Supporting Documents for Initial Risk-Based Prioritization of High Production Volume Chemicals

Ethylphenols Category

Sponsored Chemicals
***o*-Ethylphenol (CASRN 90-00-6)**
(9th CI and CA Index Name: Phenol, 2-ethyl-)

***m*-Ethylphenol (CASRN 620-17-7)**
(9th CI and CA Index Name: Phenol, 3-ethyl-)

***p*-Ethylphenol (CASRN 123-07-9)**
(9th CI and CA Index Name: Phenol, 4-ethyl-)

Test Substance
Ethylphenol isomer mixture (CASRN 25429-37-2)
(CA Index Name: Phenol, ethyl-)

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BACKGROUND

Screening-level hazard, exposure and risk characterizations for high production volume chemicals (HPV) are important contributions to the chemicals cooperation work being done in North America[1] through the EPA Chemical Assessment and Management Program (ChAMP)[2]. These screening-level characterizations are developed by EPA for individual chemicals or chemical categories to support initial Risk-Based Prioritizations (RBPs) for HPV chemicals. These screening-level characterizations are technical documents intended primarily to inform the Agency's internal decision-making process. Accordingly, they are written for assessment professionals and assume a degree of technical understanding. Each of the support documents is described below.

The Risk-Based Prioritizations are found in an accompanying document and are written for a general audience. They present EPA's initial thinking regarding the potential risks presented by these chemicals and future possible actions that may be needed.

Hazard Characterizations for HPV Chemicals

EPA's screening-level hazard characterizations are based primarily on the review of the summaries of studies and other information submitted by the chemical sponsor(s) under the HPV Challenge Program[3]. These studies included in the scope of the HPV Challenge comprise the Screening Information Data Set (SIDS) of the Organization for Economic Cooperation and Development (OECD)[4], an internationally recognized battery of tests that provides the basic data necessary to make an initial evaluation of a chemical's hazards and fate. In preparing the initial hazard characterizations, EPA also consulted a variety of reliable sources[5] for additional relevant information and considered its own comments and public comments on the original submission as well as the sponsor's responses to comments and revisions made to the submission. In order to determine whether any new hazard information was developed since the time of an HPV submission, EPA also searched publicly available databases[6] for information entered from one year prior to the HPV submission through May 2008. The screening-level hazard characterization is performed according to established EPA guidance[7]. A more detailed description of the hazard characterization process is available on the EPA website[8].

With respect to chemicals for which internationally-accepted OECD SIDS Initial Assessment Profiles (SIAP) and Initial Assessment Reports (SIAR) were available, EPA did not generate its own screening-level hazard characterization, but did check for and incorporate updated information in the risk characterization.

Exposure Characterizations for HPV Chemicals

EPA recently received exposure-related data on chemicals submitted in accordance with the requirements of Inventory Update Reporting (IUR)[9]. The 2006 IUR submissions pertain to chemicals manufactured in

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[1] U.S. EPA – U.S. Commitments to North American Chemicals Cooperation: http://www.epa.gov/hpv/pubs/general/sppframework.htm.
[2] U.S. EPA – ChAMP information: http://www.epa.gov/champ/.
[3] U.S. EPA – HPV Challenge Program information: http://www.epa.gov/hpv.
[4] U.S. EPA – Technical Guidance Document, OECD SIDS Manual Sections 3.4 and 3.5: http://www.epa.gov/chemrtk/pubs/general/sidsappb.htm.
[5] U.S. EPA – Public Database Hazard Information: http://www.epa.gov/hpvis/hazardinfo.htm
[6] U.S. EPA – Public Database Update Information: http://www.epa.gov/chemrtk/hpvis/updateinfo.htm.
[7] U.S. EPA – Risk Assessment Guidelines: http://cfpub.epa.gov/ncea/raf/rafguid.cfm.
[8] U.S. EPA – About HPV Chemical Hazard Characterizations: http://www.epa.gov/hpvis/abouthc.htm.
[9] U.S. EPA – Basic IUR Information: http://www.epa.gov/opptintr/iur/pubs/guidance/basic-information.htm.

(including imported into) the U.S. during calendar year 2005 in quantities of 25,000 pounds or more at a single site. The reports include the identity, the quantity, and the physical form of the chemical manufactured or imported, and the number of workers reasonably likely to be exposed during manufacture of the chemical. For chemicals manufactured or imported in quantities of 300,000 pounds or more at a single site, additional reported information includes: the industrial processing and uses of the chemical; the number of industrial processing sites and workers reasonably likely to be exposed to the chemical at those sites; the consumer and commercial uses of the chemical; and an indication whether the chemical was used in products intended for use by children under 14 years of age.

EPA's screening-level exposure characterizations are based largely on the information submitted under the IUR reporting, although other exposure information submitted to the Agency (for example, in HPV submissions) or readily available through a limited set of publicly accessible databases[10] was also considered. The screening-level exposure characterizations identify a potential (high, medium, or low) that each of five populations – the environment, the general population, workers, consumers, and children – might be exposed to the chemical. In most cases, this potential doesn't address the quantity, frequency, or duration of exposure, but refers only to the likelihood that an exposure could occur.

In many instances EPA is not able to fully disclose to the public all the IUR exposure-related data reviewed or relied upon in the development of the screening-level documents because some of the material was claimed as confidential business information (CBI) when it was submitted to the Agency. These CBI claims do limit the Agency's ability to be completely transparent in presenting some underlying exposure and use data for chemicals in public documents. EPA does consider all data, including data considered to be CBI, in the screening-level exposure and risk characterization process, and endeavors whenever possible to broadly characterize supporting materials claimed as confidential in ways that do not disclose actual CBI.

Risk Characterizations for HPV Chemicals

EPA combines the information from the screening-level exposure characterization with the screening-level hazard characterization to develop a qualitative screening-level risk characterization, as described in the Agency's guidance on drafting risk characterizations[11]. These screening-level risk characterizations are technical documents intended to support subsequent priority-setting decisions and actions by OPPT. The purpose of the qualitative screening-level risk characterization is two-fold: to support initial risk-based decisions to prioritize chemicals, identify potential concerns, and inform risk management options; and to identify data needs for individual chemicals or chemical categories.

These initial characterization and prioritization documents do not constitute a final Agency determination as to risk, nor do they determine whether sufficient data are available to characterize risk. Recommended actions reflect EPA's relative judgment regarding this chemical or chemical category in comparison with others evaluated under this program, as well as the uncertainties presented by gaps that may exist in the available data.

[10] U.S. EPA – Summary of Public Databases Routinely Searched: http://www.epa.gov/chemrtk/hpvis/pubdtsum.htm.
[11] U.S. EPA – Risk Characterization Program: http://www.epa.gov/osa/spc/2riskchr.htm.

QUALITATIVE SCREENING-LEVEL RISK CHARACTERIZATION OF HIGH PRODUCTION VOLUME CHEMICALS

CHEMICAL CATEGORY NAME
Ethylphenols

SPONSORED CHEMICALS

***o*-Ethylphenol** **[9th CI Name: Phenol, 2-ethyl-]**	**CAS No. 90-00-6**
***m*-Ethylphenol** **[9th CI Name: Phenol, 3-ethyl-]**	**CAS No. 620-17-7**
***p*-Ethylphenol** **[9th CI Name: Phenol, 4-ethyl-]**	**CAS No. 123-07-9**

Test Substance

Ethylphenol isomer mixture	**No CAS No.**

September 2008

Prepared by

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Economics, Exposure and Technology Division
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QUALITATIVE SCREENING-LEVEL RISK CHARACTERIZATION FOR Ethylphenols Category

1. Category Justification

The three members of the ethylphenols category, which are structural isomers that have the same molecular weights, are liquids or crystals recovered from petroleum streams, coal coking operations and coal gasification. Toxicological data for a series of methylphenols (cresols) were provided to support the grouping of the ethylphenols as a category. Based on the similar toxicities for the methylphenol isomers, it is reasonable to expect that ethylphenol isomers will have toxicities similar to each other as well. Members of this category are typically distributed as binary or ternary mixtures of the category members. Binary isomer mixtures account for 42.3% and ternary isomer mixtures account for 57.1% of total ethylphenol in commerce, while only 0.6% is comprised of single isomer products. The individual ethylphenol isomers, *o*-ethylphenol (CAS No. 90-00-6), *m*-ethylphenol (CAS No. 620-17-7) and *p*-ethylphenol (CAS No. 123-07-9) were used as supporting chemicals to fill physicochemical property and environmental fate (except biodegradation) endpoint requirements for this category. For addressing biodegradation, health and aquatic toxicity endpoints, the sponsor conducted testing with a ternary mixture of ethylphenol isomers containing 25.9% *o*-ethylphenol, 41.1% *m*-ethylphenol and 33.0% *p*-ethylphenol (based on mole percentage). The sponsor defines this mixture as containing portions of ethylphenol isomers normalized to match the ratios of ethylphenol isomers occurring in an actual commercial product containing the highest percentage of all three ethylphenols. The commercial product containing the molar percentage mixture tested contains 18.5% ethylphenols, the largest percentage of ethylphenols in any of the sponsor's commercial products. EPA considered this grouping acceptable for the purposes of the HPV Challenge Program and further accepts this category for prioritization in the Chemical Assessment and Management Program (ChAMP).

2. Physical-Chemical Properties and Environmental Fate

Members of the ethylphenol category are colorless liquids with moderate vapor pressure at room temperature. *o*-Ethylphenol and *p*-ethylphenol are highly soluble in water, whereas *m*-ethylphenol is moderately soluble. The *ortho* and *meta* isomers are highly mobile in soil whereas the *para* isomer is moderately mobile in soil. All isomers are expected to be moderately volatile from moist soil and water. Estimated BCFs suggest that they have a low potential to bioaccumulate (B1). Their rate of biodegradation is rapid, based upon a ready biodegradability test performed on a mixture of ethylphenol isomers; therefore, they are judged to have a low persistence in the environment (P1).

3. Hazard Characterization

Aquatic Organism Toxicity: The evaluation of available toxicity data for fish, aquatic invertebrates and aquatic plants indicates that the potential acute hazard of ethylphenols to fish and aquatic invertebrates is moderate and to aquatic plants is low.

Human Health Toxicity: The acute oral toxicity for the members of the ethylphenols category is low, based on a gavage study of the ethylphenol isomer mixture in rats. *p*-Ethylphenol is severely irritating to rabbit eyes and slightly irritating to rabbit skin. A combined repeated-dose/reproductive/developmental toxicity study on the ethylphenol isomer mixture in rats showed no systemic, reproductive, or developmental toxicity. A repeated-dose toxicity study in rats showed low toxicity for *m*-ethylphenol and *p*-ethylphenol. A direct dosing study in newborn rats showed low toxicity for *m*- and *p*-ethylphenol. Neither the ethylphenol isomer mixture nor *o*-ethylphenol induced gene mutation in bacteria. The ethylphenol isomer mixture induced increases in chromosomal aberrations in mammalian cells *in vitro*.

4. Exposure Characterization

The three chemicals in the ethylphenols category have an aggregated production and/ or import volume in the range of 3 million to 30 million pounds. All IUR information concerning the industrial processing and use of chemicals in the ethylphenols category is claimed as confidential business information (CBI). Commercial and consumer uses were reported as not readily obtainable in some IUR submissions; there may be other commercial and consumer uses that are claimed as confidential. Information submitted as part of the HPV Challenge Program indicates that chemicals in this category are used as intermediates in the manufacture of a wide variety of industrial products such as resins, flame retardants, antioxidants, and insulating varnishes. Information from the Hazardous Substances Data Bank (HSDB) indicates that 3-ethylphenol (CAS# 620-17-7) can be used in the production of photochemicals and varnishes, and that 4-ethylphenol (CAS# 123-07-9) can be used in the production of phenolic resin varnishes, rubber and polymers, as an intermediate for pharmaceuticals and dyes, and as a synthetic food flavoring. According to HSDB, *m*-ethylphenol and *p*-ethylphenol may be released to the environment during their extraction from coal. In addition, *m*-ethylphenol and *p*-ethylphenol are present in cigarette smoke.

Potential Exposures to the General Population and the Environment: Based on the reported use information, it is likely that there would be some releases to water or air during manufacturing, processing, and use. Many chemicals with moderate vapor pressures, such as the ethylphenols, have industrial or end use releases that are a relatively high percentage of the volume handled or used. Higher percentage releases occur when the chemicals evaporate into the atmosphere or are captured and disposed to water. In some cases, some engineering controls or capture for recycle or reclamation may reduce these losses. The actual percentage and quantity of release of the reported chemical associated with this category is not known but could be high. Persistence and bioaccumulation ratings for this chemical are P1 and B1. These ratings suggest that these chemicals are not persistent in the environment and are not bioaccumulative.

Based on the information considered, including environmental fate, chemical presence in monitoring data, and IUR information that indicates that most of these chemicals are not site-limited, and the Agency's professional judgment, EPA identifies, for the purpose of risk-based prioritization, a medium potential that the general population and the environment might be exposed to the ethylphenols, although the degree of exposure that can be attributed to TSCA uses cannot be determined from the references examined.

Potential Exposures to Workers: Based on the information considered and the Agency's professional judgment, EPA identifies, for the purpose of risk-based prioritization, a medium relative ranking for potential worker exposure. The relative medium ranking is based on the potential for inhalation exposure to volatile liquids with vapor pressures between 0.05 torr and 0.16 torr at 25°C, and a moderate number of potentially exposed workers at manufacturing sites. The ethylphenols do not have OSHA Permissible Exposure Limits (PELs).

Potential Exposures to Consumers: EPA identifies, for the purpose of risk-based prioritization, a medium potential that consumers might be exposed to the ethylphenols from consumer products. IUR submissions indicate that information on consumer uses was Not Readily Obtainable (NRO). Information from the HPV Test Plan indicates low potential for consumer exposure. Information from HSDB, however, shows the use of 4-ethylphenol as a synthetic food flavoring and the use of 3-ethylphenol and 4-ethylphenol in the production of phenolic resin varnishes, rubber, and polymers. Therefore, consumer exposures may be expected to occur through food consumption or the household use of some consumer products.

Potential Exposures to Children: EPA identifies, for the purpose of risk-based prioritization, a medium potential that children might be exposed to the ethylphenols from consumer products. IUR submissions reported that children's use information is Not Readily Obtainable. No uses in products specifically intended to be used by children were reported in the IUR, nor were any found in other data sources. Exposures to children, however, may be expected to occur through food consumption or the household use of some consumer products.

5. Risk Characterization

The statements and rationale provided below are intended solely for the purpose of this qualitative screening-level risk characterization and will be used for prioritizing substances for future work in the Chemical Assessment and Management Program (ChAMP).

Risk Statement and Rationale

Potential Risk to Aquatic Organisms from Environmental Releases (LOW/MEDIUM). EPA identifies a medium potential that aquatic organisms might be exposed from environmental releases. Chemicals in the ethylphenol category have low persistence and low bioaccumulation. These characteristics, in combination with the low toxicity to aquatic plants and the moderate toxicity to fish and aquatic invertebrates, indicate a low concern for potential risks to aquatic plants and a medium concern for potential risks to fish and aquatic invertebrates from environmental release for chemicals in the category.

Potential Risk to the General Population from Environmental Releases (LOW CONCERN). EPA identifies a medium potential that the general population might be exposed from environmental releases. The potential human health hazard is low. Taken together, the available information indicates a low concern for potential risk to the general population from environmental releases.

Potential Risk to Workers (LOW CONCERN). EPA identifies a medium relative ranking for potential worker exposure. The potential human health hazard is low. Taken together, the available information indicates a low concern for potential risk to workers. However, there may be some concern for irritation since *p*-ethylphenol is severely irritating to rabbit eyes and slightly irritating to rabbit skin.

Potential Risk to Consumers from Known Uses (LOW CONCERN). EPA identifies a medium potential that consumers might be exposed to the ethylphenols from consumer products. The potential human health hazard is low. Taken together, the available information indicates a low concern for potential risk to consumers. However, there may be some concern for irritation since *p*-ethylphenol is severely irritating to rabbit eyes and slightly irritating to rabbit skin.

Potential Risk to Children (LOW CONCERN). EPA identifies a medium potential that children might be exposed to the ethylphenols through food consumption or the household use of some consumer products. Postnatal animal studies show low toxicity associated with the ethylphenol isomer mixture, and with *m*- and *p*-ethylphenol. Taken together, the available information suggests a low concern for potential risks to children.

SCREENING-LEVEL HAZARD CHARACTERIZATION OF HIGH PRODUCTION VOLUME CHEMICALS

CHEMICAL CATEGORY NAME
Ethylphenols

SPONSORED CHEMICALS

***o*-Ethylphenol** **[9th CI Name: Phenol, 2-ethyl-]**	**CAS No. 90-00-6**
***m*-Ethylphenol** **[9th CI Name: Phenol, 3-ethyl-]**	**CAS No. 620-17-7**
***p*-Ethylphenol** **[9th CI Name: Phenol, 4-ethyl-]**	**CAS No. 123-07-9**

Test Substance

Ethylphenol isomer mixture	**No CAS No.**

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SCREENING-LEVEL HAZARD CHARACTERIZATION
Ethylphenols Category

Introduction

The sponsor, Merisol USA LLC, submitted a Test Plan and Robust Summaries to EPA for the ethylphenols category on July 29, 2002. EPA posted the submission on the ChemRTK HPV Challenge website on August 16, 2002 (http://www.epa.gov/chemrtk/pubs/summaries/ethylphn/c13885tc.htm). EPA comments on the original submission were posted to the website on January 15, 2003. Public comments were also received and posted to the website. The sponsor submitted updated/revised documents on May 13, 2003 and May 8, 2006, which were posted to the ChemRTK website on June 11, 2003 and July 21, 2006, respectively. The ethylphenols category consists of the following substances:

Sponsored Chemicals	
o-Ethylphenol [9th CI Name: Phenol, 2-ethyl-]	CAS No. 90-00-6
m-Ethylphenol [9th CI Name: Phenol, 3-ethyl-]	CAS No. 620-17-7
p-Ethylphenol [9th CI Name: Phenol, 4-ethyl-]	CAS No. 123-07-9
Test Substance	
Ethylphenol isomer mixture	No CAS Number

Ethylphenol isomer mixture is a mixture comprised of the three sponsored category members: *o*-ethylphenol (25.9%), *m*-ethylphenol (41.1%) and *p*-ethylphenol (33.0%). The mixture was formulated to match the ratios of ethylphenol isomers occurring in an actual commercial product containing the highest percentage of all three ethylphenols.

This screening-level hazard characterization is based primarily on the review of the Test Plan and Robust Summaries of studies submitted by the sponsor(s) under the HPV Challenge Program. In preparing the hazard characterization, EPA considered its own comments and public comments on the original submission as well as the sponsor's responses to comments and revisions made to the submission. In order to determine whether any new hazard information was developed since the time of the HPV submission, a search of the following databases was made from 2005 to June 2008: the NLM databases (ChemID to locate available data sources including Medline/PubMed, Toxline, HSDB, ATSDR, EPA SRS, etc.), STN/CAS online databases (Registry file for locators, ChemAbs for toxicology data, RTECS, Merck, etc.) and Science Direct. The structures of the sponsored chemicals are included in the appendix. Summary tables of SIDS endpoint data are included in the document. The screening-level hazard characterization for environmental and human health toxicity is based largely on SIDS endpoints and is described according to established EPA or OECD effect level definitions and hazard assessment practices.

Category Justification

The three members of the ethylphenols category, which are structural isomers that have the same molecular weights, are liquids or crystals recovered from petroleum streams, coal coking operations and coal gasification. Because the substituent groups on the phenolic ring are always ethyl groups, branching differences among the side groups are not a possibility among the category members.

Members of this category are typically distributed as binary or ternary mixtures of the category members. Binary isomer mixtures account for 42.3% and ternary isomer mixtures account for 57.1% of total ethylphenol in commerce, while only 0.6% is comprised of single isomer products.

In the original submission, the sponsor proposed to use the individual ethylphenol isomers, *o*-ethylphenol (CAS No. 90-00-6), *m*-ethylphenol (CAS No. 620-17-7) and *p*-ethylphenol (CAS No. 123-07-9), as supporting chemicals to fill physicochemical property and environmental fate endpoint requirements for this category. EPA agreed with this

approach and also agreed with the sponsor's test plan for addressing the biodegradation endpoint using an equimolar mixture of ethylphenol isomers. In the revised submission, the sponsor provided ready biodegradation test data for an ethylphenol isomer mixture (25.9% *o*-, 41.1% *m*- and 33.0% *p*-ethylphenol).

Toxicological data for a series of methylphenols (cresols) were provided to support the grouping of the ethylphenols as a category. Based on the similar toxicities for the methylphenol isomers, it is reasonable to expect that ethylphenol isomers will have toxicities similar to each other as well. The toxicity data for methylphenols were not included in this hazard characterization.

For addressing health and aquatic toxicity endpoints, the sponsor originally proposed testing an equimolar mixture of isomers. EPA recommended that the submitter consider testing a commercial ethylphenols mixture that either (a) is sold in the highest production volume, or (b) has the highest percentage of ethylphenol isomers. In response, the sponsor conducted testing with a ternary mixture of ethylphenol isomers containing 25.9% *o*-ethylphenol, 41.1% *m*-ethylphenol and 33.0% *p*-ethylphenol (based on mole percentage). The sponsor defines this mixture as containing portions of ethylphenol isomers normalized to match the ratios of ethylphenol isomers occurring in an actual commercial product containing the highest percentage of all three ethylphenols. The commercial product containing the molar percentage mixture tested contains 18.5% ethylphenols, the largest percentage of ethylphenols in any of the sponsor's commercial products.

Hazard Characterization

Members of the ethylphenols category are colorless liquids with moderate vapor pressure at room temperature. *o*-Ethylphenol and *p*-ethylphenol are highly soluble in water, whereas *m*-ethylphenol is moderately soluble. The *ortho* and *meta* isomers are highly mobile in soil whereas the *para* isomer is moderately mobile in soil. All isomers are expected to be moderately volatile from moist soil and water. Estimated BCFs suggest that they have a low potential to bioaccumulate (B1). Their rate of biodegradation is rapid, based upon a ready biodegradability test performed on a mixture of ethylphenol isomers; therefore, they are judged to have a low persistence in the environment (P1).

The evaluation of available toxicity data for fish, aquatic invertebrates and aquatic plants indicates that the potential acute hazard of ethylphenols to fish and aquatic invertebrates is moderate and to aquatic plants is low.

The acute oral toxicity for the members of the ethylphenols category is low, based on a gavage study of the ethylphenol isomer mixture in rats. *p*-Ethylphenol is severely irritating to rabbit eyes and slightly irritating to rabbit skin. A combined repeated-dose/reproductive/developmental toxicity study on the ethylphenol isomer mixture in rats showed no systemic, reproductive, or developmental toxicity. A repeated-dose toxicity study in rats showed low toxicity for *m*-ethylphenol and *p*-ethylphenol. A direct dosing study in newborn rats showed low toxicity for *m*- and *p*-ethylphenol. Neither the ethylphenol isomer mixture nor *o*-ethylphenol induced gene mutation in bacteria. The ethylphenol isomer mixture induced increases in chromosomal aberrations in mammalian cells *in vitro*.

No data gaps were identified under the HPV Challenge Program.

1. Physical-Chemical Properties and Environmental Fate

The physical-chemical properties of the members of the ethylphenols category are summarized in Table 1a, while their environmental fate properties are given in Table 1b. The structures of the compounds are provided in the Appendix.

Physical-Chemical Properties Characterization

Members of the ethylphenols category are colorless liquids with moderate vapor pressure at room temperature. *o*-Ethylphenol and *p*-ethylphenol are highly soluble in water, while *m*-ethylphenol is moderately soluble.

Table 1a. Physical-Chemical Properties of the Ethylphenols Category[1]			
Property	***o*-Ethylphenol**	***m*-Ethylphenol**	***p*-Ethylphenol**
CAS No.	90-00-6	620-17-7	123-07-9
Molecular Weight	122.17	122.17	122.17
Physical State	Colorless liquid	Colorless liquid	Colorless liquid
Melting Point	-3.3°C (measured)	-4.0°C (measured)	45.08°C (measured)
Boiling Point	204.5°C (measured)	218.42°C (measured)	217.99°C (measured)
Vapor Pressure	0.16 mm Hg at 25°C (measured)	0.05 mm Hg at 25°C (measured)	0.07 mm Hg at 25°C (measured)
Water Solubility	5,340 mg/L at 25°C (measured)	23,000 mg/L at 127.3°C (2.3 wt %) Slightly soluble at 25°C	4,900 mg/L at 25°C (measured)
pK_a	10.47 at 20°C (measured)	10.17 at 20°C (measured)	10.38 at 20°C (measured)
Henry's Law Constant	1.3×10^{-5} atm·m^3/mol (estimated)[2]	6.8×10^{-6} atm·m^3/mol (estimated)[2]	4.6×10^{-6} atm·m^3/mol (estimated)[2]
Log K_{ow}	2.72 (measured)	2.77 (measured)	2.68 (measured) 2.66 (measured) 2.81 (estimated)

[1]Merisol USA LLC. 2006. Robust Summary for the Ethylphenols Category. http://www.epa.gov/chemrtk/pubs/summaries/ethylphn/c13885tc.htm.

[2]US EPA. 2008. Estimation Programs Interface Suite™ for Microsoft® Windows, v 3.20. United States Environmental Protection Agency, Washington, DC, USA. http://www.epa.gov/opptintr/exposure/pubs/episuite.htm.

Environmental Fate Characterization

Ethylphenols are expected to partition primarily to soil and water, according to the results of a Level III fugacity model that assumes equal emissions to air, water, and soil. *Ortho* and *meta* ethylphenols are highly mobile in soil whereas the *para* isomer is moderately mobile in soil. Based on their estimated Henry's Law constants, they are expected to be moderately volatile from moist soil and water. The isomers do not contain any groups which can hydrolyze under normal environmental conditions. In the atmosphere, the ethylphenols are expected to partition to the vapor phase, where the rate of photooxidation through reaction with photochemically generated hydroxyl radicals is considered moderate. Estimated BCFs suggest that they have a low potential to bioaccumulate (B1). Their rate of biodegradation is rapid, based upon a ready biodegradability test performed on a mixture of ethylphenol isomers; therefore, they are judged to have a low persistence in the environment (P1).

Table 1b. Environmental Fate Properties of the Ethylphenols Category[1]			
Property	***o*-Ethylphenol**	***m*-Ethylphenol**	***p*-Ethylphenol**
Photodegradation Half-life	9 hours (estimated)[2]	5 hours (estimated)[2]	9 hours (estimated)[2]
Hydrolysis Half-life	Negligible	Negligible	Negligible
Biodegradation	**73.9% in 7 days[3]** **87.0% in 28 days[3]** **(measured)** **Readily biodegradable** **23–42% in 8 weeks** **(anaerobic)**	**93% in 37 days;** **73.9% in 7 days[3]** **87.0% in 28 days[3]** **(measured)** **Readily biodegradable**	**76% in 37 days;** **73.9% in 7 days[3]** **87.0% in 28 days[3]** **(measured)** **Readily biodegradable**
Bioconcentration	BCF = 24.8 (estimated)[2]	BCF = 27.1 (estimated)[2]	BCF = 19 (estimated)[2]
K_{oc}	16 (estimated)[2]	15 (estimated)[2]	813 (estimated)[2]
Fugacity (Level III Model)[2]	Air = 0.6% Water = 27.5% Soil = 71.7% Sediment = 0.2%	Air = 0.3% Water = 28% Soil = 71.5% Sediment = 0.2%	Air = 0.6% Water = 26.7% Soil = 72.5% Sediment = 0.2%
Persistence[4]	P1 (low)	P1 (low)	P1 (low)
Bioaccumulation[4]	B1 (low)	B1 (low)	B1 (low)

[1]Merisol USA LLC. 2006. Robust Summary for the Ethylphenols Category. http://www.epa.gov/chemrtk/pubs/summaries/ethylphn/c13885tc.htm.
[2]US EPA. 2008. Estimation Programs Interface Suite™ for Microsoft® Windows, v 3.20. United States Environmental Protection Agency, Washington, DC, USA. http://www.epa.gov/opptintr/exposure/pubs/episuite.htm.
[3]Isomer mixture contains: 25.9% *o*-ethylphenol, 41.1% *m*-ethylphenol, and 33.0% *p*-ethylphenol.
[4]Federal Register. 1999. Category for Persistent, Bioaccumulative, and Toxic New Chemical Substances. *Federal Register* 64, Number 213 (November 4, 1999) pp. 60194–60204.

Conclusion: Members of the ethylphenol category are colorless liquids with moderate vapor pressure at room temperature. *o*-Ethylphenol and *p*-ethylphenol are highly soluble in water, whereas *m*-ethylphenol is moderately soluble. The *ortho* and *meta* isomers are highly mobile in soil whereas the *para* isomer is moderately mobile in soil. All isomers are expected to be moderately volatile from moist soil and water. Estimated BCFs suggest that they have a low potential to bioaccumulate (B1). Their rate of biodegradation is rapid, based upon a ready biodegradability test performed on a mixture of ethylphenol isomers; therefore, they are judged to have a low persistence in the environment (P1).

2. Environmental Effects – Aquatic Toxicity

A summary of aquatic toxicity data submitted for SIDS endpoints is provided in Table 2. The table also indicates where data for tested category members are read-across (RA) to untested members of the category.

Acute Toxicity to Fish

***p*-Ethylphenol (CAS No. 123-07-9)**
Fathead minnows (*Pimephales promelas*) were exposed to *p*-ethylphenol at measured concentrations of 0, 10.5, 16.1, 24.8, 38.2 or 58.9 mg/L under flow-through conditions for 96 hours.
96-h LC_{50} = 10.4 mg/L

Acute Toxicity to Aquatic Invertebrates

Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No, test substance)
Water fleas (*Daphnia magna*) were exposed to ethylphenol isomer mixture at mean measured concentrations of 0, 1.9, 2.4, 6.2, 12 and 27 mg/L under static conditions for 48 hours. Testing was conducted in a closed system.
48-h EC_{50} = 9 mg/L

Toxicity to Aquatic Plants

Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No, test substance)
Green algae (*Pseudokirchneriella subcapitata*) were exposed to ethylphenol isomer mixture at mean measured concentrations of 0, 1.1, 2, 5.2, 16 and 22 mg/L under static conditions for 72 hours. Testing was conducted in a closed system.
72-h EC_{50} (biomass) = 17 mg/L
72-h EC_{50} (growth) > 22 mg/L

Conclusion: The evaluation of available toxicity data for fish, aquatic invertebrates and aquatic plants indicates that the potential acute hazard of ethylphenols to fish and aquatic invertebrates is moderate and to aquatic plants is low.

Table 2. Summary of Environmental Effects – Aquatic Toxicity Data

Endpoints	***o*-Ethylphenol** **(90-00-6)**	***m*-Ethylphenol** **(620-17-7)**	***p*-Ethylphenol** **(123-07-9)**	**Ethylphenol isomer mixture (25.9% *o*-, 33.0% *p*-, 41.1% *m*-ethylphenol; test substance) (no CAS No.)**
Fish **96-h LC_{50} (mg/L)**	No Data 10 (RA)	No Data 10 (RA)	**10 (m)**	No Data 10 (RA)
Aquatic Invertebrates **48-h EC_{50} (mg/L)**	—**	—**	—**	**9 (m)**
Aquatic Plants **72-h EC_{50} (mg/L)**	—**	—**	—**	**17 (m)**

(m) = measured data (i.e., derived from testing); (e) = estimated data (i.e., derived from modeling); (RA) = Read Across; — indicates endpoint was not addressed for this substance; ** indicates endpoint is fulfilled by data from the isomeric mixture.

3. <u>Human Health Effects</u>

A summary of health effects data submitted is provided in Table 3. The table also indicates where data for tested category members are read-across (RA) to untested members of the category.

Acute Oral Toxicity

Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No., test substance)
Sprague-Dawley rats (3 females/dose) were administered the ethylphenol isomer mixture in corn oil via gavage at 175, 550 or 1750 mg/kg-bw and observed for 14 days. Mortality occurred at the high dose. Effects on weight gain and food consumption (unspecified) were noted. Clinical observations at the mid- and high-dose included lacrimation, excess salivation and urine-stained fur. High-dose animals exhibited decreased motor activity, twitching behavior, prostration, ptosis, ataxia, impaired righting reflexes and limb use and tachypnea.
LD_{50} = 981 mg/kg-bw

Repeated-Dose Toxicity

Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No., test substance)
In a combined repeated-dose/reproductive/developmental toxicity study, Sprague-Dawley rats (10/sex/dose) were administered the ethylphenol isomer mixture via gavage at 0, 30, 100 or 245 mg/kg-bw/day for 28 days of premating and mating (males) or 54 days of premating, mating, gestation and lactation (females). No mortality occurred. The robust summary states that the male rats exhibited reduced body weight gain and food consumption at all doses.

However, the biological significance of this is unclear since no details are provided on whether the reduction in body weight gain was statistically significant or exhibited a dose-response relationship or was related to the reduced food consumption. Male rats in all dose groups exhibited urine staining of the fur immediately following dosing at all doses. In female rats, salivation was observed at all doses immediately following dosing; no effects on food consumption and body weight gain were noted. There were no details provided on the frequency of the clinical signs. There were no other clinical signs of toxicity, functional observational battery, motor activity, hematology, clinical chemistry, gross pathology or histopathology in male or female rats.
NOAEL = 245 mg/kg-bw/day (based on no effects at the highest dose tested)

m-Ethylphenol and p-Ethylphenol
Five-week-old Sprague-Dawley rats (14/sex/dose) were given *m*-ethylphenol or *p*-ethylphenol by gavage once a day at 0, 100, 300 or 1000 mg/kg/day for 28-days. Half the animals were sacrificed on the day following the last treatment and the remaining animals had a 2-week recovery period prior to sacrifice. Clinical signs were noted immediately following dosing in 2/14 males and 5/14 females exposed to 1000 mg/kg-bw/day *m*-ethylphenol and body weights were significantly reduced in the males on days 2 and 7. In addition, relative liver weights were significantly increased in both sexes in the high-dose group and alanine aminotransferase activity was significantly increased; females had a significant increase in total cholesterol. Hyperplasia of the squamous cell in the forestomach was observed in all high-dose animals, and thinning of the ledge of the forestomach was observed in 5/7 males and 2/7 females at the end of the dosing period. There were no treatment related effects at the end of the 2-week recovery period. Clinical signs were noted immediately following dosing in 11/14 males and 9/14 females exposed to 1000 mg/kg/day *p*-ethylphenol. Significant reductions in mean body weight were observed from days 7-28 in males and days 14-28 in females in the high-dose group. Relative liver weight was significantly increased in the male mid- and high-dose groups and in the female high-dose group. There was a significant increase in alanine aminotransferase activity in high-dose males and a significant increase in total cholesterol in high-dose females. Lesions of the forestomach were observed in 7/7 males and 6/7 females in the high-dose group. Hyperplasia of the squamous cells in the forestomach was observed in 1/7 males in the mid-dose group. There were no treatment related effects at the end of the 2-week recovery period.
(Takahashi, M. et al., Congenit. Anom. 46: 26-33, 2006).
LOAEL (*m*-ethylphenol) = 1000 mg/kg-bw/day (based on increased relative liver weights and liver enzyme activities, and lesions in the forestomach)
LOAEL (*p*-ethylphenol) = 300 mg/kg-bw/day (based on increased relative liver weights and liver enzyme activities, and lesions in the forestomach)
NOAEL (*m*-ethylphenol) = 300 mg/kg-bw/day
NOAEL (*p*-ethylphenol) = 100 mg/kg-bw/day

Reproductive/Developmental Toxicity

Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No., test substance)
In the combined repeated-dose/reproductive/developmental toxicity study described previously, there were no effects on mating, fertility, pup viability, developmental parameters or reproductive performance.
NOAEL (reproductive/developmental toxicity) = 245 mg/kg-bw/day (based on no effects at the highest dose tested)

m-Ethylphenol and p-Ethylphenol
Newborn Sprague-Dawley rats (12/sex/dose) were given *m*-ethylphenol or *p*-ethylphenol by gavage once a day at 0, 30, 100 or 300 mg/kg-bw/day on postnatal days (PND) 4-21. Half the animals were sacrificed on PND 22 and the remaining pups had a 9-week recovery period (sacrificed on PND 86). Newborn rats treated with *m*-ethylphenol showed significantly reduced body weights at 300 mg/kg-bw/day. Newborn rats treated with *p*-ethylphenol showed a significant reduction in mean body weight, mortality, hypoactivity, Straub tail, deep respiration, and delayed righting reflex at 300 mg/kg-bw/day. In the newborn rats treated with 100 mg/kg-bw/day p-ethylphenol, 1/12 females showed a delayed righting reflex; the biological significance of this is unclear due to the finding in a single animal and the fact that this was not observed in the combined repeated-dose/reproductive/developmental toxicity study of the isomer mixture previously described. At the end of the treatment period, there was also a significant increase in relative liver weights in the rats exposed to 300 mg/kg-bw/day of either *m*- or *p*-ethylphenol, but the toxicological significance of this is unclear due to the lack of histological findings and the absence of changes in parameters of blood chemistry related to liver damage. There

were no treatment-related effects after the end of the recovery period in the rats exposed to either *m*- or *p*-ethylphenol. (Takahashi, M. et al., Congenit. Anom. 46: 26-33, 2006).
LOAEL (*m*-ethylphenol) = 300 mg/kg-bw/day (based on reduced body weights)
NOAEL (*m*-ethylphenol) = 100 mg/kg-bw/day
LOAEL (*p*-ethyl phenol) = 300 mg/kg-bw/day (based on reduced body weights, mortality, and clinical signs)
NOAEL (*p*-ethylphenol) = 100 mg/kg-bw/day

Genetic Toxicity – Gene Mutation

In vitro
***o*-Ethylphenol (CAS No. 90-00-6)**
In a National Toxicology Program (NTP) study, *Salmonella typhimurium* strains TA1535, TA100, TA98 and TA97 were exposed to *o*-ethylphenol in DMSO in the presence and absence of metabolic activation. Strains TA100 and TA98 were exposed to 0, 3.3, 10, 33, 100, 333 or 1000 µg/plate and strains TA1535 and TA97 were exposed to 0, 3.3 (TA 1535 only), 10, 33, 100, 200, 333, 500 or 1000 µg/plate. Positive and negative controls were tested concurrently and responded appropriately. Cytotoxic concentrations for strains TA1535, TA100, TA98 and TA97 were 500, 1000, 1000 and 333 µg/plate, respectively, in the presence and absence of metabolic activation.
***o*-Ethylphenol was not mutagenic in this assay.**

Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No., test substance)
Salmonella typhimurium strains TA98, TA100, TA1535 and TA1537 and *Escherichia coli* strain WP2 uvrA were exposed to the ethylphenol isomeric mixture in DMSO at concentrations of 0, 50, 150, 500, 1500 or 5000 µg/plate in the presence and absence of metabolic activation. Positive and negative controls were tested concurrently, but control responses were not provided. Cytotoxicity was observed at = 1500 µg/plate.
Ethylphenol isomer mixture was not mutagenic in this assay.

Genetic Toxicity – Chromosomal Aberrations

In vitro
Ethylphenol isomer mixture (25.9% o-, 41.1% m- and 33.0% p-ethylphenol; no CAS No., test substance)
Chinese hamster ovary (CHO) cells were exposed to the ethylphenol isomer mixture in DMSO at concentrations ranging from 50 – 1200 µg/mL for 4 hours in the presence and absence of metabolic activation or 5 – 120 µg/mL for 20 hours in the absence of metabolic activation. Additional 4-hour assays were conducted at concentrations of 100, 200 or 120 µg/mL in the presence of metabolic activation. Positive and negative controls were tested concurrently, but control responses were not provided. Precipitate was observed in culture medium at = 1500 µg/mL. The percentage of cells with structural aberrations was markedly increased by 4- and 20-hour treatments without metabolic activation and by 4-hour treatment with activation. No treatment-related increases in numeric aberrations were observed.
Ethylphenol isomer mixture induced chromosome aberrations in this assay.

Additional Information

The skin and eye irritation studies described below were submitted to EPA under TSCA and the summaries are available in the TSCATS database (http://www.syrres.com/esc/tscats.htm).

Skin Irritation

p-ethylphenol (CAS No. 123-07-9)
In a dermal irritation study, rabbits (sex and strain not reported) were exposed to *p*-ethylphenol at 0.5 ml/kg. Mild dermal irritation consisted of very slight erythema without edema and slight erythema with edema.
p-ethylphenol was slightly irritating to rabbit skin in this study.

Eye Irritation

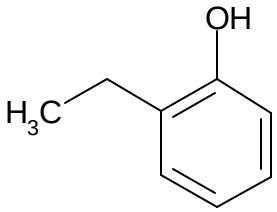
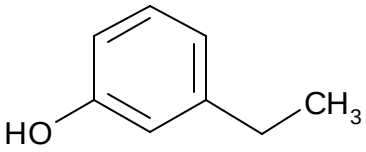
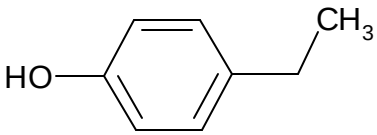
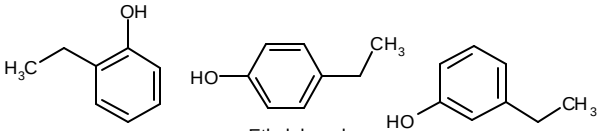
p-ethylphenol (CAS No. 123-07-9)
In an eye irritation study, rabbits (sex and strain not reported) were exposed to *p*-ethylphenol at 0.1 mL/kg. At 24-hours, severe ocular irritation consisted of moderate to severe conjunctival irritation, iritis, corneal opacity, stippling and ulceration. By day-7 severe irritation persisted.
***p*-ethylphenol was severely irritating to rabbit eyes in this study.**

Conclusion: The acute oral toxicity for the members of the ethylphenol category is low, based on a gavage study of the ethylphenol isomer mixture in rats. *p*-Ethylphenol is severely irritating to rabbit eyes and slightly irritating to rabbit skin. A combined repeated-dose/reproductive/developmental toxicity study on the ethylphenol isomer mixture in rats showed no systemic, reproductive, or developmental toxicity. A repeated-dose toxicity study in rats showed low toxicity for *m*-ethylphenol and *p*-ethylphenol. A direct dosing study in newborn rats showed low toxicity for *m*- and *p*-ethylphenol. Neither the ethylphenol isomer mixture nor *o*-ethylphenol induced gene mutation in bacteria. The ethylphenol isomer mixture induced increases in chromosomal aberrations in mammalian cells *in vitro*.

Table 3. Summary of Human Health Data				
Endpoints	***o*-Ethylphenol (90-00-6)**	***m*-Ethylphenol (620-17-7)**	***p*-Ethylphenol (123-07-9)**	**Ethylphenol isomer mixture (25.9% *o*-, 33.0% *p*-, 41.1% *m*-ethylphenol; test substance) (no CAS No.)**
Acute Oral Toxicity LD_{50} (mg/kg-bw)	**—****	**—****	**—****	**981**
Repeated-Dose Toxicity NOAEL/LOAEL Oral (mg/kg-bw/day)	**—****	(28-d) **LOAEL = 1000** **NOAEL = 300**	(28-d) **LOAEL = 300** **NOAEL = 100**	**NOAEL = 245 (highest dose tested)**
Reproductive/ Developmental Toxicity NOAEL/LOAEL Oral (mg/kg-bw/day)	No Data LOAEL = 300 NOAEL = 100 (RA)	**LOAEL = 300** **NOAEL = 100**	**LOAEL = 300** **NOAEL = 100**	**NOAEL = 245 (highest dose tested)**
Genetic Toxicity – Gene Mutation *In vitro*	**Negative**	No Data Negative (RA)	No Data Negative (RA)	**Negative**
Genetic Toxicity – Chromosomal Aberrations *In vitro*	**—****	**—****	**—****	**Positive**
Additional Information – Skin Irritation Eye Irritation	**—***	**—***	**Slightly irritating Severely irritating**	—*

Measured data (i.e., derived from testing) in bold text; (RA) = Read Across; — indicates endpoint was not addressed for this chemical; * indicates endpoint is not included in the base data set under the HPV Program; ** indicates endpoint is fulfilled by data from the isomeric mixture.

APPENDIX

Ethylphenols		
CAS No.	**Chemical Name**	**Chemical Structure**
SPONSORED CHEMICALS		
90-00-6	***o*-Ethylphenol**	 $C_8H_{10}O$
620-17-7	***m*-Ethylphenol**	 $C_8H_{10}O$
123-07-9	***p*-Ethylphenol**	 $C_8H_{10}O$
TEST SUBSTANCE		
–	**Ethylphenol isomer mixture**	 o-Ethylphenol (25.9%) p-Ethylphenol (33.0%) m-Ethylphenol (41.1%)

Screening Level Exposure Characterization for HPV Challenge Chemical

Ethylphenols Category

CAS #
90-00-6; 620-17-7; 123-07-9

September 2008

Prepared by

Exposure Assessment Branch
Chemical Engineering Branch
Economics, Exposure and Technology Division
Office of Pollution Prevention and Toxics
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460-0001

Screening Level Exposure Characterization
Ethylphenols Category

Non-CBI Executive Summary

The three chemicals in the ethylphenols category have an aggregated production and/ or import volume in the range of 3 million to 30 million pounds.[12] Non-confidential information in the Inventory Update Reporting (IUR) indicates that all three chemicals were manufactured and/or imported at the following company and site: Merisol USA LLC, Houston, TX. There may be other companies and sites that are claimed confidential.

All IUR information concerning the industrial processing and use of chemicals in the ethylphenols category is claimed as confidential business information (CBI). Commercial and consumer uses were reported as not readily obtainable in some IUR submissions; there may be other commercial and consumer uses that are claimed as confidential. Information submitted as part of the HPV Challenge Program indicates that chemicals in this category are used as intermediates in the manufacture of a wide variety of industrial products such as resins, flame retardants, antioxidants, and insulating varnishes.[13] Information from the Hazardous Substances Data Bank (HSDB) indicates that 3-ethylphenol (CAS# 620-17-7) can be used in the production of photochemicals and varnishes, and that 4-ethylphenol (CAS# 123-07-9) can be used in the production of phenolic resin varnishes, rubber and polymers, as an intermediate for pharmaceuticals and dyes, and as a synthetic food flavoring.[14] According to HSDB, 3-ethylphenol and 4-ethylphenol may be released to the environment during their extraction from coal, or from cigarette smoke.

Potential Exposures to the General Population and the Environment: Based on the reported use information, it is likely that there would be some releases to water or air during manufacturing, processing, and use. Many chemicals with moderate vapor pressures, such as the ethylphenols, have industrial or end use releases that are a relatively high percentage of the volume handled or used. Higher percentage releases occur when the chemicals evaporate into the atmosphere or are captured and disposed to water. In some cases, some engineering controls or capture for recycle or reclamation may reduce these losses. The actual percentage and quantity of release of the reported chemical associated with this category is not known but could be high.

Persistence and bioaccumulation ratings for this chemical are P1 and B1. These ratings suggest that these chemicals are not persistent in the environment and are not bioaccumulative.[15]

Based on the information considered, including environmental fate, chemical presence in monitoring data, and IUR information that indicates that most of these chemicals are not site-

[12] USEPA, 2006. Partial Updating of TSCA Chemical Inventory.
[13] USEPA, 2001. HPV Test Plan. Ethylphenol Isomers. Accessed, 6/12/08. http://www.epa.gov/chemrtk/pubs/summaries/ethylphn/c13885tp.pdf.
[14] HSDB, 2008. Hazardous Substances Data Bank. Accessed, 6/4/2008. 3-Ethylphenol, 4-Ethylphenol. http://toxnet.nlm.nih.gov.
[15] EPA, 2008. Screening-Level Hazard Characterization for High Production Volume Chemicals, Ethylphenols Category, CAS Nos. 90-00-6, 620-17-7, and 123-07-9. Revised: June 2008.

limited, EPA identifies, for purposes of risk-based prioritization, a medium potential that the general population and the environment might be exposed to the ethylphenols, although the degree of exposure that can be attributed to TSCA uses cannot be determined from the references examined.

Potential Exposures to Workers: Based on the information considered and the Agency's professional judgment, EPA identifies, for the purpose of risk-based prioritization, a medium relative ranking for potential worker exposure. The relative medium ranking is based on the potential for inhalation exposure to volatile liquids with vapor pressures between 0.05 torr and 0.16 torr at 25°C,[16] and a moderate number of potentially exposed workers at manufacturing sites. The ethylphenols do not have OSHA Permissible Exposure Limits (PELs).[17]

Potential Exposures to Consumers: EPA identifies, for the purpose of risk-based prioritization, a medium potential that consumers might be exposed to the ethylphenols from consumer products. IUR submissions indicate that information on consumer uses was Not Readily Obtainable (NRO). Information from the HPV Test Plan indicates low potential for consumer exposure. Information from HSDB, however, shows the use of 4-ethylphenol as a synthetic food flavoring and the use of 3-ethylphenol and 4-ethylphenol in the production of phenolic resin varnishes, rubber, and polymers.[18] Therefore, consumer exposures may be expected to occur through food consumption or the household use of some consumer products.

Potential Exposures to Children: EPA identifies, for the purpose of risk-based prioritization, a medium potential that children might be exposed to the ethylphenols from consumer products. IUR submissions reported that children's use information is Not Readily Obtainable. No uses in products specifically intended to be used by children were reported in the IUR, nor were any found in other data sources. Exposures to children, however, may be expected to occur through food consumption or the household use of some consumer products.

Below, are tables summarizing non-confidential processing and use information in the IUR for each of the individual chemicals in this category.

This exposure characterization was completed using both public, non-confidential sources, and one or more IUR submissions that were available as of this writing.

[16] EPA, 2008. Screening-Level Hazard Characterization for High Production Volume Chemicals, Ethylphenols Category, CAS Nos. 90-00-6, 620-17-7, and 123-07-9. Revised: June 2008.
[17] NIOSH, 1988. OSHA PEL Project Documentation. Accessed, 5/22/08. http://www.cdc.gov/niosh/pel88/npelcas.html.
[18] HSDB, 2008. Hazardous Substances Data Bank. Accessed, 6/4/2008. 3-Ethylphenol, 4-Ethylphenol. http://toxnet.nlm.nih.gov.

Non Confidential IUR Data Summary: *o*-Ethylphenol (CAS# 90-00-6)

Manufacturing/Import Information

Production (including import volume):	1 million to 10 million pounds
List of non-CBI companies/sites:*	Merisol USA LLC/Houston, TX
Maximum number of exposed workers:**	less than 100 (including those of manufacturing, industrial processing and use)
Highest non-CBI maximum concentration:*	up to 60% by weight
Non-CBI physical forms:*	liquid

* There may be other companies/sites, concentrations, and physical forms that are claimed CBI.
** There may be additional potentially exposed industrial workers that are not included in this estimate since not all submitters were required to report on industrial processing and use and/or there may be at least one use that contains a "Not Readily Obtainable" (NRO) response among the submissions.

Table 1
Industrial Processing and Use Information
Reported in 2006 IUR

Processing Activity	Industrial Sector	Function in Industrial Sector
Claimed as CBI		

Table 2
Commercial/Consumer Uses
Reported in 2006 IUR

Commercial/Consumer Product Category Description	Highest maximum concentration range	Use in Children's Products
Not Readily Obtainable		
Additional line item(s) may be claimed as CBI		

Non Confidential IUR Data Summary: *m*-Ethylphenol (CAS# 620-17-7)

Manufacturing/Import Information

Production (including import volume):	1 million to 10 million pounds
List of non-CBI companies/sites:*	Merisol USA LLC/Houston, TX
Maximum number of exposed workers:**	less than 100 (including those of manufacturing, industrial processing and use)
Highest non-CBI maximum concentration:*	up to 30% by weight
Non-CBI physical forms:*	liquid

* Note: There may be other companies/sites, concentrations, and physical forms that are claimed CBI.
** There may be additional potentially exposed industrial workers that are not included in this estimate since not all submitters were required to report on industrial processing and use and/or there may be at least one use that contains a "Not Readily Obtainable" (NRO) response among the submissions.

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Commercial/Consumer Uses
Reported in 2006 IUR

Commercial/Consumer Product Category Description	Highest maximum concentration range	Use in Children's Products
Not Readily Obtainable		
Additional line item(s) may be claimed as CBI		

Non Confidential IUR Data Summary: *p*-Ethylphenol (CAS # 123-07-9)

Manufacturing/Import Information

Production (including import volume):	1 million to 10 million pounds
List of non-CBI companies/sites:*	Merisol USA LLC/Houston, TX
Maximum number of exposed workers:**	less than 100 (including those of manufacturing, industrial processing and use)
Highest non-CBI maximum concentration:*	up to 30% by weight
Non-CBI physical forms:*	liquid

* Note: There may be other companies/sites, concentrations, and physical forms that are claimed CBI.
** There may be additional potentially exposed industrial workers that are not included in this estimate since not all submitters were required to report on industrial processing and use and/or there may be at least one use that contains a "Not Readily Obtainable" (NRO) response among the submissions.

Table 1
Industrial Processing and Use Information
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Processing Activity	Industrial Sector	Function in Industrial Sector
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Commercial/Consumer Uses
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Commercial/Consumer Product Category Description	Highest maximum concentration range	Use in Children's Products
Not Readily Obtainable		
Additional line item(s) may be claimed as CBI		