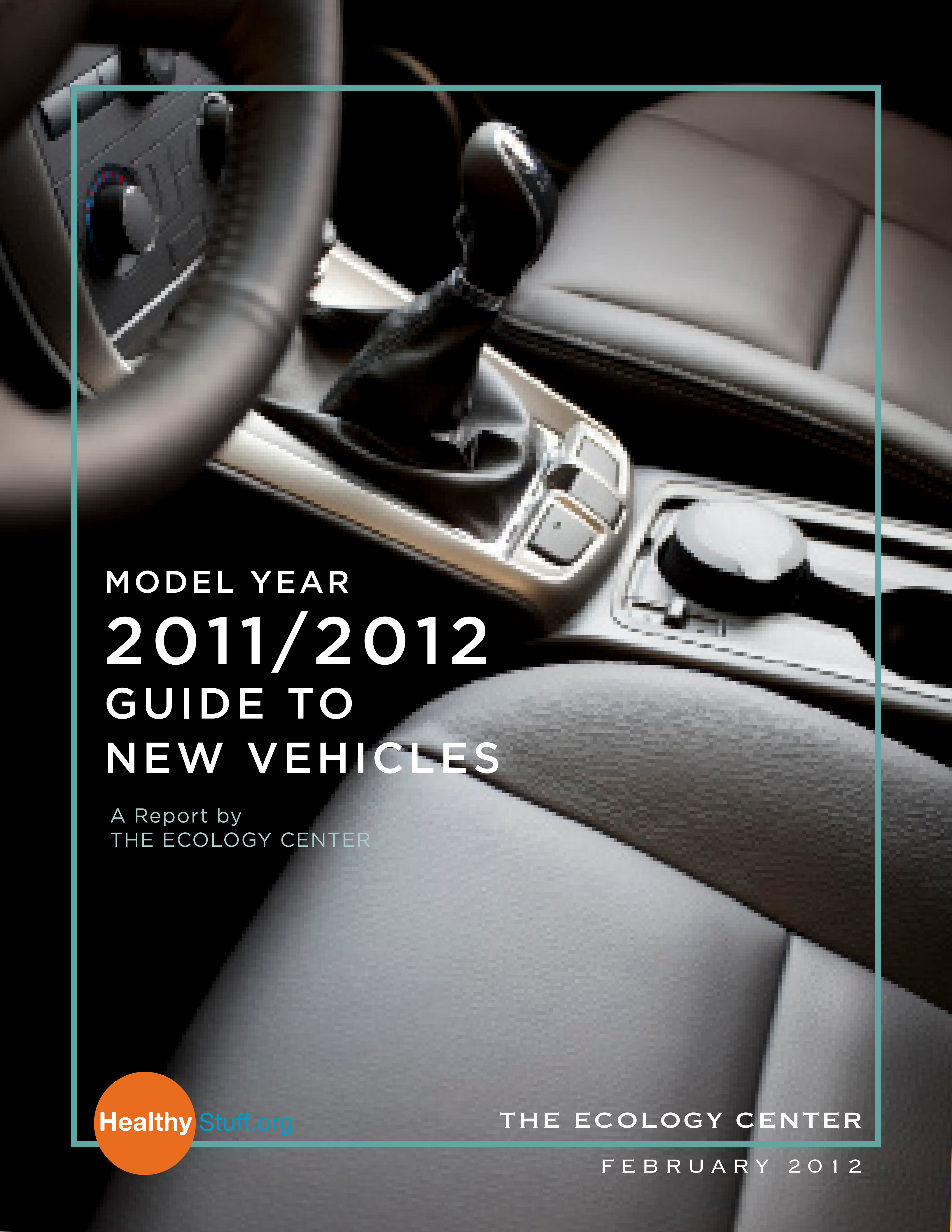

MODEL YEAR 2011/2012 GUIDE TO NEW VEHICLES

A Report by
THE ECOLOGY CENTER

HealthyStuff.org

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FEBRUARY 2012

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ECOLOGY CENTER

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INTRODUCTION

Consumers are increasingly concerned about toxic chemicals that off-gas and leach from interior auto parts such as steering wheels, dashboards and seats. In addition to contributing to "new car smell," these chemicals can be harmful when inhaled or ingested and may lead to severe health impacts such as birth defects, learning disabilities and cancer. Since the average American spends more than 1.5 hours in a car every day,[1] toxic chemical exposure inside vehicles is becoming a major source of potential indoor air pollution. While the emphasis of this study is on the exposure to toxic chemicals during the use phase of vehicle life, our rating system also considers potential health and environmental impacts during the production of materials and end-of-life of vehicles.

The good news is that some cars are better than others. Toxic chemicals are not required to make indoor auto parts, and some manufacturers have begun to phase them out. Scientists and researchers at the Ecology Center have created www.HealthyStuff.org so that consumers can access information about the chemicals used in their car or the car they are thinking of purchasing. In addition to gas mileage and crash test ratings, car-buyers can now learn if the materials in their car are safe for themselves and their family.

CHEMICAL HAZARDS IN VEHICLES

The average person spends about 5.5% of their time in automobiles during the work commute, recreation or other travel activities which makes it an important microenvironment for exposure to pollutants.[2] The importance of this microenvironment has noted by the World Health Organization which has recognized interior air pollution of vehicles are a major threat to human health.[3] The indoor air quality of an automobile is diminished from outdoor and traffic pollution, and compounds used in the interior materials and finishes of cars. These pollutants include such compounds as, polybrominated diphenylesthers (PBDEs) and other brominated flame retardants (BFRs), volatile organic compounds (VOCs), phthalate plasticizers, hydrocarbons and particulate matter.[4] Among the common VOCs found in vehicles include benzene, ehtybenzene and styrene, all known or suspected carcinogens.[7] Most exposure to these compounds is through ingestion of contaminated dust, and inhalation of dust, gases and vapors. All of these pollutants have been studied in detail and produce unique human health effects.

Several studies have investigated the concentration of VOCs, BFRs and hydrocarbons in car interiors. Many of these pollutants, including benzene, toluene and xylene, were found in levels exceeding indoor and outdoor air quality standards and, for some BFRs, contribute nearly 30% to total daily exposure with average exposure levels of 396 pg/m^3 and maximum concentrations of 2644 pg/m^3[3,2] Total VOC concentrations were have been found at levels up to 3,656 ng/m^3[7]

These compounds are present in the interior fabrics and materials of the car (coatings, trims, leather, etc.) as well as fuel combustion products from neighboring motorists. VOC concentrations decrease significantly over time as the compounds off-gas and are removed from the interior of the car.[3] However, it has been shown that increased temperature of the car interior increases the concentration of VOCs and sunlight (UV) exposure reaction products which can also be harmful to human health.[2,5]

Particulate matter, specifically with diameters less than 10 micrometers (PM_{10}) and 2.5 micrometers ($PM_{2.5}$) are primarily from fuel combustion on the roadways which then make their way into the interior of the car through open windows or heating/air conditioning units. Studies of automobile interiors have measured particulate concentrations exceeding US EPA standards, especially for drivers in heavy traffic situations.[6] Average $PM_{2.5}$ concentrations were 24 μg/m^3 and average PM_{10} concentration was 21 μg/m^3[4]

When compared to residential indoor air, in-vehicle VOC concentrations commonly exceed those found in residential settings and can 2-3 times higher then other modes of transportation.[7,8] One recent study found VOC concentrations in car showrooms were 12-times higher than ambient concentrations outside of the showroom.[4]

2012 FINDINGS

VEHICLE RATINGS

- This report is releasing new test data on 204, 2011-2012 model new vehicles. This data is part of a multi-year HealthyStuff.org vehicle database containing test results for 900 vehicles.
- The overall best and worst vehicles are listed below. The 2012 Honda Civic (score 0.46) was the overall best rated vehicle and 2011 Mitsubishi Outlander Sport (score 3.17) was the overall worst rated vehicle this year.
- The Civic achieved its ranking by being free of bromine-base flame retardants is all interior components, utilizing PVC-free interior fabrics and interior trim, and low levels of heavy metals and other metal allergens
- The Mitsubishi Outlander contained bromine and antimony-bases flame retardants in seating, the center console and seat base, chromium treated leather on several components and over 400 ppm lead in seating materials.

2011/2012 Overall Best/Worst by Model Year

Ten Best Picks

2012	**Honda**	Civic	0.46
2011	**Toyota**	Prius	0.55
2011	**Honda**	CR-Z	0.63
2011	**Nissan**	cube	0.65
2012	**Acura**	RDX	0.74
2012	**Acura**	ZDX	0.74
2012	**Audi**	S5	0.74
2011	**Smart**	Coupe	0.74
2011	**Toyota**	Venza	0.77
2011	**Smart**	Passion	0.79

Ten Worst Picks

2012	**Mini Cooper**	S. Clubman	2.84
2012	**VW**	Eos	2.85
2011	**Kia**	Sportage	2.87
2011	**Chevy**	Aveo5	2.89
2012	**Hyundai**	Accent	2.98
2011	**Mazda**	CX-7	3.08
2011	**Nissan**	Versa	3.08
2011	**Kia**	Soul	3.11
2011	**Chrysler**	200 S	3.17
2011	**Mitsubishi**	Outlander Sp	3.17

Top Ranked Manufacturer:
The top-rated automaker for healthy interiors continues to be Honda. Honda has been HealthyStuff.org's top ranked automaker every year since 2007. Hyundai-Kia has been the lowest ranked manufacturer for the last two years.

2011/2012 Manufacturer Rankings*

Rank	Company	Fleet Ave. Rank
1	Honda	1.23
2	Suzuki	1.37
3	Nissan	1.52
4	VW	1.61
5	Toyota	1.62
6	Ford	1.66
7	GM	1.69
8	BMW	1.70
9	Subaru/Fuji	1.70
10	Volvo	1.71
11	Saab	1.72
12	Daimler AG	1.83
13	Chrysler	1.89
14	Mitsubishi	2.10
15	Hyundai-Kia	2.27

*Based on average vehicle ratings for fleet.
(0 = Lower hazard; 5 = High hazard)

Overall Vehicle Ratings:
Overall vehicle ratings continue to improve. These improvements are due to a significant reduction in the use of PVC and BFRs by some automakers.

Fleet-wide Average Scores

Model Year	Average Vehicle Score
pre2006	3.08
2006	2.31
2007	2.2
2008	1.98
2009/10	2.05
2011/12	171

(0 = Lower hazard; 5 = High hazard)

TRENDS

- **Most Improved Automakers:** Most improved automakers in terms of the average ratings for their vehicles are **VW (+42%), Mitsubishi (+38%)** and **Ford (+30%)**. These represent improvement in their average vehicle scores between the combined 2009-2010 models years to the combined 2011-2012 model years.

- **Automakers With Declining Ratings:** Two automakers had overall declining average scores between the combined 2009-2010 models years to the combined 2011-2012 model years. **Daimler AG (-29%)** and **Volvo (-13%).**

PVC USE

- **On a fleet-wide basis PVC use continues to decline:** Before 2006, all vehicle interiors had PVC present. **However, in our 2011-2012 vehicle screening, 17% (34 vehicles) had PVC-free interiors.** A total of 103 vehicles (with model years from 2006 to 2012) in the HealthyStuff.org vehicle database have PVC-free interiors. A complete list of PVC-free vehicles is available at HealthyStuff.org.

- Honda is phasing out PVC: Honda has virtually eliminated PVC, with 83% of its 2011-2012 model vehicles being free of PVC in the interiors. HealthyStuff.org testing confirms Honda's publicly-stated commitment in its 2011 North American Environmental Report, *"Honda's goal is to reduce the use of materials containing chlorine to a less than 1% concentration in materials that can end up in the waste stream as shredder residue at the end of an automobile's useful life."*

- **PVC use by make (for 2011-12 model year vehicles):**
    - Manufacturers with the lowest PVC use: Honda, Suzuki & Mazda
    - Manufacturers with the highest PVC use: Daimler AG, Saab & Volvo

HAZARDOUS FLAME RETARDANTS IN VEHICLES

Brominated flame retardants are widely use in vehicles: Brominated flame retardants (BFRs) refer to a wide range of brominated chemicals added to materials to both inhibit their ignition and slow their rate of combustion. Commonly used examples include polybrominateddiphenyl ethers (PBDEs), hexabromocyclododecane (HBCD) and tetrabromobisphenol A (TBBPA), as well as brominated polymeric and oligomeric materials. *In our 2011-2012 vehicle screening, 40% of vehicle interiors we tested contained BFRs.*

HALOGEN-FREE VEHICLES

PVC & BFR-free vehicles are on the market today: Automakers continue to implement alternatives to PVC and BFRs. In 2006 only 2% of vehicle interiors were free of PVC and BFRs; however, in 2012, that number was quadrupled, with 8% of vehicle interiors being free of PVC and BFRs.

REGIONAL DIFFERENCES IN CHEMICAL USE

This data highlights regional differences in PVC and BFRs between European, Asian and North America assembled vehicles. The country in which vehicles were assembled was tracked using the Vehicle Identification Number (VIN). *Overall, the progressive regulation of chemical additives in consumer products in Europe and end of life vehicle concerns in Asia is driving elimination of important chemical hazards from vehicles.*

Asia: Vehicles assembled in Asia utilized significantly less PVC in vehicle components. On average, vehicles assembled in Japan or Korea showed a 50% reduction in the use of PVC. However, Asia assembled vehicles contained on average over twice the number of components. *This data likely reflects the increased focus by Asian manufacturers, lead by Honda, on reducing the amount of chlorine in vehicles due to concerns about emissions during end-of-life vehicle processing.*

Europe: Vehicles assembled in Europe utilized the most PVC, more than double the amount of vehicles assembled in other parts of the world. However, levels of BFR use in vehicles are by far the lowest in Europe. *This difference likely reflects the impact of European regulations, including the End of Life Vehicle Directive, RHoS and REACH on components being used in vehicles.*

North America: While all North American manufacturers market vehicles globally, our data illustrates that US produced vehicles lag behind European and Asian produced vehicles in PVC and BFR use reduction. *The US has the weakest chemical regulatory system for chemical in consumer products and provides the fewest incentives for companies to phase-out hazardous chemicals.*

PVC Use in Components by Manufacturer Region
(percentage components containing PVC)

Region	2008	2009-2010	2011-2012
Asia	13.6%	11.2%	11.4%
Europe	21.7%	24.3%	27.3%
North America	21.0%	19.9%	19.6%

BFR Use in Components by Manufacturer Region
(percentage of components containing BFRs)

Region	2008	2009-2010	2011-2012
Asia	9.90%	11.80%	11.60%
Europe	1.90%	2.80%	2.70%
North America	4.70%	6.10%	4.50%

USING THE GUIDE

HealthyStuff.org includes test results from approxomiately 900 of the most popular vehicles in the U.S. market between model years 2006-2012. The first sampling phase included vehicles of model years 2006 and 2007 that were sampled from October to December of 2006. Since then vehicle were sampled periodically during the last six years and results release in four reports, 2007, 2008, 2009/2010 and this 2011/2012 report.

HealthyStuff.org 2012 includes test results from over 203 of the most popular vehicles in the U.S. market from the 2011 and 2012 model years. In each vehicle, 11 different components were sampled using a portable, hand-held X-Ray Flouresence[9] (XRF) spectrometry device. The components sampled include: steering wheel, shift knob, armrest/center console, dashboard, headliner, carpet, seat front, seat back, seat base, hard and soft door-trim. The XRF device identified the elemental composition of each of these components. XRF tests are limited to analysis of elements and do not reveal the compounds containing a particular element. For example, the presence of chlorine indicates a chlorine-containing compound, such as PVC. Based on our findings, each vehicle was given an *overall vehicle rating*, as well as *chemical ratings* for bromine, chlorine, lead and a group of substances referred to as "other chemicals". A detailed description of the rating system is provided in the Appendix.

The *overall vehicle rating* indicates the relative level of health and environmental concern associated with the materials in the vehicle, in comparison to all other vehicles tested. The ratings range from 0 to 5, with 0 representing vehicles with the relative lowest concern and 5 the relative highest.

Each vehicle is also assigned a relative level of concern of *low, medium* or *high*. Vehicles with a low rating are indicated in green. Vehicles with a high rating are indicated in red. All others received an average or *medium* rating and are indicated in yellow.

The *chemical ratings* for bromine, chlorine, lead and other chemicals indicate the relative concern associated with levels of those elements detected in the vehicle, compared to all other vehicles tested. These ratings also range from 0 to 5, with 0 representing vehicles with the relative lowest concern and 5 the relative highest.

In addition, the online guide provides the detection information for bromine, chlorine, lead, antimony, arsenic, chromium, cobalt, copper, nickel, mercury and tin in parts shown in Table 1.

RATING KEY

Low	0.0 - 1.25
Medium	1.25 - 3.13
High	3.13 - 5.00

	OVERALL RATINGS	B
Volvo V50	0.80	
Suzuki Aerio	0.80	
Toyota Matrix	1.00	
Suzuki SX4	1.10	
Pontiac Vibe	1.20	
Volvo V70	1.70	
Saab 9-5	1.90	
Audi A3	2.90	
Mercedes E350	2.90	
Mazda 5	3.20	
Suzuki Forenza Wagon	4.10	
Scion xB	4.30	

HealthyStuff.org ratings do not provide any absolute measure of health risk or chemical exposure associated with any individual vehicle, or any individual element or related chemical. HealthyStuff.org ratings only provide a relative measure of "level of concern" for a vehicle in comparison to all vehicles sampled.

In addition to toxic chemicals, consumers might also want to consider other issues, such as fuel-economy and safety, when considering a vehicle purchase. Visit HealthyStuff.org to find links to other helpful vehicle shopping tools and answers to frequently asked questions.

CHEMICALS OF CONCERN

Indoor auto parts contain chemicals that are added during the production processes to impart specific properties such as rigidity, durability or flame resistance. Many of these chemicals are not chemically bound to the parts and are consequently released into the environment during the life of the product. One of the common ways chemicals are released is referred to as “off-gassing,” and evidence of this is sometimes present as a window film or “fogging” that develops on the inside of the windshield. Heat can accelerate this process and UV-ray exposure may also cause chemicals to break down into more toxic compounds. These chemicals are inhaled or ingested by drivers and passengers through dust and air, potentially causing allergic or other acute reactions, or even long-term health impacts such as birth defects, impaired learning, liver toxicity and cancer.

The same chemicals that may cause human health problems due to exposure inside vehicles can also cause problems in the general environment. When vehicles are discarded at the end of their life, the majority of plastic and other nonmetallic parts are shredded and put into landfills or burned in incinerators. When discarded in landfills, harmful chemicals contained in vehicle plastics and other materials can leach out and contaminate soil and water. When incinerated, toxic chemicals are dispersed throughout the atmosphere.

While there are numerous chemical compounds in vehicles that may lead to health and environmental problems, HealthyStuff.org focuses on chemicals containing the elements bromine, chlorine, and lead, as well as other heavy metals, allergens and carcinogens. All of these elements and their related chemical compounds were chosen because of their toxicity, persistence, and tendency to build up in people and the environment.

These substances were also chosen because they could be easily and quickly identified using non-destructive methods. This was essential since sampling for HealthyStuff.org was limited to new vehicles. In addition, these substances, or their related molecular compounds, have been subject to either regulatory restrictions or voluntary limits set by industry associations or third party environmental certification organizations.

HealthyStuff.org ratings do not provide any absolute measure of health risk or chemical exposure associated with any individual vehicle, or any individual element or related chemical. HealthyStuff.org ratings only provide a relative measure of “level of concern” for the vehicles sampled. The ratings allow comparison between vehicles based on the presence and levels of chemicals of concern detected in the vehicles.

BROMINE

Detection of bromine in a vehicle component indicates the likely presence of a brominated flame retardant (BFR). A number of different BFRs are commonly used in vehicle components. While the sampling conducted for HealthyStuff.org could not identify the chemical structure of the brominated flame retardant in a particular component, automakers in generally use the following three BFRs.

Deca-Brominated Diphenyl Ether

One of the most common BFR used in auto applications in the U.S. is deca-brominated diphenyl ether (decaBDE, or “deca”)[11]. Deca is also used in many other products, including furniture, mattresses, televisions, and computers. In 2003, over 56,000 tons were used worldwide[12]. Deca is used at loadings of 10-15% weight in polymers and is always used in conjunction with antimony trioxide[13]. Deca is physically mixed into the plastic during production and can be released to the environment over the life a product. It is becoming ubiquitous in homes, offices, and even the outdoor environment.

One of the major concerns with deca is that it may “debrominate,” or break down when exposed to UV radiation. Some of the breakdown products include pentaBDE and octaBDE, which have been phased-out by government health organizations and the global automotive industry, due to their toxicity. This is of particular concern to drivers and passengers since vehicle components that contain deca are exposed to high UV levels and heat when parked in the sun. In a recent report, research conducted by the Ecology Center testing found that concentrations of penta, octa and deca were much higher in dust and window film samples from new model vehicles than from samples obtained in homes and offices[14]. Once released from products, these chemicals remain in the environment for long periods and build up in people’s bodies, in breast milk, and in fish and other animals[15].

Exposure to deca is linked to a number of human health effects. Deca may pass through the placenta[16] and cause neuro-developmental toxicity in unborn babies[17]. Other suspected health concerns for polybrominated diphenyl ethers (PBDEs) include: thyroid hormone disruption[18], permanent learning and memory impairment[19], behavioral changes, hearing deficits, delayed puberty onset, decreased sperm count[20], fetal malformations[21,22], and possibly cancer23. Its breakdown products, pentaBDE and octaBDE as well as other lower brominated BDEs, have been linked to similar health effects. Levels in the environment are close to those levels in which health effects are seen in animal studies.

Alternatives to deca and BFRs in general exist and are readily available on the market. Testing for HealthyStuff.org found that for each component tested, numerous models did not contain any bromine, showing that automakers have met stringent fire safety codes without using decaBDE or other BFRs. For further discussion of alternatives see the alternatives section below.

Many companies are voluntarily eliminating their use of deca. The use of deca has been restricted in electronics and electrical equipment in the European Union as of 2006. Some computer companies began phasing out deca even before this restriction was put in place[24].

While our testing did not conclusively determine the chemical form of bromine found is vehicle components, the most common forms of BFRs are well known. Other BFRs other than deca that could be contained in the auto parts are listed below, though their use in auto interiors is limited.

Tetrabromobishenol A

TBBPA is another type of BFR that is commonly used in plastic applications. Over 130,000 tons were used in 2002 around the world, predominantly in circuit boards for electronics, but also in acrylonitrile butadiene styrene (ABS)[25]. TBBPA is known to off-gas to the environment, though the amount of off gassing varies depending how the TBBPA was combined with the plastic[26]. Lab tests have suggested that it may disrupt thyroid function27. Studies also suggest that it may adversely affect hormone levels and the immune system[28].

The use of TBBPA can be eliminated by replacement with available alternatives. Many electronics companies are voluntarily removing TBBPA from their products. Sony Ericson has promised to eliminate it in circuit boards by 2007, Dell by 2009. Meanwhile, Motorola and Fujitsu Siemens Computers have begun introducing TBBPA-free and BFR-free products to the market. They are able to do this by substituting TBBPA in circuit boards with phosphorous-based alternatives that are capable of meeting the same fire safety regulations[29,30].

Hexa-Bromocyclododecane

HBCD is used in extruded polystyrene for thermal insulation foams and is also applied in the back coating of textiles for furniture. It is produced in much smaller quantities than deca and TBBPA, but is still substantial, with 16,700 tons used worldwide in 2001[31]. Use of HBCD increased in recent years as it began to be used as a substitute for penta and octa after these chemicals were banned by the European Union. HBCD has a very strong propensity to bioaccumulate and is found in increasing concentrations in the environment. Studies suggest that HBCD affects thyroid hormone levels, causes learning and memory defects in neonatal laboratory animals, and has been detected in breast milk. In general, research is limited and more studies are needed in order to understand the extent of human health and environmental impacts caused by HBCD.

CHLORINE

Detection of chlorine in a vehicle component indicate the likely use of PVC, a widely used type of plastics that is of concern to the environment and public health during all phases of its life cycle. During the production phase, workers at PVC facilities, as well as residents and wildlife in surrounding neighborhoods, may be exposed to the vinyl chloride monomer and/or dioxin, both of which are likely carcinogens[33]. At the end of vehicle life, PVC causes a host of additional environmental issues. PVC is not easily recycled from auto parts and therefore often ends up in landfills, where the chemicals can leach out and contaminate soil, water and wildlife. Otherwise, it is incinerated or burned for energy recovery, in which case highly toxic dioxins and furans can form and be emitted into the air.

Flexible PVC often contains plasticizers, or “softeners,” called phthalates, which off-gas during vehicle use and are deposited on dust particles and windshields, where they cause “fogging.” One of the most common phthalates used, DEHP (di 2-ethyl-hexyl phthalate), has been linked to a number of serious health problems. The EPA classifies it as a probable human carcinogen[34], and there is also evidence that it causes male and female genital and urinary malformations, pre-term deliveries, and testicular atrophy[35]. Short-term high exposure to DEHP interferes with sperm formation in mice and rats as well as delayed sexual maturity. Long-term exposure affects the liver and testes, and in some cases thyroid, ovaries, kidneys, and blood[36]. Studies on animals suggest that DEHP, or some of its breakdown products, pass across the placenta and reach the fetus, causing birth defects, alterations in the structure of bones, brain, liver, kidney, and testes of the young animals, and even fetal death[37]. Studies have also shown that DEHP, or some of its breakdown products, can pass from mother to babies through breast milk and alter the development of the young animals[38].

PVC-free alternatives are available for almost every use of PVC in the automotive sector. In recent years, automakers have begun replacing PVC with polyurethanes and polyolefins, which contain fewer harmful additives and are easier to recycle. In the event that an automaker cannot avoid using PVC, the phthalates in the PVC should be replaced with alternative plasticizers. Higher price is currently the biggest barrier to substitution of phthalates and PVC. Some automakers are getting close to eliminating PVC, but others still have a long way to go. For information on automakers’ policies regarding the use of PVC and other types of plastics, refer to the Ecology Center’s 2006 Automotive Plastics Report Card[39].

A second common use of chlorine in plastics is chlorinated paraffins, which are by far the most widely used aliphatic chlorine-containing flame retardants. They have applications in plastics, including PVC, fabrics, paints and coatings. They may be present in the vehicles components that were found to contain chlorine.

Since there are no indications of the use of inorganic forms of chlorine (e.g. chlorides) in interior automotive applications, we assume that XRF detectable concentrations of chlorine above 10,000 ppm (1%) indicate the presence of organic chlorine compounds, such as PVC and other chlorinated hydrocarbons. Depending on the percentage of additives, such as stabilizers, plasticizers, and flame retardants, the chlorine content of PVC ranges between 28 and 57% by weight (280,000-570,000 ppm)[40]. Since all chlorine detection levels in HealthyStuff.org testing were found to be consistent with these levels, it is likely that detection of chlorine indicates the use of PVC in all vehicles components we tested.

LEAD

Lead is sometimes used as an additive in automotive plastics such as PVC and is also commonly used in wheel weights and solder. The European Union began restricting some of these uses of lead in automotive applications in accordance with its End of Life Vehicle Directive issued in 2000. Since then, many auto companies have significantly reduced their use of lead, but nonetheless it is still found in many vehicle components in the U.S.

The link between lead exposure and a number of severe health effects is well established. Long-term exposure in children can affect a child's growth, damage kidneys, and cause learning and behavioral problems, as well as possible brain damage[41]. In adults, exposure to lead can increase blood pressure, cause kidney damage, nerve disorders, reproductive problems, and other health problems[42]. The Department of Health and Human Services has determined that lead and lead compounds are reasonably anticipated to be human carcinogens. Lead also causes environmental concerns when disposed of in landfills or incinerated at the end of vehicle life because it can contaminate water, soil, air and wildlife.

OTHER CHEMICALS, ALLERGENS AND HEAVY METALS

XRF measurements of interior car components also revealed the presence of several other elements and chemical compounds containing these elements. Since these are known to cause health and environmental problems at varying degrees depending on concentration and application, they were included in our evaluations, but at a lesser relative weight than bromine, chlorine and lead. Voluntary and mandatory safety standards for most of these chemicals have been published both in the U.S. and Europe, particularly for applications involving direct human contact, such as with toys. The "levels of concern" in these standards — based either on leaching tests or the percent by weight of the element contained in a material — are typically much lower than levels found by XRF analyses of car components. All of these chemicals may be released from plastics or fabrics due to abrasion or evaporation. It must be noted that the presence of low-level toxic metals in cars also has the potential for negative environmental impacts during the end-of-life processing of vehicles. Plastics and fabrics usually end up in automotive shredder residue (ASR) from which they may be released to the broader environment.

Antimony

DecaBDE and other BFRs are commonly combined with antimony trioxide during the production process to increase fire resistance[43]. Antimony is also used as a catalyst in the production of polyesters[44]. In our testing we found both lower levels of antimony (160-700 ppm range) that are consistent with polyester applications, as well as higher levels (2000-5000 ppm range) that may be consistent with flame retardant applications[45,46]. In either case, it is possible that antimony is released from the material, contaminating the air and dust inside vehicles.

Antimony trioxide is classified as a carcinogen in the state of California and has been listed as a possible human carcinogen by the International Agency for Research on Cancer[47] and the European Union[48]. In long-term studies, animals that breathed very low levels of antimony had eye irritation, hair loss, lung damage, and heart problems. Higher levels of antimony have been shown to cause fertility problems and lung cancer in animals[49].

Arsenic

In automotive applications, arsenic is traditionally used as a biocide in coated fabrics[50]. Arsenic is a known human carcinogen[51]. There is strong evidence that arsenic is linked to lung, skin, and bladder cancer[52]. It may also cause skin irritation, blood disorders, cardiovascular diseases, and hormone disruption[53].

Chromium

In vehicles, the presence of chromium compounds is often linked to leather tanning[54]. Our vehicle testing confirmed that chromium (most likely chromium Cr(III)) was often used in leather seating applications. Approximately 90% of all leather is tanned with Cr(III)[55]. Chromium compounds may be released from leather upholstery as the material is abraded during the life of the product. The toxicity of chromium strongly depends on the oxidation state of this element, two of the most common forms are the less toxic Cr (III) and the highly toxic Cr (VI) state. XRF does not however distinguish between oxidation states and only indicates the presence of the element chromium.

While chromium is an essential nutrient[56], the limit level of chromium in fabrics, leathers and plastics established to be protective from allergic reactions <50 ppm[57]. HealthyStuff.org revealed levels greater than this in automotive seating. There is strong evidence that chromium can cause asthma attacks and other allergic reactions, bronchitis and lung conditions, skin irritation, and kidney disorders[58]. There is also evidence that exposure to chromium may cause brain cancer, photosensitivity, stomach cancer, and possibly reduced fertility, immune system disorders, adult-onset Leukemia and other cancers[59].

Cobalt

Cobalt is used as a catalyst in production of polyethylene[60] and other plastics. It can also be used as pigment in paints[61]. HealthyStuff.org detected cobalt in several different vehicle components.

Cobalt is essential in trace amounts for human life. The toxicity of cobalt is quite low compared to many other metals, however high exposure can cause several health effects. Cobalt is an allergen that can cause asthma and skin irritation[62]. Some cobalt compounds are classified as a possible human carcinogen according to the International Agency for Research on Cancer[63]. Long term exposure to low doses results in damage to the heart, liver, kidneys, blood, testes, and behavioral changes in laboratory animals[64]. There is also strong evidence that cobalt is linked to hearing loss, lung disorders, and thyroid disorders. There is limited evidence that it causes lung cancer, damage to the pancreas, and skin cancer[65].

Copper

Copper has a number of uses in fabrics and plastics. Copper ions are often added to polyester and a variety of other fibers, ranging from cotton to rayon, polypropylene and nylon in order to protect against bacteria, fungus and odors[66,67]. The main applications in vehicles include seat upholstery, carpets, 35 Br | 82 Pb | 17 Cl -

headliners and trunk liners. Copper may also be used in combination with flame retardants to reduce the toxicity of combustion emissions[68].

Copper is an essential nutrient for all living things, but too much can be harmful. Long-term exposure to copper dust can irritate the nose, mouth and eyes, and cause headaches, dizziness, nausea and diarrhea[69]. Exposure to excess levels of copper may result in liver and kidney damage, and anemia[70]. Children may be more sensitive to copper than adults[71].

Nickel

Automotive uses of nickel are wide ranging, including printed circuit boards in electronic components, batteries, valves and other applications. Nickel is also increasingly used in electroplating of plastic components.

The most common harmful health effect of nickel in humans is allergic reaction. Approximately 10-15% of the population is sensitive to nickel. Reactions may occur in the form of skin irritations or asthma[72]. The Department of Health and Human Services has determined that nickel metal may reasonably be anticipated to be a carcinogen and that some nickel compounds are known human carcinogens.

Mercury

Mercury is used as a catalyst in reactions to form polymers[73]. HealthyStuff.org detected low concentrations of mercury in many different vehicle components.

Mercury is a persistent toxin that can build up in the body. According the Department of Health and Human Services, long-term exposure to high levels of methylmercury or phenylmercury causes behavior changes and damage to the kidneys, stomach, large intestine, circulatory system, and reproductive organs in animals. The nervous system is more sensitive to methylmercury toxicity than are other organs in the body and is affected at lower concentrations. Animal studies also provide evidence that mercury damages the nervous system during development and increases the incidence of spontaneous abortions and stillbirths[75]. It is not known whether mercury compounds cause cancer in humans.

Tin

Organic tin compounds are used as esterification catalysts in polyurethane foam production and polyvinyl chloride (PVC) heat stabilizers in plastic production. The major use of organotin compounds is for heat stabilization of PVC, which represents approximately two-thirds of the global consumption[76].

Organotins may also be used as additives in fabrics and plastics due to their strong fungicidal and bactericidal properties[77]. Exposure to some organic tin compounds can occur through contact with consumer products that are made of PVC, polyurethane and other plastics, or when these products are abraded and turned into dust that is inhaled.

According to the Department of Health and Human Services, breathing, swallowing, or direct skin contact with some organotins can interfere with the way the brain and nervous system work. Some have also been shown to affect the immune and reproductive system in animals, though the effects depend on the exact compound used. Direct contact with certain organotins can also produce skin and eye irritation[78].

PRINCIPLES FOR SAFER CHEMICALS BY THE BIZNGO WORKING GROUP

Creating Healthy Solutions for the Environment, People and the Economy

Demand for products made from greener chemicals is growing rapidly. Consumers, investors and governments want chemicals that have low to no toxicity and degrade into innocuous substances in the environment[79]. Leading businesses are seeking to capture these emerging market opportunities by redesigning their products and catalyzing change in their supply chains.

To advance an economy where the production and use of chemicals are healthy for humans, as well as for our global environment and its non-human inhabitants, responsible companies and their supply chains should adopt and implement the following four guiding principles for chemicals policy:

1. **Know and disclose product chemistry.** Manufacturers will identify the substances associated with and used in a product across its lifecycle and will increase as appropriate the transparency of the chemical constituents in their products, including the public disclosure of chemicals of high concern. Buyers will request product chemistry data from their suppliers.
2. **Assess and avoid hazards.** Manufacturers will determine the hazard characteristics of chemical constituents and formulations in their products, use chemicals with inherently low hazard potential, prioritize chemicals of high concern[80] for elimination, minimize exposure when hazards cannot be prevented, and redesign products and processes to avoid the use and/or generation of hazardous chemicals. Buyers will work with their suppliers to achieve this principle.
3. **Commit to continuous improvement.** Establish corporate governance structures, policies and practices that create a framework for the regular review of product and process chemistry, and that promote the use of chemicals, processes, and products with inherently lower hazard potential.
4. **Support public policies and industry standards that:** advance the implementation of the above three principles, ensure that comprehensive hazard data are available for chemicals on the market, take action to eliminate or reduce known hazards and promote a greener economy, including support for green chemistry research and education.

These principles are key features of an effective strategy for promoting, developing and using chemicals that are environmentally preferable across their entire lifecycle.

ALTERNATIVES

When considering alternatives, automakers have the following three choices, listed in order of environmental preference:

1. Change the product: Redesign or engineer the auto component to eliminate the need for a chemical. This can be done, for example, by eliminating the need for foams that contain BFRs, or enhancing barriers between foam and fabric.
2. Change the material: Select an alternative material that does not require the chemical.
3. Change the chemical: For example, replace BFRs with an alternative flame retardant that is non-halogenated (i.e. does not contain bromine, chlorine or other halogens).

In addition to following this general approach, automakers should implement a comprehensive chemicals policy. Key elements of a comprehensive chemicals policy are outlined at HealthyStuff.org. A overall approach to chemicals management is outline in the next section.

APPENDIX

HealthyStuff.org Methodology

This section lists the vehicle ratings for popular vehicles from the 2006-2012 model years. The vehicles are listed by market class and in order of lowest to highest relative concern. The overall vehicle rating, as well as ratings for bromine, chlorine, lead and other chemicals, are provided. Detailed information on the concentrations of elements found in particular components is available at www.HealthyStuff.org.

SELECTING THE CHEMICALS OF CONCERN

HealthCar.org rates vehicles based on the detection and concentrations of the following elements or chemical compounds containing these elements: Antimony, Arsenic, Bromine, Chlorine, Chromium, Cobalt, Copper, Lead, Mercury, Nickel, Tin. These elements or compounds were chosen for the following reasons.

1. **They could be easily and quickly identified using non-destructive methods.** Sampling for this project was limited to new vehicles, thus testing could not damage the vehicle. The XRF device was used to sample each component for the presence of 38 elements as percent by weight or parts per million (ppm). The reporting of 27 of these elements was eliminated on the basis of non-occurrence or low concern, leaving the 11 elements mentioned above.

2. **These elements, and the chemical(s) associated with them in vehicle applications, have been subject to either regulatory restrictions and/or voluntary limits set by industry associations or third party certification organizations.** These elements and their chemical compounds have been associated with health and environmental concerns in the range of the concentrations detected in the sampling conducted for this study. A wide-range of regulatory and voluntary limits for elements in products were reviewed for this study. A summary of the standards reviewed for toys, paints, vehicles, electronics and packaging is included in Table A1 on the next page.

Two voluntary certification standards are currently being used by Volvo and Ford to certify vehicles for air quality and allergen-free content: the Oeko-Tex 100 and TÜV standards. Ford certifies vehicles using the TÜV Rheinland Group's TOXPROOF Certification (including the SG textiles standard). To date, four of Ford's European model vehicles have been certified, including the Focus, Focus C-MAX, Ka and Galaxy. Volvo has certified all of its vehicle interiors to the Oeko-Tex Standard 100. Two other standards for plastic and fabric in other types of products are also highlighted. Since the 1980's TCO Development in Sweden has developed standards for information technology equipment for ease of use and environmental considerations.

The TCO'05 Desktop Computer and Work Chairs Standard is one of the more comprehensive and restrictive standards available. The Nordic Swan label for computers also limits the presence of many groups of chemicals, including halogens, in plastic components. The elemental limits for all of these standards are listed in Table A1.

Due to the current use of the Oeko-Tex & TÜV standards within the auto industry, the elemental limits in these standards were used as a baseline for evaluating the health of the inside vehicle environment. While the elemental limits in these standards are based on the amount of extractable metals from a homogeneous material, the XRF measures elemental composition of materials as percent by weight and averages measurements between different layers of a heterogeneous material (e.g. fabric covers the seat foam). In general, the amount of metals extractable from materials is typically less then the actual content of the material.

The XRF results were considered to be relevant because the levels typically observed in cars significantly exceeded guideline limits cited in Table A1. The XRF also underestimates actual levels of elements in heterogeneous materials due to the averaging of different layers of the material. Most materials in this study were multi-layer materials. XRF results greater than the instrument detection limit in general exceed the levels outlined in Table A1.

Table A1: Guideline Limits

Note: <LOD, Level of Detection; Levels in ppm

Products	Oeko-Tex 100 Fabrics and Leather	TUV Cars and Fabrics	Nordic Swan4 Computers	TCO8 Computers and Work Chairs
ELEMENTS		**SAFE LIMITS**		
Antimony	30.00 ppm	2 ppm		
Arsenic	1 ppm	0.2 ppm	None, Leathers	
Bromine	No BFRs[1]	Non Detect	No BFRs[6]	No BFRs[9]
Chlorine			"No PVC/	
No Cl FRs5"	"No PVC			
NoClFRs9"				
Chromium	2 ppm	"2 ppm[2] /		
200/50 ppm3"	3 ppm[7]			
Cobalt	4 ppm	4 ppm		
Copper (organic)	50 ppm	60 ppm		
Lead	1 ppm	0.8 ppm	1,000 ppm	None
Mercury	0.02 ppm	0.02 ppm	1,000 ppm	None
Nickel	4.0 ppm	4 ppm		
Tin (organic)	1 ppm	Non Detect		
TEST METHOD	Extractable	Extractable	By weight	By weight

1. BFR includes: PBB, TRIS, TEPA, pentaBDE, octaBDE. A list of approved flame retardant materials are listed on Oeko Tex web site.

2. Chromium (VI)

3. Total Chromium content. 200 ppm adults/50 ppm children

4. Available at: http://www.svanen.nu/Eng/products/ (Accessed on 03/02/07).

5. No PVC in housing and chassis. No chlorinated flame retardants.

6. No BFRs. Exemption for printed wiring boards and plastic parts weighing less than 25g. These parts must not, however, contain any PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers) or chlorinated paraffins (maximum allowable concentration for impurities is 0.1 % by weight in homogenous material).

7. Chromium (VI)

8. Available at: http://www.tcodevelopment.com/ (Accessed on 03/02/07)

9. Plastic parts weighing more than 25 grams shall not contain flame retardants that include organically bound bromine or chlorine. Exempted are printed wiring board laminates, electronic components and all kinds of cable insulation. Plastic parts weighing more than 25 grams shall not contain chlorine or bromine as a part of the polymer. Parts containing other materials in any significant amounts, e.g. cables with their metal conductors, are not included in the requirements.

Table A2: XRF Detection Limits

ELEMENT	Manufacturers Detection Limits[1]	Observed Detection Limits (30 second sample)[2]
Antimony	50-150 ppm	109 ppm
Arsenic	10-100 ppm	1 ppm
Bromine	10-100 ppm	2 ppm
Chlorine	1%-5%	2.80%
Chromium	10-100 ppm	39 ppm
Cobalt	10-100 ppm	37 ppm
Copper	10-100 ppm	38 ppm
Lead	10-100 ppm	5 ppm
Mercury	10-100 ppm	7 ppm
Nickel	10-100 ppm	27 ppm
Tin	50-150 ppm	130 ppm

1. InnovX Model ABC XRF Detector detection estimates based on 1-2 minute test times and detection confidence of 3-sigma, or 99.7% confidence. Detection limits are a function of testing time, sample matrix and presence of interfering elements.

2. Observed detection limits varied by type of material being tested. Detection limits presented here are the lowest observed from all testing.

VEHICLE SAMPLING

The primary purpose of testing individual components in vehicles was to establish the presence and relative abundance of chemicals of concern.

A total of 11 components from each vehicle were selected for sampling. The components were selected based on the following criteria:

- Potential of exposure, i.e. components that drivers or passengers come in contact with, that are subject to abrasion, or that otherwise release vapors or particles to the environment;
- Surface area and relative size of component;
- Potential to off-gas or degrade during heat and/or UV-ray exposure;
- Ease of access to component for sampling.

Components sampled included:

Armrest/Center Console	Carpet
Dashboard	Headliner
Door Trim (hard)	Seat Base
Door Trim (soft)	Shift Knob
Front Seat (front side)	Steering Wheel
Front Seat (back side)	

Non-destructive sampling was conducted on vehicle components using X-ray Fluorescence (XRF) spectrometry. XRF spectrometry is used to identify elements in a substance and quantify the amount of those elements present. Hand-held, portable XRF devices are now commonly used in many industrial settings to verify material quality and assure adherence to composition specifications.

XRF devices use the following process to determine the composition of materials:

1. An x-ray tube emits high-energy x-ray photons that strike the sample being analyzed.
2. These photons knock electrons in each atom from the innermost orbitals of some atoms in the sample, making the atoms unstable.
3. As electrons move from outer orbitals to the vacant space closer to the nucleus of the atom, they emit energy in a secondary x-ray photon; this is known as fluorescence.
4. The analyzer measures the amount of energy in the x-rays emitted by the atoms in the sample material as they return to their original state, an energy that is characteristic of each element.
5. The analyzer quantifies this energy and makes a conversion to report whether an element is present and in what concentration.

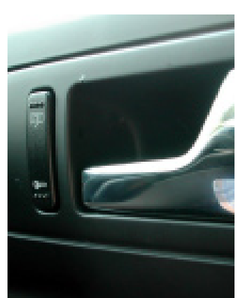
When in use, the analyzer emits radiation from the exit port (the front of the instrument). Radiation levels at the port are approximately 28,000 millirems per hour in the direct x-ray beam, and 2,000 millirems per hour 4 inches away. To put these numbers in perspective, a chest x-ray provides a dose of 100 millirems; 5,000 millirems total per year are considered acceptable for a non-pregnant adult. The radiation level for the operator is less than 0.1 millirems per hour. The analyzer does not emit radiation when it is not in use. When it is emitting radiation during a test, the red light on the top of the analyzer blinks. The XRF Analyzer is manufactured by Innov-X Systems, Inc., located in Woburn, Massachusetts. More information about the analyzer and the company may be found at www.innov-xsys.com.

Each component was sampled for 30 seconds. Components were sampled at similar locations in each vehicle. Detection limit guidelines were provided by the XRF manufacturer. (Detection limits are estimates based on 1-2 minute test times and detection confidence of 3-sigma, or 99.7% confidence.) Detection limit guidelines and lowest observed detection limits are presented in Table A2. Observed detection limits were consistent with manufacturers guidelines.

The XRF sampler also automatically calculates a 1-sigma (68.2%) error margin for each sample. A sample of the test data showing detected level in ppm and +/- one-sigma error margin is shown in Table A3.

To ensure that our readings were accurate, we performed a quality analysis on several samples. In this analysis, we tested the same component at multiple points in two vehicle models, the Subaru Legacy and the Nissan Versa. In addition, repeat samples were collected from identical vehicles to look for variation between vehicles. The results of these samples are shown in Table A4 and Table A6 on the next pages. In all cases, we found adequate consistency in detection levels at different locations in the same component and the same components tested in identical vehicles.

XRF measures surfaces up to a depth of 6–12 mm and provides quantitative values for specific elements within the matrix of a given test object. For homogeneous materials, the results are expected to reflect the actual concentration of the measured element. However, since components like seats or headliners are usually composed of several layers of different materials, the XRF results are an average of all materials up to the depth of X-Ray penetration. For example, the XRF reading for bromine levels in a seat will be composed of the foam, the fabric or leather seat covering, and any fabric backing as shown in Table A5. Therefore, the seat foam alone may have a higher bromine level, but the reading will be lower due to the presence of the fabric and back coating, or vice versa. This type of averaging results in lower levels being reported in heterogeneous samples. Most samples used in this study are considered heterogeneous samples.



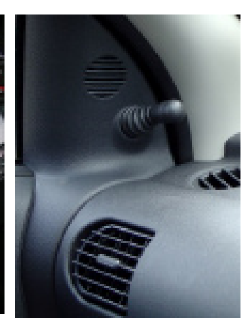


Table A4: Repeat Sample Data, Components

Note: <LOD, Level of Detection; Levels in ppm

2007 SUBARU LEGACY: Element detection levels (ppm)										
COMPONENT	Cl	Cl +/-	Br	Br +/-	Sb	Sb +/-	Pb	Pb +/-	Cr	Cr +/-
Steering Wheel	<LOD	11,160	7	1	<LOD	125	<LOD	5	<LOD	36
Steering Wheel	<LOD	12,139	6	1	<LOD	130	<LOD	5	<LOD	37
Steering Wheel	<LOD	12,981	8	1	<LOD	139	<LOD	5	<LOD	40
Dashboard	<LOD	12,375	9	1	<LOD	133	<LOD	6	<LOD	46
Dashboard	<LOD	12,692	10	1	<LOD	134	<LOD	6	<LOD	43
Dashboard	<LOD	13,383	11	1	<LOD	143	<LOD	6	<LOD	48
Headliner	<LOD	23,444	11	2	<LOD	220	<LOD	12	<LOD	98
Headliner	<LOD	19,856	8	2	<LOD	208	<LOD	9	<LOD	73
Headliner	<LOD	22,590	13	2	<LOD	218	<LOD	12	<LOD	89
Seat Front	<LOD	16,443	<LOD	3	<LOD	175	14	3	<LOD	59
Seat Front	<LOD	17,072	<LOD	3	<LOD	182	<LOD	8	<LOD	66
Seat Front	<LOD	18,561	<LOD	3	<LOD	193	<LOD	8	<LOD	69
Exterior Window Seal	303,078	12,526	<LOD	5	<LOD	159	<LOD	12	<LOD	153
Exterior Window Seal	258,969	11,484	<LOD	5	<LOD	168	<LOD	9	<LOD	140
Exterior Window Seal	277,308	12,366	<LOD	5	<LOD	166	<LOD	11	<LOD	128

NISSAN VERSA: Element detection levels (ppm)										
COMPONENT	Cl	Cl +/-	Br	Br +/-	Sb	Sb +/-	Pb	Pb +/-	Cr	Cr +/-
Armrest/Cnt Console	116,232	8,766	<LOD	4	2,866	81	<LOD	9	<LOD	92
Armrest/Cnt Console	112,203	8,793	<LOD	4	2,855	83	<LOD	9	<LOD	94
Armrest/Cnt Console	100,292	8,086	<LOD	3	2,685	76	<LOD	8	<LOD	78
Seat Front	<LOD	36,809	34,098	835	7,761	255	139	11	492	58
Seat Front	<LOD	34,375	32,146	764	7,577	242	156	11	626	65
Seat Front	<LOD	31,505	25,283	550	5,964	190	115	9	431	51
Hard Door Trim	<LOD	13,921	<LOD	3	<LOD	146	<LOD	7	128	25
Hard Door Trim	<LOD	15,796	<LOD	2	<LOD	158	<LOD	7	146	29
Hard Door Trim	<LOD	14,302	<LOD	3	<LOD	153	<LOD	8	131	26
Soft Door Trim	112,451	6,485	53	2	1,566	55	9	3	<LOD	62
Soft Door Trim	282,862	13,035	203	7	3,523	92	48	7	<LOD	158
Soft Door Trim	136,685	7,748	65	3	2,012	62	16	3	<LOD	76
Exterior Window Seal	471,785	20,375	<LOD	11	<LOD	162	<LOD	24	<LOD	374
Exterior Window Seal	547,122	22,473	<LOD	12	<LOD	154	<LOD	28	939	205
Exterior Window Seal	550,000	23,843	<LOD	12	<LOD	158	31	10	735	204

Table A2: XRF Detection Limits

ELEMENT	Manufacturers Detection Limits[1]	Observed Detection Limits (30 second sample)[2]
Antimony	50-150 ppm	109 ppm
Arsenic	10-100 ppm	1 ppm
Bromine	10-100 ppm	2 ppm
Chlorine	1%-5%	2.80%
Chromium	10-100 ppm	39 ppm
Cobalt	10-100 ppm	37 ppm
Copper	10-100 ppm	38 ppm
Lead	10-100 ppm	5 ppm
Mercury	10-100 ppm	7 ppm
Nickel	10-100 ppm	27 ppm
Tin	50-150 ppm	130 ppm

1. InnovX Model Alpha XRF Detector detection estimates based on 1-2 minute test times and detection confidence of 3-sigma, or 99.7% confidence. Detection limits are a function of testing time, sample matrix and presence of interfering elements.

2. Observed detection limits varied by type of material being tested. Detection limits presented here are the lowest observed from all testing.

Table A3: Sample Data for Door trim (soft), Cl and Br error margins (ppm)

MAKE	MODEL	SPECS	Market Class	Year	CHLORINE	Cl (1-sigma +/-)	BROMINE	Br (1-sigma +/-)
Chrysler	Town & Country	LTD	Minivan	2006	247,636	10,424	0	4
VW	Jetta	-	Small Car	2006	183,186	8,736	0	4
Buick	Lucerne	CXL	Large Sedan	2007	157,568	7,659	3	1
Audi	Q7	-	SUV	2007	175,511	8,534	4	1
VW	Touareg	V8	SUV	2006	170,562	8,181	0	3
GMC	Yukon	Denali	SUV	2006	141,634	8,001	2,500	35
Saturn	Sky	-	Convertible	2007	163,789	9,607	0	4
Mercedes	GL450	4matic	SUV	2007	204,440	9,236	0	4
Cadillac	DTS	4.6L V8	Luxury Sedan	2007	134,341	7,362	26	2
Buick	Terraza	CXL 1SD	Minivan	2007	121,029	7,504	791	13
Saturn	Relay	AWD RF3	Minivan	2006	153,625	7,867	0	4
Audi	A6 Avanti	3	Luxury Sedan	2006	175,068	8,707	17	2

Table A5: XRF Averaging of Heterogeneous Samples[1]

VEHICLE	COMPONENT	BROMINE
1996 Dodge Neon	**Full Seat (Cloth)**	**21,300 ppm**
	Seat Foam Only	89 ppm
	Fabric Only - outer surface	62,400 ppm
	Fabric Only - inner surface	77,400 ppm
1993 Mercury Grand Marquis	**Full Seat (PVC)**	**87 ppm**
	Seat Foam Only	8 ppm
	Fabric/PVC - outer surface	192 ppm
	Fabric/PVC - inner surface	34 ppm
1998 Oldsmobile Silhouette	**Full Seat (Leather)**	**4,181 ppm**
	Foam Only	10,100 ppm
	Leather - outer surface	2,780 ppm
	Leather - inner surface	2,564 ppm

1. Seat coverings (cloth, PVC or leather) were removed from foam and analyzed from the outer and inner surface of the material. "Full seat" reading is taken with seat assembly intact and is typical of samples used in this study. "Foam only" sample is for seat foam that has been sliced in half to give a foam only sample.

Table A6: Repeat Sample Data, Vehicles & Components

Note: <LOD, Level of Detection; Levels in ppm

Vehicle	Component/Test Area	Cl	Cl +/-	Cr	Cr +/-	Co	Co +/-	Br	Br +/-	Sb	Sb +/-
2008 Honda Civic	Arm rest/cnt console	<LOD	12,921	<LOD	47	<LOD	32	5	1	<LOD	142
2008 Honda Civic Hybrid	Arm rest/cnt console	<LOD	12,767	<LOD	41	<LOD	31	14	1	<LOD	143
2008 Honda Civic	Carpet	<LOD	17,115	<LOD	59	955	48	5,206	76	<LOD	176
2008 Honda Civic Hybrid	Carpet	<LOD	29,646	<LOD	106	161	52	26	3	<LOD	289
2008 Honda Civic	Door trim (hard)	<LOD	15,210	<LOD	70	<LOD	153	39	2	<LOD	160
2008 Honda Civic Hybrid	Door trim (hard)	<LOD	16,721	<LOD	64	<LOD	144	37	2	<LOD	159
2008 Honda Civic	Door trim (soft)	<LOD	13,686	<LOD	50	<LOD	28	4	1	<LOD	152
2008 Honda Civic Hybrid	Door trim (soft)	<LOD	12,926	<LOD	41	<LOD	36	<LOD	2	<LOD	139
2008 Honda Civic	Front seat (front)	<LOD	22,117	<LOD	85	<LOD	53	<LOD	4	<LOD	226
2008 Honda Civic Hybrid	Front seat (front)	<LOD	18,383	<LOD	60	<LOD	42	7	1	<LOD	191
2008 Honda Civic	Front seat (rear)	<LOD	20,156	<LOD	68	<LOD	105	<LOD	3	<LOD	197
2008 Honda Civic Hybrid	Front seat (rear)	<LOD	18,996	<LOD	112	3,254	165	7	1	<LOD	195
2008 Honda Civic	Headliner	<LOD	22,886	<LOD	90	745	74	33	3	<LOD	227
2008 Honda Civic Hybrid	Headliner	<LOD	23,998	<LOD	110	1,395	148	20	3	<LOD	243
2008 Honda Civic	IP	<LOD	12,734	<LOD	41	<LOD	75	<LOD	2	<LOD	134
2008 Honda Civic Hybrid	IP	<LOD	12,859	<LOD	56	<LOD	113	<LOD	2	141	46
2008 Honda Civic	Seat base	<LOD	12,670	86	20	<LOD	60	<LOD	2	<LOD	136
2008 Honda Civic Hybrid	Seat base	<LOD	12,624	187	24	<LOD	56	<LOD	2	235	46
2008 Honda Civic	Shift Knob	<LOD	13,906	<LOD	41	<LOD	27	13	1	<LOD	148
2008 Honda Civic Hybrid	Shift Knob	<LOD	14,798	<LOD	42	<LOD	26	11	1	<LOD	154
2008 Honda Civic	Steering wheel	<LOD	12,615	<LOD	40	<LOD	55	<LOD	2	<LOD	136
2008 Honda Civic Hybrid	Steering wheel	<LOD	12,555	<LOD	37	<LOD	64	<LOD	2	<LOD	136

Vehicle	Component/Test Area	Cl	Cl +/-	Cr	Cr +/-	Co	Co +/-	Br	Br +/-	Sb	Sb +/-
2008 Saturn Astra XR	Arm rest/cnt console	<LOD	13,384	180	25	<LOD	78	<LOD	2	663	53
2008 Saturn Astra XR 5dr	Arm rest/cnt console	<LOD	12,974	185	25	<LOD	81	<LOD	2	630	52
2008 Saturn Astra XR	Carpet	<LOD	17,192	<LOD	66	508	54	8	1	<LOD	183
2008 Saturn Astra XR 5dr	Carpet	<LOD	16,745	<LOD	57	<LOD	92	6	1	214	60
2008 Saturn Astra XR	Door trim (hard)	<LOD	14,495	220	30	<LOD	103	<LOD	2	597	58
2008 Saturn Astra XR 5dr	Door trim (hard)	<LOD	15,758	<LOD	51	<LOD	55	218	6	<LOD	164
2008 Saturn Astra XR	Door trim (soft)	<LOD	18,355	<LOD	58	<LOD	45	4	1	<LOD	192
2008 Saturn Astra XR 5dr	Door trim (soft)	<LOD	15,354	<LOD	52	<LOD	53	<LOD	3	<LOD	164
2008 Saturn Astra XR	Front seat (front)	<LOD	16,952	<LOD	63	<LOD	44	59	3	<LOD	179
2008 Saturn Astra XR 5dr	Front seat (front)	<LOD	18,018	<LOD	77	<LOD	71	<LOD	4	<LOD	187
2008 Saturn Astra XR	Front seat (rear)	<LOD	18,852	82	26	<LOD	42	5	1	<LOD	195
2008 Saturn Astra XR 5dr	Front seat (rear)	<LOD	16,456	<LOD	60	<LOD	40	<LOD	3	<LOD	183
2008 Saturn Astra XR	Headliner	<LOD	26,035	<LOD	104	336	66	<LOD	7	<LOD	259
2008 Saturn Astra XR 5dr	Headliner	<LOD	31,274	<LOD	182	4,994	257	23	3	<LOD	261
2008 Saturn Astra XR	IP	<LOD	12,804	<LOD	42	<LOD	23	<LOD	3	<LOD	137
2008 Saturn Astra XR 5dr	IP	<LOD	12,693	<LOD	42	<LOD	22	<LOD	3	<LOD	134
2008 Saturn Astra XR	Seat base	<LOD	14,055	160	26	<LOD	45	7	1	356	52
2008 Saturn Astra XR 5dr	Seat base	<LOD	14,333	135	26	<LOD	49	14	1	331	54
2008 Saturn Astra XR	Shift Knob	<LOD	12,978	<LOD	42	<LOD	67	<LOD	3	<LOD	143
2008 Saturn Astra XR 5dr	Shift Knob	<LOD	12,374	<LOD	41	<LOD	32	<LOD	2	<LOD	136
2008 Saturn Astra XR	Steering wheel	<LOD	14,583	<LOD	48	<LOD	54	<LOD	2	<LOD	156
2008 Saturn Astra XR 5dr	Steering wheel	<LOD	14,080	<LOD	46	<LOD	39	<LOD	2	<LOD	153

Vehicle	Component/Test Area	Cl	Cl +/-	Cr	Cr +/-	Co	Co +/-	Br	Br +/-	Sb	Sb +/-
2007 Toyota Tundra	Arm rest/cnt console	211,304	11,794	<LOD	111	<LOD	65	<LOD	5	1,671	74
2007 Toyota Tundra CMAX	Arm rest/cnt console	178,825	11,421	<LOD	121	<LOD	116	<LOD	5	1,179	73
2007 Toyota Tundra	Carpet	<LOD	18,542	<LOD	53	<LOD	46	423	9	213	61
2007 Toyota Tundra CMAX	Carpet	<LOD	20,339	<LOD	67	<LOD	115	30	3	251	70
2007 Toyota Tundra	Door trim (hard)	<LOD	14,885	<LOD	55	<LOD	91	<LOD	3	<LOD	162
2007 Toyota Tundra CMAX	Door trim (hard)	<LOD	19,219	<LOD	82	<LOD	190	<LOD	3	<LOD	201
2007 Toyota Tundra	Door trim (soft)	150,137	11,368	<LOD	112	<LOD	46	<LOD	4	6,310	141
2007 Toyota Tundra CMAX	Door trim (soft)	145,232	11,743	<LOD	95	<LOD	75	<LOD	5	6,279	152
2007 Toyota Tundra	Front seat (front)	<LOD	33,177	<LOD	160	<LOD	129	23,194	541	4,492	176
2007 Toyota Tundra CMAX	Front seat (front)	<LOD	33,958	<LOD	148	<LOD	124	24,537	571	4,533	178
2007 Toyota Tundra	Front seat (rear)	<LOD	29,636	<LOD	133	717	163	17	3	<LOD	272
2007 Toyota Tundra CMAX	Front seat (rear)	<LOD	24,121	<LOD	97	<LOD	115	668	18	<LOD	249
2007 Toyota Tundra	Headliner	<LOD	27,130	<LOD	88	<LOD	119	<LOD	5	<LOD	259
2007 Toyota Tundra CMAX	Headliner	<LOD	35,526	<LOD	120	419	78	10	3	<LOD	329
2007 Toyota Tundra	IP	<LOD	14,108	<LOD	105	<LOD	56	<LOD	2	<LOD	146
2007 Toyota Tundra CMAX	IP	<LOD	19,736	<LOD	150	<LOD	169	<LOD	3	<LOD	204
2007 Toyota Tundra	Seat base	<LOD	17,337	<LOD	56	<LOD	46	9	2	<LOD	190
2007 Toyota Tundra CMAX	Seat base	<LOD	18,557	<LOD	74	<LOD	124	<LOD	4	<LOD	192
2007 Toyota Tundra	Shift Knob	200,656	14,634	<LOD	164	<LOD	56	<LOD	6	<LOD	252
2007 Toyota Tundra CMAX	Shift Knob	188,372	13,832	<LOD	144	<LOD	69	<LOD	5	308	82
2007 Toyota Tundra	Steering wheel	<LOD	13,039	<LOD	40	<LOD	37	23	1	<LOD	142
2007 Toyota Tundra CMAX	Steering wheel	<LOD	19,479	<LOD	69	<LOD	169	<LOD	4	<LOD	219

Vehicle	Component/Test Area	Cl	Cl +/-	Cr	Cr +/-	Co	Co +/-	Br	Br +/-	Sb	Sb +/-
2008 VW Beetle Vehicle #1	Arm rest/cnt console	101,513	6,870	<LOD	58	<LOD	62	<LOD	3	1,165	58
2008 VW Beetle Vehicle #2	Arm rest/cnt console	150,616	7,960	<LOD	77	<LOD	64	<LOD	3	1,284	57
2008 VW Beetle Vehicle #1	Carpet	<LOD	18,152	<LOD	59	<LOD	64	14	2	<LOD	193
2008 VW Beetle Vehicle #2	Carpet	<LOD	21,325	95	30	<LOD	63	<LOD	4	<LOD	213
2008 VW Beetle Vehicle #1	Door trim (hard)	<LOD	13,672	101	26	499	33	<LOD	2	282	49
2008 VW Beetle Vehicle #2	Door trim (hard)	<LOD	11,517	<LOD	33	<LOD	34	92	3	<LOD	126
2008 VW Beetle Vehicle #1	Door trim (soft)	211,109	10,347	<LOD	138	<LOD	120	<LOD	4	2,453	75
2008 VW Beetle Vehicle #2	Door trim (soft)	215,988	10,006	<LOD	88	<LOD	40	<LOD	4	2,320	71
2008 VW Beetle Vehicle #1	Front seat (front)	271,112	11,606	<LOD	154	<LOD	103	<LOD	6	2,478	74
2008 VW Beetle Vehicle #2	Front seat (front)	238,717	10,727	<LOD	98	<LOD	64	9	2	1,721	65
2008 VW Beetle Vehicle #1	Front seat (rear)	303,739	13,328	<LOD	188	131	42	<LOD	6	2,194	73
2008 VW Beetle Vehicle #2	Front seat (rear)	287,105	12,518	<LOD	139	121	29	7	2	1,925	69
2008 VW Beetle Vehicle #1	Headliner	<LOD	25,023	<LOD	117	<LOD	76	248	9	2,807	122
2008 VW Beetle Vehicle #2	Headliner	<LOD	24,187	<LOD	113	<LOD	74	285	9	1,942	105
2008 VW Beetle Vehicle #1	IP	223,956	10,801	<LOD	103	<LOD	33	8	2	<LOD	152
2008 VW Beetle Vehicle #2	IP	233,359	10,215	<LOD	102	<LOD	37	6	2	<LOD	147
2008 VW Beetle Vehicle #2	Other	<LOD	23,190	178	52	<LOD	173	21	2	954	82
2008 VW Beetle Vehicle #2	Sealer (trunk)	<LOD	34,340	<LOD	172	<LOD	75	<LOD	6	<LOD	267
2008 VW Beetle Vehicle #1	Seat base	<LOD	15,634	3,432	111	<LOD	84	<LOD	3	<LOD	168
2008 VW Beetle Vehicle #2	Seat base	<LOD	14,128	<LOD	45	133	29	4	1	<LOD	150
2008 VW Beetle Vehicle #1	Shift Knob	<LOD	12,000	<LOD	37	<LOD	36	<LOD	2	<LOD	133
2008 VW Beetle Vehicle #2	Shift Knob	<LOD	12,012	<LOD	41	<LOD	38	<LOD	2	<LOD	135
2008 VW Beetle Vehicle #1	Steering wheel	<LOD	14,070	75	18	<LOD	31	<LOD	2	<LOD	151
2008 VW Beetle Vehicle #2	Steering wheel	<LOD	14,251	<LOD	47	<LOD	48	<LOD	2	<LOD	150

ESTABILSHING THE RELATIVE LEVELS OF CONCERN

Vehicle ratings were calculated based on the XRF results from the 11 vehicle components that were tested on all vehicles. Wheel weights, sealers, and wiring were not sampled in every vehicle and thus were not included in the ratings.

The rating for each vehicle was determined using the following process:

1. Each component was given a weighting based on its relative size and potential to release chemicals or dust. This weighting was based on judgment on the part of the researchers. The component weighting factor for each component is indicated in Table A7.

2. Each element was given a chemical weighting factor (multiplier) based on the level of concern associated with it and its related chemical compounds, as well as the concentration level detected. Higher concentrations were assigned higher weights. For instance, there were 2 levels of concern determined for bromine depending on the concentration that was detected. The weighting for each element and for different concentrations of elements is shown in Table A8. Explanation of the relative weight of each element is provided below.

Bromine: Bromine indicates the likely presence of a brominated flame retardant (BFR). BFRs, particularly decabrominated diphenylethers (deca), have been found in dust and windshield film samples from new model vehicles. Deca may degrade into more toxic chemicals when exposed to heat and UV radiation. We therefore consider bromine a relatively high-concern substance when present at higher concentrations. We thus assigned it a relative weight of 10 for concentrations above 1,000 ppm. Concentrations lower than 1,000 ppm received a weight of 1.

Chlorine: All chlorine detected was in concentrations higher than 10,000 ppm, which indicates the likely prescence of PVC. We cannot, however, rule out the possibility of other chlorinated compounds, like flame retardants, being present in the materials. PVC has been identified as a problem chemical throughout its lifecycle. Formation of highly toxic dioxins and furans during combustion and evaporation in production and end of life, as well as release of phthalates from soft PVC materials are of particular concern. Considering the likely possibility that chlorine indicates the use of PVC and phthalates additives, we regard chlorine as a relatively high-concern substance and assigned it a relative weight of 10.

Lead: The link between lead and serious developmental and other health concerns is well established. The toy industry restricts the use of lead in concentrations higher than 600 ppm. We therefore assigned a relative weight of 5 to lead concentrations above 600 ppm, and a relative weight of 1 to lower concentrations.

The remaining elements were also found in vehicle components and are associated with harmful health effects even at relatively low concentrations. Some of them are carcinogens, others are allergens or heavy metals. Concentrations of these substances were mostly found at lower levels than the above-mentioned substances, and thus we consider them to have a comparatively low health concern, and assigned them each a relative weight of 1.

1. The component weight factor was multiplied by the chemical (and concentration) weight factor to produce points. The shaded area in Table A9 shows the resulting points.

2. The points for each of the 12 components were added to produce chemical scores for bromine, chlorine, lead and other chemicals. In order to communicate the relative concern to the public, these scores were then scaled on a 0-5 basis, with 5 being the highest concern and 0 being the lowest. These 0-5 scores are referred to as the chemical ratings.

3. The total scores for all the chemicals were added to produce an overall score that indicates the relative concern of the complete vehicle. This score was then scaled on a 0-5 basis with 5 being the highest concern and 0 being the lowest. This scaled score is referred to as the overall vehicle rating. It allows consumers to identify vehicles of lower concern.

4. Finally, the general categories of concern were established. This was done by ranking the overall vehicle rating for all 209 vehicles sampled as part of the original 2007 HealthyStuff.org sample set, and assigning relative low concern to vehicles in the 0-15th percentile; relative medium concern to vehicles between the 15th to 85th percentile; and relative high concern to vehicles above the 85th percentile. The 15th and 85th percentile values established in the 2007 sample set have been used to evaluate all subsequently sampled vehicles. HealthyStuff.org 2012 vehicles are evaluated in relation to previously sampled vehicles.

Table A7: Relative Weighting of Each Component

COMPONENT	"COMPONENT WEIGHT"
Armrest/Cntr Console	1
Carpet	5
Dashboard	5
Hard Door Trim	1
Headliner	2
Seat Back	1
Seat Base	5
Seat Front	2
Shift Knob	2
Soft Door Trim	1
Steering Wheel	1

Table A8: Elements Detected & their Relative Weight in the Ratings

ELEMENT	"RELATIVE WEIGHT"
Bromine (low)	1 (>LOD, <1,000 ppm)
Bromine (high)	10 (>1,000 ppm)
Chlorine	10 (> 10,000ppm)
Lead (low)	1 (>LOD, <600 ppm)
Lead (high)	5 (>600 ppm)
Antimony	1 (>LOD)
Arsenic	1 (>LOD)
Chromium	1 (>LOD)
Cobalt	1 (>LOD)
Copper	1 (>LOD)
Nickel	1 (>LOD)
Mercury	1 (>LOD)
Tin	1 (>LOD)

LOD = Level of Detection

Table A9: Final Points Used for Vehicle Ratings

	BROMINE		CHLORINE		LEAD		OTHER*
COMPONENT WEIGHT"	PPMs	>LOD & <1000	>1000	>10,000	>LOD & <600	>600	>LOD
POINTS"	1 POINT	10 POINTS	10 POINTS	1 POINT	5 POINTS	"UP TO 8	
Armrest/Cntr Console	1	1	10	10	1	5	8
Carpet	5	5	50	50	5	25	40
Dashboard	5	5	50	50	5	25	40
Hard Door Trim	1	1	10	10	1	5	8
Headliner	2	2	20	20	2	10	16
Seat Back	2	2	20	20	2	10	16
Seat Base	1	1	10	10	1	5	8
Seat Front	5	5	50	50	5	25	40
Shift Knob	1	1	10	10	1	5	8
Soft Door Trim	2	2	20	20	2	10	16
Steering Wheel	2	2	20	20	2	10	16

APPENDIX

GUIDE TO VEHICLE RATINGS

This section lists the vehicle ratings for popular vehicles from the 2006-2012 model years. The vehicles are listed by market class and in order of lowest to highest relative concern. The overall vehicle rating, as well as ratings for bromine, chlorine, lead and other chemicals, are provided. Detailed information on the concentrations of elements found in particular components is available at **www.HealthyStuff.org.**

A

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Acura	RDX	2012	**0.74**	0.31	0.00	0.00	1.78
Acura	TL	2012	**1.01**	0.07	0.00	0.00	3.05
Acura	ZDX	2012	**0.74**	0.27	0.00	0.00	1.84
Acura	MDX	2011	**1.57**	0.24	1.18	0.25	2.13
Acura	TSX	2011	**0.83**	0.41	0.00	0.50	1.78
Acura	TSX	2011	**1.07**	0.38	0.00	0.00	2.7
Acura	TSX Wagon	2011	**0.85**	0.38	0.00	0.00	2.01
Acura	MDX	2009	**1.75**	0.65	1.47	0.25	1.44
Acura	RDX	2009	**0.98**	0.45	0.00	1.50	1.95
Acura	TL	2009	**1.37**	0.92	0.00	0.00	2.70
Acura	TSX	2009	**0.94**	0.68	0.00	0.00	1.78
Acura	MDX	2008	**1.48**	0.38	1.47	0.00	1.09
Acura	RDX	2008	**0.63**	0.41	0.00	1.25	0.98
Acura	TL	2008	**1.51**	0.68	1.18	0.50	1.15
Acura	RDX Tech	2007	**0.79**	0.75	0.00	0.00	1.21
Acura	MXD	2006	**1.70**	0.99	0.59	0.00	2.47
Acura	RL	2006	**1.33**	1.20	0.00	0.00	2.13
Acura	TL	2006	**1.64**	0.86	0.88	0.00	1.95
Acura	TSX	2006	**1.27**	0.62	0.00	0.00	2.93
Audi	A3	2012	**1.61**	0.10	1.47	1.25	1.67
Audi	A4	2012	**1.51**	0.31	1.47	0.00	1.32
Audi	A5	2012	**1.62**	0.45	1.76	0.00	0.86
Audi	A6	2012	**1.86**	0.17	1.76	0.00	2.07
Audi	A7	2012	**1.66**	0.31	1.76	0.00	1.21
Audi	Q5	2012	**1.37**	0.38	1.18	0.00	1.32
Audi	S5	2012	**0.74**	0.24	0.29	0.00	1.32
Audi	A8	2011	**1.79**	0.99	0.88	1.00	1.95
Audi	TTS	2011	**1.46**	0.21	1.18	0.00	1.90
Audi	A4 Cabriolet 2.0 Quattro	2009	**2.34**	0.34	2.35	1.25	1.84
Audi	A4 Sedan 2.0 Quattro	2009	**2.79**	0.27	2.65	3.00	2.36
Audi	TT Roadster 2.0 FWD	2009	**3.30**	2.77	1.76	3.00	1.49
Audi	A3	2008	**2.86**	0.65	3.24	0.00	1.49
Audi	A4 Cabriolet Quattro	2008	**3.08**	0.45	3.24	0.50	2.41
Audi	A4 Quattro Sedan	2008	**2.99**	0.38	3.24	1.25	2.07
Audi	A6	2008	**2.79**	0.62	3.24	0.00	1.32
Audi	TT Coupe 2.0	2008	**3.32**	2.81	1.76	2.50	1.61

Audi	TT Coupe Quattro	2008	**3.15**	2.81	1.76	1.75	1.26
Audi	Q7	2007	**2.79**	0.31	2.94	1.25	2.13
Audi	Q7	2007	**3.32**	0.58	3.24	3.25	2.30
Audi	S4	2007	**2.10**	0.68	1.76	2.00	1.49
Audi	A3	2006	**2.95**	0.55	3.24	1.25	1.67
Audi	A4	2006	**3.12**	0.75	3.24	0.50	2.01
Audi	A6	2006	**3.10**	0.58	3.24	0.00	2.36

B

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
BMW	135i	2012	**1.38**	0.38	0.88	0.25	1.90
BMW	X6	2012	**1.55**	0.62	0.88	0.00	2.07
BMW	X6 M	2012	**0.92**	0.45	0.00	0.00	2.13
BMW	328i	2011	**1.33**	0.17	0.59	0.00	2.70
BMW	328i	2011	**1.64**	0.45	1.18	0.25	2.01
BMW	535i	2011	**1.68**	0.41	0.88	0.00	2.8
BMW	X3	2011	**0.92**	0.45	0.00	0.00	2.13
BMW	X5	2011	**1.57**	0.55	0.88	0.00	2.24
BMW	Mini Cooper	2009	**2.75**	0.31	2.94	0.00	2.30
BMW	Mini Cooper S	2009	**2.23**	0.41	2.35	0.00	1.67
BMW	Mini John Cooper Works	2009	**1.18**	0.58	0.59	0.00	1.55
BMW	128i	2008	**3.89**	0.48	4.41	1.25	2.41
BMW	328i	2008	**3.15**	0.38	3.53	0.00	2.30
BMW	335i	2008	**3.17**	0.38	2.94	1.75	3.10
BMW	335xi	2008	**1.33**	0.75	0.00	0.00	2.87
BMW	M5	2008	**0.81**	0.55	0.00	0.00	1.61
BMW	Mini Cooper S Clubman	2008	**1.29**	0.41	0.59	1.25	1.90
BMW	X3	2008	**1.85**	0.55	1.47	0.00	1.95
BMW	X5	2008	**3.28**	0.68	3.24	0.25	2.70
BMW	525xi Sedan	2007	**2.77**	0.38	2.35	0.50	3.28
BMW	530i Sedan	2007	**1.61**	0.45	0.88	0.25	2.47
BMW	Mini Cooper Sample 1	2007	**1.29**	0.41	0.88	0.00	1.61
BMW	Mini Cooper Sample 2	2007	**2.05**	0.14	2.06	0.00	2.13
BMW	X3 3.0Si	2007	**2.01**	0.86	1.47	0.00	1.95
BMW	325i Sedan	2006	**1.94**	0.68	0.59	2.00	3.28
BMW	330 i	2006	**1.51**	0.86	0.00	1.50	2.93
BMW	335i Coupe	2006	**1.64**	0.51	0.59	1.25	2.82
BMW	M3 Convertible	2006	**1.51**	0.55	0.00	1.75	3.39
BMW	X3	2006	**0.94**	0.55	0.00	0.00	2.01
BMW	Z4 3.0	2006	**1.27**	0.48	0.29	0.00	2.59
Buick	Enclave	2011	**1.31**	0.31	0.88	1.25	1.55
Buick	Lacrosse	2011	**1.62**	0.24	1.47	0.00	1.78
Buick	Regal	2011	**1.96**	0.24	1.47	0.50	2.70
Buick	Enclave	2009	**1.53**	0.00	1.47	1.50	1.55
Buick	Lucerne	2009	**1.62**	0.82	1.18	0.00	1.38
Buick	Lucerne	2008	**2.03**	0.48	1.76	0.00	2.07
Buick	Lucerne	2007	**2.03**	0.58	1.47	0.50	2.36
Buick	Rainer	2007	**2.88**	0.58	2.94	0.00	2.24
Buick	Rendezvous	2007	**1.44**	0.89	0.88	0.25	1.21
Buick	Terraza	2007	**1.66**	0.45	0.88	0.00	2.70
Buick	Lacrose	2006	**1.92**	0.75	0.88	0.00	2.99
Buick	Century	2000	**3.80**	2.88	2.06	2.50	2.41
Buick	Century	1998	**3.62**	2.88	2.06	3.00	1.72
Buick	Century	1997	**2.90**	1.30	2.06	4.50	1.78
Buick	LeSabre	1994	**4.48**	0.38	3.82	13.75	2.70
Buick	Roadmaster	1992	**2.47**	1.51	1.47	2.50	1.72

C

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Cadillac	CTS	2011	**2.08**	0.92	1.18	0.00	2.64
Cadillac	CTS	2011	**2.29**	0.99	1.76	0.00	2.01
Cadillac	CTS-V	2011	**1.81**	1.10	1.18	0.00	1.49
Cadillac	CTS-V	2011	**2.03**	1.34	1.18	0.50	1.67
Cadillac	Escalade	2011	**1.79**	0.38	1.47	0.25	2.01
Cadillac	Escalade	2011	**1.81**	0.34	1.47	0.00	2.2
Cadillac	Escalade	2011	**1.81**	0.21	1.47	1.25	2.13
Cadillac	SRX	2011	**1.13**	0.41	0.59	0.00	1.67
Cadillac	CTS	2009	**2.14**	0.24	1.76	0.00	2.82
Cadillac	CTS V-Series	2009	**2.58**	1.03	1.76	0.50	2.76
Cadillac	SRX	2009	**1.29**	0.14	0.59	0.00	2.64
Cadillac	CTS	2007	**1.14**	0.45	0.00	0.25	2.76
Cadillac	DTS	2007	**1.55**	0.55	1.18	0.00	1.61
Cadillac	Escalade	2007	**2.95**	0.72	2.94	0.00	2.24
Cadillac	STS Lux	2006	**1.35**	0.41	0.59	0.25	2.30
Cadillac	Seville	2002	**3.23**	2.50	2.35	0.00	1.26
Chevy	Corvette Coupe	2012	**1.37**	1.34	0.00	0.25	1.95
Chevy	Cruze Eco	2012	**1.14**	1.30	0.00	0.50	1.26
Chevy	Equinox	2012	**1.29**	0.38	0.88	0.00	1.67
Chevy	Impala	2012	**1.99**	0.51	1.47	0.25	2.41
Chevy	Malibu	2012	**1.16**	0.48	0.59	0.00	1.67
Chevy	Traverse	2012	**1.07**	0.34	0.88	0.00	1.03
Chevy	Avalanche	2011	**1.53**	0.34	1.18	0.00	1.90
Chevy	Aveo5	2011	**2.90**	2.98	0.00	3.50	3.22
Chevy	Camaro	2011	**2.03**	1.10	1.18	0.50	2.07
Chevy	Colorado	2011	**1.07**	0.45	0.29	0.00	2.01
Chevy	Cruze	2011	**1.33**	0.34	0.59	1.25	2.13
Chevy	Silverado	2011	**1.61**	0.48	1.18	0.25	1.84
Chevy	Suburban	2011	**1.55**	0.34	1.18	0.00	1.95
Chevy	Tahoe	2011	**1.72**	0.31	1.18	0.00	2.53
Chevy	Traverse	2011	**1.49**	0.82	0.88	0.25	1.49
Chevy	Aveo	2009	**4.83**	4.83	0.29	14.25	3.10
Chevy	Cobalt	2009	**0.68**	0.41	0.00	0.00	1.44
Chevy	Impala	2009	**3.75**	2.16	2.65	2.25	2.36
Chevy	Malibu	2009	**1.38**	0.65	0.59	0.00	2.07
Chevy	Silverado	2009	**1.05**	0.17	0.59	0.00	1.84
Chevy	Avalanche	2008	**1.46**	0.21	1.18	0.50	1.78
Chevy	Aveo	2008	**2.21**	2.36	0.00	1.75	2.53
Chevy	Cobalt	2008	**0.85**	0.48	0.00	0.00	1.84
Chevy	Colorado	2008	**1.09**	0.27	0.29	0.00	2.36
Chevy	Corvette	2008	**1.33**	0.00	1.18	0.00	1.84
Chevy	HHR	2008	**0.81**	0.00	0.59	0.00	1.38
Chevy	Impala	2008	**2.36**	0.17	2.35	0.00	2.47
Chevy	Malibu	2008	**2.01**	0.03	1.47	6.25	1.90
Chevy	Silverado	2008	**1.09**	0.31	0.59	0.00	1.72
Chevy	Silverado 2500 HD	2008	**1.20**	0.75	0.29	0.25	1.84
Chevy	Suburban	2008	**1.83**	0.48	1.18	0.25	2.53
Chevy	Tahoe	2008	**2.53**	0.38	2.94	0.00	1.49
Chevy	Trailblazer	2008	**2.03**	0.34	2.35	0.00	1.15
Chevy	Avalanche	2007	**2.07**	0.62	1.76	0.00	1.95
Chevy	Aveo	2007	**4.46**	4.49	0.29	3.50	5.00
Chevy	Cobalt	2007	**0.50**	0.31	0.00	0.25	0.98
Chevy	Corvette	2007	**1.25**	0.00	1.18	0.00	1.61
Chevy	Equinox	2007	**1.07**	0.14	0.59	0.00	1.95

Chevy	Express	2007	**3.86**	1.92	2.65	1.50	3.28
Chevy	HHR	2007	**1.00**	0.27	0.59	0.00	1.49
Chevy	Impala	2007	**3.54**	2.36	2.65	1.25	1.61
Chevy	Malibu	2007	**0.72**	0.24	0.59	0.00	0.69
Chevy	Malibu	2007	**0.85**	0.21	0.59	0.00	1.15
Chevy	Silverado	2007	**3.89**	2.95	1.47	3.50	3.51
Chevy	Suburban	2007	**2.47**	1.99	1.18	0.25	2.01
Chevy	Colorado 2WD	2006	**1.16**	0.21	0.59	0.00	2.13
Chevy	Equinox	2006	**1.44**	0.34	0.59	0.00	2.76
Chevy	Malibu	2006	**1.25**	0.68	0.29	1.25	1.90
Chevy	Malibu	2006	**1.44**	0.62	0.59	1.25	2.01
Chevy	Malibu Maxx	2006	**2.80**	0.68	1.47	6.50	3.22
Chevy	Monte Carlo	2006	**3.63**	0.45	3.24	6.25	2.82
Chevy	Tahoe	2006	**2.10**	0.51	1.76	0.00	2.24
Chevy	Trailblazer	2006	**2.66**	0.27	2.94	0.00	2.07
Chevy	Uplander	2006	**2.90**	1.75	1.18	1.75	3.39
Chevy	Malibu	2004	**1.66**	1.95	0.29	2.50	0.75
Chevy	Malibu	2004	**2.32**	2.71	0.29	2.50	1.55
Chevy	Impala	2002	**1.90**	0.41	2.06	1.25	0.92
Chevy	Malibu	2000	**2.55**	0.65	2.35	1.25	1.95
Chevy	Lumina	1997	**2.45**	2.47	0.29	2.75	2.30
Chrysler	200	2011	**1.79**	0.27	1.47	0.00	2.24
Chrysler	300	2011	**1.53**	0.34	0.88	0.00	2.47
Chrysler	200 S	2011	**3.17**	1.71	1.47	6.25	2.70
Chrysler	Town & Country	2011	**1.53**	0.55	0.59	0.00	2.70
Chrysler	300/SRT-8	2009	**2.99**	0.21	3.24	0.25	2.59
Chrysler	PT Cruiser	2009	**2.66**	2.50	0.88	1.75	1.95
Chrysler	Sebring	2009	**1.75**	0.24	1.47	0.50	2.07
Chrysler	Town and Country	2009	**1.20**	0.17	0.29	0.00	2.87
Chrysler	300	2008	**2.64**	0.38	2.94	0.00	1.84
Chrysler	Aspen	2008	**2.20**	0.24	2.35	0.00	1.84
Chrysler	Pacifica	2008	**2.75**	0.41	2.94	0.00	2.13
Chrysler	Sebring	2008	**2.40**	2.43	0.88	1.75	1.26
Chrysler	Sebring Convertible	2008	**2.68**	2.43	0.88	1.75	2.13
Chrysler	Town & Country	2008	**1.35**	0.41	0.29	0.00	2.93
Chrysler	Aspen	2007	**3.21**	0.58	3.53	0.50	2.01
Chrysler	Pacifica FWD	2006	**3.56**	2.26	2.35	1.25	2.41
Chrysler	PT Cruiser	2006	**0.79**	0.10	0.88	0.00	0.57
Chrysler	Sebring	2006	**2.10**	0.24	1.47	2.25	2.76
Chrysler	SRT8/300C	2006	**3.14**	1.85	2.06	1.25	2.36
Chrysler	Town & Country	2006	**3.71**	0.58	4.12	0.50	2.41
Chrysler	PT Cruiser	2001	**2.16**	2.57	0.29	1.75	1.44

D

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Dodge	Challenger	2011	**1.51**	0.14	0.88	0.00	2.76
Dodge	Charger	2011	**1.68**	0.45	0.88	0.25	2.70
Dodge	Durango	2011	**1.57**	0.38	0.88	0.00	2.53
Dodge	Journey	2011	**2.20**	1.99	0.88	0.50	1.67
Dodge	Ram 1500	2011	**2.58**	0.10	2.94	0.00	2.13
Dodge	Avenger	2009	**1.83**	0.24	1.47	0.50	2.30
Dodge	Caliber	2009	**2.16**	2.50	0.00	1.75	2.13
Dodge	Challenger	2009	**2.32**	0.41	2.35	0.00	1.95
Dodge	Charger	2009	**2.27**	0.27	2.65	0.00	1.44
Dodge	Dakota	2009	**2.55**	2.02	0.88	0.00	2.82
Dodge	Grand Caravan	2009	**1.18**	0.41	0.29	0.00	2.41

Dodge	Journey	2009	**2.05**	1.92	0.88	0.25	1.38
Dodge	Nitro	2009	**1.29**	0.10	0.88	0.25	2.07
Dodge	Ram 1500	2009	**2.79**	2.57	0.88	2.25	2.13
Dodge	Avenger	2008	**2.80**	2.43	0.88	1.75	2.53
Dodge	Caliber	2008	**0.89**	0.21	0.59	0.00	1.26
Dodge	Charger	2008	**1.01**	0.27	0.88	0.00	0.98
Dodge	Dakota	2008	**2.56**	1.82	1.47	1.25	1.78
Dodge	Grand Caravan	2008	**1.85**	2.02	0.29	2.50	1.21
Dodge	Journey	2008	**0.92**	0.03	0.88	0.00	1.09
Dodge	Nitro	2008	**0.77**	0.07	0.29	0.00	1.72
Dodge	RAM	2008	**3.04**	2.16	2.06	1.25	1.55
Dodge	Caliber	2007	**1.44**	0.31	0.59	0.25	2.76
Dodge	Durango	2007	**2.77**	1.95	0.88	1.25	3.33
Dodge	Nitro	2007	**1.83**	0.41	1.47	0.00	2.13
Dodge	Ram 1500	2007	**3.41**	2.26	1.47	1.75	3.56
Dodge	Charger RT	2006	**2.16**	0.51	2.06	0.00	1.84
Dodge	Dakota Club Cab	2006	**2.77**	2.77	0.59	0.75	2.64
Dodge	Grand Caravan	2006	**2.38**	0.48	2.35	0.00	2.01
Dodge	Ram 2500	2006	**2.97**	1.82	1.47	1.75	2.93
Dodge	Stratus	2006	**3.23**	1.99	1.76	1.25	2.99
Dodge	Dakota	1999	**1.44**	0.68	0.88	0.25	1.55
Dodge	Neon	1995	**3.14**	2.50	1.18	3.00	2.59

F

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Ford	Mustang	2012	**1.88**	1.95	0.29	0.00	2.01
Ford	E-Series	2011	**1.79**	2.33	0.00	0.25	1.61
Ford	E150 Van	2011	**1.03**	0.27	0.59	1.50	1.26
Ford	EDGE	2011	**1.33**	0.48	0.88	0.50	1.49
Ford	Escape	2011	**1.13**	0.55	0.29	0.50	1.90
Ford	Expedition	2011	**1.88**	0.41	1.47	0.50	2.18
Ford	Explorer	2011	**1.81**	0.27	1.47	0.00	2.30
Ford	F-150	2011	**1.09**	0.55	0.59	0.00	1.32
Ford	Fiesta	2011	**1.44**	0.34	1.18	0.00	1.61
Ford	Flex	2011	**2.75**	2.26	0.88	1.25	2.76
Ford	Fusion	2011	**1.77**	0.34	1.47	0.25	2.01
Ford	Ranger	2011	**0.98**	0.65	0.00	0.50	1.84
Ford	Taurus	2011	**1.48**	0.48	0.88	0.00	2.07
Ford	Transit	2011	**1.77**	1.82	0.29	1.50	1.55
Ford	Transit Connect Van	2011	**1.51**	1.75	0.29	1.25	0.92
Ford	Edge	2010	**1.33**	0.45	1.18	0.00	1.09
Ford	Fusion	2010	**2.82**	0.45	2.94	0.00	2.30
Ford	Mustang	2010	**1.75**	0.27	1.47	0.25	2.07
Ford	Escape	2009	**2.58**	1.95	1.18	2.50	1.90
Ford	Expedition	2009	**3.43**	3.63	1.47	1.50	1.38
Ford	Explorer	2009	**1.75**	0.48	1.47	0.00	1.78
Ford	F-150	2009	**2.01**	1.78	0.88	0.00	1.55
Ford	Flex	2009	**2.31**	1.37	1.47	0.00	2.01
Ford	Focus	2009	**1.44**	0.27	1.18	0.00	1.72
Ford	Ranger	2009	**2.75**	1.92	2.06	1.25	1.03
Ford	Taurus	2009	**2.47**	1.34	1.47	0.00	2.59
Ford	E-150 Van	2008	**1.75**	0.48	2.06	0.00	0.63
Ford	Edge	2008	**1.66**	0.27	1.47	0.00	1.84
Ford	Escape	2008	**1.44**	0.41	1.18	0.00	1.49
Ford	Explorer	2008	**2.49**	0.24	2.94	0.50	1.49
Ford	F-250	2008	**2.12**	2.19	0.59	1.25	1.49

Ford	Focus	2008	**2.86**	2.57	1.18	2.50	1.72
Ford	Fusion	2008	**2.55**	0.17	3.24	0.00	1.32
Ford	Mustang	2008	**2.31**	2.43	0.88	1.25	1.09
Ford	Ranger	2008	**3.03**	2.71	2.06	0.00	0.86
Ford	Taurus	2008	**1.81**	0.55	1.47	0.25	1.78
Ford	Taurus X	2008	**1.86**	0.31	1.76	0.00	1.84
Ford	Edge	2007	**1.88**	0.45	1.47	0.00	2.24
Ford	Escape Hybrid	2007	**2.80**	0.96	2.35	2.25	2.01
Ford	Expedition	2007	**3.03**	2.05	1.47	0.75	2.93
Ford	Fusion	2007	**2.56**	0.38	2.65	0.25	2.13
Ford	Mustang GT Coup.	2007	**2.27**	0.65	1.47	0.50	2.99
Ford	Crown Vic.	2006	**2.23**	1.16	1.47	0.50	2.01
Ford	Expedition	2006	**1.88**	0.72	1.47	1.00	1.55
Ford	Explorer	2006	**1.42**	0.45	0.88	0.00	1.95
Ford	F150	2006	**1.42**	0.62	0.88	0.25	1.61
Ford	Five Hundred	2006	**2.90**	0.38	2.94	0.75	2.47
Ford	Focus	2006	**2.56**	1.20	1.18	2.25	3.16
Ford	Freestar	2006	**1.48**	0.48	0.88	0.00	2.07
Ford	Freestyle	2006	**1.94**	0.17	1.47	0.50	2.76
Ford	Fusion	2006	**2.32**	0.27	2.65	0.00	1.61
Ford	Mustang	2006	**2.08**	0.99	0.88	1.75	2.70
Ford	Ranger	2006	**2.42**	2.77	0.00	3.00	2.18
Ford	Crown Victoria	2005	**2.42**	1.88	1.47	3.00	0.80
Ford	Expedition	2005	**0.77**	0.10	0.59	1.75	0.69
Ford	Expedition	2003	**0.79**	0.14	0.59	1.75	0.69
Ford	Escort	1999	**4.54**	0.55	4.71	4.25	3.05
Ford	Crown Victoria	1998	**2.82**	0.62	2.65	1.75	2.18
Ford	Contour	1995	**1.94**	0.55	1.76	1.50	1.32
Ford	Mustang	1994	**1.97**	0.72	0.59	6.00	2.41
Ford	F-150	1993	**2.60**	1.95	0.59	6.75	2.13
Ford	Probe	1993	**4.15**	2.26	2.06	9.50	2.93
Ford	Crown Victoria	1992	**2.92**	0.65	1.47	4.75	4.02
Ford	Tempo	1992	**3.41**	0.62	2.35	9.75	2.76
Ford	Crown Victoria	1991	**3.71**	2.16	1.76	4.00	3.56
Ford	F-250	1990	**3.01**	0.27	2.06	11.00	2.36
Ford	Mustang	1990	**2.32**	2.09	0.59	2.25	2.07
Ford	Tempo	1989	**3.73**	0.55	2.65	9.75	3.28
Ford	Thunderbird	1987	**4.32**	1.16	2.65	8.25	4.43
Ford	F-150 Ranger	1979	**5.00**	4.28	4.12	12.25	3.16

G

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
GMC	Sierra 1500	2011	**2.77**	2.09	1.18	1.25	2.53
GMC	Acadia	2009	**2.60**	0.24	2.94	2.50	1.38
GMC	Envoy	2009	**2.12**	0.31	2.35	0.00	1.49
GMC	Sierra	2009	**1.37**	0.17	1.18	0.00	1.67
GMC	Yukon	2009	**1.79**	0.07	1.76	0.00	2.01
GMC	Acadia	2008	**2.20**	0.31	1.47	6.25	2.01
GMC	Envoy	2008	**2.07**	0.31	2.35	0.00	1.32
GMC	Sierra 1500	2008	**0.89**	0.55	0.59	0.00	0.69
GMC	Sierra 2500	2008	**2.55**	2.09	1.18	1.25	1.84
GMC	Yukon	2008	**1.57**	0.10	1.47	0.00	1.84
GMC	Yukon	2008	**1.64**	0.48	1.18	0.00	2.01
GMC	Arcadia	2007	**1.29**	0.34	1.18	0.00	1.15
GMC	Canyon	2007	**1.14**	0.48	0.59	0.00	1.61
GMC	Savanna	2007	**3.51**	1.88	2.65	1.75	2.18

GMC	Sierra	2007	**1.72**	0.62	1.18	0.00	2.01
GMC	Envoy	2006	**3.25**	0.51	3.24	0.00	2.93
GMC	Yukon	2006	**2.42**	1.34	1.47	0.50	2.30

H

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Honda	Civic	2012	**0.46**	0.38	0.00	0.50	0.69
Honda	Accord	2011	**1.25**	0.99	0.00	1.50	1.90
Honda	Accord	2011	**2.18**	3.15	0.00	0.75	1.32
Honda	CR-V	2011	**1.72**	2.02	0.00	0.00	1.95
Honda	CR-Z	2011	**0.63**	0.55	0.00	0.00	1.03
Honda	Element	2011	**2.12**	2.57	0.29	1.75	1.32
Honda	Fit	2011	**1.83**	2.05	0.29	0.25	1.61
Honda	Insight	2011	**0.87**	0.86	0.00	0.00	1.26
Honda	Odyssey	2011	**1.33**	1.13	0.00	0.50	2.13
Honda	Pilot	2011	**1.16**	1.13	0.00	0.00	1.72
Honda	Insight Hybrid	2010	**0.79**	0.58	0.00	0.00	1.49
Honda	Accord	2009	**0.70**	0.45	0.00	0.50	1.32
Honda	Civic Hybrid	2009	**0.87**	0.55	0.00	0.00	1.78
Honda	CR-V	2009	**1.20**	1.20	0.00	1.25	1.44
Honda	Element	2009	**2.08**	2.53	0.29	1.75	1.26
Honda	Fit	2009	**1.83**	2.12	0.29	0.00	1.55
Honda	Odyssey	2009	**0.96**	0.55	0.00	0.50	1.95
Honda	Pilot	2009	**1.68**	1.23	0.29	0.00	2.59
Honda	Ridgeline	2009	**1.09**	0.68	0.29	0.00	1.67
Honda	Accord	2008	**0.85**	0.34	0.00	0.00	2.07
Honda	Civic	2008	**1.25**	1.95	0.00	0.00	0.63
Honda	Civic Hybrid	2008	**0.98**	0.58	0.00	1.25	1.78
Honda	CR-V	2008	**1.16**	1.23	0.00	0.25	1.49
Honda	Element	2008	**2.21**	2.84	0.29	0.00	1.55
Honda	FIT	2008	**1.46**	0.72	0.29	0.25	2.70
Honda	Odyssey	2008	**1.40**	0.58	0.59	0.00	2.24
Honda	Pilot	2008	**1.09**	0.34	0.29	0.50	2.13
Honda	Ridgeline	2008	**1.05**	0.45	0.29	1.25	1.67
Honda	Fit	2007	**1.37**	0.86	0.00	0.00	2.82
Honda	Ridgeline	2007	**1.00**	0.24	0.29	0.00	2.13
Honda	Accord	2006	**1.96**	0.31	1.47	0.50	2.59
Honda	Civic	2006	**2.21**	2.81	0.00	1.25	1.90
Honda	CR-V	2006	**1.03**	0.38	0.29	1.25	1.72
Honda	Element	2006	**2.58**	1.82	0.88	3.00	2.59
Honda	Odyssey	2006	**0.79**	0.38	0.00	0.00	1.84
Honda	Pilot	2006	**1.57**	0.99	0.29	0.00	2.64
Honda	Civic	2000	**2.16**	0.62	2.06	1.75	1.26
Honda	Accord	1995	**2.97**	2.29	1.47	3.00	1.84
Honda	Accord	1992	**5.00**	4.01	2.06	8.75	2.99
Honda	Accord	1990	**4.32**	2.81	2.94	4.75	1.90
Hummer	H3	2007	**1.96**	0.41	1.47	0.50	2.41
Hummer	H2	2006	**1.85**	1.20	0.59	0.00	2.59
Hyundai	Accent	2012	**2.99**	3.77	0.29	1.50	2.07
Hyundai	Genesis	2011	**1.83**	1.10	0.29	2.00	2.82
Hyundai	Genesis	2011	**1.97**	1.03	0.88	0.00	2.70
Hyundai	Santa Fe	2011	**2.32**	1.30	1.47	0.25	2.13
Hyundai	Sonata	2011	**1.97**	1.99	0.29	1.25	1.95
Hyundai	Sonata	2011	**2.14**	2.19	0.29	1.25	2.13
Hyundai	Tucson	2011	**1.37**	0.99	0.00	1.25	2.30

Hyundai	Veracruz	2011	**2.75**	2.95	0.88	1.50	1.55
Hyundai	Accent	2009	**2.10**	2.02	0.29	2.50	2.01
Hyundai	Azera	2009	**2.69**	2.09	0.88	2.00	2.70
Hyundai	Elantra	2009	**2.32**	2.47	0.29	1.25	2.24
Hyundai	Genesis	2009	**2.51**	1.20	0.88	3.75	3.22
Hyundai	Genesis Coupe	2009	**2.58**	2.84	0.29	1.50	2.36
Hyundai	Santa Fe	2009	**1.13**	0.79	0.29	0.50	1.49
Hyundai	Sonata	2009	**1.88**	0.58	0.88	2.75	2.53
Hyundai	Sonata GLS	2009	**1.42**	0.68	0.29	1.00	2.47
Hyundai	Sonata SEV6	2009	**1.09**	0.62	0.29	0.00	1.78
Hyundai	Tuscon	2009	**4.11**	3.73	0.59	8.75	3.39
Hyundai	Accent	2008	**2.20**	2.67	0.29	0.75	1.61
Hyundai	Elantra	2008	**1.62**	0.99	0.88	0.00	1.67
Hyundai	Entourage	2008	**1.31**	0.62	0.59	0.75	1.72
Hyundai	Veracruz	2008	**2.93**	2.91	0.59	1.00	2.87
Hyundai	Accent	2007	**3.82**	4.59	0.29	2.00	3.16
Hyundai	Eutourage Ltd	2007	**1.49**	1.34	0.00	0.00	2.41
Hyundai	Sante Fe	2007	**1.00**	0.99	0.00	0.50	1.32
Hyundai	Sonata	2007	**1.79**	0.17	0.88	0.00	3.56
Hyundai	Tiburon	2007	**2.16**	0.51	1.47	3.75	2.13
Hyundai	Tuscon	2007	**1.99**	1.23	0.59	2.25	2.47
Hyundai	Azera	2006	**2.23**	1.20	0.59	0.75	3.62
Hyundai	Elantra	2006	**3.73**	2.33	2.35	3.00	2.41
Hyundai	Santa Fe	2006	**3.38**	0.51	2.06	9.25	3.51
Hyundai	Tiburon	2006	**3.60**	2.74	0.59	5.50	4.20
Hyundai	Tucson V6	2006	**3.51**	3.32	0.00	2.25	4.83
Hyundai	Sonata GL	1997	**3.01**	0.82	2.65	4.25	1.84

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Infiniti	FX35	2012	**1.53**	0.51	0.88	0.00	2.18
Infiniti	G Sedan	2012	**1.46**	0.31	0.88	0.00	2.30
Infiniti	QX56	2012	**2.21**	1.27	1.18	0.25	2.41
Infiniti	EX35 Journey	2011	**1.20**	0.38	0.29	0.00	2.53
Infiniti	G Convertible	2011	**1.62**	0.34	1.47	0.00	1.61
Infiniti	M56X	2011	**1.75**	1.82	0.00	1.25	2.13
Infiniti	FX35	2009	**2.56**	0.62	2.35	0.00	2.36
Infiniti	G37x	2009	**2.71**	0.92	2.35	0.00	2.30
Infiniti	M35x	2009	**2.05**	0.99	0.88	0.00	2.99
Infiniti	EX35	2008	**1.66**	0.55	0.88	0.00	2.53
Infiniti	FX35	2008	**1.40**	0.51	0.59	0.00	2.36
Infiniti	G35	2008	**1.24**	0.14	0.88	0.00	1.90
Infiniti	G37	2008	**1.44**	0.24	0.88	0.00	2.36
Infiniti	M35	2008	**1.79**	1.06	0.88	1.25	1.78
Infiniti	M45	2008	**1.59**	1.03	0.59	0.00	2.07
Infiniti	QX56	2008	**1.83**	1.40	0.88	0.00	1.61
Infiniti	G35 Sedan	2007	**1.49**	0.55	0.29	0.25	3.10
Infiniti	M35	2007	**2.21**	1.13	0.88	0.00	3.28
Infiniti	QX56	2007	**2.07**	0.75	0.88	0.50	3.33
Infiniti	FX35	2006	**1.64**	0.65	0.59	1.00	2.64
Infiniti	I30	2001	**4.89**	1.58	4.41	6.50	2.47

J

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Jeep	Grand Cherokee	2011	**0.92**	0.31	0.00	0.00	2.36
Jeep	Liberty	2011	**2.79**	2.43	0.88	1.75	2.47
Jeep	Wrangler	2011	**1.57**	0.58	0.88	0.00	2.18
Jeep	Wrangler	2011	**1.64**	0.34	0.88	2.75	2.18
Jeep	Commander	2009	**1.92**	0.48	1.47	0.00	2.30
Jeep	Compass	2009	**1.18**	0.55	0.88	0.50	0.92
Jeep	Grand Cherokee	2009	**2.92**	2.05	1.18	3.50	2.53
Jeep	Liberty	2009	**1.62**	0.41	0.59	0.00	3.22
Jeep	Patriot	2009	**2.20**	1.88	1.18	1.25	1.09
Jeep	Wrangler	2009	**0.83**	0.41	0.29	1.50	0.98
Jeep	Commander	2008	**2.56**	2.64	0.88	0.00	1.84
Jeep	Compass	2008	**2.05**	2.50	0.00	1.75	1.78
Jeep	Grand Cherokee	2008	**2.21**	1.99	0.88	0.50	1.72
Jeep	Liberty	2008	**1.24**	0.24	0.88	0.00	1.72
Jeep	Wrangler	2008	**2.14**	2.60	0.29	1.75	1.32
Jeep	Compass	2007	**0.79**	0.27	0.00	0.00	2.01
Jeep	Wrangler	2007	**0.89**	0.07	0.29	0.50	1.95
Jeep	Commander	2006	**3.14**	2.09	1.76	2.50	2.24
Jeep	Grand Cherokee	2006	**2.21**	0.65	1.76	0.00	2.36
Jeep	Jeep Liberty	2006	**1.96**	0.31	1.76	0.00	2.13
Jeep	Cherokee	1994	**4.10**	1.82	2.35	11.25	2.53

K

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Kia	Sorento	2012	**1.48**	0.45	1.18	0.00	1.55
Kia	Forte	2011	**2.62**	3.42	0.29	2.00	1.38
Kia	Optima	2011	**2.79**	2.36	0.88	1.75	2.59
Kia	Sedona	2011	**1.59**	0.31	1.18	1.25	1.84
Kia	Soul	2011	**3.12**	3.08	0.29	6.25	2.53
Kia	Sportage	2011	**2.88**	3.12	0.29	4.25	2.18
Kia	Soul	2010	**1.62**	2.05	0.00	1.25	1.32
Kia	Borrego	2009	**2.62**	2.26	1.18	1.50	1.72
Kia	Optima	2009	**2.68**	2.33	0.88	3.25	1.95
Kia	Rio	2009	**1.92**	2.09	0.00	1.25	2.18
Kia	Rondo	2009	**3.06**	2.19	1.18	3.00	2.87
Kia	Sedona	2009	**2.56**	2.23	0.88	2.50	1.95
Kia	Spectra	2009	**3.25**	2.60	1.18	1.25	3.16
Kia	Sportage	2009	**1.85**	0.48	0.88	1.75	2.82
Kia	Kia Sportage	2008	**2.64**	2.02	1.18	3.50	1.72
Kia	Optima	2008	**3.12**	2.91	1.18	2.25	2.01
Kia	Rio	2008	**2.32**	2.77	0.29	0.75	1.84
Kia	Rondo	2008	**3.32**	2.05	2.35	0.25	2.24
Kia	Sedona	2008	**2.53**	2.57	0.29	3.00	2.30
Kia	Sorento	2008	**3.23**	2.67	1.18	2.75	2.64
Kia	Spectra	2008	**3.21**	3.15	1.18	0.50	2.30
Kia	Optima	2007	**3.19**	2.91	1.18	1.00	2.53
Kia	Rondo	2007	**2.56**	2.53	0.88	1.25	1.72
Kia	Rondo	2007	**3.08**	2.16	1.18	2.75	3.05
Kia	Amanti	2006	**2.77**	0.68	2.35	0.75	2.70
Kia	Optima	2006	**3.52**	1.47	2.06	3.50	3.68
Kia	Rio	2006	**4.17**	5.00	0.29	2.25	3.51
Kia	Sedona	2006	**3.30**	3.25	0.29	2.50	3.68

Kia	Sorento	2006	**3.63**	3.39	0.59	2.75	3.85
Kia	Spectra 5	2006	**4.04**	4.55	0.29	3.25	3.62
Kia	Sportage	2006	**3.08**	2.57	0.59	3.50	3.33
Kia	Rio	2005	**3.30**	3.70	0.29	5.00	2.36
Kia	Optima	2002	**3.43**	0.99	2.65	6.75	2.30

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Lexus	ES	2011	**1.22**	1.13	0.00	0.25	1.84
Lexus	IS	2011	**1.85**	1.10	0.59	0.00	2.76
Lexus	RX	2011	**1.75**	1.13	0.59	0.00	2.41
Lexus	RX 350	2010	**2.64**	2.36	0.59	0.50	2.99
Lexus	ES 350	2009	**1.38**	0.65	0.00	0.50	3.10
Lexus	ES 350	2009	**1.40**	1.40	0.00	1.25	1.72
Lexus	GS 350	2009	**1.37**	0.86	0.00	1.25	2.53
Lexus	GX 470	2009	**1.61**	0.62	0.59	0.00	2.82
Lexus	IS 250	2009	**1.88**	0.82	0.59	1.25	3.05
Lexus	IS 350 C	2009	**1.77**	1.23	0.59	0.00	2.30
Lexus	LS 460	2009	**1.16**	1.10	0.00	0.00	1.78
Lexus	ES 350	2008	**1.75**	1.44	0.00	0.00	3.05
Lexus	GS 460	2008	**1.75**	0.89	0.00	1.25	3.68
Lexus	GX 470	2008	**1.31**	0.82	0.59	0.00	1.55
Lexus	IS 250	2008	**1.31**	0.75	0.00	1.25	2.53
Lexus	IS 350	2008	**1.31**	0.75	0.00	1.25	2.53
Lexus	LS 460	2008	**1.05**	0.62	0.00	0.50	2.13
Lexus	RX 350	2008	**1.24**	0.68	0.00	0.00	2.70
Lexus	ES 350	2007	**1.27**	0.72	0.00	0.00	2.76
Lexus	GX 470	2007	**1.48**	0.41	0.59	0.50	2.64
Lexus	IS 350	2007	**1.01**	0.45	0.00	0.00	2.41
Lexus	RX 350	2007	**1.92**	1.10	0.59	0.00	2.99
Lexus	LX 470	2006	**2.21**	0.55	1.76	0.50	2.41
Lexus	SC 430	2006	**2.93**	0.82	2.35	0.00	3.16
Lincoln	MKZ	2012	**1.94**	0.92	1.47	0.00	1.61
Lincoln	MKS	2011	**1.88**	1.20	1.47	0.00	0.98
Lincoln	MKT	2011	**1.53**	0.34	1.47	0.00	1.32
Lincoln	MKX	2011	**2.07**	1.13	1.18	0.50	2.13
Lincoln	MKZ	2011	**1.96**	0.31	1.76	0.50	2.01
Lincoln	Navigator	2011	**1.88**	0.45	1.76	0.00	1.67
Lincoln	MKZ	2010	**2.90**	0.45	3.24	0.00	1.95
Lincoln	MKS	2009	**2.93**	1.03	2.94	0.00	1.67
Lincoln	MKX	2009	**2.53**	1.27	1.47	0.00	2.87
Lincoln	Town Car	2009	**2.53**	0.41	2.94	1.25	1.15
Lincoln	Mark LT	2008	**3.54**	1.75	2.65	1.25	2.64
Lincoln	MKX	2008	**1.92**	0.58	1.47	0.00	2.13
Lincoln	MKZ	2008	**2.73**	0.27	2.94	0.00	2.30
Lincoln	Navigator	2008	**3.34**	1.75	2.94	0.00	1.72
Lincoln	Town Car	2008	**1.81**	0.27	1.76	0.00	1.72
Lincoln	Lincoln MKX	2007	**1.79**	0.21	1.47	0.25	2.30
Lincoln	Mark LT	2007	**1.75**	0.45	1.18	0.50	2.30
Lincoln	MKZ	2007	**2.88**	0.68	2.94	0.25	2.01
Lincoln	Navigator	2007	**2.73**	0.55	2.94	2.00	1.38
Lincoln	Town Car	2007	**3.21**	1.64	2.94	0.75	1.32
Lincoln	Navigator	2005	**2.21**	0.10	2.65	1.25	1.26
Lincoln	Continental	1997	**2.45**	0.62	2.35	1.00	1.78
Lincoln	Continental	1995	**2.31**	0.58	1.76	1.75	2.36
Lincoln	Towncar	1994	**2.73**	0.51	2.06	0.25	3.56
Lincoln	Continental	1992	**2.97**	0.31	2.35	8.50	2.18

M

Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Mazda	MAZDA 5	2012	**2.69**	3.36	0.00	3.00	2.07
Mazda	CX-7	2011	**3.08**	3.29	0.88	2.50	1.78
Mazda	CX-9	2011	**1.81**	0.31	1.47	0.50	2.13
Mazda	MAZDA 2	2011	**1.86**	2.60	0.00	1.25	1.15
Mazda	MAZDA 3	2011	**2.75**	3.32	0.29	2.50	1.84
Mazda	MAZDA 6	2011	**2.62**	3.42	0.29	2.25	1.32
Mazda	5	2009	**3.01**	3.63	0.00	4.50	2.24
Mazda	3i	2009	**2.45**	2.19	0.88	1.25	1.95
Mazda	3s	2009	**2.58**	2.67	0.88	1.25	1.55
Mazda	6i	2009	**2.29**	3.49	0.29	0.00	0.69
Mazda	MX 5 Miata	2009	**2.71**	2.64	1.18	1.75	1.32
Mazda	5	2008	**2.69**	3.12	0.59	2.00	1.55
Mazda	6	2008	**3.39**	3.18	2.06	0.25	1.15
Mazda	CX-7	2008	**2.18**	2.09	0.88	1.25	1.26
Mazda	CX-9	2008	**1.77**	0.55	1.47	0.00	1.72
Mazda	MX-5	2008	**1.20**	0.45	0.59	1.25	1.55
Mazda	6i	2007	**2.95**	0.34	3.24	0.00	2.30
Mazda	CX-7	2007	**2.03**	0.41	1.47	0.00	2.76
Mazda	Mazda 3	2007	**3.49**	3.32	0.29	2.75	4.08
Mazda	Mazda 5	2007	**3.17**	2.84	0.59	1.75	3.56
Mazda	Mazda 6	2007	**3.14**	0.55	2.94	0.25	3.05
Mazda	6i	2006	**2.14**	0.34	2.06	0.00	2.07
Mazda	MX-5 Miata	2006	**1.37**	0.48	0.59	0.00	2.30
Mazda	RX-8	2006	**1.83**	1.34	0.29	0.00	2.87
Mercedes	GLK	2012	**2.34**	0.07	2.65	0.00	2.01
Mercedes	C	2011	**2.38**	0.27	2.65	0.00	1.78
Mercedes	E	2011	**1.37**	0.27	0.88	0.25	2.01
Mercedes	E	2011	**2.42**	0.17	2.94	0.00	1.49
Mercedes	G	2011	**1.83**	0.96	0.88	0.50	2.24
Mercedes	GL	2011	**1.94**	0.34	1.47	0.25	2.53
Mercedes	M	2011	**2.71**	0.31	2.94	0.25	2.13
Mercedes	R	2011	**2.69**	0.38	2.94	0.00	2.01
Mercedes	S	2011	**1.49**	0.31	0.59	0.25	2.93
Mercedes	SLK	2011	**1.29**	0.31	0.59	0.00	2.36
Mercedes	C300	2008	**2.99**	0.41	2.65	2.50	2.87
Mercedes	C350	2008	**3.19**	0.72	2.65	2.50	2.99
Mercedes	CL550C	2008	**1.40**	0.45	0.59	0.50	2.36
Mercedes	CLK350	2008	**1.11**	0.34	0.00	1.25	2.59
Mercedes	CLS550	2008	**1.75**	0.27	0.59	1.75	3.45
Mercedes	E320	2008	**3.30**	0.27	2.65	5.00	3.51
Mercedes	E350	2008	**3.36**	0.24	2.65	4.25	3.91
Mercedes	E63	2008	**1.70**	0.96	0.00	2.00	3.22
Mercedes	GL450	2008	**2.84**	0.31	2.94	1.50	2.24
Mercedes	ML350	2008	**2.29**	1.06	1.47	1.75	2.07
Mercedes	R350	2008	**3.25**	0.27	2.94	2.00	3.45
Mercedes	S550	2008	**1.55**	0.34	0.59	1.75	2.70
Mercedes	SL550	2008	**1.49**	0.55	0.59	0.00	2.59
Mercedes	SLK280	2008	**1.72**	0.27	0.59	2.00	3.28
Mercedes	C350	2007	**3.17**	0.55	2.65	0.00	3.79
Mercedes	CLK350	2007	**1.68**	0.51	0.59	0.00	3.22
Mercedes	CLS550	2007	**1.72**	0.45	0.59	0.00	3.45
Mercedes	E350	2007	**3.03**	0.21	2.65	2.25	3.39

N

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Nissan	Altima	2012	**1.55**	0.27	0.88	0.75	2.47
Nissan	Altima	2011	**1.33**	1.51	0.00	0.25	1.55
Nissan	cube	2011	**0.65**	0.51	0.00	0.50	1.03
Nissan	Frontier	2011	**1.05**	0.24	0.00	0.50	2.76
Nissan	Juke	2011	**1.62**	1.10	0.88	0.00	1.49
Nissan	Maxima	2011	**1.55**	0.48	0.88	0.00	2.30
Nissan	Pathfinder	2011	**1.81**	0.34	1.47	0.50	2.07
Nissan	Quest	2011	**1.94**	0.48	1.47	0.00	2.36
Nissan	Rogue	2011	**1.55**	0.24	1.47	0.00	1.55
Nissan	Sentra	2011	**0.90**	0.48	0.29	0.00	1.44
Nissan	Versa	2011	**3.08**	2.71	0.88	6.25	1.90
Nissan	Altima	2009	**1.29**	0.79	0.29	2.00	1.67
Nissan	Cube Krom	2009	**0.72**	0.58	0.00	0.00	1.26
Nissan	Frontier	2009	**1.57**	0.41	1.18	0.00	1.90
Nissan	Murano	2009	**1.25**	0.99	0.29	0.25	1.61
Nissan	Murano	2009	**1.61**	0.62	0.88	1.25	1.95
Nissan	Versa	2009	**2.34**	2.57	0.59	0.50	1.72
Nissan	Xterra	2009	**2.44**	2.71	0.59	0.25	1.84
Nissan	350Z	2008	**3.01**	2.95	1.18	0.25	2.07
Nissan	Altima	2008	**1.77**	2.29	0.00	1.25	1.38
Nissan	Armada	2008	**1.18**	0.58	0.59	0.00	1.55
Nissan	Frontier	2008	**1.22**	0.41	0.88	0.00	1.38
Nissan	Pathfinder	2008	**1.48**	0.48	0.88	0.25	2.01
Nissan	Quest	2008	**1.97**	0.45	1.76	0.00	1.95
Nissan	Rogue	2008	**2.20**	1.03	1.76	0.00	1.67
Nissan	Sentra	2008	**1.66**	0.48	1.47	0.00	1.49
Nissan	Titan	2008	**1.13**	0.34	0.88	1.25	0.92
Nissan	Versa	2008	**1.48**	1.10	0.88	0.50	0.92
Nissan	Xterra	2008	**1.33**	0.51	0.88	0.00	1.55
Nissan	Altima	2007	**2.20**	2.29	0.00	3.25	2.24
Nissan	Armada	2007	**2.32**	0.92	1.47	0.50	2.70
Nissan	Maxima	2007	**1.62**	0.38	0.88	1.00	2.47
Nissan	Quest	2007	**1.51**	1.13	0.59	0.25	1.61
Nissan	Sentra	2007	**1.64**	1.13	0.88	0.00	1.49
Nissan	Versa	2007	**5.00**	3.90	2.65	2.25	3.33
Nissan	35OZ Roadster Tour	2006	**2.42**	1.44	1.18	0.25	2.76
Nissan	Frontier	2006	**0.98**	0.31	0.59	0.00	1.38
Nissan	Murano	2006	**1.94**	0.68	0.88	0.00	3.16
Nissan	Pathfinder	2006	**2.73**	1.44	1.47	0.50	3.10
Nissan	Titan	2006	**1.27**	0.38	0.59	1.50	1.84
Nissan	XTerra	2006	**1.42**	0.31	1.18	0.00	1.61
Nissan	Sentra	2002	**1.99**	0.82	0.59	3.75	2.82
Nissan	Sentra	1994	**4.56**	2.88	2.94	3.00	2.93

O

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Oldsmobile	Alero	1999	**4.28**	3.63	2.06	5.00	2.07
Oldsmobile	Intrigue	1998	**3.71**	0.45	4.12	1.50	2.41
Oldsmobile	Cutlass Supreme	1996	**2.97**	2.74	0.88	5.25	1.72

P

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Pontiac	G5	2009	**0.65**	0.07	0.00	0.00	1.90
Pontiac	G6	2009	**2.60**	0.58	1.47	6.25	2.82
Pontiac	G8	2009	**1.57**	0.45	1.18	0.00	1.84
Pontiac	Vibe	2009	**1.68**	1.92	0.29	1.25	1.15
Pontiac	G6	2008	**1.31**	0.48	0.88	1.25	1.26
Pontiac	G8	2008	**1.01**	0.21	0.59	0.00	1.67
Pontiac	Solstice	2008	**1.77**	0.17	1.47	0.00	2.36
Pontiac	Solstice	2008	**2.80**	0.38	2.94	0.00	2.36
Pontiac	Torrent	2008	**1.14**	0.55	0.59	0.00	1.49
Pontiac	G5	2007	**1.09**	0.34	0.29	0.00	2.24
Pontiac	Grand Prix	2007	**2.66**	2.33	1.18	0.25	2.01
Pontiac	Solstice	2007	**2.07**	0.24	1.47	0.00	3.16
Pontiac	Torrent	2007	**1.29**	0.51	0.59	0.00	2.01
Pontiac	Vibe	2007	**1.07**	0.31	0.29	1.75	1.84
Pontiac	G6	2006	**1.77**	0.68	0.88	1.75	2.24
Pontiac	GTO	2006	**1.94**	0.45	1.47	0.00	2.41
Pontiac	Montana SV6	2006	**2.73**	2.19	0.59	1.25	3.39
Pontiac	Grand Am	2003	**1.68**	0.48	1.47	1.25	1.26
Pontiac	Bonneville	1995	**3.12**	0.38	2.35	8.25	2.59
Porsche	911	2012	**0.92**	0.51	0.00	0.00	2.01
Porsche	911	2011	**1.33**	1.06	0.29	0.75	1.61
Porsche	Cayman	2011	**1.14**	0.45	0.59	0.00	1.67
Porsche	911 Carrera	2009	**2.60**	1.06	2.35	0.00	1.72
Porsche	911	2008	**1.18**	0.89	0.00	1.25	1.90
Porsche	Boxster	2008	**1.14**	0.48	0.00	1.25	2.47
Porsche	Carrera	2008	**2.29**	0.51	2.65	0.00	1.09
Porsche	Cayenne	2008	**2.95**	0.34	3.24	0.00	2.30
Porsche	Cayman	2007	**2.44**	0.65	2.35	0.00	1.90

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Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
SaabGM	Sep 3, 2012	2009	**1.72**	0.65	0.88	0.25	2.47
SaabGM	9-7x	2007	**2.97**	0.58	2.94	0.50	2.41
SaabGM	9-3 2.0T	2006	**1.68**	0.34	1.47	0.50	1.67
SaabGM	9-3 Aero	2006	**2.03**	0.45	1.47	1.75	2.30
SaabGM	9-5 2.3T	2006	**2.01**	0.24	1.76	0.00	2.41
SaabGM	Sep 3, 2012	2000	**1.44**	0.48	0.88	1.75	1.55
SaabGM	Sep 3, 2012	1999	**2.08**	0.55	0.88	8.00	2.01
SaabSpyker Cars N.V.	Sep 3, 2012	2011	**1.53**	0.17	1.47	0.00	1.61
SaabSpyker Cars N.V.	Sep 3, 2012	2011	**1.85**	0.41	1.47	0.50	2.07
SaabSpyker Cars N.V.	Sep 5, 2012	2011	**1.83**	0.24	1.47	0.50	2.30
SaabSpyker Cars N.V.	9-3X	2011	**1.68**	0.27	1.47	1.00	1.67
Saturn	Aura	2009	**1.77**	0.31	1.18	1.25	2.41
Saturn	Outlook	2009	**3.03**	1.92	1.18	7.50	2.18
Saturn	SKY	2009	**1.46**	0.00	0.88	0.00	2.82
Saturn	Vue	2009	**1.09**	0.48	0.00	0.00	2.59
Saturn	Astra XR	2008	**1.11**	0.51	0.00	2.75	1.95

Saturn	Astra XR 5dr	2008	**0.94**	0.31	0.00	1.50	2.07
Saturn	Aura	2008	**2.05**	0.48	0.88	6.25	2.41
Saturn	Aura Hybrid	2008	**2.05**	0.48	0.88	6.25	2.41
Saturn	Outlook	2008	**1.96**	0.03	1.47	6.25	1.72
Saturn	Sky	2008	**2.10**	0.14	1.76	1.25	2.59
Saturn	Vue	2008	**1.62**	1.27	0.00	1.25	2.64
Saturn	Aura	2007	**3.14**	0.58	2.65	1.75	3.22
Saturn	Ion 2	2007	**2.23**	2.40	0.29	0.00	2.36
Saturn	Outlook	2007	**2.56**	1.88	0.88	1.25	2.82
Saturn	Sky Roadster	2007	**2.25**	1.03	1.47	0.00	2.41
Saturn	VUE	2007	**3.23**	2.16	1.76	1.25	2.70
Saturn	Relay	2006	**1.88**	0.45	1.47	0.00	2.24
Saturn	SL2	2002	**2.21**	0.38	2.35	0.25	1.61
Saturn	SL1	1999	**2.71**	0.55	2.35	5.50	1.67
Saturn	SL2	1999	**4.10**	3.39	1.76	6.00	2.24
Saturn	SC2	1997	**3.03**	0.82	2.94	0.75	2.13
Scion	tC	2011	**2.32**	2.09	0.29	2.50	2.59
Scion	xB	2011	**1.37**	0.92	0.29	0.25	2.07
Scion	xD	2011	**1.72**	2.09	0.29	0.00	1.26
Scion	tC	2009	**2.12**	2.12	0.59	1.25	1.61
Scion	xB	2009	**2.60**	3.32	0.29	0.00	1.95
Scion	xD	2009	**2.45**	2.71	0.29	1.75	2.13
Scion	TC	2008	**2.86**	2.74	0.59	3.75	2.30
Scion	xB	2008	**2.23**	2.71	0.29	1.25	1.55
Scion	tC	2006	**2.10**	2.29	0.29	2.50	1.55
Scion	xA 5 Door	2006	**3.04**	2.88	0.29	1.75	3.68
Scion	xB 5dr	2006	**4.24**	4.90	0.29	3.50	3.62
Smart	Coupe	2011	**0.74**	0.51	0.00	0.50	1.32
Smart	Passion Cabriolet	2011	**0.79**	0.45	0.00	0.50	1.61
Smart	Brabus Coupe	2009	**0.96**	0.45	0.29	0.00	1.67
Smart	Passion Cabriolet	2009	**1.79**	1.82	0.29	1.25	1.67
Smart	Passion Coupe	2009	**1.49**	0.48	0.88	0.00	2.13
Smart	Passion Coupe	2009	**1.70**	0.62	0.88	0.00	2.53
Smart	Pure	2009	**1.14**	0.31	0.88	0.00	1.32
Smart	Passion	2008	**0.83**	0.31	0.59	0.00	0.92
Smart	Passion Cabriolet	2008	**0.81**	0.58	0.00	0.00	1.55
Smart	Pure	2008	**0.50**	0.03	0.00	0.00	1.49
Subaru	Forester	2011	**2.16**	3.25	0.00	0.50	1.15
Subaru	Impreza	2011	**0.94**	0.34	0.59	0.00	1.21
Subaru	Legacy	2011	**1.75**	0.55	1.18	0.00	2.24
Subaru	Outback	2011	**2.40**	1.95	0.88	1.25	2.18
Subaru	Tribeca	2011	**1.24**	0.51	0.00	0.00	2.99
Subaru	Forester	2009	**2.44**	2.81	0.29	1.75	1.90
Subaru	Forester AWD	2009	**2.58**	3.32	0.00	2.25	1.95
Subaru	Impreza	2009	**1.90**	1.13	0.88	1.25	2.01
Subaru	Legacy	2009	**2.20**	2.12	0.29	1.25	2.41
Subaru	Legacy	2009	**2.31**	2.67	0.29	1.25	1.84
Subaru	Outback	2009	**2.23**	2.12	0.29	1.50	2.47
Subaru	Tribeca	2009	**1.14**	0.34	0.00	0.00	2.99
Subaru	Impreza	2008	**1.25**	0.48	0.88	0.00	1.38
Subaru	Outback	2008	**2.18**	2.67	0.29	1.25	1.44
Subaru	Tribeca	2008	**1.14**	0.41	0.59	0.00	1.72
Subaru	Forester	2007	**3.93**	3.63	0.88	3.00	3.74
Subaru	Legacy	2007	**2.86**	2.77	0.29	3.50	2.87
Subaru	Outback	2007	**2.60**	2.81	0.29	2.25	2.30
Subaru	Impreza WRX	2006	**2.62**	3.42	0.00	1.75	2.01
Subaru	Tribeca	2006	**1.22**	0.51	0.00	0.50	2.82
Suzuki	Grand Vitara	2011	**1.05**	0.24	0.88	0.50	1.03
Suzuki	Kizashi	2011	**1.20**	1.10	0.00	0.00	1.90

Make	Model	Year	Overall Rating	Bromine	Chlorine	Lead	Other Chemicals
Suzuki	SX4	2011	**1.85**	2.33	0.29	1.25	0.98
Suzuki	Equator	2009	**1.70**	0.34	1.18	0.50	2.30
Suzuki	SX4	2009	**1.44**	1.54	0.29	0.50	1.21
Suzuki	Forenza	2008	**3.54**	3.66	1.76	0.00	1.44
Suzuki	Grand Vitara	2008	**1.57**	1.27	0.59	0.00	1.61
Suzuki	Reno	2008	**4.32**	4.42	2.06	0.25	1.95
Suzuki	SX4	2008	**1.72**	2.60	0.00	0.00	0.98
Suzuki	SX4 Crossover	2008	**1.24**	1.23	0.29	1.75	0.80
Suzuki	SX4 Sport	2008	**1.72**	2.60	0.00	0.00	0.98
Suzuki	XL7	2008	**1.46**	0.27	0.88	0.25	2.30
Suzuki	Forenza	2007	**2.97**	2.57	1.76	0.50	1.38
Suzuki	Grand Vitara	2007	**1.29**	0.51	0.59	0.25	1.95
Suzuki	SX4	2007	**1.14**	1.03	0.29	0.50	1.15
Suzuki	Aerio	2006	**0.81**	0.45	0.29	0.00	1.21
Suzuki	Aerio Sedan	2006	**1.99**	2.53	0.29	0.00	1.38
Suzuki	Forenza	2006	**3.73**	2.88	1.76	2.50	2.76
Suzuki	Forenza Wagon	2006	**4.08**	2.57	1.76	4.00	4.02
Suzuki	Reno	2006	**3.62**	2.91	2.06	1.25	2.07
Suzuki	XL7	2006	**1.42**	0.62	0.59	0.50	2.13

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Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Toyota	4Runner	2011	**1.29**	0.31	0.59	0.00	2.36
Toyota	Avalon	2011	**1.59**	1.13	0.00	1.25	2.76
Toyota	Camry	2011	**1.88**	2.09	0.59	0.00	1.21
Toyota	Corolla	2011	**1.48**	2.12	0.29	0.00	0.46
Toyota	Highlander	2011	**1.73**	1.16	1.18	0.00	1.15
Toyota	Land Cruiser	2011	**1.50**	1.00	0.60	0.00	1.90
Toyota	Prius	2011	**0.55**	0.38	0.00	0.50	0.98
Toyota	RAV 4	2011	**1.81**	0.45	1.47	0.00	2.01
Toyota	Sequoia	2011	**1.72**	0.51	1.18	0.00	2.18
Toyota	Sienna	2011	**1.97**	0.55	1.18	1.25	2.64
Toyota	Tundra	2011	**2.01**	2.05	0.59	1.25	1.38
Toyota	Venza	2011	**0.77**	0.51	0.00	0.00	1.55
Toyota	Yaris	2011	**2.20**	2.67	0.29	2.50	1.21
Toyota	4Runner	2009	**2.69**	2.09	1.18	1.25	2.30
Toyota	Camry	2009	**1.25**	1.13	0.00	0.50	1.90
Toyota	Camry	2009	**1.97**	2.26	0.59	1.25	0.92
Toyota	Corolla	2009	**0.68**	0.58	0.29	0.00	0.57
Toyota	FJ Cruiser	2009	**2.84**	2.12	0.88	6.25	2.13
Toyota	Matrix	2009	**1.72**	1.82	0.29	0.00	1.72
Toyota	Matrix	2009	**1.73**	1.88	0.00	0.50	2.13
Toyota	Prius	2009	**0.83**	0.68	0.00	0.00	1.44
Toyota	Sequoia	2009	**1.44**	0.51	0.59	0.00	2.47
Toyota	Sienna	2009	**2.07**	2.19	0.29	0.00	2.18
Toyota	Tacoma	2009	**2.55**	2.47	0.29	1.75	2.82
Toyota	Tundra	2009	**2.01**	2.71	0.00	1.75	1.32
Toyota	Venza	2009	**1.99**	2.26	0.29	0.00	1.84
Toyota	Yaris	2009	**2.88**	3.39	0.29	3.00	2.01
Toyota	4Runner	2008	**2.79**	2.77	0.88	1.25	2.01
Toyota	Avalon	2008	**2.20**	1.34	0.88	0.00	2.87
Toyota	Avalon	2008	**2.80**	2.84	1.18	0.00	1.67
Toyota	Camry	2008	**1.85**	1.30	0.59	0.50	2.30
Toyota	Camry Solara	2008	**1.29**	0.41	0.59	0.50	2.07
Toyota	FJ Cruiser	2008	**2.51**	1.88	1.47	1.25	1.49
Toyota	Highlander	2008	**1.22**	0.48	1.18	0.00	0.69

Toyota	Highlander	2008	**1.96**	0.55	1.47	0.00	2.30
Toyota	Highlander Hybrid	2008	**2.21**	2.02	0.88	0.50	1.67
Toyota	Sequoia	2008	**1.73**	0.38	1.18	0.00	2.47
Toyota	Sienna	2008	**1.90**	2.02	0.88	0.00	0.80
Toyota	Tacoma	2008	**0.90**	0.51	0.29	0.00	1.38
Toyota	Camry	2007	**3.08**	2.98	0.59	0.00	3.45
Toyota	FJ Cruiser	2007	**3.34**	2.29	1.47	1.50	3.33
Toyota	Prius	2007	**0.79**	0.75	0.00	0.00	1.21
Toyota	Tundra	2007	**2.49**	2.05	1.18	1.25	1.72
Toyota	Tundra CMAX	2007	**2.40**	2.02	1.18	1.25	1.49
Toyota	Yaris	2007	**3.56**	3.39	0.29	3.50	4.02
Toyota	4 Runner	2006	**1.66**	0.55	1.18	0.00	1.95
Toyota	Avalon	2006	**2.99**	2.95	0.88	0.00	2.64
Toyota	Corolla Le Sadan	2006	**2.21**	2.05	0.29	1.25	2.59
Toyota	Highlander	2006	**3.39**	3.22	0.29	2.50	4.02
Toyota	Matrix	2006	**0.94**	0.68	0.00	0.00	1.78
Toyota	Prius	2006	**1.85**	1.34	0.59	0.00	2.36
Toyota	Rav 4	2006	**3.63**	2.71	1.18	2.50	3.91
Toyota	Sequoia	2006	**1.83**	0.55	1.18	0.00	2.47
Toyota	Sienna	2006	**2.64**	2.74	0.29	1.75	2.64
Toyota	Solara	2006	**2.56**	2.02	0.29	1.25	3.74
Toyota	Tacoma	2006	**1.27**	0.62	0.29	0.00	2.36
Toyota	Tundra	2006	**1.88**	2.36	0.00	0.00	1.90
Toyota	Tercel	1993	**4.34**	2.40	3.53	2.50	2.01
Toyota	Camry	1989	**5.00**	2.81	3.53	9.75	2.18

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Make	Model	Year	**Overall Rating**	Bromine	Chlorine	Lead	Other Chemicals
Volvo	S60	2012	**1.40**	0.58	1.47	0.00	0.52
Volvo	C30	2011	**1.38**	0.00	1.47	0.00	1.44
Volvo	S60	2011	**1.81**	0.65	1.47	0.25	1.61
Volvo	S80	2011	**2.20**	0.79	1.76	0.00	2.07
Volvo	XC60	2011	**1.57**	0.68	1.18	0.00	1.44
Volvo	XC60	2011	**1.79**	0.65	1.47	1.25	1.32
Volvo	XC70	2011	**1.94**	1.16	1.47	0.25	1.15
Volvo	XC90	2011	**1.57**	0.34	1.47	0.50	1.32
Volvo	XC60	2010	**1.88**	0.65	1.47	0.00	1.90
Volvo	C30	2009	**1.55**	0.55	1.47	0.00	1.03
Volvo	C70 Convertible	2009	**1.64**	0.38	1.47	0.00	1.61
Volvo	S40	2009	**1.46**	0.65	0.88	0.00	1.72
Volvo	S60	2009	**1.40**	0.24	1.18	0.50	1.55
Volvo	V50	2009	**1.40**	0.38	0.88	1.25	1.72
Volvo	XC70	2009	**1.31**	0.62	0.88	1.25	1.03
Volvo	XC90 AWD	2009	**1.46**	0.17	0.88	2.25	2.01
Volvo	C30	2008	**1.25**	0.21	1.18	0.00	1.26
Volvo	C70	2008	**1.72**	0.41	1.47	0.00	1.78
Volvo	S40	2008	**1.00**	0.45	0.29	1.75	1.38
Volvo	S60	2008	**1.62**	0.38	1.18	0.50	2.01
Volvo	S80	2008	**1.88**	0.58	1.47	0.00	2.01
Volvo	S80 AWD	2008	**2.16**	0.79	1.47	1.50	2.18
Volvo	XC70	2008	**2.18**	0.55	1.47	1.25	2.70
Volvo	XC90	2008	**1.24**	0.31	0.88	0.50	1.49
Volvo	S40	2007	**0.96**	0.24	0.88	0.00	0.86
Volvo	S60	2007	**1.61**	0.41	1.18	0.00	2.01
Volvo	S80	2007	**1.97**	0.31	1.47	0.50	2.64
Volvo	V50	2007	**0.59**	0.17	0.29	0.25	0.92

Volvo	V70	2007	**1.61**	0.58	1.18	0.50	1.61
Volvo	XC 90	2007	**2.36**	1.16	1.47	0.00	2.53
Volvo	XC 70	2006	**2.36**	0.58	2.65	0.00	1.21
VW	Eos	2012	**2.86**	0.17	3.24	1.00	2.07
VW	GTI	2012	**0.89**	0.55	0.00	1.75	1.44
VW	Golf	2011	**1.57**	1.16	0.00	2.00	2.47
VW	Jetta	2011	**2.62**	0.17	3.24	0.00	1.55
VW	Routan	2011	**2.42**	0.27	2.35	1.25	2.18
VW	Tiguan	2011	**1.57**	0.41	1.47	0.00	1.32
VW	Beetle	2009	**3.73**	0.82	4.41	0.00	1.61
VW	Eos	2009	**3.51**	0.21	4.71	2.25	0.86
VW	GTI	2009	**2.92**	1.27	2.06	0.00	2.93
VW	Jetta	2009	**3.87**	0.45	4.71	0.25	2.07
VW	Passat Komfort	2009	**2.80**	0.31	2.94	0.00	2.47
VW	Rabbit	2009	**2.12**	0.41	2.06	1.50	1.55
VW	Routan	2009	**1.09**	0.48	0.59	1.25	1.15
VW	Tiguan	2009	**2.42**	1.16	1.76	0.25	2.07
VW	Beetle SE	2008	**3.86**	0.55	4.41	1.25	2.18
VW	EOS	2008	**2.75**	0.41	3.24	0.50	1.44
VW	GTI	2008	**2.29**	0.62	1.76	1.25	2.36
VW	Jetta	2008	**1.81**	0.27	1.76	1.25	1.44
VW	Passat	2008	**2.80**	0.10	3.24	1.25	1.95
VW	R32	2008	**2.82**	0.58	2.94	0.50	1.95
VW	Rabbit	2008	**2.29**	0.55	2.35	0.25	1.55
VW	Tiguan	2008	**1.77**	0.45	1.76	1.00	1.09
VW	Touareg	2008	**2.51**	0.38	2.94	0.25	1.38
VW	Touareg VR6	2008	**4.02**	0.48	4.71	1.25	2.24
VW	EOS	2007	**2.25**	0.41	2.65	0.50	1.03
VW	Beatle	2006	**3.82**	0.38	5.00	0.50	1.38
VW	Jetta	2006	**3.73**	0.68	4.41	0.00	1.84
VW	new GTI	2006	**2.20**	0.75	1.76	0.00	2.13
VW	Passat	2006	**1.79**	0.38	1.18	0.00	2.64
VW	Rabbit	2006	**2.47**	1.06	2.06	0.50	1.78
VW	Touareg	2006	**3.21**	0.62	2.94	1.75	2.82
VW	Jetta	1993	**3.76**	2.91	1.76	2.25	2.87

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