1.5	.7	2	1.2	-.8	.5	2.2	3.2	3	2	1	.5	2.5	3.5	3.2	3.4	24	2.1
29	4.2	3.9	2.7	.3	-1.3	-1.5	-.6	-1.8	-1.5	2.2	4.9	3.4	1.3	1	2.2	1.7	1.7	3.4	3.2	3.2	3.2	4.4	4.1	2.7	24	2.0
30	2.9	3.4	1.5	.1	1	2.9	2.9	1.9	AY	AY	6.6	6.8	2.5	1.7	2	3.9	5.6	3.7	.3	1	2.2	-1	.3	3.6	22	2.5
31																									0	
NO.:	30	30	30	30	30	30	30	30	29	28	29	29	29	29	30	30	30	30	30	30	30	30	30	30		
MAX:	10.	11.	9.	7.1	8.	20.	13.	10.	12.	12.	9.	19.	9.	9.	9.	9.	9.	7.	7.	11.	20.	18.	22.	15.		
AVG:	4.4	4.4	4.1	3.04	3.2	4.3	4.1	4.1	4.3	4.1	3.8	4.1	3.6	3.2	3.1	3.2	3.0	2.3	2.3	3.2	4.1	4.2	4.5	4.8		

MONTHLY OBSERVATIONS: 713 MONTHLY MEAN: 3.7 MONTHLY MAX: 22.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MAY 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	4.4	6.1	6.8	5.8	5.4	4.2	2.7	4.6	4.1	2.9	3.2	3	3.9	2.2	2.2	3.2	2	1.7	2	6.1	7.1	9.5	9.3	6.6	24	4.5
2	8.3	7	6.8	5.1	3.4	2.7	1.9	1.3	2.2	3.4	2.5	3.7	14.8	6.1	7.3	8.3	7.3	4.9	6.4	7.6	8.1	10	8.8	8.1	24	6.1
3	7.3	1.7	1.7	2.2	4.6	6.3	5.4	6.6	6.8	15.5	5.9	15	9.8	11.2	11	9.1	7.1	7.6	7.4	4	3.2	3.2	.6	-1.3	24	6.4
4	1.5	6.8	6.6	5.9	4.9	3.2	4.4	8	11.5	9.5	8.6	8.3	5.4	4.9	4.9	5.2	5.4	5.4	4.9	4.9	5.6	5.6	2.7	4.6	24	5.8
5	11.9	10.2	3.7	2.2	3.9	4.6	6.6	6.8	5.1	4.9	4.5	3	1.2	1.7	3.7	3.2	2	1.7	1	1	7.3	8.8	4.9	4.7	24	4.5
6	4.2	5.6	3.9	2.2	2.9	5.6	5.9	3.7	2.7	3.5	5.4	4.7	3.9	5.2	5.2	4.7	3	4.5	4.5	3	5.2	6.4	5.1	7.1	24	4.5
7	7.6	5.4	4.7	1.5	2.5	4.4	3.4	6.1	6.8	5.6	4.9	3.2	5.2	5.6	4.7	5.4	8.1	10.1	8.4	7.3	7.6	9.3	10.5	9.3	24	6.15
8	8.8	9.1	10	10.5	10	10	6.1	4.2	AT	7.8	8.1	8.8	11.3	9.3	8.1	9.8	9.3	9.8	10.1	7.4	10	10.5	7.8	7.3	23	8.9
9	6.1	6.4	5.9	6.6	5.1	5.4	8.5	10	6.8	3.9	4.2	3.5	4.7	6.1	8.1	7.8	7.3	AQ	AQ	AQ	AQ	AQ	AQ	AQ	17	6.3
10	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	BA	18.8	13.1	10.8	6.9	6.4	5.2	7.9	8.1	8.6	12.5	14.8	11	12	10.3
11	10	7.6	9.5	11.2	7.1	4.4	3.2	15.5	12.2	11.5	9.5	7.6	6.9	9.3	9.1	4.3	3.3	6.7	6.7	10.9	8.3	8.6	5.9	4.7	24	8.4
12	6.1	7.1	6.9	7.1	10	10.8	8.8	6.6	6.4	7.4	7.4	4.5	7.6	9.8	7.9	7.9	6.3	5.8	6.2	8.7	8.9	8.4	8.1	6.8	24	7.6
13	6.6	3.7	4.7	7.4	6.9	5.2	4.7	6.6	7.6	5.2	4.7	4.5	5.2	6.2	6.4	5.3	4.3	7.2	5.9	3.7	3.7	3	3	1	24	5.1
14	2.2	2	1.5	3.9	3.2	1.7	3.5	4.7	2.5	.8	2.2	2.7	3.7	3.9	AY	AH	AH	3.2	3.9	3.2	4.4	2.5	.6	2.5	21	2.8
15	4.2	6.1	5.6	2.7	4.4	4.7	4.2	14.8	5.2	3	1.3	2.7	4.2	5.6	5.6	4.9	3.7	2.2	3.9	2.2	1.7	4.4	7.1	6.1	24	4.6
16	5.4	5.8	3.4	1.7	2.2	6.1	6.8	6.8	6.1	3.9	4.7	4.7	5.2	3	1.3	4.2	4.7	3.2	3.7	3.5	4.5	5.9	4.9	3	24	4.4
17	1.3	2.2	3.2	2.7	2.7	4.4	5.4	6.1	5.9	6.4	5.9	5.1	4.9	3.9	5.1	5.9	5.6	4.7	8.5	8.8	4.4	8.6	10	4.7	24	5.3
18	2.5	3.7	4.7	5.1	6.6	5.4	4.7	6.4	5.9	5.6	4.9	3.5	3.5	1.5	2.5	2.5	.6	3.5	3.7	.3	1.7	4.4	2.2	.1	24	3.56
19	3.2	3.5	-.3	.3	3.2	4.4	4.2	4.9	7.1	6.1	3.4	4.9	5.2	4.9	7.6	6.8	5.4	4.5	4.4	5.2	6.4	7.1	6.9	7.6	24	4.87
20	4.9	2.5	4.7	2.7	1.8	6.8	9	7.6	5.6	17.6	6.9	5.1	2.7	3.9	6.1	3.7	1.5	2	2	4.4	7.6	5.4	2	3.5	24	5.0
21	4.9	3.2	4.2	4.7	4.2	3.9	2.2	3.7	5.2	7.3	6.6	5.4	4.2	2	1.2	1.1	2.5	4.9	6.4	6.1	5.9	4	2	3.7	24	4.1
22	4.7	3.9	3.7	1.3	1.3	3.7	2.7	2.5	3.2	2.2	1.3	2.7	4.7	4.5	3.5	1.7	3.5	2.5	2.7	4.9	2.2	.6	1.3	3.4	24	2.86
23	3.9	4.9	4.2	2.5	3.9	1.5	2.2	3.4	2.5	3.2	3	1.5	1.5	4.7	3	1.2	3.7	2.7	1.3	3	3.2	.8	-.1	1.5	24	2.6
24	.6	1.8	3.7	3.7	5.1	3.9	2	1.8	2.2	4.4	4.2	1.2	.1	.6	3.7	2.7	0	-.1	1.7	2.5	2	1.7	.6	1.5	24	2.2
25	4.4	2.7	2.2	5.6	5.8	5.8	4.4	4.6	6.8	6.8	4.4	1.2	1.5	2.7	1.2	1	1.2	-.8	.1	1	1.5	5.9	10.7	10	24	3.8
26	4.2	3.7	4.7	-.1	-.6	2.9	5.8	6.3	4.7	3.9	2.2	1	2.2	4.9	5.6	3.5	2.7	2.5	3.2	4.4	3.4	2.5	1.3	1.5	24	3.2
27	1.3	-1.8	-1.5	.6	.1	1.5	2.2	1	2.7	1.3	.3	1.5	.6	.6	2	2.2	.1	2	3.5	3	5.2	4.9	2	.6	24	1.5
28	2.5	3.2	3.2	3.9	3	.6	1.1	3.2	3.7	3	2.2	3.5	4.4	3	3.5	5.2	2.7	1.3	2	1.1	1.3	3.2	7.1	6.6	24	3.1
29	4.2	5.6	4.4	2.5	2.5	5.1	5.6	3.7	5.4	3.2	-.3	.8	1.7	3	3.7	3.9	4.9	3.9	1.1	.3	-.3	.6	1.7	-.1	24	2.8
30	1.3	3	1.3	.6	2.2	1.6	2	1.3	-.1	2.3	.4	-2	1.3	2	-.8	.6	4	3.9	2.7	2	2.5	2.5	.1	2	24	1.5
31	.8	.3	2	.6	4.4	7.3	4.9	4.4	3.9	4.9	AT	7.3	6.3	5.1	5.4	5.1	5.9	4.7	2.7	4.7	7.3	9	6.1	3.9	23	4.7
NO.:	30	30	30	30	30	30	30	30	29	30	29	30	31	31	30	30	30	30	30	30	30	30	30	30		
MAX:	12.	10.	10.	11.2	10.	11.	9.	16.	12.2	18.	10.	15.	18.8	13.	11.	10.	9.	10.	10.	19.	10.	13.	15.	11.		
AVG:	4.6	4.5	4.2	3.76	4.1	4.6	4.5	5.6	5.20	5.6	4.2	4.1	5.05	4.9	5.0	4.6	4.2	4.0	4.3	4.7	5.0	5.7	4.9	4.4		

MONTHLY OBSERVATIONS: 720 MONTHLY MEAN: 4.6 MONTHLY MAX: 19.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.150889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JUNE 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6.6	6.8	2.9	3.2	4.1	3.9	3.7	4.6	3.9	4.4	8.5	10.2	9.3	7.3	6.8	7.3	5.6	3.9	5.1	6.1	4.2	6.1	7.6	7.1	24	5.80
2	8.1	4.7	1.3	2.2	3.9	5.8	8.5	9.7	9.5	4.9	3.4	5.1	3	4.2	3.9	2.7	4.4	3.2	1.7	2.4	2.7	-.3	1	3.7	24	4.2
3	3.2	4.6	5.6	5.1	4.9	3.9	4.6	6.1	9.5	9	5.1	5.1	5.1	2.7	.8	-.5	.3	3.4	2	1.9	4.9	3.9	2	2.2	24	4.0
4	1.8	.8	2.4	4.1	4.6	4.6	5.1	5.6	3.4	2	3.7	6.8	9	8.3	8.1	4.9	3.4	5.6	3.9	3.2	6.6	9.5	8.8	4.6	24	5.0
5	1.3	-.1	2.3	3.7	5.1	6.6	3.2	3.9	9.3	10.7	10	7.1	4.2	4.2	2.5	3.4	4.9	4.9	4.4	1.5	2.7	2.9	2.5	5.4	24	4.4
6	6.3	4.9	3.7	1.5	3	6.1	3.9	5.9	8.8	9	9	7.1	5.8	4.9	5.8	6.6	5.9	5.6	3.2	4.7	5.9	4.9	6.8	7.3	24	5.7
7	6.3	4.9	5.8	5.4	3	2.7	3.2	4.7	7.8	8.8	7.1	5.9	4.7	4.4	4.7	5.6	6.6	6.6	6.4	6.1	4.7	5.1	6.1	5.9	24	5.5
8	5.1	4.2	5.4	7.3	6.8	4.4	6.1	9.5	10.2	7.3	5.4	6.6	5.6	4.2	3	3.4	3.2	4.7	5.9	6.1	4.7	4.7	7.3	7.1	24	5.8
9	5.8	5.6	3.9	3.4	4.7	4.9	5.9	4.9	3.2	1.7	.6	2.5	3	1.7	1.3	.8	.8	1.7	2	3	2.5	5.9	7.3	6.1	24	3.5
10	7.6	5.9	3	2.7	4.7	4.4	5.6	8.3	7.6	4.7	4.4	4.7	3.2	2	3.4	2.5	3.9	4.9	2	3.4	3.7	4.2	6.4	6.8	24	4.6
11	4.9	6.3	5.4	4.9	7.1	8	9	10	8.8	6.6	8.8	4.9	3.9	6.8	7.1	7.6	6.3	4.4	4.7	3	5.1	9.5	9	8.8	24	6.7
12	7.8	5.9	4.7	6.4	7.6	7.1	8.8	10.5	8.8	8.1	7.6	8.1	10.3	9.8	8.6	5.9	3.9	4.9	5.8	6.4	7.3	4.7	3	4.4	24	6.9
13	4.2	4.9	6.6	5.9	5.4	4.7	1.3	.3	2.9	2.7	4.7	9.3	9.1	6.6	5.1	3.7	1.7	4.2	5.9	2.7	2.2	2.7	-1	-2	24	3.9
14	4.2	7.8	6.3	3.7	2.7	5.8	5.6	4.2	3.9	5.9	8.8	10	9.3	7.3	5.1	5.2	3.9	4.6	5.6	5.4	5.9	5.4	5.1	3.2	24	5.6
15	1.8	1	2.3	3.4	4.4	4.6	5.1	6.3	6.6	10	12	7.8	5.9	5.9	3.2	2	1.3	.3	2.2	3	2.2	5.4	7.1	8	24	4.7
16	7.8	5.1	5.1	3.4	-.1	2.7	5.9	8.5	12	12	8.5	5.9	5.6	2.5	2.2	2.9	2.7	4.7	5.1	4.7	2.2	.8	3	5.1	24	4.9
17	9.3	7.6	4.7	4.9	3.4	1.6	3.7	7.8	7.1	3.7	3.2	5.4	5.2	4.7	3	4.2	8.5	8.1	6.6	6.1	7.8	7.1	6.1	8.1	24	5.7
18	7.8	5.9	1.3	2.2	6.1	7.8	8.3	6.8	5.1	3.7	8.1	7.6	AY	AY	5.1	7.6	8.3	9.3	9.8	8.8	6.1	7.3	6.1	3.9	22	6.50
19	6.8	8.1	7.1	8.3	8.3	6.6	3.2	.1	0	.6	1.1	1.7	2.2	1.6	2	2	1.3	3	2.7	2.7	3.2	2.7	2.3	.8	24	3.3
20	.8	3.2	3.2	.8	1.3	1.8	2.7	2.9	3.4	6.1	7.6	6.6	3.4	1.1	.8	3	3.9	2.7	1.6	1.7	3.2	3.9	3.2	2.7	24	3.0
21	-.1	.1	5.6	5.8	5.9	5.3	4.4	4.7	6.1	10.5	9.8	5.4	4.2	3.7	1.5	3	4.7	6.6	4.9	.1	.8	3	3.2	4.7	24	4.3
22	4.2	1.8	-.1	.8	3.2	4.4	5.6	8.3	11	7.8	4.9	8.1	8.3	5.2	5.6	6.4	6.6	5.9	4.9	15.5	8.1	5.9	6.1	5.1	24	6.0
23	4.4	2.7	.8	5.1	8	6.1	4.4	8.5	11.7	9.8	6.1	4.9	3.2	1.1	.6	.6	.8	-.3	.3	2.5	6.1	9.3	8.1	6.4	24	4.6
24	5.4	4.2	3.2	2.5	4.2	6.1	5.2	6.1	5.9	4.4	3.5	3.7	6.8	6.9	4.4	3.2	1.3	4.4	6.4	3.4	3.7	6.1	6.1	5.1	24	4.68
25	4.9	3.5	4	3	2	1.7	-1	-.3	2.7	1.6	-.6	2	2	-.1	1.6	2.2	2	1.8	1.6	3	2.5	2.5	5.1	3.5	24	2.1
26	1.1	1.1	.8	.8	1.7	2	4	5.4	3.7	3	4.7	8.3	4.9	2.7	3.7	3.7	3.7	1.1	2.5	3.2	4.7	5.6	6.4	7.8	24	3.6
27	7.6	7.8	8.6	5.6	4.7	6.1	4.2	5.6	8.6	7.6	8.8	19	AY	AY	11	12.7	12.9	9.3	6.8	8.6	7.8	6.6	8.3	8.8	22	8.5
28	9.5	8.8	7.3	8.6	7.6	6.9	7.3	6.8	8.8	11.7	11	6.9	6.6	11.5	12.9	9.5	7.1	7.6	8.6	7.1	8.8	11	11	8.3	24	8.8
29	7.3	9.8	11.7	12	9.3	9.3	10.7	16.6	13.2	13.9	11.7	15.3	17.3	19	12.7	11.2	10	8.3	5.6	8.8	11.5	15.3	12.5	12.7	24	11.9
30	11.7	11.2	12.2	9.8	7.3	7.8	8.8	10.5	12.2	13.2	16.3	14.4	18.6	13.9	11.3	9.1	10.3	9.6	10	11.2	9.8	19.3	13.7	12.2	24	11.9
31																									0	
NO.:	30	30	30	30	30	30	30	30	30	30	30	30	28	28	30	30	30	30	30	30	30	30	30	30		
MAX:	11.7	11.	12.	12.	9.	9.	11.	17.	13.	14.	16.	19.	19.	19.	13.	13.	13.	10.	10.	16.	11.5	19.	14.	13.		
AVG:	5.45	5.0	4.6	4.6	4.8	5.1	5.2	6.4	7.2	6.8	6.8	7.2	6.4	5.5	4.9	4.7	4.7	4.8	4.6	4.9	5.05	6.0	6.0	5.8		

MONTHLY OBSERVATIONS: 716 MONTHLY MEAN: 5.5 MONTHLY MAX: 19.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1068
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JULY 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	10.8	10	9.1	9.5	10	8.8	14.6	12.2	AT	AT	AM	22.7	15	12	9.3	4.7	4.9	6.4	6.8	7.8	8.3	9.1	9.3	9.3	21	10.0
2	8.1rt	6.1rt	9rt	12.7rt	10.5rt	8.6rt	7.6rt	9.8rt	13.2rt	18.8rt	20rt	16.8rt	16.1rt	15.8rt	8.1rt	7.6rt	8.1rt	11.2rt	13.6rt	15.5rt	15.3rt	12.7rt	11.7rt	11.7rt	24	12.0
3	20.5	20.3	14.4	16.1	12.7	15.5	12.7	12.9	12.9	12.2	10.3	9.5	8.8	7.6	7.4	5.4	4.9	5.9	5.6	4.4	3.5	8.8	11	7.8	24	10.5
4	6.6	4.2	3.2	3.2	3.7	5.9	6.8	6.1	6.1	8.1	9.5	8.6	7.1	5.2	2	1.1	1.1	.8	1.1	1.1	2.7	27.5	23.7	7.6	24	6.4
5	7.3	9.1	9.8	6.6	3.2	3.2	6.6	7.3	4.2	3.2	3.2	3.2	4.2	3.9	4.2	4.9	3.5	2	3.9	3.9	3.2	4.9	5.4	4.7	24	4.8
6	4.7	4.7	4.9	4.7	5.6	5.6	4.7	6.1	6.6	5.4	5.1	5.1	5.6	4.7	5.2	5.9	3	2.7	4.5	4.9	7.3	10	7.3	4.9	24	5.4
7	6.1	6.3	3.7	5.1	5.9	4.4	7.3	6.6	5.9	5.4	4.7	7.1	7.6	5.9	5.2	4.2	4.2	6.8	7.3	5.9	4.9	7.8	9.3	6.1	24	5.99
8	6.4	9.8	10.8	8.3	7.8	6.8	6.6	6.4	8.8	9.5	5.8	5.6	5.2	4.2	5.6	6.1	5.4	5.4	3.4	1.7	2.5	5.1	7.1	9.8	24	6.42
9	12.9	11.7	10.3	8.6	7.6	9.8	11	9.5	8.5	11.7	13.6	12.7	11.5	12	12.2	10.3	8.1	7.6	6.1	4.9	6.4	6.1	4.2	3.9	24	9.2
10	7.6	10.7	9.5	9.5	11	10.7	10.5	10.7	12.2	13.2	10.5	7.8	8.1	8.8	6.8	6.6	7.6	8	10.3	10	8.3	8.1	7.6	6.8	24	9.2
11	10	8.5	5.4	14.5	5.9	5.9	7.8	11.2	11.7	7.3	6.3	6.6	4.9	6.1	6.1	3.9	5.1	6.4	6.6	6.6	5.1	4.7	4.2	3.9	24	6.9
12	5.1	7.1	6.1	4.9	3.7	3.4	5.4	6.1	5.4	AY	AY	AM	20.3	11	8.3	8.3	6.8	3	4.9	5.9	7.8	7.8	6.4	7.8	21	6.9
13	9.7	7.6	4.9	4.2	3.9	4.4	5.2	7.3	8.3	7.3	5.6	7.8	10.5	9.3	7.3	4.7	2.5	3.9	3.2	3	4.4	4.9	6.8	9.3	24	6.1
14	8.3	5.9	7.1	5.6	.3	.3	2.5	3.9	9	11.5	11.5	11.7	10	8.6	5.6	2.2	1.6	1.7	2.7	3.7	4.4	6.1	7.6	8.5	24	5.8
15	9	7.8	7.6	5.6	3.7	3.9	6.1	7.6	6.6	6.1	6.1	6.9	8.6	6.9	2.7	3.2	4.5	3	2.2	4.7	5.2	3.2	3.9	6.4	24	5.5
16	5.4	4.4	7.1	7.8	6.4	7.6	8.1	8.8	8.6	5.6	7.3	9.5	8.1	5.2	8.3	9.5	7.6	6.4	2.7	4.2	5.9	6.4	8.1	6.1	24	6.88
17	4.7	5.9	4.9	4.2	3.9	2.7	6.4	10.3	9.8	11.7	10.8	7.8	8.6	8.3	6.9	6.6	7.8	7.3	7.8	9.5	11.2	12	8.6	6.6	24	7.7
18	6.8	9.5	9.5	7.6	8.3	9.5	10.3	11.7	12.5	16.8	11.7	12	10.8	7.8	7.3	9.1	6.6	5.6	6.8	7.8	9.8	9	9	11.2	24	9.5
19	12.2	12.9	11.3	7.6	8.1	7.8	9.3	12	12.7	14.4	11.7	11.7	16.1	11.2	10.3	8.6	9.8	11.5	11	10	9	8.3	10.7	12.2	24	10.9
20	9.3	8.6	9.5	8.5	7.8	8.1	6.4	8.3	12.5	9.5	7.1	8.1	7.1	5.6	6.8	9.3	8.1	6.1	4.4	3.7	4.2	6.6	8.8	6.1	24	7.52
21	4.4	4.4	5.6	3.4	1.3	-.3	-.1	5.6	7.3	5.9	6.4	7.1	6.6	4.9	4.7	5.4	3.4	3.7	5.6	4.4	4.4	7.1	4.4	3.2	24	4.53
22	5.9	3.7	3.9	5.4	6.1	AQ	AQ	AQ	AQ	AQ	BA	22.2	6.3	4.9	6.8	7.6	7.8	5.6	2.2	4.7	5.6	6.4	8.8	5.6	18	6.64
23	3.7	6.6	3.9	2.2	4.4	7.3	8.8	6.1	6.1	7.1	6.8	15	7.1	5.1	3.2	2.2	4.7	7.1	6.1	5.9	7.8	7.8	4.7	7.8	24	6.1
24	11.7	10.5	7.3	5.6	4.9	4.7	4.7	3.4	6.6	9.5	7.6	8.3	7.6	6.1	7.3	7.3	6.8	5.2	4.4	3.2	14.8	14.1	13.4	11	24	7.8
25	9.8	10	7.8	6.4	7.8	7.3	5.4	7.1	10.5	12.7	12.9	12.5	11.2	5.9	4.4	6.4	8.1	9.3	14.8	22.5	19	19.3	12.2	12.2	24	10.6
26	12	15.3	10	15	8.1	6.8	9	22.2	16.3	AY	17.8	16.8	15.5	9.8	10	10	8.6	7.1	5.9	5.4	7.3	11	11	9	23	11.3
27	15.5rt	19.3rt	22rt	24.7rt	20.5rt	17.8rt	20.3rt	20.5rt	28.5rt	24.2rt	20.8rt	20.5rt	13.4rt	12.7rt	11rt	6.8rt	2.7rt	3.5rt	5.2rt	66.8rt	39.2rt	32.2rt	54.3rt	42.1rt	24	22.7
28	42.4rt	46rt	33.2rt	24.7rt	23.7rt	25.4rt	20.5rt	18rt	21.5rt	16.6rt	13.9rt	12.2rt	10.5rt	11.7rt	15.5rt	12.2rt	11.2rt	12.5rt	21.3rt	32.2rt	28.7rt	23.2rt	22rt	22.5rt	24	21.7
29	21rt	21.5rt	21.7rt	20.5rt	12.7rt	13.6rt	12.5rt	20.3rt	16.6rt	14.3rt	19rt	8.8rt	9.8rt	17.8rt	12.2rt	12.7rt	6.6rt	6.9rt	24.9rt	28.5rt	23.5rt	22.7rt	22.5rt	24.2rt	24	17.3
30	22.5rt	22.5rt	21rt	19.8rt	21.5rt	18.8rt	19.8rt	23.5rt	21.3rt	21.3rt	15rt	17.1rt	18.8rt	17.3rt	19rt	18.8rt	25.1rt	26.7rt	26.1rt	25.9rt	24.7rt	18.3rt	16.3rt	20.5rt	24	20.9
31	15rt	12.2rt	11.7rt	10.7rt	11.5rt	12.2rt	10.8rt	11rt	12rt	19rt	20.3rt	16.1rt	22.2rt	16.3rt	12.5rt	16.6rt	19.5rt	20rt	20.5rt	21rt	24.4rt	20.5rt	25.6rt	25.6rt	24	17.0
NO.:	31	31	31	31	31	30	30	30	29	27	28	30	31	31	31	31	31	31	31	31	31	31	31	31		
MAX:	42.	46.	33.	25.	24.	25.4	21.	24.	29.	24.	21.	23.	22.	18.	19.	19.	25.	27.	26.	67.	39.	32.	54.	42.		
AVG:	10.8	11.1	9.9	9.5	8.1	8.22	8.9	10.4	11.1	11.4	10.8	11.3	10.4	8.8	7.8	7.4	7.0	7.1	8.1	11.0	10.6	11.3	11.8	10.8		

MONTHLY OBSERVATIONS: 731 MONTHLY MEAN: 9.7 MONTHLY MAX: 67.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIPP'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: AUGUST 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

HOUR

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	34.6rt	29.7rt	29rt	27rt	19.8rt	23rt	21rt	17.8rt	21.5rt	23rt	13.9rt	13.9rt	15.8rt	7.6rt	15.8rt	19.3rt	12.2rt	11.5rt	10.5rt	9rt	10.3rt	6.1rt	2.7rt	8.1rt	24	16.8
2	5.6	4.2	5.9	3.9	2.5	1.8	3.2	7.8	9.1	18.3	8.3	10	10.7	11.2	11	7.1	5.9	8.1	10	9.8	10.5	11.5	9	9.3	24	8.1
3	11.5	9.3	7.8	7.1	6.1	7.3	8.5	9.5	19.3	18.1	14.1	18.1	15.5	12	12.2	13.4	13.4	12.4	10.8	9	8.6	9.8	10	9.5	24	11.4
4	11.7	12.5	15.3	8.8	9.8	11.2	9.8	14.8	12.9	15.3	9.8	11.2	11	11.5	11.7	8.3	5.9	2.3	2	5.6	8.1	10	9	8.1	24	9.9
5	7.3	7.3	8.3	6.1	3	3.9	5.4	5.1	6.8	9.8	12.4	11.5	9.5	11.2	7.8	6.1	11	12.4	10.7	8.6	10.7	13.6	12	10.7	24	8.8
6	10.5	11.2	10.3	10.7	12	9.3	8.3	10.7	12.5	AT	24.4	10.5	10.7	8.6	5.2	4.7	5.9	5.1	4.9	7.3	9.3	9.3	8.5	8.1	23	9.5
7	6.6	7.8	7.6	3.4	3	5.4	6.8	6.1	5.4	8.1	8.3	8.3	9	6.1	4.7	4.4	4.7	5.4	6.1	7.1	6.6	8.3	9.3	10	24	6.6
8	9.5	5.4	4.9	4.2	3.2	4.9	6.4	7.3	8.6	7.8	8.3	10.5	9.3	7.6	7.8	7.1	7.6	10.3	9.8	8.8	7.6	3.9	4.4	5.6	24	7.12
9	7.8	9.8	7.6	7.8	8.8	7.8	8.8	11.2	14.8	12	9.5	6.4	7.8	AY	12.2	12	9.1	9.3	8.6	9.5	11.7	12.7	11	10.5	23	9.9
10	12.5rt	11.5rt	10.7rt	9.8rt	11.2rt	10.3rt	7.6rt	9.3rt	10.7rt	13.6rt	13.2rt	12rt	11rt	8.3rt	7.6rt	6.1rt	5.9rt	7.6rt	5.6rt	6.1rt	107.5rt	107rt	109rt	112.9rt	24	26.1
11	104.9rt	99.3rt	79.2rt	63.3rt	41.6rt	31.5rt	29.2rt	24.9rt	21.5rt	19.5rt	26.6rt	26.6rt	36.4rt	40.2rt	44.1rt	25.4rt	28.7rt	28.5rt	27.2rt	29.5rt	6.6rt	7.1rt	9rt	12rt	24	36.0
12	18rt	18.8rt	17.3rt	12rt	20.5rt	15.3rt	12.7rt	13.2rt	13.4rt	12.5rt	14.8rt	13.9rt	16.1rt	15.5rt	14.4rt	13.2rt	12.7rt	11rt	8.1rt	8.1rt	7.3rt	7.8rt	9.5rt	10.5rt	24	13.2
13	12	10.2	10.3	16.1	7.6	8.3	7.3	7.8	10.7	10.5	11.5	17.1	14.5	13.6	18.1	9.3	10.3	10	10	11	10	10	7.8	6.6	24	10.9
14	7.1	5.4	6.1	5.4	5.4	6.1	5.9	8.8	9.7	6.8	9.5	12.7	14.5	3.7	4.9	6.4	3.7	2.5	6.4	6.6	7.8	9.8	10.3	12	24	7.4
15	10.3rt	7.6rt	7.3rt	8.8rt	9rt	11rt	10.7rt	9.8rt	12rt	13.2rt	12.2rt	11.5rt	11.7rt	9.5rt	8.8rt	9.8rt	9.8rt	14.5rt	11.7rt	26.8rt	21.5rt	24.9rt	23.2rt	21.2rt	24	13.2
16	19rt	21.2rt	22.5rt	24.9rt	21.7rt	22rt	25.6rt	23rt	22.5rt	22.7rt	23.2rt	21rt	12.4rt	11.7rt	12.7rt	17rt	14.8rt	13.2rt	16.3rt	13.4rt	16.3rt	13.9rt	13.9rt	17.6rt	24	18.4
17	16.8rt	18.8rt	20.3rt	19.8rt	19.3rt	19.5rt	22.5rt	22.7rt	24.7rt	21.5rt	12.9rt	12.4rt	11.5rt	12.7rt	14.1rt	14.1rt	12.4rt	17.1rt	14.5rt	15rt	13.9rt	13.9rt	12.9rt	11.5rt	24	16.5
18	9.8rt	9.5rt	10rt	12rt	12.7rt	11.2rt	11.2rt	18.8rt	16.1rt	23.2rt	23.7rt	12.4rt	11.2rt	11rt	11.7rt	9.5rt	7.3rt	5.4rt	6.4rt	16.8rt	17.3rt	12.9rt	11.5rt	11.7rt	24	12.6
19	13.4	12.7	10.5	10.3	8.1	9.8	12.2	11.7	13.4	13.4	15.3	7.8	7.3	4.4	.1	.1	3.9	8.6	5.2	4.4	8.5	10	10.5	7.6	24	8.7
20	7.8rt	10rt	11.7rt	12.7rt	14.8rt	13.9rt	18.1rt	21rt	43.1rt	35.4rt	22.5rt	18.5rt	10rt	10rt	10rt	5.4rt	4.4rt	7.3rt	6.8rt	17.3rt	18.3rt	23.2rt	25.4rt	23.5rt	24	16.3
21	20.2rt	20rt	21.2rt	14.8rt	24.7rt	22.7rt	19.5rt	30rt	40.9rt	47.5rt	AZ	61.8rt	68.4rt	67rt	56rt	43.9rt	31rt	30rt	55.3rt	55.6rt	53.4rt	52.6rt	56.5rt	57.3rt	23	41.3
22	45.3rt	45.1rt	34.4rt	38.3rt	35.4rt	30.5rt	35.6rt	37.3rt	37.1rt	38.6rt	39.3rt	39.7rt	39.5rt	41.4rt	44.1rt	41.9rt	46rt	43.6rt	45.1rt	45.1rt	41.4rt	40.9rt	40.4rt	40.9rt	24	40.3
23	26.6rt	24.6rt	26.1rt	20.7rt	22.7rt	18.5rt	23.2rt	16.6rt	27.5rt	AY	28.7rt	31.2rt	31.2rt	33.7rt	31.7rt	27.3rt	31rt	24.7rt	22.5rt	15.8rt	13.9rt	12rt	16.1rt	9.1rt	23	23.3
24	11.2rt	11.7rt	16.3rt	9.8rt	11.7rt	9.5rt	9.3rt	21.2rt	31.2rt	25.6rt	18.3rt	19rt	15.8rt	15.8rt	20.8rt	23.7rt	41.9rt	46.8rt	39.1rt	49.4rt	36.6rt	32rt	AM	28rt	23	23.7
25	28.7rt	25.9rt	21.7rt	21rt	17.6rt	17.8rt	18.5rt	17.1rt	10.8rt	17.8rt	16.5rt	13.4rt	11.2rt	8.8rt	10.3rt	12.5rt	16.8rt	12.4rt	17.8rt	12.9rt	16.1rt	14.5rt	15.8rt	18.3rt	24	16.4
26	20rt	18.8rt	11.7rt	20.8rt	16.8rt	16.8rt	12.2rt	18.1rt	27.2rt	20.5rt	18.3rt	22.5rt	24.7rt	23rt	16.3rt	21.5rt	24.2rt	27.5rt	28.5rt	28.2rt	31.2rt	24.7rt	26.6rt	26.8rt	24	22.0
27	29.5rt	28.2rt	29.7rt	23rt	27.7rt	25.1rt	26.6rt	29.5rt	43.4rt	37.9rt	37.1rt	34.7rt	28.2rt	26.1rt	24rt	26.1rt	29.5rt	25.6rt	30.2rt	26.1rt	24.7rt	26.4rt	22.2rt	19.8rt	24	28.4
28	11.5rt	12.9rt	13.4rt	12.4rt	11.2rt	11.5rt	12.7rt	11.5rt	10.7rt	10.3rt	8.8rt	15rt	19.3rt	20.3rt	9.5rt	11.7rt	12.7rt	14.5rt	15.3rt	12.5rt	15.5rt	17rt	16.8rt	18.3rt	24	13.6
29	17.1rt	13.9rt	19.8rt	16.3rt	15.5rt	12.2rt	16.3rt	21.5rt	17.8rt	19.8rt	13.9rt	11.7rt	11.2rt	18.3rt	17rt	19rt	13.4rt	13.6rt	14.4rt	15rt	15.3rt	13.6rt	15.8rt	13.9rt	24	15.7
30	14.1rt	13.6rt	20.5rt	18.1rt	14.1rt	15.3rt	12.2rt	24.2rt	21.2rt	30.5rt	26.8rt	25.4rt	18.8rt	14.6rt	13.4rt	7.1rt	2.7rt	4.2rt	6.1rt	7.3rt	6.8rt	6.1rt	5.9rt	5.6rt	24	13.94
31	5.6	8.1	9.5	8.5	7.1	5.1	6.1	9.3	21	14.4	16.8	14.8	13.9	12.2	7.3	3.4	2.5	4.4	7.1	9.5	8.8	7.6	7.6	7.8	24	9.1
NO.:	31	31	31	31	31	31	31	31	31	29	30	31	31	30	31	31	31	31	31	31	31	31	30	31		
MAX:	105.	99.	79.	63.	42.	32.	36.	37.	43.	48.	39.3	62.	68.	67.	56.	44.	46.	47.	55.	56.	108.	107.	109.	113.		
AVG:	18.3	17.6	17.0	15.4	14.3	13.5	14.0	16.1	19.3	19.6	17.30	17.9	17.4	16.6	15.7	14.1	14.2	14.5	15.3	16.4	18.8	18.5	18.1	18.5		

MONTHLY OBSERVATIONS: 739 MONTHLY MEAN: 16.6 MONTHLY MAX: 113.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: SEPTEMBER 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6.6	5.6	6.1	7.8	9.5	10.2	13.1	20.3	23.2	12	9.3	9.8	13.4	12.9	10	7.3	8.3	10.3	10.3	10.3	11.2	11.2	10.8	12.7	24	10.9
2	12.7rt	12.7rt	21.7rt	16.1rt	19.5rt	16.1rt	20.2rt	37.3rt	37.1rt	33.2rt	38.3rt	31.5rt	25.4rt	20.7rt	17rt	11.5rt	15.3rt	14.8rt	13.2rt	12.7rt	12rt	12.4rt	12.4rt	12.2rt	24	19.8
3	16.3rt	15.3rt	17.3rt	19.8rt	28.7rt	34.2rt	21.2rt	19.5rt	25.1rt	26.1rt	34.4rt	32.7rt	32.4rt	28.7rt	31.7rt	34.9rt	32rt	27.5rt	25.6rt	23.5rt	29rt	28.5rt	22.5rt	25.6rt	24	26.4
4	24.4rt	21.2rt	21.7rt	17.3rt	16.8rt	12.9rt	11.7rt	10.5rt	12.2rt	AT	25.1rt	16.3rt	10rt	9.5rt	10.7rt	10.5rt	10.3rt	10.5rt	17.6rt	9.7rt	11rt	12.7rt	12.2rt	12.5rt	23	14.2
5	12.2	11.5	11.2	8.8	9.8	12.9	12.5	15	12.2	13.4	17.1	12.5	12	12	12.7	9.8	6.6	8.3	8.8	8.3	7.6	5.4	7.8	6.6	24	10.6
6	5.4	7.1	7.8	8.3	7.1	8.6	10.7	10.2	6.8	5.4	6.4	5.9	5.6	4.9	AY	5.9	9.3	10	7.6	6.8	8.6	8.1	6.1	6.1	23	7.3
7	6.4	6.8	6.9	8.3	8.3	5.9	6.8	8.1	10.5	15.3	9.8	8.6	7.1	5.9	7.1	8.8	7.8	4.7	1.6	2.2	3.4	3	4.7	5.1	24	6.8
8	5.6	6.4	5.4	4.4	6.6	5.9	2.5	4.2	7.8	8.5	6.8	7.1	9.8	6.8	5.6	7.1	4.4	2.2	1.6	2	2	2	2.4	3.9	24	5.0
9	1.7	.6	2.5	3.4	3.2	2.7	3	3.9	5.4	5.1	6.1	5.6	5.6	6.1	4.7	3.2	1.5	.6	1.3	3.9	6.1	5.4	1.8	2.2	24	3.6
10	5.1	4.4	4.2	3.4	2.5	2.5	4.1	6.1	7.8	11	12.9	12	8.3	6.1	4.9	2.7	1.8	3	5.6	7.6	6.4	6.1	6.4	5.6	24	5.9
11	5.6	3.9	5.1	5.1	2.7	2	2.3	4.9	6.6	7.1	8.1	9.5	10.5	12	9.3	6.6	5.9	4.2	5.1	4.7	5.4	5.6	6.1	9.3	24	6.2
12	11.2	7.8	4.2	7.8	10.5	7.3	5.4	8.5	10	10.7	12	10.2	9.3	7.3	5.4	4.4	3.9	6.6	6.8	6.8	8.6	9.3	8.1	5.1	24	7.8
13	3	.8	.6	2.2	4.4	4.2	4.4	6.1	8.1	10	9.8	7.6	7.3	9	8.1	8.3	6.8	9	10	7.6	5.9	6.4	4.9	7.1	24	6.4
14	7.6	4.9	3.4	3.4	6.6	4.9	2	1.3	3.5	6.8	5.4	5.4	8.3	10	11.7	10.7	11	12	8.8	9	9.3	8.5	8.5	9	24	7.2
15	9.8	7.1	5.6	7.6	8.1	7.1	7.3	7.1	16.1	9.3	8.8	6.8	5.6	4.9	5.1	4.2	2.2	3.2	4.7	3.7	2.7	4.7	5.6	4.2	24	6.31
16	4.7	4.9	4.7	4.2	.3	-1	1.1	4	3	1.1	1.3	2.5	2.5	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	13	2.6
17	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AY	57.2	13.9	12.2	7.8	15	7.6	4.2	3	7.3	8.1	6.1	1.6	-1.8	13	10.9
18	-.5	1.5	-.6	-1.3	2.1	.3	1.3	2.3	1.3	1.5	1.3	.6	-.3	-.6	1.3	.8	-2.2	-2.5	.8	3.4	-.6	-.3	4.9	3.9	24	.77
19	2	3.7	4.9	2.7	1.8	3.2	4.6	3.2	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	8	3.3
20	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
21	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
22	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
23	AQ	AQ	AQ	AQ	AQ	AQ	AQ	BA	3.9	9.3	12.4	6.8	2.7	2.9	.8	1	1.5	2.2	4.2	8.1	10.3	7.3	4.6	4.4	16	5.2
24	4.4	6.1	10	7.1	3.4	3.4	5.3	8.5	9	8.5	9	9.2	10	8	3.4	2.5	2	2.9	5.8	5.1	4.9	6.3	5.8	5.4	24	6.1
25	5.6	6.3	5.4	3.9	2.9	1	0	2.9	4.1	1.8	2.5	4.7	1	0	3.4	3.7	2.5	2.9	4.2	3.7	3.4	2.5	2	1.8	24	3.0
26	1	2	3.2	3.2	2	3.4	5.3	4.4	4.6	4.6	4.9	4.9	6.3	9	6.6	4.4	3.6	5.1	6.1	9.2	17.5	14.6	12.9	9	24	6.2
27	6.3	4.6	5.8	10.4	9	6	7.3	7	7	8.3	9.5	11.9	10.7	5.8	4.4	4.9	3.9	4.2	5.1	4.1	5.1	7	7.5	6.3	24	6.6
28	6.3	6.1	6.5	6.3	3.2	3.2	3.6	6.3	5.8	5.3	3.2	2	3.2	.1	1.7	4.2	1.8	1.1	2.5	2	1.3	4.9	5.6	2.5	24	3.7
29	3.2	3.7	2.3	-.3	-.6	2.5	2.7	1.8	2.9	4.4	5.4	2.8	1	4.4	4.4	2.9	3.9	1.3	2.7	3.9	1.3	1.3	1.8	3.7	24	2.6
30	2.7	2.3	2	1	2	1.8	.5	.8	2.5	3.7	2.3	2.7	.8	.5	5.6	4.2	2	2	1	1.8	4.6	6.8	6.1	7	24	2.8
31																									0	
NO.:	25	25	25	25	25	25	25	25	25	24	25	26	26	25	24	25	25	25	25	25	25	25	25	25		
MAX:	24.	21.	22.	20.	29.	34.	21.	37.	37.	33.	38.	57.	32.	29.	32.	35.	32.	28.	26.	24.	29.	29.	23.	26.		
AVG:	6.8	6.3	6.7	6.4	6.8	6.4	6.4	8.2	9.5	9.3	10.5	11.0	8.6	8.0	7.6	7.2	6.2	6.0	6.6	6.7	7.4	7.4	6.9	6.8		

MONTHLY OBSERVATIONS: 600 MONTHLY MEAN: 7.5 MONTHLY MAX: 57.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: OCTOBER 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	HOUR 0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6.8	5.4	9.7	12.9	11.2	9	10	9	6.3	7.1	7.3	14.6	15.7	7.1	4.9	1.7	.6	.6	3.7	.6	.1	4.4	2	1.3	24	6.3
2	2	4.1	7.5	6.6	4.2	2.9	4.6	6.6	6.3	7.1	6.3	9.5	11	4.7	-.8	.3	4.4	4.4	4.6	5.1	4.9	3.2	2.3	5.8	24	4.9
3	9	7.8	4.6	2.5	3.2	2.7	2.3	4.1	3.2	1.3	4.1	5.1	4.1	3.6	1.3	1.8	1.8	1.8	5.8	9.3	5.8	4.4	7.3	7.3	24	4.3
4	8	9.5	8.3	4.4	3.2	4.4	9.5	15.3	6.3	5.8	5.6	4.6	4.1	5.6	6.1	5.1	5.1	6.1	AY	AY	AY	AY	AY	AY	18	6.5
5	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
6	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
7	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
8	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
9	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
10	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	0	
11	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	AY	4.6	7.3	12.6	22.2	18	7.6	7	7	11.4
12	8.5	8.5	6.1	5.6	5.8	8.3	9	6.1	5.6	7.5	20	19.7	9.5	8.8	9.5	8	5.1	6.3	7.3	9.5	16.5	18.8	17.3	16	24	10.1
13	15	7.3	7.5	9.7	11.2	9.5	10.2	12.2	12.9	11.9	10.7	8.3	9.5	12.9	11.2	7.8	6.3	5.9	2.9	.8	2.7	9.5	10.7	9	24	9.0
14	8.3	6.6	8.3	7.8	5.6	8.8	12.7	13.6	13.1	11.4	10.9	8.3	5.1	6.1	7.1	7.5	5.9	4.4	6.8	6.3	19.5	14.1	17.8	22.9	24	9.95
15	16	13.1	10.5	6.8	5.6	10	12.2	10	9.5	8.3	5.8	5.4	6.6	7.1	9.3	10.5	9.5	8.1	7	6.1	18	15.5	23.4	5.8	24	10.0
16	6.5	7.5	6.3	8.3	10.2	17.8	12.7	10.9	9	9.5	10.2	11	11.7	10.5	10.5	10.5	8.5	9	26.8	20.2	17.8	14.3	18.5	29.7	24	12.8
17	13.8	15.8	11.4	11.4	12.9	11.4	10.9	15.7	13.1	13.8	12.4	14.8	13.6	16.8	14.8	11.9	13.1	20	22.4	32.4	19.2	14.6	28.4	13.4	24	15.8
18	15.2	14.6	16	14.6	13.6	12.4	15	11.9	12.7	15.8	8.8	9.7	AY	AM	AM	24.9	12.9	12.5	10	8.5	11	22.2	29.7	28.2	21	15.2
19	27.5	16.8	24.6	13.4	10.5	15.5	19	10	10	9.5	11.7	22.7	19.3	10	9.3	9.3	9.3	5.1	5.1	19.7	10.9	11.5	11.4	19.7	24	13.8
20	17	11.9	11.7	11.7	11.7	11.4	9.2	7.3	7.3	8.3	10.7	15.3	9	6.1	5.1	6.8	5.1	8.3	13.6	11.9	8.5	15.2	16.8	7	24	10.3
21	9	8.5	7.5	7.5	6.1	5.3	4.1	2.9	2.9	4.6	8	10.7	15.5	8.5	9.5	7.8	5.4	7.3	7.8	6.3	5.1	7.8	9	8.3	24	7.3
22	6.8	5.4	7	6.3	6.8	6.3	6.1	16.3	13.6	12.4	10	9.8	16.5	11	11.5	10	9.3	10.7	8.8	6.1	7.1	10	11.9	10.9	24	9.6
23	7.5	6.8	7.8	5.3	3.9	7.3	8	25.1	8	7.8	8.3	9.7	12.4	12.7	8.3	4.4	5.1	9	15.2	9.7	9.7	10.2	10.2	9.2	24	9.2
24	8.7	9.7	7.1	4.1	5.8	8	16.8	14.1	15.5	4.6	6.6	10.2	18	10.7	10	8.1	8.3	15	14.1	10	8.5	11.5	10.7	11.4	24	10.3
25	12.9	10.9	11.2	10	6.8	8.5	11.2	17.3	18.3	7.8	8.3	10.5	17.5	15	11.2	9.3	8.5	10.5	8.5	8.5	16.5	12.9	10.7	7	24	11.2
26	8.5	12.6	11.4	11.2	9.2	9	11.7	10.7	16.8	20.7	17.3	10.2	10	16.3	14.5	14.8	13.9	19.8	14.6	13.6	25.8	24.9	15	20.5	24	14.7
27	17.7	16	12.2	9.5	7.3	15	12.4	15.5	16.5	13.3	9.7	9.5	10.9	10	11	10.9	12.4	13.8	12.4	9	5.6	4.9	3.9	1.8	24	10.9
28	2.7	4.9	6.3	5.8	3.6	2.3	.3	.8	2.4	3.9	5.6	6	3.9	4.4	4.9	6.2	7	5.8	3.9	3.9	4.1	2.7	4.1	5.8	24	4.2
29	9	12.4	16.5	7	5.3	17.8	7	31.9	11.4	11.4	12.4	9.7	AY	AM	AM	17	4.9	8.5	15.2	14.6	29.4	22.2	12.4	21.9	21	14.2
30	17	14.1	12.9	13.1	14.8	14.8	15.2	22.9	23.6	16.7	17.8	17.5	15.7	15.2	6.3	6.6	9.7	12.2	21.2	24.4	12.4	20	13.8	20.2	24	15.8
31	20.7	20.4	24.9	27.7	7	10	10.5	9.7	9	6.3	6.5	7.5	8.3	7.8	8	8.7	9.2	10	23.7	17	19.7	18.5	8.5	8.3	24	12.8
NO.:	24	24	24	24	24	24	24	24	24	24	24	24	22	22	22	24	24	25	24	24	24	24	24	24		
MAX:	28.	20.	25.	28.	15.	18.	19.	32.	24.	20.7	20.	23.	19.	17.	15.	25.	14.	20.	27.	32.	29.	25.	30.	30.		
AVG:	11.4	10.4	10.7	9.3	7.7	9.5	10.0	12.5	10.6	9.45	9.8	10.8	11.3	9.6	8.3	8.7	7.6	8.8	11.2	11.1	12.5	13.0	12.7	12.4		

MONTHLY OBSERVATIONS: 571 MONTHLY MEAN: 10.4 MONTHLY MAX: 32.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: NOVEMBER 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	8.8	9.2	7.5	6.8	8.3	8.7	6.8	5.1	6.1	5.8	6.6	6.8	9	10	4.9	1.1	2.4	4.1	9	13.1	10.2	11.7	16	14.8	24	8.0
2	12.9	16.5	15	13.4	25.3	11.2	17.8	16.5	13.1	12.6	8.7	3.7	3.4	3.2	2	3.7	3.4	2.3	4.9	5.3	3.9	2.9	.5	-.1	24	8.4
3	2.4	4.4	2.7	1.7	2.6	2.4	5.8	4.9	2	4.6	5.1	5.1	5.3	3.7	1.8	4.4	4.4	1.8	3.9	6.1	6.8	7.8	8.5	4.9	24	4.3
4	1.5	3.9	5.3	4.4	2.4	-.4	1	4.6	4.4	7.3	9.2	3.6	4.9	7.3	3.9	4.4	5.8	3.4	2.4	3.9	6.3	8.5	10.5	12.9	24	5.1
5	13.8	12.2	8.3	6.1	4.4	6.3	7.3	5.3	5.3	6.3	7.3	7.8	7.3	4.9	3.6	3.4	4.1	7	11.7	13.8	11.7	8.7	9.2	14.8	24	7.9
6	16.5	11.9	12.2	17.3	10.2	16.7	17.2	9.7	15.2	11.7	13.1	12.4	10.4	7.5	3.4	3.2	3.9	5.8	5.8	7	9.7	17.5	13.6	15	24	11.1
7	15.5	16	18	20.5	12.9	17.5	13.8	19.7	16	20.7	6.1	6.6	6.8	6.5	6.1	7.5	7.8	7.3	10	8.5	3.9	1.8	3.9	7.5	24	10.9
8	5.6	2.5	2.4	2.4	1.7	1.8	1.5	2.4	5.3	4.4	2.4	2.9	2.5	2.7	2.3	3.4	5.8	6.8	8.5	21.7	19.5	32.6	10.5	9.2	24	6.70
9	7	4.6	2.4	3.6	2.5	1.5	4.8	5.1	2.5	19.2	59.6	40.6	29.5	24.4	20.2	17	18.5	28.7	77.5	50.6	46.7	40.6	46.7	39	24	24.7
10	41.8	42.8	32.4	43.1	35.1	45	40.9	42.3	48.4	54	88.2	47	57.9	42.6	25.6	29.5	23.2	33.1	35.3	60.6	53.1	65.9	44.3	43.6	24	44.8
11	42.8	33.6	27.9	25.3	13.8	14.6	8.7	9.2	6.8	6.3	5.6	5.3	8.3	16.5	13.1	11.2	10.7	11.4	24.4	26.8	34.6	33.6	27	17.5	24	18.1
12	24.4	26.8	15.2	14.6	13.3	10.9	23.7	19	10.9	11.9	13.1	12.9	15	13.8	11.9	12.2	23.7	24.6	28.2	32.6	32.9	44.3	44.3	33.6	24	21.4
13	24.6	19.5	11.2	15.5	17.5	19.2	20.2	21.2	28.5	18	19	10.4	7.8	AT	5.6	6.1	7.3	9.2	10.4	17.5	4.4	17	33.1	32.4	23	16.3
14	23.4	5.6	4.6	5.1	8	10.4	12.4	12.2	12.2	11.4	11.9	17	12.9	13.4	10.7	7	8	23.9	28.4	36.6	26.8	27.9	54.5	50.1	24	18.1
15	28.9	11.4	7.5	3.9	4.6	2.7	2.9	3.2	6.3	6.8	2.3	2.2	2.9	AY	3.4	4.1	4.1	1.5	2.6	4.6	5.3	4.1	2.9	3.4	23	5.29
16	4.1	3.1	3.9	4.4	2.3	1.8	2.7	3.4	3.9	3.9	.8	2.9	1.8	-1.1	.3	.8	2.4	3.2	3.9	4.1	2.9	4.4	5.1	5.3	24	2.93
17	3.6	1.5	.5	-.1	2.4	2.7	6.6	7.5	3.7	6.8	5.8	2.4	3.4	2.9	3.6	2	2	6	5.3	3.9	3.6	1.7	.5	1.7	24	3.1
18	4.9	5.3	2.4	-2.3	-.9	3.9	2	1	4.9	5.3	3.4	3.9	3.6	3.9	6.6	3.4	2.9	8.5	21.4	10.7	19.5	21.9	22.2	9.7	24	7.0
19	7	4.1	5.3	4.4	3.4	1.8	.5	1	-.1	2.2	2.9	-.1	1	.8	.5	2.5	2.4	5.3	5.1	7.8	11.2	5.6	4.1	5.1	24	3.5
20	4.1	3.2	1.8	1.5	1	1.3	2.5	1	2.2	4.4	2	2.9	4.9	3.9	2.7	3.6	4.4	4.4	5.1	6.3	5.8	4.1	4.6	6.3	24	3.5
21	8.3	8.2	9.5	10.7	7.8	6.8	15.2	23.6	20.2	6.3	7	8	6.5	6.1	7.5	7.3	15	20.2	25.8	20.9	33.9	15.5	14.5	16.3	24	13.4
22	14.5	35.8	22.7	13.3	20	22.4	27.5	27	37	26	14.8	19.4	8.7	9.9	11.7	11.9	12.4	23.4	29.9	28.2	32.4	45.3	37.8	30.9	24	23.5
23	20.5	35.8	22.4	38.5	24.1	18	16.5	21.2	27	33.4	15.2	19.7	13.6	15	7.3	10.9	20.2	37.8	40.6	25.1	52.4	39	29.2	40.4	24	26.0
24	61.6	58.4	46.2	37.3	26.8	22.2	20.4	12.9	28.4	26.5	23.7	20.5	14.3	13.6	13.1	14.7	16.8	21.7	42.6	58.7	39.7	55.2	32.6	35.8	24	30.99
25	32.1	47.4	27	AQ	AQ	AQ	AQ	AQ	AQ	30.9	13.8	22.9	25.8	28.2	-2.5	28.2	27.4	29.7	25.6	35.3	33.4	59.4	69.1	41.6	18	32.0
26	50.6	35.1	44	29.9	29.7	38.8	36.3	35.3	37.3	36.6	41.6	22.4	22.2	21.9	20.2	19.7	15.5	31.9	29.4	25.1	45	44.8	41.8	44.5	24	33.3
27	47.7	45.8	33.1	41.6	30.9	29.9	31.2	25.5	32.9	27.9	19.7	28.2	30.7	19.2	20	11.4	20	37.5	27	42.1	24.4	41.8	41.1	37.3	24	31.1
28	62.8	42.1	33.1	36.3	35.3	24.2	34.6	25.8	31.7	23.7	23.9	21.9	25.8	23.2	22.9	15	21.4	28.9	37.3	37.8	29.2	35.8	40.1	26.5	24	30.8
29	41.4	50.6	51.1	35.6	30.2	22.7	24.6	26.8	32.1	21.2	33.8	28.2	25.6	25.1	22.2	20.2	32.4	31.7	40.1	42.8	40.6	49.6	40.6	39	24	33.7
30	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
31																									0	
NO.:	29	29	29	28	28	28	28	28	28	29	29	29	29	27	29	29	29	29	29	29	29	29	29	29		
MAX:	63.	58.	51.	43.1	35.	45.	41.	42.	48.	54.	88.	47.	58.	43.	26.	30.	32.	38.	78.	61.	53.	66.	69.	50.		
AVG:	21.8	20.6	16.4	15.53	13.4	13.0	14.5	14.0	15.9	15.7	16.1	13.4	12.8	12.2	8.8	9.3	11.3	15.9	20.8	22.7	22.4	25.8	24.6	22.0		

MONTHLY OBSERVATIONS: 688 MONTHLY MEAN: 16.6 MONTHLY MAX: 88.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: DECEMBER 2013

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

HOUR DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
2	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	-.4	-.3	-1.1	-1.3	-.6	1.2	2.9	3.9	3.9	2.3	3.4	5.6	9.2	9.7	14	2.74
3	5.6	5.8	5.6	1.2	1	3.9	2.5	-.9	-.1	.8	1.5	4.6	6.5	4.8	4.1	AY	7	9	8.2	6.5	4.1	4.6	4.6	4.1	23	4.1
4	10	21.7	1.7	3.6	5.6	7	9	19.5	5.6	6.5	7	4.8	4.1	3.1	2	3.9	4.6	18.7	18.5	20	14.1	17	14	12.6	24	9.8
5	8.7	7.3	3.9	5.3	6.3	2.9	3.4	8.2	21.7	-.4	1.2	4.1	AT	7.3	8.7	7.5	7	17.5	17	36.3	36	42.8	29.9	31.1	23	13.6
6	26.7	15.2	12.4	8.7	7	8	5.3	6.3	8.2	7	4.4	4.1	5.5	5.3	6.8	7.5	6.3	7	8.2	9.4	15.2	19.2	17.7	9.2	24	9.6
7	7.2	6.3	6.3	7	7.8	6.8	5.6	2.2	1.7	3.6	4.6	6	8.2	9.4	8.5	8.2	7.7	16	19.7	46.9	40.6	36	14.8	20.4	24	12.6
8	21.2	17.7	24.8	25.8	22.4	19	20.4	15.2	18.5	18.5	16.2	13.3	10.2	7.5	7	7.3	11.2	27.9	27.4	38	26.5	18	19.4	32.4	24	19.4
9	31.4	26	20.9	19.2	24.4	1.5	6.3	9.4	9.4	12.1	11.1	9.2	7.5	7.5	10.4	10.9	11.4	11.9	12.9	13.8	21.9	29.7	34.3	22.7	24	15.7
10	17.5	24.4	18.5	9.5	10.7	8.7	6	5.8	5.3	3.9	2.9	3.1	2.6	2.4	3.4	5.6	2.9	3.4	7.5	22.9	28.2	36.8	10.2	7.2	24	10.4
11	15.2	1.2	1.2	2.7	8.5	11.9	12.8	20.4	5.3	5.3	4.8	2.4	6	11.1	10.2	8.5	10.2	31.9	31.9	2.4	4.8	7.3	7	7	24	9.6
12	6.5	3.9	1	.3	2.2	.3	1.7	4.3	3.9	3.4	2	3.6	4.8	2	.8	3.4	6.8	9.2	11.4	43.3	33.4	45	43.3	21.2	24	10.7
13	31.2	20.9	5.3	2.4	6.3	21.9	19	21.2	19.5	10.4	9.2	8.3	7.3	3.6	2.7	3.1	5.6	9.2	19.7	23.9	21.9	20.2	16.3	15	24	13.5
14	4.6	7.3	6.3	0	-.8	1.8	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	6	3.2
15	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
16	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	4.9	AY	10	10.4	3.6	14.7	12.9	15.5	25.3	33.3	36.8	10.2	11	16.1
17	6.5	4.1	2.4	-.1	-.1	2.4	6.3	5.1	3.2	3.4	4.8	3.1	1	1.9	3.2	3.9	8.5	11.7	9	10.2	10.7	8.3	5.8	2	24	4.9
18	-.4	-2.1	-.1	2	.8	.5	.3	0	-.9	2	2.4	-.4	-.8	-1.6	-.8	-.4	.3	1	1.8	2.7	4.6	6.8	8.7	7.8	24	1.4
19	4.6	3.4	3.1	4.4	4.1	1	.3	3.6	3.4	1	2.9	4.6	3.1	2.4	2.2	2.9	.8	3.6	11.2	10.7	15.5	26.8	15.7	11.9	24	6.0
20	10.4	19.2	8.2	11.2	14.9	17	20	17.2	19.2	6.5	3.9	1.2	0	-.9	-1.3	-.4	1.5	2.2	4.6	6	7.7	6.5	5.1	9	24	7.9
21	9.2	6.3	5.1	3.1	.5	3.4	5.3	8.7	13.3	10.7	10.2	12.9	11.4	8.2	8	9.9	10.4	12.2	17.7	9.5	9	7.7	7.2	8.5	24	8.7
22	8.2	5.1	2.2	3.6	7	8.2	8.2	7.8	7.7	19.5	12.2	11.4	8.5	8.5	10.4	10	9	24.8	26.5	25.3	40.1	50.6	52.6	39.7	24	17.0
23	9	7	3.7	1.2	2.7	4.1	4.1	4.6	2.4	0	-.6	1	1.7	.5	-.1	-1.1	-1.6	-.6	2	3.6	2.7	2.5	5.6	1.8	24	2.3
24	.8	3.4	-.4	-3	-1.6	1.8	2.9	2.9	3.6	4.9	2.7	0	2.7	2	.5	2	2.4	7	12.4	11.9	22.7	20.9	8.5	5.1	24	4.8
25	4.6	4.9	5.3	4.4	-.6	-1.8	0	1	2.9	3.6	3.6	4.6	2.6	2	.8	2.2	9	12.6	15.2	21.2	6.5	17.8	17.5	11.4	24	6.3
26	28.2	10.9	10.4	10	15.2	11.4	9.7	10	16.3	17	7.3	15	16	20.7	18	11.4	12.6	27.4	39	48.9	43.6	7	6.8	5.8	24	17.4
27	3.9	1	.5	3.6	3.9	7	12.9	18.5	23.2	21.4	15.5	15	12.6	17.3	13.1	11.2	10.9	24.9	27.9	24.2	-.1	1.8	3.9	1.5	24	11.5
28	-.1	1.8	2.7	0	.3	2	2	3.9	2.9	2	2.7	2.4	2.7	7	5.8	1.3	1.7	5.3	6.3	20.4	19	38.5	61.3	12.9	24	8.5
29	10.7	8.2	10.4	7	3.1	4.6	3.4	2.7	.5	1.8	5.6	4.4	3.1	4.6	1.8	.5	8.2	7	2.9	5.8	3.9	3.1	42.3	23.2	24	7.0
30	17.5	26.5	9.2	7.3	5.1	4.4	3.6	4.4	7	2.2	.8	3.4	2.4	5.1	2.4	.8	.5	1.8	3.2	1.3	.8	-.1	2.4	3.4	24	4.8
31	2.2	2.9	3.6	3.4	2	1.8	1.8	1.3	2.6	2.7	0	.5	3.9	2	-1.1	.5	2.9	3.4	2.9	17.5	10.2	16	10	11.7	24	4.4
NO.:	27	27	27	27	27	27	26	26	26	26	27	27	27	27	28	27	28	28	28	28	28	28	28	28		
MAX:	31.	27.	25.	26.	24.	22.	20.	21.	23.	21.	16.	15.	16.	21.	18.	11.	13.	32.	39.	49.	44.	51.	61.	40.		
AVG:	11.2	9.6	6.5	5.3	5.9	6.0	6.6	7.8	7.9	6.5	5.1	5.3	5.1	5.3	4.9	4.9	5.9	11.6	13.6	17.9	16.9	18.9	18.2	12.8		

MONTHLY OBSERVATIONS: 653 MONTHLY MEAN: 9.2 MONTHLY MAX: 61.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: JANUARY 2014

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

HOUR

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	11.4	8.3	7	8	8.5	8.3	8	9.2	11.2	13.4	11.9	7.8	4.6	4.1	6.1	2.7	.8	20.7	37.3	17.8	10.2	7	4.1	4.6	24	9.7
2	5.3	4.8	1.3	-.1	3.4	3.7	.8	1.3	16.3	4.1	5.3	9.7	8.5	1.3	-.3	2.7	3.4	-.1	2	4.8	2	2.3	0	-2.3	24	3.3
3	-.1	0	.8	0	-.6	.5	.5	3.2	4.9	.3	.3	.8	-4.9	-5	-1.1	-.3	-1.1	0	2.7	4.6	6.1	5.8	9.2	18	24	1.9
4	7.8	6.6	4.6	2	.3	.3	.8	2.3	2.7	-1.3	-3.2	.8	3.4	2.7	1	-.8	.3	3.2	5.1	6.6	4.9	3.2	2.4	.3	24	2.3
5	2.9	5.8	3.2	.1	-2.5	2	5.6	5.3	6.5	2	-.1	1.3	1.8	3.6	3.4	3.4	1.5	.5	20.7	20	32.1	19.2	22.9	18.5	24	7.5
6	9	9.7	17	12.9	13.8	14.5	13.3	23.7	30.9	17.2	9.2	AT	9	7.3	7	6	6.5	2.9	16.7	17.7	16	12.6	11.9	20	23	13.3
7	14.1	18.7	14.3	17.7	19.9	12.4	22.9	19.7	9	17.2	16.2	18	16.8	13.8	AY	16.5	13.8	18.5	24.4	17	21.2	18.7	26.7	21.4	23	17.8
8	28.2	27.4	39.2	21.2	17.2	20.7	22.6	26.7	29.9	27.9	27.3	18.7	25.8	2	.3	-.8	-1.1	2.4	5.6	4.6	5.8	4.1	.5	-.6	24	14.8
9	.5	1	0	-1.3	-.8	-.6	-.6	-.1	-.9	0	3.1	3.9	2.6	1	-1.1	-1.1	.3	1	.5	0	.8	2.9	.5	-.1	24	.5
10	2	1.5	1.7	.5	-.8	-1.6	-1.1	-.4	1.5	1.7	2	-.1	1	2.4	.8	1.5	1.7	2.2	1.8	2.7	5.1	7.5	3.9	-1.1	24	1.5
11	-.4	2.4	3.6	.5	-1.8	.5	.8	-2.1	-1.6	0	1	2.3	2.7	2.2	-.4	-.4	-.4	-.9	3.9	2.4	1.8	5.1	2.7	0	24	1.0
12	2	3.6	3.4	2.2	.8	-.1	.5	0	-.9	1.8	1	-.8	1.7	2.2	2.9	3.9	1.7	1.2	1.7	1	.5	0	-.1	.5	24	1.3
13	.3	-1.1	-2.1	-1.1	-.4	.3	1	0	-.1	-.9	-2.1	-1.3	0	1.5	2	-.1	0	-.8	-1.1	2	1	2	2.4	-1.3	24	0.0
14	-.1	2	1.5	-.6	-1.3	.5	1	3.6	5.8	7.3	5.1	-.1	-.6	1	1.5	.8	2	4.1	9.7	11.7	7	4.9	5.1	4.1	24	3.2
15	1.5	2.2	3.9	2.4	5.3	7.8	6.3	8	6.3	4.6	7.5	5.8	3.4	3.9	4.1	6	3.1	18.5	9.7	15.2	15.2	19.7	29.4	16.5	24	8.5
16	9.9	5.6	6.3	3.4	.3	1	1.5	.3	2.4	6.3	3.1	0	3.4	4.4	3.2	5.8	8.5	11.9	28.2	17.5	7.8	8.2	6.3	2.9	24	6.2
17	17.2	22.2	3.9	3.9	4.6	15.5	5.8	9	27.4	15.5	8.2	10.9	11.9	10.9	8.7	9	12.6	12.6	15.7	33.1	33.4	23.9	26.3	26	24	15.3
18	20.7	7.5	17.2	18.7	21.4	26.8	15.2	14.8	18.2	27.4	16.2	14.5	14.1	12.9	12.4	11.7	9.7	31.4	45.3	34.3	30.2	22.7	10.5	17	24	19.6
19	21.9	40.8	12.9	11.2	19.7	-.1	3.4	6.8	3.9	5.1	17.5	7	8.3	11.6	10.2	6.8	9.2	23.9	12.6	10.9	11.9	17.8	22.7	31.9	24	13.7
20	16.2	15.7	17.5	12.6	13.3	11.4	8.2	9.2	16.3	6.3	4.8	4.8	5.1	4.1	4.4	5.1	5.1	7.5	9.9	10.7	29.9	17	9.7	20.7	24	11.1
21	21.7	19.2	22.7	30.6	14.6	23.7	26.5	18.2	48.6	33.4	16	8.3	10.7	11.7	9.9	9.2	10.2	24.4	26.7	17.5	43.1	53.8	28.1	46.5	24	24.0
22	30.6	26.3	20.7	20.4	17	16.2	15	26.8	19.7	16.7	12.4	21.9	15.5	9	9	8	8.3	10.2	12.4	25.8	20	26.5	5.6	30.4	24	17.7
23	26.7	34.1	21.9	20.2	21.9	20.4	17.5	24.1	19.2	20.9	1.3	1	1	4.6	6.1	AY	4.8	9.5	18.7	12.9	25.1	25.1	55	14.5	23	17.7
24	11.4	6.8	7	22.7	23.4	15	13.3	21.6	27	15.2	12.1	10.2	6	5.8	9	7.5	5.6	9.5	34.1	21.7	22.4	31.6	41.3	39.5	24	17.5
25	42.1	21.7	26.8	20.7	20.7	23.4	22.2	12.6	29.2	28.9	14.3	15	17.2	17.5	15.2	13.6	10.2	17.7	27.3	29.7	29.9	34.1	31.1	26.8	24	22.8
26	41.8	37	29.2	25.3	13.6	20.4	23.9	21.4	24.8	29.9	42.3	20	11.2	15.7	12.6	10.2	8	21.2	19.2	18.5	2.4	1	1.5	4.1	24	18.6
27	3.9	4.4	3.9	.3	-.4	1.7	2.9	2.9	6.3	8	5.8	4.1	3.9	4.1	3.6	2.2	1	7	12.9	17	15.2	17	6.3	7.5	24	5.9
28	6.5	4.6	3.4	.5	4.4	8.5	38	24.4	20.2	23.1	6.5	7	8.5	9.2	8.5	9.2	9.9	9.4	9.5	11.7	13.3	13.1	16.5	25.5	24	12.1
29	15.5	18.2	16	14.3	14.3	14.1	13.3	11.2	8	5.3	1.7	0	-.1	.3	-.6	-.1	.8	1	3.9	4.8	2.2	.3	3.4	1.8	24	6.2
30	-.6	-.6	1.8	4.4	3.1	.5	2.3	6.8	7.8	3.4	.5	1.3	1.8	2.2	2.4	4.6	5.1	3.2	3.9	2.9	3.6	5.6	2.7	2.2	24	2.95
31	7	9.5	5.6	3.6	6.3	8.7	6.5	9	9.7	8	7.3	6.1	8	9.7	10.2	9.7	9.5	9.5	11.2	11.4	12.2	11.9	7.5	4.6	24	8.4
NO.:	31	31	31	31	31	31	31	31	31	31	31	30	31	31	30	30	31	31	31	31	31	31	31	31		
MAX:	42.	41.	39.	31.	23.	27.	38.	27.	49.	33.	42.	22.	26.	18.	15.	17.	14.	31.	45.	34.	43.	54.	55.	47.		
AVG:	12.2	11.8	10.2	8.9	8.4	8.9	9.6	10.3	13.2	11.2	8.2	6.6	6.5	5.7	5.0	5.1	4.9	8.8	13.9	13.2	13.9	13.7	12.8	12.9		

MONTHLY OBSERVATIONS: 741 MONTHLY MEAN: 9.9 MONTHLY MAX: 55.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk (***) indicates that the region has reviewed the value and does not concur with the qualifier.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Jul. 22, 2014

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
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LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: FEBRUARY 2014

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	1.3	2.7	8.3	4.8	16.3	9.9	10.2	12.2	13.1	11.4	8	6.5	5.1	3.9	6.5	5.1	1.5	AQ	AQ	AQ	AQ	AQ	AQ	AQ	17	7.5
2	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	0	
3	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	BA	4.6	-.1	-4.7	-2.5	-3.5	3.6	4.6	-2.1	2.3	7.7	9.2	6.3	5.3	13	2.36
4	8	5.1	4.6	3.6	.8	3.2	29.2	25.1	24.4	29.2	9	5.3	2.6	4.8	3.9	.8	1.8	3.1	4.4	5.3	4.6	4.8	5.6	4.8	24	8.1
5	3.6	2.2	5.1	7	8	8	21.4	32.4	34.6	13.1	9	3.6	1	2.4	4.1	2	4.8	8.5	16.5	21.9	26.7	23.1	30.2	9.7	24	12.5
6	10.7	11.9	10.6	5.5	4.8	6.3	5.3	8	9.2	5.6	4.6	4.8	5.8	5.6	5.3	5.5	5.1	6	21.4	28.9	20.4	40.4	27.7	24.4	24	11.8
7	16	9	9.9	14.8	16.2	8.5	7.8	6.5	8	10.7	12.6	12.8	12.6	11.4	9.2	10.9	AY	13.3	20	39	28.9	39.2	42.6	35.5	23	17.2
8	41.3	29.2	20.4	16.7	22.4	15.2	16.7	14.3	15.5	16.7	2.7	3.1	7	14.7	8	8.7	9	8.5	10.7	21.2	24.1	14.1	44.5	66.7	24	18.8
9	18	10.7	11.7	16.5	15.5	7.7	5.6	4.4	5.6	5.3	5.6	7.3	6.5	2.9	2.2	4.6	5.8	7	9.9	12.4	18	20.2	13.6	18.2	24	9.8
10	28.2	17.8	17.8	23.9	18.5	26.3	31.9	22.4	30.9	23.4	23.9	17.2	9	15.7	15.7	12.6	21.2	26.5	16.3	8	6.3	3.6	2.7	1.5	24	17.6
11	.3	.3	1.7	1.8	1.2	4.4	3.9	4.1	5.1	1.2	1.8	3.9	1	.8	3.2	3.9	2.7	.5	2.4	7.5	8	3.4	.3	1.7	24	2.7
12	1.8	0	.8	.5	.5	2.2	AT	2	-.4	1	3.6	2.4	.3	2	4.9	5.8	3.9	3.4	9	12.9	11.4	9.5	8	3.1	23	3.9
13	.8	1.5	0	1	3.6	2.7	-1.1	.8	1.5	.8	.3	-.8	2.6	2.7	0	2	3.4	4.6	5.6	5.6	5.8	5.1	16.5	1.5	24	2.9
14	4.6	5.8	2.9	1.3	1	1.7	1.5	.5	.5	2	2.2	2	1.8	.7	.5	2.4	2.7	2.4	3.9	6.3	7.3	4.4	5.8	8.7	24	3.0
15	25.8	5.8	4.6	2.9	2.4	2.3	2.7	5.6	5.1	1.7	1	1.5	.3	0	3.2	4.6	2	.3	1.8	2.3	2	2.7	2.9	3.1	24	3.6
16	2	2.5	4.1	2	2	1.5	.5	2	-.1	.8	2.9	.8	-.4	1.2	1.7	2.4	4.4	2.4	2	2.4	1.5	0	1.5	3.6	24	1.8
17	1.5	.5	.5	-.6	2	2.2	-.6	0	1	.3	.5	.3	.3	3.4	1.7	-.4	.3	0	1.2	2.9	4.4	2.9	1.8	3.6	24	1.2
18	4.8	1.8	-.1	2.2	0	-.6	2.2	3.6	4.1	2.7	1.8	0	-1.3	-.8	-.4	.5	.3	-.9	.3	1.5	1.2	.8	-.1	-1.1	24	.9
19	1.7	1.7	-2.3	-.1	.8	-.6	2	1	1.5	1.7	.8	2	1.7	1.7	2.4	2.2	1.3	2.3	2.7	8.3	8.7	5.3	9	9	24	2.7
20	5.1	3.6	3.4	1.8	-.6	-.6	2.2	2	0	2.4	4.9	1.3	0	-.1	-1.3	2.2	4.1	2.4	4.1	4.1	2.7	3.6	5.3	4.4	24	2.4
21	2.6	2	2.4	1.2	-1.1	-.6	.7	2.4	1.8	1.5	2.9	4.6	3.1	AY	2	3.4	1.3	.3	2.7	4.9	3.1	2.7	3.6	1.7	23	2.1
22	1.2	4.8	4.9	1.5	2.7	3.4	3.9	5.6	4.9	2.7	4.1	7	8	9.5	8.5	5.3	2.7	3.9	8.7	10.4	7	6.3	5.6	5.6	24	5.3
23	5.6	3.9	4.6	3.4	3.6	5.8	6.5	5.1	4.8	3.9	1.5	1.8	2.7	5.6	6	4.6	4.6	4.1	4.1	2.4	2.2	4.6	5.8	3.6	24	4.2
24	4.4	6.3	6.8	6.1	4.1	4.1	5.3	5.8	5.8	5.1	3.9	9.2	11.7	9.4	9.9	8.5	7.5	7.5	8.2	7	7.5	8.3	4.4	2.2	24	6.6
25	4.6	8	6.3	6.8	8.2	7.5	8	8.7	6.8	6.3	9	7.7	6.5	9	9.9	8.5	7.5	6.8	8.9	23.4	28.4	46	41.1	31.1	24	13.1
26	37.8	27.9	18	13.8	20.4	19.5	22.7	17.2	16.5	16.5	17.7	20.2	16.5	9	8.2	10.2	11.2	10.9	18.7	23.4	36.3	50.9	29.4	29.4	24	20.9
27	38	39.2	20.7	16.2	30.7	19	17.7	20.4	36.5	31.9	25.8	19.5	13.8	17.5	14.7	13.3	12.8	19.5	23.9	19	20.2	21.9	18.5	20.9	24	22.2
28	25.5	27.7	19.5	23.6	21.7	25.3	20.2	21.6	4.1	2.6	2	1.7	1.2	2.2	1.7	2.2	3.4	1.7	1.7	2.9	2.6	1.7	2.9	5.1	24	9.4
29																									0	
30																									0	
31																									0	
NO.:	26	26	26	26	26	26	25	26	26	26	26	27	27	26	27	27	26	26	26	26	26	26	26	26		
MAX:	41.	39.	21.	24.	31.	26.	32.	32.	37.	32.	26.	20.	17.	18.	16.	13.	21.	27.	24.	39.	36.	51.	45.	67.		
AVG:	11.4	8.9	7.2	6.9	7.9	7.1	9.1	9.0	9.3	7.7	6.2	5.6	4.4	5.0	4.8	4.8	5.0	5.8	8.0	11.0	11.4	12.9	13.0	11.7		

MONTHLY OBSERVATIONS: 627 MONTHLY MEAN: 8.1 MONTHLY MAX: 67.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

(88101) PM2.5 - Local Conditions

SITE ID: 30-081-0007 POC: 3
COUNTY: (081) Ravalli
CITY: (33775) Hamilton
SITE ADDRESS: MADISON AND 3RD STREET SOUTH
SITE COMMENTS: SHERIFF'S LOT PARKING SPOT #46
MONITOR COMMENTS: REPLACES HAMILTON COURTHOUSE SITE.

STATE: (30) Montana
AQCR: (144) MISSOULA
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: RESIDENTIAL
LOCATION SETTING: URBAN AND CENTER CITY

CAS NUMBER:
LATITUDE: 46.2436210009
LONGITUDE: -114.158889
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 1088
PROBE HEIGHT: 4.5

SUPPORT AGENCY: (0730) Mt Dept Of Environmental Quality, Air Quality Division
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (170) Met One BAM-1020 Mass Monitor w/VS
PQAO: (0730) Mt Dept Of Environmental Quality, Air Quality Division

REPORT FOR: MARCH 2014

DURATION: 1 HOUR
UNITS: Micrograms/cubic meter (LC)
MIN DETECTABLE: 2

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	2.4	-.9	.7	1.5	-.1	1.7	1.7	0	2	2.9	2.9	2.2	2.9	3.1	2.2	4.1	5.1	5.6	7	8.3	9.9	8	5.1	5.8	24	3.5
2	7	4.6	2.6	3.6	5.1	7	3.9	3.6	7.7	6.5	3.4	5.1	7.2	6.8	8.7	9	7.3	7.5	8	9.9	10.7	12.2	16.2	13.6	24	7.4
3	11.9	10.4	9.9	8.7	4.1	2	2.4	2.4	1.5	2.7	3.4	-.4	1.7	3.4	2.4	3.6	5.8	15.5	4.4	6.3	6.1	4.1	2.9	1	24	4.8
4	.8	.6	-.1	.5	.7	2.4	4.1	2.4	1.5	1.8	2.9	3.4	2.7	2.7	3.1	3.1	2	-.4	1	4.1	2.9	2.9	3.4	2.7	24	2.1
5	5.1	5.1	4.9	4.9	2.9	2.4	21.2	3.6	2	2.3	4.1	4.1	AZ	3.6	3.4	3.9	4.4	2.2	.3	3.1	3.1	2	3.1	3.9	23	4.2
6	2.6	0	-.4	.5	2.9	3.4	-.1	-.8	2.2	4.8	4.1	2.2	0	-.3	2	3.1	2.9	2	5.3	8.2	8.7	7.3	6.3	7.8	24	3.1
7	4.6	5.1	5.8	.8	1.5	3.7	.8	1	2.2	2	1.3	2	2	3.9	4.1	-1.8	-1.1	3.1	2.4	7.5	11.4	18.2	11.2	10.2	24	4.2
8	5.8	5.3	5.6	3.4	3.6	3.6	1	-.8	2.4	4.6	4.1	4.4	2.7	.5	0	-.6	2.2	1.7	3.4	7.8	6.5	2.2	.3	2	24	3.0
9	1.7	.8	-.1	1.2	2.2	1.3	2	3.4	2	3.4	3.6	3.2	2.2	2	1.8	-.6	.8	4.9	3.2	1.3	2.7	5.1	5.1	5.8	24	2.5
10	5.1	4.6	4.9	3.2	3.6	2.3	2	3.7	3.1	2	2.7	3.6	3.2	0	-1.1	-1.3	.3	3.4	1.8	1.8	3.9	1.3	0	2.5	24	2.4
11	3.9	5.8	6.3	3.6	2.3	3.9	8.3	12.6	13.3	9.7	5.3	4.1	4.9	4.6	5.6	3.2	-.1	2.5	6.8	7.3	4.9	3.9	4.9	5.6	24	5.55
12	6.3	6.3	5.8	6.3	4.1	3.1	2.4	2.2	4.4	4.6	2.4	3.9	6.3	8.8	8.3	4.9	3.2	1.9	4.1	20.4	7.8	5.1	4.4	6	24	5.5
13	4.8	5.6	5.6	3.1	2	3.4	6.1	21.7	2.9	4.4	7.8	7.8	4.4	3.4	2.7	2.9	2.9	4.4	3.4	2.7	6.8	6	5.3	4.8	24	5.2
14	2	1.8	2	-.8	.3	2.2	1.8	2.9	7	9.7	10.5	7.5	AY	5.3	6.6	3.2	2	2.3	2	1.5	2.7	3.2	3.4	3.4	23	3.6
15	2	2.9	.8	1.3	1.5	.8	3.4	4.1	2.6	2	2.9	5.8	7	5.8	3.7	.5	3.6	5.6	5.6	5.3	4.4	6.3	5.6	5.1	24	3.7
16	6.1	3.2	3.9	8	6.1	2.7	3.6	5.6	5.6	4.8	4.9	3.4	2	3.2	1.9	3.9	5.8	5.6	6.8	5.2	2.9	2.4	5.3	6.1	24	4.5
17	3.9	5.1	6.8	6.1	2.9	.8	.5	-.8	0	.3	1.5	2.4	2.7	4.1	2.2	.5	.5	-.6	-.8	2.7	8.2	9.5	4.8	4.4	24	2.8
18	4.1	2	1	-.4	2.2	5.6	5.6	7.8	7.8	5.3	1.8	-.4	6.1	7.5	3.2	3.4	4.6	3.6	2	6.3	9.5	20	16.7	15.7	24	5.9
19	6.3	4.8	3.4	3.9	2	.3	-.4	1	1.7	1.7	3.6	3.6	3.9	3.4	1.9	1.7	3.9	3.2	-.8	5.1	9.2	6.3	7.3	5.6	24	3.4
20	4.1	5.1	2.6	.8	1.5	2.9	.8	2.6	5.3	2.6	.3	0	4.1	5.8	4.1	2.4	3.4	4.4	2.7	3.4	5.6	6.5	5.8	6.8	24	3.5
21	9	10	7.8	3.1	3.2	3.1	2.2	2.7	2.2	6.3	15	7.8	AM	AM	AM	10.9	11.2	8.7	9.7	6.3	4.9	4.6	3.6	4.6	21	6.5
22	4.6	4.6	5.3	4.1	3.1	4.8	4.8	6.5	7.5	7.3	8	6.3	8.2	10.7	12.2	8.3	2.7	3.1	8.5	13.6	13.3	17	9.2	10.2	24	7.7
23	7.5	2.9	2.2	1.8	1	3.1	8.5	11.4	10.4	8.3	8	8	7.5	7.5	8.5	6.6	3.2	3.2	3.6	4.1	5.8	16.3	12.9	15.5	24	7.0
24	10.2	10	7.5	4.1	6.3	8	6.8	8	8.7	9.5	11.7	12.4	18	9	8.8	8.3	8.8	8.5	6.8	7.3	15.7	10.9	10.4	9.4	24	9.4
25	8.3	6.3	4.4	4.8	7.5	11.7	13.6	25.5	23.9	16.2	14.3	17	11.2	18.7	14	13.4	16.3	5.1	7	7.5	7	3.6	1.7	5.1	24	11.0
26	6.8	4.6	4.4	5.3	5.3	5.1	6.3	9.9	8.3	5.6	20.2	2.9	4.4	6.5	6.3	2.4	1	1	3.1	7	8.7	8	5.6	4.4	24	6.0
27	4.1	3.4	2.9	4.9	6.3	5.6	3.4	3.4	1.7	2.6	2.9	1	.8	-2.5	-.9	2.4	3.4	.8	2.7	5.1	1.7	2	2.7	3.4	24	2.7
28	4.1	1.5	2	1.5	.8	1.8	1.5	1.2	2.4	2.7	-.1	1.3	1.8	2.2	2.9	2.2	2	1.7	1.9	1.8	2.9	4.9	3.9	3.2	24	2.2
29	2.9	1.5	.5	2	2.7	2.7	2.9	2	2	1.8	2	1.5	2.5	2.2	-.4	1.7	3.2	2.2	3.6	8	10	9.2	9.5	7.5	24	3.5
30	4.6	2.9	4.1	3.6	1.2	3.4	5.3	5.3	5.3	5.8	4.1	2	1.7	3.9	2.9	.5	-.4	.5	2.4	1.2	5.6	6.3	2.7	4.4	24	3.3
31	4.4	3.4	2.5	2.4	2.7	2.7	2.2	1	1.2	1.7	1.8	1.3	2.4	5.3	3.2	-1.1	.1	3.9	8.3	9.2	10	9.2	5.8	6	24	3.7
NO.:	31	31	31	31	31	31	31	31	31	31	31	31	28	30	30	31	31	31	31	31	31	31	31	31		
MAX:	12.	10.	10.	9.	8.	12.	21.	26.	24.	16.	20.	17.	18.	19.	14.	13.	16.	16.	10.	20.	16.	20.	17.	16.		
AVG:	5.1	4.2	3.7	3.2	3.0	3.5	4.1	5.0	4.9	4.7	5.2	4.2	4.4	4.7	4.1	3.4	3.6	3.8	4.1	6.1	6.9	7.2	5.9	6.2		

MONTHLY OBSERVATIONS: 739 MONTHLY MEAN: 4.6 MONTHLY MAX: 26.

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

QUALIFIER CODES:

Qualifier Code	Qualifier Description	Qualifier Type
AM	Miscellaneous Void	NULL
AN	Machine Malfunction	NULL
AQ	Collection Error	NULL
AT	Calibration	NULL
AV	Power Failure	NULL
AY	Q C Control Points (zero/span)	NULL
AZ	Q C Audit	NULL
BA	Maintenance/Routine Repairs	NULL
rt	Wildfire-U. S.	REQEXC

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional concurrence are shown in lower case.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT - 8 2009

THE ADMINISTRATOR

The Honorable Brian Schweitzer
Governor, State of Montana
State Capitol
Helena, Montana 59620

Dear Governor Schweitzer:

Based on the most recent air quality data, the U.S. Environmental Protection Agency has determined that all areas in Montana meet the National Ambient Air Quality Standards for fine particles ($PM_{2.5}$), measured over a 24-hour period. Consistent with the requirements of the Clean Air Act, EPA is designating all of Montana unclassifiable/attainment. I commend the residents of Montana and their environmental leaders for meeting these air-quality standards.

My predecessor, Administrator Stephen Johnson, sent a letter last December, identifying areas that EPA had designated as meeting or not meeting the 24-hour $PM_{2.5}$ standards based on data available at that time. However, the Agency did not complete the process of designating areas as attainment or nonattainment. Once the new EPA leadership team was in place, we reviewed the status of areas for the 24-hour $PM_{2.5}$ standards to ensure that the final designation decisions reflect current policy and the most up-to-date air-quality monitoring data. The final rule I signed today reflects the results of that review.

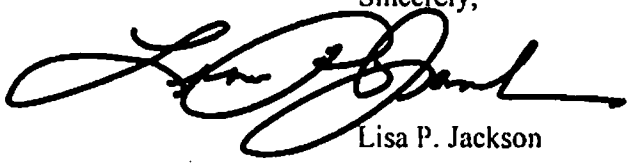
Meeting these air-quality standards is very important to protect public health and the environment. Fine-particle pollution is a complex mixture of extremely small particles and liquid droplets. When inhaled, they can reach the deepest regions of the lungs and cause serious health problems, including aggravated asthma, chronic bronchitis, reduced lung function, irregular heartbeat, heart attack and premature death in people with heart or lung disease. Fine-particle pollution is also the main cause of visibility impairment in our cities and our treasured national parks.

EPA has taken significant actions that will reduce fine-particle pollution locally, regionally and nationally. The Clean Diesel Program, for example, will dramatically reduce particle-forming emissions from highway, non-road and stationary diesel engines. The American Recovery and Reinvestment Act of 2009 provided $300 million in new funding for programs to support the implementation of verified and certified diesel-emission reduction technologies. Federal programs to reduce particle-forming emissions of nitrogen oxides and sulfur dioxide from stationary sources have also dramatically reduced the interstate transport of pollution that contributes to local violations of the standards. However, protecting public health

by keeping fine-particle pollution levels below EPA's health protective standards will require continued work by EPA as well as our valued partners at the state, tribal and local environmental agencies.

Thank you for your continued efforts to improve air quality. Together, we have made considerable progress in reducing air pollution and its impacts on public health and the environment. For additional technical information, please visit *http://www.epa.gov/pmdesignations.*

Sincerely,



Lisa P. Jackson

cc: Mr. Richard Opper
Environmental Commissioner, Montana

Mr. David McIntosh
Associate Administrator, Office of Congressional and Intergovernmental Relations

Ms. Carol Rushin
Acting Regional Administrator, Region 8

July 22, 2014

Daniel M. Norderud, AICP

Environmental Studies Division Manager

Robert Peccia & Associates, Inc.

P.O. Box 5653

Helena, MT 59604

Subject: 2014 Draft Environmental Assessment (EA) of Ravalli County Airport (RCA) near Hamilton, MT

Please consider the following comments in regards to the development proposal to expand the acreage and lengthen the runway of the RCA as described in the Proposed Action.

The Summary of Impacts in the 2014 Draft EA claims the Proposed Action will have no significant impact on any species designated as "Threatened" or "Endangered" under the federal Endangered Species Act. Simply put, such a claim is absurd, as the existing scientific data and level of analysis contained in the EA, particularly regarding the federally listed "Threatened" Bull Trout (Salvelinus malma) is grossly inadequate to make such a claim. My professional opinion as an aquatic biologist and water resource specialist for over 30 years is that the present version of the 2014 Draft EA should be considered incomplete, inaccurate and insufficient in its entirety, as it has not meaningfully described the population structure and composition of Bull Trout living in Gird Creek, nor has it assessed the relationship of the Gird Creek population to the main-stem Bitterroot River population, nor has it assessed any probable impacts on these populations due to any aspect of the Proposed Action. Such probable impacts include degradation of water quality due to increased loading of harmful chemical constituents, increased loading of the nutrients nitrogen and phosphorous, increased sedimentation, and increased water temperatures.

Bull Trout have been documented as present in Gird Creek upstream of the RCA in 1978, based on a one-day sampling effort. The stream channel sampled in 2005 by Montana Department of Fish, Wildlife and Parks was 75 – 100 feet north of the runway, and was conducted on March 10, 2005. These two fish records, from the only two sampling efforts conducted over the past 36 years, constitute the entire database on record for the Gird Creek Bull Trout population. Both the number of samplings and the length of stream sampled have been miniscule. The 2005 effort occurred in March, a time of year when Bull Trout, especially any fluvial trout, are least likely to be present in tributaries of the mainstem, as Bull Trout spawn in the late summer and early fall. No population estimates were ever obtained, no redd count surveys were done, no juvenile fish out-migration sampling ever conducted, and no genetic

analysis exists to even begin to characterize the Bull Trout population, let alone assess significance of probable impacts from the environmental factors associated with the Proposed Action.

In October, 2010, the main-stem Bitterroot River and a number of tributaries were designated as "Critical Bull Trout Habitat" by the U.S. Fish and Wildlife Service (USFWS). Increased environmental impacts from the Proposed Action is likely to compromise that critical habitat's biological capacity to optimally function for further recovery of Bull Trout, and will impede the progress of delisting Bull Trout as "Threatened" under the Endangered Species Act (ESA). The Ravalli County Board of County Commissioners supported the USFWS critical habitat designation in April, 2010 (see Document ID: FWS-R1-ES-2009-0085-0298: Endangered and Threatened Wildlife and Plants: Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States, Comment Tracking Number: 80ad0a3c – Letter of Support for Bull Trout Habitat). Approval of the Proposed Action as proposed is contradictory to the recovery and delisting of Bull Trout, and no mitigation is being provided for the impacts of pollution on the "Critical Bull Trout Habitat".

Therefore, I am requesting the Federal Aviation Administration (FAA) engage in a formal ESA Section 7 consultation with the U.S. Fish and Wildlife Service regarding this proposed action as deleterious to "Critical Bull Trout Habitat". The past, present, and expected future expenditure of federal funds associated with the Proposed Action requires a Section 7 consultation, and this formal consultation should be documented prior to any determination by the FAA that the Draft EA be deemed complete, sufficient, or accurate.

The central question to consider is: What are the ramifications of permitting degradation of primary constituent elements of designated critical habitat as defined under the ESA? If components of water quality are not considered to be primary constituents to critical aquatic habitats, what would be? I understand this may be a relatively recent consideration for the FAA and the USFWS, but it cannot be avoided. The FAA should realize that the probable impacts for Proposed Actions at the scale being proposed is allowing cumulative degradation of critical habitat that will very likely lead to a change of status for Bull Trout under the ESA from "Threatened" to "Endangered", a result that hopefully no one desires.

James E. Rokosch,

Aquatic Biologist/Water Resource Specialist/Natural Resource Management Consultant

463 Ridge Road

Stevensville, MT 59870

406-777-2511; jrokosch@cybernet1.com

Statement of Carlotta Grandstaff

In November 2010 the Ravalli County Commission, after approximately 14 months of public hearings and fact-finding efforts, developed and voted to accept alternative 2A in the Hamilton Airport Environmental Analysis.

The public process the board followed was thorough, thoughtful, arduous and lengthy. Our numerous public hearings often lasted for as much as four hours. I, personally, contacted numerous interested individuals I knew to hold opposing opinions on the airport issue in order to bring them into the discussion and ensure that everyone was heard. The existing commission held only three public meetings on this issue and one of them resulted in the rescission of the right of the public to vote on this issue.

After well over a year of public hearings and private one-on-one meetings with individuals holding different opinions, the board, with its contracted consultant, developed alternative 2A for the following reasons:

- The number of flight operations of B-II aircraft as reported by the consultant in the Environmental Analysis were not backed up by data.
- Hangar use was stable, if not declining, and there appeared to be no need for additional hangar space beyond the additional 55 hangars 2A provided By contrast, the new proposal provides for only 12 more hangars.
- Alternative 2A would have closed the runway - not the airport - for approximately 30 days in March or April, when airport use was at a minimum.
- Fuel fees were stable or declining. This indicated to me that there was no justification for a large, expensive airport project.
- Commissioner Jim Rokosch and I spoke to a USDA Forest Service air tanker pilot who told us that a longer runway was unnecessary from a safety standpoint because the pilots do not fill their air tankers to capacity because doing so results in "blow back" of the retardant onto the windshield of the aircraft.
- The *sole issue* of concern to the FAA was the distance between runway and taxiway. Alternative 2A remedied this concern.

As a former newspaper reporter who reported on this issue for about 10 years prior to making a decision on it as a county commissioner, I was well aware of the issue and very motivated to settle it during my tenure. In fact, I pledged publicly to do so. It had caused too much unnecessary strife and contention in the community. I made the decision that I did because I strongly believed that alternative 2A, painstakingly developed with the input of numerous citizens, was the option that would be *generally acceptable to most people* and would not be litigated. I still believe that, and would make the same decision today.

Carlotta Grandstaff
844 Sleeping Child Rd.
Hamilton, MT 59840

Federal Register

Wednesday,
April 28, 2010

Part II

Environmental Protection Agency

40 CFR Part 87

Advance Notice of Proposed Rulemaking on Lead Emissions From Piston-Engine Aircraft Using Leaded Aviation Gasoline; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 87

[EPA–HQ–OAR–2007–0294; FRL–9141–7]

RIN 2060–AP79

Advance Notice of Proposed Rulemaking on Lead Emissions From Piston-Engine Aircraft Using Leaded Aviation Gasoline

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rulemaking.

SUMMARY: EPA is issuing this Advance Notice of Proposed Rulemaking (ANPR) to describe information currently available and information being collected that will be used by the Administrator to issue a subsequent proposal regarding whether, in the Administrator's judgment, aircraft lead emissions from aircraft using leaded aviation gasoline (avgas) cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. In this ANPR we describe and request comment on the data available for evaluating lead emissions, ambient concentrations and potential exposure to lead from the continued use of leaded avgas in piston-engine powered aircraft. We also describe and request comment on additional information being collected that will inform any future action.

This ANPR is being issued to further respond to a petition submitted by Friends of the Earth (FOE) in 2006. Emissions of lead from piston-engine aircraft using leaded avgas comprise approximately half of the national inventory of lead emitted to air. There are almost 20,000 airport facilities in the U.S. at which leaded avgas may be used. EPA has long-standing concerns regarding exposure to lead, particularly during childhood. The most recent review and revision of the National Ambient Air Quality Standard (NAAQS) for lead, promulgated in 2008, found that serious health effects occur at much lower levels of lead in blood than previously identified and did not identify a safe level of lead exposure.

DATES: Comments must be received on or before June 28, 2010.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2007–0294, by one of the following methods:

- *http://www.regulations.gov:* Follow the on-line instructions for submitting comments.
- *E-mail: a-and-r-docket@epa.gov.*
- *Fax:* (202) 566–9744.
- *Mail:* Environmental Protection Agency, Mail Code: 6102T, 1200 Pennsylvania Ave., NW., Washington, DC 20460. Please include two copies.
- *Hand Delivery:* EPA Docket Center (Air Docket), U.S. Environmental Protection Agency, EPA West Building, 1301 Constitution Avenue, NW., Room: 3334 Mail Code: 2822T, Washington, DC. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2007–0294. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov* or e-mail. The *http://www.regulations.gov* Web site is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through *http://www.regulations.gov* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

Docket: All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, *e.g.,* CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the EPA Docket Center, EPA/DC, EPA West, Room 3334, 1301 Constitution Avenue, NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Marion Hoyer, Assessment and Standards Division, Office of Transportation and Air Quality, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: (734) 214–4513; fax number: (734) 214–4821; e-mail address: *hoyer.marion@epa.gov.*

SUPPLEMENTARY INFORMATION:

I. General Information

A. What should I consider as I prepare my comments for EPA?

1. *Submitting CBI.* Do not submit this information to EPA through *http://www.regulations.gov* or e-mail. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD ROM that you mail to EPA, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR Part 2.

2. *Tips for Preparing Your Comments.* When submitting comments, remember to:

- Identify the rulemaking by docket number and other identifying information (subject heading, Federal Register date and page number).
- Follow directions—The agency may ask you to respond to specific questions or organize comments by referencing a Code of Federal Regulations (CFR) part or section number.
- Explain why you agree or disagree, suggest alternatives, and substitute language for your requested changes.
- Describe any assumptions and provide any technical information and/or data that you used.
- If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for it to be reproduced.

- Provide specific examples to illustrate your concerns, and suggest alternatives.
- Explain your views as clearly as possible, avoiding the use of profanity or personal threats.
- Make sure to submit your comments by the comment period deadline identified.

Table of Contents

I. Overview

EPA is publishing this ANPR in further response to a petition submitted by Friends of the Earth (FOE) entitled "Petition for Rulemaking Seeking the Regulation of Lead Emissions From General Aviation Aircraft Under § 231 of the Clean Air Act."[1] In the petition, FOE requests that the Administrator of EPA: (1) Make a finding that lead emissions from general aviation aircraft endanger public health and welfare and issue a proposed emission standard for lead from general aviation aircraft under the Clean Air Act (CAA) or, alternatively, (2) if the Administrator of EPA believes that insufficient information exists to make such a finding, commence a study and investigation of the health and environmental impacts of lead emissions from general aviation aircraft, including impacts to humans, animals and ecosystems under the CAA and issue a public report on the findings of the study and investigation. Section I.C of this notice discusses the background on the petition and EPA's response to date and Section I.D discusses EPA's statutory authority under section 231(a) of the CAA. Under the CAA, if, in the Administrator's judgment, lead emissions from the use of leaded avgas cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, then EPA would be required under our statutory authority to prescribe standards to control the emissions of lead from piston-engine aircraft. In promulgating such standards, the EPA would be required to consult with the Federal Aviation Administration (FAA), and could not change standards if doing so would significantly increase noise and adversely affect safety. FAA would then be required, after consultation with EPA, to prescribe regulations to insure compliance with any standards to control the emissions of lead from piston-engine aircraft. Under 49 U.S.C. 44714, FAA would also be required to prescribe standards for the composition or chemical or physical properties of piston-engine fuel or fuel additives to control or eliminate aircraft lead emissions.

In this notice, we discuss our analysis of the relevant information and issues to date, and we seek further public input regarding FOE's petition. For the purposes of this notice, we will refer to the positive or negative exercise of judgment as to whether lead emissions from aircraft engines resulting from the use of aviation gasoline (avgas) cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare as the "endangerment finding" and the "cause or contribute finding." This short-hand use of "endangerment finding" and "cause or contribute finding" is strictly for purposes of simplifying the discussion, and should not be read as implying that EPA considers the exercise of the Administrator's judgment to require a formal "finding" or "determination."

In 2006, EPA completed the Air Quality Criteria Document (AQCD) for Lead, which critically assesses and integrates relevant scientific information regarding the health effects of lead.[2] EPA concluded that the latest evidence indicates adverse health effects, most notably among children, are occurring at much lower levels than previously considered. In 2008, EPA decreased the level of the primary National Ambient Air Quality Standard (NAAQS) for lead from 1.5 micrograms per cubic meter ($\mu g/m^3$) to 0.15 $\mu g/m^3$ in order to provide increased protection for children and other at-risk populations against an array of adverse health effects, most notably neurological effects in children, including neurocognitive and neurobehavioral effects.[3] Neurotoxic effects in children and cardiovascular effects in adults are among those best substantiated as occurring at blood lead concentrations as low as 5 to 10 $\mu g/dL$ (or possibly lower); and these categories are currently clearly of greatest public health concern (AQCD for Lead, p. 8–60). The U.S. Centers for Disease Control and Prevention (CDC) concluded in 2005 that no "safe" threshold for blood lead has been identified, and emphasized the

[1] *See* docket item EPA–HQ–OAR–2007–0294–0003.

[2] U.S. Environmental Protection Agency (2006) Air Quality Criteria for Lead. Washington, DC, EPA/600/R–5/144aF. Available online at: *http://www.epa.gov/ncea/*.

[3] National Ambient Air Quality Standards for Lead 73 FR 66965 (Nov. 12, 2008).

importance of preventative measures.[4] [5] To provide increased protection against lead-related welfare effects, in 2008 EPA revised the secondary standard to be identical in all respects to the revised primary standard. Section II of this ANPR provides more detail regarding health and welfare effects of lead.

Given the recent findings of the science summarized by EPA in the AQCD for Lead as well as the findings of the CDC, the Agency is concerned about the potential for health and welfare effects from exposure to lead emissions from aircraft engines using leaded avgas. On a national basis, emissions of lead from aircraft engines using leaded avgas are the largest single source category for emissions of lead to air, comprising approximately half of the national inventory.[6] There are almost 20,000 airport facilities in the U.S. at which leaded avgas may be used, and in some areas of the country there are densely populated residential developments immediately adjacent to these airport facilities. As described in Section V, we estimate that up to 16 million people reside and three million children attend school in close proximity to airport facilities servicing piston-engine aircraft that are operating on leaded avgas.

Exposure to lead occurs through multiple routes (*e.g.*, inhalation, ingestion and dermal adsorption), and lead emitted to the atmosphere can contribute to lead levels in multiple media (*e.g.*, air, soil and water). The lead monitoring studies conducted at or near airports, described in Section IV of this ANPR, indicate that lead levels in ambient air on and near airports servicing piston-engine aircraft are higher than lead levels in areas not directly influenced by a lead source. In addition, the emissions of lead from these engines are also expected to distribute widely through the environment. This is in part due to the emission of lead at various altitudes during aircraft operations as well as the fine particle size of lead emitted by piston engines. Continued use of leaded avgas provides an ongoing source of new lead that is deposited in various environmental media and participates in long term cycling mechanisms in the environment, thus adding to the pool of lead available for uptake by humans and biota. We expect the lead from avgas to be bioavailable in the same way as the lead emitted by motor vehicles in the past, which was well documented to contribute to blood levels through both ingestion and inhalation.

As noted in Section II of this ANPR, once deposited to surfaces, lead can subsequently be resuspended into the ambient air and, because of the persistence of lead, emissions of this metal contribute to environmental media concentrations for many years into the future. Lead that is a soil or dust contaminant today may have been airborne yesterday or many years ago. Therefore lead emissions from piston-engine aircraft could contribute to increased lead exposure and risk currently or at some time in the future.

Section VI of this ANPR provides an overview of additional information that will be available for the NPRM to evaluate the potential for public health and welfare impacts from lead emitted by piston-engine aircraft. These additional data will come from lead monitoring being planned to satisfy requirements of the Lead NAAQS, air quality modeling planned at EPA and any information submitted to EPA during the comment period for this ANPR.

The remainder of this section provides background on leaded avgas, FOE's petition and EPA's response to the petition to date, and statutory authority over emissions, fuel for aircraft and Federal actions to reduce lead exposure. Section II provides a discussion of the health and welfare effects of lead. Sections III, IV and V describe the emissions of lead from avgas, ambient lead concentration in the vicinity of airports and potential exposure to lead from leaded avgas, respectively. In Section VI, we describe the additional information EPA is collecting and considerations regarding engine emission standards. Section VII contains information on statutory and executive order reviews covering this action.

A. Background on Leaded Aviation Gasoline

In 1996, EPA promulgated regulations that banned the use of leaded gasoline in highway vehicles.[7] The addition of lead to fuel used in piston-engine powered aircraft was not banned in this action, and the use of leaded avgas is the largest remaining source category of lead emissions. Lead is not added to jet fuel that is used in commercial aircraft, most military aircraft, or other turbine-engine powered aircraft. Most piston-engine aircraft fall into the categories of either general aviation (GA) or air taxi (AT). GA and AT aircraft include a diverse set of aircraft types and engine models and are used in a wide variety of applications.[8]

Lead is added to fuel for piston-engine aircraft in the form of tetraethyl lead (TEL). This lead additive helps boost fuel octane, prevents knock, and prevents valve seat recession and subsequent loss of compression for engines without hardened valves. There are two main types of leaded avgas: 100 Octane, which can contain up to 4.24 grams of lead per gallon; and 100 Octane Low Lead (100 LL), which can contain up to 2.12 grams of lead per gallon. Currently, 100LL is the most commonly available and most commonly used type of avgas.[9] [10] TEL was first used in piston-engine aircraft in 1927.[11] Into the 1950s commercial and military aircraft in the U.S. operated on 100 Octane leaded avgas, but in subsequent years, the commercial and military aircraft fleet largely converted to jet turbine-engine propelled aircraft. However, the use of avgas containing 4 grams of lead per gallon continued in piston-engine aircraft until the early 1970s when 100LL became the dominant leaded fuel in use. Currently, very little 100 Octane is supplied in the U.S. and we use the lead content of 100LL (2.12 grams per gallon) to characterize the lead available from avgas.

Since lead is a persistent pollutant, it is important to characterize the historical use of this fuel.

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[4] Centers for Disease Control and Prevention (2005) Preventing lead poisoning in young children: a statement by the Centers for Disease Control and Prevention. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. August.

[5] Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP) (2007) Interpreting and managing blood lead levels <10 ug/dL in children and reducing childhood exposures to lead: Recommendations of CDC's Advisory Committee on Childhood Lead Poisoning Prevention. Morbidity and Mortality Weekly Report. 56(RR-8). November 2, 2007.

[6] U.S. Environmental Protection Agency Electronic Report on the Environment. Available at: *http://cfpub.epa.gov/eroe.* Updated in December 2009 using the 2005 National Emissions Inventory.

[7] *See* "Prohibition on Gasoline Containing Lead or Lead Additives for Highway Use" 61 FR 3832 (Feb. 2, 1996).

[8] Commercial aircraft include those used for scheduled service transporting passengers, freight, or both. Air taxis fly scheduled and for-hire service carrying passengers, freight or both, but they usually are smaller aircraft than those operated by commercial air carriers. General aviation includes most other aircraft (fixed and rotary wing) used for recreational flying, business, and personal transportation.

[9] ChevronTexaco (2006) Aviation Fuels Technical Review. FTR-3. Available online at: *http://www.chevronglobalaviation.com/docs/aviation_tech_review.pdf.*

[10] ASTM International (2007) Standard Specification for Aviation Gasolines D910-06.

[11] Ogston, A.R. (1981) A Short History of Aviation Gasoline Development, 1903-1980. Society of Automotive Engineers. Paper number 810848.

Approximately 14.6 billion gallons of leaded avgas have been consumed in the U.S. between 1970 and 2007. If this fuel was all 100LL, it would account for approximately 34,000 tons [12] of lead emitted to the air.[13] In terms of the potential impacts from long-term use of leaded avgas at and near airports, older facilities would be expected to have a legacy of lead, particularly those that supported military and commercial aircraft operating on 100 Octane. Over 3,000 of the 20,000 airport facilities in the U.S. are at least 50 years old and some airports have been in operation since the early 1900s.

The Department of Energy's (DOE's) Energy Information Administration (EIA) provides information on the volume of leaded avgas supplied in the U.S.[14] The Department of Transportation's (DOT's) FAA provides information on the volume of leaded avgas consumed in the U.S.[15] EPA has historically used the DOE EIA avgas fuel volumes supplied to calculate national lead inventories from the consumption of leaded avgas. We are currently evaluating methods used by DOE and DOT to calculate annual avgas supply and consumption volumes. In this document, we provide avgas fuel volume data supplied by DOE and DOT and we note the source of the data for clarity. Over the past ten years, DOE estimates of the volume of leaded avgas supplied has ranged from 326 million gallons in 1999 to 235 million gallons in 2008 (Figure 1). Applying the concentration of lead in 100LL (2.12 grams of lead per gallon), the total quantity of lead supplied in avgas in the nation has ranged from 762 tons in 1999 to 550 tons in 2008 (a 28% decrease over that time period). The decrease in fuel consumption is attributed to the decrease in piston-engine aircraft activity over that time period and not due to a shift to unleaded fuel. There are currently over 200,000 piston-engine aircraft in the U.S. that continue to consume leaded avgas and approximately 2,000 new piston-engine aircraft requiring leaded avgas are manufactured annually.[16] As described in Section III.B of this ANPR, there is a slight growth in the activity of general aviation aircraft projected to 2025.

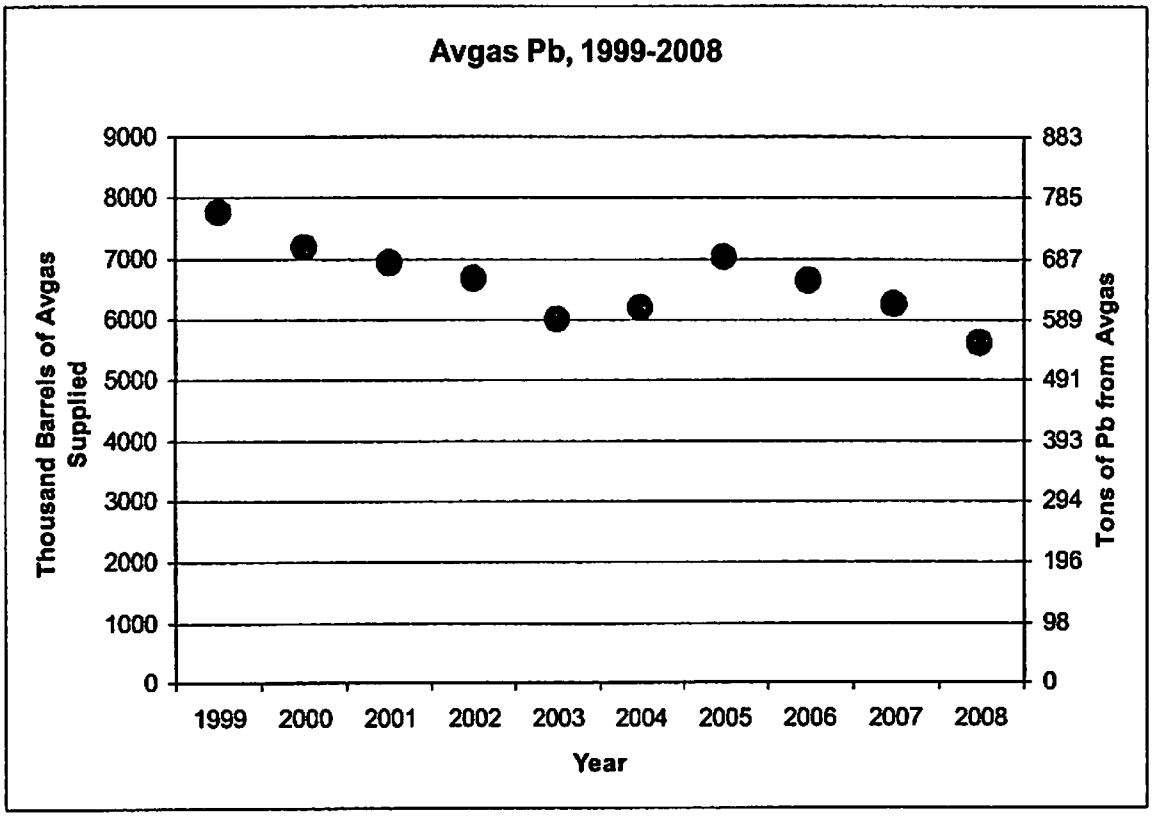

Figure 1. Tons of Lead Supplied in Aviation Gasoline Annually from 1999 – 2008.

Source: DOE Energy Information Administration

[12] In this ANPR and in EPA's National Emissions Inventory, the use of the unit tons refers to short tons.

[13] Oak Ridge National Laboratory (2009) Transportation Energy Data Book: Edition 28. Available at: *http://cta.ornl.gov/data*. Table A.7.

[14] Department of Energy Information Administration. Fuel production volume data obtained from *http://tonto.eia.doe.gov/dnav/pet/hist/mgaupus1A.htm* accessed June 2009.

[15] U.S. Department of Transportation Federal Aviation Administration Aviation Policy and Plans. FAA Aerospace Forecast Fiscal Years 2009–2025. p.81. Available at: *http://www.faa.gov/data_research/aviation/aerospace_forecasts/2009-2025/media/2009%20Forecast%20Doc.pdf*. This document provides historical data for 2000–2008 as well as forecast data.

[16] General Aviation Manufacturers Association (2008) General Aviation Statistical Databook & Industry Outlook. Available online at: *http://www.gama.aero/files/2008_general_aviation_statistical_databook__indust_499b0dc37b.pdf*.

B. Background Information Regarding General Aviation and Use of Piston-Engine Aircraft

In the U.S., general aviation aircraft fly over 27 million hours and carry 166 million passengers annually.[17] Approximately 66 percent of hours flown by general aviation are conducted by piston-engine aircraft.[18] Aircraft in the general aviation fleet are used for personal transportation (36 percent), instructional flying (19 percent), corporate uses (11 percent), business (11 percent), air taxi and air tours (8 percent) and the remainder include hours spent in other applications such as aerial observation and aerial application.[19] According to the 2008 General Aviation Statistical Databook & Industry Outlook report by the General Aviation Manufacturers Association (GAMA) there were 578,541 pilots in the United States in 2008.[20] According to GAMA, in 2008, the number of active single-engine piston-powered aircraft was 144,220 and the number of active twin-engine piston-powered aircraft was 18,385. In 2008, 1,791 new piston-engine aircraft were manufactured in the U.S.

FAA's Office of Air Traffic provides a complete listing of operational airport facilities in the National Airspace System Resources (NASR) database.[21] In 2008, there were 19,896 airport facilities in the U.S., the vast majority of which are expected to have activity by piston-engine aircraft that operate on leaded avgas. FAA's National Plan of Integrated Airport Systems identifies approximately 3,400 airports that are significant to national air transportation.

[17] General Aviation Manufacturers Association (2008) General Aviation Statistical Databook and Industry Outlook, p.30. Retrieved on August 17, 2009 from: *http://www.gama.aero/files/2008_general_aviation_statistical_databook__indust_499b0dc37b.pdf.*

[18] General Aviation Manufacturers Association (2008) General Aviation Statistical Databook and Industry Outlook, p.30. Retrieved on August 17, 2009 from: *http://www.gama.aero/files/2008_general_aviation_statistical_databook__indust_499b0dc37b.pdf.*

[19] General Accounting Office Report to Congressional Requesters (2001) General Aviation Status of the Industry, Related Infrastructure, and Safety Issues. GAO–01–916.

[20] General Aviation Manufacturers Association (2008) General Aviation Statistical Databook and Industry Outlook, pp.51–55. Retrieved on August 17, 2009 from: *http://www.gama.aero/files/2008_general_aviation_statistical_databook__indust_499b0dc37b.pdf.*

[21] An electronic report can be generated from the NASR database and is available for download from the Internet at the following Web site. *http://www.faa.gov/airports_airtraffic/airports/airport_safety/airportdata_5010/.* This database is updated every 56 days.

C. Background on the Petition and EPA's Response

In a 2003 letter to the EPA, FOE initially raised the issue of the potential for endangerment caused or contributed to by lead emissions from the use of leaded avgas.[22] In 2006, FOE filed a petition with EPA requesting that the Administrator find endangerment or, if there was insufficient information to find endangerment, commence a study of lead emissions from piston-engine aircraft. In 2007, the EPA issued a **Federal Register** notice on the petition requesting comments and information related to a wide range of issues regarding the use of leaded avgas and potential public health and welfare exposure issues.[23] We sought comments regarding exposure to lead from avgas combustion, emissions of lead, fuel options, and piston-engine technology. The comments received to date are publicly available in the docket (EPA–HQ–OAR–2007–0294). The majority of comments received concerned the nature of the industry and fuel supply issues. The commenters did not supply information regarding health or exposure issues. In 2008, the EPA initiated a lead study which will improve the manner in which EPA models emissions from piston-engine aircraft. This study is described in further detail in Section VI of this document. At the time we received FOE's petition, the EPA was in the process of a full re-evaluation of the science supporting the lead NAAQS. Information from that re-evaluation and the relationship between the new lead standard and the emissions of lead from piston-engine aircraft are discussed in this ANPR.

D. Statutory Authority

1. Background

Section 231 of the CAA sets forth EPA's authority to regulate aircraft emissions of air pollution. As described further in Section I.D.2 of this ANPR, Section 231(a)(2)(A) requires EPA to, from time to time, issue proposed emission standards applicable to the emission of any air pollutant from any class or classes of aircraft engines which, in the Administrator's judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. EPA has broad authority in exercising its judgment regarding whether emissions from certain sources cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.[24] EPA has discussed its "endangerment finding" authority at length in recent notices for greenhouse gases published in the **Federal Register**, and we refer readers to those notices for detailed discussions of the analytical and legal framework.[25]

In 1976, EPA listed lead under CAA section 108, making it what is called a "criteria pollutant." As part of the listing decision, EPA determined that lead was an air pollutant which, in the Administrator's judgment, has an adverse effect on public health or welfare under then section 108(a). Once lead was listed, EPA issued primary and secondary NAAQS that the Administrator determined were requisite to protect public health with an adequate margin of safety and to protect public welfare from any known or anticipated adverse effects. Section 109(b)(1) and (2). As discussed elsewhere in this notice, EPA issued the first NAAQS for lead in 1978, and recently revised the lead NAAQS by reducing the level of the standard from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$, measured over a 3-month averaging period. These actions are part of the context for the issues before EPA under section 231(a).

The first part of the endangerment test concerns identification of air pollution which may reasonably be anticipated to endanger public health or welfare. The CAA defines both "air pollutant" and "welfare." Air pollutant is defined in CAA section 302(g) as: "Any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term 'air pollutant' is used." Lead fits within

[22] FOE letter dated December 12, 2003 submitted to EPA Docket EPA–HQ–OAR–2002–0030.

[23] *See* "Petition Requesting Rulemaking To Limit Lead Emissions from General Aviation Aircraft; Request for Comments" 72 FR 64570 (Nov. 16, 2007).

[24] *See, e.g., Ethyl Corp.* v. *EPA*, 541 F.2d 1, 6 (DC Cir.), cert. denied 426 U.S. 941 (1976); *see also Massachusetts* v. *EPA*, 549 U.S. 497, 506, n.7 (2007).

[25] *See*, "Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act; Final Rule," 74 FR 66496, 66505 (Dec. 15, 2009); *see also*, "Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act," 74 FR 18886, 18890–94 (April 24, 2009); *see also* "Regulating Greenhouse Gas Emissions Under the Clean Air Act; Advance Notice of Proposed Rulemaking," 73 FR 44354, 44421–23 (July 30, 2008).

this capacious definition, and has long been regulated as an air pollutant by EPA under the CAA (*see* Section I.E. of this ANPR).

There is no definition of public health in the CAA. The U.S. Supreme Court has discussed the concept in the context of whether costs can be considered when setting NAAQS. *Whitman* v. *American Trucking Ass'n*, 531 U.S. 457 (2001). In *Whitman*, the Court imbued the term with its most natural meaning: "the health of the public." *Id.*, at 466. When considering public health, EPA has looked at morbidity, including acute and chronic health effects, as well as mortality. EPA has long regulated emissions of lead air pollution due to their adverse impacts on public health (*see* section I.E. of this ANPR). Exposure to lead causes "a broad array of deleterious effects on multiple organ systems," among children and adults (AQCD for Lead, p.8–24 and Section 8.4.1). Of particular concern are the neurotoxic effects of lead in young children.[26] *See* Section II of this ANPR for a more complete overview of the public health effects of lead.

Regarding "welfare," CAA section 302(h) states that "[a]ll language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants." This definition is quite broad, and may include effects other than those listed here as effects on welfare. Welfare effects caused by lead have been evaluated by EPA and were the basis for establishing the secondary lead standard.[27]

By instructing the Administrator to consider whether emissions of an air pollutant cause or contribute to air pollution, the statute is clear that she need not find that emissions from any one sector or group of sources are the sole or even the major part of an air pollution problem. Moreover, section 231(a) does not contain a modifier on its use of the term contribute. Unlike some other CAA provisions, it does not require "significant" contribution.[28] Congress made it clear that the Administrator is to exercise her judgment in determining contribution, and authorized regulatory controls to address air pollution even if the air pollution problem results from a wide variety of sources. The cause or contribute test is designed to authorize EPA to identify and then address what may well be many different sectors or groups of sources that are each part of an air pollution problem.

Section 231(a)(2) refers to contribution and does not specify that the contribution must be significant before an affirmative finding can be made. Any finding of a "contribution" requires some threshold to be met; a truly trivial or *de minimis* "contribution" might not count as such. In the past, the Administrator has evaluated the emissions of the source or sources in different ways, based on the particular circumstances involved. In some mobile source rulemakings, the Administrator has used the percent of emissions from the regulated mobile source category compared to the total mobile source inventory for that air pollutant as the best way to evaluate contribution.[29] In other instances the Administrator has looked at the percent of emissions compared to the total nonattainment area inventory of the air pollution at issue.[30] EPA has found that air pollutant emissions that amount to 1.2 percent of the total inventory met the statutory test for contribution, triggering EPA's regulatory authority.[31]

2. Regulatory Authority for Emission Standards

Section 231 of the CAA sets forth EPA's authority to regulate aircraft emissions of air pollution. Section 231(a)(2)(A) requires EPA to, from time to time, issue proposed emission standards applicable to the emission of any air pollutant from any class or classes of aircraft engines which, in the Administrator's judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. Section 231(a)(2)(B)(i) directs EPA to consult with FAA on aircraft engine emission standards, and section 231(a)(2)(B)(ii) provides that EPA shall not change the aircraft engine emission standards if such change would significantly increase noise and adversely affect safety. Section 231(a)(3) directs EPA to issue final regulations with such modifications as the Administrator "deems appropriate."

In setting or revising standards, section 231(b) provides that EPA shall have them take effect after such period as EPA finds necessary (after consultation with the Secretary of Transportation) to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period. Section 231(c) then states that EPA's regulations regarding aircraft shall not apply if disapproved by the President, after notice and opportunity for public hearing, on the basis of a finding by DOT that such regulations would create a hazard to aircraft safety. Section 232 directs DOT to issue and implement regulations to insure compliance with EPA's standards, while section 233 pre-empts States and local governments from adopting or enforcing any aircraft emission standards that are not identical to EPA's standards.

In recently reviewing this statutory scheme, the U.S. Court of Appeals for the District of Columbia Circuit ruled that it constitutes a "both explicit and extraordinarily broad" delegation of "expansive authority to EPA to enact appropriate regulations applicable to the emissions of air pollutants from aircraft engines."[32]

3. Regulatory Authority for Fuel Standards

Section 211(c) of the CAA allows EPA to regulate fuels used in motor vehicles and nonroad vehicles or engines where emission products of the fuel either: (1) Cause or contribute to air pollution that reasonably may be anticipated to endanger public health or welfare, or (2) will impair to a significant degree the performance of any emission control device or system which is in general use, or which the Administrator finds has been developed to a point where in a reasonable time it will be in general use were such a regulation to be promulgated. This section of the CAA was used to eliminate lead from fuel used in motor vehicles. EPA's authority to regulate fuels is limited to those fuels used in motor vehicles, motor vehicle engines, or nonroad engines or vehicles, under CAA section 211(c)(1). The CAA defines "motor vehicle," "nonroad engine," and "nonroad vehicle" in section 216 for purposes of part A of title II of the CAA. Part A is also where the authority to regulate fuels under section 211 resides. However, EPA's authority to regulate aircraft resides in

[26] *See* "National Ambient Air Quality Standards for Lead" 73 FR 66970–67007 (Nov. 12, 2008).

[27] *See* "National Ambient Air Quality Standards for Lead" 73 FR 67007–67012 (Nov. 12, 2008).

[28] *See, e.g.*, CAA sections 111(b); 213(a)(2), (4).

[29] *See, e.g.*, 66 FR 5001 (January 18, 2001) (heavy duty engine and diesel sulfur rule).

[30] *See, e.g.*, 67 FR 68242 (November 8, 2002) (snowmobile rule).

[31] *Bluewater Network* v. *EPA*, 370 F.3d 1, 15 (DC Cir. 2004) (For Fairbanks, this contribution was equivalent to 1.2 percent of the total daily CO inventory for 2001).

[32] *NACAA* v. *EPA*, 489 F.3d 1221, 1229–30 (DC Cir. 2007).

part B of title II, and therefore the definitions of section 216 do not apply to aircraft. This means that aircraft are not "nonroad vehicles," and aircraft engines are not "nonroad engines." Consequently, EPA's authority to regulate fuels under section 211 does not extend to fuels used exclusively in aircraft, such as leaded avgas, that are not also used in motor vehicles or nonroad vehicles or engines (excluding fuel used in vehicles exclusively).

Instead, fuels used exclusively in aircraft engines are to be regulated by the FAA. Title 49 (49 U.S.C. 44714) requires that "the Administrator of the Federal Aviation Administration shall prescribe (1) standards for the composition or chemical or physical properties of an aircraft fuel or fuel additive to control or eliminate aircraft emissions the Administrator of the Environmental Protection Agency decides under section 231 of the Clean Air Act (42 U.S.C. 7571) endanger the public health or welfare; and (2) regulations providing for carrying out and enforcing those standards."

E. Federal Actions To Reduce Lead Exposure

The U.S. has made tremendous progress in reducing lead concentrations in the outdoor air. Nationwide, average concentrations of lead in the air have dropped 91 percent between 1980 and 2008.[33] Much of this dramatic improvement occurred as a result of the permanent phase-out of lead in motor vehicle gasoline discussed in this section of the ANPR. However, lead continues to be emitted into the air from many different types of stationary sources and piston-engine aircraft as well as certain high performance engines such as race cars.

Federal programs provide for nationwide reductions in emissions of lead and other air pollutants through several provisions in the CAA. In the early 1970s, EPA issued regulations regarding lead in gasoline in order to accomplish two purposes.[34] First, EPA issued regulations designed to ensure the availability of unleaded gasoline for use in motor vehicles equipped with emission control systems such as catalytic converters. EPA had determined that lead additives would impair to a significant degree the performance of emission control systems. Second, EPA issued regulations designed to gradually reduce the content of lead in leaded gasoline, because EPA found that lead emissions from motor vehicles presented a significant risk of harm to the health of urban population groups, especially children. Children are at a sensitive life stage with regard to the adverse health effects of lead. In 1985, EPA, noting the significant reduction in adverse health effects, mainly among pre-school age children, that would result from reductions in lead content in gasoline, promulgated additional regulations to decrease the allowable concentration of lead in gasoline for motor vehicles to 0.10 grams per gallon.[35] In 1990 Congress added section 211(n) to the CAA which provides that after December 31, 1995, it shall be unlawful to sell any gasoline for use in any motor vehicle which contains lead or lead additives. In 1996, EPA incorporated the CAA statutory ban on gasoline containing lead or lead additives for highway use into the Agency's existing regulations on the lead content of gasoline.[36] In this regulation, it was noted that the petroleum industry may continue to make and market gasoline produced with lead additives for all remaining uses, including use as fuel in aircraft, racing cars, and nonroad engines such as farm equipment engines and marine engines, to the extent otherwise allowed by law.[37]

In fact, there have been no regulatory limits placed on the production and consumption of leaded avgas, and, as noted in Section I.A of this ANPR, emissions of lead from piston-engine aircraft account for an increasing fraction of the lead emissions to air (*e.g.*, accounting for approximately half the national inventory of lead emission in 2005). This is in spite of the decrease in the supply of leaded avgas nationally from 374 million gallons (875 tons of lead) in 1990 to 235 million gallons (550 tons of lead) in 2008.[38] The decrease in fuel consumption is attributed to the decrease in piston-engine aircraft activity over that time period and not due to a shift to unleaded fuel. There are over 200,000 piston-engine aircraft in the U.S. that continue to consume leaded avgas and approximately 2,000 new piston-engine aircraft requiring leaded avgas are manufactured annually. Projected growth for this industry is discussed in Section III.B.

Significant reductions in emission of lead from stationary sources have been achieved between 1985 and 2002, totaling almost 2,000 tons of lead.[39] Regulations promulgated in 1995, 1997 and 1999 controlled emissions of lead from primary and secondary lead smelters, contributing to these reductions.[40][41][42] Currently, metal industry emissions of lead comprise 23% of the national inventory (298 tons). Additional reductions in the emission of lead have been accomplished through controls on waste incineration and other stationary sources.[43][44][45] These standards have been set at "maximum achievable control technology" (MACT) levels, and under CAA sections 112 and 129 EPA must revisit these standards in the future to determine whether they are sufficiently stringent to provide an ample margin of safety to protect public health and prevent an adverse environmental effect.

As lead is a multimedia pollutant, a broad range of Federal programs beyond those that focus on air pollution control provide for nationwide reductions in environmental releases and human exposures. In addition, the U.S. Centers for Disease Control and Prevention (CDC) programs provide for the tracking of children's blood lead levels nationally and provide guidance on levels at which medical and environmental case management activities should be implemented.[46][47] In

[33] *See http://www.epa.gov/airtrends/lead.html.*

[34] "Regulation of Fuels and Fuel Additives" 38 FR 1254 (Dec. 4, 1973).

[35] "Regulation of Fuels and Fuel Additives; Gasoline Lead Content" 50 FR 9386 (March 7, 1985).

[36] "Prohibition on Gasoline Containing Lead or Lead Additives for Highway Use" 61 FR 3832 (Feb. 2, 1996).

[37] "Prohibition on Gasoline Containing Lead or Lead Additives for Highway Use" 61 FR 3834 (Feb. 2, 1996).

[38] These fuel volume estimates are from the Department of Energy Information Administration. *http://tonto.eia.doe.gov/dnav/pet/hist/mgaupus1A.htm.*

[39] U.S. Environmental Protection Agency (2008) EPA's Report on the Environment EPA/600/R–07/045F. Available at: *http://www.epa.gov/roe/.*

[40] "National Emission Standards for Hazardous Air Pollutants From Secondary Lead Smelting" 60 FR 32587 (June 23, 1995).

[41] "National Emission Standards for Hazardous Air Pollutants From Secondary Lead Smelting" 62 FR 32209 (June 13, 1997).

[42] "National Emission Standards for Hazardous Air Pollutants for Primary Lead Smelting" 64 FR 30194 (June 4, 1999).

[43] "Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Municipal Waste Combustors" 60 FR 65387 (Dec. 19, 1995).

[44] "Emission Guidelines for Existing Sources and Standards of Performance for New Stationary Sources" 62 FR 45124 (Aug. 25, 1997).

[45] "Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Large Municipal Waste Combustors" 71 FR 27324–27348 (May 10, 2006).

[46] Centers for Disease Control and Prevention (2005) Preventing lead poisoning in young children: a statement by the Centers for Disease Control and Prevention. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. August.

[47] Advisory Committee on Childhood Lead Poisoning Prevention (2007) Interpreting and managing blood lead levels <10 µg/dL in children and reducing childhood exposures to lead:

1991, the Secretary of the U.S. Department of Health and Human Services (HHS) characterized lead poisoning as the "number one environmental threat to the health of children in the United States."[48] In 1997, President Clinton created, by Executive Order 13045, the President's Task Force on Environmental Health Risks and Safety Risks to Children in response to increased awareness that children face disproportionate risks from environmental health and safety hazards (62 FR 19885).[49] By Executive Orders issued in October 2001 and April 2003, President Bush extended the work for the Task Force for an additional three and a half years beyond its original charter (66 FR 52013 and 68 FR 19931). The Task Force set a Federal goal of eliminating childhood lead poisoning by the year 2010, and reducing lead poisoning in children was identified as the Task Force's top priority.

Federal abatement programs provide for the reduction in human exposures and environmental releases from in-place materials containing lead (*e.g.*, lead-based paint, urban soil and dust, and contaminated waste sites). Federal regulations on disposal of lead-based paint waste help facilitate the removal of lead-based paint from residences (68 FR 36487). Further, in 1991, EPA lowered the maximum levels of lead permitted in public water systems from 50 parts per billion (ppb) to 15 ppb measured at the consumer's tap (56 FR 26460).

Federal programs to reduce exposure to lead in paint, dust, and soil are specified under the comprehensive Federal regulatory framework developed under the Residential Lead-Based Paint Hazard Reduction Act (Title X). Under Title X and Title IV of the Toxic Substances Control Act (TSCA), EPA has established regulations and associated programs with the goal of reducing exposure to lead via lead-based paint. For example, under Title IV of TSCA, EPA established standards identifying hazardous levels of lead in residential paint, dust, and soil in 2001. On March 31, 2008, the Agency issued a new rule (73 FR 21692) to further protect children from lead-based paint hazards resulting from renovation and repair work occurring in housing in which they live.

Programs associated with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) and Resource Conservation Recovery Act (RCRA) also implement abatement programs, reducing exposures to lead and other pollutants. For example, EPA determines and implements protective levels for lead in soil at Superfund sites and RCRA corrective action facilities. Federal programs, including those implementing RCRA, provide for management of hazardous substances in hazardous and municipal solid waste.[50] Federal regulations concerning batteries in municipal solid waste control the collection and recycling or proper disposal of batteries containing lead.[51] Similarly, Federal programs provide for the reduction in environmental releases of hazardous substances such as lead in the management of wastewater.[52]

A variety of Federal nonregulatory programs also provide for reduced environmental release of lead-containing materials through voluntary measures and more general encouragement of pollution prevention, promotion of reuse and recycling, reduction of priority and toxic chemicals in products and waste, and conservation of energy and materials. These include the voluntary partnership between EPA and the National Association for Stock Car Auto Racing (NASCAR) which has achieved the goal of removing alkyl lead (organic forms of lead) from racing fuels used in the Nextel Cup, Busch and Craftsman Truck Series.[53] Other programs include the Resource Conservation Challenge,[54] the National Waste Minimization Program,[55] "Plug in to eCycling" (a partnership between EPA and consumer electronics manufacturers and retailers),[56] and activities to reduce the practice of backyard trash burning.[57]

In addition to the lead control programs summarized above, EPA's research program, with other Federal agencies, identifies, encourages and conducts research needed to locate and assess serious risks and to develop methods and tools to characterize and help reduce risks. For example, EPA's Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK model) and the Adult Lead Methodology are widely used and accepted as tools that provide guidance in evaluating site specific data. More recently, in recognition of the need for a single model that predicts lead concentrations in tissue for children and adults, EPA is developing the All Ages Lead Model (AALM) to provide researchers and risk assessors with a pharmacokinetic model capable of estimating blood, tissue, and bone concentrations of lead based on estimates of exposure over the lifetime of the individual. EPA research activities on substances including lead focus on better characterizing aspects of health and environmental effects, exposure, and control or management of environmental releases.[58]

II. Health and Welfare Effects of Lead

A. Multimedia and Multi-Pathway Exposure Considerations

This section briefly summarizes the information presented in the 2008 NAAQS for Lead,[59] the 2007 Lead Staff Paper[60] and the 2006 Air Quality Criteria Document for Lead (AQCD for Lead).[61] Lead is an unusual pollutant in that the distribution of lead to different environmental media (*e.g.*, air, soil, water) is important for evaluating public health and welfare effects. Lead emitted to the air can result in exposure via multiple pathways (*e.g.*, inhalation, ingestion, dermal absorption). Some key multimedia and multi-pathway considerations for lead include the following:

(1) Lead is emitted into the air from many sources encompassing a wide

Recommendations of CDC's Advisory Committee on Childhood Lead Poisoning Prevention. Morbidity and Mortality Weekly Report. 56(RR-8). November 2, 2007.

[48] Alliance to End Childhood Lead Poisoning (1991) The First Comprehensive National Conference; Final Report. October 6, 7, 8, 1991.

[49] Co-chaired by the Secretary of the HHS and the Administrator of the EPA, the Task Force consisted of representatives from 16 Federal departments and agencies.

[50] *See, e.g.*, 66 FR 58258.

[51] *See, e.g.*, "Implementation of the Mercury-Containing and Rechargeable Battery Management Act" *http://www.epa.gov/epaoswer/hazwaste/recycle/battery.pdf* and "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2005" *http://www.epa.gov/epaoswer/osw/conserve/resources/msw-2005.pdf.*

[52] *http://www.epa.gov/owm/.*

[53] U.S. Environmental Protection Agency Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Program (2002) PBT national action plan for alkyl-Pb. Washington, DC. Available online at: *http://www.epa.gov/pbt/pubs/Alkyl_lead_action_plan_final.pdf.*

[54] *http://www.epa.gov/epawaste/rcc/index.htm.*

[55] *http://www.epa.gov/epawaste/hazard/wastemin/.*

[56] *http://www.epa.gov/epawaste/partnerships/plugin/index.htm.*

[57] *http://www.epa.gov/epawaste/nonhaz/municipal/backyard/index.htm.*

[58] *http://www.epa.gov/ord/.*

[59] National Ambient Air Quality Standards for Lead 73 FR 66970–67007 (Nov. 12, 2008) Section II.A.

[60] U.S. Environmental Protection Agency Review of the National Ambient Air Quality Standards for Lead: Policy Assessment of Scientific and Technical Information OAQPS Staff Paper (2007) Chapter 2. EPA–452/R–07–013 November.

[61] U.S. Environmental Protection Agency Air Quality Criteria for Lead (2006) Volume I: Chapters 2 & 3. EPA/600/R–5/144aF. October.

variety of stationary and mobile source types. Lead emitted to the air is predominantly in particulate form, with the particles occurring in various sizes. Once emitted, the particles can be transported long or short distances depending on their size, which influences the amount of time spent in the aerosol phase. In general, larger particles tend to deposit more quickly, within shorter distances from emissions points (*e.g.*, kilometers), while smaller particles will remain in the aerosol phase and travel longer distances before depositing (*e.g.*, hundreds to thousands of kilometers).[62] As summarized in the AQCD for Lead, airborne concentrations of lead at sites near sources are much higher than at sites not known to be directly influenced by sources.

(2) Once deposited to surfaces, lead can subsequently be resuspended into the ambient air and, because of the persistence of lead, emissions of this metal contribute to environmental media concentrations for many years into the future as it is cycled within and between environmental media such as soil, air and water. Lead that is a soil or dust contaminant today may have been airborne yesterday or many years ago.[63]

(3) Exposure to lead emitted into the ambient air can occur directly by inhalation, or indirectly by ingestion of lead-contaminated food, water or other materials including dust and soil. This occurs due to the environmental cycling of this persistent metal which, once emitted into the ambient air is distributed to other environmental media and can contribute to human exposures via indoor and outdoor dusts, outdoor soil, food and drinking water, as well as inhalation of air. Atmospheric deposition is estimated to comprise a significant proportion of lead in food (AQCD for Lead, p. 3–48). For example, livestock may be exposed to lead in vegetation (*e.g.*, grasses and silage) and in surface soils via incidental ingestion of soil while grazing (USEPA 1986, Section 7.2.2.2.2).[64] And dietary intake may be a predominant source of lead exposure among adults, greater than consumption of water and beverages or inhalation (73 FR 66971). These exposure pathways are described more fully in Section 8.2.2 of the AQCD for Lead.

(4) Air-related exposure pathways are affected by changes to air quality, including changes in concentrations of lead in air and changes in atmospheric deposition of lead. Further, because of its persistence in the environment, lead deposited from the air may contribute to human and ecological exposures for years into the future as described above.

Additionally, human exposures to lead include pathways that are not related to ambient air concentrations. The pathways of human exposure to lead that are not air-related include ingestion of indoor lead paint,[65] lead in diet as a result of inadvertent additions during food processing, and lead in drinking water attributable to lead in distribution systems, as well as other generally less prevalent pathways, as described in the AQCD for Lead (pp. 3–50 to 3–51).

B. Health Effects Information

In 2008, EPA decreased the level of the primary (health-based) NAAQS for Lead from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$ in order to provide increased protection for children and other at-risk populations against an array of adverse health effects, most notably neurological effects in children, including neurocognitive and neurobehavioral effects.[66] This section summarizes information provided in the numerous recent documents summarizing health and welfare effects from exposure to lead, including the AQCD for Lead, CDC documents, the EPA Staff Paper[67] and the proposed and final NAAQS for Lead. First, the use of blood lead as a measure of exposure to lead is described followed by a brief summary of the broad array of lead-induced health effects. Particular focus is given here to the effects of lead on the developing nervous system in children since this is among the most sensitive endpoints identified for this toxic metal. The section ends with a description of at-risk populations and life stages.

1. Blood Lead

Lead enters the body most commonly via the respiratory system and/or gastrointestinal tract, from which it is quickly absorbed into the blood stream and distributed throughout the body.[68] Less commonly, lead, particularly organic forms of lead such as alkyl lead, can be absorbed through the skin (AQCD for Lead, page 4–12). Blood lead levels are extensively used as an index or biomarker of exposure by national and international health agencies, as well as in epidemiological (AQCD for Lead, Sections 4.3.1.3 and 8.3.2) and toxicological studies of lead health effects and dose-response relationships (AQCD for Lead, Chapter 5). The U.S. CDC, and its predecessor agencies, has for many years used blood lead level as a metric for identifying children at risk of adverse health effects and for specifying particular public health recommendations.[69] Most recently, in 2005, with consideration of a review of the evidence by their advisory committee, CDC revised their statement on Preventing Lead Poisoning in Young Children.[70] CDC specifically recognized the evidence of adverse health effects in children with blood lead levels below 10 µg/dL,[71] the data demonstrating that no "safe" threshold for blood lead had been identified, and emphasized the importance of preventative measures.[72]

Since 1976, the CDC has been monitoring blood lead levels in multiple age groups nationally through the National Health and Nutrition Examination Survey (NHANES).[73] The

[62] U.S. Environmental Protection Agency (2004) Air quality criteria for particulate matter. Research Triangle Park, NC: Office of Research and Development, National Center for Environmental Assessment; EPA report no. EPA–600/P–99/002aaF.

[63] National Ambient Air Quality Standards for Lead 73 FR 66971 (Nov. 12, 2008), AQC for Lead, Section 2.5.

[64] U.S. Environmental Protection Agency (1986) Air quality criteria for lead. Research Triangle Park, NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA–600/8–83/028aF–dF. 4v. Available from: NTIS, Springfield, VA; PB87–142378.

[65] Weathering of outdoor lead paint may also contribute to soil lead levels adjacent to the house.

[66] National Ambient Air Quality Standards for Lead 73 FR 66965 (Nov. 12, 2008).

[67] U.S. Environmental Protection Agency (2007) Review of the National Ambient Air Quality Standards for Lead: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA–452/R–07–013. Office of Air Quality Planning and Standards, Research Triangle Park.

[68] Additionally, lead freely crosses the placenta resulting in continued fetal exposure throughout pregnancy, with that exposure increasing during the latter half of pregnancy (AQC for Lead, Section 6.6.2).

[69] Centers for Disease Control (1991) Preventing lead poisoning in young children: a statement by the Centers for Disease Control. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service; October 1. Available online at: *http://wonder.cdc.gov/wonder/prevguid/p0000029/p0000029.asp.*

[70] Centers for Disease Control and Prevention (2005) Preventing lead poisoning in young children: a statement by the Centers for Disease Control and Prevention. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. August.

[71] As described by the Advisory Committee on Childhood Lead Poisoning Prevention, "In 1991, CDC defined the blood lead level (BLL) that should prompt public health actions as 10 µg/dL. Concurrently, CDC also recognized that a BLL of 10 µg/dL did not define a threshold for the harmful effects of lead. Research conducted since 1991 has strengthened the evidence that children's physical and mental development can be affected at BLLS <10 µg/dL" (ACCLPP, 2007).

[72] Advisory Committee on Childhood Lead Poisoning Prevention (2007) Interpreting and managing blood lead levels <10 µg/dL in children and reducing childhood exposures to lead: Recommendations of CDC's Advisory Committee on Childhood Lead Poisoning Prevention. Morbidity and Mortality Weekly Report. 56(RR–8). November 2, 2007.

[73] This information documents a variation in mean blood lead levels across the various age groups monitored. For example, mean blood lead

NHANES information has documented the dramatic decline in mean blood lead levels in the U.S. population that has occurred since the 1970s and that coincides with regulations regarding leaded motor vehicle fuels, leaded paint, and lead-containing plumbing materials that have reduced lead exposure among the general population (AQCD for Lead, Sections 4.3.1.3 and 8.3.3).

While blood lead levels in the U.S. general population, including geometric mean levels in children aged 1–5 have declined significantly, levels have been found to vary among children of different socioeconomic status (SES) and other demographic characteristics (AQCD for Lead, p. 4–21), as well as by age.[74] Racial/ethnic and income disparities in blood lead levels in children persist. For example, blood lead levels for lower income and African American children are higher than those for the general population.

The spectrum of health effects discussed in the following section is relevant for all forms of lead that enter the blood stream. Once in the blood stream, lead bioaccumulates in the body, with the bone serving as a large, long-term storage compartment. Soft tissues (*e.g.*, kidney, liver, brain, *etc.*) serve as smaller compartments, in which lead may be more mobile (AQCD for Lead, Sections 4.3.1.4 and 8.3.1). During childhood development, bone represents approximately 70% of a child's body burden of lead, and this accumulation continues through adulthood, when more than 90% of the total lead body burden is stored in the bone (AQCD for Lead, Section 4.2.2). Lead in bone can be mobilized during critical periods including pregnancy and lactation (AQCD for Lead, Section 5.8.6).

2. Health Effects

Lead, as with mercury and arsenic, has no known biological function.[75] Lead has been demonstrated to exert "a broad array of deleterious effects on multiple organ systems via widely diverse mechanisms of action" (AQCD for Lead, p. 8–24 and Section 8.4.1). This array of health effects includes effects on heme biosynthesis and related functions; neurological development and function; reproduction and physical development; kidney function; cardiovascular function; and immune function. The weight of evidence varies across this array of effects and is comprehensively described in the AQCD for Lead. There is also some evidence of lead carcinogenicity, primarily from animal studies, together with limited human evidence of suggestive associations (AQCD for Lead, Sections 5.6.2, 6.7, and 8.4.10). The U.S. EPA has listed lead under current EPA guidelines as a probable human carcinogen based on the available animal data (AQCD for Lead, p. 6–195).[76] Inorganic lead has been classified as a probable human carcinogen by the International Agency for Research on Cancer (inorganic lead compounds), based mainly on sufficient animal evidence,[77] and classified as reasonably anticipated to be a human carcinogen by the U.S. National Toxicology Program (lead and lead compounds) (AQCD for Lead, Section 6.7.2).[78 79]

As described in the AQCD for Lead, the key effects associated with individual blood lead levels in children and adults in the range of 10 µg/dL and lower include neurological, hematological and immune[80] effects for children, and hematological, cardiovascular and renal effects for adults (AQCD for Lead, Tables 8–5 and 8–6, pp. 8–60 to 8–62). As evident from the discussions in Chapters 5, 6 and 8 of the AQCD for Lead, "neurotoxic effects in children and cardiovascular effects in adults are among those best substantiated as occurring at blood lead concentrations as low as 5 to 10 µg/dL (or possibly lower); and these categories are currently clearly of greatest public health concern" (AQCD for Lead, p. 8–60).[81 82] The AQCD for Lead states, "There is no level of lead exposure that can yet be identified, with confidence, as clearly not being associated with some risk of deleterious health effects" (AQCD for Lead, p. 8–63).

While adults are susceptible to lead effects at lower blood lead levels than previously understood (*e.g.*, AQCD for Lead, p. 8–25), among the wide variety of health endpoints associated with lead exposures, there is general consensus that the developing nervous system in children is among the, if not the, most sensitive. Blood lead levels in U.S. children have decreased notably since the late 1970s. Studies evaluating current blood lead levels in children have reported associations with neurodevelopment effects (AQCD for Lead, Chapter 6). Functional manifestations of lead neurotoxicity during childhood include sensory, motor, cognitive and behavioral impacts. Numerous epidemiological studies have reported neurocognitive, neurobehavioral, sensory, and motor function effects in children with blood lead levels below 10 µg/dL (AQCD Lead, Sections 6.2 and 8.4).

Cognitive effects associated with lead exposures that have been observed in epidemiological studies have included decrements in intelligence test results, such as the widely used IQ score, and in academic achievement as assessed by various standardized tests as well as by class ranking and graduation rates (AQCD for Lead, Section 6.2.16 and pp 8–29 to 8–30). As noted in the AQCD for Lead with regard to the latter, "Associations between lead exposure and academic achievement observed in the above-noted studies were significant even after adjusting for IQ, suggesting that lead-sensitive neuropsychological processing and learning factors not

levels in 2001–2002 for ages 1–5, 6–11, 12–19 and greater than or equal to 20 years of age, are 1.70, 1.25, 0.94, and 1.56 µg/dL, respectively (AQC for Lead, p. 4–22).

[74] Axelrad, D., U.S. EPA (November 4, 2009) E-mail message to Marion Hoyer, U.S. EPA. Available in docket number EPA–HQ–OAR–2007–0294.

[75] U.S. Environmental Protection Agency (2007) Framework for Metals Risk Assessment. Office of the Science Advisor. EPA 120/R–07/001.

[76] U.S. Environmental Protection Agency, Integrated Risk Information System (IRIS) (1993) IRIS Summary for Lead and compounds (CASRN 7439–92–1). Available online at: *http://www.epa.gov/ncea/iris/subst/0277.htm.*

[77] International Agency for Research on Cancer (IARC) (2006) Inorganic and organic lead compounds. Lyon, France: International Agency for Research on Cancer. IARC monographs on the evaluation of the carcinogenic risk of chemicals to humans: volume 87. Available online at: *http://monographs.iarc.fr/ENG/Monographs/vol87/index.php.*

[78] National Toxicology Program (2003) Report on carcinogens background document for lead and lead compounds. Research Triangle Park, NC: U.S. Department of Health and Human Services. Available online at: *http://ntp.niehs.nih.gov/ntp/newhomeroc/roc11/Lead-Public.pdf.*

[79] National Toxicology Program. (2004) Lead (CAS no. 7439–92–1) and lead compounds. In: Report on carcinogens, eleventh edition. Research Triangle Park, NC: U.S. Department of Health and Human Services. Available online at: *http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s101lead.pdf.*

[80] At mean blood lead levels, in children, on the order of 10 µg/dL, and somewhat lower, associations have been found with effects to the immune system, including altered macrophage activation, increased IgE levels and associated increased risk for autoimmunity and asthma (AQC for Lead, Sections 5.9, 6.8, and 8.4.6).

[81] With regard to blood lead levels in individual children associated with particular neurological effects, the AQC for Lead states "Collectively, the prospective cohort and cross-sectional studies offer evidence that exposure to lead affects the intellectual attainment of preschool and school age children at blood lead levels <10 µg/dL (most clearly in the 5 to 10 µg/dL range, but, less definitively, possibly lower)." (p. 6–269)

[82] Epidemiological studies have consistently demonstrated associations between lead exposure and enhanced risk of deleterious cardiovascular outcomes, including increased blood pressure and incidence of hypertension. A meta-analysis of numerous studies estimates that a doubling of blood-lead level (e.g., from 5 to 10 µg/dL) is associated with ~1.0 mm Hg increase in systolic blood pressure and ~0.6 mm Hg increase in diastolic pressure (AQC for Lead, p. E–10).

reflected by global intelligence indices might contribute to reduced performance on academic tasks" (AQCD for Lead, pp 8–29 to 8–30).

With regard to potential implications of lead effects on IQ, the AQCD for Lead recognizes the "critical" distinction between population and individual risk, identifying issues regarding declines in IQ for an individual and for the population. The AQCD for Lead further states that a "point estimate indicating a modest mean change on a health index at the individual level can have substantial implications at the population level" (AQCD for Lead, p. 8–77).[83] A downward shift in the mean IQ value is associated with both substantial decreases in percentages achieving very high scores and substantial increases in the percentage of individuals achieving very low scores (AQCD for Lead, p. 8–81).[84] For an individual functioning in the low IQ range due to the influence of developmental risk factors other than lead, a lead-associated IQ decline of several points might be sufficient to drop that individual into the range associated with increased risk of educational, vocational, and social failure (AQCD for Lead, p. 8–77).

Other cognitive effects observed in studies of children have included decrements in attention, executive functions, language, memory, learning and visuospatial processing (AQCD for Lead, Sections 5.3.5, 6.2.5 and 8.4.2.1), with attention and executive function effects associated with lead exposures indexed by blood lead levels below 10 µg/dL (AQCD for Lead, Section 6.2.5 and pp. 8–30 to 8–31). The evidence for the role of lead in this suite of effects includes experimental animal findings (discussed in the AQCD for Lead, Section 8.4.2.1; p. 8–31), which provide strong biological plausibility of lead effects on learning ability, memory and attention (AQCD for Lead, Section 5.3.5), as well as associated mechanistic findings.

The persistence of such lead-induced effects is described in the AQCD for Lead (*e.g.*, AQCD for Lead Sections 5.3.5, 6.2.11, and 8.5.2). The persistence or irreversibility of such effects can be the result of damage occurring without adequate repair offsets or of the persistence of lead in the body (AQCD for Lead, Section 8.5.2). It is additionally important to note that there may be long-term consequences of such deficits over a lifetime. Poor academic skills and achievement can have "enduring and important effects on objective parameters of success in real life," as well as increased risk of antisocial and delinquent behavior (AQCD for Lead, Section 6.2.16).

The current evidence reviewed in the AQCD for Lead with regard to the quantitative relationship between neurocognitive decrement, such as IQ, and blood lead levels indicates that the slope for lead effects on IQ is nonlinear and is steeper at lower blood lead levels, such that each µg/dL increase in blood lead may have a greater effect on IQ at lower blood lead levels (*e.g.*, below 10 µg/dL) than at higher levels (AQCD for Lead, Section 6.2.13; pp. 8–63 to 8–64; Figure 8–7). As noted in the AQCD for Lead, a number of examples of non- or supralinear dose-response relationships exist in toxicology (AQCD for Lead, pp. 6–76 and 8–38 to 8–39). With regard to the effects of lead on neurodevelopmental outcomes such as IQ, the AQCD for Lead suggests that initial neurodevelopmental effects at lower lead levels may be disrupting very different biological mechanisms (*e.g.*, early developmental processes in the central nervous system) than more severe effects of high exposures that result in symptomatic lead poisoning and frank mental retardation (AQCD for Lead, p. 6–76). The AQCD for Lead describes this issue in detail with regard to lead (summarized in AQCD for Lead at p. 8–39). Various findings within the toxicological evidence, presented in the AQCD for Lead, provide biologic plausibility for a steeper IQ loss at low blood lead levels, with a potential explanation being that the predominant mechanism at very low blood lead levels is rapidly saturated and that a different, less-rapidly-saturated process becomes predominant at blood lead levels greater than 10 µg/dL.

3. At-Risk Populations and Life Stages

Individuals potentially at risk from exposure to environmental pollutants include those with increased susceptibility and vulnerability. The terms "susceptibility" and "vulnerability" have been used to characterize those with a greater likelihood of an adverse outcome given a specific exposure in comparison with the general population. This increased likelihood of response to a pollutant can result from a multitude of factors, including genetic or developmental factors, life stages (*i.e.*, childhood or old age), gender differences, or preexisting disease states. In addition, new attention has been paid to the concept of some population groups having increased responses to pollution-related effects due to factors including socioeconomic status (SES) (*e.g.*, reduced access to health care, poor nutritional status) or particularly elevated exposure levels.

EPA uses the term "life stage" to refer to a distinguishable time frame in an individual's life characterized by unique and relatively stable behavioral and/or physiological characteristics that are associated with development and growth. To recognize the rapid changes that occur during childhood related to physiology, metabolism, anatomy and behavior that can impact exposure and risk to environmental hazards, EPA now views childhood as a sequence of life stages, from conception through fetal development, infancy, and adolescence. EPA published several exposure and risk assessment guidance documents beginning in 2005,[85] [86] [87] in which we emphasized the importance of considering the potential for increased sensitivity of different life stages or age groups in addition to that of groups that form a fixed portion of the population based on characteristics such as pre-existing disease, gender, socioeconomic status, geographical location, culture/ethnicity, or genetic make-up.

Physiological, behavioral and demographic factors contribute to increased risk of lead-related health effects. Children are at increased risk of lead-related health effects due to various factors that enhance their exposures (*e.g.*, via the hand-to-mouth activity that is prevalent in very young children, AQCD for Lead, Section 4.4.3) and susceptibility. While children are considered to be at a period of maximum exposure around 18–27 months, the current evidence has found even stronger associations between blood lead levels at school age and IQ at school age. The evidence "supports the idea that lead exposure continues to be toxic to children as they reach school age, and [does] not lend support to the interpretation that all the damage is done by the time the child reaches 2 to

[83] As an example, the AQC for Lead states "although an increase of a few mmHg in blood pressure might not be of concern for an individual's well-being, the same increase in the population mean might be associated with substantial increases in the percentages of individuals with values that are sufficiently extreme that they exceed the criteria used to diagnose hypertension" (AQC for Lead, p. 8–77).

[84] For example, for a population mean IQ of 100 (and standard deviation of 15), 2.3% of the population would score above 130, but a shift of the population to a mean of 95 results in only 0.99% of the population scoring above 130 (AQC for Lead, pp. 8–81 to 8–82).

[85] U.S. EPA (2005) Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposure to Environmental Contaminants. EPA/630/P–03/003F.

[86] U.S. EPA (2006) A Framework for Assessing Health Risks of Environmental Exposures to Children. EPA/600/R–05/093A.

[87] U.S. EPA (2008) Child-Specific Exposure Factors Handbook. EPA/600/R–06/096F.

3 years of age" (AQCD for Lead, Section 6.2.12). Physiological factors that can affect risk of lead-related effects in children include genetic polymorphisms and nutritional status. Children with particular genetic polymorphisms (*e.g.*, presence of the δ-aminolevulinic acid dehydratase-2 [ALAD-2] allele) have increased sensitivity to lead toxicity, which may be due to increased susceptibility to the same internal dose and/or to increased internal dose associated with the same exposure (AQCD for Lead, p. 8-71, Sections 6.3.5, 6.4.7.3 and 6.3.6). Some children may have blood lead levels higher than those otherwise associated with a given lead exposure (AQCD for Lead, Section 8.5.3) as a result of nutritional status (*e.g.*, iron deficiency, calcium intake), as well as genetic and other factors (AQCD for Lead, Chapter 4 and Sections 3.4, 5.3.7 and 8.5.3).

Demographic factors that can affect risk of lead-related effects in children include residential location, poverty, and race. As noted in previous EPA actions on lead, situations of elevated exposure, such as residing near sources of ambient lead, as well as socioeconomic factors, such as reduced access to health care or low socioeconomic status can also contribute to increased blood lead levels and increased risk of associated health effects from air-related lead.[88] Additionally, as described in the NAAQS for Lead, children in poverty and black, non-Hispanic children have notably higher blood lead levels than do economically well-off children and white children, in general.[89]

C. Welfare Effects

Lead is persistent in the environment and accumulates in soils, aquatic systems (including sediments), and some biological tissues of plants, animals and other organisms, thereby providing long-term, multi-pathway exposures to organisms and ecosystems. In 2008, EPA established a secondary lead standard of 0.15 ug/m^3. This standard is intended to protect the public welfare from known or anticipated adverse effects associated with the presence of lead in the ambient air. This section provides a summary of information regarding welfare effects of lead, focusing on terrestrial and aquatic ecosystems. This information is largely drawn from the 2006 AQCD for Lead, Chapter 6 of the Office of Air Quality Planning and Standards Staff Paper on Lead (SP)[90] and the Lead NAAQS.

1. Terrestrial Ecosystems

Lead is removed from the atmosphere and deposited on soil and other surfaces via wet or dry deposition. In soils, most lead is retained via the formation of stable solid phase compounds, precipitates, or complexes with organic matter. Thus, terrestrial ecosystems remain primarily sinks for lead but amounts retained in various soil layers vary based on forest type, climate, and litter cycling (AQCD for Lead, Section 7.1). Once in the soil, the migration and distribution of lead is controlled by a multitude of factors including pH, precipitation, litter composition and other factors, which in turn, govern the rate at which lead is bound to organic materials in the soil (AQCD for Lead, Section 2.3.5, and Section AX 7.1.4.1).

Lead exists in the environment in different forms which vary widely in their ability to cause adverse effects on ecosystems and organisms. Many forms of lead in the ambient air are quite insoluble and thus not easily leached to underground water once deposited to surfaces. However, leaching may occur under acidic conditions, where lead concentrations are extremely high, or in the presence of substances (*e.g.*, soluble organic matter, high concentrations of chlorides or sulfates) that form relatively soluble complexes with lead (AQCD for Lead, Section 2.3.5).

Plants take up lead via their foliage and through their root systems. The rate of plant uptake from soil varies by plant species, soil conditions, and lead species. Most lead in plants is stored in roots, and very little is stored in fruits. Metals that are applied to soil as salts (usually as sulfate, chloride, or nitrate salt) are accumulated more readily than the same quantity of metal added via sewage sludge, flue dust, or fly ash (AQCD for Lead, Section 2.3.7).

Surface deposition of lead onto plants may represent a significant contribution to the total lead in and on the plant, as has been observed for plants near smelters and along roadsides (AQCD for Lead, page E-19). Atmospheric deposition of lead also contributes to lead in vegetation as a result of contact with above-ground portions of the plant (AQCD for Lead, pp. 7-9 and AXZ7-39; USEPA, 1986, Sections 6.5.3 and 7.2.2.2.1). Wildlife may subsequently be exposed to lead in vegetation (*e.g.*, grasses and silage) and in surface soils via incidental ingestion of soil while grazing (USEPA 1986, Section 7.2.2.2.2).[91]

By far, the majority of air-related lead found in natural terrestrial ecosystems was deposited in the past during the use of lead additives in motor vehicle gasoline. Many sites receiving lead predominantly through long-range transport of gasoline-derived small particles have accumulated large amounts of lead in soils (AQCD for Lead, p. AX7-98). There is little evidence that terrestrial sites exposed as a result of this long range transport of lead have experienced significant effects on ecosystem structure or function (AQCD for Lead, Section AX7.1.4.2 and p. AX7-98). Strong complexation of lead by organic matter in soil may explain why few ecological effects have been observed (AQCD for Lead, p. AX7-98). Studies have shown decreasing levels of lead in vegetation, which appears to correlate with decreases in atmospheric deposition of lead resulting from the removal of lead additives to motor vehicle gasoline (AQCD for Lead, Section AX 7.1.4.2).

The deposition of gasoline-derived lead into forest soils has produced a legacy of slow moving lead that remains bound to organic materials despite dramatic reductions in the use of leaded additives to motor vehicle fuels. Current levels of lead in soil vary widely depending on the source of lead but in all ecosystems lead concentrations exceed natural background levels. For areas influenced by point sources of air lead, concentrations of lead in soil may exceed by many orders of magnitude the concentrations which are considered harmful to laboratory organisms. Adverse effects in terrestrial organisms associated with lead include neurological, physiological and behavioral effects which may influence ecosystem structure and functioning (73 FR 67008).

2. Aquatic Ecosystems

Atmospheric lead enters aquatic ecosystems primarily through deposition (wet and dry) and the erosion and runoff of soils containing lead. While overall deposition rates of atmospheric lead have decreased dramatically since the removal of lead additives from motor vehicle gasoline,

[88] U.S. Environmental Protection Agency (2007) Review of the National Ambient Air Quality Standards for Lead: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA-452/R-07-013. Office of Air Quality Planning and Standards, Research Triangle Park.

[89] *See* 73 FR 66973 (November 12, 2008).

[90] U.S. Environmental Protection Agency (2007) Review of the National Ambient Air Quality Standards for Lead: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA-452/R-07-013. Office of Air Quality Planning and Standards, Research Triangle Park.

[91] U.S. Environmental Protection Agency (1986) Air quality Criteria for Lead. Research Triangle Park, NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA-600/8-83/028aF-dF. 4v. Available from: NTIS, Springfield, VA; PB87-142378.

lead continues to accumulate and may be re-exposed in sediments and water bodies throughout the United States (AQCD for Lead, Section 2.3.6).

Several physical and chemical factors govern the fate and bioavailability of lead in aquatic systems. A significant portion of lead remains bound to suspended particulate matter in the water column and eventually settles into the substrate. Species, pH, salinity, temperature, turbulence and other factors govern the bioavailability of lead in surface waters (AQCD for Lead, Section 7.2.2). Lead can bioaccumulate in the tissues of aquatic organisms through ingestion of food and water, and adsorption from water, and can subsequently lead to adverse effects if tissue levels are sufficiently high.[92] The accumulation of lead is influenced by pH and decreasing pH favors bioavailability and bioaccumulation. Organisms that bioaccumulate lead with little excretion must partition the metal such that it has limited bioavailability, otherwise toxicity will occur if a sufficiently high concentration is reached.[93] The general symptoms of lead toxicity in fish include production of excess mucus, lordosis, anemia, darkening of the dorsal tail region, degeneration of the caudal fin, destruction of spinal neurons, aminolevulinic acid dehydratase (ALAD) inhibition, growth inhibition, renal pathology, reproductive effects, growth inhibition, and mortality.[94] Toxicity in fish has been closely correlated with duration of lead exposure and uptake.[95]

Lead exists in the aquatic environment in various forms and under various chemical and physical parameters which determine the ability of lead to cause adverse effects either from dissolved lead in the water column or lead in sediment. Current levels of lead in water and sediment vary widely depending on the source of lead. Conditions exist in which adverse effects to organisms and thereby ecosystems may be anticipated given experimental results. It is unlikely that dissolved lead in surface water constitutes a threat to ecosystems that are not directly influenced by point sources. For lead in sediment, the evidence regarding the effects is less clear. It is likely that some areas with long-term historical deposition of lead to sediment from a variety of sources as well as areas influenced by point sources have the potential for adverse effects to aquatic communities. The long residence time of lead in sediment and its ability to be resuspended by turbulence make lead likely to be a factor for consideration regarding potential risk to aquatic systems for the foreseeable future (73 FR 67008).

III. Lead Emissions From Piston-Engine Aircraft

Currently, lead emitted by piston-engine aircraft operating on leaded avgas is the largest source of lead to the air, contributing about 50% of the National Emission Inventory in 2005. This section describes the draft 2008 avgas lead inventory which is currently undergoing review by State, local and Tribal air agencies. We describe and request comment on input data used to derive airport-specific lead inventories. This section ends with a summary of data forecasting the potential growth of the industry using leaded avgas.

A. Inventory of Lead From Piston-Engine Powered Aircraft

Every three years, the EPA prepares a National Emissions Inventory (NEI) of air emissions of criteria pollutants and hazardous air pollutants with input from numerous State, local, and Tribal air agencies and from industry.[96] For the purposes of this ANPR, EPA is describing piston-engine aircraft lead information provided in the draft 2008 NEI as well as information from the final 2005 NEI. We have chosen to describe the draft 2008 NEI for the following reasons: (1) This is the first version of the NEI that will include airport-specific lead inventories that use our most recently developed methods for estimating lead (described below); (2) this inventory is the first NEI to include approximately 20,000 airport facilities in the U.S.; and (3) to increase awareness of the opportunity for State, local, and Tribal governments and industry to review this draft NEI and provide information that could improve airport lead inventories. Comments and data can be supplied to EPA for the 2008 NEI until mid-2010. While we are describing the draft 2008 NEI for piston-engine aircraft emissions of lead, we do not have draft inventory estimates for 2008 for all sources of lead. The 2008 NEI will be final in 2010.

1. National Emissions of Lead From Piston-Engine Aircraft

To calculate the national avgas lead inventory, the volume of leaded avgas produced in a given year is multiplied by the concentration of lead in the avgas and by the fraction of lead emitted from a combustion system operating on leaded fuel (to account for the lead that is retained in the engine, engine oil and/or exhaust system). For example, the volume of avgas produced in the U.S. in 2008 according to DOE was 235,326,000 gallons.[97] The concentration of lead in avgas ([Pb] in the equation below) can be one of four levels (ranging from 0.14 to 1.12 grams of lead per liter or 0.53 to 4.24 grams of lead per gallon) as specified by the American Society for Testing and Materials (ASTM). By far the most common avgas supplied is "100 Low Lead" or 100LL which has a maximum lead concentration specified by ASTM of 0.56 grams per liter or 2.12 grams per gallon.[98][99] A fraction of lead is retained in the engine, engine oil and/or exhaust system which we currently estimate at 5%.[100]

For 2008, using DOE fuel volume estimates, the national estimate of lead emissions from the consumption of avgas is 522 tons as calculated according to the following equation:

$$\frac{(235{,}326{,}000\ \text{gal})(2.12\ \text{g Pb/gal})(0.95)}{907{,}185\ \text{g/short ton}} = 522\ \text{short tons Pb}$$

[92] AQC for Lead I. 7–24: (Vink, 2002; Rainbow, 1996).

[93] AQC for Lead AX7.2.3.1.

[94] AQC for Lead page 232, Annex 7.

[95] AQC for Lead page 232, Annex 7.

[96] *http://www.epa.gov/air/data/neidb.html.*

[97] DOE Energy Information Administration. Fuel production volume data obtained from *http://tonto.eia.doe.gov/dnav/pet/hist/mgaupus1A.htm* accessed November 2006.

[98] ChevronTexaco (2006) Aviation Fuels Technical Review. FTR–3. Available online at: *http://www.chevronglobalaviation.com/docs/aviation_tech_review.pdf.*

[99] ASTM International (2007) Standard Specification for Aviation Gasolines D910–06.

[100] U.S. Environmental Protection Agency (2008) Lead Emissions from the Use of Leaded Aviation Gasoline in the United States, Technical Support Document. EPA420–R–08–020. Available online at: *http://www.epa.gov/otaq/aviation.htm.*

As described in the Overview section of this ANPR, DOT's FAA also provides estimates of annual avgas fuel consumption. For 2008, DOT estimates 351,000,000 gallons of avgas were consumed. Consumption of this volume of avgas equates to a national lead emissions estimate for this source of 779 short tons. DOT fuel volume data are derived from FAA estimates of piston-engine activity annually.[101] We are working to identify the source(s) of the information used to derive DOE fuel volume estimates. In the draft 2008 NEI, we are using DOT fuel volume estimates.

We currently cannot estimate the fraction of total lead emissions these estimates comprise since the inventories for all other sources of lead to air are not yet in the draft 2008 NEI. In 2005, lead from avgas comprised about 50% of the national lead inventory for emissions to air. As point source emissions of lead have decreased, lead emissions from piston-engine aircraft have become the largest single source of lead to air (Figure 2). These lead emissions estimates do not include evaporative losses of lead and minimal military aircraft data. Few military aircraft are piston-engine powered and consume leaded avgas.[102] Military aircraft data are supplied by States, and data provided to EPA during the 2008 NEI review will be included in the final 2008 inventory.

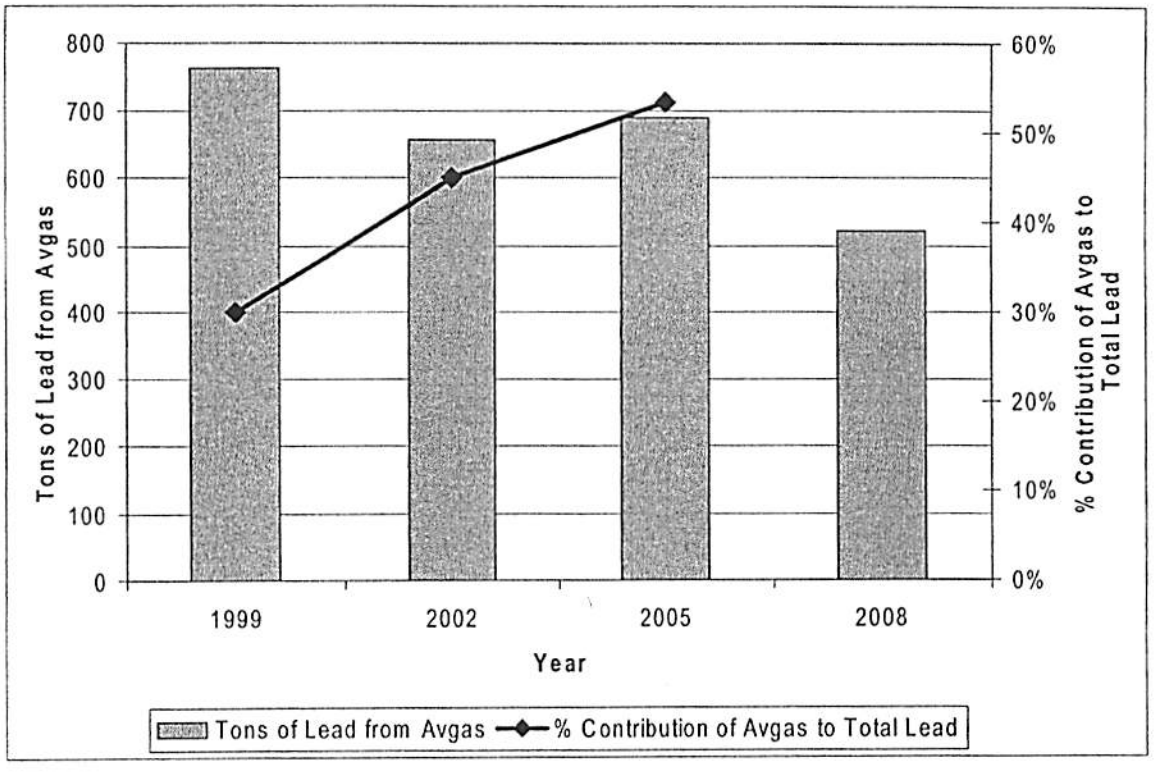

Figure 2. The Increasing Contribution of Lead from Aviation Gasoline to the Total Inventory of Lead Emissions to Air Annually (the total lead inventory for 2008 will be available in 2010). Fuel volume data is from DOE's Energy Information Administration.

2. Airport-Specific Emissions of Lead From Piston-Engine Aircraft

Aircraft gaseous and particulate matter (PM) emissions are calculated through the FAA's Emissions and Dispersion Modeling System (EDMS).[103] This modeling system was designed to develop emission inventories for the purpose of assessing potential air quality impacts of airport operations and proposed airport development projects. Lead emissions from piston-engine aircraft are not included in EDMS. To estimate airport-specific lead inventories we use engine data and other attributes of general aviation (GA) and air taxi (AT) that are used in EDMS for GA and AT and we use methods similar to those in EDMS that are described in an EPA Technical Support Document (TSD) and briefly

[101] U.S. Department of Transportation Federal Aviation Administration Aviation Policy and Plans. FAA Aerospace Forecast Fiscal Years 2009–2025. p.81. Available at: *http://www.faa.gov/data_research/aviation/aerospace_forecasts/2009-2025/media/2009%20Forecast%20Doc.pdf*. This document provides historical data for 2000–2008 as well as forecast data.

[102] ChevronTexaco (2006) Aviation Fuels Technical Review p. 44. Available online at: *http://www.chevronglobalaviation.com/docs/aviation_tech_review.pdf*.

[103] EDMS is available online at: *http://www.faa.gov/about/office_org/headquarters_offices/aep/models/edms_model/*.

summarized here.[104] The data required to estimate airport-specific lead inventories includes the landing and take-off (LTO) activity of piston-engine aircraft at a facility; fuel consumption rates by these aircraft during the various modes of the landing and take-off cycle; the time spent in each mode of the LTO (taxi/idle-out, takeoff, climb-out, approach, and taxi/idle-in); the concentration of lead in the fuel; and the retention of lead in the engine and oil. The equation used to calculate airport-specific lead emissions during the LTO cycle is below, followed by a description of each of the input parameters.

$$\text{LTO Pb (tons)} = \frac{(\text{piston-engine LTO})(\text{avgas gal/LTO})([\text{Pb}])(\text{1-Pb retention})}{907{,}185 \text{ g/short ton}}$$

Piston-engine LTO: Most piston-engine aircraft fall into the categories of either GA or AT. Some GA and AT activity is conducted by turboprop and turbojet aircraft which do not use leaded avgas. There are no national databases that provide airport-specific LTO activity data for piston-engine aircraft separately from turbojet and turboprop aircraft. The fraction of GA and AT aircraft that use piston engines will vary by airport. However, in the absence of airport-specific data, EPA calculated a national default estimate using FAA's GA and AT Activity (GAATA) Survey.[105] The 2005 GAATA Survey reports that approximately 72% of all GA and AT LTOs are from piston-engine aircraft which use avgas, and about 28% are turboprop and turbojet powered which use jet fuel, such as Jet A.[106] Lead is not added to jet fuel. Therefore, to calculate piston-engine aircraft LTO as input for this equation, the total GA plus AT LTOs are multiplied by 0.72.

Avgas use (gal/LTO): Piston-engine aircraft can have either one or two engines. EDMS version 5.0.2 contains information on the amount of avgas used per LTO for some single and twin-engine aircraft. The proportion of piston-engine LTOs conducted by single- versus twin-engine aircraft was taken from the FAA's GAATA Survey for 2005 (90% of LTOs are conducted by aircraft having one engine and 10% of LTOs by aircraft having two engines). Since twin-engine aircraft have higher fuel consumption rates than those with single engines, a weighted average LTO fuel usage rate was established to apply to the population of piston-engine aircraft as a whole. For the single-engine aircraft, the average amount of fuel consumed per LTO was determined from the six types of single piston-engine aircraft within EDMS.[107] This was accomplished by averaging the single-engine EDMS outputs for fuel consumed per LTO using the EDMS scenario property of ICAO/USEPA Default—Times in Mode (TIM), with a 16 minute taxi-in/taxi-out time according to EPA's *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*, 1992.[108] This gives a value of 16.96 pounds of fuel per LTO (lbs/LTO). Next, the average single-engine consumption rate was divided by the average density of 100LL avgas, 6 pounds per gallon (lbs/gal), producing an average fuel usage for single-engine piston aircraft of 2.83 gallons per LTO (gal/LTO). This same calculation was performed for the two twin-engine piston aircraft within EDMS, producing an average LTO fuel usage rate for twin-engine piston aircraft of 9.12 gal/LTO.

Using these single- and twin-engine piston aircraft fuel consumption rates, a weighted average fuel usage rate per LTO was computed by multiplying the average fuel usage rate for single-engine aircraft (2.83 gal/LTO) by the fleet percentage of single-engine aircraft LTOs (90%). Next, the twin-engine piston aircraft average fuel usage rate (9.12 gal/LTO) was multiplied by the fleet percentage of twin-engine aircraft LTOs (10%). By summing the results of the single- and twin-engine aircraft usage rates, the overall weighted average fuel usage rate per LTO of 3.46 gal/LTO is obtained.

Concentration of lead in fuel, [Pb]: The maximum lead concentration specified by ASTM for 100LL is 0.56 grams per liter or 2.12 grams per gallon. This amount of lead is normally added to assure that the required lean and rich mixture knock values are achieved. As noted above, 100 Octane (containing 1.12 grams of lead per liter or 4.24 grams of lead per gallon) is used by a small number of piston-engine aircraft. We currently do not include estimates of lead emissions using 100 Octane and we are requesting comment on the airport facilities where 100 Octane is used and the LTO activity associated with the use of this fuel.

Retention of lead in engine and oil (1-Pb Retention): Recent data collected from aircraft piston engines operating on leaded avgas suggests that about 5% of the lead from the fuel is retained in the engine and engine oil.[109] Thus the emitted fraction is 0.95.

Multiplying the lead concentration in 100LL avgas by the weighted average fuel usage rate produces an overall average value of 7.34 grams of lead per LTO (g Pb/LTO) for piston engines: 3.46 gal/LTO × 2.12 g Pb/gal = 7.34 g Pb/LTO. The denominator is a unit conversion factor used to express the lead inventory in units of short tons.

Applying these parameters in the equation above yields the following equation:

[104] U.S. Environmental Protection Agency (2008) Lead Emissions from the Use of Leaded Aviation Gasoline in the United States, Technical Support Document. EPA420-R-08-020. Available online at: *http://www.epa.gov/otaq/aviation.htm.*

[105] The FAA GAATA is a database collected from surveys of pilots flying aircraft used for general aviation and air taxi activity. For more information on the GAATA, *see* Appendix A, online at: *http://www.faa.gov/data_statistics/aviation_data_statistics/general_aviation/.*

[106] There are about 194,000 piston-engine aircraft in the U.S. general aviation and air taxi fleet (175,000 single-engine and 19,000 twin-engine aircraft) according to FAA's 2005 GAATA Survey.

[107] EPA understands that EDMS 5.0.2 has a limited list of piston engines, but these are currently the best data available.

[108] U.S. Environmental Protection Agency (1992) Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, EPA-450/4-81-026d (Revised).

[109] The information used to develop this estimate is from the following references: (a) Todd L. Petersen, Petersen Aviation, Inc, *Aviation Oil Lead Content Analysis*, Report Number EPA 1-2008, January 2, 2008, available at William J. Hughes Technical Center Technical Reference and Research Library at *http://actlibrary.tc.faa.gov/* and (b) E-mail from Theo Rindlisbacher of Switzerland Federal Office of Civil Aviation to Bryan Manning of U.S. EPA, regarding lead retained in engine, September 28, 2007.

$$\text{Pb (tons)} = \frac{\text{(piston-engine LTO)(7.34 g Pb/LTO)(0.95)}}{\text{907,185 g/short ton}}$$

which simplifies to: Pb = (piston-engine LTO) (7.7×10^{-6} short tons) or 7 grams of lead per LTO where piston-engine LTO = (GA LTO + AT LTO)(0.72). EPA used similar methods to estimate lead emissions from piston-engine powered helicopters which are described separately.[110] We currently estimate there are 6 grams of lead emitted by piston-engine helicopters per LTO.

Lead emitted during the LTO cycle is assigned to the airport facility where the aircraft operations occur.[111] FAA's Office of Air Traffic provides a complete listing of operational airport facilities in the National Airspace System Resources (NASR) database.[112] In 2008, there were 19,896 airport facilities in the U.S., the vast majority of which are expected to have activity by piston-engine aircraft that operate on leaded avgas. There are seven types of airport facilities: airports, balloonports, seaplane bases, gliderports, heliports, stolports,[113] and ultralight facilities. Among these, balloonports are the only facilities not expected to have piston-engine aircraft activity.

Preparing airport-specific lead inventories requires information regarding LTO activity.

These activity data are reported to the FAA for only a small subset of the approximately 20,000 facilities in the U.S. EPA obtains LTO information for approximately 3,400 facilities from FAA's Terminal Area Forecast (TAF) database that is prepared by FAA's Office of Aviation Policy and Plans.[114] The TAF database currently includes information for airports in FAA's National Plan of Integrated Airport Systems (NPIAS), which identifies airports that are significant to national air transportation. For airports not listed in the TAF, operations data are obtained from the NASR database, where available. Operations data provided by the NASR database may be self-reported by airport operators through data collection accomplished by airport inspectors who work for the State Aviation Agency, or operations data can be obtained through other means.[115]

We are using the January 15, 2009 version of the NASR database to evaluate airport lead emissions inventories for 2008. Using the TAF database as the primary source of LTO information and the NASR as a secondary source, we have LTO activity data for approximately 5,600 airport facilities. There are approximately 14,000 facilities in the NASR database for which there are no LTO activity data.[116] We developed methods based on previous work conducted by the FAA to estimate LTO activity at the remaining airport and heliport facilities. We are requesting comment on these methods which are described here briefly. The details regarding the method described here are available in the docket.[117]

The FAA has used regression models to estimate operations at facilities where operations data are not available.[118] [119] In this work and other work, FAA identified characteristics of small towered airports for which there were statistically significant relationships with operations at these airports.[120] Regression models based on the airport characteristics were then used to estimate general aviation operations for a set of non-towered airports. The airport characteristics identified by the FAA and used to estimate general aviation operations at small airports include: the number and type of aircraft based at the facility (*i.e.*, "based aircraft"), population in the vicinity of the airport, airport regional prominence, per capita income, region of the country, and the presence of certificated flight schools. We were able to obtain data from the NASR and the U.S. Census Bureau to evaluate relationships between several airport characteristics and LTO activity. LTO estimates were derived using different models depending on data availability.

The number of based aircraft and county population in which the airport is located were the most highly significant and positive regressors to LTO activity that our analysis provided.[121] The regression equation for based aircraft and county population is: LTOs = 1248 + 203.04*Aircraft + 0.0019*County Population with an R^2 = 0.64. For approximately 7,800 facilities that do not report LTO activity to FAA, we used based aircraft and county population to estimate activity. We request comment on the method we are using to estimate LTO activity at these airport facilities.

To estimate LTO activity at the airport facilities that do not report based aircraft, we used a regression equation based on county population and region of the country. The regression equation using county population and regression of the country is: LTOs = 6200.2 + 0.0087*county population— 175.07*West State − 5567.3*Alaska + 854.83*Northeast with an R^2 = 0.15. This equation has a low correlation coefficient and we are exploring additional options for estimating LTO activity at these facilities for which very little information is reported to the FAA. We request comment on applying the regression equation above and alternative methods to estimate LTO activity at these facilities.

For heliports, which comprise approximately 5,500 facilities in the NASR database, we had insufficient information on which to develop a regression equation and are currently using the median of activity (141 LTOs/year) at heliports for which we have LTO activity data. Nationally, 25% of helicopters are piston-engine powered and therefore use leaded avgas. The FAA and EPA have limited information

[110] U.S. EPA (March 2010) Memorandum from Meredith Pedde to docket EPA–HQ–OAR–2007–0294, titled, "Calculating Aviation Gasoline Lead Emissions in the 2008 NEI," pp.8–9.

[111] An aircraft operation is defined as any landing or take-off event, therefore, to calculate LTOs, operations are divided by two. Most data sources from FAA report aircraft activity in numbers of operations which, for the purposes of calculating lead emissions using the method described in the TSD, need to be converted to LTO events.

[112] An electronic report can be generated from the NASR database and is available for download from the Internet at the following Web site. *http://www.faa.gov/airports_airtraffic/airports/airport_safety/airportdata_5010/.* This database is updated every 56 days.

[113] Stolport is an airport designed with STOL (Short Take-Off and Landing) operations in mind, normally having a short single runway.

[114] *http://aspm.faa.gov/main/taf.asp.*

[115] In the absence of updated information from States, local authorities or Tribes, we are using the LTO data provided in the FAA database.

[116] No Commuter, GA Itinerant, GA Local, or Air Taxi operations data.

[117] U.S. EPA (March 2010) Memorandum from Meredith Pedde to docket EPA–HQ–OAR–2007–0294, titled, "Calculating Aviation Gasoline Lead Emissions in the 2008 NEI."

[118] Federal Aviation Administration, Office of Aviation Policy and Plans, Statistics and Forecast Branch. (July 2001) Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-towered Airport Data. Prepared by GRA, Inc.

[119] Hoekstra, M. (April 2000) Model for Estimating General Aviation Operations at Non-Towered Airports. Prepared for FAA Office of Aviation Policy and Plans.

[120] GRA, Inc. "Review of TAF Methods," Final Report, prepared for FAA Office of Aviation Policy and Plans under Work Order 45, Contract No. DTFA01–93–C–00066, February 25, 1998.

[121] U.S. EPA (March 2010) Memorandum from Meredith Pedde to docket EPA–HQ–OAR–2007–0294, titled, "Calculating Aviation Gasoline Lead Emissions in the 2008 NEI."

regarding the specific heliports that have activity by piston-engine helicopters. We are requesting information regarding heliport facilities at which piston-engine powered aircraft operate and the activity of these aircraft.

The draft 2008 NEI is the first inventory for which we are implementing the use of LTO-based lead estimates at almost 20,000 airport facilities and we are expecting State, local and Tribal air agency review of these data to improve our current estimates. The specific information on which we are requesting data include: (1) The fraction of GA and AT LTO activity reported to FAA that is conducted by piston-engine versus jet-engine powered aircraft, (2) airport-specific LTO activity for single- versus twin-engine piston-powered aircraft, (3) fuel consumption rates for the piston-engine aircraft operating at each airport, (4) the time spent in each mode of operation including run-up checks conducted by piston-engine aircraft prior to take-off, and (5) the concentration of lead in fuel delivered to individual airports. Methods for providing information to EPA as part of the review process involved in finalizing the 2008 NEI are available.[122]

The discussion above pertains only to lead emissions during the LTO cycle. Lead emitted outside the LTO cycle occurs during aircraft cruise mode and portions of the climb-out and approach modes. This part of an aircraft operation emits lead at various altitudes as well as close to and away from airports. We are developing methods to estimate lead emissions outside the LTO cycle which we anticipate will be available in 2010.

B. Projections for Future Growth

The FAA publishes an annual forecast of the number of piston-engine powered aircraft, hours flown, the consumption of avgas, the numbers of pilots and student pilots.[123] The most recent forecast is for the years 2009 through 2025. The General Aviation Manufacturers Association (GAMA) reproduces the FAA forecast in their annual statistical databook.[124] According to the GAMA summary, the number of active single-engine piston-powered aircraft is projected to increase annually at a 0.5% growth rate, with the aircraft population increasing from 144,220 in 2008 to 157,400 in 2025. The number of active twin-engine piston-powered aircraft is projected to decrease 0.9% annually, with aircraft population decreasing from 18,385 in 2008 to 15,650 in 2025. The piston-powered helicopter population is expected to grow 4.7% annually from a population of 3,970 in 2008 to 8,295 in 2025.

The FAA forecast predicts the number of hours flown in single-engine piston-powered aircraft is projected to increase 0.5% yearly from 2008 to 2025); the number of hours flown in twin-engine piston-powered aircraft is projected to decrease 1.5% annually and the number of hours flown in piston-powered rotocraft is projected to increase 3.9% annually. The changes in numbers of piston aircraft and hours flown is generally reflected in the consumption of leaded avgas. For the years 2008 through 2025, DOT's FAA estimates no change in the volume of leaded avgas consumed by single-engine aircraft in the U.S. (204 million gallons in 2008 and 2025), a 1.9% decrease in leaded avgas consumed by multi-engine aircraft (from a baseline of 108 million gallons in 2008 to 78 million gallons in 2025), and a 3.8% annual increase in the volume of leaded avgas consumed by piston-powered helicopters (from a baseline of 13 million gallons in 2008 to 24 million gallons in 2025). For 2025, the forecast volume of leaded avgas is 348 million gallons. Consumption of this volume of fuel would release 773 tons of lead to the air in 2025.

The number of active pilots flying general aviation aircraft (excluding air transport pilots) is projected to be slightly over half a million in 2025, representing a yearly increase of 0.7% over the forecast period.[125] The student pilot population is forecast to increase at a slightly higher rate of 1.0% yearly for a 2025 total slightly over 100,000. Private pilots and sport pilots are also projected to increase yearly (0.2% yearly increase in the number of private pilots). EPA is requesting comments on the forecast information presented in this section and on the uncertainty in these projections.

IV. Lead Concentrations in the Vicinity of Airports

This section summarizes information regarding the chemical and physical properties of lead emitted by piston-engine aircraft and monitoring and modeling studies regarding ambient and soil lead concentrations in the vicinity of airports where piston-engine aircraft operate.

A. Chemical and Physical Properties of Lead Emitted by Piston-Engine Aircraft

Information regarding lead emissions from engines operating on leaded fuel is summarized in prior AQCDs for Lead.[126] [127] The chemical form of lead added to avgas (*i.e.*, tetraethyl lead) and the lead scavenger, ethylene dibromide, are the same compounds used in leaded gasoline for motor vehicles in the past. Therefore, the summary of the science regarding emissions of lead from motor vehicles presented in the 1997 and 1986 AQCD for Lead are relevant to understanding some of the properties of lead emitted from piston-engine aircraft. In addition, the Swiss Federal Office of Civil Aviation (FOCA) published a study of piston-engine aircraft emissions including measurements of lead.[128]

When leaded avgas is combusted, the lead is oxidized to form lead oxide. In the absence of a lead scavenger in the fuel, lead oxide can collect on the valves and spark plugs and if the deposits become thick enough, the engine can be damaged. Ethylene dibromide reacts with the lead oxide, converting it to brominated lead and lead oxybromides. These halogenated forms of lead are volatile at the high temperatures experienced under combustion conditions and are therefore exhausted from the engine along with the other combustion by-products.[129] Upon cooling to ambient temperatures these brominated lead compounds are converted to particulate matter. In addition to lead halides, ammonium salts of lead halides were also emitted by motor vehicles.[130] Lead halides

[122] All documentation for use in preparing 2008 emission inventories can be found on the NEI/EIS Implementation Web site: *http://www.epa.gov/ttn/chief/net/neip/index.html.*

[123] FAA Aerospace Forecast Fiscal Years 2009–2025. Available online at: *http://www.faa.gov/data_research/aviation.*

[124] General Aviation Manufacturers Association (2008) General Aviation Statistical Databook and Industry Outlook, pp.51–55. Available online at: *http://www.gama.aero/files/2008_general_aviation_statistical_databook__indust_499b0dc37b.pdf.*

[125] Except for sport pilots, an active pilot is a person with a pilot certificate with a valid medical certificate. Source: FAA 2008–2025 Aerospace Forecast.

[126] U.S. Environmental Protection Agency (1977) Air Quality Criteria for Lead. Research Triangle Park, NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA–600/8–77–017. Available at: *http://www.epa.gov/ttn/naaqs/standards/pb/s_pb_pr.html.*

[127] U.S. Environmental Protection Agency (1986) Air Quality Criteria for Lead. Research Triangle Park, NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA–600/8–83/028aF–dF. 4v. Available at: *http://www.epa.gov/ttn/naaqs/standards/pb/s_pb_pr.html.*

[128] Federal Office of Civil Aviation Environmental Affairs (2007) Aircraft Piston Engine Emissions Summary Report. *33–05–003 Piston Engine Emissions_Swiss FOCA_Summary. Report_070612_rit.* Available online at: *http://www.bazl.admin.ch.*

[129] ChevronTexaco (2006) Aviation Fuels Technical Review pp. 64–65. Available online at: *http://www.chevronglobalaviation.com/docs/aviation_tech_review.pdf.*

[130] U.S. Environmental Protection Agency (1986) Air Quality Criteria for Lead. Volume 2 Section

undergo compositional changes upon cooling and mixing with the ambient air as well as during transport; the water-solubility of these lead-bearing particles increases with a shift toward smaller mean particle size (USEPA 1977, Section 6.2.2.1). Lead halides from automobile exhaust break down rapidly in the atmosphere, via redox reactions in the presence of atmospheric acids (AQCD for Lead, page E–17).

A small fraction of uncombusted alkyl lead was measured in the exhaust of motor vehicles operating with leaded gasoline and is therefore likely to be present in the exhaust from piston-engine aircraft.[131] Alkyl lead is the general term for organic lead compounds and includes the lead additives tetramethyl lead and tetraethyl lead. Tetraethyl lead is a highly volatile compound and therefore, a portion of tetraethyl lead in fuel exposed to air will partition into the vapor phase. Tetraethyl lead can enter the atmosphere from avgas distribution systems, refueling operations, fuel check pre-flight procedures and evaporative losses from the aircraft.[132] Tetraethyl lead has an atmospheric residence time ranging from a few hours to a few days. Tetraethyl lead reacts with the hydroxyl radical in the gas-phase to form a variety of products that include ionic trialkyl lead, dialkyl lead and metallic lead. Trialkyl lead is slow to react with the hydroxyl radical and is quite persistent in the atmosphere (AQCD for Lead, page 2–5).

Particles emitted by piston-engine aircraft are in the submicron size range (less than one micron in diameter). The Swiss FOCA reported the mean particle diameter of particulate matter emitted by one single-engine piston-powered aircraft ranged from 0.049 to 0.108 microns under different power conditions. The particle number concentration ranged from 5.7×10^6 to 8.6×10^6 particles per cm^3 and using a specific density for soot of 1.2, the authors estimated the mass concentration of particulate emissions as approximately 10,000 $\mu g/m^3$. The authors noted that these particle emission rates are comparable to those from a typical diesel passenger car engine without a particle filter (FOCA, Section 2.2.3.a).

A significant fraction of particles in the submicron size range are deposited and retained in the lower respiratory system of humans and animals (AQCD for PM, page 6–108).[133] The 1986 AQCD for Lead concludes that lead deposited in the lower respiratory tract is totally absorbed (USEPA 1986, page 10–2).

Due to their small size (*i.e.*, typically less than one micron in diameter), lead-bearing particles emitted by piston engines may disperse widely in the environment. However, lead emitted during LTO, particularly during ground-based operations such as start-up, idle, preflight run-up checks, taxi and take-off may deposit to the local environment. Meteorological factors (*e.g.*, wind speed, convection, rain, humidity) will influence local deposition rates. As discussed in the overview section of this ANPR, many airports in the country have been home to piston-engine operations for decades, including years when lead concentrations in avgas were twice as high as current levels. We seek comment on the chemical and physical form of lead emissions from piston-engine aircraft as well as dispersion and deposition patterns that may influence the risk for local-scale impacts.

B. Summary of Airport Lead Monitoring and Modeling Studies

Lead concentrations in ambient air have been reported for samples collected on or near five airports: the Santa Monica municipal airport in Santa Monica, CA, the Van Nuys airport in Van Nuys, CA, the Chicago O'Hare airport in IL, the Toronto Buttonville municipal airport in Ontario, Canada, and the Destin airport in Destin, FL.[134] [135] [136] [137] [138] Air quality modeling of lead emissions from piston-engine aircraft has been conducted as part of EPA's National Air Toxics Assessment and in one study.[139] [140] As discussed in Section VI.A of this ANPR, State and local agencies are initiating lead monitoring at four airports in 2010 that will provide additional information regarding the air quality impact of lead emissions from piston-engine aircraft.

1. Summary of Airport Lead Monitoring Studies

The ambient air monitoring studies reporting lead concentrations on and near airport property served many purposes and therefore used different criteria for determining sample locations, sample durations, sample collection methods, and collection of important metadata (*e.g.*, activity of piston-engine aircraft and aircraft engine type). This section summarizes results from these studies.

Ambient monitoring studies at and near airports indicate that lead levels in ambient air at or near airports with piston-engine activity are higher than lead levels in areas not directly influenced by a lead source. The study at the Santa Monica Airport [141] is the only study to date in which a lead monitor was sited at an area of anticipated maximum concentration for a period of time that provides ambient concentrations relevant for comparison to the Lead NAAQS.[142] In this study where monitors were placed in

Chapters 5 & 6. Research Triangle Park, NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA–600/8–83/028aF–dF. 4v. Available from: NTIS, Springfield, VA; PB87–142378.

[131] U.S. Environmental Protection Agency Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Program (2002) PBT national action plan for alkyl-Pb. Washington, DC. Available online at: *http://www.epa.gov/pbt/pubs/Alkyl_lead_action_plan_final.pdf.*

[132] U.S. Environmental Protection Agency Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Program (2002) PBT national action plan for alkyl-Pb. Washington, DC. p. 12. Available online at: *http://www.epa.gov/pbt/pubs/Alkyl_lead_action_plan_final.pdf.*

[133] U.S. Environmental Protection Agency (2004) Air Quality Criteria for Particulate Matter (AQCD). Volume II Document No. EPA600/P–99/002bF. Washington, DC: U.S. Environmental Protection Agency. Available online at: *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=87903.*

[134] South Coast Air Quality Management District (2007) Community-Scale Air Toxics Monitoring—Sun Valley Neighborhood and General Aviation Airports. Presented by Dr. Philip Fine at the U.S. EPA Air Toxics Data Analysis Workshop—Chicago, IL. October 2–4, 2007.

[135] Illinois Environmental Protection Agency Bureau of Air (2002) Chicago O'Hare Airport Air Toxic Monitoring Program June–December, 2000.

[136] Environment Canada (2000) Airborne Particulate Matter, Lead and Manganese at Buttonville Airport. Toronto, Ontario, Canada:Conor Pacific Environmental Technologies for Environmental Protection Service, Ontario Region.

[137] Tetra Tech, Inc. (2007) Destin Airport Air Sampling Project Executive Summary. Prepared for City of Destin, Florida.

[138] Tetra Tech, Inc. (2008) Destin, Florida Airport Sampling Report. October 2008. Prepared for City of Destin, Florida.

[139] Piazza, B for the Los Angeles Unified School District Environmental Health and Safety Branch (1999) Santa Monica Municipal Airport: A Report on the Generation and Downwind Extent of Emissions Generated from Aircraft and Ground Support Operations. Report Prepared for The Santa Monica Airport Working Group. Available online at: *http://yosemite.epa.gov/oar/CommunityAssessment.nsf/6ce396ab3fa98ee485256db0004acd94/$FILE/Santa_Monica.pdf*

[140] U.S. Environmental Protection Agency (2009) 2002 National-Scale Air Toxics Assessment (NATA). Available online at: *http://www.epa.gov/ttn/atw/nata2002/index.html.*

[141] South Coast Air Quality Management District (2007) Community-Scale Air Toxics Monitoring—Sun Valley Neighborhood and General Aviation Airports. Presented by Dr. Philip Fine at the U.S. EPA Air Toxics Data Analysis Workshop—Chicago, IL. October 2–4, 2007. This presentation includes lead monitoring data collected at and near the Santa Monica Airport and the Van Nuys Airport.

[142] As with other lead sources, source-oriented monitors for airports should be sited in ambient air at the location of predicted maximum lead concentration. Typically, the location of maximum lead concentration will be downwind of the take off strip near the "blast fence." *http://www.epa.gov/ttnamti1/files/ambient/pb/NetworkDesignQA.pdf.*

locations to identify the gradient in lead concentrations with distance from piston-engine activity, ambient lead increased with increasing proximity to the airport. Lead monitors were located at seven sites around the Santa Monica Airport for two three-month periods, in Spring 2006 and Winter 2006–2007. At the monitor placed near the runway blast fence (*i.e.*, the maximum impact site) on the Santa Monica Airport property, the quarterly average concentrations of lead in total suspended particulate matter (TSP) were 0.08 (winter) and 0.10 (spring) μg/m³.[143] The maximum quarterly average concentration of lead in total suspended particulate matter (TSP) was 0.10 μg/m³, 67% of the 2008 Lead NAAQS of 0.15 μg/m³. This suggests that ambient air lead concentrations at similar airports with more piston-engine activity than the Santa Monica Airport may be higher, and could further approach or exceed 0.15 μg/m³. At a neighborhood site, 70 meters in the prevailing downwind direction from the maximum impact site, quarterly average concentrations of lead in TSP were 0.02 μg/m³ (winter) and 0.03 μg/m³ (spring).[144] At a distance of one kilometer in the prevailing downwind direction from the maximum impact site, lead concentrations were 0.004 μg/m³ and 0.008 μg/m³ in winter and spring, respectively (these concentrations are considered the background lead concentration). The study conducted at the Santa Monica Airport reported concentrations of ambient lead that were highest at on- and near airport areas downwind from the emissions of piston-engine aircraft. These data suggest that piston-engine activity can increase ambient lead concentrations in downwind neighborhood sites, resulting in levels that are four to five times higher than background levels and maximum impact site concentrations that are up to 25 times higher than background lead levels.[145]

As with other emissions from internal combustion engines, lead emitted by piston-engine aircraft are largely in the submicron and even ultrafine size fraction; therefore, analogies to gradients in ultrafine PM are relevant. As summarized in EPA's 2009 Integrated Science Assessment for Particulate Matter, ultrafine particulate number counts decrease exponentially with distance from roadways.[146] A recent study at the Santa Monica Airport reported increased ultrafine PM in a neighborhood downwind from aircraft operations that were conducted by jet and piston-engine aircraft.[147] The EPA is conducting modeling and monitoring studies to further evaluate the gradient in lead concentrations with distance from airports (*see* Section VI.B of this ANPR).

At the Van Nuys Airport, lead monitoring in ambient air was conducted at six sites for two three-month periods. Lead monitoring for this study included locations of ambient air on airport property. However, monitors were not sited in the area anticipated to experience the maximum impact from piston-engine aircraft emissions. The monitoring site that was in closest proximity to the maximum impact area was more than one kilometer downwind from the maximum impact site.[148] The highest quarterly concentration of lead observed at the Van Nuys Airport was at the monitor located over one kilometer away from the maximum impact site and the lead concentration at this site was 0.03 μg/m³ which was four-fold higher than the regional background level of 0.008 μg/m³ measured during the same time period at a site over 2.5 kilometers from the north end of the Van Nuys Airport.

At the Toronto Buttonville Municipal Airport, ten 24-hour PM_{10} samples were collected at four sites at the airport (as close as 15 meters from the runway) and one urban background site in downtown Toronto (located about 10 kilometers west, southwest of the airport). PM_{10} is particulate matter less than ten microns in aerodynamic diameter. The average lead concentration among the airport monitors (which includes three samples that were taken for less than a 12-hour period), was 0.03 μg/m³ and the maximum 24-hour lead concentration was 0.13 μg/m³. One sample, collected for 11 hours, measured 0.30 μg/m³. The maximum concentration observed over a 24-hour period at the airport during this study (0.13 μg/m³) was 11 times higher than the lead concentration reported for the downtown Toronto, Canada background site during the same time period (0.012 μg/m³).[149] The average lead concentration reported for the downtown Toronto site was 0.007 μg/m³. The total particulate matter mass in PM_{10} was also measured in this study, and at the airport, the average mass of lead in PM_{10} was 0.15% of the total PM_{10} mass. At the downtown Toronto site, the average mass of lead in PM_{10} was 0.04% of the total PM_{10} mass. The study reported that the use of leaded avgas at the airport was evident in enhanced airborne lead levels.

Lead and other hazardous air pollutants were measured at sites upwind and downwind of the Chicago O'Hare Airport on sixteen days during the period from June through December, 2000. In order to assess the potential impact of airport operations on ambient concentrations of lead and other pollutants in areas adjacent to airport property, two monitoring sites were deployed on different sides of the airport: one in Bensenville, IL and the other in Schiller Park, IL. For five days during the sampling campaign, the prevailing wind direction provided samples that were collected simultaneously upwind and downwind of the airport. Lead concentrations measured at the downwind site on these five days were, on average, 88% higher than lead concentrations measured at the upwind site. Lead concentrations at the upwind site over the five days averaged 0.016 μg/m³ and downwind concentrations averaged 0.030 μg/m³. This study demonstrates the potential for operations on airport property to impact ambient lead concentrations downwind.

Lead TSP samples were collected for four days in April 2007 and for three days in July 2008 near the Destin Airport in Destin, FL. Twelve-hour TSP samples (AM and PM) were collected at four residential locations ranging from 200 meters to 400 meters from the runway at the Destin Airport and at two urban background locations which were 1.4 kilometers and 2.7 kilometers from the airport.[150] The average lead concentration among the four residential locations was 0.004 μg/m³ and 0.005 μg/m³ in April and July, respectively, and the average urban

[143] A low-volume sampler was used at this site which EPA expects would yield comparable results to a high-volume sampler, the latter of which is the current method used to collect samples for comparison with the Lead NAAQS.

[144] These distances were measured using Google Earth Pro software.

[145] EPA notes that additional information regarding this study at the Santa Monica Airport may become available. If additional information does become available, EPA will take this information into account in the NPRM.

[146] U.S. Environmental Protection Agency (2009) Integrated Science Assessment for Particulate Matter. Second External Review Draft. EPA/600/R-08/139B. p. 3–110. Available online at: *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=210586.*

[147] Hu, S., Fruin, S., Kozawa, K., Mara, S., Winer, A.M., Paulson, S.E. (2009) Aircraft Emission Impacts in a Neighborhood Adjacent to a General Aviation Airport in Southern California. Environ. Sci. Technol. 43:8039–8045.

[148] These distances were measured using Google Earth Pro software. Prevailing wind direction, which determines the direction in which the majority of aircraft depart, is provided in the SCAQMD presentation of these data.

[149] Average concentrations reported in this study include three days of short-duration sampling so the average is not used for comparison here.

[150] These distances were measured using Google Earth Pro software.

background lead concentration was 0.003 and 0.004 μg/m³ in April and July, respectively.

In addition to these airport-specific studies, authors evaluating ambient lead concentrations collected as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network and the National Oceanic and Atmospheric Administration (NOAA) monitoring sites reported a weekend increase in ambient lead that the authors attributed to weekend increases in piston-engine powered general aviation activity.[151] At some airports, piston-engine aircraft activity conducted for recreational purposes can increase greatly on weekends and can also change seasonally with weather conditions. These peaks in activity are important to capture because they may have a strong influence on long-term average concentrations in an area. However, the current database for ambient lead concentrations at maximum impact sites at airports is severely limited and does not allow us to quantitatively evaluate the influence of this variability in activity on ambient lead concentrations.

We have identified no studies evaluating the potential contribution of piston-engine aircraft emissions on vegetation. We have identified only one study that reports soil concentrations on airport property where piston-engine aircraft are active. The air monitoring study conducted at the Toronto Buttonville airport in Ontario, Canada reported lead concentrations in soil samples collected at eight locations at the airport and two locations at the urban background site. Soil samples that were collected at the Toronto Buttonville airport had lead concentrations ranging from 22–46 μg/g which was not substantially higher than the lead concentrations in soil samples at the two urban background sites (29 and 31 μg/g). We are seeking comments on the potential for piston-engine aircraft emissions to impact local soil lead concentrations.

2. Summary of Airport Lead Modeling Studies

Lead emissions from piston-engine aircraft at 3,410 airports were included in the recently released 2002 National Air Toxics Assessment (NATA) as nonroad sources of lead.[152] Ambient lead concentrations and exposures to lead are modeled for area, point and nonroad sources. Nonroad sources include only lead emissions from piston-engine aircraft. Lead emission rates are based on the lead concentration in fuel and not direct emission measurements. For the NPRM we will summarize modeling results from the 2005 NATA which will incorporate all 20,000 airport facilities discussed in Section III of this ANPR.

As discussed in Section VI of this ANPR, the EPA has conducted a study to develop a modeling approach to evaluate the local-scale variability in ambient lead concentrations attributable to piston-engine activity at a case study airport. This project includes collection of air monitoring data for use in evaluating model performance. In the NPRM, we will describe the results of the modeling study with NATA results for this airport and previous modeling work.[153]

We are requesting comment on the availability of additional monitoring or modeling studies that evaluate the air quality impact of lead emissions from piston-engine aircraft as well as potential impacts on soil, house dust, surface water or other environmental media. We also request comment on the availability of studies that assess the potential public health and welfare impacts of lead emissions from piston-engine aircraft.

V. Exposure to Lead From Piston-Engine Aircraft and Potential for Impacts

The continued use of lead in avgas by piston-engine aircraft is a significant source of current lead emissions to the environment. Piston-engine aircraft emissions of lead occur at ground level as well as at flying altitude. Lead from this source is thus concentrated near airports and is also deposited over a large geographic area potentially contributing to higher ambient concentrations in many communities. Numerous groups within the population may be at risk of exposure to lead in fresh emissions from piston-engine aircraft, resuspended dust or other routes. Further, lead accumulates in the environment posing a potential risk to future generations

In this section we discuss a variety of exposure pathways and scenarios by which the general population and environment may experience an increase in lead exposure from emissions of lead by piston-engine aircraft. This section also describes the potential for public health and welfare effects from exposure to compounds associated with the continued use of tetraethyl lead in fuel, such as the contribution of lead to ambient particulate matter, emissions of ethylene dibromide and non-exhaust exposure to tetraethyl lead. We are seeking comments and information on these exposure scenarios as well as additional exposure pathways and scenarios.

A. Exposure to Lead Emissions From Piston-Engine Aircraft

Piston-engine aircraft emissions of lead occur at ground level as well as at altitudes, resulting in areas of more concentrated ambient air exposure, as discussed in Section IV, and can also be distributed over large geographic areas due to in-flight emissions. Lead particles can deposit to soil, water, vegetation and other surfaces or remain airborne for some time following emissions. In this section we discuss potentially exposed populations which include people living or attending schools near airports and pilots. Additional pathways by which people and animals could be exposed to lead emissions from piston-engine aircraft are those associated with agricultural applications of these aircraft and piston-engine activity at seaport and inland waterways.

Lead from aviation gasoline has been identified as a potential source of contamination for local communities.[154] As described below, many general aviation airports are located in densely populated areas. GA airport facilities were typically built in sparsely populated areas, many of which are now heavily populated or are experiencing increased residential development. This development includes dense residential neighborhoods, schools, businesses, and recreational facilities.

Airports can function as a center of many forms of activity in a community. In EPA's initial research, EPA has found that airports are often surrounded by a variety of land uses including recreational sport facilities (*e.g.*, baseball diamonds, soccer fields, golf courses, and swimming pools) and residential communities that take

[151] Murphy, D.M., Capps, S.L., Daniel, J.S., Frost, G.J., and White, W.H. (2008) Weekly patterns of aerosol in the United States. Atmos. Chem. Phys., 8, 2729–2739.

[152] U.S. Environmental Protection Agency (2009) 2002 National-Scale Air Toxics Assessment (NATA). Available online at: *http://www.epa.gov/ttn/atw/nata2002/tables.html.*

[153] Piazza, B for the Los Angeles Unified School District Environmental Health and Safety Branch (1999) Santa Monica Municipal Airport: A Report on the Generation and Downwind Extent of Emissions Generated from Aircraft and Ground Support Operations. Report Prepared for The Santa Monica Airport Working Group. Available online at: *http://yosemite.epa.gov/oar/CommunityAssessment.nsf/6ce396ab3fa98ee485256db0004acd94/$FILE/Santa_Monica.pdf.*

[154] Levin, R.; Brown, MJ; Kashtock, ME; Jacobs, DE; Whelan, EA; Rodman, J; Schock, MR; Padilla, A; Sinks, T. (2008) Lead Exposures in U.S. Children, 2008: Implications for Prevention. Environ. Health Perspec. 116:1285–1293.

advantage of the ease of transport and pilot training/recreation offered by quick access to an airport. Many airports offer on-site tours to the general public, educational classes, and recreational opportunities that can present near-source exposure scenarios. Airports are especially attractive to young children, and programs at some airports are focused on this population and provide outdoor observation facilities and picnic facilities for families to observe aircraft operations. Many general aviation airports offer instructional flying and/or clubs where children 14 years of age and older as well as adults can learn to fly in rental aircraft. Airport facilities also host community-friendly activities such as antique sales, fireworks displays, air shows and community meals. Many airport facilities provide activities which bring people from the general public in close proximity to lead emissions from piston-engine aircraft and piston-engine helicopters. EPA is requesting information regarding national databases that provide information regarding recreational fields and community gardens in close proximity to airports.

1. Population Residing Near Airports

To evaluate the number of people who might be exposed to elevated lead levels due to emissions from piston-engine aircraft, EPA calculated the number of people that live within one kilometer of the centroid of an airport.[155] The centroid of the airport is defined here as the latitude and longitude coordinate provided by airports to FAA.[156] These coordinates typically identify a location in the center of the runway or runway area. For some airports, nearby residences are outside the one kilometer distance from the airport centroid. This is the case for residences near airports that have runways that are longer than two kilometers and for residences near large airports such as those servicing primarily commercial aircraft activity. For airport facilities with one runway that is approximately one kilometer in length, this method will generally include people residing within approximately 500 meters from the ends of the runway and may include residences up to approximately 900 meters from the sides of the runway. The limited ambient lead monitoring data near airports presented in Section IV of this ANPR suggests that for some airports this analysis will underestimate the actual number of people potentially exposed to elevated levels of ambient lead from piston-engine powered aircraft. This is because the analysis will include very little of the nearby population for airports that have a large footprint. We plan to revise this analysis for the NPRM using a graphical interface system that will allow us to evaluate the number of people living within uniform distances of aircraft activity.

Using 2000 U.S. Census Data[157] at the block level, EPA estimates that 16 million people live within one kilometer of the centroid of the 19,896 airport facilities which includes airports, seaplane bases, heliports, stolports, ultralight facilities and glider ports. There are currently 5,567 heliports in this analysis, which can be in densely populated areas. Fourteen of the 16 million people living within one kilometer of the centroid of an airport facility live within one kilometer of a heliport. We currently have limited information regarding which heliport facilities have piston-engine activity and we are seeking comment on piston-engine activity at heliports.

There are several pathways by which people may be exposed to lead associated with the use of piston-engine aircraft. These include inhalation of ambient airborne lead as well as incidental ingestion of ambient lead through contact with indoor or outdoor surfaces to which ambient lead has deposited. Additionally, ambient lead deposited to outdoor soil can be tracked into interior spaces. There is also the potential for ingestion of lead emitted by piston engine aircraft emissions to deposit on edible plants and produce being cultivated in locations near airports. Consequently, there is the potential for exposure to lead emitted by piston-engine aircraft via ingestion for those consuming vegetables grown near airports that service piston-engine aircraft. In addition to personal gardens, community gardens are sometimes sited near airports as these areas can have undeveloped available land. We do not have information on the potential significance of this exposure pathway and we are seeking comment on information and analyses that could inform this issue.

In some cases, pilots and their families choose to live in close proximity to an airstrip. These communities intentionally placed near airports are known as airport communities, fly-in communities or residential airparks. Some residential airparks are private while others have public services and facilities. Some residential airparks are specifically designed as airport communities with driveways leading from aircraft hangars or tie-downs onto the airstrip, while other residential airparks allow apartments to be built in the airplane hangar. Other residential airparks are developed by the addition of a neighborhood immediately adjacent to a commercial airport. FAA terms this a "through-the-fence" operation.[158] Homes are required to be at least 45 meters from the runway centerline and can be built along one or both sides of the runway.[159] Some residential airparks provide taxiways for access to the runway, some provide streets separate from taxiways, and some share automobile and aircraft traffic on the same thoroughfares. A variety of resources list the location and services offered by residential airparks in the U.S. and estimates of the number of residential airparks range from 300 to 600.[160] [161]

In some cases, records are maintained only for those residential parks that have five or more homes or lots.

Exposure modeling at the EPA indicates that, for the 20 highest air emission sources, local emissions are significantly related to local blood lead levels.[162] We are aware of no studies evaluating blood lead levels among people who live in close proximity to airports with piston-engine activity or those for whom lead emissions from piston engines may elevate their exposure via other exposure pathways. As noted in Section II.B.2, the current evidence indicates that the slope for

[155] U.S. EPA (March 2010) Memorandum from Meredith Pedde to docket EPA-HQ-OAR-2007-0294, titled, "Evaluation of People Living Within 1 km of U.S Airport Facilities."

[156] Federal Aviation Administration. Airport Data (5010) & Contact Information. Airport Facilities Data. Retrieved on August 13, 2009 from: *http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/index.cfm.*

[157] Obtained from: *http://www.epa.gov/ttn/fera/human_hem_censusandmet.html.*

[158] FAA officially defines "through-the-fence" as those activities permitted by an airport sponsor through an agreement that permits access to the public landing area by independent entities or operations offering an aeronautical activity or to owners of aircraft based on land adjacent to, but not part of, the airport property. The obligation to make an airport available for the use and benefit of the public does not impose any requirement for the airport sponsor to permit ground access by aircraft from adjacent property. (*http://www.aopa.org/whatsnew/region/airportOps0712.pdf*).

[159] ASTM International (2005) ASTM F2507-05 Standard Specification for Recreational Airpark Design

[160] *http://www.airparks.com* maintains a list of airparks that have five or more homes/lots. The list can be updated by the public and as of July 31, 2009, lists 326 residential airparks.

[161] *http://livingwithyourplane.com/about/* has a directory of over 600 residential airparks.

[162] U.S. Environmental Protection Agency (2007) Pilot Study of Targeting Elevated Blood Lead Levels in Children (Draft Final Report). Washington DC: U.S. EPA Office of Pollution Prevention and Toxics. *http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=195303.*

lead effects on IQ is nonlinear and is steeper at lower blood lead levels, such that each µg/dL increase in blood lead may have a greater effect on IQ at lower blood lead levels (*e.g.*, below 10 µg/dL) than at higher levels (AQCD for Lead, Section 6.2.13; pp. 8–63 to 8–64; Figure 8–7). We are therefore seeking comment and information regarding blood lead concentrations in children living near airports and the extent to which these emissions cause or contribute to any increases in blood lead levels.

2. Children Attending School Near Airports

As noted in Section II.B.2 of this ANPR, while adults are susceptible to lead effects at lower blood lead levels than previously understood (*e.g.*, AQCD for Lead, p. 8–25), there is general consensus that the developing nervous system in children is among the, if not the, most sensitive health endpoints. Also, as noted in Section II.B.3, while children are considered to be at a period of maximum exposure around 18–27 months, the current evidence has found even stronger associations between blood lead levels at school age and IQ at school age. The evidence "supports the idea that lead exposure continues to be toxic to children as they reach school age, and [does] not lend support to the interpretation that all the damage is done by the time the child reaches 2 to 3 years of age" (AQCD for Lead, Section 6.2.12). Accordingly, school-age children are an at-risk population for lead exposures. This section discusses potential exposures of children at school to lead associated with piston-engine aircraft.

During the school year, students spend many hours a day at school, which usually includes time on school playgrounds and on school athletic fields. Those children attending schools in close proximity to piston-engine activity may have increased exposure to lead. Using data from the U.S. Department of Education's National Center for Education Statistics, EPA calculated that there are 8,637 schools located within one kilometer of the centroid of an airport in the U.S., at which over 3 million children are in attendance (Table 1).[163] [164] These children represent 6% of the total U.S. student population.

TABLE 1—NUMBERS OF PUBLIC AND PRIVATE SCHOOLS AND SCHOOL CHILDREN ATTENDING SCHOOLS LOCATED WITHIN ONE KILOMETER OF THE CENTROID OF AN AIRPORT SERVICING PISTON-ENGINE AIRCRAFT

	Number of schools within 1 km of an airport	Number of students who attend schools within 1 km of an airport
Private Schools	2,185	420,824
Public Schools	6,452	2,869,939
All Schools	8,637	3,290,763

Section II.B.1 notes that children in poverty and black, non-Hispanic children have notably higher blood lead levels than do economically well-off children and white children, in general. To evaluate potential ethnic and economic disparities among children attending schools close to airports compared with the general population, we used data from the Department of Education that provides this information. These data indicate that minorities are overrepresented at schools that are located within one kilometer from the centroid of an airport. For example, Hispanic students represent 23% of students at schools located within one kilometer of an airport, whereas Hispanic students represent 19% of students in all U.S. schools (Table 2). Black students represent 18% of students at schools located within one kilometer of an airport, whereas black students represent 16% of the student population in the U.S. (Table 2).

TABLE 2—RACIAL DISTRIBUTION AT SCHOOLS WITHIN ONE KILOMETER OF THE CENTROID OF AN AIRPORT AND THE RACIAL DISTRIBUTION AT ALL U.S. SCHOOLS

		American Indian/Alaskan Indian	Asian/Pacific Islander	Black, Non-Hispanic	Hispanic	White, Non-Hispanic	Total students*
All Schools within 1 km of an airport.	Number	46,861	154,408	597,223	764,704	1,646,882	3,290,763
	Percent	1%	5%	18%	23%	50%	
All U.S. Schools	Number	632,237	2,581,822	8,696,565	10,525,763	30,664,231	54,271,986
	Percent	1%	5%	16%	19%	57%	

*This table includes only those children that identify as one of the five races/ethnicities. A small fraction of students identify as mixed race or 'other' and they are not included here, therefore the percent of students does not total 100%.

In general, housing and income data suggest that people living in close proximity to major transportation sources (*i.e.*, major roadways, airports, ports, railyards) are likely to have lower income than the general population.[165] To evaluate the socioeconomic status of students who attend schools near airports, EPA evaluated the number of students who are eligible for the U.S. Department of Agriculture's free or reduced school lunch program. Children

[163] U.S. EPA (March 2010) Memorandum from Meredith Pedde to docket EPA–HQ–OAR–2007–0294, titled, "Identification of Schools Within 1 km of U.S Airport Facilities."

[164] Public School Data available for 2006–2007: *http://nces.ed.gov/ccd/bat/*; Private School Data available for 2007–2008: *http://nces.ed.gov/surveys/pss/pssdata.asp*.

[165] U.S. Environmental Protection Agency (2007) Regulatory Impact Analysis for the Regulation to Control Hazardous Air Pollutant Emissions from Mobile Sources. Chapter 3, p. 3–122.

from families with incomes at or below 130 percent of the poverty level are eligible for free meals. Those with incomes between 130 percent and 185 percent of the poverty level are eligible for reduced-price meals.[166] Free and reduced lunch eligibility is only tracked by the U.S. Department of Education's National Center for Education Statistics for students who attend public schools. At public schools that are located within one kilometer of the centroid of an airport, 47% of students are eligible for either free or reduced lunches, whereas nationally, 41% of students at public schools are eligible for either free or reduced lunches. As this analysis demonstrates, those living in the vicinity of airports are more likely to be low-income households and minority residents.

We are aware of no studies evaluating blood lead levels among children attending school in close proximity to airports with piston-engine activity. We are seeking comment and information regarding blood lead concentrations in children who attend schools in close proximity to airports and the extent to which these emissions cause or contribute to any increases in blood lead levels.

3. Agricultural Activities

Piston-engine aircraft are used in a variety of agricultural activities that may introduce lead into the human diet as well as contribute to lead in the environment. The FAA conducts the General Aviation and Air Taxi Activity (GAATA) Survey annually to obtain information on the general aviation and air taxi fleet, the number of hours flown, and the reasons people use general aviation and air taxi aircraft.[167] [168] According to the results of the 2007 GAATA Survey (the most recent), aerial application in agriculture and forestry represented 5% of all hours flown by general aviation aircraft in 2007. Of the total aerial application hours flown in 2007 (1.41 million hours), 60% of the hours were flown by piston-engine aircraft. Aerial application activity includes crop and timber production, which involve fertilizer and pesticide application and seeding cropland. The National Agricultural Aviation Association estimates that there are approximately 3,200 aerial application professional operators and pilots in the United States.[169]

As discussed in Section II.C.1, surface deposition of lead onto plants may represent a significant contribution to the total lead in and on the plant. Lead halides, the primary form of lead emitted by engines operating on leaded fuel, are slightly water soluble. They therefore may be more readily absorbed by plants than other forms of inorganic lead. Atmospheric deposition of lead also contributes to lead in vegetation as a result of contact with above-ground portions of the plant (AQCD for Lead, pp. 7–9 and AXZ7–39; USEPA, 1986, Sections 6.5.3 and 7.2.2.2.1). Livestock may subsequently be exposed to lead in vegetation (*e.g.*, grasses and silage) and in surface soils via incidental ingestion of soil while grazing (USEPA 1986, Section 7.2.2.2.2).[170] The lead concentration of plants ingested by animals is primarily a result of atmospheric deposition of lead particles onto plant surfaces rather than the uptake of soil lead through plant roots. Some of the highest levels of lead exposure among livestock have been attributed to grazing near major sources such as smelters (AQCD for Lead, Section 2.3.8). Atmospheric deposition is estimated to comprise a significant proportion of lead in food (AQCD for Lead, p. 3–48) and dietary intake may be a predominant source of lead exposure among adults (greater than consumption of water and beverages or inhalation (73 FR 66971)).

Depending on wind conditions, an aircraft involved in aerial application may fly only 4 inches to 12 feet above the crops.[171] [172] [173] The low flying height is needed to minimize the drift of the fertilizer and pesticide particles away from their intended target. An unintended consequence of this practice is that exhaust emissions of lead have a substantially increased potential for directly depositing on vegetation and surrounding soil. We have not identified any data or analyses regarding the contribution of piston-engine aircraft lead emissions to lead concentrations in or on plant tissues, in livestock or the dose that this might deliver to the human population. We are seeking comments on the potential significance of this exposure pathway.

4. Pilots, Student-Trainees, Passengers

Pilots, student-trainees, and passengers are all potentially exposed to lead emissions from piston-engine aircraft that use leaded avgas. General aviation passengers and pilots access their aircraft in areas that are typically in close proximity to runways. Therefore, these individuals walk near and breathe the air near locations where aircraft are idling, conducting run-up checks, taxiing, taking off, and landing.

In the U.S., general aviation aircraft fly over 27 million hours and carry 166 million passengers annually.[174] Approximately 36 percent of the hours flown by general aviation are for personal transportation, 19 percent are instructional flight hours, 11 percent are corporate flight hours, 11 percent are for business, eight percent are air taxi and air tours and the remainder include hours spent in other applications such as aerial observation and aerial application.[175] According to the 2008 General Aviation Statistical Databook & Industry Outlook report by the General Aviation Manufacturers Association (GAMA) there were 578,541 pilots in the United States in 2008.[176] Among the pilot population, 75,382 were student pilots, comprising 13% of the total pilot population. The majority of initial pilot training is conducted in piston-engine aircraft.[177] There is no age minimum for

[166] United States Department of Agriculture: Food and Nutrition Service, National School Lunch Program Fact Sheet. Obtained from: *http://www.fns.usda.gov/cnd/Lunch/AboutLunch/NSLPFactSheet.pdf*, August 3, 2009. For the period July 1, 2008, through June 30, 2009, 130 percent of the poverty level is $27,560 for a family of four; 185 percent is $39,220.

[167] The FAA GAATA is a database collected from surveys of pilots flying aircraft used for general aviation and air taxi activity. For more information on the GAATA, *see* Appendix A at *http://www.faa.gov/data_statistics/aviation_data_statistics/general_aviation/*.

[168] National Agricultural Aviation Association: "Help the Aerial Application Industry by completing the 2008 General Aviation Activity Survey." Retrieved from: *http://www.agaviation.org/2008%20GenAvnSurvey.htm* on August 13, 2009.

[169] National Agricultural Aviation Association: "History." Retrieved from: *http://www.agaviation.org/history.htm* on August 13, 2009.

[170] U.S. Environmental Protection Agency (1986) Air Quality Criteria for Lead. Research Triangle Park, NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA–600/8–83/028aF-dF. 4v. Available from: NTIS, Springfield, VA; PB87–142378.

[171] Xiong, Chao. (9–23–2007) "Future for Crop Dusters is up in the Air". The Star Tribune. Retrieved on August 12, 2009 from: *http://www.startribune.com/local/11606661.html*.

[172] Harpole, T. (3–1–2007) "That Old-Time Profession" Air & Space Magazine. Retrieved on August 12, 2009 from: *http://www.airspacemag.com/history-of-flight/old_time_profession.html*.

[173] Petersen, R. "So you want to be a spray pilot". AgAir Update. Retrieved on October 9, 2009 from: *http://www.agairupdate.com/aau/wannabe/pilot.html*.

[174] General Aviation Manufacturers Association (2008) General Aviation Statistical Databook and Industry Outlook. Available at: *http://www.gama.aero/files/2008_general_aviation_statistical_databook_indust_499b0dc37b.pdf*.

[175] General Accounting Office Report to Congressional Requesters (2001) General Aviation Status of the Industry, Related Infrastructure, and Safety Issues. GAO–01–916.

[176] GAMA 2008 General Aviation Statistical Databook & Industry Outlook report. Retrieved on August 17, 2009 from: *http://www.gama.aero/files/2008_general_aviation_statistical_databook_indust_499b0dc37b.pdf*.

[177] *See http://flighttraining.aopa.org/*.

pilots to begin taking flying lessons.[178] The minimum age for conducting a solo flight is 16 years and a pilot certificate cannot be issued until 17 years of age. According to the 2008 General Aviation Statistical Databook & Industry Outlook report by the GAMA, there are 190 student pilots in the 14–15 year old age group and 11,562 student pilots in the 16–19 years old age group. GAMA reports that in 2008 there are 3,846 private pilots in the 16–19 years old age group. According to the FAA there are more than 500 flight training schools.[179] [180] The requirement for a private pilot certificate is 40 hours in a non-approved school, and 35 hours in an approved school. However, most people obtain 60 to 75 hours of training before earning their pilot certificate.

The general public for whom flying is a recreational activity may be the most highly exposed population to lead emissions from piston-engine activity. In addition to their inhalation exposure to engine exhaust emissions, pilots can be exposed to evaporative emissions of TEL during aircraft fueling, and fuel sump checks during preflight inspections.

5. Bioaccumulation of Lead in Aquatic Organisms

As discussed in Section II.C.2 of this ANPR, lead bioaccumulates in the tissues of aquatic organisms through ingestion of food and water. Because of the potential for significant deposition of lead compounds to water bodies, EPA researches and reports on the atmospheric deposition of lead compounds to the Great Waters (the Great Waters include the Great Lakes, Lake Champlain, Chesapeake Bay and many U.S. coastal estuaries).[181] Alkyl lead, in particular, has been identified by EPA as a Level I Persistent, Bioaccumulative, and Toxic (PBT) pollutant. Level I substances are targeted for virtual elimination through pollution prevention and other incentive-based actions that phase out their use, generation or release in a cost-effective manner within the most expedient timeframe. In 2002, EPA issued the PBT National Action Plan for Alkyl-lead to promote further voluntary reductions of use and exposure to alkyl lead compounds, including leaded avgas.[182]

We are interested in the potential for lead emissions from piston-engine aircraft to be a source of lead pollution to aquatic organisms. Among the approximately 20,000 airport facilities in the United States there are 448 seaplane facilities. Landing and take-off activity by aircraft at these facilities provides a direct pathway for emission of organic and inorganic lead to the air near/above inland waters and ocean seaports where these aircraft operate. In addition to seaplane facilities, many airports and heliports are located very close to rivers, lakes and streams, which can provide a direct pathway for emission of organic and inorganic lead to the air near/above inland waters. Lead emissions from seaplane facilities as well as airports and heliports near water bodies can enter the aquatic ecosystem by either deposition from ambient air or runoff of lead deposited to surface soils. As noted in Section IV.A, lead halides (the primary form of lead emitted by engines operating on leaded fuel) are slightly water-soluble and may be more readily dissolved into water than other inorganic forms of lead.

The EPA Office of Water maintains a database of the National Listing of Fish Advisories (NLFA) which is made available on the Internet to provide information regarding locally-issued fish advisories and safe eating guidelines.[183] States, territories, and Tribes (collectively referred to here as "States") provide this information to EPA every year. The most recent year for which data are available is 2008. States provide information regarding contaminant levels of bioaccumulative toxins measured in fish including lead, mercury, polychlorinated biphenyls (PCBs) and dioxin. Based on these data states issue fish consumption advisories that provide information regarding water bodies for which fish tissue concentrations of these pollutants are found by the State criteria to be safe or unsafe for consumption. The EPA recommends that if fish are detected as having any measureable level of accumulated lead in their tissues that this is cause for concern for all consumers, but especially for children and pregnant or nursing women, and that issuing an advisory is prudent.

The 2008 NLFA database includes data on lead concentrations in over 23,000 fish from over 1,000 lakes and streams. Among these fish, lead concentrations were above the analytical detection limit in 1,000 fish samples[184] and among the fish in which measureable lead concentrations were reported, the concentrations of lead ranged from 5 ppb to 60,400 ppb.[185] States do not provide information regarding the source of contamination in water bodies where fish tissue concentrations of lead are above detection limits. Lead concentrations in fish tissue samples declined from mean concentrations of 0.28 ppm in 1976 to 0.11 ppm in 1984.[186] The decrease in mean lead concentrations was attributed primarily to reductions in the lead content of motor vehicle gasoline. Sources of contamination of lead to waterways frequently noted include lead gunshot, lead sinkers, and Superfund sites.[187] Lead emissions from piston-engine aircraft may contribute to fish tissue lead concentrations in water bodies that are in close proximity to piston-engine aircraft activity. In one case, a State reported lead contaminated fish in a lake on airport property. Piston-engine aircraft emissions of lead also have the potential to contribute to fish tissue lead concentrations at water bodies throughout the U.S. due to the emission of lead in-flight. These in-flight emissions are greatly dispersed in the environment and have been providing a source of lead to the environment for over 80 years.

The Fond du Lac Band of Lake Superior Chippewa, the Leech Lake Band of Ojibwe and the Mille Lacs Band of Ojibwe submitted comments to the Lead NAAQS docket noting the importance of fish consumption in their diet.[188] The Fond du Lac Band of Lake

[178] Federal Aviation Administration (FAA). "Become a Pilot—Student Pilot's Certificate Requirements." Retrieved on August 17, 2009 from: *http://www.faa.gov/pilots/become/student_cert/.*

[179] Federal Aviation Administration (FAA). "Types of Pilot Schools & Choosing a Pilot School". Retrieved on August 17, 2009 from: *http://www.faa.gov/training_testing/training/pilot_schools/.*

[180] Federal Aviation Administration (FAA). "Pilot Schools—Search". Retrieved on August 17, 2009 from: *http://av-info.faa.gov/PilotSchool.asp.*

[181] U.S. Environmental Protection Agency, "The Great Waters Program." Retrieved on August 17, 2009 from: *http://www.epa.gov/air/oaqps/gr8water/.*

[182] U.S. Environmental Protection Agency Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Program (2002) PBT national action plan for alkyl-Pb. Washington, DC. Available online at: *http://www.epa.gov/pbt/pubs/Alkyl_lead_action_plan_final.pdf.*

[183] U.S. Environmental Protection Agency, "The National Listing of Fish Advisories." Retrieved on August 17, 2009 from: *http://www.epa.gov/waterscience/fish/advisories/.*

[184] In some instances States supply individual fish tissue sample results and in some instances States supply averages of multiple fish tissue sample results.

[185] State-specific fish advisories for lead can be downloaded from: *http://oaspub.epa.gov/nlfwa/nlfwa.bld_qry?p_type=advrpt&p_loc=on.*

[186] U.S. Environmental Protection Agency (2000) Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 1: Fish Sampling and Analysis. EPA 823–B–00–007. p. 4–59. Available online at: *http://www.epa.gov/waterscience/fish/advice/volume1/index.html.*

[187] U.S. Environmental Protection Agency, "Lead Fishing.". Retrieved on August 17, 2009 from: *http://www.epa.gov/owow/fish/animals.html.*

[188] *See* Docket ID Number EPA–HQ–OAR–2006–0735. The Tribes that submitted comments were:

Continued

Superior Chippewa also noted in their comments, "As a reservation with a municipal airport within its exterior boundaries with two schools and Tribal housing in close proximity to the airport (one half mile), leaded aircraft fuel is a concern." The Leech Lake Band of Ojibwe noted in their comments, "Along with the concerns over the emission inventory, the Tribes have great concern regarding the amount of lead from "small" prop engine airports. On or very near the Leech Lake Reservation there are seven prop plane airports with many private air strips scattered throughout the area." EPA is requesting comment on any information regarding the potential impact of lead emissions from piston-engine aircraft on aquatic environments.

B. Related Exposures of Concern

While the subject of this ANPR is focused on the emissions of lead from piston-engine aircraft, the use of tetraethyl lead in fuel contributes to additional public health and welfare issues that are also of concern to the Agency. Among these issues are: (1) The contribution of lead emissions to ambient PM, especially in areas in nonattainment with the $PM_{2.5}$ NAAQS; (2) the emissions of ethylene dibromide to the environment; and (3) the evaporative emissions of tetraethyl lead.

1. Lead Contribution to Ambient Particulate Matter

As discussed in Section IV.A of this ANPR, lead emitted by piston engines is expected to be predominantly in the particle phase and will contribute to ambient PM. There are two U.S. National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$: an annual standard (15 $\mu g/m^3$) and a 24-hour standard (35 $\mu g/m^3$). As of March 4, 2009 there are 39 1997 $PM_{2.5}$ nonattainment areas. Area designations for the 2006 24-hour $PM_{2.5}$ NAAQS were promulgated in 2009 for 31 areas.[189] All of these nonattainment areas have at least one airport servicing aircraft using leaded avgas and most nonattainment areas have several airport facilities. The Los Angeles-South Coast Air Basin has 343 airport facilities which have a cumulative lead inventory of 15.0 tons. The contribution of PM-lead to these nonattainment areas ranges from 0.001 to 0.7% of the mobile source $PM_{2.5}$ inventory in these areas. In each of four areas designated as nonattainment with the $PM_{2.5}$ annual standard, there is at least one lead monitor at which design values for 2006–2008 are greater than the 2008 Lead NAAQS and two of these counties have $PM_{2.5}$ concentrations exceeding the 24-hour $PM_{2.5}$ NAAQS. Reductions in lead emissions in these counties would help bring the area into attainment.

2. Ethylene Dibromide

As noted in Section IV.A, ethylene dibromide (1,2-dibromoethane) is added to leaded avgas to scavenge lead in order to prevent the deposition of lead oxide to valves and spark plugs. Emissions of ethylene dibromide are a concern to the EPA. Ethylene dibromide is classified in EPA's Integrated Risk Information System database as likely to be carcinogenic to humans, and a number of chronic noncancer effects have been observed in animals and humans exposed to ethylene dibromide by inhalation and ingestion.[190] EPA developed an inhalation reference concentration, ingestion dose and cancer unit risk estimates for inhalation and ingestion of ethylene dibromide.[191] Evidence of nasal tumors, hemangiosarcomas and mesotheliomas in rodents was used by EPA to develop inhalation unit risk estimates (central tendency estimates and 95% upper bound estimates) of 3×10^{-4} to 6×10^{-4} per $\mu g/m^3$. Evidence of forestomach tumors, hemangiosarcomas, thyroid follicular cell adenomas or carcinomas was used by EPA to develop drinking water unit risk estimates (central tendency estimates and 95% upper bound estimates) of 3×10^{-5} to 6×10^{-5} per $\mu g/L$ assuming consumption of 2 L of water per day by a 70 kg human. EPA developed a reference concentration for chronic inhalation of 9 $\mu g/m^3$ based on the critical effect of nasal inflammation and a reference dose for chronic ingestion of 9 μg per kg per day based on the critical effects of testicular atrophy, liver peliosis, and adrenal cortical degeneration. The National Toxicology Program listed ethylene dibromide as "reasonably anticipated to be a human carcinogen" in the Eleventh Report on Carcinogens in 2005.[192] The International Agency for Research on Cancer (IARC) has classified ethylene dibromide as a Group 2A carcinogen: probably carcinogenic to humans. –

In the additive package used to dose fuel with lead, ethylene dibromide is added to achieve a lead-to-bromine atom ratio of 1:2 and a bromine-to-lead weight ratio of 1:2.[193] The concentration of ethylene dibromide in leaded avgas is listed as less than 4 milliliters per gallon (<9 grams per gallon).[194] Since ethylene dibromide was measured in the exhaust and evaporative emissions from light-duty vehicles in the U.S. when they were operated on leaded fuel containing ethylene dibromide we anticipate piston-engine aircraft are currently a source of ethylene dibromide to air.[195] Measurements of ethylene dibromide have not been made that would allow estimation of the exhaust and evaporative emissions from piston-engine aircraft as well as the emissions associated with refueling and pre-flight fuel checks.

In addition to contributing to ambient concentrations, ethylene dibromide may also enter underground aquifers via leaking underground storage tanks or fuel spills. Studies demonstrate that ethylene dibromide may persist for long periods of time in certain groundwater environments.[196] The EPA established a Maximum Concentration Level (MCL) of 0.05 $\mu g/L$ for ethylene dibromide, which is 100-fold lower than the MCL for benzene and 300-fold lower than the MCL for lead. The MCL is the highest level of a contaminant that is allowed in drinking water and is an enforceable drinking water standard.[197]

The EPA Office of Underground Storage Tanks (OUST) and Office of Research and Development's National Risk Management Research Laboratory (NRMRL) in association with the Association of State and Territorial

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The Bad River Band of Lake Superior Tribe of Chippewa Indians, The Quapaw Tribe of Oklahoma, The Leech Lake Band of Ojibwe, The Lone Pine Paiute-Shoshone Reservation, The Fond du Lac Band of Lake Superior Chippewa, and The Mille Lacs Band of Ojibwe.

[189] *http://www.epa.gov/pmdesignations/.*

[190] U.S. Environmental Protection Agency (2004) Integrated Risk Information System (IRIS), IRIS Summary for 1,2-dibromoethane CASRN 106–93–4. Available online at: *http://www.epa.gov/ncea/iris/subst/0361.htm.*

[191] U.S. Environmental Protection Agency (2004) Integrated Risk Information System (IRIS), Toxicological Review of 1,2-dibromoethane in support of summary information on the Integrated Risk Information System. Available online at: *http://www.epa.gov/ncea/iris/toxreviews/0361tr.pdf.*

[192] National Toxicology Program (NTP) (2005) 11th Report on Carcinogens. Public Health Service, U.S. Department of Health and Human Services, Research Triangle Park, NC. Available from: *http://ntp-server.niehs.nih.gov.*

[193] Thomas VM; Bedford JA; Cicerone RJ. (1997) Bromine emissions from leaded gasoline. Geophys Res Letters 24(11):1371–1374.

[194] Chevron Material Safety Data Sheet for aviation gasoline. Available online at: *http://www.chevronglobalaviation.com/docs/aviation_gas.doc.*

[195] Sigsby, J.E.; Dropkin, D.L.; Bradow, R.L.; Lang, J.M. (1982) Automotive Emissions of Ethylene Dibromide. SAE Technical Paper Series 820786.

[196] U.S. Environmental Protection Agency Office of Research and Development (2008) Natural Attenuation of the Lead Scavengers 1,2-Dibromoethan (EDB) and 1,2-Dichloroethane (1,2-DCA) at Motor Fuel Release Sites and Implications for Risk Management, Chapter 2. EPA 600/R-08/107. Available online at: *http://www.epa.gov/ada.*

[197] U.S. Environmental Protection Agency, "Drinking Water Contaminants" Available online at: *http://www.epa.gov/safewater/contaminants/index.html.*

Solid Waste Management Officials (ATSWMO) have formed a team to evaluate the potential for public health and welfare effects attributable to ethylene dibromide from past or present fuel leaks and spills.[198] Among the goals of the EPA/ATSWMO team is to develop information on the distribution of ethylene dibromide in groundwater at leaking underground storage tank sites in States that do not routinely monitor this contaminant. Water samples for this study were provided by State agencies to EPA between October 2005 and July 2007. Of the 802 groundwater samples provided from 102 sites, ethylene dibromide was detected in 54 samples, 43 of which had ethylene dibromide concentrations above the MCL.[199] These sites did not include analysis of groundwater at airports.

While not the focus of this ANPR, ethylene dibromide exposure from inhalation or ingestion pathways is an ongoing concern for EPA, and reduction in the use of leaded gasoline containing ethylene dibromide may reduce exposure and risk to public health and welfare from ethylene dibromide.

3. Non-Exhaust Exposure to Tetraethyl Lead

Tetraethyl lead is a volatile component of leaded avgas. The largest source of tetraethyl lead exposure is expected to originate from evaporative emissions associated with fuel production, fuel distribution, aircraft refueling, pre-flight fuel checks, accidental spills, and fuel tank venting. Pilots check fuel for contaminants by draining a small amount of fuel from each tank sump before flight and after refueling. This fuel is frequently deposited onto the tarmac after the fuel check. EPA is interested in data regarding this practice and any estimates of lead emitted to the air by evaporation of the alkyl lead in the fuel deposited on the tarmac. Alkyl lead becomes oxidized in the atmosphere by direct photolysis, reaction with ozone, and by reaction with hydroxyl compounds. Therefore, depending on ambient conditions, alkyl lead may exist in the atmosphere for hours to days.

Pilots, aviation fuel attendants and mechanics are likely to be among the most highly exposed population to alkyl lead. These populations are at risk due to both inhalation and possible dermal exposure. Absorption of inhaled alkyl lead into the bloodstream is higher than that for inorganic lead compounds which are generally in particulate form (AQCD for Lead, Section 4.2.1). In addition to exposure to lead in the exhaust emissions from piston-engine aircraft, the PBT National Action Plan for Alkyl-lead [200] noted that aviation fuel attendants and mechanics are potentially exposed to alkyl lead emissions due to inhalation of alkyl lead compounds released to the air during fueling, via evaporative emissions from spills, or via evaporative emissions from unused gasoline remaining in the engine or fuel tanks. Further, these populations are also at risk because of possible dermal absorption of gasoline containing alkyl lead compounds. Due to the lipophilic nature of alkyl lead and its ability to permeate biological membranes, alkyl lead is absorbed rapidly and extensively through the skin (AQCD for Lead, page 4–12). In addition to direct human exposure, runoff and deposition of alkyl lead to waterways would increase the amount of lead available for uptake by aquatic plants and animals (*see* Section V.A.7 of this ANPR for more information).

VI. Additional Information Available for the NPRM To Evaluate the Potential for Public Health and Welfare Impacts and Considerations Regarding Engine Emission Standards

As noted in the Overview section of this ANPR, in this action we are describing information currently available and information being collected that will be used by the Administrator to subsequently exercise her judgment regarding whether aircraft lead emissions from avgas use cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. These additional data will come from lead monitoring being planned to satisfy requirements of the Lead NAAQS, air quality modeling planned at EPA that is described below and any information submitted to EPA during the comment period for this ANPR.

A. The Lead NAAQS and Lead Emissions From Piston-Engine Aircraft

On November 12, 2008, when EPA promulgated revisions to the Lead NAAQS, EPA also adopted revisions to ambient air monitoring requirements for lead, described the approach for implementing the revised standards, and provided an implementation timeline. We describe each of these activities as well as more recent activities below. This section also discusses the most current information available regarding how implementation of the Lead NAAQS may provide additional data on the potential for lead emissions from piston-engine aircraft to cause or contribute to ambient air concentrations that exceed the 2008 Lead NAAQS.

Acknowledging that the existing monitoring network for lead is not sufficient to determine whether many areas of the country would meet the 2008 Lead NAAQS, the EPA re-designed the nation's lead monitoring network to allow assessment of compliance with the revised lead standard. Lead monitoring requirements promulgated in 2008 stipulate that, at a minimum, monitoring agencies must place monitors at maximum impact areas where lead emissions are greater than or equal to one ton or more per year. We refer to these monitors as source-oriented monitors. EPA Regional Administrators may waive the source-oriented monitoring requirements if the monitoring agency can demonstrate that emissions from the source will not contribute to maximum air lead concentrations greater than 50 percent of the revised standard, or 0.075 ug/m^3. EPA estimated that approximately 135 facilities emit lead at levels over the one ton emission threshold, making them subject to the lead monitoring requirements. Lead monitors are operating at a small number of these sources (described in Section VI.A.2 below). For the remainder, source-oriented monitors are to be operational by January 1, 2010.

EPA also required monitors to be operated in each of the 101 urban areas with populations greater than 500,000 in order to gather information on the general population's exposure to lead in air. We refer to these monitors as population-oriented monitors.

Following promulgation of the 2008 Lead NAAQS and monitoring requirements, the Natural Resources Defense Council, the Missouri Coalition for the Environment Foundation, Physicians for Social Responsibility, and the Coalition to End Childhood Lead Poisoning (Petitioners) petitioned

[198] U.S. Environmental Protection Agency Office of Research and Development (2008) Natural Attenuation of the Lead Scavengers 1,2-Dibromoethan (EDB) and 1,2-Dichloroethane (1,2-DCA) at Motor Fuel Release Sites and Implications for Risk Management. p.3. EPA 600/R-08/107. Available online at: *http://www.epa.gov/ada.*

[199] U.S. Environmental Protection Agency Office of Research and Development (2008) Natural Attenuation of the Lead Scavengers 1,2-Dibromoethan (EDB) and 1,2-Dichloroethane (1,2-DCA) at Motor Fuel Release Sites and Implications for Risk Management. p.4. EPA 600/R-08/107. Available online at: *http://www.epa.gov/ada.*

[200] U.S. Environmental Protection Agency Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Program (2002) PBT national action plan for alkyl-Pb. Washington, DC. Page 14. Available online at: *http://www.epa.gov/pbt/pubs/Alkyl_lead_action_plan_final.pdf*

EPA for reconsideration of the lead emission rate at which we required monitoring (the "emission threshold," currently 1.0 tpy).[201] EPA granted the petition to reconsider aspects of the monitoring requirements and proposed revisions to lead ambient air monitoring requirements in December 2009 (74 FR 69050).

Also as part of promulgating the 2008 Lead NAAQS, EPA described the approach for implementing the revised standards and provided an implementation timeline. EPA will use county boundaries as the presumptive boundaries for nonattainment areas, and adjustments to boundaries will be made on case-by-case bases. States in which there is sufficient monitoring data made recommendations for areas to be designated attainment, nonattainment, or unclassifiable in October 2009. States update their recommendations to EPA in October 2010 using any additional monitoring data available from the increased source-oriented monitoring network described above. Final designations of all attainment, nonattainment and unclassifiable areas will be effective no later than January 2012. Where data are sufficient from the currently existing lead monitoring network, we expect that initial designations will be effective January 2011. States are directed to submit State Implementation Plans (SIPs) no later than eighteen months after designation, outlining how they will reduce pollution to meet the lead standards. States are required to attain the standards no later than five years after designation. Additional information regarding the lead standard implementation is available at *http://www.epa.gov/air/lead/actions.html* and in the 2008 Lead NAAQS (73 FR 67030–67043).

1. Monitoring Lead at Airports To Evaluate Ambient Concentrations to Which Lead Emissions From Piston-Engine Aircraft Contribute

Among the estimated 135 source-oriented lead monitoring sites, there are four airports where we expect lead monitoring to begin in January 2010. These airports are the Van Nuys Airport in Van Nuys, CA; the Phoenix Deer Valley Airport in Phoenix, AZ; the Centennial Airport in Englewood, CO; and the Daytona Beach International Airport in Daytona Beach, FL. In each of these areas, we will, as data becomes available, evaluate the impact of lead emissions from piston-engine aircraft on air quality.

2. Evaluating the Contribution of Lead Emissions From Piston-Engine Aircraft to Areas Approaching or Exceeding the Lead NAAQS

In this section we discuss available information and information that will become available in 2010 that can be used to evaluate the potential for lead emissions from piston-engine aircraft to contribute to ambient concentrations in areas exceeding the Lead NAAQS. This evaluation may include the following: (1) Areas currently out of attainment or designated as maintenance with the 1978 Lead NAAQS; (2) areas with current lead monitors that are out of attainment with the 2008 Lead NAAQS; and (3) locations that will have new lead monitors to meet the 2008 Lead NAAQS source-oriented monitoring requirements. In each of these areas, we will, as data become available, evaluate the contribution of lead emissions from piston-engine aircraft to lead inventories and air quality.

The EPA is retaining the 1978 Lead NAAQS until one year after designations for the 2008 Lead NAAQS, except in current nonattainment areas. In those areas, EPA will retain the 1978 standard until the area submits, and EPA approves, attainment and/or maintenance demonstrations for the new standards. Only two areas, East Helena, MT (including Lewis and Clark counties), and part of Jefferson County in Herculaneum, MO, are designated nonattainment with the 1978 Lead NAAQS. The industrial facility causing nonattainment with the Lead NAAQS in the East Helena area closed in 2001. Eleven areas are designated as maintenance areas, only three of which currently have lead monitors. These three locations (Iron County, MO, Dakota County MN, and Collin County, TX) have lead monitors with design value concentrations exceeding the 2008 Lead NAAQS. The design value is the highest "rolling" three month average over a three-year period that is relevant for comparison to the level of the 2008 Lead NAAQS.

Implementation of the 2008 Lead NAAQS is underway, and we have not yet designated areas under it. When EPA promulgated the 2008 Lead NAAQS, EPA provided a list of 18 counties with design values exceeding the 2008 lead standard of 0.15 $\mu g/m^3$. Using more recent data from EPA's Air Quality System, there are 14 sites at which design values exceed the 2008 Lead NAAQS (Table 3). Over 4.6 million people live in the counties where design values are greater than the 2008 Lead NAAQS. After EPA designates areas that currently have sufficient lead monitoring data, no later than October 15, 2010, we will evaluate the contribution of lead emissions from piston-engine aircraft to lead inventories in nonattainment, maintenance and in some cases, unclassifiable areas, depending on the presence of point sources of lead and the status of ambient lead monitoring in those areas.

TABLE 3—COUNTIES WITH MAXIMUM ROLLING QUARTERLY AVERAGE LEAD CONCENTRATIONS EXCEEDING THE 2008 LEAD NAAQS

County, state	EPA region	County population (2000 Census)	Design value, 2006–2008 ($\mu g/m^3$)
Jefferson, MO	7	198,099	2.89
Iron, MO	7	10,697	2.46
Delaware, IN	5	118,769	2.16
Hillsborough, FL	4	998,948	1.77
Collin, TX	6	491,675	1.26
Pike, AL	4	29,605	1.21
Dakota, MN	5	355,904	0.70
Fulton, OH	5	42,084	0.69
Berks, PA	3	373,638	0.36
Madison, IL	5	258,941	0.28
Logan, OH	5	46,005	0.27

[201] The petition is available at: *http://www.epa.gov/air/lead/pdfs/OAR.09.000.7687.pdf.*

TABLE 3—COUNTIES WITH MAXIMUM ROLLING QUARTERLY AVERAGE LEAD CONCENTRATIONS EXCEEDING THE 2008 LEAD NAAQS—Continued

County, state	EPA region	County population (2000 Census)	Design value, 2006–2008 (μg/m³)
Sullivan, TN	4	153,048	0.26
Beaver, PA	3	181,412	0.20
Cuyahoga, OH	5	1,393,978	0.17

Lead emissions from piston-engine aircraft operating at airports outside nonattainment areas can also contribute to lead measured in the nonattainment area. In addition, other sources of lead that do not, by themselves, exceed the lead emission monitoring threshold may be located near airports. For example, at some airports in the U.S., race track venues are located immediately adjacent to runways where piston-engine aircraft operate. We are seeking information regarding ambient concentrations of lead that can result from the combined emissions of leaded fuel used in some race vehicles, lead emissions from piston-engine aircraft and other sources of ambient lead.

The EPA intends to conduct modeling analyses to evaluate the contribution of these lead emissions to nonattainment areas and areas that may be approaching nonattainment concentrations. Lead emitted by piston-engine aircraft flying through nonattainment areas may also contribute to lead measured in the nonattainment area. These emissions would be potentially challenging to quantify, although a series of scoping analyses could be conducted. We seek comment on characterizing the contribution of lead emissions from piston-engine aircraft flying through areas that are not attaining the 2008 Lead NAAQS and the potential contribution of piston-engine lead emissions that may be transported into lead nonattainment areas.

As noted above, approximately 135 new lead monitors will begin collecting ambient lead samples starting in January 2010 in order to satisfy the source-oriented monitoring requirements of the 2008 Lead NAAQS. In the NPRM we will discuss the potential contribution of lead from piston-engine aircraft to these areas where the ambient data suggest lead concentrations are close to or exceeding the 2008 Lead NAAQS of 0.15 μg/m³.

B. Additional Information EPA Is Collecting To Evaluate Ambient Lead Concentrations Attributable to Emissions From Piston-Engine Aircraft

In 2008 EPA initiated a study to provide information regarding the local-scale gradient in lead concentrations on- and near airport facilities with piston-engine powered aircraft activity.[202] This study focused mainly on developing an approach for modeling lead emissions from piston-engine aircraft using the Meteorological Society (AMS)/EPA Regulatory Model (AERMOD), and evaluating it using air quality measurements. For purposes of local-scale dispersion modeling, AERMOD is EPA's preferred model.[203] The approach developed includes apportioning lead emitted during landing and take-off to different altitudes in order to characterize emissions during these modes of operation in a realistic manner. In addition, this modeling study includes analysis of the spatial and temporal emissions from piston-engine aircraft during the other modes of aircraft operation (*e.g.*, taxi, run-up check, take-off, landing). The modeling results include an evaluation of the relative contributions of all known sources of lead to the local ambient air, including piston-engine aircraft, local traffic, resuspended road dust, and industrial sources within 20 km of the airport selected for our case study. The EPA study at the Santa Monica Airport was recently completed.[204]

As part of this work, we collected air, soil and house dust samples for lead analysis in order to conduct a model-to-monitor evaluation, and to evaluate the potential for lead emissions from piston-engine aircraft to create a gradient in air, soil and house dust concentrations of lead in proximity to the airport activities.

We selected the Santa Monica municipal airport for this study because of the data available from the monitoring study conducted by the SCAQMD in 2005–2007 discussed in Section IV.B of this ANPR. In addition, there are no major point sources of lead in close proximity to the airport, simplifying the model development and interpretation of monitoring results.

EPA intends to use this modeling approach to evaluate potential for exceedance of the Lead NAAQS on airport property and surrounding areas, as well as providing an approach to characterize the contribution of lead emissions from piston-engine aircraft to areas with ambient lead concentrations currently exceeding the 2008 Lead NAAQS. This modeling approach will also allow us to quantify the changes in ambient lead concentrations following the implementation of different piston-engine control strategies. The application of this modeling approach to a case-study airport could also be used as input to conduct a risk assessment evaluating the potential contribution of lead from piston-engine emissions on blood lead levels and IQ deficits for those living near or attending school near general aviation activity.

We request comment on all information EPA is collecting to evaluate ambient lead concentrations attributable to emissions from piston-engine aircraft and risk posed by emissions of lead from piston-engine aircraft.

C. Considerations Regarding Engine Emission Standards

A positive endangerment and cause or contribute finding with respect to the emissions of lead from general aviation aircraft would trigger EPA's duty to set emission standards. In considering emission standards, EPA would consider controlling emissions from piston engines using aviation gasoline in aircraft. In cooperation with FAA, EPA would evaluate the technical feasibility of a possible phase-down or elimination of leaded aviation gasoline. One option to consider, for example, could be an emissions standard

[202] U.S. EPA (March 2010) Memorandum from Marion Hoyer to the docket EPA–HQ–OAR–2007–0294, titled, "Work Plan for Air Quality Modeling and Monitoring of Lead Emissions from Piston-Engine Powered Aircraft." Docket number EPA–HQ–OAR–2007–0294.

[203] The EPA provides modeling guidance for AERMOD at *http://www.epa.gov/ttn/scram/guidanceindex.htm* and *http://www.epa.gov/scram001/dispersion_prefree.htm#aermod*. A post-processor for AERMOD that reads model output and calculates rolling 3-month averages for the period modeled to provide lead concentrations that can be compared with the Lead NAAQS is available online at: *http://www.epa.gov/ttn/amtic/files/ambient/pb/leadpost.zip*.

[204] The report from this study is posted at *http://www.epa.gov/otaq/aviation.htm*.

(established under 40 CFR 87) that would require all newly-manufactured general aviation piston engines to be able to operate with appropriate reliability and durability on unleaded aviation gasoline by some future date. Such a standard might require that new engines used in aircraft would have to receive an FAA type certificate that reflects achievement of these requirements under FAA regulations set forth at 14 CFR parts 33/34.

Beyond this, EPA recognizes that there is a big challenge in dealing with the in-use fleet. Converting in-use aircraft/engines to operate on unleaded aviation gasoline would be a significant logistical challenge, and in some cases a technical challenge as well. In many cases, the implementation of this concept might depend upon efforts and actions of aircraft and engine manufacturers in identifying the necessary modifications and developing hardware as necessary. Depending on timing, these engines might need to be able to operate on either leaded or unleaded aviation gasoline, or a blend thereof. EPA recognizes that in many cases these modifications could trigger the need for FAA regulatory approval of the modifications for both the engines and airframes. Given the potentially large number of affected aircraft and the potential complexities involved, a program affecting in-use aircraft engines would need careful consideration by both EPA and FAA and the two agencies would need to work together in considering any potential program affecting the in-use fleet.

EPA requests comment on this outline of approaches for transitioning the fleet to unleaded aviation gasoline, as well as potential implementation dates, if EPA were to trigger the duty to set emission standards. Comment is also requested on how a program could be best structured to assure that conversions conducted by engine manufacturers (OEMs), independent shops, and in the field by certified power plant mechanics are performed to fully meet the intent of a possible program without compromising the safety of those aircraft and engines. EPA also asks for comment on potential problems with this approach including suggested modifications, improvements, or other approaches. EPA is requesting comment on potential implications for international import and export of piston engines and aviation fuel, as well as potential impacts on international transport. Finally, EPA requests comment on how market incentives might be developed to encourage modification to run on unleaded aviation gasoline as part of a regulatory requirement.

As part of the responses to the **Federal Register** notice EPA published in November 2007 entitled "Petition Requesting Rulemaking to Limit Lead Emissions from General Aviation Aircraft," EPA received a number of comments addressing both technology and fuel-based options as potential measures to reduce or eliminate lead in avgas.[205] In addition to these comments, EPA is aware of completed and ongoing work done under the auspices of the Coordinating Research Council and more recent viewpoints and efforts put forth by industry trade associations, airframe/engine manufacturers, specialty vendors, aviation user groups, and other innovators. The work and perspectives of these groups on technology and avgas fuel quality options are important, and EPA asks for further comment reflecting any new data on technology developments, fuel formulation approaches, or other technical viewpoints.

According to Department of Energy data, annual demand for aviation gasoline is very small in comparison to motor gasoline yet its use is as geographically widespread. This of course creates challenges for supply, distribution, and storage. EPA asks for comment on the avgas refining locations and practices, supply (including imports and exports, if any), details on distribution to terminals and airports, and storage practices for avgas at terminals and airports across the country. EPA is also interested in comments on progress and timeframes for developing alternatives to current leaded avgas and how these might be integrated into the fuel supply and distribution system.

[205] 72 FR 64570 (Nov. 16, 2007); EPA Docket EPA–HQ–OAR–2007–0294.

VII. Statutory and Executive Order Reviews

Under Executive Order 12866, entitled *Regulatory Planning and Review* (58 FR 51735, October 4, 1993), this is a "significant regulatory action" because of the cross-agency nature of this issue. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under Executive Order 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action. Because this action does not propose or impose any requirements, other statutory and Executive Order reviews that apply to rulemaking do not apply. Should EPA subsequently determine to pursue a rulemaking, EPA will address the statues and Executive Orders as applicable to that rulemaking.

Nevertheless, the Agency welcomes comments and/or information that would help the Agency to assess any of the following: Tribal implications pursuant to Executive Order 13175, entitled *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249, November 6, 2000); environmental health or safety effects on children pursuant to Executive Order 13045, entitled *Protection of Children from Environmental Health Risks and Safety Risks* (62 FR 19885, April 23, 1997) and human health or environmental effects on minority or low-income populations pursuant to Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629, February 16, 1994). The Agency will consider such comments during the development of any subsequent rulemaking.

Dated: April 20, 2010.

Lisa P. Jackson,

Administrator.

[FR Doc. 2010–9603 Filed 4–27–10; 8:45 am]

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PUBLIC HEALTH STATEMENT
Lead
CAS#: 7439-92-1

Division of Toxicology and Environmental Medicine **August 2007**

This Public Health Statement is the summary chapter from the Toxicological Profile for Lead. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-800-232-4636.

This public health statement tells you about lead and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Lead has been found in at least 1,272 of the 1,684 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which lead is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may harm you.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to lead, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

1.1 WHAT IS LEAD?

Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust. However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds.

Metallic lead is resistant to corrosion (i.e., not easily attacked by air or water). When exposed to air or water, thin films of lead compounds are formed that protect the metal from further attack. Lead is easily molded and shaped. Lead can be combined with other metals to form alloys. Lead and lead alloys are commonly found in pipes, storage batteries, weights, shot and ammunition, cable covers, and sheets used to shield us from radiation. The largest use for lead is in storage batteries in cars and other vehicles.

Lead compounds are used as a pigment in paints, dyes, and ceramic glazes and in caulk. The amount of lead used in these products has been reduced in recent years to minimize lead's harmful effect on people and animals. Tetraethyl lead and tetramethyl lead were once used in the United States as gasoline

additives to increase octane rating. However, their use was phased out in the United States in the 1980s, and lead was banned for use in gasoline for motor vehicles beginning January 1, 1996. Tetraethyl lead may still be used in gasoline for off-road vehicles and airplanes. It is also still used in a number of developing countries. Lead used in ammunition, which is the largest non-battery end-use, has remained fairly constant in recent years. However, even the use of lead in bullets and shot as well as in fishing sinkers is being reduced because of its harm to the environment.

Most lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). Lead is mined in the United States, primarily in Alaska and Missouri. However, most lead today is "secondary" lead obtained from lead-acid batteries. It is reported that 97% of these batteries are recycled.

1.2 WHAT HAPPENS TO LEAD WHEN IT ENTERS THE ENVIRONMENT?

Lead occurs naturally in the environment. However, most of the high levels found throughout the environment come from human activities. Environmental levels of lead have increased more than 1,000-fold over the past three centuries as a result of human activity. The greatest increase occurred between the years 1950 and 2000, and reflected increasing worldwide use of leaded gasoline. Lead can enter the environment through releases from mining lead and other metals, and from factories that make or use lead, lead alloys, or lead compounds. Lead is released into the air during burning coal, oil, or waste. Before the use of leaded gasoline was banned, most of the lead released into the U.S. environment came from vehicle exhaust. In 1979, cars released 94.6 million kilograms (208.1 million pounds) of lead into the air in the United States. In 1989, when the use of lead was limited but not banned, cars released only 2.2 million kg (4.8 million pounds) to the air. Since EPA banned the use of leaded gasoline for highway transportation in 1996, the amount of lead released into the air has decreased further. Before the 1950s, lead was used in pesticides applied to fruit orchards. Once lead gets into the atmosphere, it may travel long distances if the lead particles are very small. Lead is removed from the air by rain and by particles falling to land or into surface water.

Sources of lead in dust and soil include lead that falls to the ground from the air, and weathering and chipping of lead-based paint from buildings, bridges, and other structures. Landfills may contain waste from lead ore mining, ammunition manufacturing, or other industrial activities such as battery production. Disposal of lead-containing products contribute to lead in municipal landfills. Past uses of lead such as its use in gasoline are a major contributor to lead in soil, and higher levels of lead in soil are found near roadways. Most of the lead in inner city soils comes from old houses with paint containing lead and previous automotive exhaust emitted when gasoline contained lead.

Once lead falls onto soil, it sticks strongly to soil particles and remains in the upper layer of soil. That is why past uses of lead such as lead in gasoline, house paint, and pesticides are so important in the amount of lead found in soil.

Small amounts of lead may enter rivers, lakes, and streams when soil particles are moved by rainwater.

Small amounts of lead from lead pipe or solder may be released into water when the water is acidic or "soft". Lead may remain stuck to soil particles or sediment in water for many years. Movement of lead from soil particles into groundwater is unlikely unless the rain falling on the soil is acidic or "soft". Movement of lead from soil will also depend on the type of lead compound and on the physical and chemical characteristics of the soil.

Sources of lead in surface water or sediment include deposits of lead-containing dust from the atmosphere, waste water from industries that handle lead (primarily iron and steel industries and lead producers), urban runoff, and mining piles.

Some lead compounds are changed into other forms of lead by sunlight, air, and water. However, elemental lead cannot be broken down.

The levels of lead may build up in plants and animals from areas where air, water, or soil are contaminated with lead. If animals eat contaminated plants or animals, most of the lead that they eat will pass through their bodies.

1.3 HOW MIGHT I BE EXPOSED TO LEAD?

Lead is commonly found in soil especially near roadways, older houses, old orchards, mining areas, industrial sites, near power plants, incinerators, landfills, and hazardous waste sites. People living near hazardous waste sites may be exposed to lead and chemicals that contain lead by breathing air, drinking water, eating foods, or swallowing dust or dirt that contain lead. People may be exposed to lead by eating food or drinking water that contains lead. Drinking water in houses containing lead pipes may contain lead, especially if the water is acidic or "soft". If one is not certain whether an older building contains lead pipes, it is best to let the water run a while before drinking it so that any lead formed in the pipes can be flushed out. People living in areas where there are old houses that have been painted with lead paint may be exposed to higher levels of lead in dust and soil. Similarly, people who live near busy highways or on old orchard land where lead arsenate pesticides were used in the past may be exposed to higher levels of lead. People may also be exposed to lead when they work in jobs where lead is used or have hobbies in which lead is used, such as making stained glass.

Foods may contain small amounts of lead. However, since lead solder is no longer used in cans, very little lead is found in food. Leafy fresh vegetables grown in lead-containing soils may have lead-containing dust on them. Lead may also enter foods if they are put into improperly glazed pottery or ceramic dishes and from leaded-crystal glassware. Illegal whiskey made using stills that contain lead-soldered parts (such as truck radiators) may also contain lead. Cigarette smoke may also contain small amounts of lead. The amount of lead found in canned foods decreased 87% from 1980 to 1988 in the United States, which indicates that the chance of exposure to lead in canned food from lead-soldered containers has been greatly reduced. Lead-soldered cans are still used in some other nations. In the most recent studies, lead was not detectable in most foods and the average dietary intake of lead was about 1 microgram (a microgram is a millionth of a gram) per kilogram of body weight per day. Children may be exposed to lead

by hand-to-mouth contact after exposure to lead-containing soil or dust.

In general, very little lead is found in lakes, rivers, or groundwater used to supply the public with drinking water. More than 99% of all publicly supplied drinking water contains less than 0.005 parts of lead per million parts of water (ppm). However, the amount of lead taken into your body through drinking water can be higher in communities with acidic water supplies. Acidic water makes it easier for the lead found in pipes, leaded solder, and brass faucets to be dissolved and to enter the water we drink. Public water treatment systems are now required to use control measures to make water less acidic. Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than 20 years old. However, as buildings age, mineral deposits form a coating on the inside of the water pipes that insulates the water from lead in the pipe or solder, thus reducing the amount of lead that can leach into the water. Since 1988, regulations require that drinking water coolers must not contain lead in parts that come into contact with drinking water.

Breathing in, or swallowing airborne dust and dirt, is another way you can be exposed to lead. In 1984, burning leaded gasoline was the single largest source of lead emissions. Very little lead in the air comes from gasoline now because EPA has banned its use in gasoline for motor vehicles. Other sources of lead in the air include releases to the air from industries involved in iron and steel production, lead-acid-battery manufacturing, and nonferrous (brass and bronze) foundries. Lead released into air may also come from burning of solid waste that contains lead, windblown dust, volcanoes, exhaust from workroom air, burning or weathering of lead-painted surfaces, fumes and exhaust from leaded gasoline, and cigarette smoke.

Skin contact with dust and dirt containing lead occurs every day. Recent data have shown that inexpensive cosmetic jewelry pieces sold to the general public may contain high levels of lead which may be transferred to the skin through routine handling. However, not much lead can get into your body through your skin.

In the home, you or your children may be exposed to lead if you take some types of home remedy medicines that contain lead compounds. Lead compounds are in some non-Western cosmetics, such as surma and kohl. Some types of hair colorants, cosmetics, and dyes contain lead acetate. Read the labels on hair coloring products, use them with caution, and keep them away from children.

People who are exposed at work are usually exposed by breathing in air that contains lead particles. Exposure to lead occurs in many jobs. People who work in lead smelting and refining industries, brass/bronze foundries, rubber products and plastics industries, soldering, steel welding and cutting operations, battery manufacturing plants, and lead compound manufacturing industries may be exposed to lead. Construction and demolition workers and people who work at municipal waste incinerators, pottery and ceramics industries, radiator repair shops, and other industries that use lead solder may also be exposed. Painters who sand or scrape old paint may be exposed to lead in dust. Between 0.5 and 1.5 million workers are exposed to lead in the workplace. In California alone, more than 200,000 workers are exposed to lead. Families of workers may be exposed to higher levels of lead

when workers bring home lead dust on their work clothes.

You may also be exposed to lead in the home if you work with stained glass as a hobby, make lead fishing weights or ammunition, or if you are involved in home renovation that involves the removal of old lead-based paint.

1.4 HOW CAN LEAD ENTER AND LEAVE MY BODY?

Some of the lead that enters your body comes from breathing in dust or chemicals that contain lead. Once this lead gets into your lungs, it goes quickly to other parts of the body in your blood.

Larger particles that are too large to get into your lungs can be coughed up and swallowed. You may also swallow lead by eating food and drinking liquids that contain it. Most of the lead that enters your body comes through swallowing, even though very little of the amount you swallow actually enters your blood and other parts of your body. The amount that gets into your body from your stomach partially depends on when you ate your last meal. It also depends on how old you are and how well the lead particles you ate dissolved in your stomach juices. Experiments using adult volunteers showed that, for adults who had just eaten, the amount of lead that got into the blood from the stomach was only about 6% of the total amount taken in. In adults who had not eaten for a day, about 60–80% of the lead from the stomach got into their blood. In general, if adults and children swallow the same amount of lead, a bigger proportion of the amount swallowed will enter the blood in children than in adults. Children absorb about 50% of ingested lead.

Dust and soil that contain lead may get on your skin, but only a small portion of the lead will pass through your skin and enter your blood if it is not washed off. You can, however, accidentally swallow lead that is on your hands when you eat, drink, smoke, or apply cosmetics (for example, lip balm). More lead can pass through skin that has been damaged (for example, by scrapes, scratches, and wounds). The only kinds of lead compounds that easily penetrate the skin are the additives in leaded gasoline, which is no longer sold to the general public. Therefore, the general public is not likely to encounter lead that can enter through the skin.

Shortly after lead gets into your body, it travels in the blood to the "soft tissues" and organs (such as the liver, kidneys, lungs, brain, spleen, muscles, and heart). After several weeks, most of the lead moves into your bones and teeth. In adults, about 94% of the total amount of lead in the body is contained in the bones and teeth. About 73% of the lead in children's bodies is stored in their bones. Some of the lead can stay in your bones for decades; however, some lead can leave your bones and reenter your blood and organs under certain circumstances (e.g., during pregnancy and periods of breast feeding, after a bone is broken, and during advancing age).

Your body does not change lead into any other form. Once it is taken in and distributed to your organs, the lead that is not stored in your bones leaves your body in your urine or your feces. About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of

weeks, but only about 32% of the lead taken into the body of a child will leave in the waste. Under conditions of continued exposure, not all of the lead that enters the body will be eliminated, and this may result in accumulation of lead in body tissues, especially bone.

1.5 HOW CAN LEAD AFFECT MY HEALTH?

Scientists use many tests to protect the public from harmful effects of toxic chemicals and to find ways for treating persons who have been harmed.

One way to learn whether a chemical will harm people is to determine how the body absorbs, uses, and releases the chemical. For some chemicals, animal testing may be necessary. Animal testing may also help identify health effects such as cancer or birth defects. Without laboratory animals, scientists would lose a basic method for getting information needed to make wise decisions that protect public health. Scientists have the responsibility to treat research animals with care and compassion. Scientists must comply with strict animal care guidelines because laws today protect the welfare of research animals.

The effects of lead are the same whether it enters the body through breathing or swallowing. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults to lead at work has resulted in decreased performance in some tests that measure functions of the nervous system. Lead exposure may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people. Lead exposure may also cause anemia. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

We have no conclusive proof that lead causes cancer (is carcinogenic) in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens based on limited evidence from studies in humans and sufficient evidence from animal studies, and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans. IARC determined that organic lead compounds are not classifiable as to their carcinogenicity in humans based on inadequate evidence from studies in humans and in animals.

1.6 HOW CAN LEAD AFFECT CHILDREN?

This section discusses potential health effects in humans from exposures during the period from conception to maturity at 18 years of age.

Studies carried out by the Centers for Disease Control and Prevention (CDC) show that the levels of lead in the blood of U.S. children have been getting lower and lower. This result is because lead

is banned from gasoline, residential paint, and solder used for food cans and water pipes. However, about 310,000 U.S. children between the ages of 1 and 5 years are believed to have blood lead levels equal or greater than 10 µg/dL, the level targeted for elimination among young children in the Unites States by 2010.

Children are more vulnerable to lead poisoning than adults. Children are exposed to lead all through their lives. They can be exposed to lead in the womb if their mothers have lead in their bodies. Babies can swallow lead when they breast feed, or eat other foods, and drink water that contains lead. Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. These activities make it easier for children to be exposed to lead than adults. The dirt or dust on their hands, toys, and other items may have lead particles in it. In some cases, children swallow nonfood items such as paint chips; these may contain very large amounts of lead, particularly in and around older houses that were painted with lead-based paint. The paint in these houses often chips off and mixes with dust and dirt. Some old paint contains as much as 50% lead. Also, compared with adults, a bigger proportion of the amount of lead swallowed will enter the blood in children.

Children are more sensitive to the health effects of lead than adults. No safe blood lead level in children has been determined. Lead affects children in different ways depending on how much lead a child swallows. A child who swallows large amounts of lead may develop anemia, kidney damage, colic (severe "stomach ache"), muscle weakness, and brain damage, which ultimately can kill the child. In some cases, the amount of lead in the child's body can be lowered by giving the child certain drugs that help eliminate lead from the body. If a child swallows smaller amounts of lead, such as dust containing lead from paint, much less severe but still important effects on blood, development, and behavior may occur. In this case, recovery is likely once the child is removed from the source of lead exposure, but there is no guarantee that the child will completely avoid all long-term consequences of lead exposure. At still lower levels of exposure, lead can affect a child's mental and physical growth. Fetuses exposed to lead in the womb, because their mothers had a lot of lead in their bodies, may be born prematurely and have lower weights at birth. Exposure in the womb, in infancy, or in early childhood also may slow mental development and cause lower intelligence later in childhood. There is evidence that these effects may persist beyond childhood.

Children with high blood lead levels do not have specific symptoms. However, health workers can find out whether a child may have been exposed to harmful levels of lead by taking a blood sample. They can also find out how much lead is in a child's bones by taking a special type of x-ray of the finger, knee, or elbow. This type of test, however, is not routine.

1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO LEAD?

If your doctor finds that you have been exposed to substantial amounts of lead, ask whether your children might also have been exposed. Your doctor might need to ask your state health department to investigate.

The most important way families can lower exposures to lead is to know about the sources of lead in their homes and avoid exposure to these sources. Some homes or day-care facilities may have more lead in them than others. Families who live in or visit these places may be exposed to higher amounts of lead. These include homes built before 1978 that may have been painted with paint that contains lead (lead-based paint). If you are buying a home that was built before 1978, you may want to know if it contains lead based paint. Federal government regulations require a person selling a home to tell the real estate agent or person buying the home of any known lead-based hazards on the property. Adding lead to paint is no longer allowed. If your house was built before 1978, it may have been painted with lead-based paint. This lead may still be on walls, floors, ceilings, and window sills, or on the outside walls of the house. The paint may have been scraped off by a previous owner, but paint chips and lead-containing dust may still be in the yard soil. Decaying, peeling, or flaking paint can introduce lead into household dust and the area where this is occurring should be repainted. If your paint is decaying or your child has symptoms of lead poisoning, you may want to have your house tested for lead. In some states, homeowners can have the paint in their homes tested for lead by their local health departments. The National Lead Information Center (1-800-532-3394) has a listing of approved risk assessors (people who have met certain criteria and are qualified to assess the potential risks of a site) and of approved testing laboratories (for soil, paint, and dust).

Sanding surfaces painted with lead-based paint or using heat to peel the paint may cause exposure to high levels of lead. Many cases of lead poisoning have resulted from do-it-yourself home renovations. Therefore, any renovations should be performed by a licensed contractor who will minimize exposure to household members. It is important for the area being renovated to be isolated from the rest of the house because of lead-containing dust. The federal government requires that contractors who test for or remove lead must be certified by the EPA or an EPA-approved state program. Ask to see certifications of potential contractors. Your state health department or environmental protection division should be able to identify certified contractors for you. The National Lead Abatement Council (P.O. Box 535; Olney, MD 20932; telephone 301-924-5490) can also send you a list of certified contractors.

Families can lower the possibility of children swallowing paint chips by discouraging their children from chewing or putting these painted surfaces in their mouths and making sure that they wash their hands often, especially before eating. Lead can be found in dirt and dust. Areas where levels of lead in dirt might be especially high are near old houses, highways, or old orchards. Some children have the habit of eating dirt (the term for this activity is pica). Discourage your children from eating dirt and other hand-to-mouth activity.

Non-Western folk remedies used to treat diarrhea or other ailments may contain substantial amounts of lead. Examples of these include: Alarcon, Ghasard, Alkohl, Greta, Azarcon, Liga, Bali Goli, Pay-loo-ah, Coral, and Rueda. If you give your children these substances or if you are pregnant or nursing, you may expose your children to lead. It is wise to know the ingredients of any medicines that you or your children use.

Older homes that have plumbing containing lead may have higher amounts of lead in drinking water. Inside plumbing installed before 1930 is most likely to contain high levels of lead. Copper pipes have replaced lead pipes in most residential plumbing. You cannot see, taste, or smell lead in water, and boiling your water will not get rid of lead. If you have a water-lead problem, EPA recommends that anytime water in a particular faucet has not been used for 6 hours or longer, you should flush your cold water pipes by running water until it is cold (5 seconds–2 minutes). Because lead dissolves more easily in warm water than in cold water, you should only use cold water for drinking, cooking, and preparing baby formula. You can contact your local health department or water supplier to find out about testing your water for lead. If your water tests indicate a significant presence of lead, consult your water supplier or local health department about possible remedies.

You can bring lead home in the dust on your hands or clothes if lead is used in the place where you work. Lead dust is likely to be found in places where lead is mined or smelted, where car batteries are made or recycled, where electric cable sheathing is made, where fine crystal glass is made, or where certain types of ceramic pottery are made. Pets can also bring lead into the home in dust or dirt on their fur or feet if they spend time in places that have high levels of lead in the soil.

Swallowing of lead in house dust or soil is a very important exposure pathway for children. This problem can be reduced in many ways. Regular hand and face washing to remove lead dusts and soil, especially before meals, can lower the possibility that lead on the skin is accidentally swallowed while eating. Families can lower exposures to lead by regularly cleaning the home of dust and tracked in soil. Door mats can help lower the amount of soil that is tracked into the home; removing your shoes before entering the home will also help. Planting grass and shrubs over bare soil areas in the yard can lower contact that children and pets may have with soil and the tracking of soil into the home.

Families whose members are exposed to lead dusts at work can keep these dusts out of reach of children by showering and changing clothes before leaving work, and bagging their work clothes before they are brought into the home for cleaning. Proper ventilation and cleaning—during and after hobby activities, home or auto repair activities, and hair coloring with products that contain lead—will decrease the possibility of exposure.

Lead-containing dust may be deposited on plant surfaces and lead may be taken up in certain edible plants from the soil by the roots; therefore, home gardening may also contribute to exposure if the produce is grown in soils that have high lead concentrations. Vegetables should be well washed before eating to remove surface deposits. Certain hobbies and home or car repair activities like radiator repair can add lead to the home as well. These include soldering glass or metal, making bullets or slugs, or glazing pottery. Some types of paints and pigments that are used as facial make-up or hair coloring contain lead. Cosmetics that contain lead include surma and kohl, which are popular in certain Asian countries. Read the labels on hair coloring products, and keep hair dyes that contain lead acetate away from children. Do not allow children to touch hair that has been colored with lead-containing dyes or any surfaces that have come into contact with these dyes because lead

compounds can rub off onto their hands and be transferred to their mouths.

It is important that children have proper nutrition and eat a balanced diet of foods that supply adequate amounts of vitamins and minerals, especially calcium and iron. Good nutrition lowers the amount of swallowed lead that passes to the bloodstream and also may lower some of the toxic effects of lead.

1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO LEAD?

The amount of total lead in the blood can be measured to determine if exposure to lead has occurred. This test shows if you have been recently exposed to lead. Lead can be measured in teeth or bones by x-ray techniques, but these methods are not widely available. These tests show long-term exposures to lead. The primary screening method is measurement of blood lead. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

1.9 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government develops regulations and recommendations to protect public health. Regulations *can* be enforced by law. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but *cannot* be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as "not-to-exceed" levels, that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value that is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that provides it. Some regulations and recommendations for lead include the following:

CDC recommends that states develop a plan to find children who may be exposed to lead and have their

blood tested for lead. CDC recommends that the states test children:

- at ages 1 and 2 years;
- at ages 3–6 years if they have never been tested for lead;
- if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children;
- if they live in a building or frequently visit a house built before 1950;
- if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or
- if they have a brother, sister, or playmate who has had lead poisoning.

CDC considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 µg/dL. Many states or local programs provide intervention to individual children with blood lead levels equal to or greater than 10 µg/dL. Medical evaluation and environmental investigation and remediation should be done for all children with blood lead levels equal to or greater than 20 µg/dL. Medical treatment (i.e., chelation therapy) may be necessary in children if the lead concentration in blood is higher than 45 µg/dL.

EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter ($\mu g/m^3$) averaged over 3 months. EPA regulations no longer allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

Under the Lead Copper Rule (LCR), EPA requires testing of public water systems, and if more than 10% of the samples at residences contain lead levels over 0.015 milligrams per liter (mg/L), actions must be taken to lower these levels. Testing for lead in drinking water in schools is not required unless a school is regulated under a public water system. The 1988 Lead Contamination Control Act (LCCA) was created to help reduce lead in drinking water at schools and daycare centers. The LCCA created lead monitoring and reporting requirements for schools, as well as the replacement of fixtures that contain high levels of lead. However, the provisions in the LCCA are not enforceable by the federal government and individual states have the option to voluntarily comply with these provisions or create their own.

To help protect small children, the Consumer Product Safety Commission (CPSC) requires that the concentration of lead in most paints available through normal consumer channels be not more than 0.06%. The Federal Hazardous Substance Act (FHSA) bans children's products containing hazardous amounts of lead.

The Department of Housing and Urban Development (HUD) develops recommendations and regulations to prevent exposure to lead. HUD requires that federally funded housing and renovations, Public and Indian housing be tested for

lead-based paint hazards and that such hazards be fixed by covering the paint or removing it. When determining whether lead-based paint applied to interior or exterior painted surfaces of dwellings should be removed, the standard used by EPA and HUD is that paint with a lead concentration equal to or greater than 1.0 milligram per square centimeter (mg/cm^2) of surface area should be removed or otherwise treated. HUD is carrying out demonstration projects to determine the best ways of covering or removing lead-based paint in housing.

EPA has developed standards for lead-paint hazards, lead in dust, and lead in soil. To educate parents, homeowners, and tenants about lead hazards, lead poisoning prevention in the home, and the lead abatement process, EPA has published several general information pamphlets. Copies of these pamphlets can be obtained from the National Lead Information Center or from various Internet sites, including http://www.epa.gov/opptintr/lead.

OSHA regulations limit the concentration of lead in workroom air to 50 $\mu g/m^3$ for an 8-hour workday. If a worker has a blood lead level of 50 µg/dL or higher, then OSHA requires that the worker be removed from the workroom where lead exposure is occurring.

FDA includes lead on its list of poisonous and deleterious substances. FDA considers foods packaged in cans containing lead solders to be unsafe. Tin-coated lead foil has been used as a covering applied over the cork and neck areas of wine bottles for decorative purposes and to prevent insect infestations. Because it can be reasonably expected that lead could become a component of the wine, the use of such foil is also a violation of the Federal Food, Drug, and Cosmetic Act. FDA has reviewed several direct human food ingredients (i.e., food dyes) and has determined them to be "generally recognized as safe" when used in accordance with current good manufacturing practices. Some of these ingredients contain allowable lead concentrations that range from 0.1 to 10 ppm.

1.10 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below.

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

Toxicological profiles are also available on-line at www.atsdr.cdc.gov and on CD-ROM. You may request a copy of the ATSDR ToxProfiles™ CD-ROM by calling the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636), by e-mail at cdcinfo@cdc.gov, or by writing to:

PUBLIC HEALTH STATEMENT
Lead
CAS#: 7439-92-1

Division of Toxicology and Environmental Medicine **August 2007**

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental
Medicine
1600 Clifton Road NE
Mailstop F-32
Atlanta, GA 30333
Fax: 1-770-488-4178

Organizations for-profit may request copies of final Toxicological Profiles from the following:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 1-800-553-6847 or 1-703-605-6000
Web site: http://www.ntis.gov/

Source:
http://www.sciencenews.org/view/generic/id/332463/description/Airports_leaden_fallout_may_taint_some_kids

Airports' leaden fallout may taint some kids

Study makes link between blood lead and the gasoline used to fuel small planes

By Janet Raloff

Web edition: July 14, 2011

A+A-Text Size

People who live near airports serving small planes are exposed to lead from aviation fuel. A new study now links an airport's proximity to slightly elevated blood-lead levels in children from area homes.

Small planes (known in the trade as general aviation) tend to run on gasoline, most of which contains lead as an octane booster. These aircraft — used as taxis, personal aircraft and training vehicles — fly out of nearly 20,000 U.S. airports. And as other sources of lead have fallen, the relative share that aviation gas, or avgas, contributes has been rising.

Indeed, the Environmental Protection Agency, estimates: "Emissions of lead from piston-engine aircraft using leaded avgas comprise approximately half of the national inventory of lead emitted to air" — making it the largest contributor to airborne lead in the United States.

But high as that sounded, researchers still couldn't evaluate the fuel's health significance. People wanted to know: In terms of lead poisoning, 'is this an important source,'" observes Bruce Lanphear of Simon Fraser University in Vancouver, British Columbia, who was not involved with the new study. "We simply lacked data to answer that," the toxicologist says.

The new study's attempt to tie proximity to regional airports with lead levels in kids "certainly makes it a noteworthy paper," he now concludes.

Environmental health scientists and statisticians at Duke University's Nicholas School of the Environment in Durham, N.C., used state records to identify children who had been tested for blood-lead levels, and mapped their residences in relation to regional airports in several counties. Then the researchers correlated lead concentrations in those kids with the distance of their homes from those airports.

Children 7 and under who lived within 1,000 meters (six-tenths of mile) of an airport — and especially within 500 meters — had higher lead levels, generally, than youngsters living beyond that distance. This association remained "robust" even after adjusting for a host of other factors that might affect the likelihood a child would be exposed to lead, such as living in an older home (which might have lead-based paint), observes study leader Marie Lynn Miranda.

In a paper published online July 13 in *Environmental Health Perspectives,* she and her colleagues find that the likely contribution of aviation gasoline to a child's blood-lead burden is small — in the range of 2 to 4 percent (depending on whether they lived within 1,000 meters of an airport versus half that distance).

Policy implications

That may not sound like much, Miranda acknowledges, but every little bit matters. Her own studies have linked end-of-the-year test grades with increasing levels of lead in a child's blood. In fourth graders, lower scores could be correlated with blood concentrations as low as 2 micrograms per deciliter, she found — just a fraction of the 10 µg/dl value viewed as a federal "action level".

The Duke team's new analysis did not stratify children in terms of where their homes were in relation to prevailing winds or predominant take-off and -landing paths. So, Miranda says, her team's quantitative estimates will likely underestimate the contributions of avgas emissions to lead levels in some youngsters.

And Lanphear anticipates that toddlers, who tend to put things into their mouths a lot, may have an exaggerated early exposure to the lead in dust. Instead of seeing a 4 percent contribution of avgas fallout to their blood lead values, he said, you might see a 10 percent increase.

Finally, Lanphear adds, children aren't the only potentially at-risk population. Several studies have shown "that even extraordinarily low blood lead levels in adults are associated with an increasd risk of death from heart attacks and strokes." The mechanism: lead's ability to boost blood pressure, he says.

There are alternative leadfree or certainly reduced-lead fuels for small planes, Miranda points out. And it's in that context, she says, that she'd argue her team's new findings "are highly policy relevant."

What policy?

Five years ago an environmental group, Friends of the Earth, petitioned EPA to issue a finding under the Clean Air Act that "lead emissions from general aviation aircraft endanger public health and welfare." If such a finding were issued, then the group wanted EPA to issue a proposed lead-emissions standard for small planes.

A little more than a year ago, EPA published an "advance notice of proposed rulemaking" that summarized pertinent data scientists might use in evaluating whether leaded avgas poses a health

threat.

Three months later, five industry groups representing general aviation aircraft owners, operators and manufacturers sent a letter to the director of EPA's Office of Transportation and Air Quality, Margo Oge. In it, they asked whether there was any truth to the rumor that EPA would ban leaded avgas by 2017.

"There is concern," the letter said, "that current and future EPA actions will be taken that could potentially jeopardize the safety of the operation of piston aircraft" — planes designed to run on high-octane fuel. Moreover, the letter observed, "there is a strong and growing perception that EPA actions will lead to the grounding of portions of the existing fleet that require high octane avgas."

Oge responded within five days noting that her agency's 40-page notice of proposed rulemaking was only a means to ferret out additional data that might be useful in determining whether lead-emissions standards for small planes might be warranted. She also emphasized "EPA has not established or proposed any date by which lead emissions from aircraft operating on leaded avgas would need to be reduced. In fact EPA does not have authority to control aviation fuels." (That's the Federal Aviation Administration's bailiwick.)

What EPA can do is restrict emissions from a vehicle that could endanger health, Oge pointed out; after that, manufacturers and operators could choose how to comply.

Since then, EPA has remained quiet on the status of its deliberations.

CITATIONS

Agency for Toxic Substances and Disease Registry. Lead toxicity: What are the U.S. standards for lead levels? [Go to]

M.L. Miranda, et al. The relationship between early childhood blood lead levels and performance on end-of-grade tests. Environmental Health Perspectives, Vol. 115, August 2007, p. 1242. doi:10.1289/ehp.9994 [Go to]

M.L. Miranda, et al. Environmental contributors to the achievement gap, NeuroToxicology, Vol. 30, November 2009, p. 1019. doi:10.1016/j.neuro.2009.07.012

[Go to]

M.L. Miranda, R. Anthopolos and D. Hastings. A geospatial analysis of the efffects of aviation gasoline on childhood blood lead levels. Environmental Health Perspectives, in press, posted online July 13, 2011. doi: 10.1289/ehp.1003231 Abstract: [Go to]

SUGGESTED READING

U.S. Environmental Protection Agency. Fact sheet for Advance Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft Using Leaded Aviation Gasoline: Regulatory Announcement. [Go to]

U.S. Environmental Protection Agency. Fact sheet for Advance Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft Using Leaded Aviation Gasoline: Regulatory Announcement. April 20, 2010. [Go to]

Friends of the Earth. Petition for rulemaking seeking the regulation of lead emissions from general aviation aircraft under § 231 of the Clean Air Act: Petition for rulemaking & collateral relief before the Administrator of the United States Environmental Protection Agency. Oct. 3, 2006. [Go to]

R. Hackman, et al. July 22, 2010 letter to Margo Oge Re: EPA-HQ-OAR-2007-0294 Advance Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft Using Leaded Aviation Gasoline. [Go to]

M.T. Oge, U.S. EPA. July 27, 2010 letter to Robert Hackman of the Aircraft Owners and Pilots Association regarding the Advance Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft Using Leaded Aviation Gasoline. [Go to]

BEFORE THE ADMINISTRATOR OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PETITION FOR RULEMAKING & COLLATERAL RELIEF

FRIENDS OF THE EARTH
Petitioner
1717 Massachusetts Avenue, NW, 600
Washington, DC 20036-2002

PETITION FOR RULEMAKING SEEKING THE REGULATION OF LEAD EMISSIONS FROM GENERAL AVIATION AIRCRAFT UNDER § 231 OF THE CLEAN AIR ACT

October 3, 2006

Pursuant to the Right to Petition Government Clause contained in the First Amendment of the United States Constitution, the Administrative Procedure Act, and the Clean Air Act, petitioner files this petition for Rulemaking and Collateral Relief with the Administrator and respectfully requests him to undertake the following duties:

(1) Make a finding that lead emissions from general aviation aircraft endanger public health and welfare and issue a proposed emissions standard for lead from general aviation aircraft under § 231 (a) (2) (A) of the Clean Air Act; alternatively,

(2) If the Administrator believes that insufficient information exists to make such a finding, commence a study and investigation of the health and environmental impacts of lead emissions from general aviation aircraft, including impacts to humans, animals and ecosystems, under § 231 (a) (2) of the Clean Air Act, and issue a public report on the findings of the study and investigation.

BACKGROUND

On September 30, 2003, the Environmental Protection Agency ("EPA") published a Notice of Proposed Rulemaking (NPRM) for proposed amendments to existing emission standards for oxides of nitrogen (NOx) for newly certified commercial aircraft gas turbine engines with rated thrust greater than 26.7 kilonewtons (kN). 68 Fed. Reg. 56, 226. On December 12, 2003, on behalf of Bluewater Network, (currently a division of Friends of the Earth), the Golden Gate University Environmental Law and Justice Clinic commented on the proposed rule, as well as on the lack of regulation of lead emissions from general aviation aircraft. Regarding the latter issue, Bluewater argued that the combination of the lack of a threshold for safe lead exposure and the relatively high proportion of air lead pollution from general aviation aircraft should trigger the EPA's duties under Clean Air Act §231 to determine that lead emissions from this source endanger the public health and welfare.[1] Bluewater also noted that subpopulations living in the vicinity of general aviation airports, as well as aircraft workers and passengers, may be at particular risk for lead exposure.[2]

In November 2005, the EPA issued a response. The EPA claimed that there is insufficient information to enable the agency to determine that aircraft lead emissions may reasonably be anticipated to endanger public health and welfare.[3] The EPA further maintained that since a suitable, safe, unleaded aviation fuel has not been developed, regulating leaded aviation fuel would ground all general aviation aircraft, resulting in severe economic repercussions to the businesses that use the craft.[4]

Despite the volumes of studies pointing to the hazards of lead, the extent of the EPA's actions to address this problem have been to merely encourage the Federal Aviation Administration (FAA) to develop an unleaded aviation gasoline and to pursue voluntary initiatives to reduce the use of lead in aviation gasoline, while collecting information when possible.[5] The EPA is reluctant to take a more assertive stance on the problem of lead emissions from general aviation aircraft. Further reluctance is no longer appropriate, given the facts below.

PETITIONER

Petitioner FRIENDS OF THE EARTH is an environmental advocacy organization founded in 1969, with approximately 30,000 members across the nation. It's mission is to protect the planet from environmental degradation, including protecting clean air and healthy communities. BLUEWATER NETWORK is a non-profit organization founded in 1996 that works to protect air and water quality from harm caused by the transportation sector. Bluewater Network works to end environmental damage from cars, crafts, vessels, and to protect human

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[1] Letter from Golden Gate University Environmental Law and Justice Clinic, on behalf of Bluewater Network, to the U.S. EPA (December 12, 2003).
[2] *Id.*
[3] Emission Standards and Test Procedures for Aircraft and Aircraft Engines: Summary and Analysis of Comments, US EPA (November 2005) [EPA Comments] at 45.
[4] *Id.* at 42.
[5] *Id.* at 43.

health and the planet by reducing dependence on fossil fuels. In March, 2005, Friends of the Earth merged with Bluewater Network. As a result of the merger, Bluewater Network is now a division of Friends.

STATEMENT OF LAW

On behalf of Friends of the Earth, the Environmental Law and Justice Clinic submits this petition to the EPA under the authority granted by the Administrative Procedure Act, 5 U.S.C. § 553.

In 1970, Congress gave the EPA authority through Section 231(a)(2)(A) of the Clean Air Act, 42 U.S.C. § 7571, to issue proposed emission standards when it determines that aircraft emissions from any class of aircraft engines "may reasonably be anticipated to endanger public health or welfare." Indeed, the EPA itself has confirmed that it has the authority to do so.[6] EPA must consult with the FAA regarding these standards. Section 231(a)(2)(B)(i). Pursuant to 49 U.S.C. § 44714, the FAA shall prescribe fuel standards to control or eliminate aircraft emissions that the EPA decides under section 231 endanger the public health or welfare. Only if the consultation determines that the proposed changes "would significantly increase noise and adversely affect safety," shall the changes not take effect. Section 231(a)(2)(B)(ii).

ARGUMENT

EPA action regarding lead in general aviation aircraft is long overdue. Studies increasingly show that lead in any quantity threatens the public welfare. Lead emissions from general aviation aircraft constitute a substantial proportion of all current lead air emissions. Congress gave EPA the authority through Section 231(a)(2)(A) to issue proposed emission standards when it determines that aircraft emissions "endanger public health or welfare." Based on the facts presented below, the petitioner contends that sufficient data exists to conclude that lead emissions from general aviation aircraft endanger the public heath and welfare, thus creating a duty for the EPA to propose emission standards. In the alternative, sufficient data regarding the dangers of airborne lead exist to commence a study concerning the extent of the health and environmental effects of general aviation lead emissions. Failure to do so in either instance would constitute arbitrary and capricious action under the APA, 5 U.S.C. § 706.

I. LEAD EXPOSURE IS HAZARDOUS TO HUMAN HEALTH

The EPA has repeatedly concluded that "lead is a very toxic element, causing a variety of effects at low dose levels."[7] Numerous federal agencies, including the EPA, the Occupational Safety and Health Administration, the Food and Drug Administration, and the Department of Health and Urban Development, have implemented regulations controlling lead content and use.[8]

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[6] *Id.* at 5.

[7] Lead Compounds Hazard Summary, U.S. EPA (April 1992, modified January 2000), available at http://www.epa.gov/ttn/atw/hlthef/lead.html

[8] Toxicological Profile for Lead, U.S. Department of Health and Human Services (September 2005) [Toxicological Profile] at 14-17, available at http://www.atsdr.cdc.gov/toxprofiles/tp13.pdf

Acute high lead exposure can cause grave physiological consequences, including death and brain damage.[9] The severity of lead exposure differs according to time and levels of exposure, and is usually measured by blood lead levels.[10] However, blood lead levels reflect only recent exposure to lead.[11] Of the lead that is retained in the human body, most is ultimately deposited in the bones.[12] The inert lead deposited in bones can later reenter the blood stream in periods of physiological stress, pregnancy, lactation, chronic disease, and old age.[13] This reentry is exacerbated by calcium deficiency, because lead can inhibit or mimic the actions of calcium. [14] Hence, lead can affect an organism long after initial exposure.

According to the Agency for Toxic Substances and Disease Registry (ATSDR), "lead could potentially affect any system or organs in the body."[15] Common targets for lead toxicity are the cardiovascular, renal, and nervous systems.[16] The most common cardiovascular effect is increased blood pressure.[17] At the same time, lead exposure may compromise the renal system, especially by depressing the kidneys' glomerular filtration rate.[18] However, the most sensitive target for lead toxicity is the nervous system, resulting in malaise, forgetfulness, irritability, weakness, headache, and impaired concentration.[19]

The pervasive and multi-faceted hazards of lead are well documented. Therefore, as the Agency for Toxic Substances states, it is important to interdict all lead exposures.[20]

II. STUDIES INCREASINGLY SHOW THAT NO LEVEL OF LEAD IS SAFE.

The health hazards of lead are especially worrisome because studies increasingly show that no exposure to lead is safe. The levels at which adverse health effects are believed to occur have been revised downward several times in recent regulatory history.[21] For example, in 1972, the blood level considered safe for children was 40 mcg/dL.[22] More recently, the EPA defined the blood level of 10 mcg/dL as the "concentration of concern," but emphasized that this standard is not a threshold below which safety may be assured since scientific studies do not indicate any clear toxicity threshold for lead.[23]

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[9] Lead Toxicity Environmental Alert, U.S. Agency for Toxic Substances and Disease Registry (October 1992, revised October 2000) [ATSDR Report] at 16, available at http://www.atsdr.cdc.gov/HEC/CSEM/lead/docs/lead.pdf
[10] *Id.*
[11] *Id.* at 14.
[12] *Id.*
[13] *Id.* at 15.
[14] *Id.*
[15] Toxicological Profile at 21.
[16] *Id.* at 8, 21.
[17] *Id.* at 27.
[18] *Id.* at 28.
[19] ATSDR Report at 17.
[20] *Id.*
[21] *Id.*
[22] Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control and Prevention (October 1991), available at http://www.cdc.gov/nceh/lead/publications/books/plpyc/contents.html.
[23] Identification of Dangerous Levels of Lead, Final Rule, U.S. EPA (January 5, 2001), 66 Fed. Reg. 1206.

Indeed, recent studies show that lead blood levels well below 10 mcg/dL are associated with increases in serious health effects in both children and adults.[24] For example, increases in chronic kidney disease have been observed in hypertensive adults at blood lead levels of between 2.5 to 3.8 µg/dL.[25]

Children have generally been shown to absorb a larger fraction than adults of both inhaled and ingested lead, [26] and are more sensitive to lead induced toxicity than adults, [27] especially in relation to the nervous system. At lower levels of exposure, lead may compromise cognitive development and cause learning disabilities and lower IQ levels.[28] For example, Lanphear et. al. estimated a decline of 6.2 points in full scale IQ for an increase in blood lead levels from <1 to 10 µg/dL.[29] Low-level exposure has also been associated with neurological effects such as hearing impairment and peripheral nerve dysfunction.[30]

New data increasingly shows that health effects occur in both children and adults at low levels of lead exposure. Therefore, to protect the health and welfare of the public, especially of children, the EPA should strive to eliminate every source of lead to which the public could be exposed.

III. LEAD EMISSIONS FROM GENERAL AVIATION AIRCRAFT POSE HUMAN HEALTH AND ECOLOGICAL CONCERNS.

The use of leaded aviation gasoline results in the emission of both organic and inorganic lead-containing compounds. Organic alkyl lead compounds such as tetraethyl lead ("TEL") are emitted into the air mostly from fueling operations. TEL decomposes fairly quickly to inorganic forms of lead once dispersed into the air, water, or soil. For example, the half-life of TEL in summer atmospheres is approximately 2 hours and is on the order of several days in winter atmospheres.[31]

Inorganic forms of lead enter the environment from the decomposition of organic alkyl lead compounds, and more significantly, as tailpipe emissions from the gasoline combustion process. Inorganic forms of lead are highly persistent in the environment. Wet or dry deposition removes lead particles from the atmosphere and deposits them on soil and water surfaces.[32] Lead emitted as particles may remain airborne for up to ten days and may thus be transported far from the original source.[33]

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[24] ATSDR Report at 17.
[25] Muntner, P.; He, J.; Vupputuri, S.; Coresh, J.; Batuman, V. (2003) Blood lead and chronic kidney disease in the general United States population: results from NHANES III. Kidney Int. 63: 1044-1050.
[26] ATSDR Report at 9.
[27] Toxicological Profile at 9.
[28] Toxicological Profile at 25.
[29] Lanphear, B. P. (2005) Childhood lead poisoning prevention: too little, too late. JAMA J. Am. Med. Assoc. 293: 2274-2276.
[30] ATSDR Report at 17.
[31] PBT National Action Plan for Alkyl-Lead, U.S. EPA Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Program (June 2002) [PBT Action Plan] at 13.
[32] *Id.*
[33] *Id.*

As a result of the use of leaded aviation gasoline, humans and ecological receptors at or near general aviation airports may be exposed to elevated levels of lead. The main routes of human exposure to lead compounds at or near general aviation airports in urban areas include: (i) inhalation of airborne organic and inorganic lead, (ii) ingestion of lead-contaminated dusts formed via deposition of airborne lead, and (iii) ingestion of contaminated home-grown fruits and vegetables (also via particulate deposition). In farming areas, additional exposure could result from the contamination of food-animals via lead deposition onto soils, forage areas, and farm ponds.

Inhalation and ingestion exposures are likely to occur to workers, pilots, passengers and other individuals at general aviation airports. Inhalation, ingestion, garden-produce and other indirect exposures are likely to occur to residents and others located on the periphery of general aviation airports.

In addition, lead emissions from general aviation airports may also accumulate in local and regional surface waters:

> Transport of lead to surface waters can occur through direct deposition from the atmosphere, via industrial waste water discharge, or as runoff (e.g., lead associated with suspended solids in the erosional process) [...] Inorganic lead may bioconcentrate in some aquatic animals, especially benthic organisms such as bottom feeding fish and shellfish such as mussels....[34]

In this way, lead from general aviation airports is likely to contaminate sources of drinking water and fishing resources, and could also cause various adverse ecological impacts.

While the greatest source of lead air emissions comes from stationary sources like lead smelters, general aviation is the one major mobile source, constituting at least 13% all lead air emissions.[35] Other mobile sources of airborne lead emissions are recreational marine vehicles and racing automobiles.[36] The latter of these lead sources is being phased out. The National Association of Stock Car Auto Racing (NASCAR) has announced that by 2008, NASCAR will switch to unleaded gasoline.[37] This is the result of the EPA's 2002 Persistent, Bioaccumulative, and Toxic Pollutants (PBT) Action Plan, in which it identified the removal of lead from NASCAR vehicle fuel as its key priority over the next five years.[38] The EPA has not made the removal of lead from general aviation fuel a similar priority even though, in 1996, U.S. refineries produced over 3,000 times as many gallons of aviation gasoline as NASCAR fuel used in 1998.[39]

EPA's concern with removing lead from NASCAR fuel indicates the importance of removing mobile source lead emissions, and yet EPA has not acted to address lead fuel use in general aviation fuel. General aviation constitutes a substantially higher percentage of lead air

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[34] *Id.*
[35] National Air Quality and Emission Trends Report, U.S. EPA (2003).
[36] PBT Action Plan at 7.
[37] Viv Bernstein, *NASCAR Plans to Switch to Unleaded Fuel in '08*, New York Times, January 20, 2006, at 2.
[38] PBT Action Plan at 3.
[39] *Id.* at 25.

emissions than auto racing. In 2002, general aviation comprised 125.5 annual tons, or about 88% of lead from all mobile sources.[40] This percentage will increase with NASCAR adopting unleaded fuel. Now that leaded gasoline use in NASCAR has been addressed, it is time for the EPA to focus on the more important task of removing lead from general aviation fuel.

IV. SAFE UNLEADED ALTERNATIVES TO AVIATION GASOLINE EXIST AND SHOULD BE BETTER UTILIZED.

As described below, contrary to the EPA's assertions,[41] safe unleaded alternatives to aviation gasoline do exist. Since 1999, the research and development process has produced unleaded fuels that have received approval from the FAA for current use. Tens of thousands of low-performance aircraft have received supplemental type certificates allowing them to run on unleaded automobile gasoline (commonly referred to as "mogas" in the aviation community). Additionally, a mogas alternative, 82UL, has been developed for use by some low-performance planes. The combination of these two fuels can be utilized by nearly seventy percent of all piston-driven aircraft. Additionally, the FAA allows a select number of planes to run on an ethanol based aviation fuel (AGE85); the remaining thirty percent of general aviation planes can potentially use this unleaded gasoline.

A. A LARGE PORTION OF GENERAL AVIATION AIRCRAFT CAN CURRENTLY USE UNLEADED AUTOMOBILE GASOLINE SAFELY ONCE ISSUED A SUPPLEMENTAL TYPE CERTIFICATE BY THE FAA.

Seventy percent of general aviation aircraft are capable of running on mogas upon being issued a supplemental type certificate (STC).[42]

To ensure the production of safe aircraft, the FAA puts all planes through a certification process. Once the FAA determines that an aircraft meets the prescribed safety standards, it shows its approval by issuing a "type certificate." 49 U.S.C.S. § 44704(a)(1). For alterations to an airplane or its engine, each applicant must show that the changes comply with the aforementioned safety standards. 14 C.F.R. § 21.115 (2006). When the FAA confirms compliance, they issue a "supplemental type certificate." 49 U.S.C.S. § 44704(b)(1). Since changes in fuel usage involve the plane's engine, approval to begin using automotive gasoline (mogas) rather than aviation gasoline (avgas) requires the applicant to obtain an STC. Indeed, the FAA has issued STCs for airplanes and engines using mogas since 1982,[43] including over 40,000 through the Experimental Aircraft Association (EAA).[44]

As long as pilots use mogas in accordance with their STC, safety is no more an issue than with avgas. The FAA first issued a STC approving the use of mogas twenty-four years ago.

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[40] National Emissions Inventory for Lead, U.S. EPA (2002).
[41] EPA Comments at p.42.
[42] Michael A. Dornheim, *100LL Demise Expected Over Next Decade*, Aviation Week & Space Technology, July 23, 2001, at 51.
[43] *Id.*
[44] Experimental Aircraft Association, http://www.eaa.org/education/fuel/index.html (last visited March 13, 2006).

Since then, the FAA has determined that aircraft using mogas are as safe as those running on avgas:

> Autogas[45] use has been extensively compared, tested, and analyzed. Autogas has been shown to be an acceptable alternative to avgas for airplanes and engines approved for such use. Airplanes and engines approved for autogas have met the FAA certification requirements for engine detonation, engine cooling, fuel flow, hot fuel testing, fuel system compatibility, vapor lock, and performance....In summary, there are numerous studies and technical reports available comparing autogas to avgas for use in certified airplanes and engines. The service history for airplanes and engines using autogas has been good and is comparable to avgas.[46]

A plane's mogas STC specifies which grade of mogas it can use. Many of these STCs allow the use of regular grade unleaded mogas in place of Grade 80/87 avgas.[47] However, some allow premium grade mogas, usually for planes that would otherwise run on 91/96 or 100LL avgas.[48] Given these specifications, the FAA,[49] Experimental Aircraft Association,[50] and other aviation commentators[51] emphasize that pilots should strictly adhere to the terms of their STCs. Nonetheless, since STCs allow the use of a variety of grades of mogas to replace multiple grades of avgas, the number of general aviation aircraft able to run on mogas is greatly increased.

In 2000, the FAA Small Airplane and Engine and Propeller Directorate approved the use of another unleaded fuel, 82Unleaded (82UL) gasoline, as an alternative to mogas.[52] 82UL is a variation of mogas designed specifically for piston-driven aircraft, produced from the same fuel stocks but with fewer of the additives found in automobile gasoline.[53] Planes can use it with STCs that approve the use of mogas with an octane rating of 82 or less. While 82UL is not yet commercially available, it has already completed the FAA's rigorous approval process. Given its certification, 82UL could be phased into production if needed.

From a cost standpoint, increased utilization of mogas would lead to significant savings for general aviation pilots. Nationally, 100LL avgas averages $3.72 per gallon with the price exceeding six dollars in several areas.[54] By comparison, mogas pumped at airports averages just $2.77 per gallon with a high of four dollars in only one region.[55] Gasoline pumped from the neighborhood station costs even less: the national average is $2.36 per gallon with the price

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[45] In aviation circles, "Autogas" and "Mogas" are used interchangeably.
[46] Letter from Michael Gallagher, Manager of the FAA Small Airplane Directorate, to Earl Lawrence, Executive Director of the Experimental Aviation Association (June 4, 1998), *available at* http://www.eaa.org/education/fuel/letter.pdf
[47] FAA Revised Special Airworthiness Information Bulletin, April 5, 2000, available at http://www.faa.gov/aircraft/safety/alerts/saib/media/CE-00-19R1.htm (last visited March 15, 2006).
[48] *Id.*
[49] *Supra* note 46.
[50] *Supra* note 44.
[51] John Ruley, *Avgas vs. Autogas*, May 5, 2004, http://www.avweb.com/news/maint/187232-1.html.
[52] *Supra* note 47.
[53] *Id.*
[54] AirNav, http://www.airnav.com/fuel/report.html (last visited March 13, 2006).
[55] *Id.*

falling between $2.05 and $2.93.[56] Based on the average prices, a pilot would save ninety-five dollars for every one hundred gallons of fuel bought at the airport; the savings increases to $141.00 when purchased at a gas station.

Increasing the use of mogas in aircraft would prove highly beneficial to the public generally and to general aviation pilots specifically. If all seventy percent of those planes able to use mogas did so, it would result in a thirty percent reduction of overall avgas use.[57] Such a decrease would result in the removal of more than thirty-seven tons of lead emissions from the air and a significant overall diminution of lead exposure to the American people.[58] Similarly, less avgas use would reduce the more direct lead exposure experienced by residential communities adjacent to airports as well as pilots and airport personnel, in addition to reducing the cost of operating general aviation aircraft. With the FAA already deeming mogas use safe through its certification program, an exercise of the EPA's section 231 authority would prompt the FAA to expand a program already in existence. Increased issuance of mogas STCs would have a positive impact on the general aviation community and the public at large.

B. HIGH-PERFORMANCE AIRCRAFT WITH PROPER CERTIFICATION CAN SAFELY RUN ON ETHANOL BASED FUEL.

In April 1999, the FAA issued STCs for aircraft and engines to use Aviation Grade Ethanol 85 (AGE85).[59] AGE85 is an unleaded, "'high-performance, high-octane fuel -- just what newer, high-performance, high-compression aircraft engines need [--]'" designed specifically to replace 100LL fuel.[60]

While high-performance aircraft comprise only thirty percent of general aviation planes, they consume nearly seventy percent of the total avgas due to the increased energy needs of their 200+ horsepower engines. Though AGE85 is not widely available at present, current and continued expansion of commercial ethanol production facilities[61] could potentially cover the fuel needs of most high-performance engines, resulting in the removal of nearly eighty-eight tons

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[56] GasWatch, http://www.gaswatch.info/ (last visited March 13, 2006).

[57] *Supra* note 42. Generally speaking, approximately 70% of general aviation aircraft are considered "low-performance." According to 14 C.F.R. § 61.31(f) (2006), planes with engines of greater than 200 Horsepower are classified as "high-performance" and require additional pilot training. Only 30% of general aviation aircraft are high-performance; however they use nearly 70% of consumed avgas.

[58] 2002 National Emissions Inventory for Lead, U.S. EPA (General Aviation emitted 125.5 tons of lead in 2002).

[59] STCs are available for the Cessna 180 and 182s as well as the O-470 and UTS engines. Additionally, dual-fuel STCs are available for the same aircraft and engines. STCs for the Lycoming IO-360 and Pratt and Whitney R-1340 are in progress. *See* http://www.age85.org/STCs.htm (last visited March 15, 2006).

[60] At Last, A Low-Cost Aviation Gasoline That Gets The Lead Out, Science Daily, July 20, 1999, available at http://www.sciencedaily.com/releases/1999/07/990720083151.htm (last visited March 15, 2006).

[61] At the end of 2005, construction of new refineries and ongoing expansions were expected to add as much as 1.5 billion gallons of annual ethanol production capacity in the United States. Since 2001, U.S. ethanol production has increased by 126%. Renewable Fuels Association, From Niche to Nation: Ethanol Industry Outlook 2006, at 2, available at http://www.ethanolrfa.org/objects/pdf/outlook/outlook_2006.pdf (last checked April 5, 2006). Also, Richard Branson, owner of Virgin Atlantic, recently announced plans to invest $400 million in ethanol fuel factories for use in his planes and trains; $30- $40 million of the initial investment will be made in the United States as soon as this year. Jason Niss, *Branson to put $400 million into making 'green' fuel*, London Independent, April 2, 2006, News at 1.

of lead emissions. Additionally, since dual-fuel STCs are also available,[62] blends of AGE85 with 100LL, while not as substantial as exclusive AGE85 use, could still result in significant lead emission decreases. As 100LL availability decreases and AGE85 availability increases, blending of the two offers a viable solution for a transition from one fuel to the other.

As with mogas, AGE85 offers significant cost-benefits to general aviation pilots. Nationally, 100LL avgas averages $3.72 per gallon.[63] When the FAA first approved AGE85 in 2000, pure ethanol cost $0.95 per gallon and AGE85 was expected to sell for $1.10 per gallon; a 16% increase over the initial price.[64] Today, ethanol averages $2.39 per gallon in the Midwest[65] and $2.45 nationally.[66] Calculating the price as a 16% increase over the averages, AGE85 would cost from $2.77 to $2.84. That amounts to a cost-savings of $88 to $95 for every one-hundred gallons of fuel.

Recently, a Brazilian aircraft company, Embraer, developed and received type certification (from the Brazilian equivalent of the FAA) for the ethanol fueled Ipanema cropduster. This plane is the first "series production aircraft in the world coming out of the factory certified for flying with ethanol."[67] In addition to running exclusively on ethanol fuel, the new engine provides a five percent boost in power, improving takeoff, climbing rate, speed, and maximum altitude.[68] The reception of the Ipanema has been overwhelmingly positive: Scientific American named it one of the top-50 worldwide inventions of 2005.[69]

While the Ipanema is not yet approved for use in the United States, it is important to note that the plane's engine is an altered version of the American made Lycoming motor,[70] suggesting that it would be either relatively easy to develop an American version or quickly adopt the Brazilian one for use in the United States. Furthermore, the French company Aero-Alcohol has developed a kit to convert non-ethanol Ipanema planes for ethanol use. This development has attracted the attention of the American Society for Testing and Materials (ASTM) which hopes to consolidate international ethanol standards using the Ipanema's specifications as a starting point.[71]

AGE85 has already received approval for use by the FAA as a safe and viable fuel even though it is not yet available nationwide. With aviation-related ethanol fuel research on the rise at the FAA Hughes Technical Center, in Brazil, and elsewhere, and with American ethanol

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[62] *Supra* note 59.
[63] *Supra* note 54.
[64] Perspectives: A newsletter covering the research, demonstration and education projects of the Iowa Energy Center, January/February 2000, available at http://www.energy.iastate.edu/news/newsletters/perspectives/JanFeb2000.pdf (last visited March 31, 2006).
[65] State average fuel ethanol rack prices, available at http://ethanolmarket.com/fuelethanol.html (last visited March 31, 2006).
[66] Fuel ethanol terminal market price history – 18 months, available at http://www.energy.ca.gov/gasoline/graphs/ethanol_18-month.html (last visited March 31, 2006).
[67] http://www.greencarcongress.com/2004/10/embraerrsquos_e.html (last visited March 15, 2006).
[68] *Id.*
[69] James E. Hardwick, *The Ethanol-Fueled, Brazilian-Built Ipanema Agricultural Aircraft*, Business & Commercial Aviation, February 1, 2006.
[70] E-mail from a Brazilian Diplomat (March 14, 2006) (on file with author).
[71] *Id.*

production increasing and President Bush's 2006 State of the Union address encouraging the industry's growth, use of AGE85 should increase in the near future. This will provide unleaded aviation fuel for high-performance aircraft of a similar quality to avgas.

Finally, European development of a diesel-cycle jet fuel general aviation engine offers yet another possible solution: jet fuel is unleaded and readily available at airports in Europe.[72]

CONCLUSION

As described above, nearly seventy percent of general aviation aircraft can safely use either standard unleaded automobile gas or 82UL gas. Switching to these alternatives would reduce lead emissions from general aviation aircraft by almost 38 tons. Likewise, the ethanol-based AGE85, which has received FAA approval, has the potential to be used by the remaining thirty percent of planes, eliminating an additional 87.85 tons of lead emissions.

These are just some of the current alternatives to leaded avgas. As energy independence becomes a more prevalent societal and economic issue, alternative fuel research is increasing and bound to produce even more choices. In such a dynamic environment, the EPA has the opportunity to adopt rules forcing this technology -- authority the EPA agrees it has under section 231.[73] Indeed, since mogas, 82UL, and AGE85, are already in existence and have the approval of the FAA, the EPA does not even need to force technology development: it only needs to encourage its present utilization.

WHEREFORE, petitioners request that the Administrator:

(1) Make a finding that lead emissions from general aviation aircraft endanger public health and welfare and issue a proposed emissions standard for lead from general aviation aircraft under § 231 (a) (2) (A) of the Clean Air Act; or, in the alternative,

(2) Commence a study and investigation of the health and environmental impacts of lead emissions from general aviation aircraft, including impacts to humans, animals and ecosystems, under § 231 (a) (2) of the Clean Air Act, and issue a public report on the findings of the study and investigation.

As required by law, the EPA is required to give this petition prompt consideration. Additionally, under the Administrative Procedure Act, agency action includes a failure to act. Therefore, petitioners request a substantive response to this petition within 180 calendar days.[74]

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[72] Michael A. Taverna, *SMA Diesel Revs Up*, Aviation Week & Space Technology, May 24, 2004, at 68.
[73] *Supra* note 3 at 4 (EPA conclusion that section 231 does not preclude a technology forcing standard).
[74] 42 U.S.C. § 7604(a) (requiring notice of 180 days prior to commencing an action for unreasonable delay).

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