Residents for Community Preservation

Additional Information for Tyrone Township Planning Commission and Township Board Regarding:

1. Proposed Rezoning of Parcel # 4704-17-400-007
2. Proposed Rezoning of Parcel # 4704-17-200-001
3. Special Land Use Permit Application for an Asphalt Mixing Plant

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I. INTRODUCTION

Residents for Community Preservation, (the "Association") submits this information in order to aid the Tyrone Township Planning Commission and Township Board in fully assessing whether to rezone Parcels # 4704-17-400-007 and # 4704-17-200-001 to M-2 Heavy Industrial and approve the Special Land Use Application to allow construction and operation of an asphalt mixing plant. Except for the Carlisle Wortman Associates (CWA) reviews, the Planning Commission has had primarily the information included with the rezoning and special-use-permit applications and we find this information necessary to express the opposition by Tyrone Township residents. In general, we oppose both the rezoning and the Special Land Use Application because (1) they are not consistent with the Master Zoning Plan; (2) there is no need in Tyrone Township or the surrounding area for an asphalt mixing plant; (3) the proposed use is inconsistent with the site and surrounding uses and will have negative impacts on the environment, nearby residents, and the aesthetics of the US-23 corridor; (4) and the expansive rezoning of two large parcels slated for "future development" will negate the Master Plan's vision by turning an area planned for industrial research facilities and offices into a heavily industrialized area where it does not belong.

Land Use Planning requires balancing the interests of the individual landowner against the interests of the affected residents and the Township as a whole. Assessing the rezoning and proposed land use therefore requires a cost-benefit analysis asking what benefits will an asphalt mixing plant bring to the community and what negative impacts and risks will result from the proposed use. In this instance, the Association believes that the negative impacts of an asphalt mixing plant in this portion of the US-23 corridor are not only inconsistent with the Master Plan, but will create so many conflicts, risks, and negative impacts on the area and its residents that the rezoning and special land use applications should be denied.

As even the Livingston County Master Plan acknowledges, the area under consideration should be categorized as one of "constraint," not one of "opportunity," because "industrial and commercial development in Tyrone Township along the west side of US-23 may pose land use conflicts." Livingston County Master Plan 2018, pp 25-26, Chart, #6 (**Exhibit 1**).[1] And such a conflict is precisely what is unfolding here. The Tyrone Township Master Plan calls for Planned Industrial Research facilities with campus-like settings, not an industrial compound featuring massive piles of materials stored outside, large amounts of flammable liquid petroleum distillates stored and perpetually heated in huge silos, and a 100 foot smokestack emitting toxins and the noxious odor of heated asphalt into the neighborhood and atmosphere. See Tyrone Township Ordinance (TTO), Article 16A. Even worse, if both parcels are rezoned M-2, then other highly industrialized uses—including heavy machinery and chemical plants, contractor's yards, and bulk storage of petroleum products—will become "permitted uses" on 124 acres of property in the highly visible US-23 corridor. See TTO, Permitted Uses for M-1 and M-2 District, §§ 16.01 and 17.01.

[1] Available at https://www.livgov.com/plan/Documents/MasterPlan/2018-County-Master-Plan-Approved-Final-optimized-final-2.pdf.

The rezoning is not only inconsistent with the Master Plan, it will prevent effectuating the Master Plan for this area. The presence of an asphalt plant will have a negative impact on the Township's ability to attract the industrial research and office facilities called for by the Master Plan. Everyone can attest that the smell of hot asphalt is very unpleasant. What company would want to put its office complex or sensitive research facility in a location that is continually exposed to the sights, sounds, smells, and other hazards of an asphalt plant neighbor? Thus, the presence of an asphalt plant will result in the development of the area into pure industrial facilities, directly undermining the Master Plan.

This report will first address the proposed rezoning of the two parcels in the context of the standards outlined in the Tyrone Township Zoning Ordinance before discussing the special land use permit application for an asphalt plant.

II. REZONING OF PARCELS # 4704-17-400-007 AND # 4704-17-200-001

The rezoning requests encompass a 50-acre parcel and a 74-acre parcel directly to the north running parallel on the west side of US-23. Thirty acres of the southern parcel is to be rezoned as M-2 and developed into an asphalt mixing plant. The balance of the southern parcel and most of the northern parcel would also be rezoned to M-2. The developer is also requesting rezoning of a portion of the northern parcel into multi-family residential, explaining that it is intended to act as a buffer between the residential areas to the north and the industrial uses to the south. Not only is split-zoning discouraged, the intent of the M-2 designation states that M-2 districts "should not be adjacent to any residential district." TTO § 17.00. This prohibition would include multi-family residential. Furthermore, the applicant's recognition of the need for a buffer zone underscores why the Master Plan envisions a PIRO to act as a buffer to more industrialized uses to the west.

Except for the area designated for the asphalt plant, the other 94 acres is broadly labeled for "future development" in the application, with no explanation of what that future development might be. With an M-2 designation, all of the permissible uses for M-1 and M-2 would be allowed as permissible uses. Those uses may include heavy manufacturing, chemical plants, petroleum storage, and construction yards. One thing is certain, with an asphalt plant close by, it is unlikely any company will wish to develop the land into an office or research complex with a campus-like setting.

The criteria for amending the Official Zoning Map (rezoning) and the Association's reasons why the rezoning should be denied are as follows:

> **1. Consistency.** Consistency with the goals, policies and future land use map of the Township Master Plan and consideration of current market factors, demographics, infrastructure, traffic and environmental issues, if it is determined by the Planning Commission and Township Board that these conditions have changed significantly since the Plan was created.
> When amending the zoning map, the Zoning Enabling Act (ZEA) mandates that

"[a] zoning ordinance shall be based upon a plan." MCL 125.3203(1). Tyrone Township's zoning ordinance likewise requires that zoning map amendments and special use permits be consistent with the Master Plan. The ZEA requires that zoning ordinances must "be made with reasonable consideration of the character of each district, its peculiar suitability for particular uses, the conservation of property values and natural resources, and the general and appropriate trend and character of land, building, and population development." MCL 125.3203(1). Despite the applicant's unexplained claim to the contrary, the rezoning requested here is inconsistent with the Township Master plan and will increase the difficulty of effectuating the Plan in the future.

The Future Land Use Map on page 103 of the Master Plan designates the subject parcels as "Planned Industrial Research Office" (PIRO) **Exhibit 2**. The zoning ordinance provides:

> The intent of the PIRO District is to encourage the development of a high quality office, research and industrial environment, in campus-type settings with generous landscaping, low intensity lot coverage, and preserving significant natural features. Such areas are often visible from freeways, in high image locations and can impact the impression the Township makes on visitors and travelers, which influences the marketability of the land and the community.
>
> The PIRO District is intended to provide a desirable location for larger office, light industrial, and limited heavier industrial uses as provided in the table of permitted and special uses provided below. The District provides opportunities for enterprises to locate office facilities with laboratories or small assembly or distribution sites nearby. By integrating these uses into a planned development, potential impacts of the heavier uses may be mitigated. [TTO § 16A.00.]

There are three classes of PIRO Districts contemplated in the zoning ordinance: A-Research and Office; B-Light Industry; and C-General Industry. MAP 11 of the Master Plan, designates the subject parcels as "Research Office" or PIRO A. **Exhibit 3**. Higher intensity general industry uses (PIRO C) are located to the west. Asphalt and concrete mixing plants are specifically not permitted in PIRO-A and PIRO-B Districts. See chart, TTO § 16A-2, of the TTO, **Exhibit 4**.

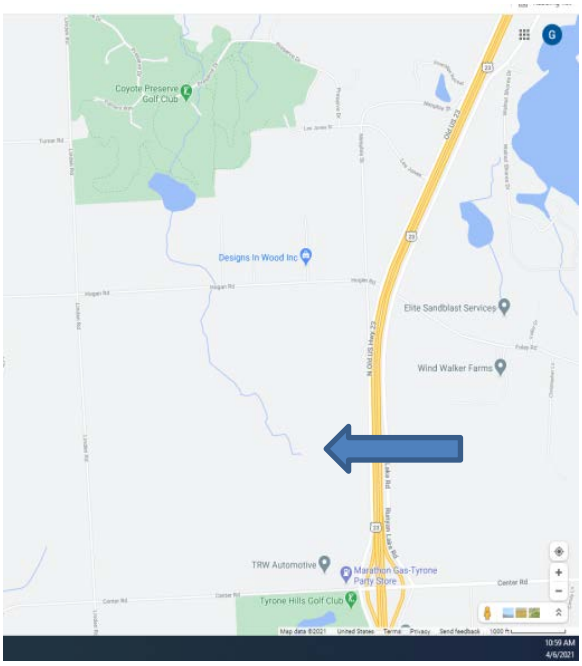
Even PIRO C, which allows asphalt mixing plants via special use permit, expressly prohibits certain uses, including "Hazardous materials handling and similar related uses" and any use "which may cause noxious, offensive, unhealthful or harmful odors, fumes, dust, smoke, lights, waste, noise or vibration . . . ." TTO § 16A.09.D.3 and D.4. The materials used to make asphalt are hazardous and operation of the plant will unavoidably cause "noxious, offensive, unhealthy or harmful odors," fumes, dust, smoke, and noise.

Thus, the Master Plan contemplates PIROs, not M-1 or M-2 districts. An asphalt-

mixing plant is a far more intensive use than a research facility and is incompatible with surrounding areas and current uses. As discussed below, hot asphalt produces harmful chemicals no one wants drifting onto their property.

2. Site Compatibility. Compatibility of the site's physical, geological, hydrological and other environmental features with the uses or special uses permitted in the proposed zoning district.

The CWA review states that the site appears to be generally physically compatible with the potential uses in an M-2 District. The review also notes, however, that the southern parcel slopes downward from the southeastern corner to the northwestern corner. There are wetlands and a forest in the northwestern corner of the southern lot and the southeastern corner of the northern lot. There is also a small stream or drain that travels north until emptying into Runyan Creek, which in turn empties into local lakes.



This means that anything draining from the asphalt plant or other industrial uses later developed will move to the northwest, empty into the stream, and eventually into Runyan Creek and our lakes.

3. Return on Investment. Evidence the applicant cannot receive a reasonable return on investment through developing the property with at least one (1) of the uses permitted under the current zoning.

As noted in the CWA report, the applicant has provided no evidence regarding return on investment under the current zoning. The permitted uses in the FR Farming Residential district include agriculture, single family dwellings, essential services, stables, noncommercial travel trailer storage, and child and adult care facilities. TTO § 4.01. Because of the water and sewer access, this area could easily be developed into uses more consistent with the surrounding area, such as single-family dwellings or greenhouses. The applicant has provided no evidence supporting an argument why any of the currently permitted uses would not create a reasonable return on the investment.

And to be clear, the current owner is not the developer who wishes to rezone. The current owner of the property, Newman TTP, LLC, is owned by Southfield neurosurgeon Steven E. Newman MD. Dr. Newman has apparently entered into an agreement to sell a portion of the property to a developer with the condition that the

rezoning and special use permit are approved by the Township Board and not referred by the citizens of Tyrone Township. The entity seeking the rezoning is Jon Sawyer, a developer who owns at least one other asphalt plant and is involved in numerous other business entities in several states.

> **4. Surrounding Uses.** The compatibility of all the potential uses allowed in the proposed zoning district with surrounding uses and zoning in terms of land suitability, impacts on the environment, density, nature of use, traffic impacts, aesthetics, infrastructure and potential influence on property values.

Directly to the south and west of the southern parcel is TRW, a light manufacturing plant. The applicant has argued that TRW's presence makes the proposed rezoning and special land use permit for an asphalt plant compatible. The TRW manufacturing plant, however, is vastly different from an asphalt mixing plant. TRW is a component plant producing braking and suspension systems for the automotive industry. All manufacturing is conducted inside and out of sight. There is no 100 foot smokestack, little or no noise, no piles of aggregates, no silos to hold hazardous petroleum products, no noxious odors or hazardous emissions, and apparently very little conflict with the surrounding area.[2]

The asphalt plant, however, and many of the other uses permitted in an M-2 district, will be a much more intensive use of this property and its effects will not be contained inside a building. While this factor considers the compatibility of all potential uses, the only use for which the rezoning is currently being sought is for the asphalt plant, and thus the focus remains there.

Impacts on the environment

1. **Drainage**. As shown above, the slope of the land into the wetland creates a risk of drainage from the asphalt plant into the streams and lakes of the surrounding area. But drainage directly into our waters is only one risk from an asphalt plant.

2. **Toxins**. Despite regulatory compliance, harmful substances are released from even fully compliant asphalt plants. A typical asphalt mixing plant emits between 56,000 and 74,000 pounds per year of pollutants, including carbon monoxide, volatile organic compounds, sulfur dioxide, nitrogen oxides, polycyclic aromatic hydrocarbons, phenol, and other hazardous air pollutants (HAP).[3] EPA Asphalt Emission Assessment Report, pp 2, 6-8. **Exhibit 5**. Emissions occur not just during production, however, but also when the plant fills it silos, stores and heats the petroleum product in the silos, transfers the petroleum products and aggregates for production, and loads the hot asphalt into trucks. **Exhibit 5**, pp

[2] There is also a riding stable directly across the freeway and downwind from the parcels, as well as two well-established and highly utilized golf courses to the north and south.

[3] These include naphthalene, fluorine, acetaldehyde, benzene, ethylbenzene, formaldehyde, quinone, toluene, arsenic, beryllium, cadmium, chromium, lead, mercury, and selenium, to name a few. See Tables 5 through 12, **Exhibit 5**, pp 19-25.

15-17. The following pictures are from the applicant's Lansing asphalt plant and show visible emissions at various stages of the process:

It is noteworthy that although the applicant claims asphalt production is seasonal, these pictures from the applicant's Facebook page show the plant being operated in the dead of winter.

If the plant uses recycled petroleum products, the emissions are significantly worse. Much of what is released does not come from the smokestack, but from fugitive emissions, most of which are condensed particulates. Asphalt Plant Pollution, **Exhibit 6**, p 1. Asphalt plants release known and suspected carcinogens. Asphalt Plants Contaminants of Concern: An overview of 7 toxic substances released from asphalt processing facilities and their known effects on human health, **Exhibit 7**.

The bottom line is that, no matter what regulations are in place, the asphalt plant will have a negative effect on the environment, the neighbors, and the downwind communities, such as Fenton. Although there are regulations in place, asphalt plants are regularly fined for exceeding the permitted emissions and have even been deemed a public nuisance. See Grist Creek asphalt plant declared "public nuisance," The Willits News, **Exhibit 8**. In Grist Creek, the neighbors filed hundreds of complaints about the "emissions, noxious odors, noises, health affects [sic], and other impacts to surrounding properties of the plant . . . ." **Exhibit 8**, p 2. See also, Asphalt Plant Pollutants Fact Sheet, focusing on Madison County North Carolina, listing the amount of legal emissions, and concluding that fugitive emissions may exceed those from the smokestack. Say No to the Asphalt Plant, **Exhibit 9**, link to document available

at https://sustainablemadison.org/, bottom of page.

There is no doubt that despite regulations and attempts at full compliance, there are environmental and health hazards from asphalt plants. The State of Oregon Department of Environmental Quality states:

> The health effects that can be caused by exposure to asphalt fumes depend upon:
>
> - how much has entered your body
> - how long you are exposed to asphalt fumes
> - how your body responds to asphalt fumes
>
> Fumes created from heating asphalt can be inhaled into the lungs or can condense onto exposed areas of the skin. [Hot Mix Asphalt Emissions, Oregon DEQ, **Exhibit 10**.]

3. **Noxious Odors**. It is common knowledge that asphalt emits an intense and noxious odor. Asphalt plants do so continuously and this often creates a nuisance for neighbors. See Odor Nuisance – Neighbors for Environmental Justice, **Exhibit 11**. In one community, an asphalt plant located approximately one mile from residential communities and schools created a "nauseating smell" and "visible irritants" from hundreds of residents, leading to an investigation of the plant. Ongoing Air Quality Investigations Address Reported Odors from Irvine Asphalt Plant, **Exhibit 12**. The Occupational Safety and Health Administration has concluded that hot asphalt generates toxic fumes and workers exposed to it "are at risk of developing headaches, rashes, cough, and possibly cancer." Asphalt Fumes, OSHA Archive, **Exhibit 13**. In Tyrone Township, the prevailing westerly and southwesterly winds would tend to push the odor over the freeway and into the residential areas east of the freeway, through Wind Walker Farms Riding Stable, which is directly across the freeway, into the densely populated Runyan Lake Community, and all the way up to Fenton, which is just 2.4 miles northeast of the lots up for rezoning.

4. **Noise**. The noise of production and the burners that keep the product hot can be disruptive. See Noise from Asphalt Plant Forces City to Take Action, **Exhibit 14**. In one article, a person said they were over mile away and could hear the asphalt plant when it fired up every morning. See *Can you hear an asphalt plant from a mile away?* Citizen Times, **Exhibit 15**. Add to the noise of the plant in operation the noise from the heavy equipment and trucks going in and out, and the asphalt plant will create a significant increase in noise that may extend a mile or more.

5. **Particulates**. There are often particulates that drift from asphalt plants and then settle downwind. These include not only particulates from the aggregate piles, but also particulates in the smoke, including volatile and hazardous

compounds. **Exhibit 5**. The City of Fenton is only 2.4 miles away, and is directly downwind. One must also consider farmer's fields, parking lots at the golf courses and the TRW plant, and the residential properties a stone's throw away.

Property Values. The negative impact of asphalt plants on surrounding property values is not a novel issue:

> The Blue Ridge Environmental Defense League has released two studies showing the adverse impacts on property values and public health for residents living near operating asphalt plants. A property value study documented losses of up to 56% as a direct result of an asphalt plant. In another study nearly half of the residents report negative impacts on their health after only two years of asphalt plant operations. The door-to-door survey shows that 45% of the residents living within a half mile of a two year old asphalt plant report a deterioration of their health which began after the plant opened. The most frequent problems include high blood pressure (18% of people surveyed), sinus problems (18%), headaches (14%), and shortness of breath (9%). [**Exhibit 6**, p 1.]

Roads. The impact of heavy trucks on the roadways, increased traffic, and inadequate construction of the road and freeway entrance ramp to meet the requirements of large asphalt trucks will cause significant problems for Tyrone Township. Bringing aggregates and petroleum distillate in and trucking the hot mixed asphalt out will have a significant impact on the busy Center Road and Old US 23. Even the applicant's traffic study shows a huge increase in the amount of vehicular traffic because of the asphalt plant. Furthermore, Township residents familiar with the area have voiced their concerns that the large trucks used to haul the aggregate and the asphalt will have a difficult time negotiating the turns necessary to both enter and exit Interstate 23. And finally, the applicant has stated it intends to post a paving crew at this location, which will add additional heavy equipment and trucks using the roads.

Emergency Infrastructure. Asphalt plants are not immune from explosions. See Processing Equipment Explodes at Michigan Asphalt Plant, **Exhibit 16**. Petroleum distillates burn very hot with a thick, dark smoke requiring special foam and/or powder to extinguish.

Aesthetics. The Master Plan contemplates campus-like settings to provide a view of Tyrone Township from the freeway and to act as a visual buffer to the more intensive uses. The Plan's Goal for commercial services in the U.S. 23 Corridor is to:

> Permit carefully planned and attractive multiple-service commercial development for use by the community in a few selected locations in the US 23 corridor, designed to protect the rural character of the community and to avoid individual "spot" site development for numerous small facilities like gas stations, fast food restaurants, and convenience stores. [Master Plan, p 89.]

One need only take one look at the Capital Asphalt Plant photograph submitted by the applicant to see that an asphalt plant—with a 100 foot smokestack, huge piles of aggregates, liquid petroleum silos, and the heavy equipment needed to run the facility—is completely inconsistent with the aesthetically pleasing buffer zone envisioned by the Master Plan.

5. Infrastructure Impacts. The potential impact of the rezoning on the ability of the Township's public services and infrastructure to support any of the uses allowed under the new zoning designation without compromising the health, safety and welfare of the community.

As explained above, the local roads are not currently constructed to handle the large double-trailered trucks that will be constantly going into and out of the asphalt plant. Asphalt burns very hot with thick, black smoke. These fires happen regularly and are documented online in both print and with videos.[4] This photo is from an asphalt plant fire that occurred in Wenatchee, Washington. With the proximity of U.S. 23 adjacent to the asphalt plant sought by the applicant, any fire would shut down the entire freeway. See THE EXPLOSIVE DANGER OF THE ASPHALT FUMES – A REMINDER AFTER THE ASPHALT TANK EXPLOSION AT LA CROSSE, WISCONSIN, published by Metropolitan Engineering Consultants, and giving tips for how to avoid an asphalt plant explosion. **Exhibit 17**.

6. Demand. The apparent demand for the types of uses permitted in the requested zoning district in the Tyrone Township area in relation to the amount of land currently zoned and available to accommodate the demand.

Applicant has submitted no evidence of the need for any of the types of uses that would be permitted in an M-2 district. There is currently no need in Tyrone Township for an asphalt plant because there are several asphalt plants already within a short distance to handle all of Tyrone Township's and the surrounding areas' asphalt needs. Those asphalt plants include the following:

[4] Louisville, Kentucky asphalt plant fire: https://www.youtube.com/watch?v=3a-den8Xmv0; Suffolk County New York asphalt plant fire, https://www.youtube.com/watch?v=j_yvFnFXkII; Gardner Fields asphalt plant, https://www.manufacturing.net/safety/video/21198470/fire-explosions-at-asphalt-plant-likely-caused-by-mechanical-failure;

Company	Location	Distance from Tyrone Twp	Permitted Annual Tonnage
Ace Asphalt	Davisburg	17 miles NE	985,000
Ace Asphalt	Burton	22 miles N	800,000
Cadillac Asphalt	Clarkston	18 miles E	895,000
Cadillac Asphalt	Wixom	27 miles S	895,000
Ajax Materials Corp	Brighton	17 miles S	895,000

Furthermore, the other asphalt plants in the area are currently producing less than half of their capacity, simply because there is more than enough asphalt to meet the demand.

7. **Suitability**. The uses allowed under the proposed zoning would be equally or better suited to the area than the uses allowed under the current zoning of the land.

As envisioned by the Master Plan, a PIRO is best suited to this area and for its residents. Development on the U.S. 23 corridor is envisioned and expected, but this rezoning to M-2 for the purpose of building an asphalt plant is not suited to the area.

III. SPECIAL LAND USE APPLICATION FOR AN ASPHALT MIXING PLANT

Article 22 of the Zoning Ordinance addresses Special Land Uses. The statement of Intent notes that certain uses, because of their "actual or potential impact on neighboring uses or public facilities, need to be carefully regulated with respect to their location for the protection of township residents." TTO § 22.00. It is essential, therefore, that the asphalt mixing plant be assessed for its impact on township residents and surrounding uses.

As noted by the CWA report addressing the special use permit application, it is contingent upon the successful rezoning of the subject parcels. CWA concludes "we do not recommend a favorable recommendation or approval of the requested zoning map amendment to M-2 Heavy Industrial." Parcel 007 CWA Report, p 10. In addition, CWA notes numerous inadequacies in the special use permit and site plan applications, which will need to be remedied only if the rezoning is approved. For brevity's sake, this report will not address site plan requirements but will analyze the special use permit application only in the context of the criteria contained in the Tyrone Township Ordinance for such permits in the context of an asphalt mixing plant.

A. Requirements for All Special Land Use Permits

Section 22.04 contains the review standards for all special land use permits:

A. Master Plan. The special land use will be consistent with the goals, objectives and future land use plan described in the Township's Master Plan.

As explained in the context of rezoning above, pages 2 through 4, an asphalt plant is inconsistent with the Master Plan. The Master Plan calls for PIRO A facilities, like research offices with a campus-like setting to act as a buffer to more intensive uses proposed to the west.

In discussing the U.S. 23 Corridor, the Master Plan notes, "It is important to the residents of Tyrone to manage growth in a manner that is orderly and does not compromise the character of the Township." Master Plan, p 29. The goal for commercial services in the U.S. 23 Corridor is to:

> Permit carefully planned and attractive multiple-service commercial development for use by the community in a few selected locations in the US 23 corridor, designed to protect the rural character of the community and to avoid individual "spot" site development for numerous small facilities like gas stations, fast food restaurants, and convenience stores." [Master Plan, p 89.]

One need only look at the photograph submitted by the applicant of its asphalt plant in Lansing to realize that such a facility will not "protect the rural character" of Tyrone Township. **Exhibit 18.**

B. Zoning District. The special land use will be consistent with the stated Intent of the zoning district.

The current zoning is agricultural, but for purposes of evaluating the request for the special land use permit, this factor must be assessed in the context of an M-2 Industrial District. For the reasons explained in the previous section on rezoning, the Association believes the rezoning should not be permitted. If the Board grants the rezoning request, then the Association still believes an asphalt plant is not consistent with the stated intent of an M-2 district. Section 17.00 of the ordinance states:

> The intent of the M-2 district is to provide for heavy manufacturing industries that utilize essential public and private facilities and utilities while minimizing the incompatible aspects such industries exhibit when placed contiguous to or among other land uses. The district should not be adjacent to any residential district.

Asphalt mixing plants are not permitted uses in M-2 Districts but are permissible with approval of a special land use permit. TTO § 17.03.A. And it is true that there is an indoor manufacturing facility in an M-1 district just to the south and west of the site proposed for the asphalt plant. But as explained above, TRW is relatively innocuous. Its manufacturing activities are all conducted indoors with very few emissions, noise, and odors. Furthermore, there are residential areas to the north and east (just over the freeway) that will be impacted by the operation of an asphalt mixing plant. As shown above, the effects of asphalt plants can be felt for miles and everyone to the north and east will be affected. For example, Windwalker Farms, a horse riding stable, is just on the other side of U.S. 23. Its website shows a pristine and tranquil rural setting with

kid's camps held every summer. https://windwalkerfarms.com/. Imagine the sounds and smells of an asphalt plant permeating the air while the children are trying to enjoy their summer camp. Tyrone Hills Golf Course is just to the south and Coyote Preserve Golf Club is about 1.5 miles northwest. An asphalt mixing plant should not be allowed so close to these residential and recreational uses.

> **C. Neighborhood Compatibility.** The special land use will be designed, constructed, operated and maintained to be compatible with, and not significantly alter, the existing or intended character of the general vicinity in consideration of environmental impacts, views, aesthetics, noise, vibration, glare, air quality, drainage, traffic, property values or similar impacts.

The reasons why an asphalt plant would be incompatible under this criteria are the same as those under Criteria #4 in the rezoning context. See supra, pages 5 through 8. The general vicinity around the proposed asphalt plant is an agricultural district with farmland, homes, a horse-riding stable, two golf courses, and one relatively innocuous manufacturing plant that appears to have had minimal effects on the community. An asphalt mixing plant would introduce toxins, noise, dust, hazardous particulates, offensive odors, greatly increased heavy truck traffic, and the risks associated with an asphalt plant fire, including the need to shut down the entire freeway until such a fire could be contained.

> **D. Environment.** The special land use will not significantly impact the natural environment.

The environmental effects of an asphalt plant under a special use permit are the same as those under Criteria #4 in the rezoning context. See supra, pages 5 through 8.

> **E. Public Services.** The special land use can be served adequately by public facilities and services such as police and fire protection, drainage structures, water and sewage facilities, refuse disposal and schools.

While it does appear that there is adequate water and sewage, it appears that there may be inadequate fire protection. As explained on pages 8 and 9, the risk of an asphalt fire is ever-present.

CWA's report concluded utility information was missing from the site plan, the Township Engineer will be needed to approve the onsite utilities and stormwater management, and the preparation and recordation of a stormwater easement if the property is split

> **F. Traffic.** The proposed use shall be of a nature that will make vehicular and pedestrian traffic no more hazardous than is normal for the district involved, taking into consideration the following:
>
> 1. Turning. Vehicular turning movements;

2. Intersections. Proximity and relationship to intersections;
3. Sight Distance. Adequacy of sight distances;
4. Parking. Location and access of off-street parking; and,
5. Pedestrian Access. Provisions for pedestrian traffic.

As explained above, there is significant impact on the public roadways. CWA notes various deficiencies in the site plan related to traffic on the site itself, including

- Lack of circulation paths and stacking spaces for trucks accessing the plant, subject to Township Engineer and Fire Chief approval
- Negative impact of loading space location for Warehouse 2
- Lack of off street parking calculations
- Inadequate loading space for Warehouse 3
- Barrier free parking design compliance

Strikingly, the application makes no mention of the applicant's admission during a hearing that a 30-man paving crew will also be stationed at the asphalt plant, making it a construction staging area. The site plan does not address where this 30-man crew and their personal vehicles will be parked, not to mention storage of the heavy paving equipment that will be kept on site and the heavy trucks needed for transportation of the equipment and hot asphalt.

G. Additional Development. The proposed use shall be such that the location and height of buildings or structures, and the location, nature and height of walls, fences, and landscaping will not interfere with or discourage the appropriate development and use of adjacent land and buildings or unreasonably affect their value.

As discussed, this area is intended for PIRO. It is unlikely that any facilities to be included in a PIRO A district would find it attractive to be near an asphalt mixing plant.

H. Health, Safety and Welfare. The proposed use shall be designed, located, planned, and operated to protect the public health, safety, and welfare.

Asphalt plants have a significant impact on health and safety. No matter how regulatory compliant a plant is, they still have significant emissions of toxic substances and create a fire risk because petroleum distillates and their vapors are explosive and difficult to extinguish. See discussion pages 5-9, above.

B. **Requirements Specific to Asphalt Mixing Plants**

1. Setbacks. In order to reduce the effects of airborne dust, dirt and noise, and similar operations, equipment and materials shall be located no closer than the required front yard setback, no closer than one hundred (100) feet to any adjacent property lines, and no closer than five hundred (500) feet to any residence that is not zoned industrial or as otherwise required by other provisions of this

Ordinance.

The site plan appears consistent with this requirement, but does not address parking for the 30-man paving crew, parking of their personal vehicles, and storage of the paving equipment and trucks needed to transport the crew, the equipment, and the hot asphalt to job sites.

2. Arterial Access. Asphalt, transit mix and concrete plants shall have direct access onto a paved principal arterial. All driveways, loading areas, staging areas, and truck maneuvering areas within the site shall be paved.

The site is in close proximity to Old US-23 and the freeway, but residents with knowledge of the area are concerned that the large, heavy trucks used to haul aggregates, heavy paving equipment, and asphalt will damage the roads and have difficulty negotiating the rather tight turns from Center Road to US-23 and Old US-23.

3. Staging and Parking Area. Staging and parking areas shall not occur within required yard setback areas.

The CWA report notes that the "proposed staging and parking areas are not within required yard setbacks," meaning the site plan must be modified or a variance sought. CWA SLU SP report, p 10.

4. Layout. The site shall be designed so as to minimize the off-site views of truck loading, unloading and stacking areas. As determined feasible by the Planning Commission, truck accessible areas shall be screened by other site features including buildings and landscaping to be installed on the site.

The CWA report notes that the "loading, unloading, and stacking areas are not clearly shown in the site plan, so it is not possible to determine if this standards is met" and "additional landscaping may be necessary to minimize off-site view of trucks." CWA SLU SP report, p 10.

5. Outside Storage. Outside storage of materials other than sand, gravel and other natural materials used in the manufacturing process shall be prohibited. Sand and gravel storage and temporary storage stockpiles of processed materials awaiting transport shall be enclosed on three sides with a wall or maintained landscaped berm. At no time shall material stockpiles exceed forty-five (45) feet in height. The location and size of the stockpiles shall be screened from public view. The location and screening of the stockpiles shall be shown on the site plan. The Planning Commission and Township Board shall require installation of screening consistent with these requirements in order to assure the material stockpiles are adequately screened.

As noted by the CWA report, piles of aggregate are shown by the applicant, but there are appear to be no three-sided enclosures or berms surrounding the aggregates.

Based on the pictures of the applicant's Lansing Asphalt Plant, it would seem very difficult to screen the stockpiles from public view. This picture is from Capital Asphalt's Facebook account:

6. Screening and Noise Abatement. Outside storage and parking and loading areas as permitted, shall be screened and landscaped in accordance with Section 21.35. At the discretion of the Planning Commission, additional vegetative plantings, screening walls and fences or other means of sound attenuation shall be required to mitigate noise impacts.

As discussed when analyzing the rezoning requests, asphalt plants are not quiet. There is noise from the drum, the heating system, the trucks coming and going, the conveyor, and the heavy equipment needed to move aggregates off trucks and into the production system. The site plan fails to address noise abatement.

7. Truck Traffic. Trucks hauling mixing materials to the site shall be loaded and covered in accordance with all applicable State and County and local regulations. A truck haul route shall be designated and subject to Township approval. Roadways and driveways used by the trucks shall be regularly cleaned so as to maintain a clear surface for the safe transport of people and goods on the roads. At the discretion of the Township, a schedule for cleaning and other necessary maintenance of roadways at the point of access may be required.

As noted in the CWA report, no truck haul route has been included with the application materials. Any report should include the size and weights of the trucks that will be used to deliver aggregates to the site and transport hot asphalt away. Truck haul routes must be addressed and the Township Engineer should assess the impact of these trucks on the roadways.

8. Truck and Site Maintenance and Pollution Control

a. Vehicle Washing. All vehicle washing shall be performed on a

designated hard surfaced area. Such area shall be designed so that wash water is captured and disposed of by a method approved by the MDEQ and U.S. EPA. Truck washing shall be limited to only those trucks that are permanently housed on the plant site.

The special land use permit contains no information on truck washing and how such water will be captured and disposed of. Considering the surrounding uses and the fact that a paving crew and their equipment will be stationed on-site, this is a major concern. See p 4, supra.

b. Vehicle Maintenance. All vehicle maintenance to be performed on the site shall occur within an enclosed garage. If such garage will be built, it shall be shown on the site plan for the facility.

The application contains no information on vehicle maintenance. However, it should be noted that heavy equipment will be needed to move aggregates around the site and a full paving crew and their equipment will also be stationed on site. All of this equipment will need to be maintained, and that will presumably be accomplished on-site. It seems, therefore, that a suitable garage for maintenance is needed.

c. Waste Water Disposal. The site plan must provide methods for disposal of waste water, storm drainage water, and other wastes in accordance with waste management practices approved by the Township, Livingston County, MDEQ and U.S. EPA.

Because this land slopes downward toward a wetland that connect directly with streams and lakes, it is critical for the site plan to include a method for capturing and disposing of wastewater.

d. Fugitive Dust. The site plan shall include provisions for capture of fugitive dust and emissions from stockpiles, process sources, and traffic in accordance with practices approved by the Township, Livingston County, MDEQ and U.S. EPA.

The CWA review notes that the application does not include provisions for the capture of fugitive dust and emissions. As noted when discussing environmental hazards of asphalt plants, the EPA has prepared a report including evaluation of the quantity and composition of fugitive dust emissions from hot mix asphalt plants. Those emissions can not only exceed the emissions escaping from the smokestack, they also contain hazardous substances that are not subject to any filtration. See **Exhibit 5**.

e. Hazardous Materials. All hazardous materials used in the production process including but not limited to additives, fixatives and liquid asphalt as well as any fly ash stored on site must be contained in sealed bins and housed within a building with concrete floors. Manufacturer's specifications (including potential hazards) for such additives, fixants, and other process

chemicals shall be supplied with the site plan. A proposed emergency management plan to contain fixants and other process chemicals shall be supplied with the site plan. A proposed emergency management plan to contain any possible spills shall be submitted to the Planning Commission for review and posted on site. Copies of this plan shall be forwarded to the Livingston County Emergency Program Manager and the Livingston County Health Department.

As noted by the CWA report, the applicant has included no emergency management plan. As discussed previously, asphalt plants use petroleum distillates that are flammable and create explosive vapors. See discussion and supporting documents, pages 8-9 above.

f. Odors. Offensive, noxious, or foul odors shall not be allowed to escape into the atmosphere in concentrations which are offensive, which produce a public nuisance or a hazard on adjoining property, or which could be detrimental to human, plant, or animal life. The use of any furnace or combustion device in association with concrete, asphalt, or transit mix plants shall be equipped with recognized and approved equipment, methods, or technology to reduce the quantity of airborne fumes emitted into the open air as regulated by the MDEQ, USEPA, Tyrone Township, and Livingston County.

Every hot-mix asphalt plant will produce airborne fumes and every one requires a furnace or other combustion device. The petroleum distillate must be kept heated. Based on the experiences of those who live in the area of asphalt plants, even strict compliance with governmental standards is not enough to prevent the noxious odor of hot asphalt from escaping and permeating the area. We can all attest to the smell after a parking lot is paved, but that usually lasts only a few days. With an operating asphalt plant, that will be every day. The residential and recreational locations in the surrounding area will be affected.

9. Other Agency Approvals. The applicant shall obtain required approvals from all state or county agencies having jurisdiction, including but not limited to the MDEQ. Evidence of approvals from such agencies shall be submitted to the Township prior to final approval.

There is no information in the site plan as to outside agency approvals.

10. Excess Asphalt or Concrete. The proposed recovery system for excess asphalt, concrete or similar materials must be noted on the site plan and approved by the Township. The plan shall include a means of sealing the recovery area to prevent leaching of hazardous materials into the ground.

The site plan includes no information regarding a recovery system for excess asphalt or other materials.

11. Performance Guarantee

Prior to issuance of a land use permit, the Township may require submission of a performance guarantee, in accordance with the provisions of this Ordinance.

Not addressed at this time.

IV. CONCLUSION

Land use planning decisions require balancing the interests of the landowner, the nearby residents, and the Township as a whole. An asphalt plant would add some amount to the Tyrone Township tax base, but the impact on residents and surrounding uses, the costs, and the risks far outweigh the benefit. Tyrone Township is proud of its rural nature characterized by pristine natural environments, rolling hills, and gorgeous waters. The Township motto is "In harmony with nature." An asphalt plant with a 100 foot smokestack, huge piles of aggregates, and emitting noise, dust, and toxins is incompatible with this area. As is frequently quoted in the land use planning context:

> A nuisance may be merely a right thing in the wrong place, like a pig in the parlor instead of the barnyard. If the validity of the legislative classification for zoning purposes be fairly debatable, the legislative judgment must be allowed to control. [*Vill of Euclid, Ohio v Ambler Realty Co*, 272 US 365, 388; 47 S Ct 114, 118; 71 L Ed 303 (1926).]

Asphalt plants are necessary in our society, but they must be developed in the right location. The location under consideration here is not the right location.

Exhibit 1

Livingston County Master Plan

LAND USE & GROWTH MANAGEMENT

NATURAL RESOURCES

PARKS & RECREATION

HAZARD MITIGATION

TECHNOLOGY

Livingston County, Michigan

TRANSPORTATION & INFRASTRUCTURE

ECONOMIC DEVELOPMENT

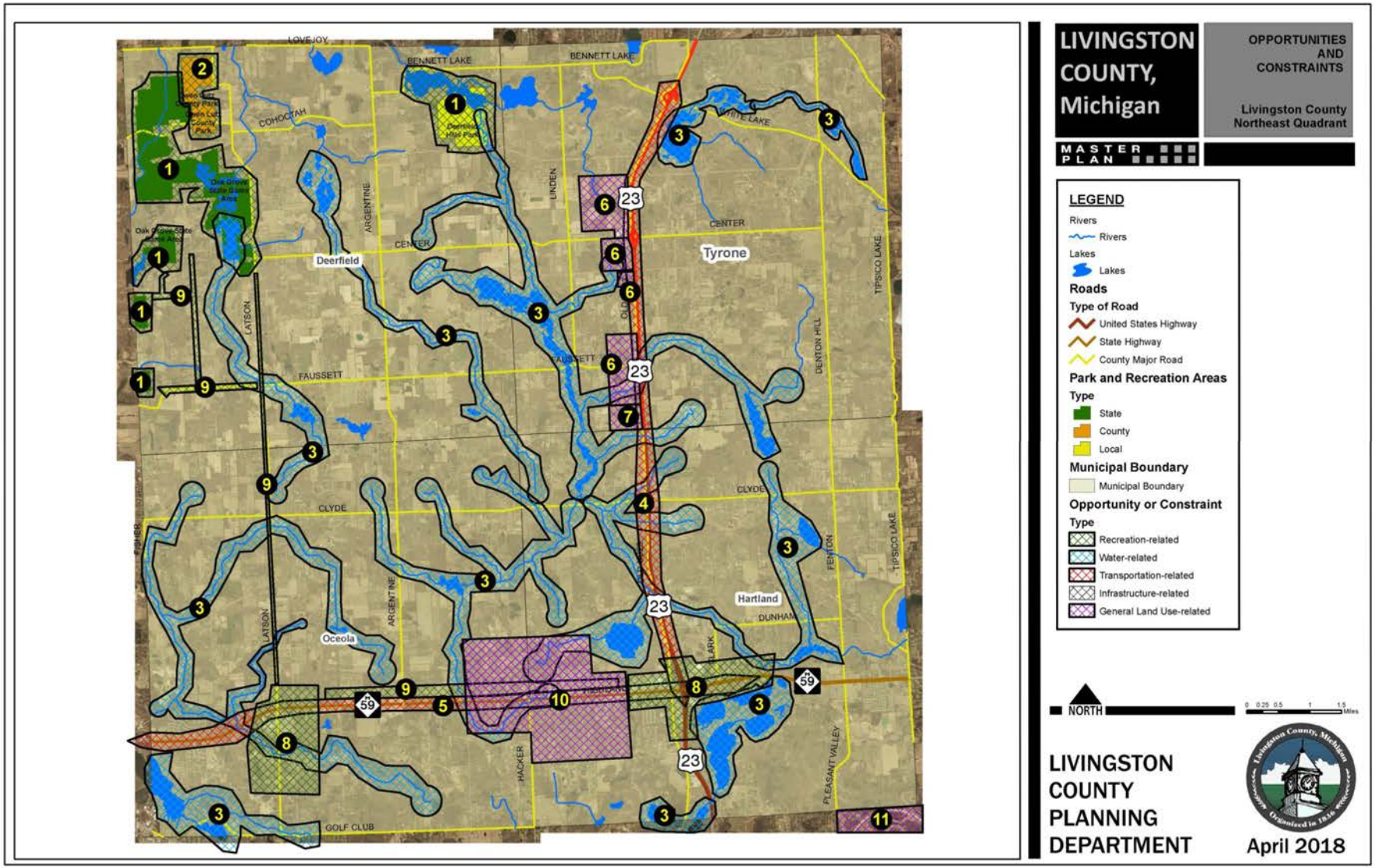
Adopted October 2018

AGRICULTURE & RURAL ENVIRONMENT

HOUSING

SOCIAL EQUITY

Through collaboration and cooperation we will work together to build a shared future


LIVINGSTON COUNTY, Michigan
OPPORTUNITIES AND CONSTRAINTS
Livingston County Northeast Quadrant
MASTER PLAN
LEGEND
Rivers
Rivers
Lakes
Lakes
Roads
Type of Road
United States Highway
State Highway
County Major Road
Park and Recreation Areas
Type
State
County
Local
Municipal Boundary
Municipal Boundary
Opportunity or Constraint
Type
Recreation-related
Water-related
Transportation-related
Infrastructure-related
General Land Use-related
NORTH
0 0.25 0.5 1 1.5 Miles
LIVINGSTON COUNTY PLANNING DEPARTMENT
April 2018
Deerfield
Tyrone
Oceola
Hartland
CLYDE
FAUSSETT
CENTER
BENNETT LAKE
COHOCTAH
LOVEJOY
WHITE LAKE
GOLF CLUB
59
23

Current Trends:

Mapping Land Use Opportunities & Constraints (continued):

NORTHEAST QUADRANT

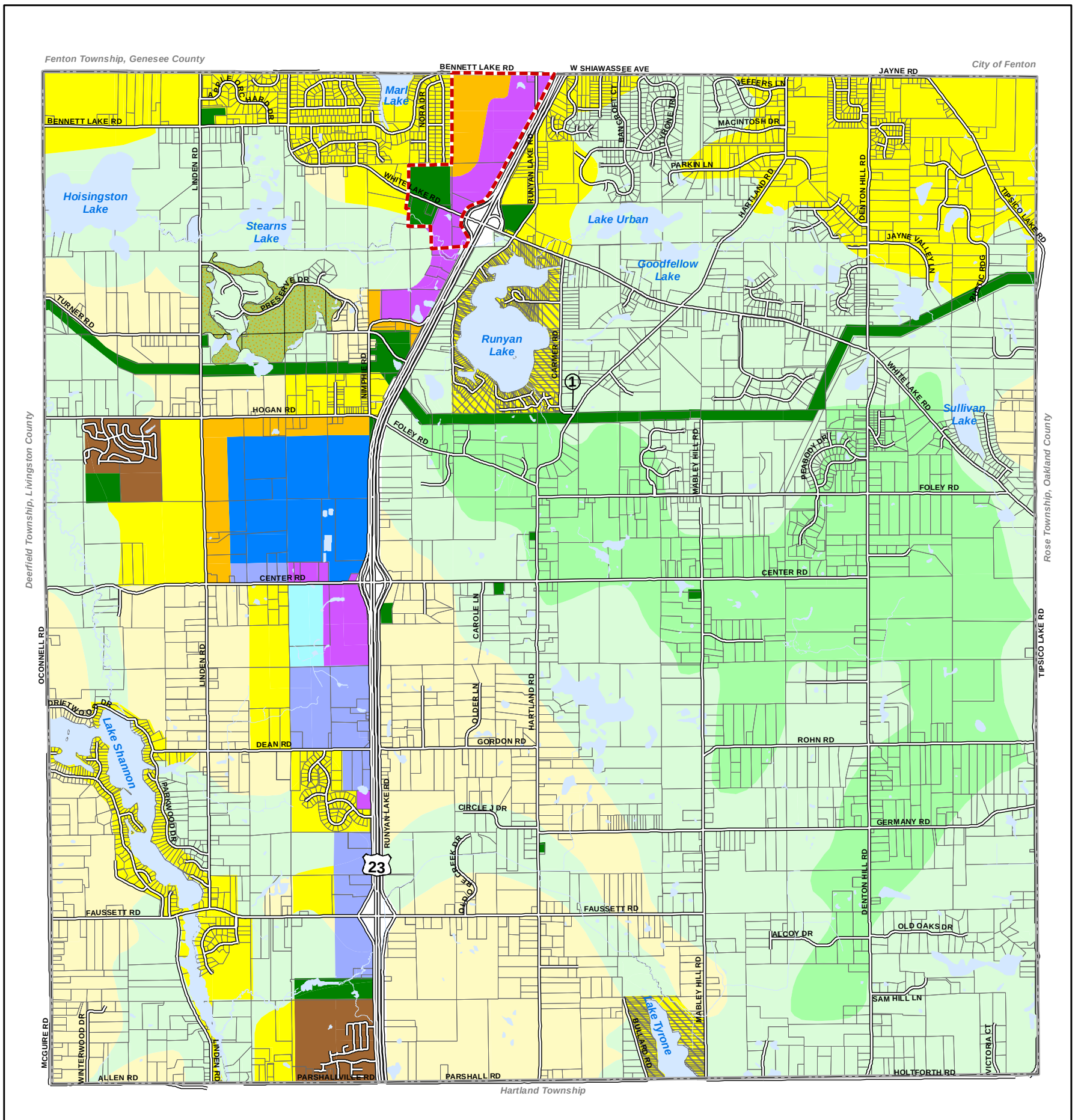
The Northeast Quadrant of Livingston County includes Deerfield, Tyrone, Hartland and Oceola Townships.

MAP# ON NE QUAD MAP	GROUP RESPONSE	OPPORTUNITY OR CONSTRAINT ?	TYPE OF OPPORTUNITY OR CONSTRAINT	EXPLANATION OF OPPORTUNITY OR CONSTRAINT
#5	M-59 presents an opportunity for better transit and corridor development	Opportunity	Transportation	The M-59 corridor connects Oceola and Hartland Townships to many neighboring communities and it is prime for transportation and planned development opportunities.
#6	Planned industrial and commercial development on the east side of US -23	Constraint	General Land Use	The location of planned industrial and commercial development in Tyrone Township along the west side of US-23 may pose land use conflicts.
#7	The mobile home park in Tyrone Township provides affordable housing but may conflict with neighboring rural residential land use	Opportunity and Constraint	General Land Use	The existing Cider Mill Crossings mobile home park land use located at the Tyrone/ Hartland Township line, provides needed affordable housing although this intense usage conflicts with rural residential land use in Hartland Township. NOTE: This development exists as a result of a consent judgement, not as a result of poor planning.
#8	Encourage sidewalks and connections to amenities in commercial areas	Opportunity	Recreation	Two commercial areas were noted as prime locations for the inclusion of a good sidewalk system that would provide pedestrian circulation within each development and connection to surrounding commercial development. The two commercial areas that were mapped for this opportunity were: 1.) The intersection of Old U.S. 23 and M-59 in Hartland Township, and 2.) The intersection of Latson Road and M-59 in Oceola Township.

Exhibit 2

McKenna ASSOCIATES

Tyrone Township, Livingston County, Michigan



Base Map Source: Livingston County GIS, 2006
Future Land Use Map Source: McKenna Associates, Inc. 2/2012

Note: Mapped Future Land Use designations do not necessarily follow property boundary lines.

Future Land Use Categories

Residential

- Agricultural/Residential
- Residential/ Natural Resources Preservation
- Low Density Single Family Detached Residential
- Medium Density Single Family Detached Residential
- Medium Density Single Family - Lake Side
- High Density Attached Residential
- Manufactured Single Family Detached Residential

Non-Residential

- Planned Commercial Services
- Planned Office
- Planned Industrial Research Office
- Planned Commercial Industrial
- Commercial Recreation
- Public/ Quasi-Public

Special Planning Area

① Footnote
(see following page)

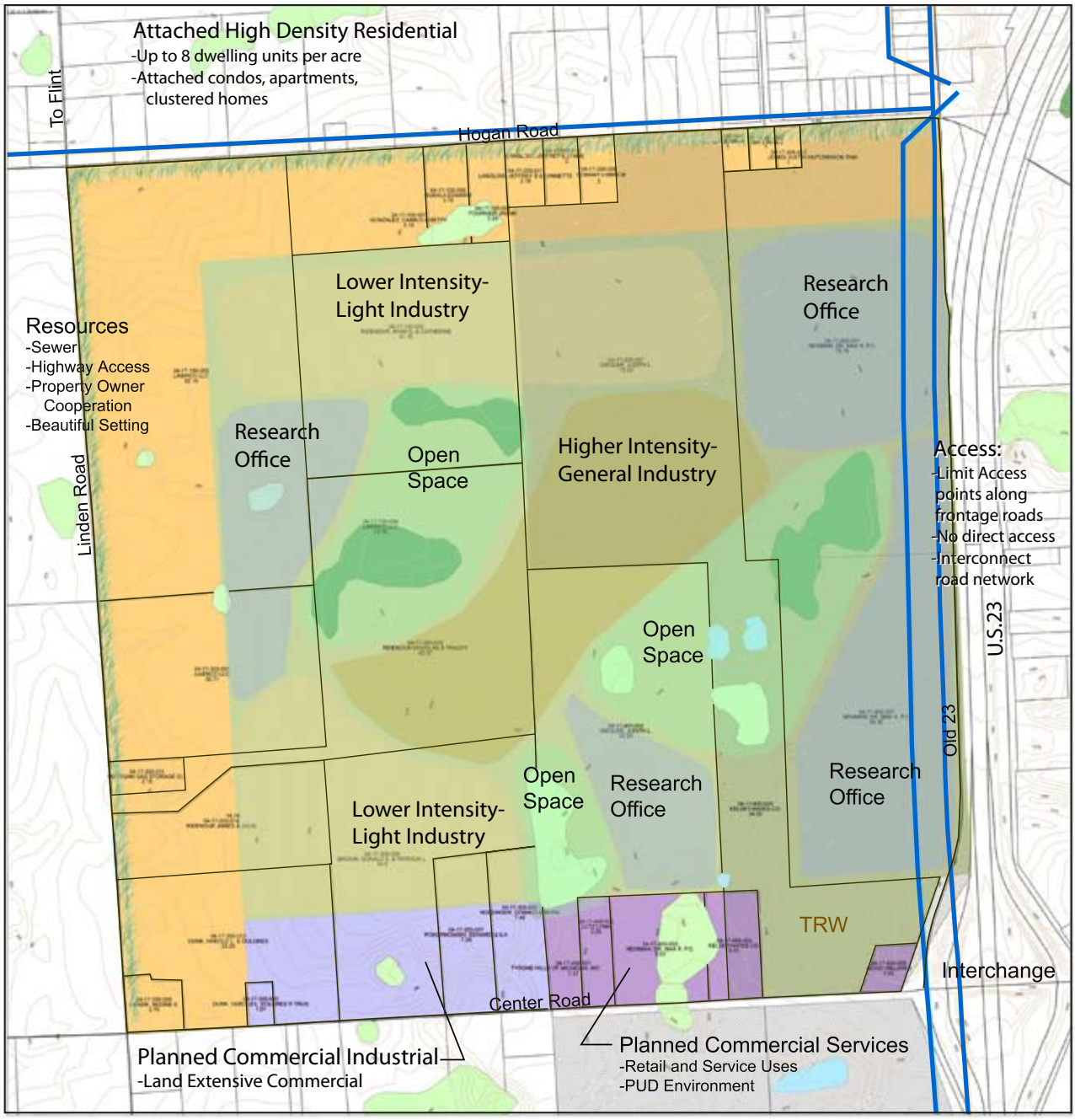
Map 10
Future Land Use

0 2,000 4,000 FT

11/15/12

Print date: 11/15/2012 E:\Projects\Livingston\tyrone\Master plan GIS maps\Map10 FLU-8.5x11.mxd

Exhibit 3



Base Map Source: Livingston County GIS, 2004
Sewer Data Source: Fishbeck, Thompson, Carr & Huber

Natural Features

- SAD
- Sanitary Sewer
- Contours
- Wetlands
- Forested Wetlands

Future Land Use Categories

- Planned Commercial Services
- High Density Attached Residential
- Planned Industrial Research Office
- Planned Commercial Industrial

Map 11
Center Road PIRO Area Plan

(Planned Industrial Research Office)

0 2,000 4,000 FT

4/4/2012

Exhibit 4

SECTION 16A.01 APPLICABILITY OF SUB-DISTRICT

The PIRO District is a combination of three sub-districts: the PIRO-A (Research and Office), PIRO-B (Light Industry), and PIRO-C (General Industry) districts. The sub-districts are mapped zoning districts that impose requirements in addition to the general requirements that apply throughout the PIRO District.

SECTION 16A.02 TABLE OF PERMITTED AND SPECIAL LAND USES

The following "Table of Permitted and Special Land Uses in the PIRO District" designates the land uses permitted in each of the sub-districts.

A. **Permitted Uses.** All uses listed in the following and signified with a letter "P" shall be uses permitted by right in the corresponding PIRO sub-district.

B. **Special Land Uses**. All uses listed in the following "Table of Permitted and Special Land Uses in the PIRO District" and signified with a letter "S" shall be permitted special land uses in the corresponding sub-district, subject to review and approval of the Planning Commission in accordance with the standards and procedures of Article 23.

C. **Uses Not Permitted.** Uses not permitted in a particular sub-district are designated with the letters "NP".

D. **Accessory Uses.** Buildings, structures, and uses customarily accessory to any permitted or special land use shall be permitted as approved during site plan review, in accordance with Section 21.02.

E. **Summary Table of Permitted and Special Land Uses in the PIRO District.** The table below lists uses permitted as follows: "P" = Permitted Use; "S" = Special Land Use; and "NP" = Use Not Permitted.

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
High technology service uses including computer information transfer, communication, distribution, management, processing, administrative, laboratory, experimental, developmental, technical, or testing services.	P	P	S

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Any use with the principal function of conducting research, design testing, and pilot or experimental product development	P	P	S
High technology industrial or research use including but not limited to agricultural technology, biological or pharmaceutical research, software technology, telecommunications, biomedical technology, fluid transfer and handling technology, defense and aerospace technologies or other technology oriented or emerging industrial or business activity but not including heavy manufacturing or stamping	P	P	S
Data processing / computer centers, including service and maintenance of electronic data processing equipment and software development	P	P	P
Research labs / testing facilities	P	P	P
Corporate offices	P	P	P
General / professional offices for any of the following occupations: executive, administrative, professional, accounting, writing, clerical, stenographic, drafting and sales	P	P	S
Alarm and security businesses, phone message centers, telemarketing businesses	P	P	NP
College / university / vocational schools, and any use charged with the principal function of technical training provided all instruction, training and testing is conducted within a completely enclosed building	P	P	S
Outdoor instruction, training and testing accessory to a permitted use	NP	S	S
Conference centers	S	S	NP

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Assembly halls, display halls, banquet centers, convention centers or similar place of assembly, excluding movie theaters	S	S	NP
Hospitals, clinics and medical offices; medical laboratories; sports medicine, physical therapy, and 24-hour emergency or urgent care	S	S	NP
Offices of manufacturers agents, sales representatives and others requiring display area and limited warehousing, subject to the following: a. Display areas shall not be for selling to the general public and shall be for restricted use of wholesale buyers and specialized merchandise not available to the public. b. Display areas shall be within a totally enclosed structure. c. Warehousing shall be accessory to the office, sales or display area, and shall be limited to quantities to support the display area and sales staff. Outbound shipment by tractor trailer or semi-truck type vehicles shall be prohibited in the PIRO-A (Research and Office) sub-district.	S	P	NP
Messenger services, mailing and delivery services, all limited to drop-off and pick-up facilities. Processing, sorting or distribution functions other than to serve the district shall not be permitted.	S	P	NP
Indoor recreation facilities	S	S	NP
Religious institutions, churches	S	S	NP

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Uses secondary to principal permitted uses: a. Restaurants or other places serving food or beverage, but not including drive-in/fast food, or drive-through restaurants b. Child care centers c. Personal service establishments, such as but not limited to: repair shops, tailor shops, beauty parlors or barber shops, laundries or dry cleaners d. Business services such as printing, copying or mailing e. Corporate fitness centers, health spas, indoor recreation facilities f. Office equipment and office supply sales and rental g. Banks, credit unions, savings and loan associations, and similar financial institutions, including drive-through and walk-up automatic teller machines on the face of the building. No free-standing or kiosk-type automatic teller machines shall be permitted separate from a financial institution.	S	S	S
Publicly owned buildings, libraries, post offices, telephone exchange buildings, and public utility offices. (Storage yards, electrical transformer stations, and gas regulator stations are not permitted in the PIRO-A (Research and Office) sub-district.	P	P	NP
Public or private parks and open space	P	P	P

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Motor vehicle fueling stations	NP	S	S
Manufacturing, assembly, processing, fabrication, packaging, or treatment of the following from previously prepared materials: • agricultural products; • food products; • furniture and fixtures; • converted paper and paper board products; • textiles and canvas products; • pharmaceuticals including biological products, drugs, medical and pharmaceutical preparations; • glass products made of purchased glass; • professional, scientific and controlling instruments; • photographic and optical goods; • office equipment; • electrical instruments; • small appliances; and • monuments and burial vaults.	NP	P	P
Light assembly, fabrication, or packaging of jewelry, silverware, musical instruments and parts, toys, novelties, sporting and athletic goods, office and artist's materials, signs and advertising displays.	NP	P	P
Tool and die, jobbing and machine repair	NP	P	P
Building trade and landscape contractors; building and landscape materials and wholesalers.	NP	SP	P

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Contractors equipment yards	NP	S	P
Printing, publishing, duplicating and photographic processing plants	NP	P	P
Radio, TV and cellular microwave relay and transmitting antennas; television broadcasting and receiving towers, dishes or antennas; public utility electrical receiving transforming stations, wireless communications towers (subject to Section 21.32).	NP	S	S
Public utility and telecommunications buildings	NP	P	P
Composting centers	NP	S	S
Essential services without outside storage	P	P	P
Essential services with outside storage permitted	NP	S	P
Transportation facilities, including passenger transit facilities, truck and motor freight terminals, maintenance and service yards	NP	S	S
Air transportation companies, airports	NP	NP	P
Wholesaling, warehousing, distribution, refrigerated and general storage of any product or commodity which is permitted to be manufactured in the district.	NP	P	P
Mini-warehouses and self-storage facilities	NP	S	P
Outdoor storage and display	NP	S	P
Vehicle Repair - Major	NP	NP	S
Vehicle Maintenance and Repair - Minor	NP	S	S
Bottling plants	NP	NP	P

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Lumber yards (non-retail), including sale of wood, plastic, fabric, synthetic specialties, wood patterns, concrete and cinder block products	NP	S	P
Central laundries, laundry services, dry cleaning and dying plants	NP	NP	P
Manufacturing, processing, fabricating, packaging, treating or assembling the following: • Prefabricated buildings and structural members • Chemical products and plastics, excluding petroleum plants • Leather and leather products • Stone, clay and glass products such as: flat glass, pressed or blown glass and glassware; brick and block; • Concrete, abrasives, asbestos and other non-metallic mineral products. • Wood containers • Aluminum, bronze, copper-base alloy and other nonferrous castings • Heavy machinery such as engines and turbines, farm machinery, industrial machinery • Transportation equipment, such as motor vehicles, motor vehicle equipment and parts, motorcycles, bicycles and parts	NP	S	P
Light assembly, fabrication, packaging of small items – from previously processed and prepared materials	NP	P	P
Vehicles, equipment and machinery sales and service for farm, construction, and industry	NP	S	S
Asphalt and concrete mixing plants	NP	NP	S

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
Slaughter houses	NP	NP	S
Junk/Salvage/Used materials yards, recycling centers	NP	NP	S
Petroleum oil and gas processing plants	NP	NP	S
Explosive, toxic and hazardous materials receiving, handling, storing, and production.	NP	NP	S
Propane storage and sales; bulk storage of refined petroleum products, with or without a retail outlet	NP	S	S
Retail sales of propane, and accessory storage of limited quantities to support the retail operation	NP	S	S
Wind and solar energy production facilities, not including oil or gas production, processing, sweetening plants, or related operations	NP	S	S
Outdoor / open air entertainment venues	NP	NP	S
Adult uses	NP	NP	S
Uses of the same nature or class as uses listed in this district, as determined by the Planning Commission based on the standards of Section 21.44.	S	S	S
Medical Marijuana Caregiver Operation. A registered primary caregiver subject to the standards of Section 21.55 of this Ordinance, the Michigan Medical Marihuana Act, as amended, and the regulations of the State of Michigan Department of Community Health adopted pursuant to the Michigan Medical Marihuana Act, as amended.	NP	S	S
Utility-scale Solar Energy Facilities	S	S	S

Uses	PIRO-A Research and Office *	PIRO-B Light Industry**	PIRO-C General Industry***
"NP" – Use Not Permitted			
"P" – Permitted Use			
"S" – Special Land Use			

Footnotes

* Outdoor storage and display of goods and materials is prohibited.
** Outdoor storage and display of goods and materials requires special approval.
*** Outdoor storage and display of goods and materials is permitted.

SECTION 16A.03 GENERAL REQUIREMENTS FOR ALL PIRO DISTRICT USES

Consistent with the intent of this district, the following conditions are required to be met by all uses in the PIRO District, irrespective of the sub-district in which they are located.

A. **Non-Residential Uses**. Residential uses shall not be permitted in the PIRO District, except that caretaker quarters may be permitted, as provided under Section 21.10 Dwellings in Nonresidential Districts.

B. **Physical Features and Site Relationships.** All development in the PIRO District shall minimize its impact on the natural environment and adjacent properties. Site design shall preserve and incorporate any natural features unique to the site. Specifically:

1. **Topography and Grading.** Site improvements shall be designed to minimize changes to the existing topography when possible. Use of existing topography and vegetation is encouraged for screening, buffering, and transition of uses and developments. Grading should be blended with the contours of adjacent properties.

2. **Existing Site Features.** The site design shall retain existing site features that are worthy of preservation as determined by the Planning Commission. The design shall also incorporate natural site amenities, such as creeks, wetlands, views, trees, natural ground forms, and similar features into the overall site design.

3. **Building Orientation.** The site design shall be sensitive to the existing terrain, existing buildings in the surrounding area in terms of size, design, and orientation of buildings. Outdoor spaces shall be sensitive to views, climate, the nature of outdoor activities that could occur in association

Exhibit 5

United States
Environmental Protection
Agency

Office Of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

EPA-454/R-00-019
December 2000

Air

HOT MIX ASPHALT PLANTS

EMISSION ASSESSMENT REPORT

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EPA 454/R-00-019

HOT MIX ASPHALT PLANTS

EMISSION ASSESSMENT REPORT

This document was prepared by:

Emissions Monitoring and Analysis Division
Office of Air Quality Planning and Standards
United States Environmental Protection Agency
Research Triangle Park, NC

and under contract, by:

Midwest Research Institute
Kansas City, MO and Cary, NC
EPA Contract Number 68D-98-027

and

Eastern Research Group, Inc.
1600 Perimeter Park
P.O. Box 2010
Moorisville, NC
EPA Contract Number 68-D7-0068

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

December 2000

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DISCLAIMER

The information in this document has been funded by the Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency (EPA) under contract 68-D-98-027 to Midwest Research Institute and under contract 68-D-70-068 to Eastern Research Group, Inc. The EPA has made additions and revisions to the information submitted by the contractors. This final report has been subjected to the Agency's review, and it has been approved for publication as an EPA document. Mention of trade names or commercial products is not intended to constitute endorsement or recommendation for use.

PREFACE

This report was produced by the Source Measurement Technology Group of EPA's Emissions Measurement Center located in Research Triangle Park, NC. It is one of a series of twelve reports prepared to document an EPA program to characterize emissions to the air from hot mix asphalt plants. These twelve reports and their associated EPA document numbers and publication dates are:

Document Title	EPA Document Number	Publication Date
Hot Mix Asphalt Plants Emission Assessment Report	EPA 454/R-00-019	December 2000
Hot Mix Asphalt Plants Kiln Dryer Stack Instrumental Methods Testing Asphalt Plant A, Cary, North Carolina	EPA 454/R-00-020	April 2000
Hot Mix Asphalt Plants Kiln Dryer Stack Manual Methods Testing Asphalt Plant A, Cary, North Carolina		
Volume 1 of 2	EPA 454/R-00-021a	April 2000
Volume 2 of 2	EPA 454/R-00-021b	April 2000
Hot Mix Asphalt Plants Kiln Dryer Stack Instrumental Methods Testing Asphalt Plant B, Clayton, North Carolina	EPA 454/R-00-022	April 2000
Hot Mix Asphalt Plants Kiln Dryer Stack Manual Methods Testing Asphalt Plant B, Clayton, North Carolina		
Volume 1 of 2	EPA 454/R-00-023a	April 2000
Volume 2 of 2	EPA 454/R-00-023b	April 2000
Hot Mix Asphalt Plants Truck Loading and Silo Filling Instrumental Methods Testing Asphalt Plant C, Los Angeles, California	EPA 454/R-00-024	May 2000
Hot Mix Asphalt Plants Truck Loading and Silo Filling Manual Methods Testing Asphalt Plant C, Los Angeles, California		
Volume 1 of 8	EPA 454/R-00-025a	May 2000
Volume 2 of 8	EPA 454/R-00-025b	May 2000
Volume 3 of 8	EPA 454/R-00-025c	May 2000
Volume 4 of 8	EPA 454/R-00-025d	May 2000
Volume 5 of 8	EPA 454/R-00-025e	May 2000
Volume 6 of 8	EPA 454/R-00-025f	May 2000
Volume 7 of 8	EPA 454/R-00-025g	May 2000
Volume 8 of 8	EPA 454/R-00-025h	May 2000
Hot Mix Asphalt Plants Technical Systems Audit of Testing at Asphalt Plant C Asphalt Plant C, Los Angeles, California	EPA 454/R-00-026	May 2000

Document Title	EPA Document Number	Publication Date
Hot Mix Asphalt Plants Truck Loading Instrumental Methods Testing Asphalt Plant D, Barre, Massachusetts	EPA 454/R-00-027	May 2000
Hot Mix Asphalt Plants Truck Loading Manual Methods Testing Asphalt Plant D, Barre, Massachusetts	EPA 454/R-00-028	May 2000
Hot Mix Asphalt Plants Response to Comments on Testing Program for Asphalt Plants C and D	EPA 454/R-00-029	May 2000
Hot Mix Asphalt Plants Stakeholders Opinions Report	EPA 454/R-00-030	

These documents, including this Emissions Assessment Report document, are available for downloading, on CD-ROM and in paper.

Downloads can be made from:

http//www.epa.gov/ttn/emc/asphalt.html

Copies of the CD ROM can be requested by mail at:

Emission Measurement Center, MD-19
US Environmental Protection Agency
Research Triangle Park, NC 27711

Paper copies of the reports can be obtained from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone orders 1-800-553-6847 or (703) 605-6000; FAX orders (703) 605-6900
http://www.ntis.gov/products/environment.htm

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LIST OF ACRONYMS

ASTM	American Society of Testing and Materials
Btu	British thermal unit
CH_4	methane
CO	carbon monoxide (as measured by EPA Method 10)
CO_2	carbon dioxide (as measured by EPA Method 3)
EPA	Environmental Protection Agency
HAP	hazardous air pollutant (listed in or pursuant to section 112(b) of the 1990 Clean Air Act Amendments)
HMA	hot mix asphalt
NO_x	nitrogen oxides (as measured by EPA Method 7)
PAH	polycyclic aromatic hydrocarbon (a class of HAPs)
PM	particulate matter (as measured by EPA Methods 5 or 17)
PM-10	particulate matter less than 10 microns in diameter
PM-2.5	particulate matter less than 2.5 microns in diameter
RAP	reclaimed asphalt pavement
RTFOT	rolling thin film oven test (ASTM Method D2872-88)
SCC	source classification code
SO_2	sulfur dioxide (as measured by EPA Methods 6 or 8)
SO_x	sulfur oxides
TOC	total organic compounds (as measured by EPA Method 25A)
VOC	volatile organic compound (refer to 40 CFR 51.100); VOC is TOC plus formaldehyde, less methane, ethane, acetone, and other chemicals listed as negligibly photochemically reactive.

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1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

This report presents an assessment of emissions from hot mix asphalt (HMA) manufacturing facilities. Included in the report is a description of the manufacturing process and the emissions associated with HMA production; the procedures for developing emission factors and emission inventories for the HMA industry; and estimated annual emissions for typical HMA facilities.

1.2 OVERVIEW OF HMA INDUSTRY

Hot mix asphalt is used primarily as paving material and consists of a mixture of aggregate and liquid asphalt cement, which are heated and mixed in measured quantities. Hot mix asphalt facilities can be broadly classified as either drum mix plants or batch mix plants, according to the process by which the raw materials are mixed. In a batch mix plant, the aggregate is dried first, then transferred to a mixer where it is mixed with the liquid asphalt. In a drum mix plant, a rotary dryer serves to dry the aggregate and mix it with the liquid asphalt cement. After mixing, the HMA generally is transferred to a storage bin or silo, where it is stored temporarily. From the silo, the HMA is emptied into haul trucks, which transport the material to the job site. Figure 1 presents a diagram of a typical batch mix HMA plant; a typical drum mix HMA plant is depicted in Figure 2.

In 1996, approximately 500 million tons of HMA were produced at the 3,600 (estimated) active asphalt plants in the United States. Of these 3,600 plants, approximately 2,300 are batch plants, and 1,300 are drum mix plants. The total 1996 HMA production from batch and drum mix plants is estimated at about 240 million tons and 260 million tons, respectively. Based on these figures, an average batch mix plant produces approximately 100,000 tons of HMA annually, and an average drum mix plant produces about 200,000 tons of HMA per year. Natural gas fuel is used to produce 70 to 90 percent of the HMA. The remainder of the HMA is produced using oil, propane, waste oil, or other fuels.

The primary emission sources associated with HMA production are the dryers, hot bins, and mixers, which emit particulate matter (PM) and a variety of gaseous pollutants. Other emission sources found at HMA plants include storage silos, which temporarily hold the HMA; truck load-out operations, in which the HMA is loaded into trucks for hauling to the job site; liquid asphalt storage tanks; hot oil heaters, which are used to heat the asphalt storage tanks; and yard emissions, which consist of fugitive emissions from the HMA in truck beds. Emissions also result from vehicular traffic on paved and unpaved roads, aggregate storage and handling operations, and vehicle exhaust.

The PM emissions associated with HMA production include the criteria pollutants PM-10 (PM less than 10 micrometers in aerodynamic diameter) and PM-2.5, hazardous air pollutant (HAP) metals, and HAP organic compounds. The gaseous emissions associated with HMA production include the criteria pollutants sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC), as well as volatile HAP organic compounds.

1.3 DEVELOPMENT AND USE OF EMISSION FACTORS FOR HMA FACILITIES

An emission factor relates the quantity (weight) of pollutants emitted to a unit of activity of the source. Emission factors for the HMA industry are generally determined in units of pounds of pollutant emitted per ton of HMA produced. These emission factors typically are used to estimate area-wide

emissions for a large number of facilities and emissions for specific facilities where source-specific emissions data are not available or where source testing is cost prohibitive.

To develop emission factors for the HMA industry, data from more than 390 emission test reports and other documents on the industry were compiled and reviewed. Through a careful screening process, the documents that were determined to be unusable for emission factor development were excluded from further evaluation. The remaining reports were compiled by plant type, emission source, pollutant, and emission control. For each emission test, emission factors were calculated by dividing the measured emission rates by the HMA production rate measured at the time of the emission test. These emission factors were then grouped by source, pollutant, and control device, and an average emission factor was calculated for each group.

Emission factors can be used to estimate emissions from one or more HMA facilities by multiplying the emission factor by the HMA production rate. For example, the emission factor for CO emissions from a natural gas-fired drum mix dryer is 0.13 pounds per ton (lb/ton). If the dryer produces 200,000 tons per year (ton/yr), the estimated CO emissions during that period would be: 200,000 ton/yr × 0.13 lb/ton = 26,000 lb/yr or 13 tons/yr.

1.4 ESTIMATED ANNUAL EMISSIONS FROM TYPICAL HMA FACILITIES

Annual emissions for a facility can be estimated by summing up the emissions from each emission source over the course of a year. Annual emissions for a specific source can be estimated by multiplying the annual throughput or production rate for that source by its corresponding emission factors. For an HMA facility, annual emissions can be estimated by multiplying the annual HMA production rate by the emission factors for each type of source at the facility. Table 1 summarizes annual emissions for a typical HMA batch mix plant, and Table 2 summarizes annual emissions for a typical drum mix HMA plant. The estimates presented in these tables account for all of the identified emission sources at each type of facility. For both batch mix plants (Table 1) and drum mix plants (Table 2), the estimate includes emissions from the dryer/mixer, load-out operations, asphalt storage, yard (fugitive emissions from loaded trucks), diesel exhaust, paved and unpaved road dust, and aggregate processing (screening, conveyor transfer, and reclaimed asphalt pavement [RAP] crushing). Additionally, for the drum mix plant (Table 2), the estimate includes emissions from silo filling operations. Estimates are presented for criteria pollutants (pollutants for which national ambient air quality standards have been developed) and hazardous air pollutants (HAPs, as defined in section 112(b) of the 1990 Clean Air Act Amendments). Criteria pollutants include PM-10, VOC, CO, SO_2, and NO_x. Emissions for three classes of HAPs are presented in Tables 1 and 2: polycyclic aromatic hydrocarbons (PAHs), volatile organic HAPs, and metal HAPs. The emissions were estimated using the emission factors developed for the HMA industry and the following assumptions:

- Dryers are fueled with natural gas or No. 2 fuel oil (estimates are presented for both types). It is estimated that between 70 and 90 percent of HMA plants use natural gas, although some HMA plants use fuel oil as an alternative to natural gas.
- Dryer emissions are controlled with fabric filters.
- PM emissions from load-out and silo filling are entirely PM-10.
- Annual HMA production rate for a typical batch mix plant is 100,000 ton/yr.
- Annual HMA production rate for a typical drum mix plant is 200,000 ton/yr.
- The typical HMA plant has two 18,000-gallon asphalt storage tanks.

As indicated in Table 1, a typical batch mix plant using a No. 2 fuel oil-fired dryer emits over 74,000 lb/yr of criteria pollutants, and a typical batch mix plant using a natural gas-fired dryer emits over

56,000 lb/yr of criteria pollutants, of which approximately 41,000 lb/yr are CO and approximately 10,700 lb/yr are PM-10; emissions of other criteria pollutants range from about 500 to about 12,000 lb/yr. The same plant would emit about 770 lb/yr of HAPs. A typical drum mix plant using a No. 2 fuel oil-fired dryer emits about 83,000 lb/yr of criteria pollutants, and a typical drum mix plant using a natural gas-fired dryer emits around 75,000 lb/yr of criteria pollutants, of which approximately 28,000 lb/yr are CO, about 10,000 lb/yr are VOC, and around 31,000 lb/yr are PM-10. A typical drum mix plant emits from 1,300 to 2,000 lb/yr of HAPs, depending on the fuel used in the dryer.

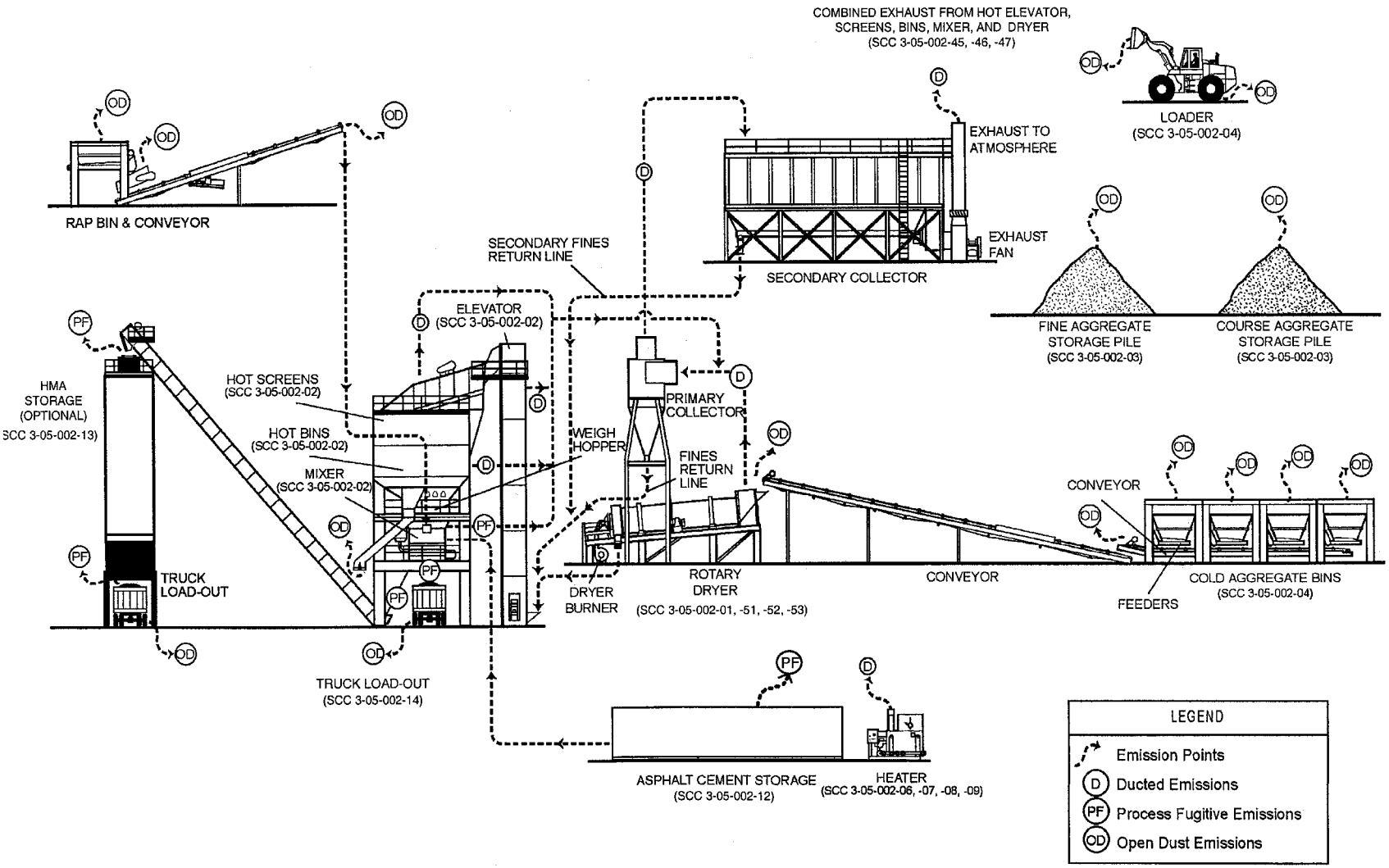

Figure 1. General process flow diagram for batch mix asphalt plants (source classification codes in parentheses).

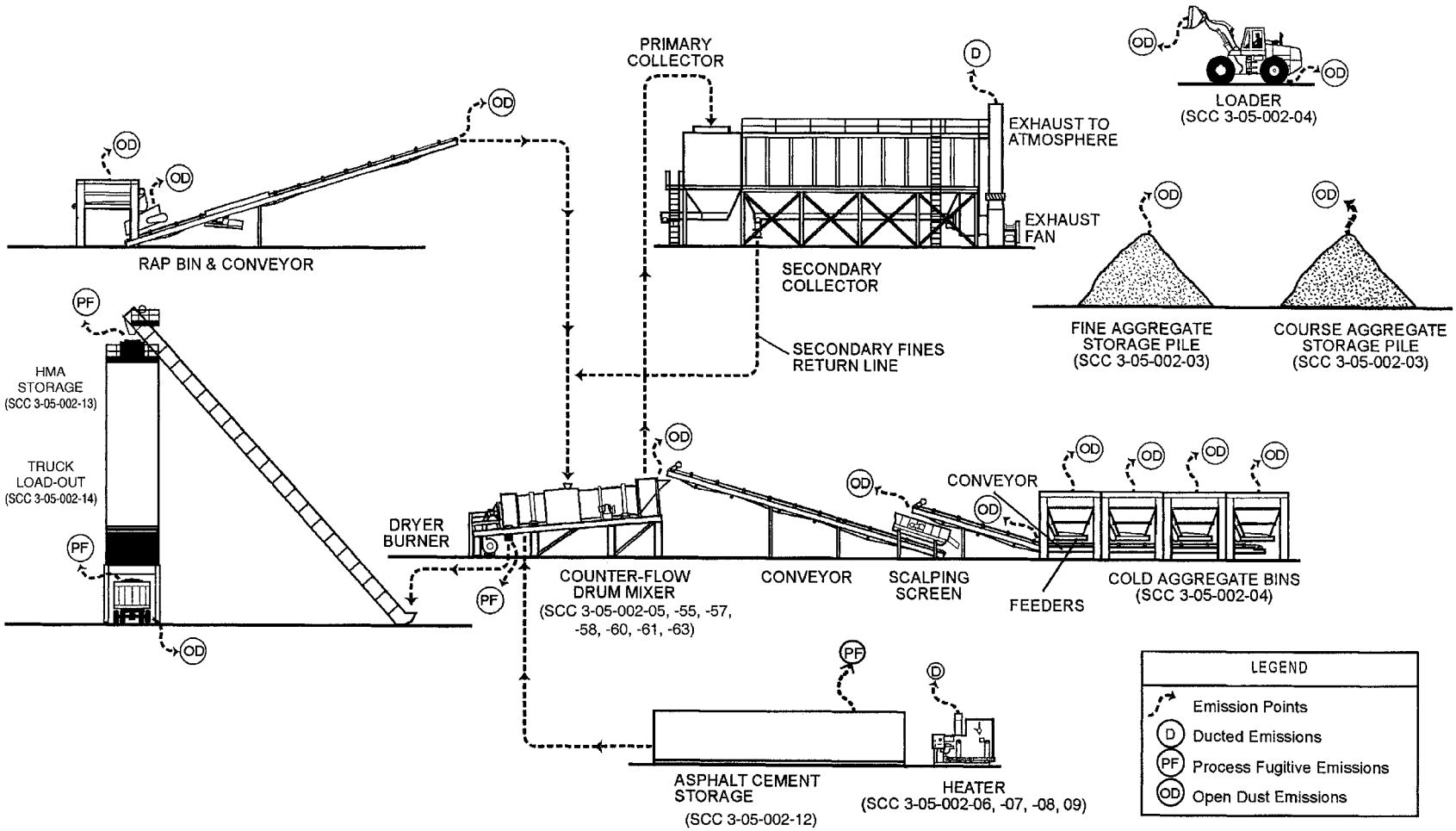

Figure 2. General process flow diagram for counter-flow drum mix asphalt plants (source classification codes in parentheses).

TABLE 1. ESTIMATED ANNUAL EMISSIONS FOR A TYPICAL BATCH MIX HMA FACILITY[a]

Pollutant	Annual emissions by source, pounds per year								
	Mobile sources (diesel exhaust)	Material handling and road dust	No. 2 fuel oil-fired dryer, hot screens, and mixer[b]	Natural gas-fired dryer, hot screens, and mixer[c]	Load-out[d]	Asphalt Storage[e]	Yard[f]	Total[g] (oil-fired)	Total[g] (gas-fired)
Criteria air pollutants									
Particulate matter less than 10 micrometers (PM-10)	46	7,900	2,700	2,700	52			10,700	10,700
Volatile organic compounds (VOC)	100		820	820	391	32	110	1,500	1,500
Carbon monoxide (CO)	700		40,000	40,000	135	3	35	41,000	41,000
Sulfur dioxide (SO_2)	22		8,800	460				8,800	480
Nitrogen oxides (NO_x)	380		12,000	2,500				12,400	2,900
Hazardous air pollutants (HAPs)									
Polycyclic aromatic hydrocarbons (PAHs)	0.035		11	11	2.0	0.12		13	13
Phenol					0.40			0.40	0.40
Volatile HAPs	1.9		751	751	6.2	140	1.6	760	760
Metal HAPs			1.4	1.4				1.4	1.4
Total HAPs[g]	1.9		760	760	8.6	140	1.6	770	770

[a] Based on an annual HMA production rate of 100,000 tons per year.
[b] Between 10 and 30 percent of the HMA is produced using fuel oil.
[c] Between 70 and 90 percent of the HMA is produced using natural gas.
[d] Loading of HMA into haul trucks.
[e] Includes emissions from oil-fired hot oil heaters.
[f] Fugitive emissions from loaded trucks prior to departure to the job site.
[g] Total expressed using two significant figures.

TABLE 2. ESTIMATED ANNUAL EMISSIONS FOR A TYPICAL DRUM MIX HMA FACILITY[a]

Pollutant	Annual emissions by source, pounds per year									
	Mobile sources (diesel exhaust)	Material handling and road dust	No. 2 fuel oil-fired dryer[b]	Natural gas-fired dryer[c]	Load-out[d]	Silo filling[e]	Asphalt storage[f]	Yard[g]	Total[h] (oil-fired)	Total[h] (gas-fired)
Criteria air pollutants										
Particulate matter less than 10 micrometers (PM-10)	220	26,000	4,600	4,600	104	117			31,000	31,000
Volatile organic compounds (VOC)	190		6,400	6,400	782	2,440	64	220	10,000	10,000
Carbon monoxide (CO)	1,200		26,000	26,000	270	236	6	72	28,000	28,000
Sulfur dioxide (SO_2)	26		2,200	680					2,200	710
Nitrogen oxides (NO_x)	560		11,000	5,200					12,000	5,800
Hazardous air pollutants (HAPs)										
Polycyclic aromatic hydrocarbons (PAHs)	0.13		176	37	4.0	5.8	0.12		190	50
Phenol					0.80				0.80	0.80
Volatile HAPs	6.6		1,560	1,020	12.4	31	140	3.3	1,800	1,200
Metal HAPs			19	16					19	16
Total HAPs[h]	6.7		1,800	1,100	17	37	140	3.3	2,000	1,300

[a] Based on an annual HMA production rate of 200,000 tons per year.
[b] Between 10 and 30 percent of the HMA is produced using fuel oil.
[c] Between 70 and 90 percent of the HMA is produced using natural gas.
[d] Loading of HMA into haul trucks
[e] Filling of temporary storage silo prior to load-out.
[f] Includes emissions from oil-fired hot oil heaters.
[g] Fugitive emissions from loaded trucks prior to departure to the job site.
[h] Total expressed using two significant figures.

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2. ASSESSMENT OF HOT MIX ASPHALT EMISSIONS

This section presents the results of an assessment of emissions from HMA manufacturing. An overview of the HMA industry and process operations is provided first (Section 2.1). Section 2.2 summarizes the methodology used to develop emission factors for the HMA industry. Section 2.3 identifies other sections of AP-42 that apply to HMA plants. An overview of the process for conducting an emission inventory is presented in Section 2.4, and Section 2.5 presents estimates of annual emissions from typical HMA facilities.

2.1 INDUSTRY OVERVIEW AND PROCESS DESCRIPTION[1]

Hot mix asphalt paving materials are a mixture of well-graded, high-quality aggregate and liquid asphalt cement, which is heated and mixed in measured quantities. The aggregate often includes RAP. Aggregate and RAP (if used) constitute over 92 percent by weight of the total mixture. Aside from the amount and grade of asphalt cement used, mix characteristics are determined by the relative amounts and types of aggregate and RAP used. A certain percentage of fine aggregate (less than 74 micrometers [μm] in physical diameter) is required for the production of good quality HMA.

Hot mix asphalt plants can be classified by their mixing operation as one of the following: (1) batch mix plants, (2) continuous mix (mix outside dryer drum) plants, (3) parallel flow drum mix plants, and (4) counterflow drum mix plants. An HMA plant can be constructed as a permanent plant, a skid-mounted (easily relocated) plant, or a portable plant. All plants can have RAP processing capabilities.

In 1996, approximately 500 million tons of HMA were produced at the 3,600 (estimated) active asphalt plants in the United States. Of these 3,600 plants, approximately 2,300 are batch plants, 1,000 are parallel flow drum mix plants, and 300 are counterflow drum mix plants. The total 1996 HMA production from batch and drum mix plants is estimated at about 250 million tons and 260 million tons, respectively. About 85 percent of new plants being constructed today are of the counterflow drum mix design, while batch plants and parallel flow drum mix plants account for 10 percent and 5 percent respectively. Continuous mix plants represent a very small fraction of the plants in use ($\leq$0.5 percent) and, therefore, are not discussed further. While most HMA plants have the capability to use both fuel oil and natural gas, it is estimated that between 70 and 90 percent of the HMA in the U. S. is produced using natural gas. The process operations at typical batch mix and drum mix plants are described in the following paragraphs.

2.1.1 Batch Mix Plants[2]

Processing begins as the aggregate is hauled from onsite storage piles and is placed in the appropriate hoppers of the cold feed unit. The material is metered from the hoppers onto a conveyer belt and is transported into a rotary dryer (typically gas- or oil-fired). As the hot aggregate leaves the dryer, it drops into a bucket elevator, is transferred to a set of vibrating screens, then separated into as many as four different grades (sizes), and dropped into "hot" bins according to size. At newer facilities, RAP may be transferred to a separate heated storage bin. At the same time, liquid asphalt cement is pumped from a heated storage tank to an asphalt bucket, where it is weighed to achieve the desired aggregate-to-asphalt cement ratio in the final mix. To control the aggregate size distribution in the final batch mix, the operator transfers material from various hot bins (and RAP bins, if used) to a weigh hopper until the desired mix

[1] See Appendix A, Section 11.1.1, and Appendix B, Section 2.1, for more detailed information.

[2] See Appendix A, Section 11.1.1.1, and Appendix B, Section 2.2.1, for more detailed information.

and weight are obtained. The aggregate from the weigh hopper is dropped into the mixer (pug mill) and dry-mixed for 6 to 10 seconds. The liquid asphalt is then dropped into the pug mill where it is mixed for an additional period of time. At older plants, RAP typically is conveyed directly to the pug mill from a storage hopper and combined with the hot aggregate. Total mixing time usually is less than 60 seconds. Then, the hot mix is conveyed to a hot storage silo or is dropped directly into a truck and hauled to the job site. Figure 1 depicts a typical batch mix plant.

2.1.2 Drum Mix Plants[3]

This process is a continuous mixing type process. The major difference between this process and the batch process is that the dryer is used not only to dry the material but also to mix the heated and dried aggregates with the liquid asphalt cement. In a parallel flow drum mixer, the aggregate is introduced to the drum at the burner end. As the drum rotates, the aggregate, as well as the combustion products from the burner, move toward the other end of the drum in parallel. Liquid asphalt cement is introduced in the mixing zone midway down the drum in a lower temperature zone, along with any RAP and PM from collectors. In a counterflow drum mixer, the material flow in the drum is opposite or counterflow to the direction of exhaust gases. In addition, the liquid asphalt cement mixing zone is located behind the burner flame zone so as to remove the materials from direct contact with hot exhaust gases. After mixing, the mixture is discharged at the end of the drum and is conveyed to either a surge bin or HMA storage silos. Figure 2 illustrates a counterflow drum mix plant.

In a parallel flow mixer, the exhaust gases also exit the end of the drum and pass on to the collection system. Parallel flow drum mixers have an advantage, in that mixing in the discharge end of the drum captures a substantial portion of the aggregate dust, therefore lowering the load on the downstream PM collection equipment. For this reason, most parallel flow drum mixers are followed only by primary collection equipment (usually a baghouse or venturi scrubber). However, because the mixing of aggregate and liquid asphalt cement occurs in the hot combustion product flow, organic emissions (gaseous and liquid aerosol) may be greater than in other processes.

Counterflow drum mix plants likely will have organic stack emissions (gaseous and liquid aerosol) that are lower than parallel flow drum mix plants because the liquid asphalt cement, virgin aggregate, and RAP are mixed in a zone removed from the exhaust gas stream. A counterflow drum mix plant normally can process RAP at ratios up to 50 percent with little or no observed effect upon emissions.

2.1.3 Recycle Processes[4]

Reclaimed asphalt pavement significantly reduces the amount of new aggregate and asphalt cement needed to produce HMA. In the reclamation process, old asphalt pavement is removed from the road base. This material is then transported to the plant, and is crushed and screened to the appropriate size for further processing. The paving material then is heated and mixed with new aggregate (if applicable), and the proper amount of new asphalt cement is added to produce HMA that meets the quality requirements of the customer.

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[3] See Appendix A, Sections 11.1.1.2 and 11.1.1.3, and Appendix B, Sections 2.2.2 and 2.2.3, for more detailed information.

[4] See Appendix A, Section 11.1.1.4, and Appendix B, Section 2.2.4, for more detailed information.

2.1.4 Emissions and Controls[5]

Hot mix asphalt plants have two major categories of emissions: ducted sources (those vented to the atmosphere through some type of stack, vent, or pipe), and fugitive sources (those not confined to ducts and vents but emitted directly from the source to the ambient air). Dryers are the most significant ducted sources of emissions from both batch mix and drum mix HMA plants. Emissions from these sources consist of water (as steam evaporated from the aggregate); PM; products of combustion (carbon dioxide [CO_2], NO_x, and sulfur oxides [SO_x]); CO; and small amounts of organic compounds of various species (including VOC, methane [CH_4], and HAPs). The CO and organic compound emissions result from incomplete combustion of the fuel and also are released from the heated asphalt.

At batch mix plants, other potential process sources include the hot-side conveying, classifying, and mixing equipment, which are vented to either the primary dust collector (along with the dryer gas) or to a separate dust collection system. These emissions are mostly aggregate dust, but they also may contain gaseous organic compounds, CO, and a fine aerosol of condensed organic particles. This organic aerosol is created by the condensation of gas into particles during cooling of organic vapors volatilized from the asphalt cement in the mixer. The amount of organic aerosol produced depends to a large extent on the temperature of the asphalt cement and aggregate entering the mixer. Organic vapor and its associated aerosol also are emitted directly to the atmosphere as process fugitives during truck load-out, from the bed of the truck itself during transport to the job site, and from the asphalt storage tank. Both the low molecular weight organic compounds and the higher weight organic aerosol may contain small amounts of HAP. The ducted emissions from the heated asphalt storage tanks may include gaseous and aerosol organic compounds and combustion products from the tank heater.

At most HMA facilities, fabric filters are used to control emissions from dryers. Other controls used include mechanical collectors and scrubbers. Emissions from aggregate handling and transfer typically are controlled with fabric filters or scrubbers. Large diameter cyclones and settling chambers also are used as product recovery devices. The material collected in those devices is recycled back into the process.

There also are a number of fugitive dust sources associated with batch mix HMA plants, including vehicular traffic generating fugitive dust on paved and unpaved roads, aggregate material handling, and other aggregate processing operations.

2.2 EMISSION FACTOR DEVELOPMENT FOR AP-42 SECTION 11.1, HOT MIX ASPHALT PLANTS

A detailed description of how the emission factors were developed for the HMA industry is provided in Section 4 of Appendix B. The following paragraphs summarize the methodology used.

To develop emission factors for the HMA industry, data from about 390 emission test reports and other documents on the industry were compiled and reviewed (a complete list of these references is provided following Section 4 of Appendix B). The majority of these reports documented measurements of emissions from batch plant dryer/mixers and drum plant dryers. Through a careful screening process, 35 of the reports were determined to be unusable for emission factor development and were excluded from further evaluation. About 350 reports remained and were compiled by plant type, emission source, pollutant, and emission control. These emission factors were then grouped by source, pollutant, and

[5] See Appendix A, Section 11.1.2, and Appendix B, Section 2.3, for more detailed information.

control device, and an average emission factor was calculated for each group. Table 3 presents a matrix of all of the sources and pollutants for which emission factors are presented in AP-42 (Appendix A).

While the particulate, CO_2, CO, and TOC emission factors are based on over 100 tests, most of the remaining criteria pollutant emission factors are based on between 5 and 10 tests. A few HAP emission factors are based on more than 5 tests, although the majority are based on between 2 and 5 tests. Information on the supporting data for specific emission factors and the quality rating assigned to the emission factor is included in the section or table in Appendices A and B as indicated in Table 4. Column four of Table 4 references the tables in Appendix A that present the emission factors and quality ratings. Column five of Table 4 references the paragraphs in Appendix B that discuss the basis for the emission factors developed for all of the sources and pollutants. Column six of Table 4 references the tables in Appendix B that present the emission factors and the individual data used to develop the emission factors. Generally, the amount of supporting data is typical of many AP-42 sections. However, the amount of data supporting the particulate, CO_2, CO, and TOC emission factors is greater than most AP-42 sections. The following paragraphs summarize the procedures followed to develop the emission factors for HMA facilities.

2.2.1 Batch Mix and Drum Mix Dryers

The usable data on batch mix and drum mix plant dryer emissions were compiled according to source type, emission control, and pollutant. Data on fuel types, the percentage of RAP used in the mix, and the process operating rate (e.g., dryer production rate) also were recorded. The quality of the emission data was evaluated with respect to the level of documentation in the report, the test methods used, the number of test runs, and any reported problems with the sampling procedures or the operation of the source during the test period. On the basis of this evaluation, data ratings of A, B, C, or D were assigned to each data set. Specific procedures used to evaluate the data are specified in *Procedures for Preparing Emission Factor Documents (*EPA-454/R-95-015).

For each emission test, an emission factor also was calculated for each pollutant sampled. These test-specific emission factors then were grouped according to source type, emission control device, pollutant, and, in the case of combustion sources, fuel type. At this stage in the process, D-rated data sets were discarded, provided there were higher quality data available for that particular group (i.e., that specific combination of source, control, fuel, and pollutant). In addition, where there were data from multiple tests on the same specific emission source, the test-specific emission factors were averaged to yield a source-specific emission factor. In subsequent calculations, this source-specific emission factor was used.

A statistical analysis of the data for batch and drum mix dryers was performed to determine the effects of RAP content, fuel type, production rate on emissions of several pollutants. The analysis showed no strong correlation between these parameters and emission factors. Details on the statistical analysis can be found in Section 4.3 of Appendix B.

To develop emission factors, the mean of the test-specific emission factors was calculated for each of the emission factor groups discussed above. In some cases, the data for two or more groups were combined and an overall mean emission factor was calculated. For example, if the data indicated that fuel type had no apparent effect on emissions of a specific pollutant, fuel type was ignored and all of the data for that source type and pollutant were combined. The final step in developing emission factors is to assign a quality rating of A, B, C, D, or E. Quality ratings are a function primarily of the number of data points

from which a specific emission factor is calculated. Additional information on the rating system used is discussed in Section 3 of Appendix B.

2.2.2 Hot Oil Heaters

For hot oil heaters, only a single test report for an oil-fired hot oil heater was available. The report was reviewed and the emission factors compiled using the procedures described previously. Appendix B, Section 4.2.4.2, provides a detailed description of how these emission factors were developed. It should be noted that most hot oil heaters are gas-fired, and the emission factors developed from the available data would not necessarily be representative of gas-fired heaters.

2.2.3 Truck Load-Out

Truck load-out emissions were developed from two emission tests sponsored by the U. S. Environmental Protection Agency (EPA) (Appendix B References 355 and 356). In designing, performing and evaluating these two tests, EPA was involved with a number of groups. The groups included citizens, State and local health agencies, State and local air pollution control agencies, and industry associations. These different groups provided input on the selection of facilities for emissions testing, the design of the test program, reviewed the individual site-specific test plans, observed emissions testing, commented on the draft test reports and provided suggestions for analysis of the data to develop emission factors. The procedures used to develop emission factors generally were the same as those described above. However, additional steps were taken to ensure the quality and consistency of the data and the representativeness and universality of the emission factors developed from the data. For example, two quality assurance scientists from Research Triangle Institute were employed to independently audit the test. These additional steps are summarized below. Detailed explanations of the methodology used are provided in Section 4.4 of Appendix B.

At one of the facilities the sampling area was enclosed but did not meet EPA requirements for a total enclosure. Consequently, the capture efficiency was quantitatively estimated and the data were corrected for capture efficiency.

At one facility, emissions due to diesel truck operation could not be segregated from emissions due to truck load-out. Therefore, background concentrations also were sampled. To account for background levels of various pollutants emitted from truck operation, the as-measured background concentrations were subtracted from the capture efficiency corrected load-out emission concentrations. For the most part, values were treated as zero if the background concentration exceeded the capture-efficiency-adjusted run concentration.

Because the asphalt types and temperatures for the two facilities differed, adjustments also were made to normalize the emission data. To account for differences in the volatility of the liquid asphalts used, samples of asphalt were collected during the emission tests and analyzed by ASTM Method D 2872-88, *Effects of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test - RTFOT)* to determine the "loss-on-heating" values for the asphalts. Additional loss-on-heating data also were obtained from several State departments of transportation laboratories in order to determine a common RTFOT value to use as a default in those situations where no historical information is available. Based upon the RTFOT data collected and the desire to select a default which encourages the use of site-specific data, a default of -0.5 percent was selected as a default value for use in the predictive emission factor equations developed from the data.

To account for differences in the load-out temperatures of the two facilities the data were adjusted using the Clausius-Clapeyron equation, which relates vapor pressure and temperature of a substance. This equation and the asphalt laboratory data provide a mechanism to normalize the emissions to a temperature of 325°F, which is the maximum midpoint load-out temperature recommended by the Asphalt Pavement Environmental Council's Best Practices Guide dated March 2000.

Using the adjusted data and the temperature and volatility relationship described above, separate predictive emission factor equations were developed for emissions of total PM, organic PM, total organic compounds (TOC), and CO from drum mix and batch mix load-out operations. Additionally, adjusted data for a variety of HAP's were used to develop ratios of the HAP pollutant to either organic PM or TOC (speciation profiles). These speciation profiles are applicable to load-out emissions and yard emissions.

2.2.4 Silo Filling

Silo filling emission factors were developed from one of the emission tests described in the previous paragraphs for load-out emissions (Appendix B Reference 355). These data also were collected and evaluated with stakeholder involvement. Additionally, the same basic methodology described in the previous paragraphs for load-out emissions was used to adjust the data on emissions from silo filling operations. Predictive emission factor equations also were developed for total PM, organic PM, TOC, and CO. A detailed explanation of the methodology used to develop these equations is provided in Section 4.4.4 of Appendix B. Speciation profiles for silo filling emissions were also developed using the methodology described for load-out emissions. The speciation profiles from silo filling are applicable to asphalt storage tank emissions.

2.2.5 Asphalt Storage Tanks

To estimate emissions from heated organic liquid storage tanks, the methodologies described in Chapter 7 of AP-42 and the TANKS software are generally used. The emissions from these types of tanks depend on the contents of the tank, the volume of gas vented, and the operating temperature range of the liquid in the tank. Emissions during the filling of these tanks (working loss) are governed by the saturation concentration of the liquid stored in the tank and the volume of gas displaced by the addition of liquid to the tank. Emissions during other periods (breathing losses) are governed by the saturation concentration of the liquid stored in the tank and the changes in the volume of the gas caused by temperature variations. Although vapor pressure information on paving asphalt is not available to allow the use of the TANKS program without additional information, information was available from the silo filling test report to infer emissions during the filling of the asphalt storage tank and, by extension, the vapor pressure characteristics of paving asphalt at the typical operating temperatures. Using these data, input values for Antoine's equation and liquid and vapor molecular weight were developed for use with the TANKS program to calculate working and breathing losses for asphalt storage tanks. A detailed explanation of the methodology used to develop these values is presented in Section 4.4.5 of Appendix B.

2.2.6 Yard Emissions

At one of the EPA-sponsored emission tests described in the previous paragraphs for load-out emissions (Appendix B Reference 355), data also were collected on fugitive emissions from loaded trucks as they sat in the yard prior to departure for the job site. As with the other data from this reference, these data were evaluated with stakeholder involvement. The data obtained were fitted to a power function in order to develop an equation for these yard emissions as a function of time. A specific emission factor for cumulative emissions over an 8-minute period (which represents the maximum time represented by the

data) was calculated using the power function equation developed from the emission data. A detailed explanation of the methodology used to develop the equations and the emission factor is provided in Section 4.4.6 of Appendix B.

2.3 OTHER APPLICABLE AP-42 SECTIONS

Emission factors for other generic sources associated with HMA facilities can be found in other sections of AP-42 (http://www.epa.gov/ttn/chief/ap42/index.html). As discussed above, methodologies for estimating emissions from asphalt storage tanks can be found in Chapter 7 of AP-42. Methods for estimating fugitive dust emissions from vehicular traffic are presented in AP-42 Chapter 13 (Sections 13.2.1 and 13.2.2). Material handling emissions and storage pile emissions are addressed in AP-42 Chapter 11 (Section 11.19.2) and Chapter 13 (Section 13.2.4). Emission factors for truck exhaust are provided in AP-42 Volume II: Mobile Sources (http://www.epa.gov/oms/ap42.htm).

To calculate the material handling and mobile source emission estimates presented in Tables 1 and 2 of this report, suitable emission factors for these material handling and mobile sources were determined. The following paragraphs describe the basis for the emission factors that were used:

- Receipt of new aggregate – Used equation from AP-42 Section 13.2.4, assuming an average moisture content of 1.5 percent and an average wind speed of 10 miles per hour (mph). The resulting PM-10 emission factor is 0.0041 lb/ton of new aggregate. The resulting PM-2.5 emission factor is 0.0013 lb/ton of new aggregate.
- Transfer of aggregate from storage to conveyor belt or between conveyor belts – Used controlled emission factor from AP-42 Section 11.19.2. The PM-10 emission factor is 0.000048 lb/ton of new aggregate.
- Screening of aggregate – Used controlled emission factor from AP-42 Section 11.19.2. PM-10 emission factor is 0.00084 lb/ton of new aggregate.
- RAP crushing – Used controlled tertiary crushing emission factor from AP-42 Section 11.19.2. PM-10 emission factor is 0.00059 lb/ton of new aggregate.
- Paved road dust emissions – Used paved roads equation from AP-42 Section 13.2.1, assuming an average vehicle weight of 22 tons and a road silt content of 3 grams per square meter. The resulting PM-10 emission factor is 0.016 lb per vehicle mile traveled. The resulting PM-2.5 emission factor is 0.0040 lb per vehicle mile traveled.
- Unpaved road dust emissions – Used unpaved roads equation from AP-42 Section 13.2.2, assuming an average vehicle weight of 6 tons, a road silt percentage of 10 percent, a surface moisture content of 0.7 percent. The resulting PM-10 emission factor is 2.04 lb per vehicle mile traveled. The resulting PM-2.5 emission factor is 0.29 lb per vehicle mile traveled.
- Diesel exhaust emissions – Used heavy duty diesel truck emission factors for idling and for an average speed of 10 mph with a 250 brake horsepower engine. The diesel engines get 10 miles per gallon at 10 mph and burn 1 gallon per hour (gal/hr) of fuel at idle. The sulfur content of diesel fuel is 0.05 percent. At idle, the emissions factors for diesel engines are: VOC - 0.208 grams per minute (g/min) (0.00046 pound per minute [lb/min]), CO - 1.57 g/min (0.0035 lb/min), NO_x - 0.917 g/min (0.0020 lb/ min), SO_2 - 0.157s pounds per gallon of fuel (lb/gal) (where s is fuel sulfur content) and PM - 0.043 g/min (0.000095 lb/min). When traveling at an average speed of 10 mph, the emission factors for diesel engines are: VOC - 3.18 grams per mile (g/mile) (0.0070 pounds per mile [lb/mile]), CO - 18.82 g/mile (0.041 lb/mile), NO_x - 8.50 g/mile (0.019 lb/mile), SO_2 - 0.157s lb/gal fuel (where s is fuel sulfur content), and PM - 0.1011 grams per brake horsepower hour (0.00022 pounds per horsepower hour). For organic HAP emissions - Used medium duty diesel truck emission

factors from article by Schauer, et. al., in Environmental Science & Technology of May 15, 1999. The volatile HAP emission factors presented were 0.084 grams per kilometer (g/km) (0.00030 lb/mile) and 0.0016 g/km (0.0000057 lb/mile) for PAHs.

The ducted and process fugitive emissions estimates presented in Tables 1, 2, 7, and 11 are based on the following additional assumptions:

- 84,800 ton/yr of new aggregate for batch mix plant.
- 10,000 ton/yr of recycled pavement for batch plant.
- 1.25 million gallons (5,200 tons) of asphalt for batch plant.
- 150,900 ton/yr of new aggregate for drum mix plant.
- 40,000 ton/yr of recycled pavement for drum mix plant.
- 2.5 million gallons (10,400 tons) of asphalt for drum mix plant.
- Two 18,000-gallon asphalt storage tanks.
- Five open conveyor transfer points for new aggregate.
- Front end loader travel over unpaved roads of 0.25 mile per ton of RAP used.
- Vehicle travel over paved roads of 1.5 miles per 25 tons of HMA produced.
- Vehicle idling time of 128,000 min (an average of 4 trucks in line during the average 8-minute load-out time) for batch plant.
- Vehicle idling time of 72,000 min (an average of 6 trucks in line during the average 1.5-minute load-out time) for drum mix plant.

2.4 EMISSION INVENTORY FOR TYPICAL HOT MIX ASPHALT PLANTS

To perform an emission inventory for a typical HMA plant, the first step is to identify the types of emission sources and to count the total number of each type of source. The next step is to identify the best emission estimation tools, which include: (1) facility-specific emissions test data; (2) source-specific emission factors; (3) other types of source-specific data, such as mass balance data; (4) emission factors for similar sources; (5) emission factors for sources that are believed to be somewhat similar to the source being considered; and (6) engineering estimates. After selecting appropriate emission estimation tools, activity factors, such as production rates, should be determined for each source so that emissions can be estimated for a specified period of time. The emissions over the specified period of time for each source and pollutant then are summed to complete the emission inventory. Appendix C provides more detailed information on procedures for performing an emission inventory at an HMA plant.

2.5 EMISSION ESTIMATES FOR TYPICAL HOT MIX ASPHALT PLANTS

Tables 1 and 2 present annual estimates of emissions of criteria pollutants and HAPs for typical batch mix and drum mix HMA plants, respectively. The estimates presented in these tables account for the most significant emission sources at each type of facility. Tables 5 through 12 present more detailed annual emission estimates for typical batch and drum mix HMA plants. Table 5 summarizes the estimated emissions from a typical batch mix plant dryer, hot screens, and mixer. Included in the table are estimates for criteria pollutants as well as specific PAHs, volatile HAPs, and metal HAPs for which emission factors were developed. Estimated annual criteria pollutant, PAH and volatile HAP emissions from typical batch mix plant load-out operations and asphalt storage tank are summarized in Tables 6 and 7. Tables 8, 9, 10, and 11 summarize the estimated annual emissions from a typical drum mix plant dryer, load-out operations, silo filling operations, and asphalt storage tank respectively. These tables includes estimates for criteria pollutants, PAHs, volatile HAPs, and metal HAPs for which emission factors were developed. Finally, Table 12 presents estimates of fugitive emissions from loaded trucks (yard emissions) for a typical

batch mix and drum mix plant. The emissions estimates presented in Tables 5 through 12 are based on the emission factors developed for the HMA industry and the following assumptions:

- Batch mix plant and drum mix plant dryers are fueled with either natural gas or fuel oil. It is estimated that between 70 and 90 percent of HMA plants use natural gas, although some HMA plants use fuel oil as an alternative to natural gas. As shown in Tables 5 and 8, fuel oil-fired mixers and dryers have higher emissions of SO_2, NO_x, and some HAPs.
- Batch mix plant dryer, hot screens, and mixer and drum mix plant dryer emissions are controlled with fabric filters.
- PM emissions from load-out and silo filling are entirely PM-10. (However, the organic portion of these emissions also can be assumed to be PM-2.5. Information is available in AP-42 Appendix B.1, Particle Size Distribution Data and Sized Emission Factors for Selected Sources, for categorizing the inorganic or filterable PM into PM-10 and PM-2.5 fractions.)
- Average asphalt loss on heating is -0.5 percent (asphalt volatility).
- Average HMA load-out temperature is 325°F.
- The typical HMA plant has two asphalt storage tanks that are 50 feet long and 8 feet in diameter. It is estimated that these storage tanks require a total heating capacity of about 200,000 Btu/hr, based on a heat loss of 60 Btu/ft^2 of tank surface area. The asphalt storage tanks are kept at 325°F continuously for the five months the HMA plant operates. As a result, 720 million Btu are used to maintain the temperature of the asphalt in the storage tank. For a gas-fired hot oil heater, 720,000 ft^3 of gas is combusted. For an oil-fired hot oil heater, 5,100 gallons of fuel oil are combusted. It should be noted that this fuel usage is about 3 percent of the fuel used in a typical batch mix plant and 1.6 percent of the fuel used in a typical drum mix plant.

TABLE 3. MATRIX OF EMISSION FACTORS DEVELOPED FOR HMA SOURCES

Plant type	Source	Criteria pollutants	HAPs	Other pollutants
Batch mix	Dryer, hot screens, and mixer	PM-10, NO_x, CO, SO_2, VOC	24 organic HAPs 9 metal HAPs	CO_2 4 other organics 3 other metals
	Hot oil heaters		22 organic HAPs	
	Load-out	PM, CO, VOC,	41 organic HAPs	3 other organics
	Yard emissions	VOC	19 organic HAPs	
Drum mix	Dryer	PM-10, NO_x, CO, SO_2, VOC	58 organic HAPs 11 metal HAPs	CO_2 15 other organics, 6 other metals
	Hot oil heaters		22 organic HAPs	
	Load-out	PM, CO, VOC	41 organic HAPs	3 other organics
	Silo filling	PM, CO, VOC	28 organic HAPs	3 other organics
	Yard emissions	VOC	19 organic HAPs	

TABLE 4. LOCATIONS OF SUPPORTING DATA FOR EMISSION FACTORS

Plant Type	Source	Pollutant	Appendix A Table	Appendix B Section	Appendix B Table
Batch Mix	Dryer, hot screens, mixer	PM-10	11.1-1, 11.1-2	4.2.4.3.1-4.2.4.3.6	4-19
		CO	11.1-5	4.2.4.3.7	4-20
		CO_2	11.1-5	4.2.4.3.8	4-20
		NO_x	11.1-5	4.2.4.3.9	4-20
		SO_2	11.1-5	4.2.4.3.10	4-20
		TOC/VOC/methane	11.1-6	4.2.4.3.11, 4.2.4.3.12	4-20
		Speciated organics	11.1-9	4.2.4.3.12-4.2.4.3.15	4-22
		Trace metals	11.1-11	4.2.4.3.16	4-21
Drum Mix	Dryer/mixer	PM-10	11.1-3, 11.1-4	4.2.4.1.1-4.2.4.1.6	4-14
		CO	11.1-7	4.2.4.1.7	4-15
		CO_2	11.1-7	4.2.4.1.8	4-15
		NO_x	11.1-7	4.2.4.1.9	4-15
		SO_2	11.1-7	4.2.4.1.10	4-15
		TOC/VOC/methane	11.1-8	4.2.4.1.11	4-15
		HCl	11.1-8	4.2.4.1.18	4-17
		Speciated organics	11.1-10	4.2.4.1.12-4.2.4.1.15, 4.2.4.1.19	4-17
		Dioxin/furans	11.1-10	4.2.4.1.17	4-17
		Trace metals	11.1-12	4.2.4.1.16	4-16
Batch or Drum Mix	Hot oil heater	Organic pollutants	11.1-13	4.2.4.2	4-18
	Load-out	PM, organic PM, TOC, CO, speciated organics	11.1-14 11.1-15 11.1-16	4.4.4	4-27 to 4-37, 4-43, 4-44
	Silo filling	PM, organic PM, TOC, CO, speciated organics	11.1-14 11.1-15 11.1-16	4.4.4	4-38 to 4-44
	Asphalt storage	Speciated organics	11.1-15 11.1-16	4.4.5	4-43, 4-44
	Yard emissions	Speciated organics	11.1-15 11.1-16	4.4.6	4-45, 4-46

TABLE 5. ESTIMATED ANNUAL EMISSIONS FOR A TYPICAL BATCH MIX PLANT DRYER, HOT SCREENS, AND MIXER[a]

Pollutant	Oil-fired dryer	Natural gas-fired dryer
	Emissions, lb/yr	
Criteria Pollutants		
PM-10	2,700	2,700
VOC	820	820
CO	40,000	40,000
SO_2	8,800	460
NO_x	12,000	2,500
PAHs (semi-volatile HAPs)		
Naphthalene	3.6	3.6
2-Methylnaphthalene	7.1	7.1
Acenaphthene	0.090	0.090
Acenaphthylene	0.058	0.058
Anthracene	0.021	0.021
Benzo(a)anthracene	0.00046	0.00046
Benzo(a)pyrene	0.000031	0.000031
Benzo(b)fluoranthene	0.00094	0.00094
Benzo(g,h,i)perylene	0.00005	0.00005
Benzo(k)fluoranthene	0.0013	0.0013
Chrysene	0.00038	0.00038
Dibenz(a,h)anthracene	0.0000095	0.0000095
Fluoranthene	0.016	0.016
Fluorene	0.16	0.16
Indendo(1,2,3-cd)pyrene	0.00003	0.00003
Phenanthrene	0.26	0.26
Pyrene	0.0062	0.0062
Total PAHs	11	11
Volatile HAPs		
Acetaldehyde	32	32
Benzene	28	28
Ethylbenzene	220	220
Formaldehyde	74	74
Quinone	27	27
Toluene	100	100
Xylene	270	270
Total Volatile HAPs	751	751
Metal HAPs		
Arsenic	0.046	0.046
Beryllium	0.015	0.015
Cadmium	0.061	0.061
Chromium	0.057	0.057
Lead	0.089	0.089
Manganese	0.69	0.69
Mercury	0.041	0.041
Nickel	0.3	0.3
Selenium	0.049	0.049
Total metal HAPs	1.35	1.35

[a] Dryer, hot screens, and mixer controlled by fabric filter producing 100,000 tons of hot mix asphalt per year. Between 70 and 90 percent of HMA is produced using natural gas; most of the remaining HMA is produced using fuel oil.

TABLE 6. ESTIMATED ANNUAL EMISSIONS FOR TYPICAL BATCH MIX PLANT LOAD-OUT OPERATIONS[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	52
VOC	391
CO	135
PAHs (semi-volatile HAPs)	
Acenaphthene	0.089
Acenaphthylene	0.0095
Anthracene	0.0239
Benzo(a)anthracene	0.0065
Benzo(b)fluoranthene	0.0026
Benzo(k)fluoranthene	0.00075
Benzo(g,h,i)perylene	0.00065
Benzo(a)pyrene	0.00078
Benzo(e)pyrene	0.0027
Chrysene	0.035
Dibenz(a,h)anthracene	0.00013
Fluoranthene	0.017
Fluorene	0.26
Indeno(1,2,3-cd)pyrene	0.00016
2-Methylnaphthalene	0.81
Naphthalene	0.43
Perylene	0.0075
Phenanthrene	0.28
Pyrene	0.051
Total PAHs	2.02
Other semi-volatile HAPs	
Phenol	0.40
Volatile HAPs	
Benzene	0.22
Bromomethane	0.040
2-Butanone	0.20
Carbon disulfide	0.054
Chloroethane	0.00087
Chloromethane	0.062
Cumene	0.46
Ethylbenzene	1.16
Formaldehyde	0.37
n-Hexane	0.62
Isooctane	0.0075
Methylene chloride	0.00
Methyl tert-butyl ether	0.00
Styrene	0.030
Tetrachloroethene	0.032
Toluene	0.87
1,1,1-Trichloroethane	0.00
Trichloroethene	0.00
Trichlorofluoromethane	0.0054
m-/p-Xylene	1.70
o-Xylene	0.33
Total volatile HAPs	6.18

[a] Uncontrolled emissions from 100,000 tons of hot mix asphalt per year.

TABLE 7. ESTIMATED ANNUAL EMISSIONS FOR TYPICAL BATCH MIX PLANT ASPHALT STORAGE TANK[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	ND
VOC	32
CO	3
PAHs (semi-volatile HAPs)	
Acenaphthene	0.0027
Acenaphthylene	0.0010
Anthracene	0.00092
Benzo(b)fluoranthene	0.00051
Fluoranthene	0.00022
Fluorene	0.00016
Naphthalene	0.087
Phenanthrene	0.025
Pyrene	0.00016
Total PAHs	0.12
Volatile HAPs	
Benzene	0.010
Bromomethane	0.0016
2-Butanone	0.012
Carbon disulfide	0.0051
Chloroethane	0.0012
Chloromethane	0.0074
Ethylbenzene	0.012
Formaldehyde	140
n-Hexane	0.032
Isooctane	0.000099
Methylene chloride	0.000086
Phenol	0.00
Styrene	0.0017
Toluene	0.020
m-/p-Xylene	0.061
o-Xylene	0.018
Total volatile HAPs	140

[a] Uncontrolled emissions from plant producing 100,000 tons of hot mix asphalt per year. Includes emissions from oil-fired hot oil heaters. All calculated PAH emissions and almost all of the formaldehyde emissions are from the oil-fired hot oil heater.

TABLE 8. ESTIMATED ANNUAL EMISSIONS FOR A TYPICAL DRUM MIX DRYER[a]

Pollutant	No. 2 fuel oil-fired dryer	Natural gas-fired dryer
	Emissions, lb/yr	
Criteria Pollutants		
PM-10	4,600	4,600
VOC	6,400	6,400
CO	26,000	26,000
SO_2	2,200	680
NO_x	11,000	5,200
PAHs (semi-volatile HAPs)		
2-Methylnaphthalene	34	15
Acenaphthene	0.28	0.28
Acenaphthylene	4.4	1.7
Anthracene	0.62	0.044
Benzo(a)anthracene	0.042	0.042
Benzo(a)pyrene	0.0020	0.0020
Benzo(b)fluoranthene	0.020	0.020
Benzo(e)pyrene	0.022	0.022
Benzo(g,h,i)perylene	0.0080	0.0080
Benzo(k)fluoranthene	0.0082	0.0082
Chrysene	0.036	0.036
Fluoranthene	0.12	0.12
Fluorene	2.2	0.76
Indeno(1,2,3-cd)pyrene	0.0014	0.0014
Naphthalene	130	18
Perylene	0.0018	0.0018
Phenanthrene	4.6	1.5
Pyrene	0.60	0.11
Total PAHs	180	37
Volatile HAPs		
Isooctane	8.0	8.0
Hexane	184	180
Benzene	78	78
Ethylbenzene	48	48
Formaldehyde	620	620
Methyl chloroform	9.6	9.6
Toluene	580	30
Xylene	40	40
Total volatile HAPs	1,568	1,020
Metal HAPs		
Lead	3	0.12
Mercury	0.52	0.048
Antimony	0.036	0.036
Arsenic	0.11	0.11
Beryllium	0.000	0.000
Cadmium	0.082	0.082
Chromium	1.1	1.1
Manganese	1.5	1.5
Nickel	12.6	12.6
Selenium	0.070	0.070
Total metal HAPs	19	16

[a] Dryer controlled by fabric filter producing 200,000 tons of hot mix asphalt per year. Between 70 and 90 percent of HMA is produced using natural gas; most of the remaining HMA is produced using fuel oil.

TABLE 9. ESTIMATED ANNUAL EMISSIONS FOR TYPICAL DRUM MIX PLANT LOAD-OUT OPERATIONS[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	104
VOC	780
CO	270
PAHs (semi-volatile HAPs)	
Acenaphthene	0.177
Acenaphthylene	0.0191
Anthracene	0.0477
Benzo(a)anthracene	0.013
Benzo(b)fluoranthene	0.0052
Benzo(k)fluoranthene	0.0015
Benzo(g,h,i)perylene	0.0013
Benzo(a)pyrene	0.00157
Benzo(e)pyrene	0.0053
Chrysene	0.070
Dibenz(a,h)anthracene	0.00025
Fluoranthene	0.034
Fluorene	0.53
Indeno(1,2,3-cd)pyrene	0.00032
2-Methylnaphthalene	1.62
Naphthalene	0.85
Perylene	0.015
Phenanthrene	0.55
Pyrene	0.10
Total PAHs	4.05
Other semi-volatile HAPs	
Phenol	0.80
Volatile HAPs	
Benzene	0.43
Bromomethane	0.080
2-Butanone	0.41
Carbon disulfide	0.11
Chloroethane	0.0017
Chloromethane	0.12
Cumene	0.91
Ethylbenzene	2.3
Formaldehyde	0.73
n-Hexane	1.25
Isooctane	0.015
Methylene chloride	0.00
Methyl tert-butyl ether	0.00
Styrene	0.06
Tetrachloroethene	0.064
Toluene	1.74
1,1,1-Trichloroethane	0.00
Trichloroethene	0.00
Trichlorofluoromethane	0.011
m-/p-Xylene	3.40
o-Xylene	0.66
Total volatile HAPs	12.35

[a] Uncontrolled emissions from 200,000 tons of hot mix asphalt per year.

TABLE 10. ESTIMATED ANNUAL EMISSIONS FOR TYPICAL DRUM MIX PLANT SILO FILLING OPERATIONS[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	120
VOC	2,400
CO	240
PAHs (semi-volatile HAPs)	
Acenaphthene	0.24
Acenaphthylene	0.0071
Anthracene	0.066
Benzo(a)anthracene	0.028
Benzo(e)pyrene	0.0048
Chrysene	0.11
Fluoranthene	0.076
Fluorene	0.51
2-Methylnaphthalene	2.7
Naphthalene	0.92
Perylene	0.015
Phenanthrene	0.91
Pyrene	0.22
Total PAHs	5.8
Other semi-volatile HAPs	
Phenol	0.00
Volatile HAPs	
Benzene	0.78
Bromomethane	0.12
2-Butanone	0.95
Carbon disulfide	0.39
Chloroethane	0.095
Chloromethane	0.56
Ethylbenzene	0.93
Formaldehyde	17
n-Hexane	2.4
Isooctane	0.0076
Methylene chloride	0.0066
Styrene	0.13
Toluene	1.5
m-/p-Xylene	4.6
o-Xylene	1.4
Total volatile HAPs	31

[a] Uncontrolled emissions from 200,000 tons of hot mix asphalt per year.

TABLE 11. ESTIMATED ANNUAL EMISSIONS FOR TYPICAL DRUM MIX PLANT ASPHALT STORAGE TANK[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	ND
VOC	64
CO	6
PAHs (semi-volatile HAPs)	
Acenaphthene	0.0027
Acenaphthylene	0.0010
Anthracene	0.00092
Benzo(b)fluoranthene	0.00051
Fluoranthene	0.00022
Fluorene	0.00016
Naphthalene	0.087
Phenanthrene	0.025
Pyrene	0.00016
Total PAHs	0.12
Volatile HAPs	
Benzene	0.020
Bromomethane	0.0031
2-Butanone	0.025
Carbon disulfide	0.010
Chloroethane	0.0025
Chloromethane	0.015
Ethylbenzene	0.024
Formaldehyde	140
n-Hexane	0.064
Isooctane	0.00020
Methylene chloride	0.00017
Phenol	0.00
Styrene	0.0035
Toluene	0.040
m-/p-Xylene	0.12
o-Xylene	0.036
Total volatile HAPs	140

[a] Uncontrolled emissions from plant producing 200,000 tons of hot mix asphalt per year. Includes emissions from an oil-fired hot oil heater. All of the calculated PAH emissions and almost all of the formaldehyde emissions are from the oil-fired hot oil heater.

TABLE 12. ESTIMATED ANNUAL YARD VOC EMISSIONS FOR TYPICAL BATCH MIX AND DRUM MIX HMA PLANTS[a]

	Batch mix[b]	Drum mix[c]
Pollutant	Emissions, lb/yr	
Criteria Pollutants		
PM-10	ND	ND
VOC	110	220
CO	36	72
PAHs (semi-volatile HAPs)	ND	ND
Other semi-volatile HAPs		
Phenol	0.00	0.00
Volatile HAPs		
Benzene	0.057	0.11
Bromomethane	0.011	0.021
2-Butanone	0.054	0.11
Carbon disulfide	0.014	0.029
Chloroethane	0.00023	0.0046
Chloromethane	0.017	0.033
Cumene	0.12	0.24
Ethylbenzene	0.31	0.62
Formaldehyde	0.10	0.19
n-Hexane	0.17	0.33
Isooctane	0.0020	0.0040
Methylene chloride	0.00	0.00
Styrene	0.0080	0.016
Tetrachloroethene	0.0085	0.017
Toluene	0.23	0.46
Trichlorofluoromethane	0.0014	0.0029
m-/p-Xylene	0.45	0.90
o-Xylene	0.088	0.18
Total volatile HAPs	1.6	3.3

[a] Fugitive VOC emissions from loaded haul truck for eight minutes after completion of load-out.
[b] Uncontrolled emissions from plant producing 100,000 tons of hot mix asphalt per year.
[c] Uncontrolled emissions from plant producing 200,000 tons of hot mix asphalt per year.

APPENDIX A

AP-42 Section 11.1
Hot Mix Asphalt Plants

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APPENDIX B

Emission Factor Documentation for AP-42 Section 11.1
Hot Mix Asphalt Production

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APPENDIX C

Chapter 3:
Preferred and Alternative Methods for Estimating
Air Emissions from Hot Mix Asphalt Plants
Emission Inventory Improvement Program (EIIP)
July 1996

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TECHNICAL REPORT DATA

(Please read Instructions on reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-454/R-00-019		

4. TITLE AND SUBTITLE	5. REPORT DATE
Hot Mix Asphalt Plants Emission Assessment Report	December 2000
	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Ron Myers (EPA) Brian Shrager (MRI) Gary Brooks (ERG)	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Research Triangle Park, NC 27711	11. CONTRACT/GRANT NO. 68D-98-027 (MRI) 68-D7-0068 (ERG)

12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Office of Air Quality Planning and Standards Office of Air and Radiation U.S. Environmental Protection Agency Research Triangle Park, NC 27711	14. SPONSORING AGENCY CODE EPA/200/04

15. SUPPLEMENTARY NOTES

16. ABSTRACT The United States Environmental Protection Agency (EPA) Emission Factors and Inventory Group (EFIG) is investigating the Hot Mix Asphalt industry to identify and quantify criteria and hazardous air pollutants (HAP's) emitted from kiln stacks, transport truck loading and silo filling. EFIG obtained over 300 emission tests from kiln stacks that characterize emissions of criteria pollutants and hazardous air pollutants' emissions. EFIG requested that EPA's Emission Measurement Center (EMC) conduct the required testing of the transport truck and silo filling operations. Under separate EPA contracts, Midwest Research Institute (MRI) and Pacific Environmental Services (PES) performed two emissions tests. The primary objective of the testing program was to characterize uncontrolled emissions of the criteria pollutants particulate matter (PM) and total hydrocarbons (THC) and emissions of volatile and semi-volatile organic HAP's including polycyclic organic matter, phenol, benzene, toluene, xylene, ethyl benzene, 2-butanone, cumene, formaldehyde, hexane, isooctane and others. The results of the two test reports and responses to comments on these test reports are covered in separate EPA reports (EPA 454/R-00-024, EPA 454/R-00-025 (a through h), EPA 454/R-00-026, EPA 454/R-00-027, EPA 454/R-00-028 and EPA 454/R-00-029). This document characterizes hot mix asphalt plant operations, summarizes emissions from the typical batch mix and drum mix plants, presents emission factors specifically developed for hot mix asphalt plants and presents analyses used to develop the emission factors developed and presents information needed to inventory the emissions at hot mix asphalt plants.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
	Air Pollution control	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(Report)*	21. NO. OF PAGES
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	Unclassified	

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

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Exhibit 6

Asphalt Plant Pollution

Asphalt plants mix gravel and sand with crude oil derivatives to make the asphalt used to pave roads, highways, and parking lots across the U.S. These plants release millions of pounds of chemicals to the air during production each year, including many cancer-causing toxic air pollutants such as arsenic, benzene, formaldehyde, and cadmium. Other toxic chemicals are released into the air as the asphalt is loaded into trucks and hauled from the plant site, including volatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), and very fine condensed particulates.[EPA]

- **Asphalt Fumes are Known Toxins.** The federal Environmental Protection Agency (EPA) states "Asphalt processing and asphalt roofing manufacturing facilities are major sources of hazardous air pollutants such as formaldehyde, hexane, phenol, polycyclic organic matter, and toluene. Exposure to these air toxics may cause cancer, central nervous system problems, liver damage, respiratory problems and skin irritation." [EPA]. According to one health agency, asphalt fumes contain substances known to cause cancer, can cause coughing, wheezing or shortness of breath, severe irritation of the skin, headaches, dizziness, and nausea. [NJDHSS] Animal studies show PAHs affect reproduction, cause birth defects and are harmful to the immune system. [NJDHSS] The US Department of Health and Human Services has determined that PAHs may be carcinogenic to humans. [DHHS]

- **Health Impacts & Loss of Property Value.** The Blue Ridge Environmental Defense League (BREDL), a regional environmental organization, has done two studies on the adverse impacts on property values and health for residents living near asphalt plants. A property value study documented losses of up to 56% because of the presence of a nearby asphalt plant. In another study, nearly half of the residents reported negative impacts on their health from a new asphalt plant. The door-to-door health survey found 45% of residents living within a half mile of the plant reported a deterioration of their health, which began after the plant opened. The most frequent health problems cited were high blood pressure (18% of people surveyed), sinus problems (18%), headaches (14%), and shortness of breath (9%). [BREDL]

- **Flawed Tests Underestimate Health Risks.** In addition to smokestack emissions, large amounts of harmful "fugitive emissions" are released as the asphalt is moved around in trucks and conveyor belts, and is stored in stockpiles. A small asphalt plant producing 100 thousand tons of asphalt a year may release up to 50 tons of toxic fugitive emissions into the air. [Dr. R. Nadkarni] Stagnant air and local weather patterns often increase the level of exposure to local communities. In fact, most asphalt plants are not even tested for toxic emissions. The amounts of these pollutants that are released from a facility are estimated by computers and mathematical formulas rather than by actual stack testing, estimates that experts agree do not accurately predict the amount of toxic fugitive emissions released and the risks they pose. According to Dr. Luanne Williams, a North Carolina state toxicologist, 40% of the toxins from asphalt plant smokestacks even meet air quality standards—and for the other 60% of these emissions, the state lacks sufficient data to determine safe levels.

BE SAFE: Take Precautionary Action to Protect Our Communities from Asphalt Plant Air Pollution

BE SAFE's FOUR PRINCIPLES

1. HEED EARLY WARNING SIGNS

There is documented evidence from health experts and federal and state regulators of the serious health effects of asphalt plant emissions. We must heed these early warning signs and take action to prevent communities from further exposure to cancer-causing substances released by asphalt plants. The following actions are needed:

Moratoriums on asphalt plant construction and operation in communities where people live and go to school;

Stricter testing and enforcement of air quality standards at asphalt plants; and

Improved air standards that address all toxic contaminants—including fugitive emissions.

2. PUT SAFETY FIRST

Even if an asphalt plant meets all state and federal air pollution standards, people living nearby are still exposed to cancer-causing substances that can cause long-term damage. These standards are based on the principle of "acceptable risk", and assume each state will enforce the standards, the plants will operate perfectly, and the owners can be trusted to operate on an honor system where they are expected to follow all the laws and regulations that apply to their facility without any government oversight. In the majority of cases, it is unknown whether the 'theoretical' air emissions predicted by computer models and used by plant owners accurately reflect air emissions from a plant's daily operations. We must put safety first and shut down or overhaul the current system that fails to protect communities from the daily health hazards of asphalt plant pollution.

3. EXERCISE DEMOCRACY

Federal regulations based on the "acceptable risk" model and self-regulating honor systems are inadequate to protect public health. Many states rely on inadequate federal standards that do not take into account local factors such as how close an industrial facility is to homes and schools, local weather patterns, and additional 'nuisance' factors such as the effect acrid and nauseating smells have on the quality of life in these communities.

Organizations are working to improve federal and state standards and add asphalt plant fumes to the hazardous air pollutant (HAP) list under the federal Clean Air Act. Communities can take advantage of any state laws aimed at protecting local values that allow counties to determine where new industrial facilities will be located. These communities can band together to work with their county governments to prevent new asphalt plants from being located in their neighborhoods and prevent existing plants from renewing their permits until further evaluation of public health risks are conducted.

BE SAFE is coordinated by the Center for Health, Environment & Justice. To sign the platform or for more information, contact us at CHEJ, P.O. Box 6806, Falls Church, VA 22040, 703-237-2249, or 518-732-4538, or visit **www.besafenet.com**

4. CHOOSE THE SAFEST SOLUTIONS

Communities faced with an asphalt plant proposal should push for setbacks from residences and community buildings, site specific health-based air pollution modeling and monitoring, enclosures for loading zones, and preferably a zero emissions asphalt plant, with total containment of air pollutants.

- **Investigate Pollution in Your Area.**
  To find out more about asphalt plant pollution in your area, go to **www.scorecard.org**

- **Join the Clean Air Campaign.**
  Support the campaign on asphalt plant pollution. To find out more, contact the Blue Ridge Environmental Defense League at **www.bredl.org.**

- **BE SAFE.**
  Take precautionary action to prevent asphalt plant pollution. Sign on to the BE SAFE Platform on the next page. Be counted when we deliver this national Platform to the White House in 2005. Endorse the BE SAFE Platform today at **www.besafenet.com.**

- **Your Vote Counts.**
  The next election will set the country's course on asphalt plant regulations. For information on environmental voting records, contact **www.sierraclub.org** and **www.lcv.org.** To register to vote, contact **www.earthday.net**

Clean Air Campaign Halts Asphalt Pollution & Improves Air Policies

"Nothing could have prepared us for the horrors of that plant; we cannot be outside when it operates, we are prisoners."
Jerry Starr, Macon County, NC

Blue Ridge Environmental Defense League (BREDL) has been leading a Clean Air Campaign to reduce toxic pollution from asphalt plants in North Carolina. In partnership with many community groups, BREDL defeated numerous asphalt plant proposals, spearheaded a trend of countywide moratoriums on asphalt plant construction and operation, and mounted plant permit challenges. The campaigns included radio ads, posted yard signs, newspaper display ads, and stories in local newspapers.

BREDL and the Clean Air Campaign have succeeded in reducing asphalt pollution and improving air quality policies. North Carolina and Tennessee signed an agreement to protect air quality in the Great Smoky Mountain National Park and other wilderness areas. North Carolina has improved methods to analyze fugitive toxic air emissions and expanded the Toxic Air Pollutant program to include all operating and proposed asphalt plants.

References:

US EPA Office of Air Quality Planning & Standards, AP-42, Fifth Edition, Volume I, Chapter 11: Mineral Products Industry, [EPA] **http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s01.pdf**. *Final Rule to Reduce Toxic Air Emissions From Asphalt Processing & Asphalt Roofing Manufacturing Facilities,* Environmental Protection Agency, June 2000 [EPA]. *Hazardous Substance Fact Sheet, Asphalt Fumes.* New Jersey Department of Health and Senior Services, January 2001 [NJDHSS]. Agency for Toxic Substances and Disease Registry (ATSDR). 1995. *Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs).* Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service[DHHS]. Blue Ridge Environmental Defense League Asphalt Health Survey, [BREDL]. Dr. R. Nadkarni developed mass balance equation to estimate total fugitive emissions and his comments to Virginia Dept. of Environmental Quality are at **www.bredl.org/pdf/DEQ072503.pdf.** [Dr. R. Nadkarni].

Primary Contributor: Lou Zeller, Blue Ridge Environmental Defense League.

BE SAFE Platform

In the 21st century, we envision a world in which our food, water and air are clean, and our children grow up healthy and thrive. Everyone needs a protected, safe community and workplace, and natural environment to enjoy. We can make this world vision a reality. The tools we bring to this work are prevention, safety, responsibility and democracy.

Our goal is to prevent pollution and environmental destruction before it happens. We support this precautionary approach because it is preventive medicine for our environment and health. It makes sense to:

- *Prevent pollution and make polluters, not taxpayers, pay and assume responsibility for the damage they cause;*
- *Protect our children from chemical and radioactive exposures to avoid illness and suffering;*
- *Promote use of safe, renewable, non-toxic technologies;*
- *Provide a natural environment we can all enjoy with clean air, swimmable, fishable water and stewardship for our national forests.*

We choose a "better safe than sorry" approach motivated by caution and prevention.
We endorse the common-sense approach outlined in the BE SAFE's four principles listed below.

Platform Principles

HEED EARLY WARNINGS

Government and industry have a duty to prevent harm, when there is credible evidence that harm is occurring or is likely to occur—even when the exact nature and full magnitude of harm is not yet proven.

PUT SAFETY FIRST

Industry and government have a responsibility to thoroughly study the potential for harm from a new chemical or technology before it is used—rather than assume it is harmless until proven otherwise. We need to ensure it is safe now, or we will be sorry later. Research on impacts to workers and the public needs to be confirmed by independent third parties.

EXERCISE DEMOCRACY

Precautionary decisions place the highest priority on protecting health and the environment, and help develop cleaner technologies and industries with effective safeguards and enforcement. Government and industry decisions should be based on meaningful citizen input and mutual respect (the golden rule), with the highest regard for those whose health may be affected and for our irreplaceable natural resources—not for those with financial interests. Uncompromised science should inform public policy.

CHOOSE THE SAFEST SOLUTION

Decision-making by government, industry and individuals must include an evaluation of alternatives, and the choice of the safest, technically feasible solutions. We support innovation and promotion of technologies and solutions that create a healthy environment and economy, and protect our natural resources.

Take precautionary action to prevent asphalt plant pollution.
Sign onto the BE SAFE Platform.

Be counted when we deliver this national platform to the White House in 2005.
Endorse the platform today at **www.besafenet.com**

BE SAFE is coordinated by the Center for Health, Environment & Justice. To sign the platform or for more information, contact us at CHEJ, P.O. Box 6806, Falls Church, VA 22040, 703-237-2249, or 518-732-4538, or visit **www.besafenet.com**

Exhibit 7

BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE

www.BREDL.org PO BOX 88 Glendale Springs, North Carolina 28629 BREDL@skybest.com (336) 982-2691 office (336) 977-0852 cell

ASPHALT PLANTS
CONTAMINANTS OF CONCERN:

An overview of 7 toxic substances released from asphalt processing facilities and their known effects on human health

Asphalt plants are sources of air pollution that may emit significant levels of both particulate matter and gaseous volatile organic compounds (VOCs). These pollutants are considered to be dangerous to human health. Some VOCs are also suspected carcinogens or cancer-causing agents (*Fact Sheet: Information Regarding Asphalt Concrete Plants,* number 5, November 1996, Ohio EPA, Division of Air Pollution Control Small Business Assistance Program).

No two asphalts are chemically alike. The chemical makeup of asphalt depends on the chemical content of the original crude petroleum from which it is made. Other manufacturing methods which alter the chemical makeup of asphalt include asphalt cement additives, higher operating temperatures, and the use of recycled asphalt paving cause increases in toxic emissions (Letter to Dr. Ernest Fuller, Division of Air Quality, Raleigh Regional Office, from Louis Zeller, BREDL, re: Tar Heel Paving DRAFT permit #08977R00, March 12, 2001).

The following are examples of seven pollutants typically found at various levels in emissions from asphalt plants - hydrogen sulfide, benzene, chromium, formaldehyde, polycyclic aromatic hydrocarbons (PAHS), cadmium and arsenic – and the known effects of these substances on human health:

Hydrogen sulfide (H_2S). Hydrogen sulfide is a poisonous, colorless gas that is associated with the characteristic smell of rotten eggs. Exposure tends to be a problem in communities located near certain types of industrial sites that release hydrogen sulfide. People who live near an industrial facility that emits hydrogen sulfide may be exposed to higher levels of hydrogen sulfide. Exposure to hydrogen sulfide occurs from breathing contaminated air or drinking contaminated water. Hydrogen sulfide remains in the air for about 18 hrs. after which it changes into sulfur dioxide and sulfuric acid. Hydrogen sulfide may also be released as a liquid waste from an industrial facility. It is not known whether children are more sensitive to hydrogen sulfide than adults nor is it known if hydrogen sulfide causes birth defects (*ToxFAQs for Hydrogen Sulfide*, Agency for Toxic Substances and Disease Registry, July 2006, CAS #7783-06-04.)

Exposures to high concentrations of hydrogen sulfide may result in respiratory distress, pulmonary edema, nervous system depression, neurobehavioral effects, tissue hypoxia, cardiovascular effects, unconsciousness and death. Exposure to lower concentrations of hydrogen sulfide can result in less severe neurological and respiratory effects such as incoordination, loss of smell, nasal symptoms, sore throat, cough, and dyspnea. Some evidence suggests that people with asthma may be overly sensitive to hydrogen sulfide, and impaired function has been observed in people with asthma who were exposed to low levels of hydrogen sulfide.

One community exposure study found an increased prevalence of eye irritations in residents exposed to low levels of hydrogen sulfide. Numerous case reports suggest that high exposures to respiratory arrest and pulmonary edema can occur after a brief exposure to hydrogen sulfide. Although most people recover after exposure to hydrogen sulfide many individuals report permanent or persistent neurological effects including headache, poor concentration ability and attention span, impaired short memory and motor function (*Toxicological Profile for Hydrogen Sulfide*, US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, 2006).

Benzene. Benzene, also known as benzol, is a colorless liquid with a sweet odor. Benzene is a known carcinogen or cancer-causing agent. Benzene enters the body through the lungs, gastrointestinal tract, and across the skin. Brief exposure (5-10 minutes) to very high levels of benzene in air can result in death. Lower levels of exposure can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Continuous exposure to benzene can lead to anemia and excessive bleeding, and may be harmful to the immune system by increasing the chance for infection and perhaps lowering the body's defense against cancer.

Exposure to benzene has been associated with development of a particular type of leukemia called acute myeloid leukemia (AML). The Department of Health and Human Services, the International Agency for Cancer Research and the EPA has determined that benzene causes cancer.

Exposure to benzene may be harmful to human reproductive organs. Benzene can pass from the mother's blood to a fetus, but it is not known what effects exposure to benzene might have on the developing fetus in pregnant women or on fertility in men. However, studies with pregnant animals show that breathing benzene has harmful effects on the developing fetus. These effects include low birth weight, delayed bone formation, and bone marrow damage.

Children can be affected by benzene exposure in the same ways as adults, and is not known if children are more susceptible to benzene poisoning than adults (*Public Health Statement for Benzene, Draft for Public Comment,* Agency for Toxic Substances and Disease Registry**,** September 2005, CAS#: 71-43-2).

Chromium. Chromium is a naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases. Chromium cannot be tasted and has no odor. Chromium is present in the environment in several different forms. The most common forms are chromium(0), chromium(III), and chromium(VI), also known as hexavalent chromium.

Chromium(VI) and chromium(0) are usually produced by industrial processes. Breathing high levels of chromium(VI) can cause irritation to the nose, such as runny nose, nosebleeds, and ulcers and holes in the nasal septum. Chromium(VI) at high levels can damage the nose and can cause cancer. Ingesting large amounts of chromium(VI) can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death. Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted (*ToxFAQs for Chromium*, Agency for Toxic Substances and Disease Registry**,** February 2001, CAS#: 7440-47-3).

Formaldehyde. Formaldehyde is a nearly colorless gas with a pungent, irritating odor even at very low concentrations (below 1 ppm). Formaldehyde is a potent sensitizer and a probable human carcinogen or cancer-causing agent. Formaldehyde is an eye, skin, and respiratory tract irritant; inhalation of vapors can produce narrowing of the bronchi and accumulation of fluid in the lungs.

Children may be more susceptible than adults to the respiratory effects of formaldehyde. Even fairly low concentrations of formaldehyde can produce rapid onset of nose and throat irritation, causing cough, chest pain, shortness of breath, and wheezing. Higher exposures can cause significant inflammation of the lower respiratory tract, resulting in swelling of the throat, inflammation of the windpipe and bronchi, narrowing of the bronchi, inflammation of the lungs, and accumulation of fluid in the lungs (*Medical Management Guidelines for Formaldehyde,* Agency for Toxic Substances and Disease Registry, CAS#: 50-00-0, updated 11/02/06).

Polycyclic aromatic hydrocarbons (PAHS). Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances and found in coal tar, crude oil, creosote, and roofing tar. The Department of Health and Human Services has determined that some PAHs may reasonably be expected to cause cancer. Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer.

Certain PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer) or had them applied to their skin (skin cancer). PAHs are found in air attached to dust particles, and can enter water through discharges can enter water from industrial and wastewater treatment plants where they can move through soil to contaminate groundwater. The PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live (*ToxFAQs for Polycyclic Aromatic Hydrocarbons (PAHs)*, Agency for Toxic Substances and Disease Registry, September 1996).

Cadmium. Cadmium is an element that occurs naturally in the earth's crust. Pure cadmium is a soft, silver-white metal that attaches to small particles in the air. People who live near hazardous waste sites or factories that release cadmium into the air have the potential for exposure to cadmium in air.

Breathing air with very high levels of cadmium can severely damage the lungs and may cause death. Breathing air with lower levels of cadmium over long periods of time (for years) may result kidney disease, lung damage and fragile bones. Data on human exposure to cadmium is limited, but studies show that rats that breathed in cadmium developed lung cancer, liver damage and changes in the immune system. Female rats and mice that breathed high levels of cadmium had fewer litters, babies with more birth defects than usual, reduced body weight, babies born with behavioral problems and learning disabilities.

As a conservative approach, and based on the limited human data and the studies in rats, the United States Department of Health and Human Services (DHHS) has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens. The International Agency for Research on Cancer (IARC) has determined that cadmium is carcinogenic to humans. The EPA has determined that cadmium is a probable human carcinogen by inhalation (*Public Health Statement for Cadmium*, Agency for Toxic Substances and Disease Registry, July, 1999, CAS # 1306-19-0).

Arsenic. Arsenic occurs naturally in soil and minerals and it therefore may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. Arsenic released from power plants and other combustion processes is usually attached to very small dust particles. These dust particles settle to the ground or are washed out of the air by rain. Arsenic attached to dust may stay in the air for many days and travel long distances. Ultimately, most arsenic ends up in the soil or sediment. Children may also be exposed to arsenic by eating dirt, skin contact with soil or water that contains arsenic, or through inhalation. If you breathe air that contains arsenic dust, particles of arsenic-contaminated dust may settle onto the lining of the lungs.

Inorganic arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur. Arsenic combined with carbon and hydrogen is referred to as organic arsenic. Long-term oral exposure to inorganic arsenic can results in a pattern of skin changes called "corns" or "warts" on the palms, soles, and torso that may develop into skin cancer. Swallowing arsenic has also been reported to increase the risk of cancer in the liver, bladder, kidneys, prostate, and lungs. The Department of Health and Human Services (DHHS) has determined that inorganic arsenic is known to cause cancer. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans. The EPA also has classified inorganic arsenic as a known human carcinogen.

Breathing high levels of inorganic arsenic will result in a sore throat, irritated lungs and the potential to develop lung cancer. This has been seen mostly in workers exposed to arsenic at smelters, mines, and chemical factories, but also in residents living near smelters and chemical factories. People who live near waste sites with arsenic may have an increased risk of lung cancer as well. High doses of an organic arsenic compound may result in nerve injury, stomach irritation or other effects.

All health effects observed in adults are of potential concern in children. Children may be more susceptible to health effects from inorganic arsenic than adults, and there is evidence that suggests that long-term exposure to arsenic in children may result in lower IQ scores (*Public Health Statement for Arsenic, Draft for Public Comment,* Agency for Toxic Substances and Disease Registry, September 2005, CAS#: 7440-38-2).

Exhibit 8

NEWS

Grist Creek asphalt plant declared “public nuisance”

By **KATE MAXWELL** |
PUBLISHED: November 11, 2015 at 12:00 a.m. | UPDATED: August 24, 2018 at 12:00 a.m.

The asphalt plant at the Grist Creek Aggregates site on Highway 162 received a second notice of violation from the Mendocino County Air Quality Management District (MCAQMD) on October 30, deeming the plant a “public nuisance” with addutuibak fines of $151,272 levied against Grist Creek Aggregates. This is in addition to the $22,000 fine for the original violation notice.

The nuisance requirements as part of the plant’s permit are established under both Mendocino county and California’s Health and Safety Code, which states: “no person shall discharge from any source whatsoever…air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any person.” According to MCAQMD Director Robert Scaglione, a public nuisance is defined as three verified complaints received within a 24 hour period.

Neighbors of the plant have documented ongoing activities at the plant and filed nuisance complaints with the county agency, the California Air Resources Board (CARB), and several other agencies based on concerns over emissions, noxious odors, noises, health affects, and other impacts to surrounding properties of the plant since operations began late September.

Grist Creek Aggregates was instructed to contact the MCAQMD to either pay the fines or set up an administrative hearing by Nov. 9, or face escalating fines and penalties. Despite repeated requests for comment, staff and Director Scaglione at the MCAQMD did not respond by press time, and Scaglione was out of the office during the week of November 2. CARB is also conducting an independent investigation, and CARB Public Information Officer Dave Clegern said Tuesday the final report from that should be available later this week.

The violations in the second notice include the continued operation of an unpermitted crumb rubber heating and blending unit for six days after the plant was first cited for lack of permits in the initial notice of violation issued on October 22. Regulations state that such equipment must be permitted prior to its initial operation, and was not included in the initial permit for the plant. A permit for the unit was submitted October 23, two days after the first notice, but as of November 3 had not been approved.

The heating unit, according to plant owner Brian Hurt during a plant tour taken on October 14 by TWN, is managed by Arizona company FNF, and “runs continuously” during operations to ensure the rubberized asphalt mix required by Caltrans remains hot. The plant has been providing rubberized asphalt for a Caltrans’ road paving contract being conducted north of Laytonville since it began commercial operations.

Violations also include ongoing “excess fugitive emissions” from the asphalt silo and shaker screen transfer point, in violation of air quality emissions requirements, also observed for six days after the first notice of violation. Regulations state “the permit holder shall operate the facility and all supporting activities as efficiently as possible to minimize fugitive dust emissions,” which has been an source of ongoing complaints from surrounding parcels. The modification of the asphalt batch plant without approval, which is required by the plant’s permit, is another violation listed in the notice.

The notice of violation states that civil penalties of up to $25,000 for each violation of emissions regulations, and that “each day during any portion of which a violation occurs is a separate offense.”

The previous notice hit Grist Creek Aggregates with nearly $22,000 in fines including emissions exceedances and air impacts considered “intentional/inexcusable.” These included fugitive air emissions from several points of operation, as well as idling of diesel trucks for a significantly longer period than permitted. During the tour, TWN also observed multiple trucks transporting asphalt in uncovered loads, which is required by the plant’s permit.

The permit requires a third-party source test to be conducted within 30 days of the start of commercial operations, which began at the end of September. According to Scaglione, the initial tests for emissions were conducted the week of October 22, at the end of the 30 day period, and the company had planned to return last week to conduct additional tests for volatiles. The results of the third-party testing have not yet been made public.

Mercer-Fraser involvement

In response to the first notice of violation, Eureka-based company Mercer-Fraser sent a letter to the MCAQMD formally declaring that the company “is assisting Grist Creek Aggregates, LLC in the production of asphalt at Grist Creek’s Longvale facility under their Authority to Construct permit…which is a customary and standard business practice in the construction materials industry. By this letter, Mercer-Fraser confirms its obligation to comply with the aforementioned Authority to Construct. We understand this letter will satisfy all of the District’s concerns raised in the draft Notice of Suspension, dated October 22, 2015, that was sent to Grist Creek Aggregates, LLC in error, and will dispose of the same.” Neighbor of the plant Glen Colwell was told by Caltrans’ Public Information Officer Betsy Totten that Mercer-Fraser is the contracted company for the Caltrans paving contract.

The permit for the asphalt plant is issued to Grist Creek Aggregates, LLC as the sole permit holder, and the permit states: “this permit becomes void upon any change of ownership or address or any alteration…this permit does not authorize the emissions of air contaminants in excess of those allowed” by state and county regulations.

During the tour taken by TWN, representatives of Mercer-Fraser were on-site assisting with asphalt plant production.

Community Response

At a community meeting held Nov. 7, more than 20 neighbors of the plant gathered to express concerns over ongoing operations, many of whom lived within a half mile of the plant for a decade or more. Many neighbors said they had experienced affects on their parcels during operations, which they described as “dust, smoke, unbelievable rumbling noises, tar smells,” with some experiencing “burning eyes and difficulty breathing.” Said one neighbor, “it’s nice where we are —but it was nicer before.”

Owner Hurt refused to comment on the previous notice of violation, stating “due to the amount of ongoing litigation I no longer feel comfortable talking to anyone.”

The Friends of Outlet Creek have filed a lawsuit concerning the lack of California Environmental Quality Act review of the plant design and operation prior to being allowed to establish a new asphalt plant on the site. Of particular concern is the impact of industrial operations on the sensitive habitat of threatened salmonid species and other wildlife as the plant sits adjacent to Outlet Creek, part of the Eel River ecosystem.

Kate

Maxwell

Exhibit 9

Please read this

ASPHALT PLANT POLLUTION

All asphalt plants emit toxic air pollution. A typical plant producing 300 thousand tons of asphalt per year and granted a permit to operate by the NC Division of Air Quality would be allowed to emit the following air pollution annually: (all numbers in pounds per year)

Chronic toxicants	
carbon disulfide	585
hexane	3,450
methyl ethyl ketone	11,700
toluene	14,700
xylene	8,550
Acute system toxicants	
styrene	3,240
CFC-11	168,000
Carcinogens	
benzene	118
methylene chloride	1,600
perchloroethylene	13,000

Chronic toxicants include neurotoxins and developmental toxins, substances which have a negative impact on the human nervous system and/or human growth and development.

Acute system toxicants are pollutants which cause the death of laboratory animals within 14 days of exposure or is toxic based on human experience.

Carcinogens are substances which are known to cause cancer or which are suspected to cause cancer in humans.

Definitions from the US Code of Federal Regulations (16CFR1500) for the Federal Hazardous Substances Control Act.

Some pollution sources at an asphalt plant are exempted from its state permit: 1) an Asphalt Tank Heater burning No. 2 fuel oil, 2) a liquid asphalt storage tank, and 3) fuel oil storage tanks. These units are known sources of toxic air pollution but are exempted by state statute; that is, they are not included in the air pollution permit.

Road asphalt contains gravel and sand mixed with asphalt cement obtained from crude oil. Asphalt cement is a mixture of hydrocarbons including naphtha which contribute to the vaporization of organic compounds at operating temperatures of 300-350 degrees F. Hydrocarbons released into the air by the hot mix asphalt as it is loaded into trucks and hauled from the plant site include volatile organic compounds, polycyclic aromatic hydrocarbons, and condensed particulates. Also, arsenic, benzene, formaldehyde, and cadmium are toxic air pollutants emitted from asphalt plants. Condensation of particulates occurs at ambient temperatures of 70 degrees F. These very fine particles carry polycyclic aromatic hydrocarbons which are a danger to public health. Animal studies show that PAHs affect reproduction, cause birth defects, and cause harmful effects on skin, body fluids, and the immune system. The US Department of Health and Human Services has determined that PAHs may be carcinogenic to humans. [Source: Agency for Toxic Substances and Disease Registry (ATSDR). 1995. *Toxicological Profile for polycyclic aromatic hydrocarbons (PAHs)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service]

The effect of fugitive emissions on local pollution levels may exceed the effects of pollutants emitted from the smokestack.

In addition to smokestack emissions asphalt plants emit large quantities of harmful fugitive emissions at ground level. A small asphalt plant producing 100 thousand tons of asphalt a year may generate 50 tons of toxic fugitive emissions. The bulk of fugitive emissions are condensed particulates. Volatile organic compounds (VOC's) emissions are about 29% of the this total. To this must be added the total emitted from the smokestack itself. Stagnant air conditions and inversions increase the level of exposure to the local community.

The Blue Ridge Environmental Defense League has released two studies showing the adverse impacts on property values and public health for residents living near operating asphalt plants. A property value study documented losses of up to 56% as a direct result of an asphalt plant. In another study nearly half of the residents report negative impacts on their health after only two years of asphalt plant operations. The door-to-door survey shows that 45% of the residents living within a half mile of a two year old asphalt plant report a deterioration of their health which began after the plant opened. The most frequent problems include high blood pressure (18% of people surveyed), sinus problems (18%), headaches (14%), and shortness of breath (9%).

Action recommendations

Federal regulation of asphalt plant emissions is inadequate to protect public health. EPA's emission estimates are inadequate to protect worker health and public health. Therefore, citizens must join together to protect their communities. Any county or town faced with an asphalt plant proposal should push for setbacks from residences and community buildings, site specific health-based air pollution modeling and monitoring, enclosures for load-out zones, and preferably a zero emissions asphalt plant, with total containment of air pollutants.

Exhibit 10

Fact Sheet

Hot Mix Asphalt Emissions

What is in Asphalt?

Asphalt is used for paving roads, parking lots and for roofing. It consists of gravel, sand or stone that is bound together by cement made from crude oil. Petroleum hydrocarbons in the crude oil form a gas that condenses into fine particles as it cools, creating a vapor. This fact sheet will answer some general questions about asphalt fumes.

What chemicals are in asphalt fumes?

Asphalt is a mixture containing thousands of different chemicals. The chemicals in asphalt vary depending on the source of the crude oil, the type of asphalt being made, and the process used. In general, the fumes are a mixture of several different types of chemicals including:

- carbon monoxide
- nitrogen oxides
- sulfur
- volatile organic compounds
- polycyclic aromatic hydrocarbons

Many of these chemicals also are emitted by other combustion sources such as cars and trucks, fireplaces and wood stoves, wildfires and industrial activity. All of these chemicals are often found in outdoor air at low levels; however, elevated levels of these chemicals may be found near an operating asphalt plant.

Does living near an asphalt plant pose a health hazard?

In Oregon, an asphalt plant must meet emission criteria to receive an operating permit from DEQ. If the criteria are met, emissions are not expected to pose a public health hazard. Asphalt plant emissions may lead to odors in the community, but the potential for adverse health effects is expected to be low.

Can odors from the plant cause adverse health effects?

If you smell odors from an asphalt plant, they are not necessarily at levels that would cause adverse health effects. Many of the highly odorous chemicals in asphalt fumes can be smelled at levels below those expected to cause adverse health effects; however, persistent odors may cause symptoms in some people.

What are the health effects of asphalt fume exposure?

The health effects that can be caused by exposure to asphalt fumes depend upon:

- how much has entered your body
- how long you are exposed to asphalt fumes
- how your body responds to asphalt fumes

Fumes created from heating asphalt can be inhaled into the lungs or can condense onto exposed areas of the skin.

People who work in asphalt plants have the greatest exposure to asphalt fumes. Symptoms reported by workers include irritation of the upper respiratory tract, headache, fatigue, wheezing and shortness of breath dizziness, and nausea.

Residents living near an asphalt plant also would be more likely to breathe low levels of asphalt fumes for a long period of time. In this setting, exposure to asphalt fumes would depend on the plant emissions and the prevailing winds. Based on sampling conducted near asphalt plants in several states, residents could experience irritation from the odors from asphalt production, but the potential for adverse health effects is expected to be very low. Children may be more sensitive than adults to certain chemicals. No studies have linked residential exposure to asphalt fumes with the development of cancer.

Where can I get more information?

Helpful websites are listed on the back of this page.

How do I report a problem?

Report an environmental problem at:
www.deq.state.or.us/complaints/dcomplaint.aspx

Alternative formats

Alternative formats of this document can be made available. Contact DEQ's Office of Communications and Outreach in Portland at (503) 229-5696.

Information provided by the Illinois Department of Public Health.

State of Oregon
Department of Environmental Quality

Air Quality Division
Western Region

750 Front St. NE Suite 120
Salem, OR 97301
Phone: (503) 378-5408
(800) 452-4011
Fax: (503) 378-4196

Contact DEQ offices:

Portland: 503-229-5582

Salem: 503-378-5305

Coos Bay: 541-269-2721

Medford: 541-776-6010

Bend: 541-633-2012

Pendleton: 541-276-4036

Last Updated: 05/2013
By: Kathy Amidon

Additional Websites for Asphalt Information

The Oregon Health Authority has compiled information odors and possible health effects.
http://public.health.oregon.gov/HealthyEnvironments/EnvironmentalExposures/ToxicSubstances/Documents/Odors%20and%20Your%20Health.pdf

Dr. Laura Green, a toxicologist and Senior Scientist and President of Cambridge Environmental, has compiled a summary of possible health effects and frequently asked questions about asphalt plants:
www.siteb.it/download/dossierbitumi/db12.pdf

The Center for Disease Control and Prevention's hazard review *Health Effects of Occupational Exposures to Asphalt:*
www.cdc.gov/niosh/docs/2001-110/#3

U.S. Environmental Protection Agency's *Hot Mix Asphalt Plants Emission Assessment Report*:
www.epa.gov/ttn/chief/ap42/ch11/related/ea-report.pdf

EPA's determination that asphalt concrete manufacturing facilities were not major sources of hazardous air pollution, 2002:
www.epa.gov/ttn/atw/socatlst/fr12fe02.pdf

Asphalt Plant Health Assessment in Nebraska, 1995 – Prepared by the U.S. Department of Health and Human Services, the Agency for Toxic Substance and Disease Registry, EPA and Nebraska DEQ:
www.atsdr.cdc.gov/HAC/pha/omni/omni_pl.html

Asphalt Health Assessment in Arizona, 2002 – An assessment conducted 300-500 yards from residential properties:
www.atsdr.cdc.gov/HAC/pha/brimhallsand/bsg_pl.html

Asphalt Health Assessment in Utah, 2005 – An assessment of residential exposure to volatile organic compounds, polycyclic aromatic hydrocarbons, and airborne particulate matter to determine if these pollutants are present at levels of public health concern:
www.atsdr.cdc.gov/HAC/pha/ValleyAsphaltProductionSite120805/ValleyAsphaltHC120805.pdf

Final environmental impact report for Dutra Haystack Landing Asphalt & Recycling Facility
www.sonoma-county.org/prmd/docs/eir/dutrafeir/index.htm

Exhibit 11

NEIGHBORS FOR ENVIRONMENTAL JUSTICE (HTTPS://N4EJ.ORG/)

Odor Nuisance

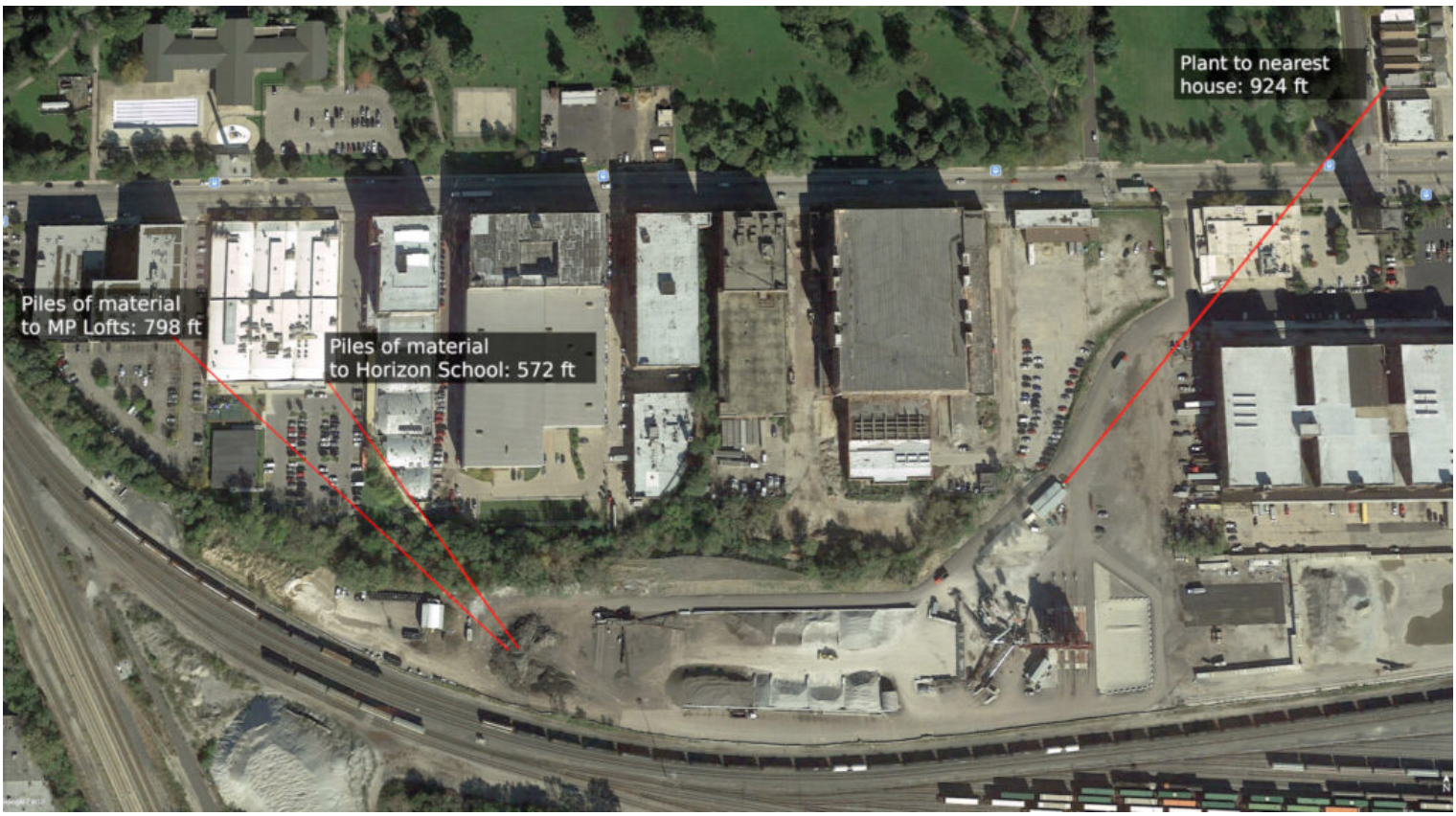
CONTACT YOUR ELECTED OFFICIALS! (HTTPS://N4EJ.ORG/RESEARCH/ELECTED-OFFICIALS/)

MAT Asphalt's permit expired on July 2nd. The IEPA has decided to allow them to keep operating (https://n4ej.org/2019/07/25/neighbors-furious-as-illinois-epa-ignores-permit-regulations/) while they apply for a **10 YEAR PERMIT.** (It was originally a 5 year permit application, but the IEPA decided to allow them to change it to a 10 year application – again, without offering formal notice to the community).

Several public officials have already committed to opposing the permit (https://www.facebook.com/n4ejchicago/photos/a.2130111153683326/2683205895040513/?type=3&__xts__%5B0%5D=68.ARBFEolJsudJWG-Nfi99ASnmOe2ClgSvNz5voiiUpVsvutczocVdYPLxDKKEAdxvmutIgrK_wOdFQoe_w8gOu

kGrw4qXyQHeKPsGpVuS8mqXg6Cxm3krGj10GvAwPDwafhfHwc5Vr_aN5T_CUJYI7ileU mBrHkak07iF8p0cPCfCgwH3ocJNFvjgs8j_9p_FU0LuumVI_slvyF8r0hN2y1JHOie8gdiv_ Q0TFp5_bFWPk2EfKZ5MRywuj6rv4j5Cn508dmQ6GjJMcr-5vNs1jG6PzCXDaOuqYgMiTWbhtOALXbGdv5G2EdCUzNX1rfM-H9jktcclu1MxqXcqOaqlDEbmS3s_&__tn__=-R), including State Sen. Tony Munoz and State Rep. Theresa Mah. Over 2,000 people have signed a petition demanding that the MAT Asphalt Plant be shut down and relocated. Join us!

SIGN THE PETITION (HTTPS://WWW.CHANGE.ORG/P/ALDERMAN-GEORGE-CARDENAS-NO-TO-TOXIC-FUMES-IN-MCKINLEY-PARK-SHUT-DOWN-THE-NEW-ASPHALT-PLANT-AT-DAMEN-PERSHING)



HOW TO REPORT ODOR NUISANCE

In the case of MAT Asphalt, their permit requires them to not create an odor nuisance. Reporting odor nuisances is a critical part of holding them accountable to their permit.

Make complaints as soon as possible after detecting an odor and provide information

in as much detail.

Click here to report an odor nuisance online with the Illinois EPA (https://www2.illinois.gov/epa/pollution-complaint/Pages/submit-a-complaint.aspx)

Click here to report an odor nuisance online with the US EP (https://echo.epa.gov/report-environmental-violations)

You can also call:

(217) 557-6474 (tel:(217)%20557-6474) to reach the Illinois EPA to file an Air Complaint with Evan Yates.

(312) 886-5870 (tel:(312)%20886-5870) to reach the federal EPA to file an Air Complaint with Anna Wagner.

In addition to the date and time of the observation, please consider:

1. Describe important characteristics:

- Frequency – how often is the odor detected (continuously, daily, hourly, once a week)?
- Intensity – how strong is the odor (very weak to very strong)?
- Duration – how long does the odor last (seconds, minutes, hours)?
- Offensiveness – how pleasant or unpleasant is the odor (pleasant to highly offensive)?
- Location – where was the odor noticed (business, residence, indoors, outdoors)?

2. Describe the odor in as much detail as possible. Does it remind you of a familiar smell such as oil, burned-diesel, asphalt, chemicals, other?
3. Weather during odor episode:

- What direction was the wind from?
- Was the wind light, moderate, or strong?
- Was it sunny, overcast or raining?

4. How does the odor affect you and your family or your business?

Exhibit 12

December 23, 2020

Ongoing Air Quality Investigations Address Reported Odors from Irvine Asphalt Plant

By: **City News Writer**

All American Asphalt/Facebook

An ongoing investigation by the South Coast Air Quality Management District (SCAQMD) is seeking to identify the source, and content, of emissions from an Irvine asphalt plant that has been in operation since 1993.

All American Asphalt (AAA) is located in north Irvine, approximately a mile from residential communities and schools. According to a petition from Irvine residents, a "nauseating smell" and "visible irritants" have led to concern over whether AAA's asphalt production emissions may be harmful to the local population.

AAA has amassed hundreds of formal complaints from residents who live in the surrounding area. According to SCAQMD Senior Enforcement Manager Victor Yip, the agency has received a total of 834 complaints from residents regarding emissions from All American Asphalt since Feb. 20 of last year. Over 700 of these complaints were received beginning September 2019, according to the SCAQMD webpage.

"Last year, in September 2019, we started receiving an increase in complaints from the community regarding odors from the All American Asphalt plant," Yip said at a virtual community meeting on Dec. 9 to address the status of the investigation. "We worked to respond to all complaints and we initiated an investigation into the facility."

Since launching the investigation, the SCAQMD, which has primary jurisdiction over the regulation and enforcement of AAA's emissions, has investigated on-site operations at the facility as well as directed community monitoring initiatives.

"Through our enforcement efforts, we conducted over 75 odor surveillances in the community, [and] over 30 on-site visits including full compliance inspections of the facility in October 2019 and October 2020," Yip said.

"As a result of our efforts, we issued All American Asphalt five notices of violations for public nuisance and one violation for rule and permit-related issues observed during our inspection," Yip said. "In response to our enforcement efforts, All American Asphalt has taken some steps to try to mitigate the potential for odors from their facility."

After receiving these notices of violations, AAA consulted an environmental specialist, repaired equipment within the facility and reevaluated the tarping and rerouting of its vehicles, according to SCAQMD's Legal Department Assistant Chief Deputy Counsel Nicholas Sanchez.

"We believe that had a significant reduction in odors reaching the community," Sanchez said at the community meeting. "We believe that was reflected in the next notice of violation not being issued until May 2020, and then most recently another one in October 2020."

However, the City of Irvine continues to urge the SCAQMD to take further action to address ongoing public complaints. A letter from the Irvine City Council to the SCAQMD Board of Directors on Nov. 17 calls AAA a "growing public nuisance and a source of potentially harmful emissions in the community."

"Although [SCAQMD] has issued a number of notices of violation in the last year related to odor issues and unpermitted operations, little has been done to resolve the underlying problem as community concern has grown," the letter said.

It went on to request that community air monitoring facilities be established in Irvine by the SCAQMD in order to assess potential health hazards.

In response, the SCAQMD issued a research permit to AAA on Nov. 20 and then reissued it on Dec. 3, according to SCAQMD Deputy Executive Officer of Engineering and Permitting Amir Dejbakhsh. The research permit allows AAA to install a carbon absorption system to mitigate emissions from crumb rubber blending and replace parts of the facility's petroleum asphalt heater.

"The research permit will allow us to evaluate the effectiveness of the carbon system in reducing odors and, at the same time, because of the extensive source testing and monitoring requirements that we have imposed, we will be able to accurately determine the emissions from this operation," Dejbakhsh said.

In addition to this research permit, SCAQMD initiated the process of collecting air samples from areas surrounding AAA on Dec. 2 in order to evaluate the content and potential impact of its emissions.

"South Coast AQMD is analyzing its first samples collected from air sampling at Northwood High School and Canyon View Elementary School, near the All American Asphalt facility," SCAQMD Senior Public Information Specialist Bradley J. Whitaker said in a written statement to the New University. "Results will be posted on South Coast AQMD's All American Asphalt Community Investigation webpage as soon as they are available."

SCAQMD Assistant Deputy Executive Officer of Science & Technology Advancement Dr. Jason Low explained that the agency has been working with the Irvine Unified School District to install one air sampling monitor at each of these school campuses, and plans to collect and evaluate the samples in the next few months.

"We initially will collect 8-10 sampling events over a two month period and evaluate next steps from the data," Low said during the December community meeting.

A map displayed at the public meeting shows that both schools are approximately a mile away from the asphalt facility. While no public data confirming the composition of AAA's emissions has been released by SCAQMD at this time, one of the residents' main concerns is the safety of their children.

"Compliance does not really equate to protecting public health and safety," Kim Konte, founder of the Non-Toxic Neighborhoods organization, said in a public comment at the community meeting. "As parents and residents of Irvine who have children ... our focus is making sure the air that our children are breathing is safe."

Konte explained that Non-Toxic Neighborhoods partners with UC Irvine faculty to independently collect and evaluate samples from Irvine residents. She cited that the air sampling monitors used in this preliminary research showed increased levels of volatile organic compounds (VOCs).

"We saw a huge spike in VOCs over the Thanksgiving holiday, which was concerning," Konte said. "And I think the biggest concern is that we know now from the baseline data ... that the peaks in VOCs are happening when our children are at school."

Residents and the Irvine City Council agree that they would like more direct enforcement from the SCAQMD. According to the City of Irvine's letter, "We believe that our residents deserve a more transparent and proactive approach from the agency charged with safeguarding their health."

The South Coast AQMD has expressed a willingness to potentially collaborate with other agencies to interpret the results of its air samples.

"Although South Coast AQMD is conducting its own independent investigation, we are open to working with other entities," Whitaker said to the New University. "In the past, South Coast AQMD has reached out to other health agencies to assist with data interpretation and are open to doing so in this case."

Results from the agency's air monitoring are expected to be released to the public by February 2021.

Ariana Keshishian is a City News Intern for the 2020 fall quarter. She can be reached at ankeshis@uci.edu.

Related

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Exhibit 13

Asphalt Fumes

Over a half-million workers are exposed to fumes from asphalt, a petroleum product used extensively in road paving, roofing, siding, and concrete work. When hot asphalt is applied in a molten state, it generates toxic fumes. Workers exposed to asphalt fumes are at risk of developing headaches, rashes, cough, and possibly cancer. There is no OSHA standard for asphalt fumes. OSHA is developing an action plan to reduce worker exposures to this hazard but is not initiating rulemaking at this time.

Hazard Description

NIOSH estimated that over 500,000 workers were potentially exposed to asphalt fumes (1). OSHA estimated in 1992 that over 300,000 construction workers were exposed primarily in road-paving and roofing operations (2). Exposures vary considerably between different types of asphalt work (i.e. roofing vs. paving) and the different worker jobs (i.e. kettle operator vs. paver operator.) More research needs to be performed to determine and control important factors which cause increased worker exposures (i.e. application temperatures, type of equipment used, environmental conditions, workplace practices, and asphalt constituents.)

The acute effects of exposure to asphalt fumes include headache, skin rash, fatigue, reduced appetite, throat and eye irritation, and cough. Asphalt paving workers, for example, have reported breathing problems, asthma, bronchitis, and skin irritation (6). A recent study has shown that some of these effects occur at exposures of 0.5 to 1.3 mg/m3 (3).

Human studies have reported lung, stomach, and skin cancers following chronic exposures to asphalt fumes. However, these studies have been inconclusive, and the possible chronic effects to workers following exposures to asphalt fumes are areas of continuing investigations. One recent summary analysis of the available human studies found a nearly twofold increase in risk of lung and stomach cancer among roofers. Increased risks were also noted for other asphalt workers for lung, stomach, and bladder cancer, and for leukemia (4).

Laboratory studies have shown chemical extracts of asphalt fumes to have cancer-causing and mutagenic properties. For example, painting of asphalt extracts on mouse skin produces tumors that increase with dose (7). Other laboratory studies show DNA changes in mouse lung and skin cells (8) and in human fetal cells exposed to asphalt fume extracts (9). Urinalysis of exposed workers shows mutations in laboratory tests (10).

Current Status

OSHA does not have a standard for asphalt fumes although it proposed a 5 mg/m3 permissible exposure limit (PEL) in 1992 (5). OSHA's quantitative risk assessment estimated a significant risk of lung cancer among exposed workers at levels as low as 0.2 mg/m3.

The American Conference of Governmental Industrial Hygienists (ACGIH) currently recommends a Threshold Limit Value (TLV) of 5 mg/m3 as an 8-hour time weighted average. In 1977, the National Institute for Occupational Safety and Health (NIOSH) recommended a 5 mg/m3 15 minute short-term exposure limit. NIOSH is developing a new Criteria Document for asphalt fumes and expects to make new recommendations for exposure limits within six months.

The International Agency for Research on Cancer (IARC) found:

- "There is sufficient evidence for the carcinogenicity of extracts of steam-refined bitumens, air-refined bitumens and pooled mixtures of steam- and air-refined bitumens in experimental animals."
- There is limited evidence for the carcinogenicity of undiluted steam-refined bitumens and for cracking-residue bitumens in experimental animals.
- There is inadequate evidence for the carcinogenicity of undiluted air-refined bitumens in experimental animals.
- There is inadequate evidence that bitumens alone are carcinogenic to humans."

Rationale

Asphalt fume exposure meets several of the criteria for designation as an OSHA priority. In particular, the known and potential health effects are serious and a large number of workers are potentially exposed, especially considering high industry turnover rates. although the human studies of workplace cancer have limitations, there is considerable experimental evidence of cancer risk. There is also evidence of acute health effects among workers exposed to asphalt fumes.

References

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Exhibit 14

Noise From Asphalt Plant Forces City to Take Action

By admin November 4, 2014 8:00 am

One of the reasons many small towns across America protest the opening of asphalt and concrete plants is the noise. Noise levels, depending on the plant, can not only break the existing rules and regulations but cause a nuisance to quiet neighborhoods. While most plants have to get city, and community, approval before building, it can be hard to tell what the noise impact will be until the plant is up and running at a full capacity.

Recently, a West Michigan town fought against an asphalt plant making too much noise during production. In this case, several homeowners banded together to get the city to take up arms against the asphalt plant. For some of these homeowners, the plant is less than 100 feet from their front doors. For others, even further away, the noise was becoming unbearable and disruptive. While the asphalt plant is able to run at full steam from 7 AM to 9 PM each day, according to city ordinances, home owners in the small town felt the noise was still above what city ordinances felt was appropriate, especially after those hours.

The asphalt plant agreed to cut down production and only operate at full capacity during the regulated hours, cutting down on the noise and keeping their neighbors happy. Since the plant opened, it has been working around the clock, with the noise ramping up and getting worse over the years, which the city ignored. Now that the city is involved in enforcing the laws in place, the community is hopeful the asphalt plant lives up to its promise to operate properly.

However, some residents are convinced that the place will be right back to it after a few weeks, causing more noise and disturbance for the community. For some residents, one who's been there for 30 years, even the day-to-day noise is too much and unfortunately, under city codes and regulations, the asphalt plant can operate at its noise level during regular hours

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NEXT
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7279 E 96th Ave Unit F, Henderson Co, 80640

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Mon – Fri: 8AM – 6PM | Sat 8AM – 12PM

Sitemap XML

Exhibit 15

Citizen Times

MADISON

Can you hear an asphalt plant from a mile away?

Paul Moon The Citizen-Times

Published 4:39 p.m. ET May 3, 2019 | **Updated 2:22 p.m. ET May 4, 2019**

A sales engineer for an asphalt plant manufacturer and a couple living “one mile as the crow flies” from a facility operating in Weaverville have different stories to tell about the sounds of asphalt.

Carlos Cardenas has helped set up asphalt systems across the globe in his work with Asphalt Drum Manufacturers, makers of the plant that Madison Asphalt LLC is looking to operate inside the McCrary Stone Service quarry along U.S. 25-70 in Marshall. Cardenas said in testimony before the Madison County Board of Adjustments April 24 that “Most plants I’ve been to, I have to see them before I hear them.”

Jeff Boyea tells a different story. Though he can’t see the Goldview Road facility that sits a mile east from the 11-acre tract his family has called home since the 70’s, he can hear the plant when it’s operating.

“It sounds like you got a jet engine right next to your window,” he said of the Harrison-APAC facility operating on the opposite side of the French Broad River from his Alexander Road address. Sitting with his wife Kathy during an interview about the plant inside his home, Jeff said “It’s bothered us over the last 20 to 30 years.”

ASPHALT PLANT COVERAGE:

Asphalt hearing underway in Madison County
Ground rules for asphalt plant hearing put in place.
Permit application paves the way for asphalt plant debate.
Citizen engagement on asphalt plant issue shaping county policy.
Marshall town board passes resolution opposed to asphalt plant.
Crowd fills Madison County commissioners meeting to talk asphalt plant.
Opposition to potential asphalt plant organizing in Madison County.

Residents organizing for, against possible asphalt plant.

Detrimental and injurious?

The sounds of an asphalt plant — and the impact any noise could have on neighbors — may play a role in whether the Reed family, owners of Madison Asphalt LLC, secures the permitting needed to operate an asphalt production and recycling facility just outside Marshall town limits.

In order to grant the conditional use permit needed for the proposed site, the Madison County Board of Adjustments — the appointed board tasked with land use matters — must determine that the site "will not adversely affect the health or safety" of individuals living and working in the neighborhood, "will not be detrimental to the public welfare," and will not be "injurious to property or public improvements in the neighborhood," according to the county's land use ordinance.

To Cardenas, the sounds from an asphalt plant should not be an issue for neighbors. Inside the Madison County Courthouse April 24, Cardenas shared testing data that said the plant's burner and blower — the loudest pieces of equipment — test around 98 decibels at 3 meters, or about the equivalent of a jet takeoff at 300 meters. Over flat ground at the distance of 800 feet, the plant would generate about 54-56 decibels, Cardenas said, quoting from sound studies on asphalt plans over flat ground. He compared that noise level to that of "an outdoor AC unit."

Boyea, however, tells of multiple times over years when operations at a Weaverville asphalt plant have woken him up as early as 2 a.m. "Sometimes it just gets you pissed off, and it's 'OK, I'm going to call the sheriff's department.'"

"If it's one day every couple of weeks, you kind of say, 'The heck with it.' But if it's day after day after day, you kind of get torqued off."

Boyea said that though he "doesn't get any smells, and you don't see any smoke," he considers the sounds from the plant — and trucks carrying asphalt and gravel that use engine breaking — as enough to cause harm.

"It's nerve-wracking," he said. "If you're trying to get eight hours of sleep and you don't, it messes up your rhythms and all that kind of stuff. It's more of a latent health problem. You know, how many times can you do that? You start having problems."

Conditional permit not just a ‘yes’ or ‘no’ decision

Boyea said he’s “got nothing against asphalt” and was quick to acknowledge how the paving and widening of Alexander Road decades ago helped his food distribution business. Told that the Madison County Board of Adjustments could institute conditions guiding operations of a potential asphalt plant, Boyea said that if the site did not take steps to contain sound, it should not be able to operate all the time.

“If there’s going to be a noise problem, I’d definitely put conditions on the noise and the days,” he said. “I don’t give a darn if they’re going to fire up the plant at 2 a.m. so long as I can’t hear it — that can be controlled by them. It can be contained, it can be controlled.”

Over the years, Boyea has made multiple complaints about the noise from the asphalt plant to both the Buncombe County Sheriff’s Office and to county commissioners. He’s also tried unsuccessfully to get in touch with the owners of the Goldview Road plant to express his concerns about the early morning noise.

“There’s no response,” he said with frustration. “You get no response.”

That experience has Boyea stressing the importance of oversight.

“They definitely need someone that oversees it and enforces it,” Boyea said. “We have all these laws here which have no teeth because there is no enforcement.”

Noise is just one issue shaping the ongoing hearing, with testimony on the environmental impact of asphalt plants also front and center on the hearing’s first two nights April 22 and 24. The effect a facility could have on the value of nearby properties is likely to dominate discussion as the hearing picks back up May 6 at 6 p.m. inside the Madison County Courthouse.

Coverage of the asphalt plant permit hearing will appear in the May 15 edition of the News-Record & Sentinel and online, at newsrecordandsentinel.com.

Exhibit 16

Processing Equipment Explodes at Michigan Asphalt Plant

TAGS: NEWS

May 28, 2020

Firefighters were called to a report of a “loud explosion” at the Reith-Riley Construction asphalt plant in Ludington, MI on Tuesday morning, according to fire officials and local news reports.

Some people heard or felt the explosion from miles away from the plant, coverage by the *Mason County Press* said. Crews responded to the incident at about 5:30 a.m.

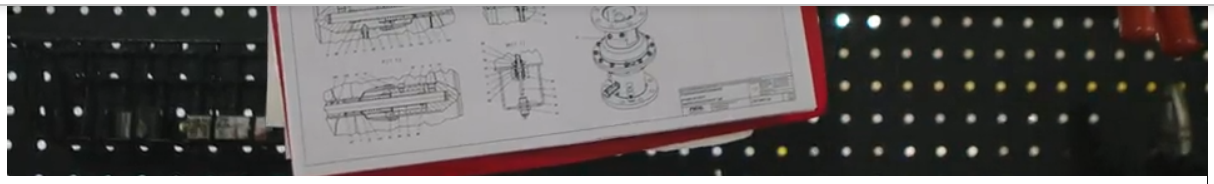
“Upon arrival crews found nothing, and began searching,” Pare Marquette Township Fire Department said in a Facebook post. “Cause was a gas leak, personnel checked the area and found no further issues.”

A fire official told the *Ludington Daily News* that processing machinery was involved in the blast.

“The leak caused an explosion in the company’s processing equipment and caused a decent amount of damage to their asphalt machine,” Pare Marquette Fire Chief Larry Gaylord said in the newspaper.

No injuries were logged during the incident.

Reith-Riley is a supplier of asphalt, aggregate and recycled materials and a provider of asphalt paving, concrete construction and paving, and site preparation and excavation services.



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Fire Ignites in Magnesium Plant in Illinois

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Chemical Plant Fire Creates Hazardous Smoke Cloud

TAGS: FACILITIES INDUSTRIAL FIRES & EXPLOSIONS SAFETY & COMPLIANCE

alarm-3410065_1920.jpg

Image courtesy of Pixabay

Industrial Park in Chatham, VA, creating a “chemical smoke cloud” that forced residents near the site to shelter in place and evacuations at a high school.

“A fire at Tightsqueeze Industrial Park is causing a chemical smoke cloud in the area. Please avoid breathing in the smoke and seek shelter immediately if you live nearby Tightsqueeze Industrial Road,” Pittsylvania County Public Safety said in a post on its Facebook page.

At 2 p.m., the agency posted that students at Chatham High School were transported to another school for pick up. Officials said 90% of the fire was contained by 3:15 p.m.

Part of a local roadway was closed during the response, per coverage by *The Chatham Star-Tribune*.

Sartomer’s parent company, Arkema, issued a statement to a local Fox News affiliate that said the incident involved an overheated acrylic product.

“The product was stored inside of a building in drums, when the contents of one of the drums overheated, which caused a polymerization reaction. Essentially, that means the small building blocks formed into long chain-like molecules known as polymers. This reaction has given off heat, which caused overheating and polymerization in some of the adjacent drums,” Arkema said to WFXR.

Fire crews are working with the company to keep the products at a lower temperature to prevent additional polymerization, according to the statement.

Pittsylvania County Public Safety Director Chris Stemp told WFXR that the chemical in the smoke cloud can be a "respiratory irritant if you get it in concentration."

Sartomer manufactures specialty acrylates, methacrylates monomers, and oligomers for use in a

Solids Digital Conference

in March

MAR 30, 2021

Several Hurt in HAZMAT Incident at 3V Sigma USA Chemical Plant

MAR 29, 2021

Celanese to Increase Compounding Capacity at 3 Plants

MAR 25, 2021

Next Article

Exhibit 17

THE EXPLOSIVE DANGER OF THE ASPHALT FUMES – A REMINDER AFTER THE ASPHALT TANK EXPLOSION AT LA CROSSE, WISCONSIN

THE EXPLOSIVE DANGER OF THE ASPHALT FUMES – A REMINDER AFTER THE ASPHALT TANK EXPLOSION AT LA CROSSE, WISCONSIN

Over a half-million workers are exposed to fumes from asphalt, a petroleum product used extensively in road paving, roofing, siding, and concrete work. Health effects from exposure to asphalt fumes include headache, skin rash, sensitization, fatigue, reduced appetite, throat and eye irritation, cough, and skin cancer.

We would like to remind you of some of the safety practices that need to be followed when storing, handling, heating, and spraying liquid asphalt products. First, it must be recognized that all asphalt products, when heated enough, are flammable. That means that if you heat any asphalt hot enough, whether it is a cut back, an asphalt cement, or an emulsion, hazardous vapors will be produced.

When these vapors are mixed in proper proportion with oxygen in the air, and come in contact with a source of ignition, a flash fire can occur. The flash may be quite violent, and if enough vapors are present a raging fire may develop. These types of fire can and have burned people very badly, and have killed some.

Many of the asphalt products we use every day are used at temperatures above their flash points. The flash point is the product temperature where a source of ignition will cause the vapors produced to catch on fire. RC and MC cut back asphalts are commonly used at temperatures above their flash points, where flammable vapors are produced. The flash points of asphalt cements may be above the temperatures at which they are used, but they are not far away. You may be using an asphalt cement (AC) at a temperature which is only 20 to 25°F below its flash point. If that AC is overheated in a small area, flammable vapors may be produced. If the water is boiled off of a bit of emulsion, the remains may be asphalt cement or there may be solvents in the asphalt which can produce flammable vapors. In either case the remains are dangerous if overheated. You may overheat a small amount of emulsion, boil off the water, overheat the remaining asphalt, and be producing flammable vapors without even realizing it. If the vapors mix with oxygen and reach a source of ignition, a fire will develop.

The flammable nature of asphalt vapors, and the quick, violent fires which can develop lead us to re[ⓘ]nmend the following safety precautions.

If any flammable vapors are present, the vapors must escape from the tank through the vent pipe. Typically the vent pipe exits at the bottom of the asphalt tank. Positioning the tank broadside to the wind will allow the wind to disperse the vapors safely away from the burners and other sources of ignition on the truck. If the tank is parked facing into the wind or with its back to the wind, the wind may carry vapors to the burners at the rear, or to other sources of combustion near the engine. If you heat the asphalt tank in a confined area flammable vapors can collect in combustible concentrations.

Always be sure that the heating flues are covered by at least six inches of asphalt before lighting the burners

If the heating flues are not sufficiently covered, the asphalt near the flues will be overheated. Flammable vapors will be produced. ACs will be heated above their flash points. Emulsions will be broken and heated above the flash point of their base asphalt. The flue pipe may be heated hot enough to provide a source of ignition. When this happens, an explosion can occur, which may rupture the tank or blow the man hole cover off. Before lighting the burners it is very important to be sure that the flues are covered over their entire length. Many asphalt tanks are built with a slope or pitch for better drainage. If the tank is parked on a grade, one end or one side of the tank may be higher than the other. You must be sure that the highest point on the flue is covered according to the equipment manufacturer's recommendation.

Never, under any circumstances light the burners without the flues covered to the depth recommended! If the tank is partially loaded you may need to add more asphalt before heating.

Never spray asphalt while the burners are running

If you spray asphalt with the burners running, you may uncover the flue causing a fire inside the tank. Running the burners while spraying will provide a source of ignition for vapors produced while spraying, causing a fire outside the tank. Be sure the burners are completely out before spraying.

LPG burners will support a flame for several minutes after the valves are shut off.

Keep all sources of ignition away from manholes and tank vents

When you open the manhole flammable vapors may escape. There may be flammable vapors in the tank which are too concentrated to burn. When you open the manhole fresh air or oxygen is introduced. The cigarette in your hand becomes a source of ignition and you may be additional fuel. Flammable vapors are intended to escape out of the tank vent. Keep hand torches, cigarettes, engine exhaust, and other sources of ignition away from these vapors.


2234
SAINT PAUL
Pro Patch
2483

Keeping the vent pipe clear and open will allow the vapors to escape and will keep them from building pressure inside the tank.

Do not operate or weld on a tank which is leaking

A leaking tank must be repaired before continuing use. The repair should be performed by an experienced tank repair shop. An “empty” tank may contain flammable vapors or residual asphalt. You would never consider welding on a gasoline tank. You should never consider welding an asphalt tank either. A tank repair shop will have sensors which can determine if there are flammable vapors present and if the tank is safe to weld.

The hazards identified are very real and very dangerous. Do not take these hazards lightly, as you will see from a small sampling of the asphalt tank explosions or fires that have happened over the years.

Accident: 201345337 - Two Employees Are Injured In Asphalt Tank Explosion

At approximately 7:45 a.m. on May 12, 2010, Employee #1, the senior maintenance member of a two-man crew, and Employee #2 were working from an elevated work platform. The platform was mounted on the back of a trailer, which was mounted to an asphalt tank. The employees had begun bypassing the normal asphalt storage tank to prepare for its five-year to seven-year cleaning. They placed a bypass valve in position to route the asphalt from the permanent tank to the temporary, trailer-mounted tank. Most of the asphalt piping was heated with a steam jacket encircling the pipes.

However, the piping that ran from the bypass valve to the temporary tank was encircled with tubing that was heated by steam. The employees complained that the steam tubing, also referred to as steam tracing, was not wrapped tight enough, thereby preventing the pipe from getting hot enough to turn the hardened asphalt back to its liquid (melted) state. The employees then attempted to repair the clogged pipe. As was reported to be the normal practice, Employees #1 and #2 went to the end of the asphalt piping outlet and began heating the last bend of the piping with a propane torch. The piping outlet was located directly over the top of the manhole opening of the heated asphalt tank. The tank was reported to be 300 degrees to 400 degrees Fahrenheit, at that time.

During the site visit, approximately five hours later, the tank temperature gauge read approximately 260 degrees Fahrenheit. After an undetermined amount of time that Employees #1 and #2 were using the propane torch to heat the piping, an explosion occurred in the asphalt tank. A witness described the explosion as a flame which shot 30 feet above the manhole cover and quickly descended back into the tank. This witness also stated that he could no longer observe the employees standing on the platform. Employee #1 remained on the platform and suffered asphalt burns and fractures to his face, where an item impacted it during the explosion. Employee #2 fell from the work platform, approximately 9 feet 5 inches to the concrete surface.

Employee #2 suffered asphalt burns to his body and face, in addition to a hip fracture. A radio call for emergency response was broadcast throughout the company. The company Emergency Response Team doused the flames and provided initial first aid to Employees #1 and Employee #2. Both employees were transported to the University of Kansas Burn Unit and were hospitalized. At the time this report was written, they were currently being treated. Both employees were in critical but stable condition and were expected to recover. The safety leader stated that Employees #1 and #2 were wearing coveralls, steel toed shoes and safety gloves. However, they did not find evidence that the employees were wearing face sh ⓘ ls and/or chemical goggles, as called for in the PPE hazard assessment

January 30, 2006

WEST SIDE — An explosion at a Chicago asphalt company Sunday killed one worker.

The explosion occurred just after 1 p.m. Sunday at Gardner Asphalt Corp., 4718 W. Roosevelt Rd., where one of four outdoor tanks caught fire, said Kevin MacGregor of the Fire Department.

The nearly 30-foot-tall tank most likely contained asphalt, which ignited for an unknown reason, MacGregor said, adding that firefighters prevented the other tanks from catching fire.

"We will be doing an investigation for cause and the origin of the fire," he said.

The worker, who was pronounced dead at the scene at 2:35 p.m., was not publicly identified because his family had not been notified, said a spokesman for the Cook County medical examiner.

No one at Gardner was available for comment Sunday.

Asphalt tank in Jessup explodes

January 31, 2006

A liquid-asphalt storage tank exploded into flames at an Owens Corning shingle plant in Jessup yesterday evening, drawing dozens of firefighters from Howard, Anne Arundel and Prince George's counties to prevent the blaze from spreading to adjacent tanks. There were no injuries.

The cause of the blaze on the grounds of the Baltimore-Washington Industrial Park, off U.S. 1, could not be immediately determined, said Bill Mould, a spokesman for Howard County's Department of Fire and Rescue Services. The fire was reported at 5:33 p.m. and was declared contained about two hours later. But firefighters planned to stay to monitor the situation throughout the night.

Aerial tower trucks were used to pour water onto the nearby tanks of liquid asphalt, which is used to make roof shingles. Plumes of black smoke filled the air, and the exterior of the 3,300-gallon asphalt tank appeared to be on fire.

Fire officials said they did not put water directly on the blaze for fear of bursting the tank. Instead, they sprayed water on the exterior to keep it cool. A chemical powder, typically used for aircraft fires, was brought from Baltimore-Washington International Thurgood Marshall Airport to help extinguish the fire.

The fire erupted in an industrial area in the 8200 block of Patuxent Range Road. No homes are in the immediate vicinity. Officials from the Maryland Department of the Environment were on the scene, assessing the risk from runoff and smoke.

Updated: Wed 9:23 PM, Jan 08, 2014

FALLON, NV - It was nearly one month ago that an explosion and fire rocked the Bango Oil plant west of Fallon, sending a thick plume of black smoke into the chilly morning air.

One worker was severely burned.

It took firefighters from Churchill County and the Fallon Naval Air Station two hours to extinguish the flames.

A preliminary report from the investigation by the fire department and the state fire marshal's office released Wednesday says it all began with too much pressure in an asphalt storage tank.

Churchill County Fire Chief Fred Rogne says that led to some of the hot asphalt oil being vented from the top of the tank.

The oil splashed down on 24 year old Daniel Snodgrass who was working below. The oil, which had been heated to 500 degrees as part of the recycling process, burned him.

Snodgrass was apparently heating pipes in the bitter cold, using a hand held burner with an open flame.

That flame ignited the oil, causing the fire and the explosion that followed as the tops of storage tanks blew off as they're designed to do.

The statement leaves some questions unanswered including the still unexplained high pressure in the storage tank. In a press release issued the day after the incident, the company says the plant was operating normally at the time.

The Occupational Safety and Health Administration is conducting its own investigation. Results could be available in two weeks.

Snodgrass suffered second, third and fourth degree burns over more than half of his body.

He was flown to the burn center at UC Davis Medical Center in Sacramento in critical condition.

A hospital a spokesperson tells us he's now listed in good condition meaning his vital signs are stable and indications are excellent.

His parents, Kevin and Lois Snodgrass, say he has good days and bad, but is enduring a daily routine of painful treatment and rehabilitation.

Daniel Snodgrass is the oldest sibling in a family of nine which now faces months of unexpected expenses.

An account has been set up to aid them. Donations can be made at any Wells Fargo Bank branch.

HARTFORD -- A July 3 explosion of an asphalt tank at a Framingham, Mass. company that killed a worker could have been prevented if the company had taken the proper safety precautions, according to the U.S. Labor Department's Occupational Safety and Health Administration (OSHA).

As a result of the agency's investigation of the fatal explosion, OSHA has issued citations alleging willful and serious safety violations to Triram Corporation of 721 Waverly St., including proposed penalties totaling $52,500.

The investigation revealed that a contractor was directed to do welding work on top of a 10,000-gallon tank without being told about the tank's volatile contents.

"This was a tragedy that could have been avoided," said Richard Fazzio, OSHA's area director for northeastern Massachusetts. "The company should have followed required safety procedures and informed workers about the dangers of the hazardous materials in the workplace."

The alleged "willful" violation, which carries a proposed penalty of $35,000, charges Triram Corporation with failing to implement a hazard communication program. The company did not inform the welding contractor about hazards related to flammable vapors produced by heated asphalt and chemicals in the tank being welded.

The company is also charged with five alleged "serious" violations of OSHA safety standards for: failing to ensure containers of hazardous chemicals were labeled with proper contents and hazard warnings; failing to assure that containers of toxic or flammable substances were either filled with water or cleaned thoroughly and vented and tested prior to welding, cutting or heating; failing to equip above-ground storage tanks with a pressure release device; and exposing employees to fire or explosion from a tank that stored flammable liquid adjacent to a main building. Proposed fines for these alleged violations total $17,500.

one in which there is substantial probability that death or serious physical harm could result, and the employer knew, or should have known, of the hazard.

Triram Corporation has 15 business days from receipt of these citations to either elect to comply with them, to request and participate in an informal conference with the OSHA area director, or to contest them before the independent Occupational Safety and Health Review Commission. OSHA's Methuen area office conducted this inspection. Its telephone number is 617-565-8110.

The Occupational Safety and Health Administration is dedicated to saving lives, preventing injuries and illnesses, and protecting America's workers. Safety and health add value to business, the workplace and life. For more information, visit www.osha.gov.

Accident: 550509 - Employee Dies In Explosion After Using Torch On Asphalt Tank

Employee #1 was directed to use an open-flame propane torch to unclog a pipe line/elbow on top of an asphalt tanker trailer. The pipe line/elbow was blocked with solidified asphalt. The blockage was suspected to be located at the pipe elbow on the gasoline-powered submerged pump. The employee checked the side motor mount area with a live, open-flame propane torch while the internal asphalt tanker heaters were operating (heating the asphalt and creating off-gassing within the tank's interior). It is suspected that the torch ignited combustible vapors/gases that were seeping out around the motor mount. The explosion blew the submerged pump off its mount and into the employee's upper body and head. The employee was blown off the platform and landed on the ground. He was burned over his upper body by the flash fire. He was pronounced dead upon arrival at a local hospital.

Accident: 14333595 -- Report ID: 0420600 -- Event Date: 05/11/1992" - Florida Tank Services, Inc.

Employee #1 was at an establishment that repairs bulk fuel transport trucks, repairing a small leak on the rear bulkhead of an aluminum tanker that had last contained an asphalt emulsion. Employee #4 was assigned as his helper. Other welders recommended opening and venting the tanker and then entering the tank to repair the leak from the inside. The company had no specific procedures for "safing" asphalt tankers, and Employee #1 apparently chose to try to repair the leak from the outside. Once the tanker was backed into the workbay, Employee #1 attempted the repair with an arc welder. The repair failed because of product contamination around the leak. Employee #1 then lowered the tanker at the front to force the remaining product to the front and away from the leak, and used an oxygen/acetylene torch in an attempt to melt the asphalt emulsion away from the leak, but did not open the top hatches and vent the tank. An explosion occurred and Employee #1 suffered fatal head injuries. Employee #4, who was next to the tanker, was knocked to the floor and suffered from ringing in the ear, dizziness, and headaches from inhalation of asphalt fumes and smoke. Employee #2 sustained bruises to his ribcage when thrown into a work bench by the explosion. Employee #3 sprained his left knee when the explosion knocked him from the top of a nearby tanker. The building was heavily damaged and the tanker was destroyed. Causal factors include: a lack of established procedures for safing an asphalt tanker before cutting/welding; inadequate supervision of welding operations; absence of employee hazard training and unsafe work practices.

Employee Is Killed When Tank Explodes While Cutting On It

Blacklidge Emulsions Inc

Employee #1 was cutting on a tank that contained SSI Asphalt emulsion using acetylene and oxygen. The tank exploded killing him.

Firefighters battle blaze at Monroe asphalt plan in Michigan

September 2014

Firefighters from Frenchtown and Monroe Townships and the City of Monroe doused a liquid asphalt holding tank that caught fire at the Michigan Paving & Materials' plant at the Port of Monroe Tuesday evening that sent large plumes of black smoke into the air.

The three departments knocked the fire down quickly with both foam and water after arriving about 5:45 p.m. at the plant off E. Front St. just west of the DTE Monroe Power Plant.

The plant is the largest liquid asphalt blending facility in the world, according to Paul LaMarre, director of the port who spotted the blaze and called 9-1-1. The cause of the blaze was not available.

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We are happy to announce the launch of our twitter account. Please make sure to follow us at @MetropForensics or @metroforensics

Metropolitan appreciates your business.

Feel free to recommend our services to your friends and colleagues.

Exhibit 18

S. Canal Rd Development Capital Asphalt Lansing, MI

- 17.16 acres
- Taxable Value as of 2019 $1,027,700