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BEFORE THE BOARD OF ENVIRONMENTAL QUALITY
STATE OF IDAHO

IN THE MATTER OF AIR QUALITY PERMIT TO CONSTRUCT P-2019.0047	)	Agency Case No. 0101-22-01
	)	OAH Case No. 23-245-01
NEZ PERCE TRIBE, IDAHO CONSERVATION LEAGUE, and SAVE THE SOUTH FORK SALMON	)	**DECLARATION OF WILLIAM TIEDEMANN**
Petitioners,	)	
v.	)	
IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY,	)	
Respondent,	)	
and	)	
PERPETUA RESOURCES IDAHO, INC.	)	
Intervenor-Respondent.	)	

I, WILLIAM TIEDEMMAN, hereby declare as follows:

1. The following facts are personally known to me, and if called as a witness, I could and would competently testify thereto. I am over eighteen years of age.

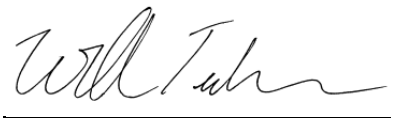
2. I am employed by the Idaho Conservation League (ICL) as a Conservation Associate.

3. The attached Exhibit is a true and correct copy of the following document, which I received from DEQ in respone to a public records request:

Exhibit 1: Meeting Packet, Idaho Division of Environmental Quality (July 13, 1992).

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information, and belief, and based on my personal experiences.

Signed this 3rd day of June, 2024 in Boise, Idaho.



William Tiedemann

Exhibit 1 - Meeting Packet, Idaho Division of Environmental Quality (July 13, 1992)

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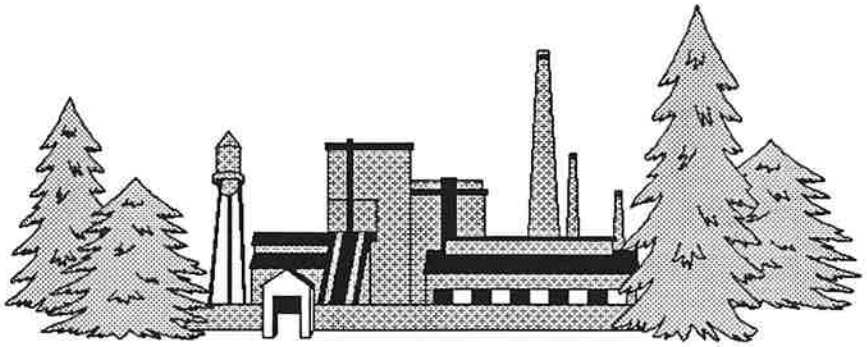
IDAHO DIVISION of

ENVIRONMENTAL QUALITY



MONDAY, JULY 13, 1992

Our Goal for Air Toxics Policy/Rule Making:

To protect the public health and the environment from the harmful effects of toxic air pollutants (TAP) per our responsibilities set forth in IDAPA 16.01.1011,01 and 1601.1952,02. and provide regulated industries with a reasonable, flexible, minimally burdensome framework with which to work.

Our Goal for this meeting:

To successfully negotiate air quality rules revisions that will satisfy the regulated industries need to have reasonable, flexible regulations that do not place an unwarranted impediment to their ability to do business in Idaho, while at the same time providing adequate protection to the public from the harmful effects of TAP. We hope that these revisions will provide industry with an awareness of what DEQ considers harmful and provide the basis for a straight forward and efficient permitting process.

Brief History of the DEQ TAP List

The DEQ TAP list (hereafter referred to as the list), was conceived as part of the New Source Review Policy, which was a response to the need to control the emissions of airborne toxic chemicals in the absence of effective EPA regulations. NESHAP (National Emmision Standards for Hazardous Air Pollutants, §122 of the 1970 Clean Air Act) had proven to be an ineffective means of of controling TAP as only seven pollutants were ever regulated after 17 years of the NESHAPS program.

It was the position of the DEQ that given the resources that we had available to us, that we would only attempt to hold the line on air quality and try to insure that new sources of air pollution did not "injure or unreasonably affect human or animal life or vegetation." One of the principal ways that we chose to do this was the development of a comprehensive list of TAP and, where possible, health based emissions limits and or acceptable ambient concentrations.

Our list was developed from a combination of sources. We surveyed what other states were doing and found that New Mexico had the most logical, straight approach to air toxics. The New Mexico list was chosen as the basis for our own TAP list. In addition, we looked at the Occupational Health and Safty Administration (OSHA), American Conference of Government and Industrial Hygenests (ACGIH) and National Institute for Occupational Safty and Health (NIOSH) occupational exposure limits (OEL) and threshold limit values (TLV) for non-carcinogens. For carcinogens we looked at the

data from the International Agency for Research on Cancer (IARC) and the Carcinogen Assesment Group of the EPA (CAG). In addition, we reviewed data from the Agency for Toxic Substances and Disease Registry of the Public Health Service. As many who have received periodic updates know, we have tried to continuously refine the list to reflect new data and to correct inaccuracies.

The DEQ list of regulated air toxics is quite large in scope. However, this was not done to burden industry. Quite the contrary. It was done in order, to the maximum extent possible, to provide industry with a ready reference to acceptable screening levels of these various compounds. This enables new sources to review their processes and see if controls, may be needed early on in the planning process, there by maximixing start up budget planning. In addition, it allows existing sources to review their emissions and see how they compare to the screening levels that the DEQ considers reasonably protective of human health and the environment. Please see appendix 6 for the derivation of emissions limits (EL) and acceptable ambient concentrations (AALC).

DEQ Position on the EPA "198" List

The EPA list of 189 compounds to be regulated represents a political process by the congress, rather than being put together by any environmental agency. This list is inadequate in and of it self to protect the air quality of Idaho or other specific location in the nation. This opinion is based on the following:

* The EPA 189 list is not an attempt to protect people or the environment of any specific area but a compromise list to address some of the major nation-wide sources of air pollution. The original proposed list contained 224 compounds, including ammonia and hydrogen sulfide which were later removed. We do not believe that this nation-wide effort can be effectively applied to Idaho and be adequate to address the unique Idaho situation. All along, EPA admitted that their agenda was not to protect all communities completely, rather their intent and design has been to address only pollutants and source catagories that are national in scope.

* The EPA 189 list does not include all the well documented carcinogens that have been assigned unit risk factors[1], let alone most possible and suspected carcinogens as listed in DEQ Appendix A2 of the New Source Review Policy. State and local agencies need to have the flexibility to protect public health by regulating the emission into the air of these very dangerous compounds should they be present locally.

* From only a partial inventory, we have found that there are currently being emitted into the ambient air of Idaho three known or suspected carcinogens which are not addressed by the EPA 189 list. In addition there are about 35 non-carcinogens of varying toxicity levels currently being emitted or being reviewed for new source permits.

* While it is not possible to predict the future, in a fast growing state like Idaho it is very reasonable to assume that new industries will be moving to Idaho as our work force expands with new residents. In addition, as environmental regulations in California and other states become more restrictive, Idaho will look more attractive to many of these regulated industries. This is already occurring in Nevada. While we certainly want the jobs and incomes that these industries may represent, just as certainly, we do not want to become a "toxic magnet" for polluting industries that other states don't want.

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[1] Unit Risk Factors for a known or suspected carcinogen describes the possibility of developing excess cancers over a 70 year lifetime of exposure to 1 microgram per cubic meter of that substance.

* Title III of the Clean Air Act Amendments of 1990 (CAAA) requires EPA to publish a list of source categories and then promulgate maximum achievable control technology (MACT) for the first 40 categories. MACT standards are then required for the rest of the categories on a phased in schedule. Even if this time schedule was adhered to, the first MACT standards would not be available before November of 1992. Without its own TAP policy or rules and regulations, Idaho is thus without any appropriate air toxics regulation until EPA is finished. EPA is already late in publishing the first source category list.

* If a particular source in Idaho is not addressed in the first 40 source categories, the DEQ could be unable to address toxic emissions from that source no mater how toxic the emissions might be or in what quantity the emissions may be emitted until EPA finally promulgates MACT standards. Given the past history of EPA deadlines, this is a very real concern. Even if EPA adhered to all deadlines, some sources would conceivably still be able to emit unregulated toxics until the year 2000, if that source was in the last group to have standards promulgated. It should also be noted that not all sources are covered by these MACT standards. As a consequence, sources not covered by this MACT standard would be essentially unregulated in Idaho. Further, the majority of covered sources are associated with surface coating and manufacturing of the regulated chemicals, while fore most sources of TAP in Idaho, the TAP in question is used in or produced as a by-product of their processes.

* Finally, Congress itself apparently felt that this list was not final. Congress required the EPA to periodically review the list and add pollutants "...which present or may present ...a threat of adverse human health effects (including but not limited to, substances which are known to be, or may be reasonably be anticipated to be, carcinogenic, mutagenic, teratogenic, neurotoxic, which cause reproductive dysfunction, or which are acuity or chronically toxic) or adverse environmental effects..." The EPA 189 list should be considered to be a starting point for toxics regulations.

* It is not the intent of DEQ to require sources to do an emissions inventory of every compound on the DEQ list. It is quite reasonable to assume that any source, including the small sources, be familiar with their own processes. There are common, readily available sources of information, such as Material Safty Data Sheets (MSDS)[2] that will assist a source

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[2] MSDS provides data concerning the nature and concentrations of hazardous or toxic components of substances used by a source. These sheets are available from the manufacturers of all compounds with hazardous or toxic components.

to ascertain what compounds can be reasonably assumed to be present in their process. They then need only inventory those compounds that can reasonably assumed to be emitted. In addition, the DEQ will be happy to assist sources in identifying potential TAP.

Some Options for Discussion

Option 1: Maintain current situation.
Pros: Would, of course, make DEQ happy; require no further legislation; all ready in place and functional.
Cons: Could make several in industry unhappy; may be seen as burdensome by industry; a policy is not as clear as a standard.

Option 2: Go with Maximum Achievable Control Technology (MACT) as per the 1990 CAAA or Best Available Control Technology (BACT) or Lowest Achievable Emissions Reduction (LAER) or Adaqualtly Demonstrated Control Technology (ADCT) or some other control technology based standard.
Pros: No EL or AALC; single consistent standard.
Cons: MACT/BACT etc. difficult to define: must be industry and chemical specific; lack flexibility esp. for relatively "clean" industries; no provision for new pollutants; may not adequately protect human health and the environment, esp. in the case where MACT/BACT has not been defined for various toxic chemicals.

Option 3: Regulate EPA "189 List" only
Pros: Would reduce the list in size; could possibly speed up permitting process
Cons: Not protective enough of human health and the environment; lacks flexibility; would not address many pollutants that are commonly emitted by modern industry; no provision for new pollutants; somewhat pointless as the EPA is already doing it; could complicate and slow the permitting process by increasing public comment over pollutants not covered.

Option 4: Regulate EPA "189 list" plus currently known TAP
Pros: list would be somewhat shorter and simpler;
Cons: no provision for adding new pollutants; could require more extensive and costly emissions inventories.

Option 5: Regulate EPA "189 List" plus any thing that has been identified elsewhere as toxic, hazardous or a carcinogen
Pros: Would be comprehensive; would regulate only pollutants that have been demonstrated to be of concern; would be similar to current policy, require little or no new legislation;
Cons: Could be a large list; May be seen as burdensome by some in industry; no provision for adding pollutants.

Option 6: Develop a series of "source specific" TAP lists
Pros: Would be easier for specific industries to know what to report on; A number of useful references available See Appendix 9.
Cons: Could require emissions inventories of some regulated industries; no provision for variation among industries of the same type; MSDS will not reflect bi-product compounds.

Option 7: Options 1 and 3 through 6 with the addtion of a method out side of DEQ to add TAP to lists. (Pros and Cons would, of course depend on the method for adding to the list, but in general, a board or review panel of some sort seems to be a common notion.)
Pros: Would provide DEQ with industry input on additions to lists; would provide DEQ with industry input on standards; would provide DEQ and industry with input by public interest groups;
Cons: Could slow down the process of adding new toxics and there for probably slow down the permitting process because of the public particapation process; could cause a political battle over the structure of the addition process; could convert the health based process for additions to list into a political one; depending on the make up of the committee/board, could be less protective of the public health.

Appendix 1

The following are known or possible carcinogens that have a URF but are not listed by EPA on the list of 189 toxics but are listed on Appendix A2 (carcinogens)

Aldrin* insecticide
Bis(2-chloroethyel)ether solvent
chloromethane methyl chloride
DDT insecticide, most uses banned; used for Tussock moth
1,2-dibromoethane solvent chemical industry
1,1-dichloroethane solvent
1,2-dichloroethane degreaser, ore flotation, solvent, paint, finish removers
1.1-dichloroethylene solvent
Dieldrin* insecticide
diethylstilbestrol synthetic estrogen
dimethylnitrosamine solvent
heptachlor epoxide insecticide
hexachlorodibenzo-p-dioxin (1:2 mixture) Possible. herbicide, a contaminant, poison
hydrazine sulfate mineral analysis, determination of arsenic in metals, fungicide, fumigant
3-methylcholanthrene biochemical research
N-nitroso-n-butylamine**
N-nitrosopyrrolidine**
pronamide herbicide
reserpine antihypertensive [lowers blood pressure], tranquilizer
thiourea photography, analytical reagent chemical intermediate

* part of current permit analysis at INEL Chem. Lab.
** no reference located
Benzo(a)pyrene, dibenz(a,h)anthracene, chrysene and other polynuclear aromatic hydrocarbons can be regulated under polycyclic organic mater (POM) which, as a category, is listed on the EPA list of 189.

Only two of these chemicals are currently under review. However, many of these chemicals are solvents which would seem to have the potential for use in industries common to Idaho (light manufacturing, electronics and so forth).

Appendix 2

The following are carcinogenic substances that are or have been reviewed in conjunction with permit applications in Idaho. These substances are not on the EPA 189 list but are on Appendix A2 (carcinogens):

Aldrin and **Dieldrin** as noted above
dimethyl sulfide from craft pulping black liquor

Appendix 3

The following are non-carcinogenic substances that are or have been reviewed in conjunction with permit applications in Idaho. These substances are not on the EPA 189 list but are on Appendix A1 (non-carcinogens): Note: many of these compounds are on the EPA Extremely Hazardous substances list, and the Community Right to Know list.

hydrogen sulfide: rotten eggs smell, human poison by inhalation, severe irritant, violent reaction with various metals & chemicals
methyl mercaptan: poison by inhalation,
turpentine: toxic by inhalation, irritant, experimental tumorigen
methanol: toxic by inhalation, experimental teratogen, reproductive effects, human mutagenic data.
fluorine: toxic by inhalation, irritant, mutagenic data
aluminum: possible cause of pulmonary fibrosis by inhalation
copper: tumorigen, teratogen, experimental reproductive effects
iron: potentially toxic by inhalation (arc welders lung)
magnesium: toxic by inhalation
zinc: relatively nontoxic
terphenyl: little toxicological data available
nitric acid: poison, corrosive, experimental teratogen and reproductive effects
isophorone diiysocyanate: poison by inhalation,
methyl ethyl ketone peroxide: moderately toxic by inhalation, experimental tumorigen
cyclohexanone: moderately toxic by inhalation, irritant
acetone: moderately toxic by various routes, irritant
hydrogen peroxide, 90%: moderately toxic by inhalation, skin contact, corrosive irritant, experimental tumorigen, suspected carcinogen
dimethyl disulfide: poison by inhalation
dimethyl sulfide: volitile liquid, gas odorant, solvent

Appendix 4

The following are non-carcinogenic substances that are or have been listed on the Toxic Release Inventory (TRI)[3] for Idaho. These substances are not on the EPA 189 list but are on Appendix A1 (non-carcinogens). Note: many of these compounds are on the EPA Extremely Hazardous substances list, and the Community Right to Know list.

sodium hydroxide: corrosive irritant, mutagenic data
methanol: toxic by inhalation, experimental teratogen, reproductive effects, human mutagenic data.
nitric acid: poison, corrosive, experimental teratogen and reproductive effects
hydrofluoric acid: human poison by inhalation, corrosive irritant, experimental teratogenic, reproductive effects, mutagenic data
chlorine: Moderately toxic by inhalation, irritant, human mutagenic data
ammonia: experimental poison by inhalation, irritant, mutagenic data
phosphoric acid: human poison, corrosive irritant
copper: tumorigen, teratogen, experimental reproductive effects
Methylene diphenyl diisocyanate (MDI): poison by inhalation, irritant, mutagenic data
Freon 113: most uses will be fazed out by 1995
ammonium sulfate: moderately toxic by several routes
ammonium nitrate: powerful allergen
zinc compounds: relatively nontoxic
barium compounds: low toxicity
hydrochloric acid: poison by unspecified route, mildly toxic by inhalation, corrosive irritant
manganese compounds: toxic by inhalation

The following substances are non-carcinogenic substances that are being reviewed in conjunction with permit applications or field inspections. These substances are not on the EPA 189 or currently on the DEQ list. ***This points out the need to be able to respond to changing circumstances.***

Acenaphthylene: irritant, mutagenic data
Amino functional Siloxane: organosilicon oxide polymer, mild to severe irritant
Busan 1127D (2-(thiocyanomethylthio)benzothiazole): mist is considered moderatly to highly toxic.
Carbitol Acetate (2-(2-Ethyoxyethoxy) Ethyl Acetate): solvent and placticizer
dimethyl disulfide: poison by inhalation

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[3] The TRI is a report of all emissions of compounds required to be disclosed under SARA Title III.

Appendix 5

The following are examples of sources now existing in Idaho that have air releases of substances not on the EPA 189 list:

American Micro systems Inc.
Basic American Foods
Blount Industries
Borden Inc. Dairy
Del Monte Foods USA #130
Deming Industries
Fiberglass Systems Inc.
FMC Corp.
Gustafson
Hewlett Packard
IBP Inc.
INEL
J.R. Simplot
J.R. Simplot Food Di.
John E. Quinn
Kerr McGee Vanadium Facility
Kraft Inc.
MIcron Technology
Monsanto
N.A Degerstrom Inc.
Nu-West Industries Inc
Ore-Ida Foods
Peabody Spunstrand
Penford Products Co.
Pondarosa Paint Mfg. Inc.
Post Falls Particalboard
Potlatch
Spears Manufacturing Inc.
Unitech Composites Inc.
Zilog

Appendix 6

In developing emissions limits for new permitted facilities, the Idaho DEQ uses the terms Unit Risk Factors and Threshold Limit Values. The following is an explanation of these terms and how they are used.

UNIT RISK FACTOR

A unit risk factor (URF) is used to describe the possibility of developing excess cancers over an average 70 year lifetime. This is based on being exposed to concentration of one microgram of a carcinogenic (cancer causing) substance in one cubic meter ($1\ ug/m^3$) of air over 70 years. The term excess cancers means cases of cancers in excess of what would be normal for a given population. For example, if there was normally 5 cases of a given type of cancer in Anytown USA before a given exposure to some substance and 7 after the exposure, there would be 2 excess cancers.

Inhalation URFs are developed for carcinogenic substances by the EPA. Each URF represents months of research and often years of policy process. Teams of toxicologists gather toxicological data for each known or suspected carcinogen. The available data are then rated or point factored per the quality of the research involved. A URF is then a probability statement derived from this process. Each URF proposed by EPA is extensively reviewed and debated in public by scientists, health officials and industry representatives. Every URF represents a consensus of the best science and health opinion of the potency of a given carcinogen.

URFs are usually expressed as a number times 10 to some negative power. For example, benzene, an organic hydrocarbon found in various petroleum products and cigarette smoke has a unit risk factor of 8.3×10^{-6}. This means that are 8.3 chances in one million of getting cancer if a person is exposed to $1\ \mu g/m^3$ 24 hours a day for 70 years.

Another example would be asbestos. Asbestos has a URF of 2.3×10^{-1}. That means that if exposed to $1\ ug/m^3$ concentration for 70 years, the chances of getting cancer would be .23 in 10.

Within IAQB New Source Review (NSR) policy, URFs are used to calculate acceptable ambient levels for a given carcinogen. IAQB generally establishes that an ambient concentration which causes no more excess cancers than one in a million (1×10^{-6}) is acceptable. Once an acceptable ambient level is established, IAQB can then back calculate via engineering equations to an acceptable emission rate (in pounds per hour) for a given stack.

THRESHOLD LIMIT VALUE

Threshold Limit Value (TLV) is a time weighted exposure limit developed by the Occupation and Safety Administration or the American Council of Government Industrial Hygienists. This value is used to limit the exposure of informed workers to a given toxic substance in the work place. The value is based on exposure of adult males working an eight hour shift. The DEQ uses TLV information to screen proposed new source emissions levels. The DEQ divides the TLV first by a value of 10 due to the fact that an ambient air exposure of a carcinogen means people are usually living under that exposure longer than eight hours out of 24. This value is then again divided by 10 to compensate for the fact that not everyone who is potentially exposed is an adult male. Other people may be more sensitive. The TLV thus is divided by a total of 100 for use in setting an acceptable ambient level.

For example, the TLV for cyanide is 5 milligrams per cubic meter (mg/m^3). An acceptable ambient level under DEQ policy would be 5 divided by 100 or 0.05 mg/m^3. For another example, the TLV for Lindane (an insecticide) would be 0.5 mg/m^3 concentration. The acceptable ambient level would be 0.5 divided by 100 or 0.005 mg/m^3. As with carcinogens, the TLV derived acceptable ambient levels are used by the DEQ engineers to back calculate an acceptable stack emission rate for any proposed new source.

EL and AAL(C) as listed in the TAP list are *screening levels*, not standards. If a proposed source, at any level of review is shown to be under the screening level for the TAP in question then the source goes forward in the permitting process. If, on the other hand, the source is shown to likely exceed the screening level, then there is a number of options such as further analysis or enhanced controls that can be pursued. See: Idaho DEQ Procedures for Modeling Impacts of Toxic Air Emissions and Assessing Associated Risk Appendix 7, and the General Summary of DEQ's New Source Review Policy for Toxic Air Pollutants, Appendix 8 for a more complete discussion of this topic.

APPENDIX 7

DRAFT

Idaho DEQ Procedures for Modeling Impacts of Toxic Air Emissions and Assessing Associated Risk

Procedures for modeling the dispersion of air emissions are consistent for criteria pollutants and toxics.

Emissions are calculated for the specific operation, with EPA's AP-42 as the standard guidance document. Impacts for any toxic air pollutant (TAP) emitted in potentially significant amounts are estimated through a three tiered evaluation approach, using the Division of Environmental Quality (DEQ) TAP list and models approved by EPA for regulatory use.

The emissions screening levels as listed on the DEQ TAP list are a quick way to determine if modeling is needed. If a toxic air pollutant has the maximum potential to be emitted at levels below the screening emission level, the proposed emission is typically approved by the DEQ.

If the maximum potential emissions are above the screening levels, then modeling is performed. The models most commonly used for the first modeling run are TSCREEN and SCREEN for single emission points, or ISC with worst case meteorological data for multiple emission points. In "screening modeling", quantified emissions and stack (or fugitive) data are required, as well as distance to property boundary or, with DEQ approval, an off site receptor. Estimates of off site concentrations of the pollutant(s) are output by the model, which assumes a variety of worst case dispersion conditions. Model output is typically in one hour averages. Persistence factors are usually used to estimate worst case impacts for other averaging periods. Unit risk factors are then applied to translate the predicted off site concentrations to determine risk to those exposed.

If, after "screening modeling", unacceptable risks still are shown to be possible, refined modeling may be done. Refined modeling replaces many worst case assumptions in screening modeling with actual conditions. In refined modeling, a more realistic three dimensional simulation of emissions, topography, meteorology, and receptors is supplied. Actual on site meteorological data typically helps the applicant, since the alternative is a worst case meteorological data file like that used in screening modeling. The most commonly used models are ISC, COMPLEX1, and FDM. Refined modeling provides the most detailed and accurate assessment of potential air quality impacts.

After ambient concentrations are determined, these ambient levels are, in the case of known or suspected carcinogens (TAP list Appendix A2), converted to annual concentrations using persistence factors as mentioned above. They are then multiplied by the EPA

unit risk factor (URF) to obtain a risk level. A risk level of one in a million is generally considered acceptable for a long term or permanent emissions source. The acceptable ambient levels for a carcinogen (AALC) listed in the TAP list Appendix A2 reflect this one in a million risk level for carcinogens with established URFs.

For short term sources (usually less than five years in duration), such as remediation projects, a probability of greater than one in a million risk (over a 70 years) will generally be acceptable to account for the decreased term of exposure. It is not acceptable however, for exposed individuals to receive a full 70 year exposure during the life of a short term project. In addition, first impacts at receptor sites farther from the source than property boundaries may be considered for short duration projects.

For non-carcinogens (TAP list Appendix A1) the risk assessment procedures are similar. Ambient concentrations are compared with 1/100 of the published American Council of Government and Industrial Hygienists (ACGIH) Occupational Exposure Limits (OEL) or other ambient standard adopted by the DEQ in the absence of a published ACGIH OEL.

The 1/100 factor was derived to accommodate two levels of extrapolation of potential risk to the general public:

1. ACGIH factors assume an eight hour exposure; source exposures are generally continuous (24 hrs.).

2. ACGIH factors are derived from historical data that comes essentially from a work force of healthy adult males.

Thus we have used an uncertainty factor of 100 (10X for each of the above conditions) to accommodate the more sensitive populations.

In the absence of any published URF or OEL. the acceptable ambient concentration will be considered the detection limit unless it can be demonstrated to the satisfaction of the DEQ that an ambient level higher than the detection limit will not have an adverse effect on human health or the environment. In such cases we have allowed the toxicological profiles of like chemicals or compounds to be substituted for the unknowns.

General Summary of Idaho Air Quality Bureau's New Source Review Policy for Toxic Air Pollutants

Regulation Summary

January 1991

Toxic substances within ambient air are regulated in Idaho by IDAPA 16.01.1011,01. Toxic Substances, which states:

> *Any contaminant which is by its nature toxic to human or animal life or vegetation, but is not specifically controlled elsewhere in Idaho Department of Health and Welfare Rules and Regulations, Title 1, Chapter 1, "Rules and Regulations for the Control of Air Pollution in Idaho," shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation. As information becomes available, limits will be specified for concentration of toxic materials in the ambient air and emission limits will be set accordingly.*
>
> *(1-24-69)*

Any new source of air pollutants (including toxic pollutants) not specifically covered by the thirteen (13) specific New Source Performance Standards is regulated by IDAPA 16.01.1952,02 Sources Not Specifically Regulated which states:

> *Sources not specifically regulated under Idaho Department of Health and Welfare Rules and Regulations Sections 01.1955 through 01.1999 shall achieve the greatest degree of emission reduction that has been adequately demonstrated.*
>
> *(1-1-75)*

Idaho Air Quality Bureau (IAQB) has developed a method for permitting new sources of toxic air pollutants consistent with our responsibilities and authority under the Rules and Regulations for the Control of Air Pollution in Idaho. For that method, IAQB compiled a list of toxic air pollutants (TAP) and screening level emission limits for those substances.

Permit Decisions

If the Bureau finds that an eight-hour average ambient concentration of a toxic air pollutant will likely not exceed one hundredth (.01) of the OEL for non carcinogens, or is below detection levels for a compound without an OEL or URF, the Bureau shall grant the permit.

Similarly, if the Bureau can substantiate that ambient concentrations due to emissions of known or suspected carcinogens are not likely to cause excess cancers of more than one in a million (10^{-6}) then the bureau shall grant a permit.

If potential new source emissions are shown to likely cause ambient concentrations:

1. in excess of 1/100 of the OEL or

2. which could cause cancers in excess of one in one hundred thousand (10^{-5}) or

3. which exceed minimum detection levels for TAP without an OEL or URF,

the Bureau may grant the permit if the applicant implements the best available control technology (BACT) for that source or pollutant and after considering other factors.

If the TAP screening level is shown to likely be exceeded the Bureau will make a final decision considering the following factors:

(a) the health and environmental assessment prepared by the applicant (if one is required by the Bureau);

(b) the nature of the toxic air pollutant and the susceptibility and proximity of the human population;

(c) other health and environmental impacts associated with the anticipated level of exposure.

The Bureau may grant a permit for a new source to emit carcinogens which are likely to cause excess cancers between 1/100,000 and 1/1,000,000 (between 10^{-5} and 10^{-6}) after the applicant proves that additional controls would be a severe hardship.

Appendix 9

Samples of Industry Specific TAP Emissions Data for an Example Industry; the Asphalt Paving Mixtures and Block Industry, SIC Code 2951

This appendix contains excerpts from:

Toxic Air Pollutant Emission Factors - A Compilation for Selected Air Toxic Compounds and Sources, Second Edition EPA-450/2-90-011

Toxic Air Pollutant/Source Crosswalk - A screening tool For Locating Possible Sources Emitting Toxic Air Pollutants, Second Edition EPA 450/2-89-017

Compilation of Air Pollution Emission Factors, AP-42 Fourth Edition September 1985 Volume I Stationary Point And Area Sources. (While this document is not specifically for TAP, the emission factors for VOC's can be useful for calculations and it is a standard reference.

MSDS for the same industry.

United States
Environmental Protection
Agency

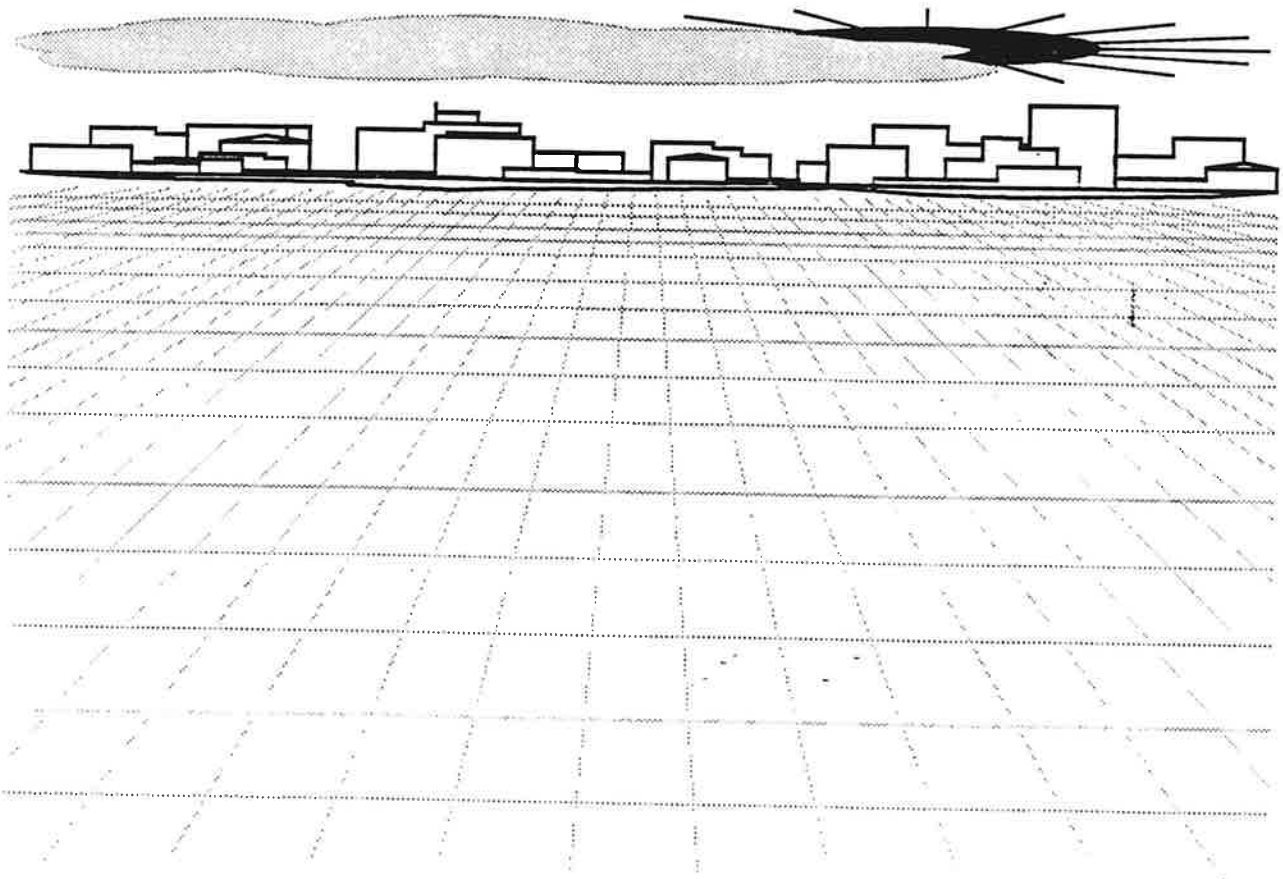
Office of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

EPA-450/2-90-011
October 1990

AIR

EPA

TOXIC AIR POLLUTANT EMISSION FACTORS - A COMPILATION FOR SELECTED AIR TOXIC COMPOUNDS AND SOURCES, SECOND EDITION



SIC	SIC Code Description	SCC Code	Associated Pollutants
2951	Asphalt paving mixtures and blocks		ACETALDEHYDE (27); ACETATE, METHYL (29); ACETONE (27,28); ALUMINUM OXIDE (27); AMMONIA (21,22,23,27,29); ANILINE, 3-NITRO- (28); ANTHRACENE (27); ANTIMONY (27); ASBESTOS (21,22,23,27,28,29); ASPHALT (22); BENZENE (20,21,23,27,28,29); BENZENE, CHLORO- (28); BENZENE, ETHYL- (27,28); BENZENE, HEXACHLORO- (22,28); BENZIDINE (28); BENZO(A)PYRENE (21,23,28); BIPHENYL (27); BUTANETHIOL, N- (28); 1-BUTANOL (27); BUTYRALDEHYDE (26); CHLORINE (27); CHROMIUM (21,23,27,29); CUMENE (27); CYCLOHEXANE (27,28); DIBUTYL PHTHALATE (27); DIOCTYL PHTHALATE (27); EPOXY RESINS (25); ETHANE, CHLORO- (27); ETHANE, 1,2-DICHLORO- (27); ETHANE, 1,1,1-TRICHLORO- (21,22,23,28,29); ETHANOL, 2-ETHOXY-, ACETATE (22); ETHYLENE (27); ETHYLENE GLYCOL (27); ETHYLENE OXIDE (27); FORMALDEHYDE (20,21,22,26,28,29); FORMAMIDE, N,N-DIMETHYL- (28); FURAN, DIBENZO- (27); FURAN, 1,2,3,6,7,8-HEXACHLORODIBENZO- (27); FURAN, 1,2,3,7,8,9-HEXACHLORODIBENZO- (27); HEPTANE (22); HEXANE (22); HYDROGEN CHLORIDE (27,28); ISOPROPANOL (27); KEROSINE (29); LEAD (27); MANGANESE (29); MERCURY (23,29); METHANOL (27); METHYL ETHYL KETONE (21,22,27,28); METHYL ISOBUTYL KETONE (27); METHYLISOCYANATE (21,22,23,29); NAPHTHALENE (21,24,27,28); NICKEL (29); N-OCTYL PHTHALATE (27); 2-PENTANOL, 4-METHYL- (29); PHENOL, 2,4-DICHLORO- (27); POLYCYCLIC ORGANIC MATTER (21,23,26,29); POLYETHYLENE GLYCOL (25); POLYVINYL CHLORIDE LATEX (28); PROPYLENE (27); SODIUM HYDROXIDE (27); SORBITAN, MONO-9-OCTADECENOATE, POLY(OXY-1,2-ETHANDIYL) (2)- (29); STYRENE (28); SULFURIC ACID (21,22,27,28); TETRACHLOROETHYLENE (22,28); THALLIUM COMPOUNDS (28); TOLUENE (20,21,22,23,27,28,29); XYLENE, M- (27); XYLENE, O- (27); XYLENE, P- (27); XYLENES (MIXED ISOMERS) (27,28); ZINC COMPOUNDS (27)
		3-05-002	BUTYRALDEHYDE (26); FORMALDEHYDE (26)
		3-05-002-01	BENZENE (20); FORMALDEHYDE (20); POLYCYCLIC ORGANIC MATTER (26); TOLUENE (20)
		3-05-002-03	NAPHTHALENE (21,24)
		3-05-002-05	POLYCYCLIC ORGANIC MATTER (26)

United States
Environmental Protection
Agency

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

EPA-450/2-89-017
December 1989

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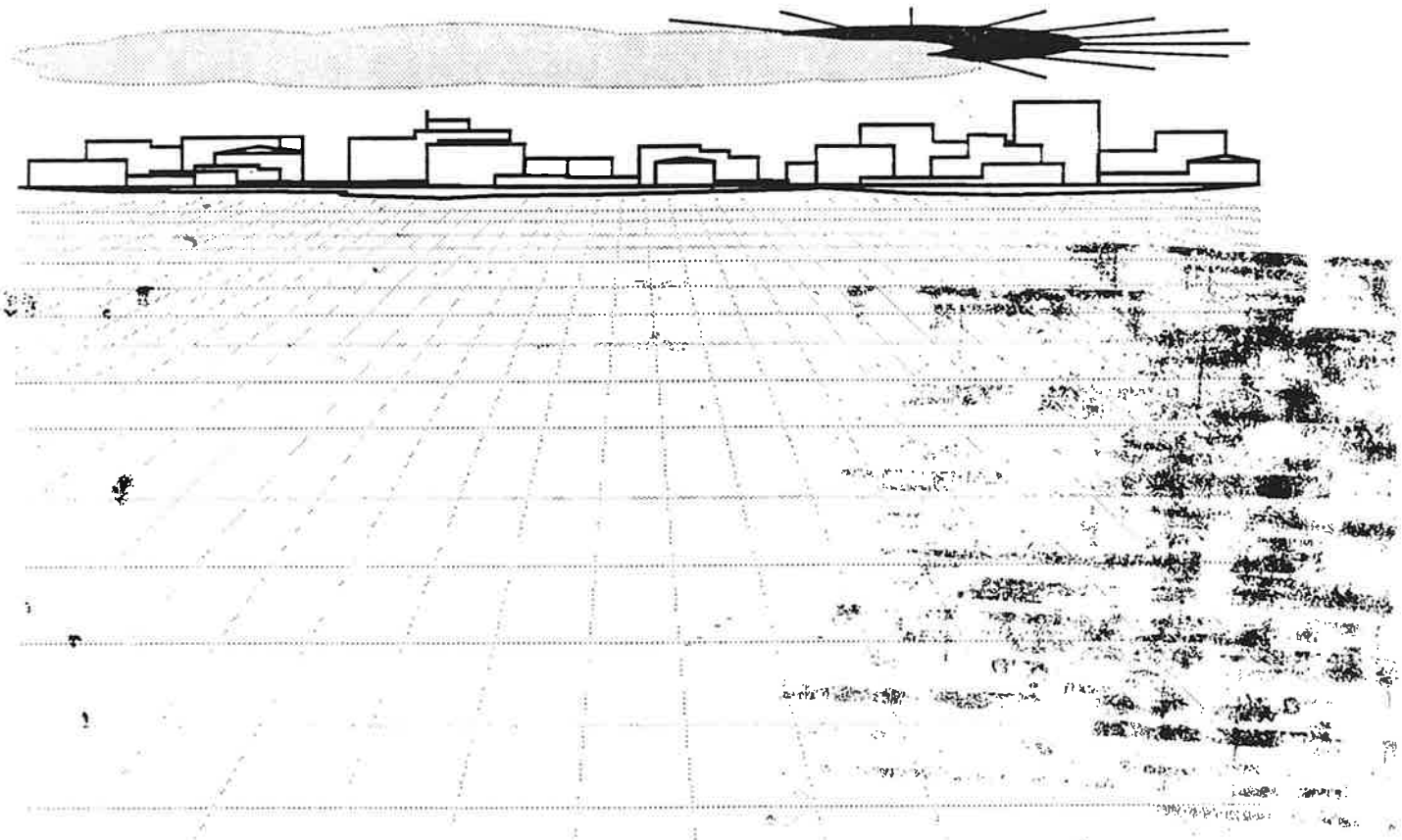
TOXIC AIR POLLUTANT/SOURCE CROSSWALK - A SCREENING TOOL FOR LOCATING POSSIBLE SOURCES EMITTING TOXIC AIR POLLUTANTS, SECOND EDITION



INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Asphaltic concrete production	2951	Plant stack	305002	Magnesium	7439954	8.8 x 10E-9 lb/ton concrete	Controlled (unspecified) from a single plant, mean of 2 values, range is 4.4 x 10E-9 - 1.32 x 10E-8 lb ton	170
Asphaltic concrete production	2951	Plant stack	305002	Magnesium	7439954	2.96 x 10E-7 lb/ton concrete	Uncontrolled from a single plant, mean of 2 values, range is 2.05 x 10E-7 - 3.87 x 10E-7 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Manganese	7439965	3.02 x 10E-10 lb/ton concrete	Controlled (unspecified) from a single plant, average of 2 values, range is 1.63 x 10E-10 - 4.4 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Manganese	7439965	5.72 x 10E-9 lb/ton concrete	Uncontrolled from a single plant, average of 2 values, range is 3.3 x 10E-9 - 8.1 x 10E-9 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Mercury	7439976	<1.1 x 10E-9 lb/ton concrete	Controlled (unspecified) from a single plant, average of 2 values, range is 8.8 x 10E-10 - 1.3 x 10E-9	170
Asphaltic concrete production	2951	Plant stack	305002	Mercury	7439976	<2.07 x 10E-9 lb/ton concrete	Uncontrolled from a single plant, average of 2 values, range is 1.5 x 10E-9 - 2.6 x 10E-9	170
Asphaltic concrete production	2951	Plant stack	305002	Nickel	7440020	1.48 x 10E-10 lb/ton concrete	Controlled (unspecified) from a single plant, avg. of 2 values, range is 1.44 x 10E-10 - 1.51 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Nickel	7440020	7.7 x 10E-10 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 6.6 x 10E-10 - 8.8 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Vanadium	7440622	1.87 x 10E-9 lb/ton concrete	Controlled (unspecified) from a single plant, avg. of 2 values, range is 1.76 x 10E-9 - 1.98 x 10E-9	170
Asphaltic concrete production	2951	Plant stack	305002	Vanadium	7440622	<3.9 x 10E-9 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 1.98 x 10E-9 - 5.7 x 10E-9	170
Asphaltic concrete production	2951	Plant stack	305002	Vanadium	7440622	8.00E-7 g/ton concrete	Controlled (unspecified) from a single plant	170
Asphaltic concrete production	2951	Plant stack	305002	Zinc	7440666	5.5 x 10E-10 lb/ton concrete	Controlled (unspecified) from a single plant, avg. of 2 values, range is 4.4 x 10E-10 - 6.6 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Zinc	7440666	1.98 x 10E-9 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 1.76 x 10E-9 - 2.2 x 10E-9 lb/ton	170
Automobile carburetor manufacture	3592	Manual plating cleaning tanks		Sodium hydroxide	1310732	0.03 lb/hr/ft2 tank	Developed by State agency and plant personnel, assume NaOH is 5.7% soln.	158
Automotive products use		End use		Xylenes (mixed isomers)	1330207	2000 lb/ton xylene consumed	Engineering Judgement	77
Bagasse combustion	0133	Industrial boilers	10201101	Polycyclic organic matter		179.7 lb/10E12 Btu heat input	2 boilers each w/ multicyclone vented to 1 common stack. Represents both gaseous & particulate POM	114
Bagasse combustion	0133	Industrial boilers	10201101	Polycyclic organic matter		99.9 lb/10E12 Btu heat input	Average of 2 (17.2-68.9), multicyclone, represents both gaseous and particulate POM.	114

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Asphaltic concrete production	2951	Plant stack	305002	Aluminum	7429905	1.2 x 10E-7 - 2.67 x 10E-7 lb/ton concrete	Uncontrolled from a single plant	170
Asphaltic concrete production	2951	Plant stack	305002	Aluminum	7429905	1.76 x 10E-9 - 5.1 x 10E-9 lb/ton concrete	Controlled (unspecified) from a single plant	170
Asphaltic concrete production	2951	Plant stack	305002	Beryllium	7440417	2.50 x 10E-11 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 2.1 - 2.9 x 10E-11 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Beryllium	7440417	1.98 x 10E-12 lb/ton concrete	Controlled (unspecified) from a single plant	170
Asphaltic concrete production	2951	Plant stack	305002	Butyraldehyde	123728	0.0024 lb/ton concrete	Based on limited test data, cyclone/wet scrubber control	97
Asphaltic concrete production	2951	Plant stack	305002	Cadmium	7440439	2.46 x 10E-10 lb/ton concrete	Controlled (unspecified) from a single plant, avg. of 2 values, range is 5.24 x 10E-11 - 4.4 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Cadmium	7440439	1.82 x 10E-10 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 1.81 x 10E-10 - 1.83 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Calcium	7440702	1.73 x 10E-5 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 1.03 x 10E-5 - 2.42 x 10E-5 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Calcium	7440702	2.76 x 10E-7 lb/ton concrete	Controlled (unspecified) from a single plant, avg. of 2 values, range is 1.72 x 10E-7 - 3.81 x 10E-7 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Calcium	7440702	3.3 x 10E-11 lb/ton concrete	Controlled (unspecified) from a single plant	170
Asphaltic concrete production	2951	Plant stack	305002	Chromium	7440473	1.24 x 10E-10 lb/ton concrete	Controlled (unspecified) from a single plant. Avg. of 2 values, range is 7.57 x 10E-11 - 1.71 x 10E-10 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Chromium	7440473	1.21 x 10E-9 lb/ton	Uncontrolled from a single plant, avg. of 2 values, range is 1.10 x 10E-9 - 1.32 x 10E-9 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Formaldehyde	50000	0.00015 lb/ton concrete	Based on limited test data, cyclone/wet scrubber control	97
Asphaltic concrete production	2951	Plant stack	305002	Iron	15438310	3.72 x 10E-7 lb/ton concrete	Uncontrolled from a single plant, avg. of 2 values, range is 2.22 x 10E-7 - 5.21 x 10E-7 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Iron	15438310	4.73 x 10E-9 lb/ton concrete	Controlled (unspecified) from a single plant, avg. of 2 values, range is 3.08 x 10E-9 - 6.38 x 10E-9 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Lead	7439921	3.98 x 10E-11 lb/ton	Controlled (unspecified) from a single plant, avg. of 2 values, range is 3.7 x 10E-11 - 4.25 x 10E-11 lb/ton	170
Asphaltic concrete production	2951	Plant stack	305002	Lead	7439921	9.9 x 10E-10 lb/ton concrete	Uncontrolled from a single plant, average of 2 values, range is 8.8 x 10E-10 - 1.1 x 10E-9 lb/ton	170

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Asphalt (hot mix) production	2951	Drum mix plant	30500205	Polycyclic organic matter		7.18 x 10E-5 lb/ton asphalt produced	Knock out box, using recycled feed	114
Asphalt (hot mix) production	2951	Drum mix plant	30500205	Polycyclic organic matter		3.38 x 10E-5 lb/ton asphalt produced	Knock out box and venturi scrubber, using recycled feed	114
Asphalt (hot mix) production	2951	Drum mix plant	30500205	Polycyclic organic matter		4.42 x 10E-5 lb/ton asphalt produced	Knock out box	114
Asphalt (hot mix) production	2951	Drum mix plant	30500205	Polycyclic organic matter		2.7 x 10E-5 lb/ton asphalt produced	Knock out box and venturi scrubber	114
Asphalt distribution/use	5032	Entire process		Benzene	71432	0.077 lb/ton asphalt applied	Benzene assumed to be 9.6% of THC	92
Asphalt distribution/use	5032	Entire process		Formaldehyde	50000	0.004 lb/ton asphalt applied	Formaldehyde assumed to be 0.5% of THC	92
Asphalt distribution/use	5032	Entire process		Polycyclic organic matter		0.0008 lb/ton asphalt applied	POM assumed to be 0.1% of THC	92
Asphalt production		Entire process		Formaldehyde	50000	0.00015 lb/ton asphalt produced	Control uncertain	94
Asphalt roofing material production	2952	Asphalt blowing still	30500101	Polycyclic organic matter		0.0304 lb/ton asphalt blown	Uncontrolled	114
Asphalt roofing material production	2952	Asphalt blowing still	30500101	Polycyclic organic matter		9.6 x 10E-5 lb/ton asphalt blown	Afterburner	114
Asphalt roofing material production	2952	Asphalt blowing still	30500101	Polycyclic organic matter		4.2 x 10E-6 lb/ton asphalt blown	Fume incinerator	114
Asphalt roofing material production	2952	Asphalt blowing still	30500101	Polycyclic organic matter		1.16 x 10E-5 lb/ton asphalt blown	Process heater furnace	114
Asphalt roofing material production	2952	Asphalt blowing still	30500101	Polycyclic organic matter		0.0096 lb/ton asphalt blown	Stack baffles, represents particulate POM	114
Asphalt roofing material production	2952	Saturator	30500103	Polycyclic organic matter		4.2 x 10E-4 lb/ton produced	Uncontrolled	114
Asphalt roofing material production	2952	Saturator	30500103	Polycyclic organic matter		1.92 x 10E-4 lb/ton produced	ESP controlled	114
Asphalt roofing material production	2952	Saturator	30500103	Polycyclic organic matter		6.6 x 10E-4 lb/ton produced	Uncontrolled	114
Asphalt roofing material production	2952	Saturator and asphalt storage tanks	30500103	Polycyclic organic matter		0.042 lb/ton produced	High velocity air filter	114

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Asbestos product fabrication	3292	Floor tile		Asbestos	1332214	1.0 lb/ton asbestos produced	Controlled	33
Asbestos product fabrication	3292	Friction material production		Asbestos	1332214	6 lb/ton asbestos produced	Controlled	33
Asbestos product fabrication	3292	Grinding brake shoes		Asbestos	1332214	465 fibers/cc air/g asbestos machined	Average of test results	22
Asbestos product fabrication	3292	Sawing asbestos cement sheet		Asbestos	1332214	1838 fibers/cc air/g asbestos machined	Average of test results, cut-off wheel saw	22
Asbestos product fabrication	3292	Sawing asbestos cement sheet		Asbestos	1332214	305 fibers/cc air/g asbestos machined	Average of test results, toothed blade saw	22
Asbestos product fabrication	3292	Sawing asbestos millboard		Asbestos	1332214	647 fibers/cc air/g asbestos machined	Average of test results, toothed blade saw	22
Asbestos product fabrication	3292	Textiles		Asbestos	1332214	40 lb/ton asbestos produced	Uncontrolled	33
Asbestos product fabrication	3292	Textiles		Asbestos	1332214	2 lb/ton asbestos produced	Controlled	33
Asbestos product usage		Brake linings		Asbestos	1332214	10 lb/ton asbestos produced	Uncontrolled	33
Asbestos product usage		Construction industry		Asbestos	1332214	26 lb/ton asbestos produced		33
Asbestos product usage		Insulating cement		Asbestos	1332214	26 lb/ton asbestos produced	Controlled	33
Asbestos product usage		Steel fireproofing		Asbestos	1332214	10 lb/ton asbestos produced	Controlled	33
Asbestos textiles manufacturing	3292	Entire process		Asbestos	1332214	63.7 lb/ton asbestos consumed	Calculated average uncontrolled factor, calculated range 26.7-88.8	100
Asbestos textiles manufacturing	3292	Entire process		Asbestos	1332214	3.54 lb/ton asbestos consumed	Calculated average controlled factor, calculated range 0.026-35.5	100
Asbestos-reinforced plastics manufacturing	3292	Entire process		Asbestos	1332214	930.8 lb/ton asbestos consumed	Calculated average uncontrolled factor, calculated range 0.96-2000	100
Asbestos-reinforced plastics manufacturing	3292	Entire process		Asbestos	1332214	5.70 lb/ton asbestos consumed	Calculated average controlled factor, calculated range 9.66 x 10-5 - 200	100
Ascorbic acid production	2833	Plantwide emissions	301060	Chloroform	67663	4.92 x 10E5 lb/yr	Based on one facility (30 million lb/yr production)	160
Asphalt (hot mix) production	2951	Batch mix plant, rotary dryer and mixer	30500201	Polycyclic organic matter		3.94 x 10E-5 lb/ton asphalt produced	Cyclone and wet scrubber, virgin feed material	114

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

COMPILATION OF AIR POLLUTANT EMISSION FACTORS, AP-42

FOURTH EDITION

September 1985

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4.5 CUTBACK ASPHALT, EMULSIFIED ASPHALT AND ASPHALT CEMENT

4.5.1 General[1-3]

Asphalt surfaces and pavements are composed of compacted aggregate and an asphalt binder. Aggregate materials are produced from rock quarries as manufactured stone or are obtained from natural gravel or soil deposits. Metal ore refining processes produce artificial aggregates as a byproduct. In asphalt, the aggregate performs three functions. It transmits the load from the surface to the base course, takes the abrasive wear of traffic, and provides a nonskid surface. The asphalt binder holds the aggregate together, preventing displacement and loss of aggregate and providing a waterproof cover for the base.

Asphalt binders take the form of asphalt cement (the residue of the distillation of crude oils) and liquified asphalts. To be used for pavement, asphalt cement, which is semisolid, must be heated prior to mixing with aggregate. The resulting hot mix asphalt concrete is generally applied in thicknesses of from two to six inches. Liquified asphalts are (1) asphalt cutbacks (asphalt cement thinned or "cutback" with volatile petroleum distillates such as naptha, kerosene, etc.) and (2) asphalt emulsions (nonflammable liquids produced by combining asphalt and water with an emulsifying agent, such as soap). Liquified asphalts are used in tack and seal operations, in priming roadbeds for hot mix application, and for paving operations up to several inches thick.

Cutback asphalts fall into three broad categories: rapid cure (RC), medium cure (MC), and slow cure (SC) road oils. SC, MC and RC cutbacks are prepared by blending asphalt cement with heavy residual oils, kerosene-type solvents, or naptha and gasoline solvents, respectively. Depending on the viscosity desired, the proportions of solvent added generally range from 25 to 45 percent by volume.

Emulsified asphalts are of two basic types. One type relies on water evaporation to cure. The other type (cationic emulsions) relies on ionic bonding of the emulsion and the aggregate surface. Emulsified asphalt can substitute for cutback in almost any application. Emulsified asphalts are gaining in popularity, because of the energy and environmental problems associated with the use of cutback asphalts.

4.5.2 Emissions[1,2]

The primary pollutants of concern from asphalts and asphalt paving operations are volatile organic compounds (VOC). Of the three types of asphalts, the major source of VOC is cutback. Only minor amounts of VOC are emitted from emulsified asphalts and asphalt cement.

VOC emissions from cutback asphalts result from the evaporation of the petroleum distillate solvent, or diluent, used to liquify the asphalt cement. Emissions occur at both the job site and the mixing plant. At the job site, VOCs are emitted from the equipment used to apply the asphaltic product and from the road surface. At the mixing plant, VOCs are released during mixing and stockpiling. The largest source of emissions, however, is the road surface itself.

For any given amount of cutback asphalt, total emissions are believed to be the same, regardless of stockpiling, mixing and application times. The two major variables affecting both the quantity of VOC emitted and the time over which emissions occur are the type and the quantity of petroleum distillate used as a diluent. As an approximation, long term emissions from cutback asphalts can be estimated by assuming that 95 percent of the diluent evaporates from rapid cure (RC) cutback asphalts, 70 percent from medium cure (MC) cutbacks, and about 25 percent from slow cure (SC) asphalts, by weight percent. Some of the diluent appears to be retained permanently in the road surface after application. Limited test data suggest that, from rapid cure (RC) asphalt, 75 percent of the total diluent loss occurs on the first day after

application, 90 percent occurs within the first month, and 95 percent in three to four months. Evaporation takes place more slowly from medium cure (MC) asphalts, with roughly 20 percent of the diluent being emitted during the first day, 50 percent during the first week, and 70 percent after three to four months. No measured data are available for slow cure (SC) asphalts, although the quantity emitted is believed to be considerably less than with either rapid or medium cure asphalts, and the time during which emissions take place is expected to be considerably longer (Figure 4.5-1). An example calculation for determining VOC emissions from cutback asphalts is given below:

Example: Local records indicate that 10,000 kg of RC cutback asphalt (containing 45 percent diluent, by volume) was applied in a given area during the year. Calculate the mass of VOC emitted during the year from this application.

To determine VOC emissions, the volume of diluent present in the cutback asphalt must first be determined. Because of density of naptha (0.7 kg/l) differs from that of asphalt cement (1.1 kg/l), the following equations should be solved to determine the volume of diluent (x) and the volume of asphalt cement (y) in the cutback asphalt:

$$10{,}000 \text{ kg cutback asphalt} = (x \text{ liter, diluent}) \cdot \left(\frac{0.7 \text{ kg}}{\text{liter}}\right) + (y \text{ liter, asphalt cement}) \cdot \left(\frac{1.1 \text{ kg}}{\text{liter}}\right)$$

and

$$x \text{ liter, diluent} = 0.45\ (x \text{ liter, diluent} + y \text{ liter, asphalt cement})$$

From these equations, the volume of diluent present in the cutback asphalt is determined to be about 4900 liters, or about 3400 kg. Assuming that 95 percent of this is evaporative VOC, emissions are then: 3400 kg x 0.95 = 3200 kg (i.e., 32% by weight, of the cutback asphalt eventually evaporates).

These equations can be used for medium cure and slow cure asphalts by assuming typical diluent densities of 0.8 and 0.9 kg/liter, respectively. Of course, if actual density values are known from local records, they should be used in the above equations rather than typical values. Also, if different diluent contents are used, they should also be reflected in the above calculations. If actual diluent contents are not known, a typical value of 35 percent may be assumed for inventory purposes.

In lieu of solving the equations in the above example, Table 4.5-1 may be used to estimate long term emissions from cutback asphalts. Table 4.5-1 directly yields long term emissions as a function of the volume of diluent added to the cutback and of the density of the diluents and asphalt cement used in the cutback asphalt. If short term emissions are to be estimated, Figure 4.5-1 should be used in conjunction with Table 4.5-1.

No control devices are employed to reduce evaporative emissions from cutback asphalts. Asphalt emulsions are typically used in place of cutback asphalts to eliminate VOC emissions.

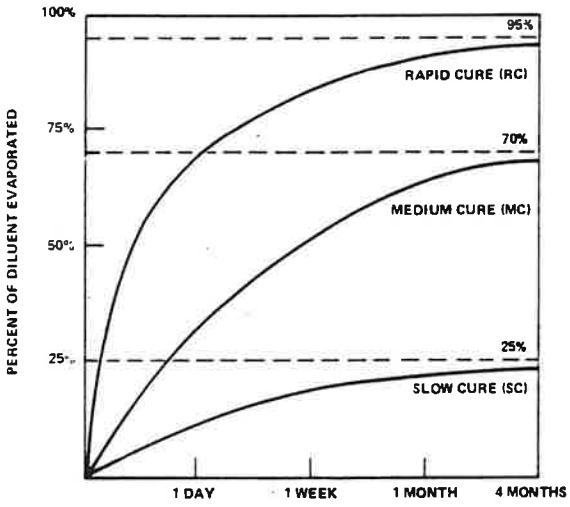

Figure 4.5-1. Percent of diluent evaporated from cutback asphalt over time.

TABLE 4.5-1. EVAPORATIVE VOC EMISSIONS FROM CUTBACK ASPHALTS AS A FUNCTION OF DILUENT CONTENT AND CUTBACK ASPHALT TYPE[a]

EMISSION FACTOR RATING: C

Type of Cutback[b]	Percent, by Volume, of Diluent in Cutback[c]		
	25%	35%	45%
Rapid cure	17	24	32
Medium cure	14	20	26
Slow cure	5	8	10

[a]These numbers represent the percent, by weight, of cutback asphalt evaporated. Factors are based on References 1 and 2.

[b]Typical densities assumed for diluents used in RC, MC and SC cutbacks are 0.7, 0.8 and 0.9 kg/liter, respectively.

[c]Diluent contents typically range between 25-45%, by volume. Emissions may be linearly interpolated for any given type of cutback between these values.

References for Section 4.5

1. R. Keller and R. Bohn, *Nonmethane Volatile Organic Emissions from Asphalt Cement and Liquified Asphalts*, EPA-450/3-78-124, U.S. Environmental Protection Agency, Research Triangle Park, NC, December 1978.

2. F. Kirwan and C. Maday, *Air Quality and Energy Conservation Benefits from Using Emulsions To Replace Asphalt Cutbacks in Certain Paving Operations*, EPA-450/2-78-004. U.S. Environmental Protection Agency, Research Triangle Park. NC, January 1978.

3. David W. Markwordt, *Control of Volatile Organic Compounds from Use of Cutback Asphalt*, EPA-450/2-77-037, U.S. Environmental Protection Agency, Research Triangle Park. NC, December 1977.

M A T E R I A L S A F E T Y D A T A S H E E T

IDAHO ASPHALT SUPPLY INC.
Nampa, Idaho

CRS-1, CRS-2, CRS-2f, CRS-2h

MATERIAL IDENTIFICATION

Chemical Name: Cationic Rapid Set Asphalt Emulsion
Manufacturer: Idaho Asphalt Supply Inc.
Address: P.O. Box 966, Nampa, Id. 83651
Hazard Rating (NFPA)
Health: 1
Fire: 0
Reactivity: 0
Special: None

CAS Registry No. N/A
Date Prepared; 5/19/89

Hazard Rating Scale:
0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

HAZARDOUS INGREDIENTS

Ingredients	CAS #	Percent	PEL	STEL	TLV
Asphalt cement	8052-42-4	65-70%	N/A	10mg/m	5mg/m
Naptha	8032-32-4	0-3%	100ppm	N/A	400ppm
Emulsifier	TSCA	0.15-0.5%	N/A	N/A	N/A

PHYSICAL DATA

Boiling Point - 212f
Vapor Pressure - <1
Vapor Density - >0.062
Specific Gravity @ 60f - 1.025 to 1.06
Melting Point - N/A
Evaporation Rate - <1
Solubility in water - up to 100%
Appearance and Odor - Viscous brown to black liquid ; odor of amines and hydrocarbons

FIRE AND EXPLOSIVE DATA

Flash Point - N/A
Autoignition Temperature NFPA - N/A
Extinguishing Media - CO2, Class "B" extinguisher, foam and water fog.
Special Fire Fighting Procedures - Avoid breathing vapors, wear self-contained breathing apparatus.
Unusual Fire Explosion Hazards - DO NOT heat material above 212f to avoid generating excessive steam pressure.

REACTIVITY DATA

Stable: X Unstable:

Conditions to Avoid	-	DO NOT HEAT ABOVE 212f, Ignition sources.
Incompatible Materials	-	Avoid strong oxidizing agents
Hazardous Decomposition Products	-	Combustion may form CO2, CO, and sulfur oxide.
Hazardous Polymerization	-	Will not occur.

HEALTH HAZARD DATA

Route of Exposure	Primary Route	Signs and Symptoms
Inhalation	[X]	Use with good ventilation. May cause respiratory tract irritation
Skin Absorption	[ ]	No significant symptoms indicative of skin absorption expected.
Skin Irritation	[X]	Will cause burns when product is hot. May cause dermatitis and acne like lesions on prolonged exposure.
Ingestion	[ ]	May cause nausea and diarrhea.
Eye Contact	[X]	Will burn and irritate.

Listed as Carcinogen? Not listed by NTP, IARC, or OSHA.

EMERGENCY FIRST AID

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration as needed Obtain medical attention promptly.
Eye Contact:	Flush eyes with low pressure water for at least 15 minutes and obtain medical attention immediately.
Skin Contact:	If product is hot, cool with cold water. Otherwise wash thoroughly with soap and water.
Ingestion:	Call physician. Do not induce vomiting.

PROTECTIVE EQUIPMENT / CONTROL MEASURES

Respiratory Protection:	Avoid breathing vapors in confined spaces. NIOSH approved respirators may be required if TLV's are exceeded.
Eye Protection:	Use safety glasses, goggles or face shields.
Skin Protection:	Use rubber gloves, coveralls and impervious footwear.
Engineering controls:	Local exhaust ventilation may be required to meet exposure standards in confined areas.
Handling Precautions:	Avoid heating over 212f.

SPILL AND DISPOSAL

Spill or Release:	Stop release, prevent flow from entering sewers or public waters. Allow to cool. Recover large spill. Let product cure or soak up with sand on smaller spills.
Waste Disposal Method:	Handle in accordance with federal, state and local regulations.

DISCLAIMER

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MATERIAL SAFETY DATA SHEET

IDAHO ASPHALT SUPPLY INC.
(Hauser) Post Falls, ID

LMCRS-2, LMCRS-2h, CRS-2R

MATERIAL IDENTIFICATION

Chemical Name: Cationic Rapid Set Asphalt Emulsion
Manufacturer: Idaho Asphalt Supply Inc.
Address: P.O. Box 966, Nampa, Id. 83651
Hazard Rating (NFPA)
Health: 1
Fire: 0
Reactivity: 0
Special: None

CAS Registry No. N/A
Date Prepared: 5/19/89

Hazard Rating Scale:
0 - Minimal 3 - Serious
1 - Slight 4 - Severe
2 - Moderate

HAZARDOUS INGREDIENTS

Ingredients	CAS #	Percent	PEL	STEL	TLV
Asphalt cement	8052-42-4	57-68%	N/A	10mg/m	5 mg/m
Naptha	8032-32-4	0-3%	100ppm	N/A	400ppm
Elastomers	126-99-8	1.5-3%	10ppm	N/A	10ppm
Emulsifier	TSCA	1-3%	N/A	N/A	N/A

PHYSICAL DATA

Boiling Point - 212f
Vapor Pressure - <1
Vapor Density - >0.062
Specific Gravity @ 60f - 1.025 to 1.06
Melting Point - N/A
Evaporation Rate - <1
Solubility in water - up to 100%
Appearance and Odor - Viscous brown to black liquid ; odor of amines and hydrocarbons

FIRE AND EXPLOSIVE DATA

Flash Point - N/A
Autoignition Temperature NFPA - N/A
Extinguishing Media - CO2, Class "B" extinguisher, foam and water fog.
Special Fire Fighting Procedures - Avoid breathing vapors, wear self-contained breathing apparatus.
Unusual Fire Explosion Hazards - DO NOT heat material above 212f to avoid generating excessive steam pressure.

REACTIVITY DATA

Stable: X Unstable:

Conditions to Avoid	-	DO NOT HEAT ABOVE 212f, Ignition sources.
Incompatible Materials	-	Avoid strong oxidizing agents
Hazardous Decomposition Products	-	Combustion may form CO2, CO, and sulfur dioxide.
Hazardous Polymerization	-	Will not occur.

HEALTH HAZARD DATA

Route of Exposure	Primary Route	Signs and Symptoms
Inhalation	[X]	Use with good ventilation. May cause respiratory tract irritation
Skin Absorption	[ ]	No significant symptoms indicative of skin absorption expected.
Skin Irritation	[X]	Will cause burns when product is hot. May cause dermatitis and acne like lesions on prolonged exposure.
Ingestion	[ ]	May cause nausea and diarrhea.
Eye Contact	[X]	Will burn and irritate.

Listed as Carcinogen? Not listed by NTP, IARC, or OSHA.

EMERGENCY FIRST AID

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration as needed Obtain medical attention promptly.
Eye Contact:	Flush eyes with low pressure water for at least 15 minutes and obtain medical attention immediately.
Skin Contact:	If product is hot, cool with cold water. Otherwise wash thoroughly with soap and water.
Ingestion:	Call physician. Do not induce vomiting.

PROTECTIVE EQUIPMENT / CONTROL MEASURES

Respiratory Protection:	Avoid breathing vapors in confined spaces. NIOSH approved respirators may be required if TLV's are exceeded.
Eye Protection:	Use safety glasses, goggles or face shields.
Skin Protection:	Use rubber gloves, coveralls and impervious footwear.
Engineering controls:	Local exhaust ventilation may be required to meet exposure standards in confined areas.
Handling Precautions:	Avoid heating over 212f.

SPILL AND DISPOSAL

Spill or Release:	Stop release, prevent flow from entering sewers or public waters. Allow to cool. Recover large spill. Let product cure or soak up with sand on smaller spills.
Waste Disposal Method:	Handle in accordance with federal, state and local regulations.

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MATERIAL SAFETY DATA SHEET

IDAHO ASPHALT SUPPLY INC.
Nampa, Idaho

MC Cutbacks

MATERIAL IDENTIFICATION

Chemical Name: Medium Cure Cutback Asphalts
Manufacturer: Idaho Asphalt Supply Inc.
Address: P.O. Box 966, Nampa, Id. 83651
Hazard Rating (NFPA)
Health: 2
Fire: 2
Reactivity: 0
Special: None

CAS Registry No. N/A
Date Prepared: 5/19/89

Hazard Rating Scale:
0 - Minimal 3 - Serious
1 - Slight 4 - Severe
2 - Moderate

HAZARDOUS INGREDIENTS

Ingredients	CAS #	Percent	PEL	STEL	TLV
Asphalt cement	8052-42-4	60-90%	N/A	10mg/m	5mg/m
Benzene	100-14-1	>0.1%?	N/A	25 ppm	10ppm
No.1 Fuel	8032-32-4	40-10%	100ppm	N/A	400ppm

PHYSICAL DATA

Boiling Point - > 300f
Vapor Pressure - < 1
Vapor Density - > 1
Solubility in water - No
Specific Gravity @ 60f - 0.90 to 1.10
Melting Point - N/A
Evaporation Rate - <1
Appearance and Odor - Black liquid or solid. Odor of hydrocarbons.

FIRE AND EXPLOSIVE DATA

Flash Point - > 100f TOC
Autoignition Temperature NFPA - N/A
Extinguishing Media - CO2. Class "B" extinguisher. foam or water fog.
Special Fire Fighting Procedures - Avoid breathing vapors. Avoid subsurface penetration with water; may cause foaming or frothing which could spread hazard
Unusual Fire Explosion Hazards - None

REACTIVITY DATA

Stable: X Unstable:

Conditions to Avoid	-	Ignition sources.
Incompatible Materials	-	Avoid strong oxidizing agents
Hazardous Decomposition Products	-	Combustion may form CO2, CO, and sulfur dioxide.
Hazardous Polymerization	-	Will not occur.

HEALTH HAZARD DATA

Route of Exposure	Primary Route	Signs and Symptoms
Inhalation	[X]	Use with good ventilation. May cause respiratory tract irritation
Skin Absorption	[ ]	No significant symptoms indicative of skin absorption expected.
Skin Irritation	[X]	Will cause burns when product is hot. May cause dermatitis and acne like lesions on prolonged exposure.
Ingestion	[ ]	May cause nausea and diarrhea.
Eye Contact	[X]	Will burn and irritate.

Listed as Carcinogen? Not listed by NTP, IARC, or OSHA.

EMERGENCY FIRST AID

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration as needed Obtain medical attention promptly.
Eye Contact:	Flush eyes with low pressure water for at least 15 minutes and obtain medical attention immediately.
Skin Contact:	If product is hot, cool with cold water. Otherwise wash thoroughly with soap and water.
Ingestion:	Call physician. Do not induce vomiting.

PROTECTIVE EQUIPMENT / CONTROL MEASURES

Respiratory Protection:	Avoid breathing vapors in confined spaces. NIOSH approved respirators may be required if TLV's are exceeded.
Eye Protection:	Use safety glasses, goggles or face shields.
Skin Protection:	Use rubber gloves, coveralls and impervious footwear
Engineering controls:	Local exhaust ventilation may be required to meet exposure standards in confined areas.
Handling Precautions:	Storage tanks and trucks must be emptied, cooled, ventilated, and tested for absence of vapors before allowing personel entry.

SPILL AND DISPOSAL

Spill or Release:	Stop release, prevent flow from entering sewers or public waters. Allow to cool. Recover large spill. Let product cure or soak up with sand on smaller spills.
Waste Disposal Method:	Handle in accordance with federal, state and local regulations.

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M A T E R I A L S A F E T Y D A T A S H E E T

IDAHO ASPHALT SUPPLY INC.
Nampa, Idaho

CMS-2, CMS-2h, CMS-2s, CMS-2R

MATERIAL IDENTIFICATION

Chemical Name: Cationic Medium Set Asphalt Emulsion
Manufacturer: Idaho Asphalt Supply Inc.
Address: P.O. Box 966, Nampa, Id. 83651
Hazard Rating (NFPA)

Health: 1
Fire: 1
Reactivity: 0
Special: None

CAS Registry No. N/A
Date Prepared; 5/19/89

Hazard Rating Scale:
0 - Minimal 3 - Serious
1 - Slight 4 - Severe
2 - Moderate

HAZARDOUS INGREDIENTS

Ingredients	CAS #	Percent	PEL	STEL	TLV
Asphalt cement	8052-42-4	60-70%	N/A	10mg/m	5mg/m
Benzene	100-14-1	>0.1%?	N/A	25 ppm	10ppm
Naptha	8032-32-4	5-15%	100ppm	N/A	400ppm
Emulsifier	TSCA	0.15-0.5%	N/A	N/A	N/A

PHYSICAL DATA

Boiling Point - 212f
Vapor Pressure - <1
Vapor Density - >0.062
Specific Gravity @ 60f - 1.025 to 1.06
Melting Point - N/A
Evaporation Rate - <1
Solubility in water - up to 100%
Appearance and Odor - Viscous brown to black liquid ; odor of amines and hydrocarbons

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FIRE AND EXPLOSIVE DATA

Flash Point - N/A
Autoignition Temperature NFPA - N/A
Extinguishing Media - CO2, Class "B" extinguisher, foam and water fog.
Special Fire Fighting Procedures - Avoid breathing vapors, wear self-contained breathing apparatus.
Unusual Fire Explosion Hazards - DO NOT heat material above 212f to avoid generating excessive steam pressure.

REACTIVITY DATA

Stable: X Unstable:

Conditions to Avoid	-	DO NOT HEAT ABOVE 212f, Ignition sources.
Incompatible Materials	-	Avoid strong oxidizing agents
Hazardous Decomposition Products	-	Combustion may form CO2, CO, and sulfur dioxide.
Hazardous Polymerization	-	Will not occur.

HEALTH HAZARD DATA

Route of Exposure	Primary Route	Signs and Symptoms
Inhalation	[X]	Use with good ventilation. May cause respiratory tract irritation
Skin Absorption	[ ]	No significant symptoms indicative of skin absorption expected.
Skin Irritation	[X]	Will cause burns when product is hot. May cause dermatitis and acne like lesions on prolonged exposure.
Ingestion	[ ]	May cause nausea and diarrhea.
Eye Contact	[X]	Will burn and irritate.

Listed as Carcinogen? Not listed by NTP, IARC, or OSHA

EMERGENCY FIRST AID

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration as needed Obtain medical attention promptly.
Eye Contact:	Flush eyes with low pressure water for at least 15 minutes and obtain medical attention immediately.
Skin Contact:	If product is hot, cool with cold water. Otherwise wash thoroughly with soap and water.
Ingestion:	Call physician. Do not induce vomiting.

PROTECTIVE EQUIPMENT / CONTROL MEASURES

Respiratory Protection:	Avoid breathing vapors in confined spaces. NIOSH approved respirators may be required if TLV's are exceeded.
Eye Protection:	Use safety glasses, goggles or face shields.
Skin Protection:	Use rubber gloves, coveralls and impervious footwear.
Engineering controls:	Local exhaust ventilation may be required to meet exposure standards in confined areas.
Handling Precautions:	Avoid heating over 212f.

SPILL AND DISPOSAL

Spill or Release:	Stop release, prevent flow from entering sewers or public waters. Allow to cool. Recover large spill. Let product cure or soak up with sand on smaller spills.
Waste Disposal Method:	Handle in accordance with federal, state and local regulations.

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M A T E R I A L S A F E T Y D A T A S H E E T

IDAHO ASPHALT SUPPLY INC.
Nampa, Idaho

CSS-1, CSS-1H

MATERIAL IDENTIFICATION

Chemical Name: Cationic Slow Set Asphalt Emulsion
Manufacturer: Idaho Asphalt Supply Inc.
Address: P.O. Box 966, Nampa, Id. 83651
CAS Registry No.: N/A
Date Prepared: 7/1/89

Hazard Rating (NFPA)

Health:	1
Fire:	0
Reactivity:	0
Special:	None

Hazard Rating Scale:
0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

HAZARDOUS INGREDIENTS

Ingredients	CAS #	Percent	PEL	STEL	LV
Asphalt cement	8052-42-4	57-68%	N/A	10mg/m	mg/m
Emulsifier	TSCA	1-3%	N/A	N/A	N/A

PHYSICAL DATA

Boiling Point - 212f
Vapor Pressure - <1
Vapor Density - >0.062
Specific Gravity @ 60f - 1.025 to 1.06
Melting Point - N/A
Evaporation Rate - <1
Solubility in water - up to 100%
Appearance and Odor - Viscous brown to black liquid ; odor of amines and hydrocarbons

FIRE AND EXPLOSIVE DATA

Flash Point - N/A
Autoignition Temperature NFPA - N/A
Extinguishing Media - CO2, Class "B" extinguisher, foam and water fog.
Special Fire Fighting Procedures - Avoid breathing vapors, wear self-contained breathing apparatus.
Unusual Fire Explosion Hazards - DO NOT heat material above 212f to avoid generating excessive steam pressure.

REACTIVITY DATA

Stable: X Unstable:

Conditions to Avoid	-	DO NOT HEAT ABOVE 212f, Ignition sources.
Incompatible Materials	-	Avoid strong oxidizing agents
Hazardous Decomposition Products	-	Combustion may form CO2, CO, and sulfur dioxide.
Hazardous Polymerization	-	Will not occur.

HEALTH HAZARD DATA

Route of Exposure	Primary Route	Signs and Symptoms
Inhalation	[X]	Use with good ventilation. May cause respiratory tract irritation
Skin Absorption	[ ]	No significant symptoms indicative of skin absorption expected.
Skin Irritation	[X]	Will cause burns when product is hot. May cause dermatitis and acne like lesions on prolonged exposure.
Ingestion	[ ]	May cause nausea and diarrhea.
Eye Contact	[X]	Will burn and irritate.

Listed as Carcinogen? Not listed by NTP, IARC, or OSHA.

EMERGENCY FIRST AID

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration as needed Obtain medical attention promptly.
Eye Contact:	Flush eyes with low pressure water for at least 15 minutes and obtain medical attention immediately.
Skin Contact:	If product is hot, cool with cold water. Otherwise wash thoroughly with soap and water.
Ingestion:	Call physician. Do not induce vomiting.

PROTECTIVE EQUIPMENT / CONTROL MEASURES

Respiratory Protection:	Avoid breathing vapors in confined spaces. NIOSH approved respirators may be required if TLV's are exceeded.
Eye Protection:	Use safety glasses, goggles or face shields.
Skin Protection:	Use rubber gloves, coveralls and impervious footwear.
Engineering controls:	Local exhaust ventilation may be required to meet exposure standards in confined areas.
Handling Precautions:	Avoid heating over 212f.

REVISION #1

LABEL INFORMATION

Chemical name: Asphalt Cements
Common name: Penetration Graded Asphalt AASHTO M-20;
Viscosity Graded Asphalt AASHTO M-226.

DANGER! VAPOR HARMFUL
DO NOT INTRODUCE WATER

Keep away from flames and other sources of ignition
Stable unless moisture is introduced
Extinguishing media - CO_2 or Class 'B' extinguisher
DO NOT APPLY WATER
Avoid breathing vapors. May contain low concentrations of hydrogen sulfide. Wear self-contained breathing apparatus when fire fighting. May cause dermatitis and acne lesions on prolonged and repeated exposure. Can cause severe burns when hot material contacts unprotected skin. Wear chemical resistant gloves, goggles or face shield, long sleeve shirt and pants. Use NIOSH approved respirator if TVL's are exceeded.

FIRST AID

Inhalation - Remove victim to fresh air. Start artificial resuscitation if necessary. Call a physician.

Eyes - Flush eyes with water for at least 15 minutes. Call a physician.

Skin- If hot material contacts skin, place affected part in cold water. Have a physician remove material or for small amounts use mineral oil for removal.

Ingestion - If ingested call a physician.

For further information refer to data sheet for Asphalt Cements.

Farmers Union Central Exchange, Inc. (CENEX)
P. O. Box 909
Laurel, Montana 59044
Telephone: (406)628-4311 or (406)628-4518

REVISION #1

FARMERS UNION CENTRAL EXCHANGE, INC.
P.O. Box 909, Laurel, Montana 59044

Asphalt Cements
Quick Identifier

MATERIAL SAFETY DATA SHEET

SECTION 1 GENERAL

Manufacturer's Name	Farmers Union Central Exchange, Inc. (CENEX)
Emergency Telephone No. 406/628-4518	Information Telephone No. 406/628-4311
Chemical Name Asphalt Cements	Date Prepared 9/20/85
Chemical Family	Petroleum Asphalt Cements
Common Name(s)	Penetration graded asphalt AASHTO M-20; Viscosity graded asphalt AASHTO M-22(

SECTION 2 HAZARDOUS INGREDIENTS/IDENTITY

This product, when heated above the softening point, may contain low concentrations of hydrogen sulfide. This gas, at low concentrations, may be irritating to eyes, skin and respiratory tract.

OSHA PEL: Petroleum Asphalt Cement Not Available

ACGIH TLV'S Asphalt Cements - 5mg/m^3 Fumes; STEL - 10mg/m^3

SECTION 3 PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	Above 1050°F	Specific Gravity	1.02-1.06
Vapor Pressure	<1	Melting Point	Unknown
Vapor Density	>1	Evaporation Rate	Unknown

Solubility in Water No

Appearance and Odor Black semi-solid thermoplastic material; odor of hydrocarbon.

Becomes liquid above 90-130°F

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

Flash Point in Degrees F (Method Used)	Above 325°F COC (D-92)	Flammable Limits in air % by volume	LEL Unknown	UEL Unknown

Extinguishing Media CO_2 and Class 'B' extinguisher

Special Fire Fighting Procedures Avoid breathing vapors, wear self-contained breathing apparatus. DO NOT APPLY WATER.

Unusual Fire and Explosion Hazards Flammable at temperatures above 500°F.

DO NOT MIX WITH WATER.

SECTION 5 REACTIVITY DATA

Stability	Unstable		Conditions to Avoid	Stable unless moisture is introduced
	Stable	X		Flames and other sources of ignition

Incompatability (Materials to Avoid) Water, hydrocarbon solvents, strong oxidizing agents

Hazardous Decomposition Products Fumes, smoke, carbon monoxide in the case of incomplete combustion

Hazardous Polymerization	May Occur		Conditions to Avoid	
	Will Not Occur	X		

SECTION 6 HEALTH HAZARDS

Acute Will cause severe burns if hot material contacts unprotected skin.

Chronic Respiratory tract irritation

Signs & Symptoms of Exposure May cause dermatitis and acne like lesions on prolonged and repeated exposure to dust or vapors.

Medical Conditions Generally Aggravated by Exposure Respiratory disease and infection; cardiovascular diseases

Chemical Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	Yes	No	X	IARC	Yes	No	X	OSHA	Yes	No	X

ROUTES OF ENTRY WITH EMERGENCY & FIRST AID PROCEDURES

1. Inhalation Remove victim to fresh air. Start artificial resuscitation if necessary. Call a physician.
2. Eyes Flush eyes with water for at least 15 minutes. Call a physician.
3. Skin If hot material contacts skin, place affected part in cold water. Have a physician remove material or for small amounts use mineral oil for removal.
4. Ingestion If ingested call a physician.

SECTION 7 SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Never introduce water when hot. Avoid skin exposure to hot material. Avoid breathing vapors in confined spaces. Avoid sources of ignition.

Shipping Information DOT ID #NA1999 - No Placard Required

Steps to be Taken in Case Material is Spilled or Released In case of spillage allow to cool and pick up when solid or semi-solid. Have proper extinguishing media present.

Waste Disposal Methods Handle in accordance with federal, state and local regulations.

SECTION 8 CONTROL MEASURES

Ventilation 1. Local Exhaust 2. Mechanical — If possibility of vapor or fume accumulation exists, utiliz explosion proof ventilating equipment, to avoid toxic or explosive concentrations.

Protective Gloves Chemical Resistant

Eye Protection Goggles or Face Shield

Respiratory Protection (Specify Type) Use appropriate NIOSH approved respirator if TLV's are exceeded.

Other Protective Clothing or Equipment Long sleeve shirt and pants to minimize skin contact.

Work & Hygienic Wash exposed skin with soap and water after work periods and before

DRAFT

Idaho Division of Environmental Quality

Air Permitting Screening Policy for Air Strippers used in the Cleanup of Petroleum Contaminated Groundwater

DRAFT

DRAFT

This policy is designed to quickly identify air stripper cleanups of petroleum contaminated ground water which pose limited risk to the public through the air pathway, and to expedite the approval for such air emissions. This policy is designed to work together with DEQ's Screening Model and Risk Assessment Procedures For Air Quality Permitting of Vapor Extraction Systems and Air Stripping Used for Leaking Underground Storage Tank Cleanup. Version 1.0 of that document is being updated to include this screening policy for air stripping.

The policy is implemented through a simple question and answer form (a copy of which follows), which conservatively estimates the significance of the emissions given the distance to the nearest property boundary or receptor. Sources with relatively insignificant emissions, as determined by answering the questions on the form and documented as required on the form, are offered DEQ review and final action within two weeks of the date of receipt. This significantly accelerates DEQ turnaround time to expedite the cleanup, since the timeline on processing air permit applications is typically 90 days or more.

For the purposes of this policy, a sensitive receptor is defined as any building or location occupied or frequented by persons who, due to age, infirmity or other health based criteria as defined by the Division of Environmental Quality, may be more susceptible to the deleterious effects of a toxic air pollutant(s) than the general population. Examples of sensitive receptors include but are not limited to: elementary and secondary schools, licensed day care centers, playgrounds and parks, hospitals, clinics and nursing homes.

The existence of a sensitive receptor within 500 feet of the proposed action will not necessarily result in a permit denial, but will trigger tighter DEQ scrutiny of risks to the surrounding population.

This screening policy does not supersede any other DEQ policies or requirements, but instead complements existing DEQ policies by identifying low risk sources, removing them from the standard air permit workload, and accelerating their review. Sources not approvable through this screening policy still may be approvable through the DEQ air quality permitting program. In those cases, a more thorough risk assessment will be required and DEQ review will remain on traditional timelines.

DRAFT

AIR PERMIT SCREENING TEST FOR AIR STRIPPING PETROLEUM CONTAMINATED WATER

Company/facility name _____
Facility address _____

A. PRESENCE OF SENSITIVE RECEPTORS

Is the proposed air stripping site located within 500 feet of a sensitive recepto: defined in the attached Air Permitting Screening Policy for Air Strippers used i: Cleanup of Petroleum Contaminated Ground water?

YES _____ NO _____

B. CALCULATE UNCONTROLLED BENZENE LEVELS IN AIR EMISSIONS

1. Flow rate of water into Air Stripper in gallons per minute. The proposed flow must have DEQ approval. The proposed flow rate must be sufficient to adequ: control, contain, and remove the petroleum contamination. Please a: documentation verifying DEQ approval of the proposed flow rate.

_____ gal./min.

2. Convert flow rate to liters per minute.
Multiply line 1 by 3.785. _____ *l*/min.

3. Determine Benzene concentration in ground water.

Is free product present in any ground water well associated with this petroleum release site? YES _____ NO _____

a. If you marked YES, you must conduct a pilot test to determine expected ber concentrations. See the attached "Directions for Conducting a Pilot Tes Determine Benzene Concentrations in Ground Water" for more information. I the benzene concentration here.

Benzene concentration from pilot test = _____ ppb (ug,

b. If you marked NO and free product is <u>not</u> present in any well, determine benzene concentration in the ground water by one of the following two meth

i. Enter the Benzene concentration from a ground water well with the hic benzene concentration. Use only the most recent analysis.

Benzene concentration from single well = _____ ppb (ug,

ii. Conduct a pilot test to determine benzene concentrations following directions of the attached "Directions for Conducting Pilot a Tes Determine Benzene Concentrations in Ground Water."

Benzene concentration from pilot test = _____ ppb (ug,

4. Calculate benzene flow rate to air stripper.
Multiply line 2 by line 3a or 3b, whichever is appropriate. _____ ug/min.

5. Convert uncontrolled benzene air emission rate from ug/min to lbs/day. Multiply line 4 by 3.18E-6. _____ lbs./day

B. CALCULATION OF MAXIMUM ALLOWABLE BENZENE EMISSION RATE

6. a. Distance to nearest property line. _____ ft
b. Distance to nearest offsite structure serving as a workplace or residence _____ ft

7. **Allowable Benzene emission level.**

   a. Divide Line 6a by 100. _____
   b. Divide line 6b by 200. _____
   c. Enter the larger of line 7a or Line 7b _____
   d. Enter the value 1.5 or the result from 7c, whichever is smaller. _____ lbs./day

The result in line 7d is the maximum allowable benzene emission rate for the proposed stripping operation at this site. Is the uncontrolled emission rate for benzene in li less than the maximum allowable benzene emission level in line 7d?

Yes ____ Control of benzene air emissions shall not be required. You ay skip Sec C. of this form and proceed directly to Section D. Document all data ent and enclose complete set of most recent water sampling results, a site map c to scale showing monitoring wells, and your monitoring plan. Send them with form to Division of Environmental Quality, Permits and Enforcement Program, N. Hilton, Boise, ID 83706.

No ____ Control of benzene air emissions shall be required. Call (208) 334-5898 review air quality permit requirements or proceed to the following page complete questions on emissions controls.

C. **CALCULATE CONTROLLED BENZENE LEVELS IN AIR EMISSIONS**
(please complete lines 1 to 7 before proceeding with this section)

8. Describe the type of emissions control you propose to use.

   _____
   _____
   _____

9. Control Efficiency (0 < eff. < 1) 0.

10. 1.0 - Control Efficiency 0.

11. Enter uncontrolled benzene air emission rate from line 7 on reverse side. _____ lbs/day

12. Controlled benzene emissions Multiply lines 10 and 11. _____ lbs/day

Is the controlled emission rate for Benzene in line 12 less than the maximum allow Benzene emission rate calculated in line 7d?

Yes ____ Document all data entries and enclose complete set of most recent water samp results, a site map drawn to scale showing monitoring wells, your monito plan, and documentation on the control equipment (manufacturer's specificatio its application at the proposed site, and its efficiency if credit is take emission controls through this process. Send them with this form to Div of Environmental Quality, Permits and Enforcement Program, 1410 N. Hilton, Bo ID 83706.

No ____ Call (208) 334-5898, to review air quality permit requirements with DEQ staff

D. **SIGNATURE AND CONTACT INFORMATION**

Applications approved through this process will be required to document emissions rat DEQ during the initial two months of operation. Emissions rates exceeding those calcu above may result in further emissions limitations. DEQ may, in its sole discretion, rec modification to any project plans in order to protect public health.

_____ _____
Signature of preparer

(____)_____ Phone number

DRAFT

Directions for Conducting a Pilot Test to Determine Benzene Concentrations in Ground Water (Air Stripping)

Benzene emission rates in air associated with air stripping operations are estimated using a benzene concentration in ground water. These data are then used to determine whether air emissions from the air stripping equipment require controls. The Division of Environmental Quality (DEQ) has determined that a short-term, full-scale pumping test with ground water sampling is an appropriate method for determining the benzene concentration in ground water in some cases. This procedure is required for determining benzene concentrations in ground water when free product is present in monitoring or recovery wells. It is also an acceptable, but not required, method of determining benzene concentrations when free product is not present.

For purposes of this guidance, the term "pilot test" shall mean the process of pumping ground water from the contaminated subsurface in the area targeted for remediation. Water samples shall be collected for laboratory analysis to determine benzene concentrations prior to treatment by the air stripping equipment. The criteria contained herein are designed specifically as a means of determining the concentration of benzene in pumped ground water. It may be possible to modify an aquifer test (designed to determine subsurface hydraulic parameters) conducted during site investigation work to obtain the same data. Alternatively, it may be appropriate to design or modify the pilot test so that subsurface hydraulic parameters are determined along with the expected benzene concentration.

Note that DEQ does not require air stripping equipment to be installed prior to conducting the pilot test. The pilot test may be conducted at any time within the site investigation as long as the benzene concentration is not likely to increase appreciably over time and site conditions are expected to be comparable between the time of sampling and cleanup. The criteria to be followed in performance of an acceptable pilot test are:

- Pumping shall take place from recovery well(s) expected to be used in the full-scale cleanup.

- The pumping rate shall be the same rate used in the full-scale cleanup. Usually, the pumping rate is approved by DEQ

through submission of a written cleanup plan. The pumping system shall operate continuously at the desired rate for a minimum of two (2) hours and a maximum of twelve (12) hours. Upon completion of pumping, one (1) grab sample shall be collected and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX).

- One (1) duplicate sample shall be collected and analyzed for BTEX. Duplicate sample analyses must result in a relative percent difference (RPD) of 25% or less.

- Samples shall be collected from the pumping system at a location representative of inflow to the air stripper but after any preliminary treatment equipment (i.e., oil/water separators, etc.).

- The laboratory analysis method must be an EPA-approved method and must have a lower detection limit of no greater than one (1) ug/l (ppb). Sampling must be conducted in accordance with the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (National Water Well Association, 1986) or equivalent.

- Contaminated water generated during the pilot test must be treated or disposed of in a safe and acceptable manner. On-site storage prior to treatment system completion is acceptable as long as all applicable regulations and ordinances are followed. The treatment and disposal of all generated wastes are the sole responsibility of the person(s) conducting the pilot test.

C. List appropriate soil sample analytical results from excavated contaminated soil. Samples collected shall be representative of the respective stockpiled PCS. If the petroleum is not gasoline or fuel oil, attach separate table.

col.1 Stockpile volume (yd^3)	col.2 Sample I.D.	col.3 Sample type TPH-Gas TPH-Diesel	col.4 Grab or composite sample?	col.5 Sample TPH (ppm)	col.6 Average TPH per stockpile	col.7 Multiply average TPH (col. 6) by stockpile volume (col. 1)
_____	_____	_____	_____	_____		
	_____	_____	_____	_____		
	_____	_____	_____	_____		
	_____	_____	_____	_____		
	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____		
	_____	_____	_____	_____		
	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____		
	_____	_____	_____	_____		
	_____	_____	_____	_____	_____	_____

sum of col. 1 _____ sum of col. 7 = _____

Note: Copies of lab results and chain of custody forms must be included.

IV. **Screening test for air emissions.**

A. Calculate average TPH for all PCS to be treated.

1. Enter TOTAL TPH x VOL. (sum of col. 7) here. _____
2. Enter TOTAL VOLUME (sum of col. 1) here. _____
3. Calculate AVERAGE TPH. Divide line 1 (TOTAL TPH x VOL.) by line 2 (TOTAL VOLUME) and enter quotient here. _____

B. Refer to table 2 to determine setback requirement based upon the TOTAL VOLUME and AVERAGE TPH values calculated above. Enter the setback requirement here. _____

Note: If the setback requirement is greater than the distance to the nearest building or residential property line appearing in line II.D, then the land-treatment proposal will not be approved under this expedited format and further review of the land-treatment proposal will be required.

V. **Include the following figures:**

A. Copy of county soil survey map (if the county has been mapped) with copies of the interpretation tables or sheets. CLEARLY MARK location of site on the soil map.

B. Map with exact land treatment site location marked.

VI. **Proposed end use of PCS:** _____

_____

_____

****

_____
Applicant's signature

_____ ( ) _____
Date Telephone

DRAFT

Consultant (or other) preparing this form

Company name_____

Street_____

City, zip_____

Telephone_____

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OFFSET DISTANCES FOR LANDFARMING GASOLINE PETROLEUM CONTAMINATED SOIL

(Distances given in feet)

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS (PPM)

CUBIC YARDS OF MATERIAL	150	200	250	300	350	400	500	600	700	800	900	1000	1200	1400	1500	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000
50	50	50	50	50	50	50	50	50	50	50	53	60	74	87	94	100	113	125	137	148	160	170	181	206	229
100	50	50	50	50	50	50	50	53	65	76	87	98	119	140	149	159	177	195	212	229	244	260	274	309	343
150	50	50	50	50	50	50	57	72	87	101	116	129	156	181	193	205	227	249	270	290	310	329	355	396	436
200	50	50	50	50	50	52	70	89	106	123	140	156	187	216	230	243	270	295	319	343	367	390	412	462	511
250	50	50	50	50	51	62	83	104	124	143	161	179	214	247	262	278	308	336	364	392	420	445	470	530	588
300	50	50	50	50	59	71	95	117	139	160	181	201	239	275	292	309	343	379	408	437	466	495	523	590	656
350	50	50	50	53	66	79	104	128	150	171	191	210	244	301	320	339	376	412	448	485	522	562	603	719	858
400	50	50	50	59	73	88	115	142	167	192	216	239	284	326	347	367	407	445	482	517	552	587	621	703	781
450	50	50	50	65	80	95	125	153	180	207	232	257	304	350	372	394	437	477	516	555	593	630	667	755	839
500	50	50	54	70	87	103	134	164	193	220	247	273	324	373	397	420	464	508	550	591	632	672	711	804	894
550	50	50	58	76	93	110	142	174	204	234	262	290	343	395	420	444	491	537	582	626	669	712	753	852	947
600	50	50	62	81	99	116	151	184	215	246	276	305	361	417	442	468	517	566	614	660	706	750	794	898	998
650	50	50	66	86	104	123	159	193	226	258	289	320	381	436	464	490	543	594	644	693	741	788	833	943	1047
700	50	50	70	90	110	129	165	202	237	270	303	335	396	453	481	508	562	613	663	711	757	801	843	942	1028
750	50	53	74	95	115	135	174	211	247	282	315	352	414	475	505	534	592	648	703	756	808	859	909	1026	1141
800	50	56	78	99	120	141	181	219	257	293	328	365	430	493	525	555	615	674	731	786	840	893	945	1065	1186
850	50	59	81	104	125	147	188	228	265	304	340	376	446	512	544	576	638	699	758	816	872	927	980	1108	1230
900	50	62	85	108	130	152	195	236	275	314	352	389	461	530	563	596	661	724	785	845	903	959	1015	1147	1273
950	50	64	88	112	135	158	201	244	285	325	364	403	476	547	582	616	683	748	811	873	933	991	1048	1185	1315
1000	50	67	92	116	140	163	209	251	294	335	375	415	491	564	600	635	705	772	837	901	962	1023	1081	1222	1356
1050	50	70	95	120	144	168	214	259	302	345	386	426	506	581	618	655	726	795	862	928	991	1053	1114	1259	1397
1100	50	72	98	124	149	173	220	266	311	355	396	439	520	596	636	673	747	818	887	954	1020	1083	1146	1295	1436
1150	50	75	101	127	153	178	226	274	319	364	409	451	534	614	653	692	767	840	911	980	1048	1113	1177	1330	1476
1200	50	77	104	131	157	183	232	281	328	374	420	463	549	630	670	710	787	862	935	1006	1075	1142	1207	1365	1514
1250	51	80	107	135	161	187	239	286	336	383	430	474	562	646	687	726	807	884	959	1031	1102	1171	1238	1399	1552
1300	53	82	110	138	165	192	244	295	344	393	440	486	575	662	704	745	827	905	982	1056	1128	1199	1267	1432	1589
1350	55	84	113	142	169	197	250	301	352	402	450	497	588	677	720	763	846	926	1005	1081	1154	1226	1297	1465	1626
1400	56	87	116	145	173	201	255	308	360	411	460	508	602	692	736	780	865	947	1027	1105	1180	1254	1325	1496	1662
1450	58	89	119	148	177	206	261	315	368	420	470	519	615	707	752	797	884	968	1049	1129	1206	1281	1354		
1500	60	91	122	152	181	210	266	321	375	428	479	529	627	722	766	813	902	988	1071	1152	1231	1307	1382		

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OFFSET DISTANCES FOR LANDFARMING DIESEL CONTAMINATED SOIL

(Distances given in feet)

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS (PPM)

CUBIC YARDS OF MATERIAL	150	200	250	300	350	400	500	600	700	800	900	1000	1200	1400	1500	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000
50	50	50	50	50	50	50	50	50	50	50	53	60	74	87	94	100	113	125	137	148	160	170	181	206	229
100	50	50	50	50	50	50	50	53	65	76	87	98	119	140	149	159	177	195	212	229	244	260	276	300	300
150	50	50	50	50	50	50	57	72	87	101	116	129	156	181	193	205	227	249	270	290	300	300	300	300	300
200	50	50	50	50	50	52	70	89	106	123	140	156	187	216	230	243	270	295	300	300	300	300	300	300	300
250	50	50	50	50	51	62	83	104	124	143	161	179	214	247	262	278	300	300	300	300	300	300	300	300	300
300	50	50	50	50	59	71	95	117	139	160	181	201	239	275	292	300	300	300	300	300	300	300	300	300	300
350	50	50	50	53	66	79	104	128	150	171	191	210	244	300	300	300	300	300	300	300	300	300	300	300	300
400	50	50	50	59	73	88	115	142	167	192	216	239	284	300	300	300	300	300	300	300	300	300	300	300	300
450	50	50	50	65	80	95	125	153	180	207	232	257	300	300	300	300	300	300	300	300	300	300	300	300	300
500	50	50	54	70	87	103	134	164	193	220	247	273	300	300	300	300	300	300	300	300	300	300	300	300	300
550	50	50	58	76	93	110	142	174	204	234	262	290	300	300	300	300	300	300	300	300	300	300	300	300	300
600	50	50	62	81	99	116	151	184	215	246	276	300	300	300	300	300	300	300	300	300	300	300	300	300	300
650	50	50	66	86	104	123	159	193	226	258	289	300	300	300	300	300	300	300	300	300	300	300	300	300	300
700	50	50	70	90	110	129	166	202	237	270	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
750	50	53	74	95	115	135	174	211	247	282	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
800	50	56	78	99	120	141	181	219	257	293	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
850	50	59	81	104	125	147	188	228	268	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
900	50	62	85	108	130	152	195	236	275	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
950	50	64	88	112	135	158	201	244	285	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1000	50	67	92	116	140	163	208	251	294	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1050	50	70	95	120	144	168	214	259	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1100	50	72	98	124	149	173	220	266	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1150	50	75	101	127	153	178	226	274	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1200	50	77	104	131	157	183	232	281	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1250	51	80	107	135	161	187	238	288	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1300	53	82	110	138	165	192	244	295	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1350	55	84	113	142	169	197	250	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1400	56	87	116	145	173	201	255	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1450	58	89	119	148	177	206	261	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
1500	60	91	122	152	181	210	266	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300