EXHIBIT 43

Intertek Industry Services

Intertek
Valued Quality. Delivered.

Rebuttal of D. J. Duquette Expert Report
In the Case of
Robert Tomassini v. Chrysler Group, LLC

Migliaccio & Rathod, LLC

May 2016

Migliaccio & Rathod LLP
Mr. Nicholas Migliaccio, Esq.
412 H Street N.E., Suite 302
Washington, DC 20002
USA
nmigliaccio@classlawdc.com

Intertek AIM
3510 Bassett Ave
Santa Clara, CA 95054
408-745-7000

www.intertek.com/aim/engineering

May 23, 2016
AIM 15018790-4-2

Subject: Rebuttal of D. J. Duquette Expert Report In the case of Robert Tomassini v. Chrysler Group, LLC

Dear Mr. Migliaccio:

This report provides Intertek AIM's rebuttal of the expert report prepared by David J. Duquette, PhD regarding fractured valve stems on tire pressure measurement sensors (TPMS). This rebuttal analysis shows that the Duquette report failed to consider several important factors in his analysis and that Duquette is in error regarding his conclusion that valve stem leakage due to stress corrosion cracking (SCC) would be slow.

If you have any questions about this report or need further assistance, please do not hesitate to contact us.

Very respectfully,

Eric V. Sullivan, P.E.
Principal Engineer

[redacted]

Intertek AIM Contact List

	Contact	Email
General Manager	[redacted]	
Technical Manager West Coast		
Technical Manager Texas		
Technical Manager East Coast		
Combustion Turbine		
Failure Analysis Laboratory		
Field Engineering		
Heat Recovery Steam Generat		
Litigation Services		
Mechanical Integrity		
Metallurgy		
Nuclear Engineering		
Power Plant Cycling		
Risk Based Inspection		
Condition Assessment/ Pulsed Eddy Current		
High Energy Piping		

Disclaimer

This report was prepared by Intertek AIM as an account of work sponsored by the organization named herein. Neither Intertek AIM nor any person acting on behalf of Intertek AIM: (a) makes any warranty, express or implied, with respect to the use of any information, apparatus, method, or process disclosed in this report or that such use may not infringe privately owned rights; or (b) assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

Table of Contents

1 | Personal Background

Eric Sullivan is a Principal Engineer at Intertek AIM and provides metallurgical engineering expertise in the areas of welding, nondestructive examination, and materials selection. He holds a Bachelor of Science degree in Metallurgical Engineering from California Polytechnic State University at San Luis Obispo, California (1979), and is a Professional Metallurgical engineer in the State of California (MT 1771). Mr. Sullivan's training includes an extensive training course on electron microscopy that was provided by Lehigh University, including evaluation of fracture surfaces. His experience and training is more fully set forth in his curriculum vita, which is provided in Appendix A. Mr. Sullivan’s hourly rate for time spent working on this matter is $280. Mr. Sullivan’s testimonial experience is provided in this report as Appendix B.

In over 35 years of professional experience, Eric Sullivan has investigated hundreds of failures in valves, machinery, engines, pressure vessels, nuclear and fossil power plants, chemical plants, and refineries. Eric Sullivan has performed cause and origin investigations for explosions and fires at refineries, gasoline storage facilities, chemical plants, power plants, and buried pipelines. In many cases, evaluation of fracture mechanisms played a key role in Mr. Sullivan's investigations.

Eric Sullivan has also performed numerous fitness-for-service evaluations of materials, including evaluation of cracked turbine case bolts for the nuclear plant at San Onofre, California, stress corrosion cracking of valve bonnet bolts in petrochemical refineries, stress corrosion cracking of boiler tubes and pressure vessels, and stress corrosion and fatigue cracking of valve cover bolts for large natural gas compressors.

A list of documents on which I have relied upon in the preparation of this report is provided in Appendix C. I understand that discovery in this matter is ongoing and that the Defendants or third parties may produce additional information that has a bearing on my analysis. I reserve the right to supplement or amend my conclusions as necessary in light of such additional information. I also understand that the class definition may change in light of such additional information.

2 | Introduction

I was asked to review and evaluate the rebuttal report prepared by David J. Duquette, PhD, regarding failure of tire pressure measurement sensors (TPMS) due to stress corrosion cracking (SCC). Duquette prepared a rebuttal to my report "Preliminary Evaluation of Fractures in Tire Pressure Monitoring Sensors" and to the reports prepared by David McLellan and R. F. Lynch. In my report, I determined that the valve stems on the TPMS devices are fabricated from an alloy that is susceptible to corrosion, which can result in sudden failure of the valve stem and cause rapid deflation of the tires. The defect of the stems pertains to the use of the particular group of aluminum alloys that contain copper as one of the alloying elements. The group of aluminum alloys that contain copper are designated as the 2000 series of alloys (or 2xxx series). It is well known that the 2xxx series of copper bearing aluminum alloys are susceptible to SCC in the presence of chlorides. There have been widespread reports of valve stem failures on TPMS devices. Laboratory analyses of broken TPMS valve stems have shown that the failures are due to SCC in the presence of chlorides.[1]

The results of my metallurgical analysis show the sample that I examined suffered from intergranular SCC and that chlorides were present on the fracture surfaces. Based on my work to date, I have determined that the potential for SCC of TPMS valve stems affects all members of the class because the key factors for SCC are present for the entire class. The three main factors for SCC are (1) chemicals in the environment, (2) an alloy that is susceptible to SCC for specific chemicals in the environment, and (3) stress.

I have concluded that all members of the class with 2xxx series aluminum valve stems have this material defect because all of the TPMS devices have valve stems composed of an aluminum alloy that is susceptible to intergranular corrosion and SCC. When a susceptible aluminum alloy is used for the TPMS valve stems, intergranular corrosion and degradation of the valve stems is progressive and inevitable. The intergranular corrosion and degradation begins as soon as the valve stems are exposed to the saline environment and chemicals to which automobiles are typically exposed. The two other factors involved in SCC of the valve stems, stress and environment, cannot be reasonably avoided because stress is inherent to the design of the part and chlorides are widespread in the environment.

The report by Duquette concludes that there are very few failures of valve stems and implies that only the worst combination of variables results in SCC of the valve stems. Duquette states that "It is my opinion that the SCC that has been identified in a few cases are isolated incidences, and it is not endemic to any class of vehicles." In this rebuttal report, I will show that there are specific errors in the Duquette conclusions and provide evidence that intergranular corrosion and SCC are widespread in the 2xxx series aluminum TPMS valve stems.

---

[1] "Chrysler Materials Engineering Lab Reports 135639 and 137860," (see Preliminary Evaluation of Fractures in Tire Pressure Monitoring Sensors Appendices C and D).

3 | Analysis

3.1 Introduction

The Duquette report can be broken down into several main areas of opinions that can be generally summarized as follows:

- The SCC failures of valve stems would not have occurred if the vehicle owners had followed the Chrysler Owners Manuals regarding replacement of the valve cap after adjusting or checking the tire pressure and if the owners had performed regular cleaning of the valve stems.
- Leakage of the TPMS valve stems due to SCC will be slow at first; therefore, there is no need to consider the possibility of a sudden "air out".
- Maintenance practices of vehicle owners are responsible for the "few" reported instances of SCC.
- Multiple alloys with various heat treatments have been used and some of those combinations are more resistant to SCC than others.
- The SCC of valve stems is limited to a few isolated cases and it is not endemic to any class of vehicles.

3.2 Analysis

3.2.1 Removed Valve Caps

Duquette concludes that all known failures have occurred due to missing valve caps. He states that "It must be concluded that the cracks and failures that were observed occurred on vehicles where the valve caps had been removed for some period." The fact that salt deposits and corrosion products are frequently found inside fractured valve stems does not prove that the valve cap had been removed. Duquette failed to recognize that saline solutions would be likely enter the valve stem through growing stress corrosion cracks. I agree with Duquette's conclusion that a crack will not propagate through the entire circumference of the valve stem at once, but will rather penetrate at one point first. Once the crack has penetrated through-wall at one point, there will be a path for salt water to enter the inside of the valve stem. Laboratory analyses performed by Chrysler support my conclusion that road salts can enter the valve stems through a growing stress corrosion crack.

The Chrysler Lab Report 137860 (included in my report Preliminary Evaluation of Fractures in Tire Pressure Monitoring Sensors) provided a chemical analysis of deposits found on the inside of a fractured TPMS valve stem. The results of the analysis showed the deposits were composed primarily of calcium (Ca), chlorine (Cl), and aluminum (Al). Only low levels of silicon (Si) were detected, which is consistent with the silicon content of the 2XXX series of aluminum alloys. The deposits analyzed were entirely consistent with calcium chloride road salts combined with aluminum corrosion products. The Chrysler Lab Report 137860 was not entirely clear about the precise region that was analyzed, and the analysis might also represent a spot that included both calcium chloride surface deposits and exposed areas of the aluminum valve stem. However, the results of the analysis are completely inconsistent with the combination of road grit and sand that would be expected if the materials had entered through a removed valve cap.

I have concluded that saline solutions (salty water) will enter the interior of the valve stem through growing stress corrosion cracks and that the absence of the valve cap is not necessary for this to occur.

Duquette relies on the Continental A.G. corrosion study as support for his conclusion that no SCC would occur if the valve cap were maintained in place. In that study, the corrosion damage was most pronounced in the 2011-T6 when exposed without the valve cap. However, no fractures occurred in a total of 90 tests of the 2011-T6 valve stems. In Chrysler Lab Report 135639, six fractured valve stems were examined and found to have failed due to SCC. The report indicated that each of those valve stems was made of 2030 alloy in the T4 heat treatment condition (2030-T4) and that all six failed due to SCC. The only conclusion that can be drawn from the Continental A.G. tests is that those tests were significantly less severe than real world conditions for valve stems that are exposed to salty water and other chemicals that may be present on the roads. The test conditions of the Continental A.G. corrosion study were not aggressive enough to cause valve stem failures and cannot be used to predict whether the presence of a valve cap would prevent failures in the salt belt, including New York state.

3.2.2 Slow Leakage at First

Duquette concludes that drivers would have plenty of warning of impending valve stem fracture because they would only leak slowly at first through a growing crack. Duquette opines that "Since there is no reliable evidence of any lack of vehicle control because of possible SCC in the valve stems of any Chrysler vehicles, and such a result is inconsistent with the progressive nature of SCC, it is my opinion that a discussion of the possible catastrophic results of an "air out" situation is not scientifically relevant."

The slow leakage scenario is no more than a hypothesis generated by Duquette to support his opinion that the discussion of an "air out" is not scientifically relevant. In the valve stem that I examined and in the ones examined by Chrysler, the SCC has taken place outside the pressure boundary. As shown in Figures 3-1, 3-2, and 3-3, the SCC fracture occurred just below the threaded portion of the valve core. That location is not pressurized and will not leak, even if the SCC cracking penetrates all the way through the thickness of the valve stem.

I have concluded that the SCC forms just below the threads of the valve core because it is a location with the highest tensile stress in the valve stem. That tensile stress is present in all of the TPMS valve stems due to the fact that the valve core must be tightened sufficiently in order to prevent leakage. When the valve core is first assembled into the valve stem, it is tightened by the manufacturer to prevent leakage. Duquette presents no evidence that Chrysler over-tightened or under-tightened any of the valve cores of any Chrysler vehicles.

A simple analysis of the forces involved shows that a tensile stress is developed in the valve stem, but only in the region between the valve core threads and the valve core seal. That is also the thinnest region of the valve stem due to the presence of both internal and external threads. The pressurized region of the valve stem exists only below the rubber seal of the valve core. The diagram in Figure 3-4 illustrates this condition.

As the SCC grows and extends around the circumference of the valve stem, the remaining sound material will eventually become too thin to support the load and the end of the valve stem will break off. Once the end of the valve stem breaks off, the valve core will come out and result in a catastrophic air out. There a many examples of such air outs in the CAIR records provided by Chrysler, which were either not provided to, sought, or otherwise reviewed by Duquette. Even if the air out does not result in an immediate catastrophic accident, the consequences of a sudden loss of tire pressure on a busy highway or at night on a poorly lit roadway are readily apparent.

I have concluded that Duquette is wrong in his assumption that only a slow loss of air pressure will occur due to SCC of the valve stems.

3.2.3 Owner Maintenance Practices

The Duquette report concludes that all cracks and failures that were observed were due to owner maintenance practices, including failure to maintain the valve caps in place. He states that "It must be concluded that the cracks and failures that were observed occurred on vehicles where the valve caps had been removed for some period."

Duquette's conclusion that the valve caps were removed for all of the failed valve stems appear to be based in part on the finding of chlorides and possible corrosion products on the inside of some failed valve stems. Duquette also cites the results of testing performed by Continental A.G..[2] As described above, I determined that saline solutions with chlorides can enter the interior of the valve stem through growing stress corrosion cracks. Once a stress corrosion crack penetrates through wall on the valve stem, capillary action will draw in any saline solution that is present on the outside.

I reviewed the saline immersion and fog tests performed by Continental A.G. and concluded that those tests do not replicate the severity of the actual conditions valve stems are typically exposed to in locations where chloride salts are used for deicing roads. Although the report states that 2,510 parts were tested, it is noteworthy that not even one of the valve stems tested fractured during the test. Continental A.G. tested 90 valve stems with removed valve caps fabricated from 2011 aluminum in the T6 condition. Of the alloys and heat treatments tested, the 2011-T6 combination is known to be the most sensitive to SCC failures. The fact that not a single fracture occurred is convincing proof that the salt spray testing detailed in the Continental A.G. report was not as severe as the actual service conditions of the known failures.

I determined that at least one factor in actual service conditions is more severe than the salt spray and immersion tests performed by Continental A.G. As the road salts and other materials collect on the valve stem, normal evaporation tends to concentrate the deposits resulting in a highly concentrated salt paste. Also, the testing done by Continental did not attempt to measure or duplicate the pH (acidic or basic conditions) of the typical saline deposits on valve stems of vehicles that have been in service.

I have concluded that neither the Continental A.G. salt solution and spray testing nor the presence of salt deposits on the inside of the valve stem support a conclusion that the valve caps had been removed for some period. In fact, the owner of the vehicle for the failed valve

---

[2] Continental A.G. presentation "TPMS - Tire Guard Wheel Unit, TGIB, Mechanical cracks on valve stem" in July, 2009.

stem that I examined (Mr. Tomassini) reported that he always kept the valve cap in place and that he washed the car on a regular basis.[3]

I have also noted from my examination of the valve stems, it is apparent that when a properly installed valve cap is in place, there is a small crevice that is formed in the threaded area adjacent to the valve cap. Not only is the crevice area difficult to clean completely, it is precisely aligned with the location or position where the cracking has been observed.

3.2.4 Multiple Alloys and Heat Treatments

The Duquette report concludes that only the 2011 aluminum alloy in the T6 heat treatment condition is susceptible to SCC and that some of the class of vehicles "may" have the other alloys that were used. I agree with Duquette's conclusion that the 6xxx series of aluminum alloys are essentially immune to SCC in the environment and chemicals to which automobiles are typically exposed. I do not believe that valve stems fabricated from the 6xxx series of aluminum should be included in the class.

I do not agree with Duquette's conclusion that "When used properly, with the valve stem cap installed, the 2011 and 2030 alloys used for the cores of the valve stems are virtually immune to SCC." Duquette failed to note that industry accepted literature shows that all of the 2xxx series aluminum alloys are susceptible to SCC. For example, the ASM Handbook on "Properties and Selection of Nonferrous Alloys and Special-Purpose Materials" gives a D rating for stress corrosion resistance of Alloy 2011 in the T4 condition.[4] Only materials with an A or B rating are recommended for use in an industrial or sea coast conditions where chlorides are typically present. Neither the 2011-T4 nor the more susceptible 2011-T6 would be recommended for use in a chloride environment, such as the environment and chemicals to which automobiles are typically exposed in the "salt belt".

Duquette also concludes that "It is unlikely that the valve stems used in the Chrysler vehicles retained any residual stresses from manufacturing." I do not see any factual basis or support for this conclusion in the Duquette report. In fact, the threaded area of the valve stem is machined, a process that typically leaves a layer of deformed and cold worked material. The deformed and cold worked material will certainly have significant residual stress that can contribute to SCC of the valve stems. Although residual surface stress can contribute to the initiation of SCC, it is my opinion that the primary source of stress driving the stress corrosion crack growth is due to the force generated when the valve core is tightened. During tightening, the valve core is compressed as the valve core seal is forced against its seat in the valve stem. An equal and opposite tensile force is generated in the valve stem, but only in the region between the threaded portion and the seal of the valve core. The location of the elevated tensile stress in the valve stem is consistent with the typical location where SCC has been observed.

---

[3] Tomassini deposition, pp. 103 – 107 where Mr. Tomassini described his regular washing of the vehicle and maintaining of the valve stem caps in place on the valve stems.

[4] ASM International, Metals Handbook Volume 2, Tenth Edition "Properties and Selection of Nonferrous Alloys and Special-Purpose Materials", Page 30.

3.2.5 Only Isolated Failures

Duquette's opinion that only isolated valve stem failures have occurred due to SCC is contradicted by widespread reports of valve stem failures. In fact Chrysler's Customer Assistance Inquiry Records (CAIR) and warranty claims, both only pertaining to Class Vehicles in New York State, show hundreds of warranty claims, and over 150 CAIR reports related to valve stem failures. For instance in one CAIR report, the customer stated "…that the sensor was not hit or damaged, it just blew out." It is of particular interest to note that the tire shop which the customer went to for repairs told the customer that "… the sensor breaking off is common and they see many of them and they are manufacturer defects." The implication is that so many valve stems are failing due to corrosion, the tire stores are aware there is a widespread problem.

I find it curious that Duquette either ignored or did not have access to Chrysler data related to TPMS valve stem failures. As stated in my report on the failures, there is quite solid evidence that Chrysler knew about the problem and eventually changed the alloy specifically due to the breakage of the 2xxx alloy valve stems. As a consultant to Chrysler, Duquette should have access to actual numbers of customer complaints related to TPMS valve stems.

Duquette also failed to consider widespread reports from tire repair shops and the many NHTSA complaints lodged by owners of Chrysler minivans. As stated in my report, a simple internet search for TPMS valve stem failures shows there are widespread reports from tire sales and repair shops indicating that valve stem failure due to corrosion are quite common. Photographs provided on many of the tire repair web sites show fractures that are consistent with SCC.

Although Duquette opines that SCC can only be attributed for certain to the 8 valve stem failures that were analyzed in the laboratory, it is my opinion that corrosion related failures can be readily identified by the average mechanic at a tire shop. Realistically, there are only two possible mechanisms for fracture and separation of the valve stem. Either the valve stems have suffered an external impact or force that breaks the stem, or the damage is corrosion related. Corrosion related failures such as SCC produce dull fracture surfaces with little no apparent deformation of the metal. In contrast, a mechanically induced failure due to impact or overload will result in a shiny fracture surface and significant plastic deformation (e.g., permanent stretching of the metal) in the region next to the fracture.

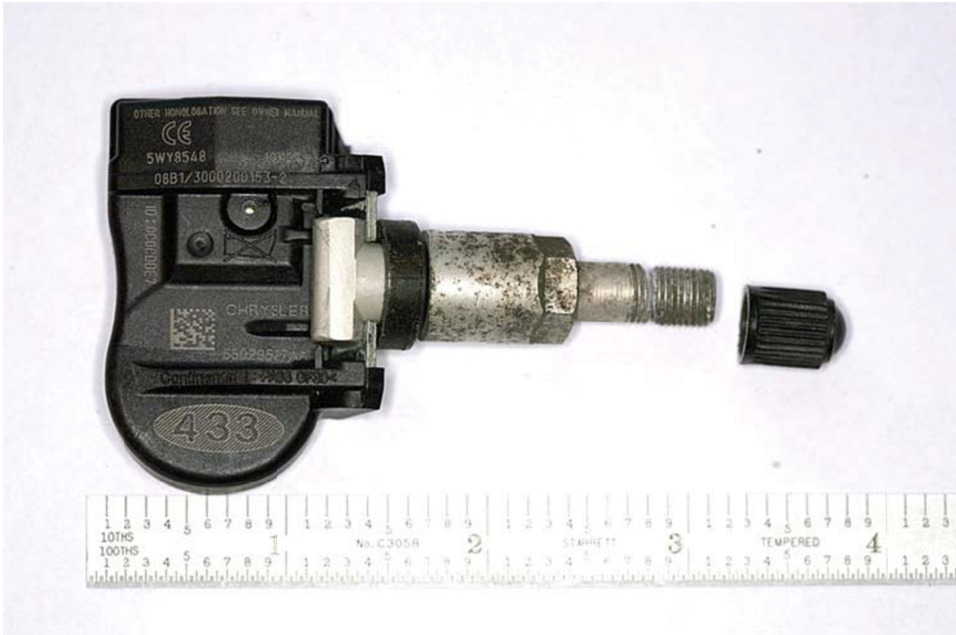

Figure 3-1 — TPMS Device Sample A with Fractured Stem.

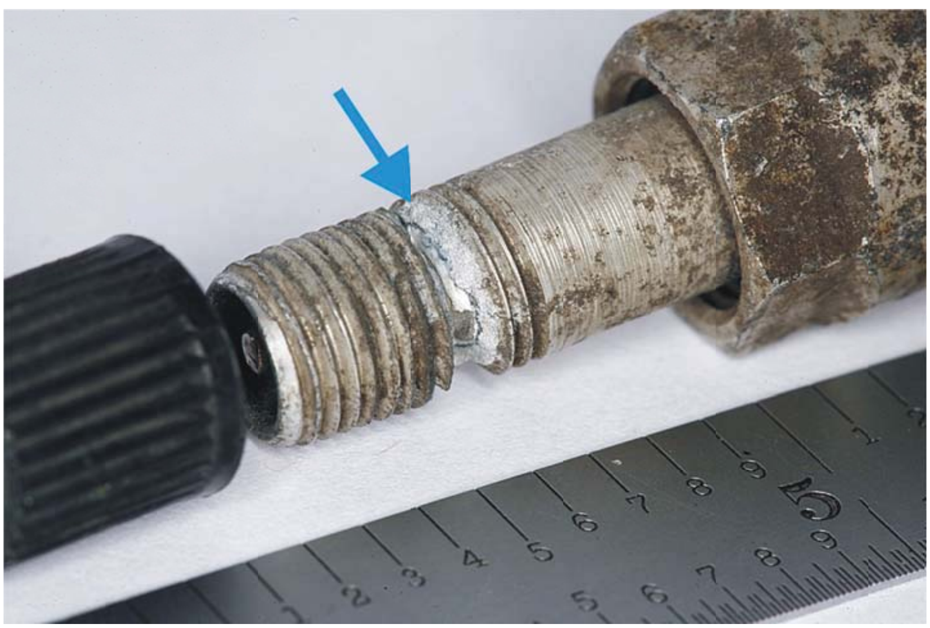

Figure 3-2 — TPMS Device Sample A, Close-up of Fracture (At Arrow).

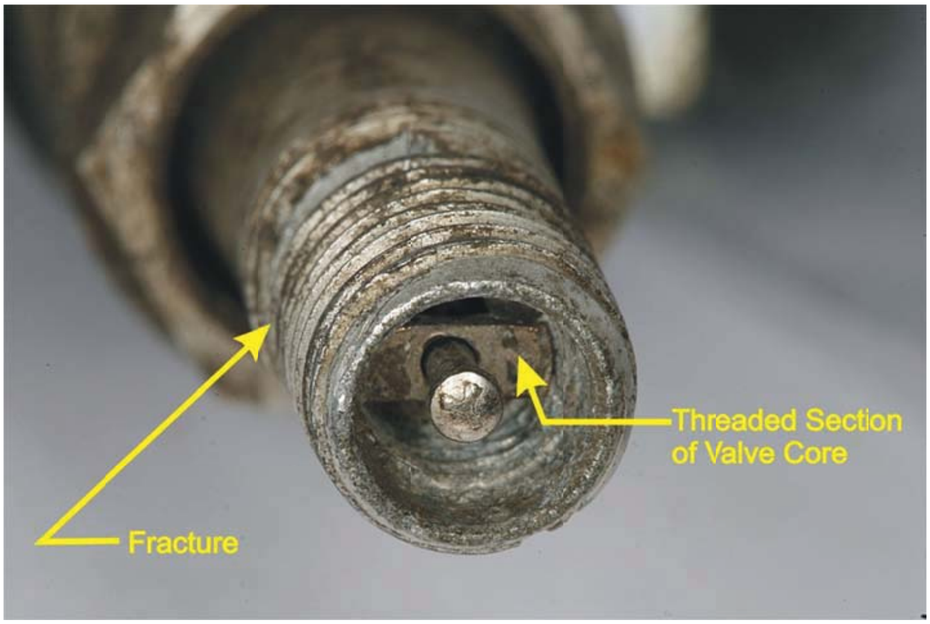

Figure 3-3 — TPMS Device Sample A, Close-up of Inside Surface.

NOTE: The fracture occurred just below the threaded portion of the valve core, a location that will have relatively high tensile stress due to reduced wall thickness in the threaded region. There are both internal threads and external threads at the location of cracking.

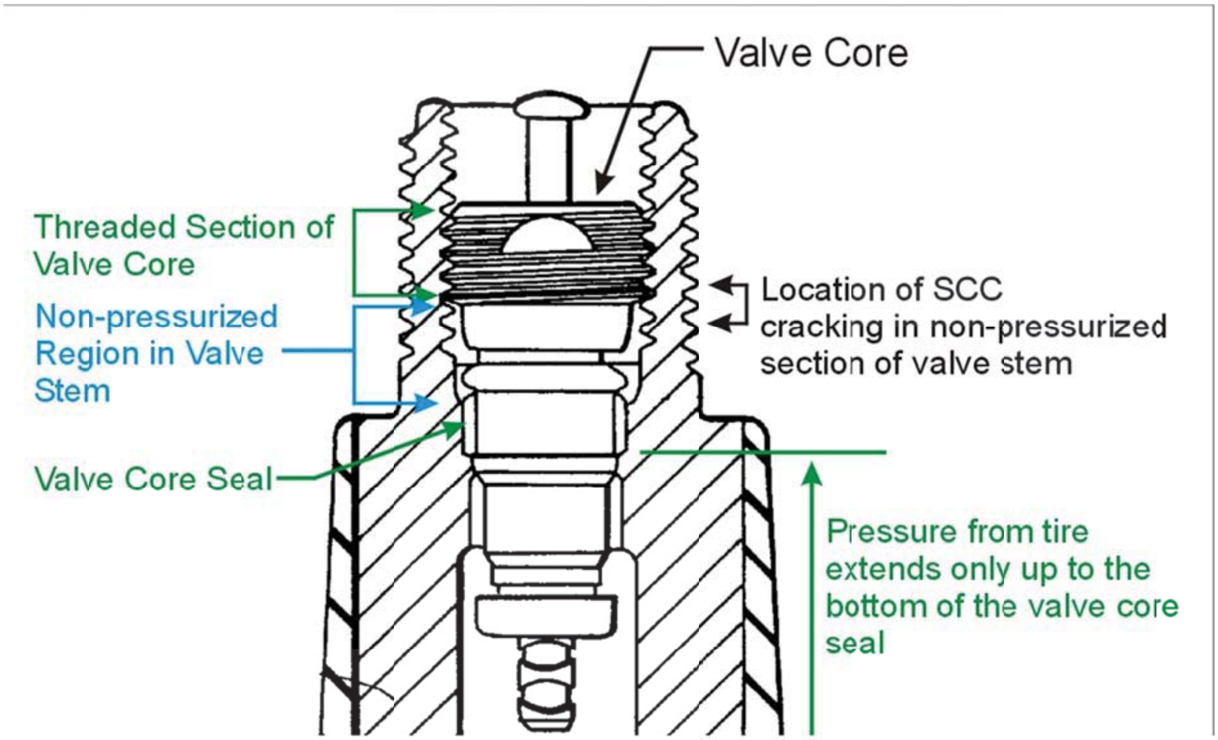

Figure 3-4 — Illustration of Valve Core and Pressure Boundary Within Valve Stem.

NOTE: Tightening the valve stem results in tensile stress in the valve stem wall, but only in the region between the valve core threads and the valve core seal. All SCC cracking failures of the TPMS valve stems has been observed only in the region between the valve core threads and the valve core seal.

4 | Conclusions

4.1 Summary of Findings

I have concluded that all members of the class with 2xxx series aluminum valve stems have this material defect because all of the TPMS devices have valve stems composed of an aluminum alloy that is susceptible to intergranular corrosion and SCC. When a susceptible aluminum alloy is used for the TPMS valve stems, intergranular corrosion and degradation of the valve stems is progressive and inevitable. The intergranular corrosion and degradation begins as soon as the valve stems are exposed to the saline environment and chemicals to which automobiles are typically exposed. The two other factors involved in SCC of the valve stems, stress and environment, cannot be reasonably avoided because stress is inherent to the design of the part and chlorides are widespread in the environment.

I have determined that the defect does not occur when the valve stem finally breaks off, but rather has manifested itself as soon as the SCC or intergranular corrosion begins. Although the SCC and intergranular corrosion are not visible to the naked eye, it is progressive and does not stop once it has started. Once crack growth has started, it is very difficult to clean the valve stems sufficiently to remove all of the chlorides that have penetrated deeply into the cracks.

4.1.1 Removed Valve Caps and Cleaning

I found that it is incorrect to conclude that the SCC failures could be avoided if the vehicle owners had followed the owner's manual with regard to replacement of the valve caps and regular cleaning. The outside of the valve stem will still be exposed to environments that cause SCC even if the valve cap is in place. It is also impractical to clean the valve stems after each use of the vehicle and SCC will take place each time the valve stem is exposed to the saline environment and chemicals to which automobiles are typically exposed. It is illogical to think that a vehicle owner is going to wash the vehicle during ongoing storms, when the exposure to deicing road salts is greatest.

4.1.2 Slow Leakage at First

The conclusion that leakage will be slow at first is wrong. Chrysler's own CAIR records show many instances of air outs inconsistent with slow leakage.

4.1.3 Multiple Aluminum Alloys

I agree that the 6xxx series of aluminum alloys are not susceptible to SCC when subjected to the environment and chemicals to which automobiles are typically exposed.

It is wrong to conclude that any of the 2xxx series alloys are immune to SCC, particularly when that conclusion is based on a test (e.g., the Continental A.G. tests) that is much less severe than the actual conditions valve stems are exposed to. The Continental A.G. tests were much less severe and quite different from the actual real-world conditions. The Continental A.G. tests of 90 valve stems with the most susceptible chemistry and microstructure, and removed valve caps, did not result in a single failure.

4.1.4 Few Isolated Cases

It is wrong to conclude that intergranular corrosion and SCC of valve stems is limited to a few isolated cases and it is not endemic to any class of vehicles. The Duquette report ignores Chrysler's own data, including documents showing that Chrysler changed the material specification for the valve stems based on customer complaints of breakage. The Duquette report ignored hundreds of warranty claims and CAIR reports that highlight the problem.

It is also wrong to conclude that only a full laboratory analysis can positively identify cases of SCC in the valve stems. Other than corrosion, the only credible failure mode for the valve stems is mechanical impact and I have not seen any evidence of such a failure mode in the testing I performed on Mr. Tomassini's valve stem or in the documents that I have reviewed. It is my opinion that corrosion-related failures can be readily identified by the average mechanic at a tire shop.

Realistically, there are only two possible mechanisms for fracture and separation of the valve stem. Either the valve stems have suffered an external impact or force that breaks the stem, or the damage is corrosion related. Corrosion-related failures such as SCC produce dull fracture surfaces with little or no apparent deformation of the metal. In contrast, a mechanically-induced failure due to impact or overload will result in a shiny fracture surface and significant plastic deformation (e.g., permanent stretching of the metal) in the region next to the fracture.

It is also unrealistic to assume that the huge increase in valve stem failures reported by tire repair/sales shops is solely due to an increase in mechanical damage events.

Appendix A | Curriculum Vitae of Eric V. Sullivan, PE

Intertek

ERIC V. SULLIVAN, P.E.
Materials and Metallurgical Engineer

Mr. Eric Sullivan has over 32 years of metallurgical engineering experience in the fields of materials, metallurgical, and welding engineering, nondestructive examination, and failure investigation. Mr. Sullivan specializes in the analysis of mechanical equipment, engines, combustion and steam turbines, and devices that are involved in complex accidents, losses, fires, and explosions. Mr. Sullivan is also experienced in providing testimony for deposition, mediation, and trial.

Specialized Professional Competence

- Metallurgical engineering
- Failure analysis and prevention
- Fire and explosion investigations
- Fatigue
- Nondestructive examination
- Field testing/instrumentation
- Welding
- Quality assurance
- Expert witness
- Fracture mechanics
- Mechanical testing
- Accident reconstruction

Equipment

- Utility and industrial boilers
- Machinery
- Pressure vessels
- Heat exchangers
- Industrial furnaces
- Ski lifts
- Bolts and fasteners
- Gasoline engines
- Diesel engines
- Automobiles and trucks
- Pumps
- Steam tubing
- Steam turbines
- Combustion turbines
- Generators
- Oil and gas pipelines
- Gas field equipment
- Welded structures
- High energy steam piping
- Fans
- Structures
- Valves and piping

Industries

- Metals processing
- Petrochemical
- Manufacturing
- Fossil and nuclear power generation
- Construction
- Aerospace
- Refinery
- Electronics

Recent Work

- Failure Analysis — Refinery piping failures, underground steam pipe failures, underground gasoline and crude oil pipeline failures, well casing failures for a salt dome natural gas storage facility, industrial gas and diesel engines, turbochargers, valves, pumps, gasoline and crude oil pipeline ruptures, fire protection system piping, water piping, and nuclear plant turbines, bolts, valves, and piping systems.

- Fire and Explosion Accident Investigation — Evaluation of failures of equipment, devices and systems that cause accidents, fires and explosions, including oxygen and oxyacetylene systems, refineries, copper smelters, industrial boilers, pump seals, pressure tanks, vessels, and natural gas storage facilities.

- Accident Reconstruction — Evaluation of accidents involving oxygen and oxyacetylene welding system explosions, oil refinery fires and explosions, personal injuries, rocket fuel oxidizer explosions, building explosions caused by leaking buried gas pipelines, underground migration of combustible gas.

- Technical Consulting — Engineering analysis and consulting on large legal cases involving refinery and chemical plant equipment integrity.

- Welding – Preparation and review of welding procedures and welding repair procedures for power plants, piping and equipment.

Project Experience – Metallurgical Engineering

- Failure Analysis — Failure analysis for a wide range of components, including pumps, pressure vessels, machinery, turbines, motor vehicles, electronic components, piping, and medical implants.

- Rotating Equipment — Instrumentation and evaluation of vibration in petrochemical equipment; failure analysis of gas and steam turbines; development of fracture mechanics code for evaluation of defects in steam turbines; fitness-for-service evaluation of inspection indications in turbine rotors; failure analysis of pumps and other machinery.

- Pressure Vessels/Piping — Metallurgical and failure analysis of buried petrochemical pipelines, steam lines, boiler tubes, water and hydraulic piping; evaluation of creep and creep/fatigue of high-temperature components; fitness-for service analysis of weld defects.

- Materials Review

- Testing and Instrumentation — Strain gage analysis of high pressure natural gas storage vessels and hydraulic piping systems; instrumentation of laboratory test setups for computerized data acquisition of strain, pressure, temperature, displacement, and force

- Accident Reconstruction — Explosion analysis of medical oxygen systems and oxyacetylene welding equipment

Education and Professional Background

- B.S. (Metallurgical Engineering), California Polytechnic State University at San Luis Obispo, California (1980)
- Professional Engineer, Metallurgical, California No. 1771
- Licensed Private Investigator, State of California
- Comprehensive Courses:
    - *Hazardous Waste Operations and Emergency Response Training*, University of California, Santa Cruz (July 1995)
    - *Scanning Electron Microscopy and X-ray Microanalysis*, Lehigh University (1992)
    - *Hazardous Materials Management*, University of California, Santa Cruz (July 1993)
    - *BATC Refinery Contractors Process Safety Orientation* (May 1999)
- Recipient of ASM Metallography Award

Selected Reports, Publications, and Invited Lectures

Task 1 – Initial Evaluation of LNG Tank Explosion at Los Angeles Bureau of Sanitation on January 29, 2014, Intertek AIM Report AIM 14078700-4-1 (September 2014).

Failure Evaluation of a Steam Tube, Intertek AIM Report AES 14038651-2-1 (September 2014).

Evaluation of Press Alternate Repair Schemes, with M. Cronin, Intertek AIM Report AES 12078179-4-4 (June 2014).

MSP–JV–Te Mihi Geothermal Plant Notes Prepared for Witness Statement for Adjudication/ Arbitration (Intertek AIM Project 0229 AES 13108493-4), Intertek AIM Report AES 13118518-4-1 (May 2014).

Metallurgical Evaluation of Waterwall Tubes with Blisters at El Centro Power Plant, Unit 4, Intertek AIM Report AES 14038632-2-1 (April 2014).

Nondestructive Inspection of a Duplex Stainless Steel Vapor Compressor Impeller and Housing, Intertek AIM Report AES 11027696-4-2 (March 2014).

Failure Investigation of a Screw Compressor Shaft Fracture at the Ripon Cogeneration Plant, Intertek AIM Report AES 13108508-4-1 (February 2014).

Review of fabrication and Construction Procedures for Grade 91 Piping and Fittings at Walter Scott Energy Center, Unit 4, Intertek AIM Report AES 13078439-2-2 (January 2014).

Investigation of Terminal Heat Exchanger Tube Failures at the Indianapolis Airport, Indianapolis, Indiana, Intertek AIM Report AES 12088185-4-1 (December 2013).

Failure Analysis of Stage 8 and 9 Compressor Blades and Vanes, Select First Stage Blades, and Analysis of Slag Deposits, Intertek AIM Report AES 13108503-2-1 (December 2013).

Investigation of a Hydraulic Cylinder Check Valve Failure, Intertek AIM Report AES 13108493-4-1 (October 2013).

Metallurgical Evaluation of Proposed Water Treatment Substitutions, Intertek AIM Report AES 13088459-3-1 (September 2013).

Metallurgical Investigation of a Gate Valve Failure at Petro Star's Valdez, Alaska, Facility on December 28, 2008, Intertek AIM Report AES 09017043-34-3 (September 2013).

Finite Element Analysis of a Repaired Forge Press Cylinder Platen, Intertek AIM Report AES 12078179-4-3 (July 2013).

Metallurgical Evaluation of Boiler Tube and Drum Samples, Sasol North America, with J. Warwick and H. Vaillancourt, Intertek AIM Report AES 13068433-3-1 (July 2013).

Evaluation of Expert Reports and Opinions in the AOP Clearwater Brine Facility Matter, Intertek AIM Report AES 12068162-4-1 (May 2013).

Preliminary Root Cause Failure Analysis Report on the Rupture of Ecopetrol S.A.'s Puerto Salgar to Cartago Pipeline - Dosquebradas, Colombia, with J. Oswell, Intertek AIM Report AES 11127975-3-12 (March 2013).

Root Cause Failure Analysis Report Investigation of the Rupture in the Caño Limón – Coveñas Pipeline, with J. Oswell, Intertek AIM Report AES 11127975-3-11 (March 2013).

Investigation of Explosion in X-Rite Color i5 Bench Top Spectrophotometer, Intertek AIM Report AES 13018300-4-1 (February 2013).

Design and Performance Analysis of Hajr Heat Recovery Steam Generator Fabrication - Second Site Visit to BHI Facilities in Korea, Intertek AIM Report AES 12058115-2-3 (November 2012).

Engineering Investigation of Forge Press Incident, Intertek AIM Report AES 12078179-4-2 (November 2012).

Steam Turbine Failure Investigation for the University of Cincinnati , Intertek AIM Report AES 12088191-4-1 (September 2012).

Power Turbine Failure Investigation for the San Gabriel Cogeneration Plant in Pomona, California, Intertek AIM Report AES 12068137-2-1 (August 2012).

Preliminary Report on Engineering Investigation of Forge Press Incident, Intertek AIM Report AES 12078179-4-1 (August 2012).

Design and Performance Analysis of Hajr Heat Recovery Steam Generator Fabrication - Site Visit to BHI Facilities in Korea, Intertek AIM Report AES 12058115-2-1 (July 2012).

Weld Repair Procedure for Service Degraded Front Lower Economizer Waterwall Header, Intertek AIM Report AES 12059109-2-1 (May 2012).

Preliminary Root Cause Failure Analysis Report Investigation of Caño Limón – Coveñas Pipeline Rupture, Limited Distribution Report, APTECH Report AES 11127975-3-4 (April 2012)

Metallurgical Evaluation of Steam Drum and Lower Drum Cracking at Jamalco, Unit 3, APTECH Report AES 11097896-2-1 (October 2011) (Caustic Stress Corrosion Cracking of Ducol W30 Steam Drum Material)

Engineering Investigation of the Failures of Gearboxes for TG 21 and TG 31 at Alumar Refinery in Sao Luis, Brazil, Limited Distribution Report, APTECH Report AES 11067816-2-1 (August 2011)

Investigation of the Breakdown of a Mitsubishi S12 PTA Engine at Sunland Park Racetrack, Limited Distribution Report, APTECH Report AES 11027684-4-1 (June 2011)

Metallurgical Evaluation of Cracking in a Duplex Stainless Steel Vapor Compressor Impeller and Housing, Limited Distribution Report, APTECH Report AES 11027696-4-1 (May 2011)

Investigation of Natural Gas Compressor at Regency Gas Services Eastside Compressor Station, Limited Distribution Report, APTECH Report AES 07046440-3-1 (2009) (Explosion and Fire Due to Valve Cap Stud Bolt Failures)

Investigation of a Frac Truck Engine Fire, Limited Distribution Report, APTECH Report AES 09047132-3-1 (November 2010)

Air Inlet Screen Failure Analysis for the Mars 100 Engine Located at the Central Utility

Plant at the California Institute of Technology, Limited Distribution Report, APTECH Report AES 07086857-4 (September 2008) (FOD Screen for Combustion Turbine Air Inlet).

Failure Analysis of a Fractured Bronze Pump Impeller Blade, Limited Distribution Report, APTECH Report AES 07076562-2-1 (August 2007)

Engineering Investigation of Buried Steam Pipe Failures, Limited Distribution Report, Mediation presentation for Massachusetts [Bay] Transportation Authority (April 2006) (Perma-Pipe Steam Line Failures at Boston's Big Dig Site)

Investigation of an Oxyacetylene Welding System Accident, Limited Distribution Report, APTECH Report AES 06016056-4-1 (May 2006).

Analysis of a Fractured Turbine Blade from the Hanford Steam Plant, APTECH Report AES 05105944-4-1 (January 2006).

Investigation of Autoclave Hatch Hardware with Magnetic Particle Indications, with M. Cronin, APTECH Report AES 05045769-5-1 (October 2005).

Investigation of a Diesel Engine Failure at the Encina Wastewater Facility, Limited Distribution Report, APTECH Report AES 05075872-4-1 (September 2005).

Investigation of Natural Gas Leaks from Dow Well No. 13, with G. Egan and J. Towers, Limited Distribution Report, APTECH Report AES 04025297-3-1 (August 2005).

Expert Report of Aptech Engineering Services, Inc. in the Matter of Baillie v. Nautilus/Schwinn Fitness Group, Inc., et al. , Limited Distribution Report, APTECH Report AES 05065821-4-1 (August 2005).

Expert Report of Aptech Engineering Services, Inc. in the Matter of State Farm General Insurance Company v. Maytag Corporation, et al. , Limited Distribution Report, with K. Clark and P. Wheeler, APTECH Report AES 04105563-4-1 (July 2005).

Inspection of Marine Diesel Engines, with S. Torbov, Limited Distribution Report, APTECH Report AES 04075475-4-1 (February 2005).

Investigation of Cooling Fan Failure at Guadalupe Cooling, Guadalupe, California, Limited Distribution Report, Limited Distribution Report, APTECH Report AES 04055430-4-1 (July 2004).

Investigation of Diesel Engines Exposed to Contaminated Fuel, Limited Distribution Report, with K. Clark and S. Torbov, APTECH Report AES 04045401-4-1 (May 2004).

Investigation of a Diesel Engine Connecting Rod Failure, Limited Distribution Report, APTECH Report AES 00104188-4-2 (April 2004).

Evaluation of Report Conclusions for Steam Line Venturi Cracking at the Whiting Cogeneration Plant, Limited Distribution Report, APTECH Report AES 03125242-4-1 (December 2003).

Investigation of Water Pipe Leak in a Heating, Ventilating, and Air Conditioning Cooling Water System, Limited Distribution Report, APTECH Report AES 03095164-4-1 (October 2003).

Rebuttal of Failure Analysis Associates Report, "Warranty Claim Regarding Turbocharger Compressor Wheels," by Roland Huet, with G. Egan and P. Besuner, Limited Distribution Report, APTECH Report AES 02114914-4-2 (August 2003).

Engineering and Reliability Analyses of Ross Aluminum Castings for Garrett Turbocharger Wheels, with G. Egan and P. Besuner, Limited Distribution Report, APTECH Report AES 02114914-4-1 (June 2003).

Investigation of Portable Oxygen Cylinder Fire Which Occurred at the Texas Department of Criminal Justice on February 11, 2001, with K. Clark and C. Lee, Limited Distribution Report, APTECH Report AES 03014954-4-1 (May 2003).

Significance of Surface Rubbing on Stress Corrosion Cracking Susceptibility for Low Pressure Rotors at San Onofre Nuclear Generating Station, Unit 3, with R. Cipolla, APTECH Report AES 01084468-1-1 (April 2003).

Assessment of Root Cause for Low Pressure Turbine Inner Casing Studs at San Onofre Nuclear Generating Station, with R. Cipolla, APTECH Report AES 02104890-1-3 (March 2003) (Stress Corrosion Cracking of Turbine Studs).

Metallurgical Analysis of Low Pressure Turbine Inner Casing Studs, San Onofre Nuclear Generating Station, Unit 2, with R. Cipolla, APTECH Report AES 02104890-1-1 (March 2003).

Technical Analysis of Chain Failures for Escalator Step Chains Supplied by ECS Corporation, Limited Distribution Report, APTECH Report AES 02044729-4-1 (November 2002).

Investigation of Fire Protection Pipe Leak at Pedro's Restaurant in San Jose, California, Limited Distribution Report, APTECH Report AES 02104887-4-1 (October 2002).

Protocol for Metallurgical Examination of Row 12 Steam Turbine Blades - Rosebud Power Plant – Colstrip, Montana, with R. Schreiber, APTECH Report AES 02064794-4-1 (August 2002).

Site and Evidence Inspection Related to an Accident Involving a Swivel Trim Chute at the Newark Sierra Paper Plant in Stockton, California, Limited Distribution Report, APTECH Report AES 01074439-4-1 (July 2002).

Evaluation of Cracks on a Steam Line Venturi at the Whiting Cogeneration Plant, Limited Distribution Report, APTECH Report AES 01104531-2-5 (April 2002).

Evaluation of Steam Leaks at Socket Welds from the Whiting Cogeneration Plant, Limited Distribution Report, APTECH Report AES 01104531-2-4 (April 2002).

Evaluation of a Cracked Weld Fitting on a Steam Line Venturi at the Whiting Cogeneration Plant, Limited Distribution Report, APTECH Report AES 01104531-2-2 (January 2002).

Evaluation of Caustic Cracking in a Heat Recovery Steam Generator Piping System, Limited Distribution Report, APTECH Report AES 01104531-2-1 (January 2002).

Investigation of Building Explosion at 851 Cerrillos Road, Santa Fe, New Mexico, on April 25, 2001, Limited Distribution Report, APTECH Report AES 01054396-4-1 (December 2001).

Investigation of Hydroelectric Turbine Shaft Cracks, Limited Distribution Report, APTECH Report AES 00114224-4-1 (June 2001).

Metallurgical Analysis of Low Pressure Turbine Inner Casing Stud San Onofre Nuclear Generating Station, Unit 3, with R. Cipolla, APTECH Report AES 01044365-1-1 (June 2001).

Investigation of Generator Field Problems at the Northern California Power Association's Alameda Unit 2 Power Plant, Limited Distribution Report, APTECH Report AES 01054384-4-1 (June 2001).

Investigation of Cracking in a Stainless Steel End Plate from a Semiconductor Oven, APTECH Report AES 00124239-5-1 (January 2001).

Investigation of Cracking in Fan Motor End Plates, APTECH Report AES 00104181-5-1 (November 2000).

Failure Analysis of a Boiler Feed Pump Turbine Blade, APTECH Report AES 00104173-2-1 (November 2000).

Metallurgical/Root Cause Evaluation of Cracking in Main Steam Piping at the Sundance, Unit 4, Turbine Terminal Point Piping, APTECH Report AES 00084106-2-1 (October 2000).

Investigation of General Electric LM6000 Gas Turbine Mechanical Breakdown, APTECH Report AES 00043972-4-1 (September 2000).

Examination of Main Steam, Hot Reheat, and Link Piping from Cayuga Station, Unit 2, with J. Yavelak, R. Moser, and T. Kuntz, APTECH Report AES 00044009-2-1 (August 2000).

Trus Joist Hot Oil Pump Fire Investigation, APTECH Report AES 00064049-4-1 (July 2000).

Investigation of Damage to an Allison 501KB Gas Turbine Which was Operated by York Research, APTECH Report AES 00013875-4-1 (April 2000).

Investigation of Damaged Slide Valve on Screw Type Gas Compressor, APTECH Report AES 00023892-4-1 (March 2000).

Investigation of Bearing Failure at Pomona Paper Company, APTECH Report AES 00013881-4-1 (February 2000).

Engineering Investigation of Damage to a Turbine Lube Oil Pump - Insured: Turbo Mechanical, Inc., Limited Distribution Report, APTECH Report AES 99113841-4-1 (December 1999).

Satellite Shaker Table Explosion Investigation, APTECH Report AES 99073751-4-1 (August 1999).

Low Strength Bolting Issues – Testing, with E. Merrick, et. al., APTECH Report AES 98123578-3-2 (July 1999).

Investigation of Engine Components Failure, APTECH Report AES 99053702-4-1 (June 1999).

Investigation of Multiple Breakdowns in an Allison 501 KB5 Gas Turbine Anderson Lithograph, APTECH Report AES 99023629-4-1 (March 1999).

Evaluation of Cracking in a Roof Truss Box Girder, APTECH Report AES 99023623-5-1 (February 1999).

ASTM A320 Grade B8 Class 1 Bolting Issues, with T. Kuntz, et al., APTECH Report AES 98123578-3-1 (January 1999).

Investigation of Co-Generation Engine Fire at Summit Medical Center, Limited Distribution Report, APTECH Report AES 98113552-4-1 (November 1998).

Investigation of Cracks in a Forge Press Hydraulic Cylinder, Limited Distribution Report, APTECH Report AES 98063431-4-1 (August 1998).

Fresh Air Heat Exchanger Tube Carburization and Deposit Melting Point Evaluation, APTECH Report AES 98053392-2-2 (July 1998).

Engineering Investigation of a Fire in an Air-Over-Oil Accumulator Tank – Kaweah River Power Authority Terminus Hydroelectric Power Plant, with R. Schreiber, Limited Distribution Report, APTECH Report AES 98023324-4-1 (July 1998).

Investigation of Silane Gas Fire at Matheson Gas Products, Claim No. N48788, Limited Distribution Report, APTECH Report AES 98043387-4-1 (April 1998).

Investigation of Structural Steel Collapse, Chino Basin Municipal Water District Water Reclamation Plant 4, Limited Distribution Report, APTECH Report AES 97063107-4-1 (August 1997).

Evaluation of Pitting Damage in a Synthol Reactor Boiler Tube, APTECH Report AES 97073123-2-1 (August 1997).

Weld Quality Audit and Engineering Assessment of the Structural Steel and Critical Weld Details in the San Diego Airport, Concourse F, Terminal 2 Construction Project, Limited Distribution Report, APTECH Report AES 97022975-4-1 (July 1997).

Investigation of a Molten Lead Bath Leak, Limited Distribution Report, APTECH Report AES 97043049-4-1 (June 1997).

Fitness for Service Evaluation of W14 Column Flanges, APTECH Report AES 97043016-4-1 (May 1997).

Project Findings for the Investigation of the Explosion of High Pressure Natural Gas Filter Separator at McDonald Island, California, Limited Distribution Report, APTECH Report 93102025-4-5 (October 1996).

Investigation of Yan Detachable Ski Lift Grips, APTECH Report AES 96042710-4-1 (September 1996).

Evaluation of Safety Bolt Thread Stripping Strength and Effect of Length of Thread Engagement, APTECH Report AES 93102025-4-4 (August 1996).

Examination of a Turbine Disk Fracture From the 22nd Stage of a Steam Turbine at Clover Bar, Unit 2, APTECH Report AES 95082518-2-1 (July 1996).

Condition Assessment of Cane Run, Unit 4, Boiler Tubing and Structural Components, with J. Yavelak and K. Ecoffey, APTECH Report AES 96012622-2-2 (June 1996).

Evaluation of a Steam Turbine Rotor Which Was Overheated During Heat Treatment, with M. Cronin and C. Lee, APTECH Report AES 96022655-4-1 (March 1996).

Investigation of the Collapse of a Conveyor Structure at Sims-Lmc Recyclers, APTECH Report AES 96012628-4-1 (February 1996).

Failure and Root Cause Analysis of Cracking in the Sheets of Air Preheater Baskets at Northeastern Station, Units 3 and 4, APTECH Report AES 95102553-2-1 (December 1995).

Investigation of Arcing in a 480 Volt Motor Starter Electrical Panel, with P. Wheeler, APTECH Report AES 95082494-4-1 (September 1995).

Cane Run, Unit 5, Waterwall Tube Failure Analysis, APTECH Report AES 95082508-2-1 (August 1995).

Evaluation of a Turbine Blade Failure at Mt. Poso Cogeneration Facility, APTECH Report AES 95052456-4-1 (July 1995).

Investigation of Unit 1 Power Transformer Failure and Fire at Colgate Hydroelectric Generation Station, Dobbins, California, APTECH Report AES 95052449-4-1 (June 1995).

Analysis of a Fan Shaft Failure, APTECH Report AES 95042427-5-1 (May 1995).

Analysis of Superior 16-SGTA Engine Failure at Griffith Park Landfill, APTECH Report AES 95012368-4-1 (April 1995).

Metallurgical Evaluation of a Failed Fastener from Puna CT-3 Power Turbine, APTECH Report AES 94112314-2-2 (March 1995).

Investigation of a Pinhole Leak in a Petroleum Products Pipeline, Declaration of Mechanisms Which Could Cause a Through Wall Penetration in Carbon Steel Pipeline Material, Trial Declaration of Facts, Limited Distribution Report, APTECH Project AES 94112317-4 (February 1995).

Investigation of the Explosion of an Abandoned Natural Gas Pipeline, Project Notes, APTECH Project AES 95012355-4 (January 1995).

Evaluation of a Natural Gas Pressure Vessel Failure (Explosion), APTECH Report AES 93102025 4-2 (October 1994).

Evaluation and Recommendations for a Failed Fastener From the Puna CT-3 Power Turbine, APTECH Report AES 94112314-2-1 (November 1994).

Failure Analysis of Four L-1 Blades From a 600 MW General Electric Turbine, APTECH Report AES 94082260-2-1 (September 1994).

Graphitization Evaluation Program for the High Temperature Steam Lines at P.T. Badak, Bontang, Indonesia, APTECH Report AES 94032136-3-2 (August 1994).

Failure Analysis of Localized Corrosion in a Titanium Heat Exchanger, APTECH Report AES 94052194-3-1 (June 1994).

Audit of Suncor Incorporated Process Piping Inspections, with S. Kohan and J. Cantwell, APTECH Report AES 94032135-3-2 (June 1994).

Failure Analysis of a Main Steam Stop Valve Bolt at Northeast Station, Unit 2, APTECH Report AES 93092007-2-1 (November 1993).

Weld Repair Procedure for Graphitization-Damage Carbon Steel Piping, APTECH Report AES 93071974-3-1 (August 1993).

Graphitization Evaluation of High Pressure Steam Piping at P. T. Badak, APTECH Report AES 93071974-3-2 (August 1993).

Condition Assessment and Remaining Useful Life Analysis of Boiler 4 and Steam Piping at P. T. Badak, with R. Impey and S. Miller, APTECH Report AES 93021867-3-2 (June 1993).

Analysis of a Failed Electro Hydraulic Servo Valve, APTECH Report AES 93021851-2-1 (March 1993).

Investigation of a Grinding Wheel Accident, APTECH Report AES 93021860-4-1 (March 1993).

P.T. Badak NGL Company Life Extension Program Prediction of Cooling Water Piping Damage for 1993 Shutdown, APTECH Report AES 92101782-3-3 (February 1993).

Metallurgical Evaluation of a Turbine Blade, Transition Piece Crack, and Powder Samples From a Combustion Turbine at Keahole Generating Station, with S. Lefton, APTECH Report AES 92051701-2-1 (February 1993).

Failure Analysis of a Forced-Draft Air Fan at Escalante Power Plant, Unit 1, APTECH Report AES 92051697-2-1 (July 1992).

Failure Analysis of Type 304 Stainless Steel Feedwater Heater Tubes From a Heat Recovery Steam Generator, APTECH Report AES 92061711-2 (June 1992).

Evaluation of Pitting Corrosion 0n an SO_2 Scrubber Mist Eliminator Fin, APTECH Report AES 92041670-2-1 (May 1992).

Justification for Repair Welding of Reheat Piping With Lamellar Discontinuities, with T. Burnett, APTECH Report AES 92011591-2-1 (March 1992).

Condition Assessment/Failure Analysis on Three Secondary Superheater Tubes, APTECH Report AES 91111561-2-1 (December 1991).

Metallurgical Evaluation of Auxiliary Cooling Water Pump Impeller, Kahe Unit 5, APTECH Report AES 91091524-2-1 (October 1991).

Estimation of Critical Flaw Sizes and Failure Probabilities for Check Valve Swing Arms at Palo Verde Nuclear Generating Station, with E. Zebroski, APTECH Report AES 90031209-1Q-2 (September 1991).

Evaluation of Service Suitability [Nuclear] of Borg-Warner Bolted-Bonnet Check Valve Swing Arms, with P. Lindsay and J. Grover, APTECH Report AES 90031209-1Q-1 (April 1991).

Microstructural Replication of Generator Retaining Rings and Metallurgical Evaluation, APTECH Report AES 90111353-2-1 (December 1990).

Tennessee Valley Authority, Watts Bar Nuclear Plant, Microbiologically Influenced Corrosion Management Program, a Third Party Review (Task 7B), with P. Lindsay and R. Cipolla, APTECH Report AES 90091312-1Q-2 (November 1990).

Examination of Damaged Cooper-Bessemer Diesel Engine Crankshaft and Evaluation of Feasibility of Proposed Repairs, APTECH Report AES 90081295-4 (October 1990).

Field Examination and Replica Evaluation of Selected Welds in the Main Steam Line of Unit 6, Trinidad Station, with M. Cronin, et.al., APTECH Report AES 89031035-2-1 (May 1989).

Evaluation of Materials and Weld Repair Practices at Thomas Hill Energy Center, Mining Division, APTECH Report AES 89021016-2-1 (April 1989).

Failure Analysis and Condition Assessment of Two Reheater Tubes from Ft. Meyers, Unit 2 (Task 16), APTECH Report AES 8704773-2-11 (January 1989).

Field Examination and Metallurgical Evaluation of Shell Cracking in the High Pressure Turbine Case of Unit 2 at Petersburg Station, with M. Cronin, APTECH Report AES 8810972-2-1 (December 1988).

Deepwater Station, Unit 6/8, Condition Assessment of High and Low Temperature Vessels, with E. Fraser and S. Paterson, APTECH Report AES 8705779-2-2 (July 1988).

Remaining Useful Life Study of the Secondary Superheater and Final Reheater Tubes and Examination of Selected Boiler Components at Riverside Station, Unit 1, with K. Hara, et.al., APTECH Report AES 8709821-2-1 (May 1988).

Failure Analysis of Dissimilar Weld From Port Everglades Plant, Unit 2 (Task 6), APTECH Report AES 8704773-2-1 (December 1987).

Sierra Pacific Power Company's North Valmy Station Failure Analysis of Main Steam Valve Stem, APTECH Report AES 8602639B-1 (April 1986).

Nondestructive Failure Analysis of a Tenon Fracture on an L-1 Turbine Blade, with S. Paterson et al., APTECH Report AES 8505555B-1 (June 1985).

Welding, Inspection, and Quality Assurance Procedures for Welding Stainless Steel Tubing for ANSI/ASME B31.3 Category M Fluid Service, APTECH Report AES 8504550E-2 (June 1985).

Additional Information

For more information regarding Intertek AIM's personnel and services, please contact our Sunnyvale, CA (USA) office at 408-745-7000 or our Houston, TX (USA) office at 832-593-0550 or visit our website at www.intertek.com/aim.

Appendix B | Testimonial Experience of Eric V. Sullivan, PE

Testimonial Experience – Eric V. Sullivan, PE

DATE	CASE NAME	CASE DESCRIPTION	Case No.	COURT
2-10-1999	Charles F. Clark and Kathleen Morgan Clark vs. Pacific Gas and Electric Company	Personal Injury, failure of a telephone pole step	**CV – 983027 Trial Testimony**	Superior Court of California, County of San Francisco
9-19-1996	Pries v. Bob Molinaro, PG&E, & Mueller Valve Co.	Gas valve failure, house burned to the ground, Pleasanton, CA	**V-010584-4 Deposition**	California State Superior Court, San Francisco County
6-25-1999	Lahkeka Lewis v. San Leandro Unified School District	Wall radiator bolt failure, broken leg	**H-1921821 Deposition**	California State Superior Court, Alameda County, Southern Division
7-25-2000	John J. Seroogy v. The Pillsbury Co, et al.	Food contamination with plastic piece, intestinal injury	**306491 Deposition**	California State Superior Court, San Francisco, San Francisco County
8-29-2001	Federal Insurance Company v. CHI Western Operations, Inc., McMaster Carr	Explosion and fire in an air over oil pressure accumulator	**F-99-6181 AWI/DLB Deposition**	United States District Court – Eastern District of California
6-6-2002	Silva v. Aspen Precision Technologies, et al.	Accident With 24 foot extension ladder	**224633 Deposition**	California State Superior Court, Sonoma County
11-08-2002	Mohave LLC v. Mitsubishi Heavy Industries[4]	Weld Fractures on wind turbine ladder rungs	**Arbitration Testimony**	American Arbitration Association Case No. 50 T 1980011900 and 50 T 1980045800
10-21-2002	Patrick L. Crocker vs. New Age Et. Al.	Caster Wheel Rivet Failure	**99AS04536 Deposition**	Superior Court, County of Sacramento, CA
7-1-2003	BART/Jones Vertrans Vs ECS Corporation	Escalator Step Chain Failures	**C 01-5366 MMC Deposition**	United States District Court, N. California
9-10-2003	Honeywell International, Inc. vs. Eagle Picher Industries, Inc.	Failures of turbocharger compressor wheels	**CV02-04279NM (CWX) Deposition**	United States District Court, Central District of California
1-24-2005	David Pafford and Tina Pafford Vs. Del Monte Foods Corp.	Steam Valve Failure With Personal Injury	**CGC03422797 Deposition**	Superior Court, San Francisco County
1-11-2008	Brian Moore vs. BT	Injury Due to Failure of	**05CECG03049**	Superior Court,

DATE	CASE NAME	CASE DESCRIPTION	**Case No.**	COURT
	Mancini Co., Bigge Crane and Rigging, et. al.	Banding Strap	**Deposition**	County of Kern, Metropolitan Division, CA
1-8-2009	BP Amoco Chemical Company vs. Flint Hills Resources, LLC	Condition of Assets involved in chemical plant sale	**05 C 5661 Deposition Daubert Hearing Trial Testimony**	United States District Court, for the Northern District of Illinois, Eastern Division
10-13-2008	Travelers Property Casualty of America	HVAC System water Leak with damage to multiple stories of 8 story building	**106CV067292 Deposition**	Superior Court of California, County of Santa Clara
7-20-2009	Pacific Indemnity vs. Solar Turbines	Gas Turbine Damage due to ingestion of pieces of the FOD (foreign object damage) screen.	**GC038236 Deposition**	Superior Court of California, County of Los Angeles
9-30-2009	Pacific Indemnity vs. Solar Turbines	Gas Turbine Damage due to ingestion of pieces of the FOD (foreign object damage) screen.	**GC038236 Trial Testimony**	Superior Court of California, County of Los Angeles
4-01-2010	Regency Gas Services vs. General Electric Company	Fire Caused by Failure of a Natural Gas Compressor	**2008-16567 Deposition**	District Court, Harris County, Texas
12-17-2013	Petro Star Inc. VS. Samshin Limited et. Al.	Fire and explosion at the Petrostar Refinery, Valdez, Alaska	**NO. 2010-68788 Deposition**	District Court, Harris County, Texas 164th Judicial District
9-22-2014 9-23-2014	Petro Star Inc. VS. Samshin Limited et. Al.	Fire and explosion at the Petrostar Refinery, Valdez, Alaska	**NO. 2010-68788 Trial**	District Court, Harris County, Texas 164th Judicial District

Publications in the last 10 years – None

Appendix C | Documents Relied Upon