

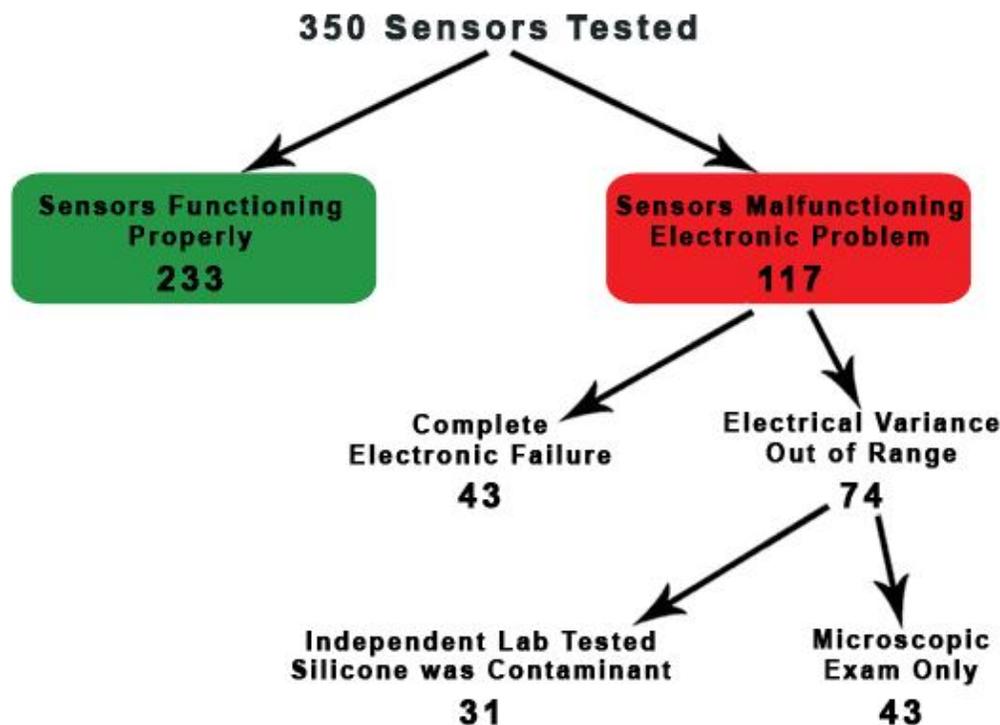
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K&N MAF Sensor Test Results

January 2004 through December 2010

K&N has millions of satisfied customers, yet we do occasionally get instances where a dealership or service provider has blamed our product for a vehicle problem. We attempt to resolve these misunderstandings by speaking directly to the service technicians. In any event, we take care of the consumer through our [Consumer Protection Pledge](#). In issues regarding MAF sensors, we have been able to recover many of the allegedly "bad" sensors and test them to diagnose the actual cause of the failure. In most of these cases the "bad" sensor was actually functioning properly and was misdiagnosed by the dealership or service provider. The diagram below is a summary of our findings.



Of the 117 sensors we received that were truly malfunctioning, 43 had a complete electronic failure in which the sensor's voltage output was a flat line, generally caused by a connection or circuitry problem within the sensor. When a sensor is responsive but its voltage output is not within the normal limits we refer to this as "out of range". This condition can be caused by circuitry problems and it can also be caused by a sensor's thermistor becoming dirty or contaminated. We sent 31 out of range sensors to an independent laboratory for an elemental and chemical analysis and the majority of them were found to have silicone as the contaminant.

Silicone is used on the circuitry of these sensors because it acts as an excellent thermal and electrical insulator, inherently sticks to most surfaces, and is resistant to moisture and heat. Some MAF sensors use a high temperature burn-off cycle to eliminate normal engine contaminants from the sensor. Silicone is resistant to this process.

Thermistors are used in MAF sensors to measure the transfer of heat from the thermistor to the air passing by the sensor. A thermistor's resistance changes as its surrounding temperature changes. The greater the air mass and air flow the greater the transfer of heat. When a thermistor is "silicone contaminated" the thermistor becomes insulated and can result in an out of range condition.

In addition to out of range sensors, functioning and failed sensors have also been sent to an independent forensic laboratory for analysis. A few of these sensors were found to have trace amounts of oil on the thermistor. The amount of oil was so minimal that an accurate analysis of the oil's source could not be determined. The trace amount of oil can conceivably be found from two possible sources: fuel in the combustion chamber or motor oil used as an engine lubricant that gets suspended in crankcase vapor. Our experience in the lab is that trace amounts of oil don't change the sensitivity of the sensor enough to cause an "out of range" electronic signal. Furthermore our testing has shown that K&N air filter oil will not come off a K&N air

filter even in extreme conditions. More on this topic [here](#).

As of the date of our last test shown below, K&N air filter oil cannot be confirmed as the source of contamination on a sensor nor can any oil type be attributed to a sensor's failure.

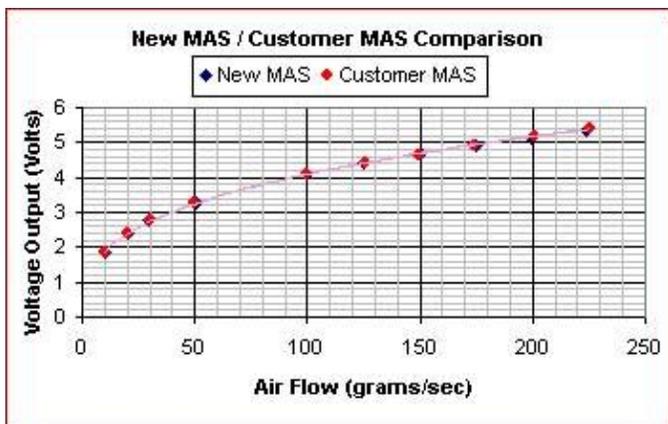
MORE DETAILS ON SILICONE & TESTING

Mass Air Flow Sensor Electronic Testing at K&N:

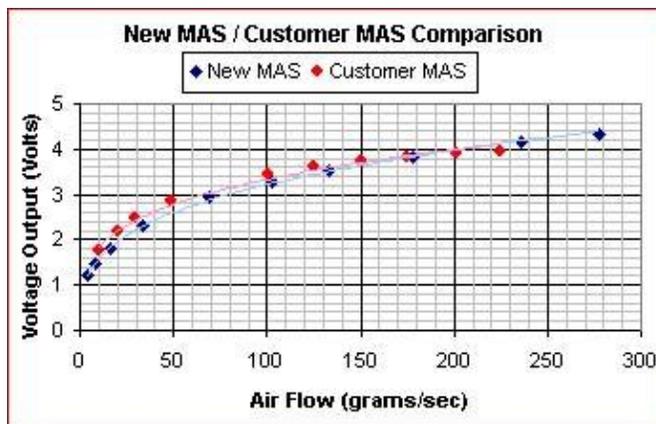
The MAF sensor is placed on a test bench designed and built by K&N Engineering. The test bench can flow air through the sensor at variable flow rates, ranging from idle to full throttle. The flow of a sensor is then compared to a new sensor.



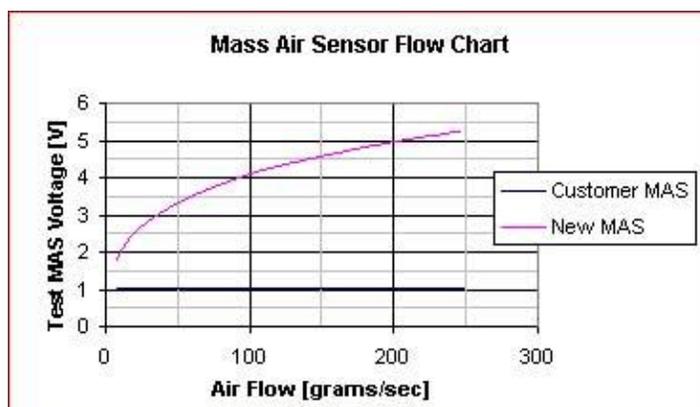
MAF Sensor Test Bench



Example of Sensor reading Normal



Example of Sensor reading Out of Range

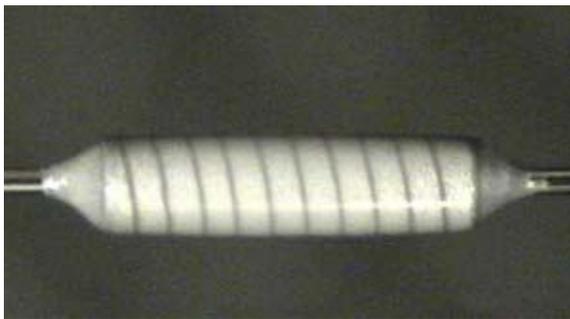


Example of Failed Sensor (flat line)

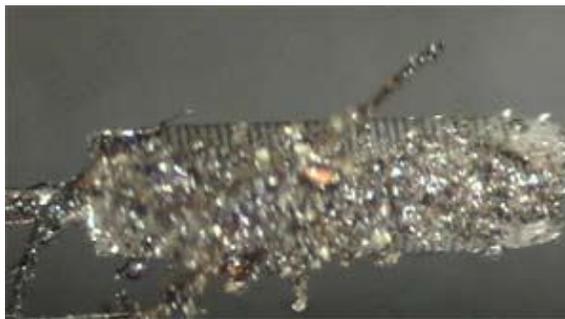
Microscopic Examination:



When a service technician looks at a MAF sensor's thermistor what they see with their naked eye is very little. It is nearly impossible to determine if a MAF sensor's thermistor is dirty or clean from looking at it without magnification and good lighting. When K&N views a MAF sensor, we look at it under a microscope. Below are sample images under microscopic view.



Example of Clean Thermistor



Example of a Contaminated Thermistor

A MAF sensor is located under the hood of your vehicle and is subject to a heat, cold, vibration, etc., in other words, a hostile environment. An engine performing as expected can contribute to contaminating a MAF sensor. The presence of gas fumes, a vehicle backfiring, combustion blow-by and even water condensation can contribute to contamination of a sensor. Ironically, the presence of contamination does not necessarily conclude the sensor is not functioning properly and requires replacement.

Independent Forensic Analysis:

An elemental and chemical analysis of the contamination has more often than not shown to be silicone. K&N filter oil does not contain silicone. The silicone can actually be traced to the sensor's housing of the electronic circuitry. The silicone can seep out of the housing area onto the sensor.



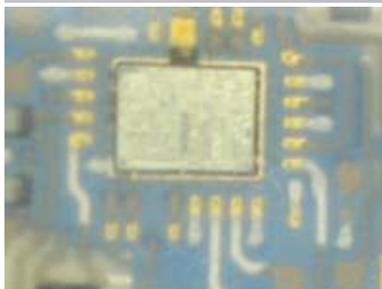
MAF sensor thermistor probes connect to the circuit board. Silicone covers the circuit electronics and it can seep down contaminating the thermistor. This photo shows the silicone compound referenced, covering/protecting the electronics. The probes leading to the thermistor are connected to the underside of this circuit board.



This photo shows a probe demonstrating the stickiness of the silicone material.



This photo shows a sensor with silicone covering the electronics. Note the small gold processor in center.



This photo is a close up of the processor under the silicone.



This photo is an extreme magnification of the processor. As can be seen, this is a complex sensor with thousands of connections and components all of which must be intact for the sensor to function properly.

Below is a more detailed summary of our actual test results.

	Quantity	Initial Sensor Test	Electronic Test Result	Microscopic Examination	Independent Laboratory Chemical Analysis	Probable Cause
	20	Bad	Failure	Clean	N/A	Electrical Failure
	9	Bad	Failure	Dirty	N/A	Electrical Failure
	5	Bad	Failure	Dirty	Silicone	Electrical Failure
	1	Bad	Failure	Dirty	Trace Oil	Electrical Failure
Electrical Conduction Failure within Sensors	8	Bad	Failure	De-lamination	N/A	Manufacturing Defect
	24	Bad	Out of Range	Clean	N/A	Electrical Failure
	19	Bad	Out of Range	Dirty	N/A	Electrical Failure
	29	Bad	Out of Range	Dirty	Silicone	Electrical Failure
	1	Bad	Out of Range	Dirty	Silicone & Trace Oil	Electrical Failure
	1	Bad	N/A	Dirty	Silicone	Severe Silicone Leak

117 BAD

	142	Good	Normal	Clean	N/A	Sensor Never Failed
	54	Good	Normal	Dirty	N/A	Sensor Never Failed
	2	Good	Normal	Dirty	Dirt	Sensor Never Failed
Normally Functioning Sensors *	29	Good	Normal	Dirty	Silicone	Sensor Never Failed
	3	Good	Normal	Dirty	Trace Oil	Sensor Never Failed
	3	Good	Normal	Dirty	Trace Oil & Silicone	Sensor Never Failed
	233					
	GOOD					

Electrical Failure: Electrical issue within sensor compared to a new sensor's specifications

Manufacturing Defect: A layer of the membrane sensor peels back causing electrical failure - known as de-lamination

Sensor Never Failed: Service provider error; sensor was not malfunctioning

Severe Silicone Leak: The silicone leak was too severe to run on the test stand

* Well over 50% of the "damaged" sensors sent to us were functioning properly meaning they were never damaged in the first place and cannot be attributed to any vehicle problem. [Click here](#) for more information on how this may happen.

Below is the list of MAF sensors that were sent to K&N for testing. The list includes dealerships that misdiagnosed the problem and blamed a K&N product for the failure. Test results are also shown.

Dealership	Date	Vehicle	Initial Sensor Test	Electronic Test Results	Microscopic Examination	Indep. Lab Chem Analysis
Auburn Toyota, Auburn, CA	01/12/04	Toyota	Good	Normal	Dirty	N/A
Precision Toyota of Tucson, AZ	01/19/04	Toyota	Good	Normal	Clean	N/A
Power Toyota Irvine, CA	01/20/04	Toyota	Good	Normal	Dirty	N/A
Rolling Hills Ford, Clearmont, FL	01/22/04	Ford	Bad	Out of Range	Dirty	N/A
Precision Toyota of Tucson, AZ	02/10/04	Toyota	Good	Normal	Dirty	N/A
Foley-Sweitzer Ford, Benton, IL	02/12/04	Ford	Good	Normal	Dirty	N/A
Mossy Toyota, San Diego, CA	02/15/04	Toyota	Bad	Out of Range	Dirty	Silicone
Scottsdale Nissan, Scottsdale, AZ	03/09/04	Nissan	Bad	Failure	Clean	N/A
Sullivan Brothers Nissan, Kingston, MA	03/31/04	Nissan	Good	Normal	Clean	N/A
Thousand Oaks Toyota, Thousand Oaks, CA	04/01/04	Toyota	Bad	Out of Range	Dirty	N/A
The Beetle Clinic, San Mateo, CA	04/28/04	VW	Good	Normal	Clean	N/A
Beach Ford, Myrtle Beach, FL	06/03/04	Ford	Bad	Out of Range	Dirty	N/A
Daub Ford L-M, Nazareth, PA	07/01/04	Ford	Bad	N/A	Dirty	Silicone
Classic Chevy, Mentor, OH	07/15/04	Chevy	Good	Normal	Dirty	N/A
Jim Click Automotive, Tucson, AZ	08/02/04	Nissan	Bad	Out of Range	Clean	N/A
Betley Chevy-Buick, Derry, NH	08/18/04	Chevy	Bad	Failure	Dirty	N/A
Fiore VW, West Warwick, RI	08/25/04	VW	Bad	Out of Range	Dirty	N/A
Bernard Chevy, Libertyville, IL	10/11/04	Isuzu	Bad	Failure	Dirty	N/A
White Bear Lake Pontiac-GMC, White Bear Lake, MN	10/11/04	GMC	Good	Normal	Clean	N/A
Don Davis Pontiac-GMC-Honda, Amhurst, NY	10/18/04	GMC	Bad	Failure	Dirty	N/A
Bay Chevy, Mobile, AL	11/05/04	Chevy	Good	Normal	Dirty	N/A
Heartland Chevy, Booneville, IN	11/19/04	Chevy	Bad	Failure	Dirty	N/A
Russ Dean Ford, Pasco, WA	12/23/04	Ford	Good	Normal	Dirty	N/A
El Cajon Ford, El Cajon, CA	01/07/05	Ford	Good	Normal	Dirty	N/A
Three Way Chevy, Bakersfield, CA	01/14/05	Chevy	Good	Normal	Clean	N/A
Tyrrell-Doyle Auto Center, Cheyenne, WY	02/03/05	Chevy	Good	Normal	Clean	N/A
Diamond Chevy, Charlotte, NC	03/08/05	Chevy	Bad	Failure	Clean	N/A

Paso Robles Ford, Paso Robles, CA	03/16/05	Ford	Good	Normal	Dirty	N/A
Peak Nissan, Littleton, CO	04/10/05	Nissan	Good	Normal	Dirty	N/A
Mossy Nissan, El Cajon, CA	05/05/05	Nissan	Bad	Out of Range	Dirty	Silicone
Antelope Valley Volkswagen, Palmdale, CA	05/12/05	VW	Bad	Out of Range	Dirty	Silicone
Bob Boyd Lincoln-Mercury, Columbus, OH	05/13/05	Ford	Good	Normal	Clean	N/A
Toyota Carlsbad, Oceanside, CA	06/03/05	Toyota	Good	Normal	Dirty	Silicone
Stevens Creek Lexus, Santa Clara, CA	06/30/05	Lexus	Good	Normal	Dirty	Silicone
Chapman Auto Center, Payson, AZ	07/01/05	Chevy	Good	Normal	Clean	N/A
Shehadi Motors Inc., South Lake Tahoe, CA	08/01/05	Toyota	Good	Normal	Dirty	Silicone
Peak Nissan, Littleton, CO	08/12/05	Nissan	Bad	Failure	Clean	N/A
All Star Pontiac, Sulphur, LA	09/19/05	Pontiac	Good	Normal	Clean	N/A
Courtesy Chevy, Phoenix, AZ	09/19/05	Chevy	Good	Normal	Dirty	N/A
North County Jeep-GMC, Escondido, CA	09/19/05	GMC	Good	Normal	Dirty	N/A
Prewitts Auto Clinic, Oxford, MS	09/28/05	VW	Bad	Out of Range	Dirty	N/A
Boose Chevy, Brookville, OH	10/13/05	Chevy	Good	Normal	Dirty	N/A
Jim Keil Chevy, Grass Valley, CA	10/31/05	Chevy	Good	Normal	Clean	N/A
Nobles Tire City, Baldwinsville, NY	11/22/05	Nissan	Bad	Failure	Clean	N/A
Jim Keil Chevy, Grass Valley, CA	11/30/05	Chevy	Bad	Failure	Dirty	Silicone
Joe Holland Service Center, S. Charleston, WV	11/30/05	Chevy	Bad	Failure	Dirty	N/A
Bill Heart Chevy, Las Vegas, NV	01/27/06	Chevy	Good	Normal	Clean	N/A
Sunnyside Toyota, North Olmstead, OH	02/28/06	Toyota	Bad	Out of Range	Dirty	Silicone
Moran, Fort Gratiot, MI	03/16/06	Cadillac	Bad	Failure	Clean	N/A
Owen Sound Hyundai, Owen Sound, ON	03/20/06	Hyundai	Bad	Failure	Clean	N/A
Blue Grass Automotive, Louisville, KY	03/28/06	Hyundai	Good	Normal	Dirty	Silicone
DeCormier Motor Sales, Manchester, CT	03/28/06	Nissan	Good	Normal	Dirty	Silicone
Hillcrest Ford, Huntsville, TX	03/28/06	Ford	Good	Normal	Dirty	Silicone
Sierra Toyota, Lancaster, CA	03/29/06	Toyota	Bad	Failure	Dirty	N/A
Parkway, Valencia, CA	04/10/06	GMC	Good	Normal	Clean	N/A
Preston Ford, Preston, MD	04/12/06	Ford	Good	Normal	Dirty	N/A
Community Chevy, Burbank, CA	04/20/06	Chevy	Good	Normal	Clean	N/A
Mercedes-Benz of Laguna Niguel, Laguna Niguel, CA	04/24/06	Mercedes	Bad	Out of Range	Dirty	Silicone
Phillips Ford Sales, Manheim, PA	04/24/06	Ford	Good	Normal	Dirty	N/A
Tobias' Automotive Specialists, Inc., Anthem, AZ	04/27/06	Porsche	Bad	Out of Range	Clean	N/A
Jay Chevy, Highland, MI	05/02/06	Chevy	Bad	Out of Range	Dirty	Silicone
Northland VW, Calgary, AB	05/02/06	VW	Good	Normal	Dirty	Silicone
Visalia Toyota, Visalia, CA	05/02/06	Toyota	Bad	Out of Range	Dirty	Silicone
Lordco, Coquitlam, BC	05/11/06	Ford	Good	Normal	Clean	N/A
Strong Volkswagen, Salt Lake City, UT	05/30/06	VW	Good	Normal	Clean	N/A
The BMW Store, Cincinnati, OH	06/27/06	BMW	Good	Normal	Clean	N/A
Pro Auto Care, Tampa, FL	06/29/06	Nissan	Bad	Failure	De-lamination	N/A
Lynch Ford, Mt. Vernon, IA	06/30/06	Ford	Bad	Out of Range	Dirty	Silicone
Courtesy Chevy, Phoenix, AZ	07/06/06	Chevy	Good	Normal	Clean	N/A
Brien Ford, Inc., Everett, WA	07/18/06	Ford	Good	Normal	Dirty	Silicone
Hammonasett Ford, Madison, CT	07/21/06	Ford	Good	Normal	Clean	N/A
Power Chevy Arrowhead, Peoria, AZ	07/25/06	Chevy	Good	Normal	Clean	N/A
J.C. Billion, Bozeman, MT	07/26/06	Nissan	Bad	Failure	Clean	N/A
Lexus of Valencia, CA	07/28/06	Lexus	Bad	Out of Range	Dirty	Silicone
Sterling Auto, Manchester, NH	07/28/06	Toyota	Bad	Out of Range	Dirty	Silicone
TNT, Oceanside, CA	07/28/06	Toyota	Bad	Out of Range	Dirty	Silicone

Courtesy Chevy, Thousand Oaks, CA	08/01/06	Chevy	Good	Normal	Clean	N/A
Grubbs Nissan, Bedford, TX	08/02/06	Nissan	Good	Normal	Clean	N/A
MedVed Auto Parts, Castle Rock, CO	08/02/06	GMC	Good	Normal	Clean	N/A
Brad Francis Ford Mercury, Las Lunas, NM	08/04/06	Ford	Good	Normal	Clean	N/A
Fitzgerald Toyota, Gaithersburg, MD	08/04/06	Toyota	Good	Normal	Clean	N/A
Folsom Lake Toyota, Folsom, CA	08/14/06	Toyota	Bad	Out of Range	Dirty	Silicone
Universal Ford, Glen Allen, VA	08/24/06	Ford	Good	Normal	Clean	N/A
Nissan Turnersville, Turnersville, NJ	08/29/06	Nissan	Bad	Out of Range	Clean	N/A
Speed Tuning, Spencerville, MD	08/29/06	Mercedes	Bad	Out of Range	Clean	N/A
Konner Chevy, West Coldwell, NJ	08/30/06	Chevy	Good	Normal	Clean	N/A
Duke & Bobs, Kansas City, MO	09/12/06	Land Rover	Good	Normal	Dirty	Silicone
Andy Mohr Nissan, Indianapolis, IN	09/13/06	Nissan	Good	Normal	Dirty	N/A
Ganley Akron, Inc., Akron, OH	09/13/06	Toyota	Bad	Out of Range	Dirty	Silicone
City Chevy, San Diego, CA	09/16/06	Chevy	Good	Normal	Clean	N/A
Land Rover Winnetka, Winnetka, IL	10/04/06	Land Rover	Good	Normal	Dirty	Silicone
Chapman Porsche, Tuscon, AZ	10/05/06	Porsche	Bad	Failure	Clean	N/A
Mitchell Mazda Lincoln Mercury, Enterprise, AL	10/05/06	Ford	Good	Normal	Clean	N/A
Roger Chevy, Woodhaven, MI	10/10/06	Chevy	Bad	Failure	Dirty	Trace Oil
Capitol Hyundai, Columbia, SC	10/19/06	Hyundai	Good	Normal	Dirty	Trace Oil
Pioneer Centres, San Diego, CA	10/23/06	Porsche	Bad	Failure	Clean	N/A
Vaughn Auto, Ottumwa, IA	11/01/06	Chevy	Good	Normal	Clean	N/A
Midwestern BMW, Dublin, OH	11/09/06	BMW	Good	Normal	Clean	N/A
Country Ford, Levittown, NY	11/21/06	Ford	Good	Normal	Dirty	Silicone
Michael Automotive Chevy, Fresno, CA	11/28/06	Chevy	Bad	Out of Range	Dirty	Silicone
Vallejo German Car Clinic, Vallejo, CA	11/28/06	VW	Good	Normal	Clean	N/A
Ramey Ford, Beckley, WV	12/01/06	Ford	Good	Normal	Clean	N/A
Michael Chevy, Fresno, CA	12/07/06	Chevy	Good	Normal	Dirty	Trace Oil & Silicone
Vogler Motor Co. Inc., Carbondale, IL	12/13/06	Ford	Good	Normal	Clean	N/A
Adams GMC, Annapolis, MD	12/13/06	Chevy	Good	Normal	Dirty	Trace Oil & Silicone
Robbins Toyota, Texarkana, TX	12/18/06	Toyota	Bad	Out of Range	Dirty	Silicone
Smith South Plains, Levelland, TX	12/22/06	Ford	Good	Normal	Dirty	N/A
Gauden Porsche, Las Vegas, NV	01/03/07	Porsche	Good	Normal	Dirty	Silicone
Smith South Plains, Levelland, TX	01/11/07	Ford	Good	Normal	Dirty	Dirt
Lubbers, Cheney, KS	01/12/07	Chevy	Good	Normal	Clean	N/A
Elias Import Repair, Forest Lake, MN	01/17/07	Nissan	Bad	Out of Range	Dirty	Silicone
Falls GM, Little Falls, MN	01/19/07	Chevy	Good	Normal	Dirty	Silicone
Wright Automotive, Wexford, PA	01/22/07	Pontiac	Bad	Failure	Clean	N/A
Senator Mazda/Hyundai/Subaru, Sacramento, CA	01/30/07	Subaru	Bad	Out of Range	Dirty	Silicone
Findlay Motor Co., Bullhead City, AZ	01/31/07	GMC	Good	Normal	Dirty	N/A
Radley Automotive Group, Fredricksburg, VA	02/01/07	GMC	Good	Normal	Clean	N/A
Titus-Will Toyota, Tacoma, WA	02/06/07	Toyota	Good	Normal	Dirty	N/A
Saturn of Aurora, Aurora, CO	02/08/07	Saturn	Good	Normal	Clean	N/A
Land Rover of Tulsa, Tulsa, OK	02/13/07	Land Rover	Bad	Failure	De-lamination	N/A
Edmonton Motors, Edmonton, AB Canada	02/13/07	Chevy	Bad	Failure	Clean	N/A
Douglas Nissan, Henderson, NV	02/19/07	Nissan	Good	Normal	Clean	N/A
Ed Voyles Hyundai, Smyrna, GA	02/23/07	Hyundai	Good	Normal	Clean	N/A
Lia Infiniti, Legham, CA	02/23/07	Infiniti	Good	Normal	Clean	N/A
Century Automotive Group, Huntsville, AL	03/06/07	BMW	Bad	Failure	Clean	N/A
Toyota of Iowa City Inc., Iowa City, IA	03/09/07	Toyota	Good	Normal	Dirty	N/A

Crown Toyota, Ontario, CA	03/12/07	Toyota	Bad	Failure	Dirty	N/A
Capital Ford, Raleygh, NC	03/30/07	Ford	Good	Normal	Clean	N/A
Tustin Toyota, Tuscin, CA	04/11/07	Toyota	Good	Normal	Dirty	Dirt
Power Toyota Irvine, Irvine, CA	04/12/07	Toyota	Good	Normal	Dirty	N/A
Mercedes of Greensboro, Greensboro, NC	04/18/07	Mercedes	Good	Normal	Clean	N/A
Town & Country Ford, Madison, TN	04/24/07	Ford	Good	Normal	Clean	N/A
Raceway Ford, Riverside, CA	04/26/07	Ford	Good	Normal	Dirty	N/A
Shawnee Service Center, Wilmette, IL	05/09/07	Ford	Bad	Failure	Dirty	N/A
Steven's Chev-Buick, Oakdale, CA	05/09/07	GMC	Good	Normal	Clean	N/A
Barrier, LLC, Bellevue, WA	05/09/07	Audi	Bad	Out of Range	Clean	N/A
Swiss Motors, Culver City, CA	05/09/07	BMW	Bad	Out of Range	Dirty	Silicone
Palm Springs Motors, Inc., Cathedral City, CA	05/16/07	Ford	Good	Normal	Dirty	N/A
Land Rover Minneapolis, Golden Valley, MN	05/21/07	Land Rover	Bad	Out of Range	Clean	N/A
Findley Motor Company, Bullhead City, AZ	05/21/07	Chevy	Good	Normal	Dirty	Silicone
Sparacio, Redding, CA	06/04/07	GMC	Good	Normal	Clean	N/A
McCroskey, Choctaw, OK	06/05/07	Chevy	Bad	Out of Range	Clean	N/A
Hubler Chevy, Shelbyville, IN	06/15/07	Chevy	Good	Normal	Dirty	N/A
Mike Savoie Chevy, Troy, MI	06/18/07	Chevy	Bad	Out of Range	Clean	N/A
Firestone In Carlsbad, Carlsbad, CA	06/22/07	Nissan	Bad	Failure	Clean	N/A
Lithia Ford, Fresno, CA	07/06/07	Ford	Good	Normal	Clean	N/A
Rusnak/Pasadena, Pasadena, CA	07/06/07	Porsche	Bad	Out of Range	Dirty	Silicone
Madison Auto Service, Lakewood, OH	07/09/07	Infinity	Bad	Failure	Dirty	Silicone
Randolphs Body Shop, Burnsville, NC	07/13/07	Toyota	Good	Normal	Dirty	N/A
Keith Hawthorne, Morganton, NC	08/03/07	Chevy	Bad	Out of Range	Clean	N/A
A1 Automotive, Yreka, CA	08/06/07	Volkswagon	Good	Normal	Clean	N/A
Wilson Ford, Fairmont, WV	08/08/07	Ford	Good	Normal	Clean	N/A
Go Ford West, Weathridge, CO	08/10/07	Ford	Bad	Out of Range	Clean	N/A
Parkway Hyundai, Valencia, CA	08/14/07	Hyundai	Good	Normal	Clean	N/A
Hemburg Ford, Norco, CA	08/21/07	Ford	Good	Normal	Clean	N/A
Automotive Solutions, Ogallala, NE	08/22/07	Chevy	Bad	Out of Range	Clean	N/A
Power Chevy Arrowhead, Peoria, AZ	08/22/07	Chevy	Good	Normal	clean	N/A
Maita Ford, Auburn, CA	08/28/07	Ford	Good	Normal	Dirty	N/A
BMW of Bayside, Bayside, NY	08/31/07	BMW	Bad	Out of Range	Dirty	Silicone
Fuerst Automotive, Broadview Heights, OH	09/05/07	Volkswagon	Good	Normal	Dirty	Silicone
Crossroads Ford, Frankfort, KY	09/06/07	Ford	Good	Normal	Clean	N/A
Long Beach Toyota, Long Beach, CA	09/14/07	Toyota	Good	Normal	Clean	N/A
Hall Automotive, Virginia Beach, VA	09/14/07	Pontiac	Good	Normal	Clean	N/A
Kitahara GMC, Fresno, CA	09/24/07	GMC	Bad	Out of Range	Clean	N/A
Power Chevy, Peoria, AZ	09/25/07	Chevy	Good	Normal	Dirty	Plastic
Walser Nissan, Burnsville, MN	09/25/07	Nissan	Good	Normal	Dirty	Silicone
Saturn Ontario, Ontario, CA	09/27/07	Saturn	Bad	Out of Range	Dirty	Silicone
Cruse Motors of Worthington, Worthington, MN	09/27/07	Chevy	Good	Normal	Clean	N/A
Chevy of Turnersville, Turnersville, NJ	10/05/07	Chevy	Good	Normal	Clean	N/A
Crest Cadillac, Plano, TX	10/10/07	Cadillac	Bad	Out of Range	Clean	N/A
Cherner Lincoln Mercury, Vienna, VA	10/22/07	Kia	Good	Normal	Clean	N/A
Harbor Chevy, Long Beach, CA	10/23/07	Chevy	Good	Normal	Dirty	N/A
Bitterroot Motor, Missoula, MT	10/23/07	Scion	Good	Normal	Clean	N/A
Automotive Plus, Redding, CA	10/24/07	Chevy	Good	Normal	Clean	N/A
Neighbors GMC/Pontiac, Costa Mesa, CA	10/31/07	GMC	Bad	Out of Range	Dirty	N/A

Motor City GMC, Bakersfield, CA	11/12/07	Chevy	Good	Normal	Clean	N/A
Phill Long Ford, Denver, CO	11/13/07	Ford	Good	Normal	Dirty	N/A
Alex Ailliamson Motor Sales, Uxbridge, ON	11/20/07	GMC	Bad	Out of Range	Dirty	Silicone
Reliance Car Care, Marietta, GA	11/20/07	Mercedes	Good	Normal	Dirty	Silicone
O'Donald Chevy, San Gabriel, CA	11/20/07	Chevy	Bad	Out of Range	Clean	N/A
West Broad Audi, Richmond, VA	12/03/07	Audi	Good	Normal	Dirty	Silicone
Abeloff Nissan, Mont Pocono, PA	12/10/07	Nissan	Good	Normal	Clean	N/A
Banbury Porsche, Banbury, CT	12/10/07	Porsche	Good	Normal	Dirty	Silicone
Courtesy Chevy, Merced, CA	12/20/07	Chevy	Bad	Out of Range	Clean	N/A
Cascade Honda Chevy, Klamath Falls, OR	01/03/08	Chevy	Bad	Out of Range	Clean	N/A
Avondale Nissan, Avondale, AZ	01/07/08	Nissan	Good	Normal	Dirty	Silicone
Sanger Ford/Mercury, Sanger, CA	01/09/08	Ford	Good	Normal	Dirty	Silicone
Toyota of Huntington Beach, Huntington Beach, CA	01/11/08	Toyota	Good	Normal	Clean	N/A
Midway Chevy, Phoenix, AZ	01/14/08	Chevy	Good	Normal	Dirty	N/A
Downtown Honda, Spokane, WA	01/14/08	Honda	Good	Normal	Clean	N/A
Ramey Ford, Johnson, TN	01/21/08	Ford	Good	Normal	Dirty	N/A
Santa Monica Auto Group, Santa Monica, CA	01/31/08	Chevy	Good	Normal	Clean	N/A
Mercedes of Encino, Encino, CA	02/05/08	Mercedes	Bad	Failure	De-lamination	N/A
Blake Chevy, Homestead, FL	02/14/08	Chevy	Good	Normal	Clean	N/A
Land Rover of Portland, Portland, OR	02/14/08	Land Rover	Good	Normal	Dirty	N/A
Vann York Pontiac GMC Buick, High Point, NC	02/18/08	GMC	Good	Normal	Clean	N/A
Alexander Family Dealerships, Bloomsburg, PA	02/19/08	Chevy	Good	Normal	Clean	N/A
Jim Jard Chevy, Rosenberg, TX	02/28/08	Chevy	Good	Normal	Clean	N/A
Banks Chevy, Concord, NH	03/12/08	Chevy	Good	Normal	Dirty	N/A
Lexus of Water Town, Water Town, MA	03/14/08	Lexus	Bad	Out of Range	Dirty	N/A
Kent Chevy, Mountain Home, AR	03/14/08	Chevy	Good	Normal	Clean	N/A
FlowCadillac, Winston-Salem, NC	03/19/08	Cadillac	Bad	Out of Range	Dirty	Silicone
Advantage Porsche, Houston, TX	03/19/08	Porsche	Bad	Failure	Dirty	Silicone
Parks Chevy, Huntersville, NC	03/25/08	Pontiac	Good	Normal	Dirty	N/A
Stevens Creek BMW, Santa Clara, CA	03/31/08	BMW	Bad	Out of Range	Clean	N/A
Bleecker Chev/Pontiac/Buick, Dunn, NC	04/11/08	GMC	Bad	Out of Range	Clean	N/A
Alaska Sales and Service, Anchorage, AK	04/11/08	Chevy	Good	Normal	Dirty	N/A
Midway GMC, Phoenix, AZ	04/11/08	GMC	Good	Normal	Clean	N/A
Walter's Mercedes Benz, Riverside, CA	04/14/08	Mercedes	Bad	Failure	De-lamination	N/A
Lexus of San Antonio, San Antonio, TX	04/22/08	Lexus	Bad	Out of Range	Dirty	Silicone
Crest Chevy, Jacksonville, FL	04/30/08	Chevy	Good	Normal	Dirty	Silicone
Volkswagen of Ft. Meyers, Ft. Meyers, FL	05/05/08	Volkswagon	Good	Normal	Clean	N/A
Carmax, Indianapolis, IN	05/09/08	Oldsmobile	Good	Normal	Dirty	Silicone
Paul Mbak, Jackson, MS	05/15/08	Volvo	Bad	Failure	De-lamination	N/A
Costal Mitsubishi, Melbourne, FL	05/20/08	Mitsubishi	Bad	Failure	Clean	N/A
Earn Hurt Ford, Chandler, AZ	05/22/08	Ford	Good	Normal	Dirty	N/A
Vara Chevy, San Antonio, TX	06/23/08	Land Rover	Good	Normal	Clean	N/A
Hatfield Buick and GMC, Redlands, CA	07/11/08	GMC	Good	Normal	Clean	N/A
Sandy Sansig Chevy, Pensacola, FL	07/16/08	Chevy	Good	Normal	Dirty	N/A
Royal Audi Motors, San Francisco, CA	07/21/08	Audi	Good	Normal	Dirty	N/A
Morehart Chevy, Durango, CO	07/24/08	Chevy	Good	Normal	Clean	N/A
BMW Cleveland, Solon, OH	07/28/08	BMW	Good	Normal	Clean	N/A
Suss GMC Pontiac Buick, Aurora, CO	07/29/08	GMC	Good	Normal	Dirty	N/A
Morrison Porsche, Anchorage, AK	08/01/08	Porsche	Bad	Failure	De-lamination	N/A

Hudiberg Chevy, Midwest City, OK	08/05/08	Chevy	Good	Normal	Clean	N/A
Galpin Ford, North Hills, CA	08/11/08	Ford	Good	Normal	Clean	N/A
BMW of Towson, Towson, MD	08/14/08	BMW	Bad	Failure	De-lamination	N/A
Foothill Ranch Chevy, Foothill Ranch, CA	08/25/08	Chevy	Good	Normal	Dirty	Silicone
Mooreheart Chevy, Durango, CO	09/11/08	Chevy	Bad	Out of Range	Clean	N/A
McCaddon, Boulder, CO	09/16/08	GMC	Good	Normal	Dirty	Trace Oil
Pike Wheaton Chevy, Red Deer, AB	09/26/08	Chevy	Good	Normal	Dirty	Silicone
Bob Moore Ford, Oklahoma City, OK	09/30/08	Ford	Good	Normal	Dirty	N/A
City Garage, Ft. Worth, TX	10/03/08	Ford	Good	Normal	Dirty	Silicone
O'Riley Chevy, Tuscon, AZ	10/28/08	Chevy	Good	Normal	Clean	N/A
New Carlisle Ford, New Carlisle, OH	10/28/08	Ford	Good	Normal	Clean	N/A
North Bakersfield Toyota, Bakersfield, CA	11/04/08	Toyota	Bad	Out of Range	Dirty	Silicone
Cypress Coast Ford Lincoln, Seaside, CA	11/21/08	Ford	Good	Normal	Dirty	Corrosion
Caper Auto Center, Mbringo, IA	12/02/08	Chevy	Good	Normal	Clean	N/A
Concourse Automotive, Murray, UT	12/04/08	Audi	Bad	Out of Range	Dirty	N/A
Gustman Chevrolet, Kaukauna, WI	12/31/08	Chevy	Good	Normal	Clean	N/A
Ken Garff Ford, American Fork, UT	1/5/2009	Ford	Bad	Out of range	Dirty	N/A
Porsche of Fairfield, Fairfield, CT	1/6/2009	Porsche	Good	Normal	Dirty	N/A
Newburg Nissan, Newburg, NY	1/7/2009	Nissan	Good	Normal	Dirty	N/A
Ottowa Ford, Ottawa, KS	1/30/2009	Ford	Bad	Out of range	Dirty	N/A
Mid City Auto, Lake Charles, LA	2/13/2009	Ford	Good	Normal	Clean	N/A
Toyota of Glendora, Glendora, CA	2/19/2009	Toyota	Good	Normal	Clean	N/A
Infinity of Melburn, Melburn, FL	2/19/2009	Infinity	Good	Normal	Clean	N/A
Millenium, Dallas, TX	3/13/2009	Jaguar	Good	Normal	Dirty	Silicone
Toronto Downtown Porsche, Canada	3/23/2009	Porsche	Bad	Failure	De-lamination	N/A
Dick Norris Auto, Palm Harbor, FL	3/26/2009	GMC	Good	Normal	Clean	N/A
Merc.Benz of Alexandria, Alexandria, VA	4/8/2009	Mercedes	Bad	Out of range	Dirty	Silicone
Aarow Transmission, Reno, NV	4/9/2009	Chevy	Good	Normal	Clean	N/A
LandRover New Port Beach, CA	4/13/2009	LandRover	Good	Normal	Dirty	N/A
Teton Motors, Jackson, WY	4/23/2009	Chevy	Bad	Out of range	Dirty	N/A
Bale Chevrolet, Little Rock, AR	4/30/2009	Chevy	Good	Normal	Clean	N/A
Marvin K. Brown Auto Center, San Diego, CA	4/30/2009	Cadillac	Good	Normal	Clean	N/A
Merc.Benz, Long Beach, CA	5/11/2009	Mercedes	Good	Normal	Dirty	Silicone
Thelan VW, Bay City, MI	5/15/2009	VW	Good	Normal	Clean	N/A
Scoggin Dickey, Lubbock, TX	6/10/2009	Chevy	Good	Normal	Clean	N/A
Revtech Auto Center, Cambridge, ON, Canada	6/23/2009	Lexus	Good	Normal	Dirty	N/A
Ed Bozrts Chev., Grand Junction, CO	6/25/2009	Chevrolet	Good	Normal	Dirty	N/A
Vern Eide Motor Cars, Inc., Sioux Falls, SD	7/2/2009	Honda	Bad	Failure	Dirty	N/A
Dellenbach Motors, Ft. Collins, CO	7/8/2009	Chevrolet	Bad	Out-of-Range	Dirty	Silicone
Crest Chev., San Bernardino, CA	7/10/2009	Chevrolet	Good	Normal	Dirty	N/A
Singh Chev., Riverside, CA	7/20/2009	Chevrolet	Good	Normal	Clean	N/A
Tonkin Mazda, Portland, OR	7/24/2009	Mazda	Good	Normal	Clean	N/A
Stones River Motors, Murfreesboro, TN	7/28/2009	Nissan	Good	Normal	Clean	N/A
Turpin Autos Limited, ON, Canada	8/5/2009	GMC	Bad	Out-of-Range	Dirty	Silicone
Whitaker GMC, Forest Lake, MN	8/12/2009	GMC	Good	Normal	Clean	N/A
Greenville GMC, Greenville, TX	8/19/2009	GMC	Good	Normal	Clean	N/A
Montgomeryville Nissian, Montgomeryville, PA	8/31/2009	Nissan	Bad	Out-of-Range	Dirty	Silicone
Don Davis Ford, Arlington, TX	9/1/2009	Ford	Bad	Failure	Clean	N/A
Bachman Auto Group, Louisville, KY	9/29/2009	Hummer	Bad	Out-of-Range	Dirty	N/A

Ultimate Pontiac GMC, Fredericksburg, VA	9/30/2009	GMC	Good	Normal	Clean	N/A
Lithia Chev., Redding, CA	10/1/2009	Chevrolet	Good	Normal	Clean	N/A
Reliable Chev., Springfield, MO	10/5/2009	Chevrolet	Bad	Failure	Clean	N/A
Romans Motor Co., Independence, KS	10/7/2009	Chevrolet	Good	Normal	Dirty	N/A
Gallagher GMC, New Britain, CT	10/20/2009	Chevrolet	Good	Normal	Clean	N/A
Brandon Hyundai, Tampa FL	10/21/2009	Hyundai	Good	Normal	Clean	N/A
Blue Ridge Motors, Kingsport, TN	10/29/2009	BMW	Good	Normal	Clean	N/A
Metro Toyota, Cleveland, OH	11/23/2009	Toyota	Bad	Failure	Dirty	Silicone
Brent Brown Ford, Provo, UT	12/9/2009	Ford	Good	Normal	Clean	N/A
Fisher Chevrolet Honda, Boulder, CO	01/04/10	Chevrolet	Bad	Out-of-Range	Clean	N/A
Borgan Ford Mazda, Grandville, MI	01/11/10	Ford	Bad	Out-of-Range	Dirty	N/A
Bill Crispin Chevrolet, Saline, MI	01/14/10	Chevrolet	Good	Normal	Clean	N/A
Pat McGrath Cheyland, Cedar Rapids, IA	01/15/10	Chevrolet	Good	Normal	Clean	N/A
Patriot Chev. Buick GMC, Hopkinsville, KY	01/27/10	Chevrolet	Good	Normal	Dirty	N/A
McGavock Nissan, Lubbock, TX	02/17/10	Nissan	Bad	Out-of-Range	Dirty	N/A
Nix Chevrolet, McAlester, OK	03/02/10	Chevrolet	Good	Normal	Clean	N/A
Sewell Cadillac, Dallas, TX	03/08/10	Cadillac	Bad	Failure	Clean	N/A
Bob Baker Toyota, San Diego, CA	03/11/10	Toyota	Bad	Out-of-Range	Dirty	N/A
Ramey Chevrolet Cadillac, Sherman, TX	03/15/10	Chevrolet	Good	Normal	Clean	N/A
Toyota of Escondido, Escondido, CA	03/26/10	Toyota	Good	Normal	Clean	N/A
Pete Moore Automotive, Pensacola, FL	03/29/10	Chevrolet	Good	Normal	Clean	N/A
Val Mark Chevrolet, New Braunfels, TX	04/07/10	Chevrolet	Good	Normal	Clean	N/A
O'Rielly Chevrolet, Tucson, AZ	05/07/10	Chevrolet	Good	Normal	Clean	N/A
Valmark Chevrolet, New Braunfels, TX	06/23/10	Chevrolet	Good	Normal	Clean	N/A
True North Chevrolet, North Bay, ON, Canada	06/24/10	Chevrolet	Good	Normal	Clean	N/A
Infiniti of Tampa, Tampa, FL	06/25/10	Infiniti	Good	Normal	Clean	N/A
Paradise Chevrolet, Temecula, CA	06/29/10	Chevrolet	Bad	Out-of-Range	Clean	N/A
Green Buick GMC, Davenport, IA	7/2/2010	GMC	Good	Normal	Clean	N/A
Redline Automotive LTD., Richmond, BC	7/8/2010	Jaguar	Bad	out-of-range	Clean	N/A
Doan Chevrolet, Spencerport, NY	7/8/2010	Chevrolet	Good	Normal	Clean	N/A
Folsom Chevrolet, Folsom, CA	7/13/2010	Chevrolet	Good	Normal	Clean	N/A
Art Moehn Chevrolet, Jackson, MI	8/9/2010	Chevrolet	Good	Normal	Dirty	N/A
Land Rover Solon, Solon, OH	8/13/2010	Land Rover	Bad	out-of-range	Clean	N/A
Rydell Chevrolet, Waterloo, IA	8/31/2010	Chevrolet	Good	Normal	Clean	N/A
Doan Chevrolet, Spencerport, NY	8/31/2010	Chevrolet	Good	Normal	Dirty	N/A
Reedman Toll Auto world, Langhorne, PA	9/6/2010	GMC	Good	Normal	Dirty	N/A
Dick Edwards Ford, Manhattan, KS	9/7/2010	Ford	Good	Normal	Dirty	N/A
Millbury Ford/Mercury, Charlton, MA	9/8/2010	Ford	Good	Normal	Clean	N/A
Spirit Toyota, St. Louis, MO	9/28/2010	Toyota	Good	Normal	Dirty	Trace oil/Silicone
Toyota-Scion of Stafford, Stafford, VA	10/12/2010	Toyota	Good	Normal	Clean	N/A
Bankston Chevrolet, Fort Worth, TX	10/14/2010	Chevrolet	Good	Normal	Clean	N/A
Global Imports BMW, Atlanta, GA	10/26/2010	BMW	Good	Normal	Clean	N/A
James Corlew Chevrolet, Clarksville, TN	11/12/2010	Chevrolet	Good	Normal	Clean	N/A
Wappinger Falls Toyota, Wappinger Falls, NY	11/24/2010	Toyota	Bad	out-of-range	Dirty	Silicone
Lithia Auto Stores Chevrolet, Redding, CA	11/24/2010	Chevrolet	Good	Normal	Clean	N/A
Shearer Chevrolet, Burlington, VT	12/6/2010	Chevrolet	Good	Normal	Clean	N/A
Bryan Chevrolet, Metairie, LA	2/28/2011	Chevrolet	Good	Normal	Clean	N/A
BMW of Bayside, Great Neck, NY	3/1/2011	BMW	Bad	Failure	Clean	N/A
Sweeney Chevrolet, Youngstown, OH	3/9/2011	Chevrolet	Good	Normal	Clean	N/A

Parks Chevrolet, Huntersville, NC	4/11/2011	Chevrolet	Good	Normal	Clean	N/A
Driver's Auto Repair, Conroe, TX	5/3/2011	Volkswagon	Good	Normal	Clean	N/A
Tomball Ford, Tomball, TX	5/6/2011	Ford	Good	Normal	Clean	N/A
Ray Smith Chevrolet, Camden, TN	6/16/2011	Chevrolet	Good	Normal	Clean	N/A
Roger Chevrolet, Woodhaven, MI	7/20/2011	Chevrolet	Good	Normal	Clean	N/A
Jaguar/Land Rover of Baton Rouge, LA	8/4/2011	Land Rover	Good	Normal	Dirty	N/A
Spradley Barr Ford, Ft. Collins, CO	8/3/2011	Ford	Bad	Out of range	Dirty	N/A
Suburban Volvo, Troy, MI	8/12/2011	Volvo	Good	Normal	Clean	N/A
Darby Buick/GMC, Venice, FL	7/20/2011	GMC	Good	Normal	Clean	N/A
Tumwater Automotive Group, Tumwater, WA	7/29/2011	Chevrolet	Good	Normal	Clean	N/A
Metro Honda, Jersey City, NJ	7/13/2011	Honda	Good	Normal	Dirty	Trace oil
Bristol Toyota Scion, Bristol, Rhode Island	9/21/2011	Toyota	Bad	Out of range	Dirty	N/A
Mike Savoie Chevrolet, Troy, MI	9/26/2011	GMC	Bad	Out of range	Dirty	Silicone & trace oil
Fairfax Chevrolet, Fairfax, VA	7/22/2011	Chevrolet	Bad	Out of range	Clean	N/A
Vestal Buick/GMC, Kernersville, NC	8/8/2011	Chevrolet	Good	Normal	Clean	N/A
Reno Vulcanizing Works, Sparks, NV	9/26/2011	VW	Bad	Failure	Dirty	Silicone
Murray Chevrolet, Merritt, BC, Canada	9/16/2011	Chevrolet	Bad	Out of range	Dirty	N/A
Ocello's Automotive Center, Tamarac, FL	8/18/2011	Mercedes	Bad	failure	clean	N/A
Ed Koehn Chevrolet, Rockford, MI	10/10/2011	Chevrolet	Good	Normal	Clean	N/A
Medford Ford, Marlton, NJ	12/20/2011	Mercury	Good	Normal	Clean	N/A
Blade Chevrolet, Mount Vernon, WA	10/7/2011	GMC	Good	Normal	Clean	N/A
Val Mark Chevrolet, New Braunfels, TX	7/27/2011	Chevrolet	Good	Normal	Clean	N/A
Midas Auto, St. Cloud, MN	9/12/2011	Audi	Bad	Failure	Clean	N/A
Singh Chevrolet, Riverside, CA	11/15/2011	Chevrolet	Good	Normal	Dirty	N/A
Alaska GM Sales & Service, Anchorage, AK	9/9/2011	Chevrolet	Bad	Out of range	Dirty	N/A
Lebanon Ford, Lebanon, OH	9/22/2011	Ford	Good	Normal	Clean	N/A
Eurotech Autowerks, Virginia Beach, VA	8/17/2011	Volvo	Good	Normal	Clean	N/A
Chapman Bell Road Imports, Phoenix, AZ	8/26/2011	Hyundai	Good	Normal	Clean	N/A
J.C. Billion GMC, Bozeman, MT	8/24/2011	Chevrolet	Good	Normal	Clean	N/A
Metropolitan Ford, Eden Prairie, MN	9/12/2011	Ford	Good	Normal	Clean	N/A

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