Heritage Research Group

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7901 W. Morris Street • Indianapolis, IN 46231 U.S.A.
317-243-0811 • 486-5095 (FAX)

EVALUATION OF HOT MIX ASPHALT FOR LEACHABILITY

by Anthony J. Kriech

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INTRODUCTION

A #11 surface mixture was prepared in the laboratory at Heritage Research. This mixture was then tested for TCLP (Toxic Characteristic Leachability Procedure) by EPA SW846-1311 and SW846-351 method. The leachate was then tested for metals, volatiles, semivolatiles, organics, and PAH's (Polynuclear Aromatic Hydrocarbons) to determine what materials, if any, were leachable from a new asphalt mixture.

Materials

The material was an AC-20 asphalt cement from Asphalt Materials Inc. in Indianapolis. The aggregate was a #11 Levy slag, #11 stone and #24 sand from Martin Marietta in Indianapolis. The blend of materials is listed below.

	% by Weight
#11 Slag	23.4
#11 Stone	23.4
#24 Sand	46.7
AC-20	6.5

The mixture met current InDOT (Indiana Department of Transportation) specifications according to InDOT 401.02 specifications.

LEACHATE TESTING

Leachate testing and analyses was performed by Heritage EMS Laboratories of Indianapolis. After the TCLP testing, the leachate was subjected to the following analyses.

Test	Method/Procedure
TCLP	SW846-1311
Semivolatiles GC/MS	SW846-3510
PAH's	SW846-8310
Metals	SW846-3010
Volatiles	SW846-3510

Metal Results

Table A lists the results of metal leachability. The metals selected are those heavy metals normally tested for by the EPA. The results show only chrome had a level above detection limit at 0.1 ppm. This is 50 fold below the level of hazardous by characteristic under RCRA (Resource Conservation Recovery Act). Since the asphalt does not typically contain measurable chrome levels, it is possible that the small level of chrome is coming from the slag aggregate, a by-product of the steel making process.

Volatile Organic Results

Table B lists the volatile organic compounds of concern. The results are in parts per billion and show no measurable compound above detection limits. This procedure uses the zero head space TCLP method.

Semivolatile Organic Results

Table C lists the semivolatile organics after TCLP. Again, the results are in parts per billion and no measurable amounts were found above detection limits.

PAH Organic Results

Table D gives the results of leachable PAH's. These compounds are the highest molecular weight group of organic compounds routinely tested by the EPA. Because of asphalt's high molecular weight, there is a concern that these compounds could be present. The detection limits for these compounds are extremely low allowing measurement well below one part per billion. Only a quarter part per billion of naphthalene was found in the asphalt mix leachate. Naphthalene, the most volatile PAH, is well below any established guideline. Naphthalene is not carcinogenic like some of the other PAH's such as Benzo(A)pyrene carcinogenic, which were not found to be present.

CONCLUSIONS

The leachate testing on the #11 surface indicates very low levels of leachable compounds. These levels are well below any guidelines

TABLE A *Metal Leachates (1311)*		
Parameter	**Result, mg/L**	**Detection Limit mg/L**
Barium	BDL	2.000
Cadmium	BDL	0.020
Chromium	0.10	0.010
Lead	BDL	0.200
Silver	BDL	0.040
Arsenic	BDL	0.005
Selenium	BDL	0.005
Mercury	BDL	0.005

TABLE B *Zero Head Space of TCLP Organic (3510)*		
Parameter	**Result μg/L**	**Detection Limit μg/L**
Benzene	BDL	5
Carbon Tetrachloride	BDL	5
Chlorobenzene	BDL	5
Chloroform	BDL	5
1,2 dichloroehtylene	BDL	5
1,1 dichloroethylene	BDL	5
Methyl Ethyl Ketone	BDL	5
Tetrachloroethylene	BDL	5
Trichloroethylene	BDL	5
Vinyl Chloride	BDL	5

TABLE C
TCLP Semi-Volatile Organics

Parameter	Result µg/L	Detection Limit µg/L
1,4-Dichlorobenzene	BDL	12
2,4-Dinitrotoluene	BDL	12
Hexachlorobenzene	BDL	12
Hexachlorobutadine	BDL	12
Hexachloroethane	BDL	12
Nitrobenzene	BDL	12
Pyridine	BDL	60
Cresylic Acid	BDL	30
2-Methyl Phenol	BDL	30
3-Mehtyl Phonel	BDL	30
4-Methyl Phenol	BDL	30
Pentachlorophenol	BDL	60
2,4,5-Trichlorophenol	BDL	30
2,4,6-Trichlorophenol	BDL	30

TABLE D
POLYNUCLEAR AROMATIC HYDROCARBONS BY TCLP

Parameter	Result µg/L	Detection Limit µg/L
Naphthalene	0.25	0.096
Acenaphthylene	BDL	0.15
Acenaphthene	BDL	0.194
Fluorene	BDL	0.023
Phenanthrene	BDL	0.033
Anthracene	BDL	0.015
Fluoranthene	BDL	0.037
Pyrene	BDL	0.04
Benz(A)Anthracene	BDL	0.048
Chrysene	BDL	0.017
Benzo(B)Fluoranthene	BDL	0.02
Benzo(K)Fluoranthene	BDL	0.022
Benzo(A)Pyrene	BDL	0.023
Dibenzo(A,H)Anthracene	BDL	0.018
Benzo(G,H,I)Perylene	BDL	0.036
Indeno(1,2,3-CD)Pyrene	BDL	0.021