

**How a Proactive Condition-Monitoring Program
Anchored By Continuous On-Premise Oil Testing Can:
Save Money
Reduce the Chance of Breakdowns
Extend Equipment Life**

Presentation by Will Willis, Jr.
Chairman, CEO & President: On-Site Analysis, Inc.
Based on Actual Company Test Records



I. Background

I. Background: On-Site Analysis, Inc. (OSA)

| | |
|---|--|
| Privately held company | Invested over \$25 million dollars in research and development to automate fluid testing technology |
| U.S. manufacturer of oil and coolant analyzers | Developed proprietary technology and predictive analytics Miniaturization of technology enables 24 inch footprint: <ul style="list-style-type: none">• used in customers' service bays• used in remote locations (mining sites and oil rigs) |
| Database | Customized software licenses with periodic updates Contains over 3 million data points |

I. BACKGROUND: Equipment Highlighted In Data Tracking

OSA4 TruckCheck®

Dimensions: 24"High X 24" Wide X 21" Deep

Analyzer Includes:

- Dual Atomic Emission Spectrometer (AES)
- Infrared Spectrometer
- Patented Dual Temperature Viscometer (40c and 100c)
- Dual Ceramic Piston Pumps



I. Background: Equipment Highlighted In Data tracking (continued)

Fluids Analyzed

- Engine lubricants
- Generator lubricants
- Gear box lubricants
- Power steering systems
- Transmission fluids

What Each Oil Test Measures: Wear Metals, Physical Properties, and Contaminants

- Fuel Dilution
- Oxidation
- Total base Number (TBN)
- Glycol
- Nitration
- Soot (in diesel only)
- Presence of up to 20 wear metals
- Silicon
- Sodium
- Potassium



II. Methodology

II. Methodology: Business Analysis

| | |
|----------------------|--|
| Approach Used | Evaluated test results data from time of the commencement of on-premise analysis throughout the test period |
| Test Controls | <p>No control over the condition of equipment, preventative maintenance (PM) protocol, or Optimum Reference State (ORS) tactics prior to test period:</p> <ul style="list-style-type: none">• No influence of lubricant selection• Lubrication schedule• PM Schedule |
| Assumptions | Assumed all pre- testing conditions remained during the tracking period, with the exception of on-premise analysis and Condition Based Maintenance protocol (CBM). Maintenance (CBM). |

II. Methodology: Business Analysis (continued)

Types of Input Considered

Combination of proprietary tracking data, supplemented by qualitative input from customers tracked:

Data-Mining: Historical database of oil test results from customer.

Anecdotal or Qualitative Input: Customer interviews and publically available data

Types of Customers Evaluated

Truck Fleet with 400 class 8 vehicles serviced by a truck service provider.

Top 20 **Municipal Fleet** with 3,821 vehicles including buses, trucks, vans, police cars, and off road equipment

II. Customers' Objectives: On-Premise Oil Testing with CBM Protocol

OPERATING EXPENSES:

- Reduce operating expenditures by monitoring oil change intervals (safely extending oil change interval for vehicles which fluids' physical properties within acceptable range of ASTM Standards)
- Make minor preventative maintenance repairs before they become catastrophic.

PERFORMANCE AND RELIABILITY:

- Reduce power train related road breakdowns, unscheduled repairs, and equipment out of service waiting for parts.

PRODUCTIVITY:

- Increase service bay throughput.
- Accelerate the diagnostic phase of PM service

ASSET PROTECTION:

- Extend the useful life of equipment.



III. Analysis: 400 Vehicle Truck Fleet

III. Truck Fleet Overview: Data Tracking of Oil Testing Results

Maintenance Protocol

- In June 2009, a truck service provider began a Condition Based Maintenance Program at multiple locations
- Oil samples were taken and analyzed, on-premise and system-wide, for every vehicle going in for general maintenance
- All tests conducted on the OSA4 TruckCheck Analyzer, at each service location, were ported to a password protected website for data collection, analysis, and storage

Data Collection Key Details

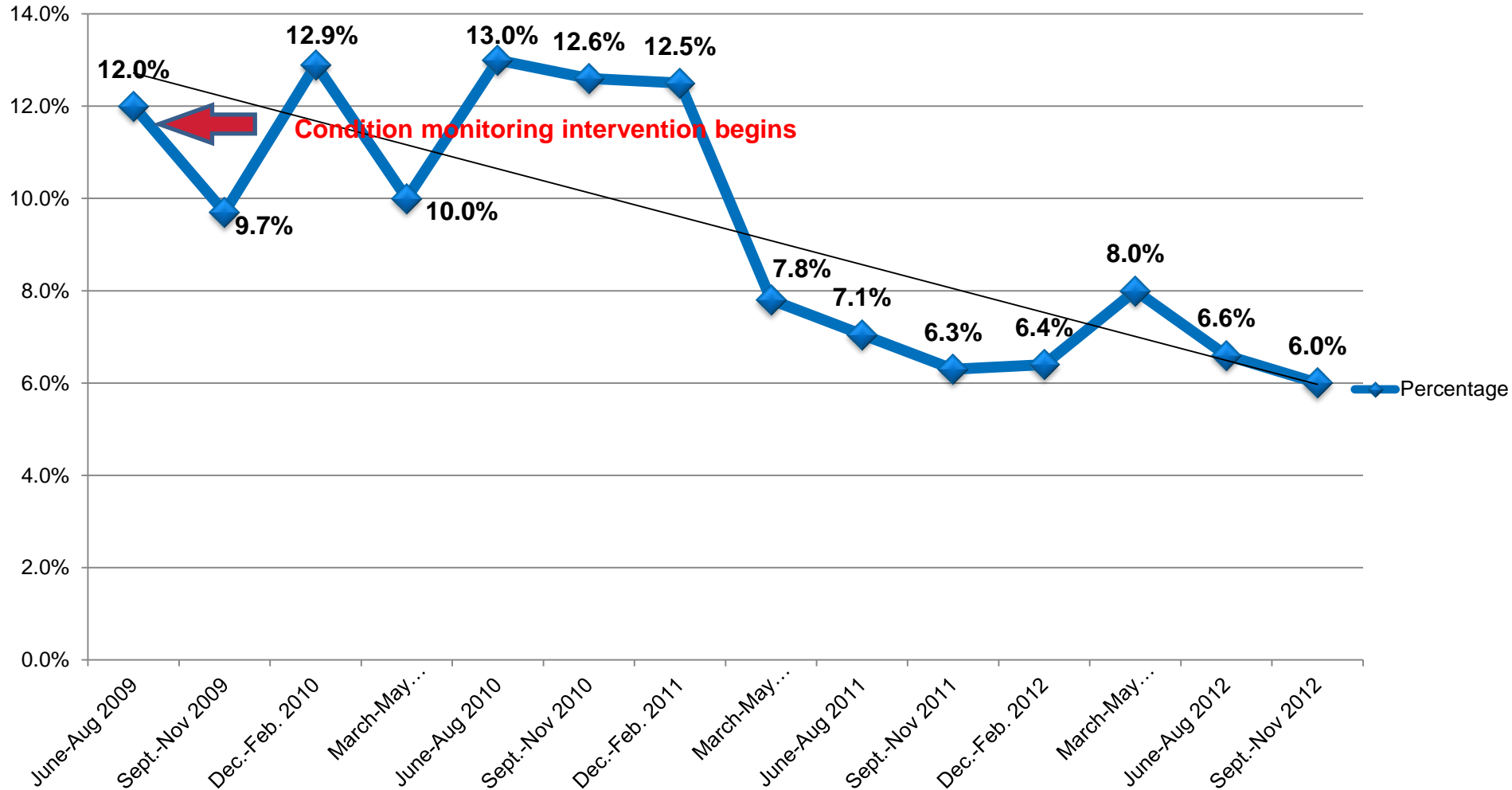
- From June 2009 through the November, 2012 period (42 months), 6,455 samples were analyzed
- Average of 1.1 test per quarter per vehicle (average 4.6 per year)

TRUCK FLEET: Data Tracking Results

Number of engine coolant leaks significantly reduced

Samples Exhibiting Engine Coolant Leaks

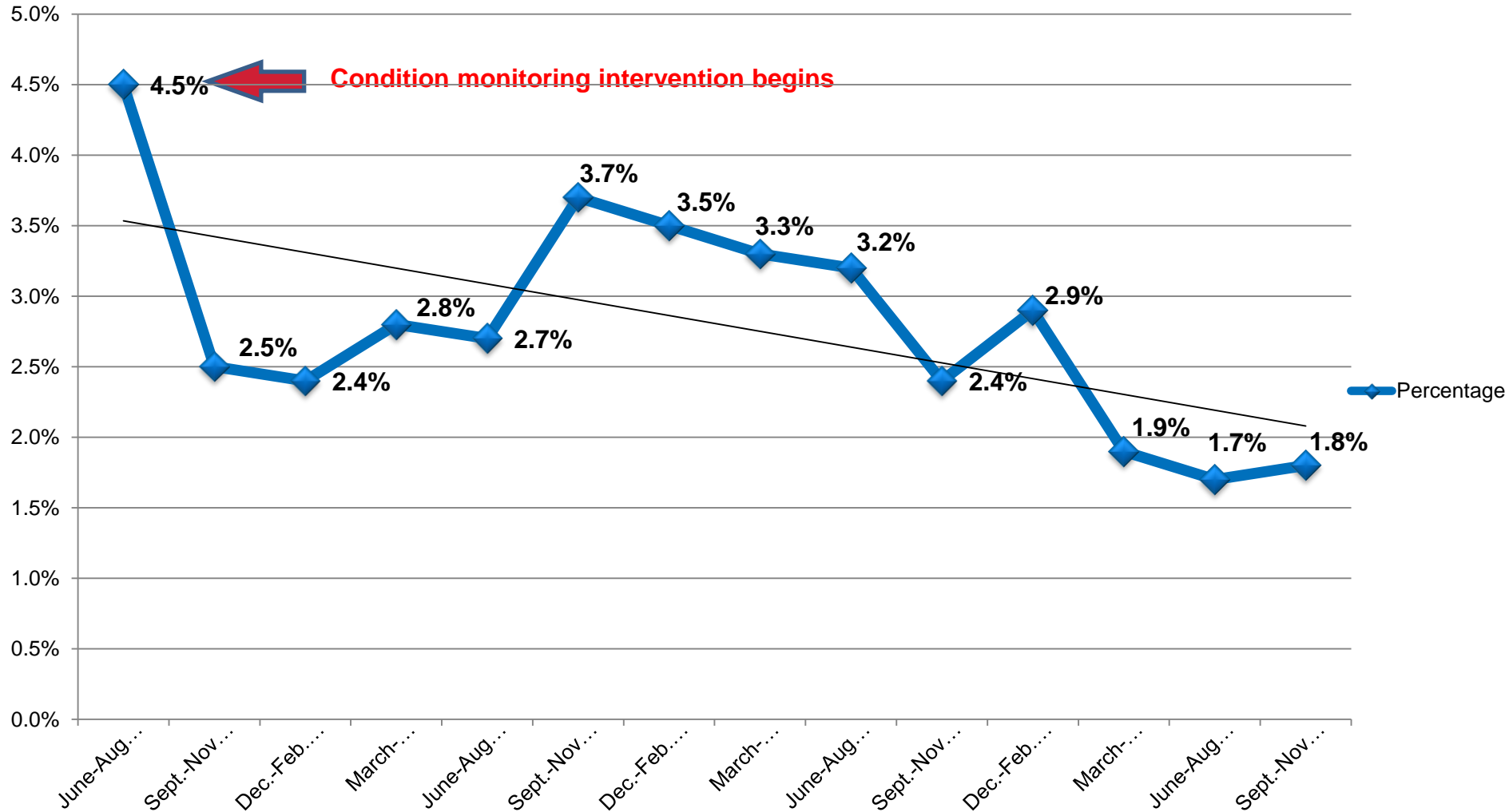
(June 2009-Novemeber 2012)



Number of engines with abnormal wear significantly reduced

Samples Exhibiting Abnormal Engine Wear

(June 2009-Novemeber 2012)

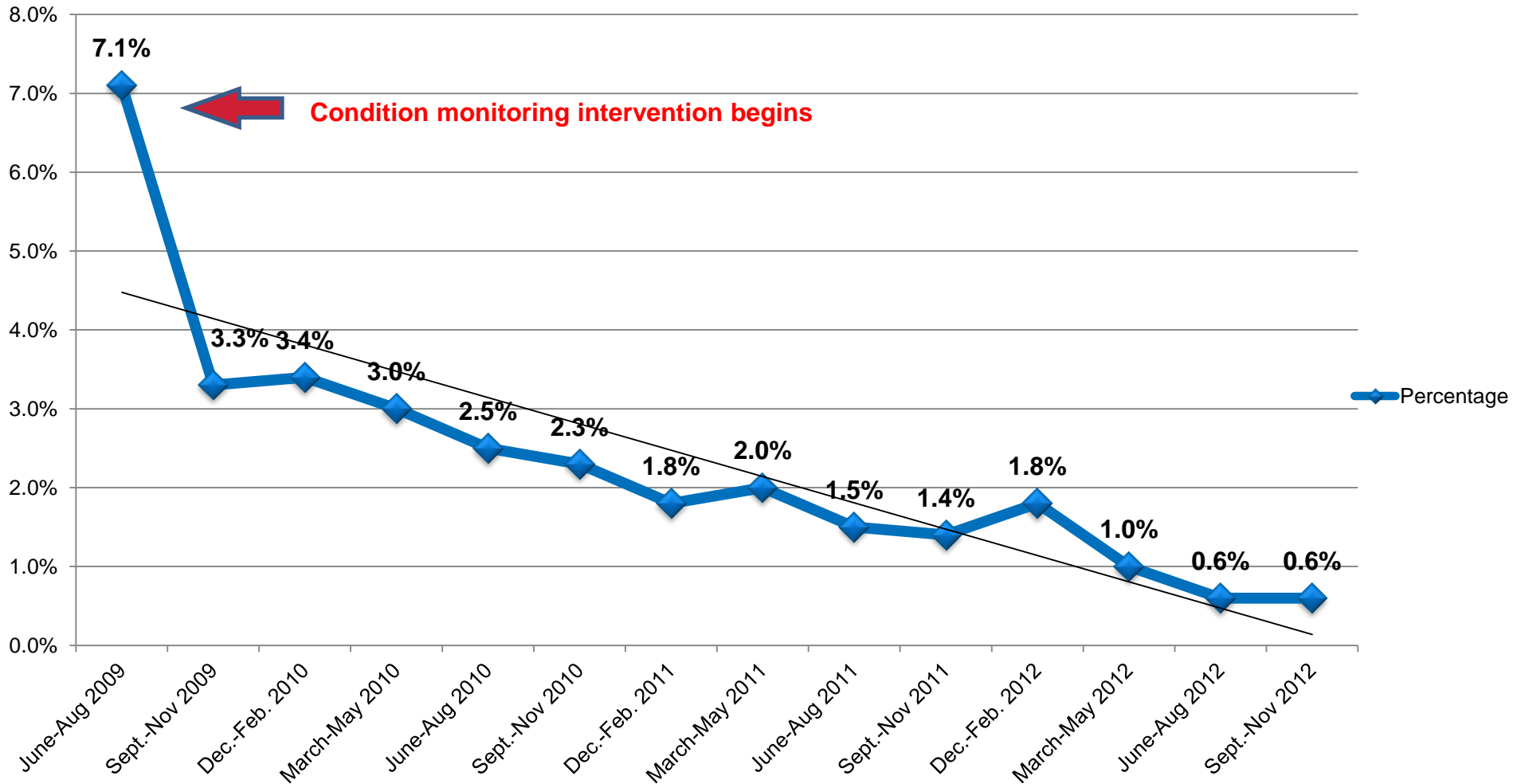


Source: Company Records

Number of engines with fuel dilution significantly reduced

Samples Exhibiting Fuel Dilution

(June 2009-Novemeber 2012)

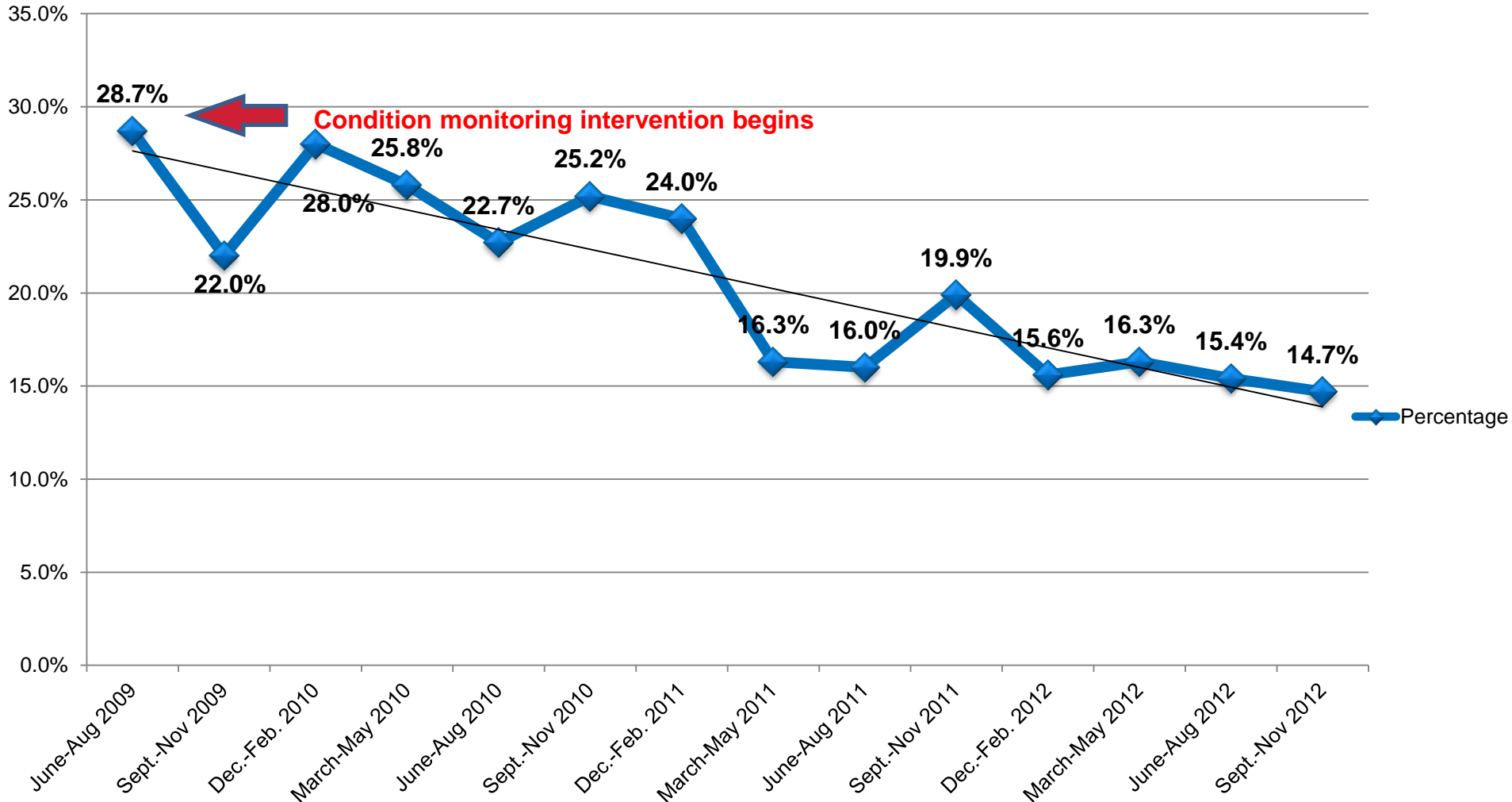


Source: Company Records

Number of vehicles with over extended oil significantly reduced

Samples Exhibiting Over Extended Drain Intervals

(June 2009-Novemeber 2012)



Source: Company Records



IV. Analysis: Top 20 Municipal Fleet

IV. Municipal Fleet Overview: Data Tracking of Oil Testing Results

Maintenance Protocol

- In August 2010, a large Southeastern Municipality purchased four analyzers to monitor a very diverse fleet of 3,821 vehicles
- Oil samples were taken and analyzed, on-premise and system-wide, for every vehicle going in for general maintenance
- All tests conducted on the OSA4 TruckCheck Analyzer, at each service location, were transmitted to LubeTrak, a password protected website for data mining and storage

Data Collection Key Details

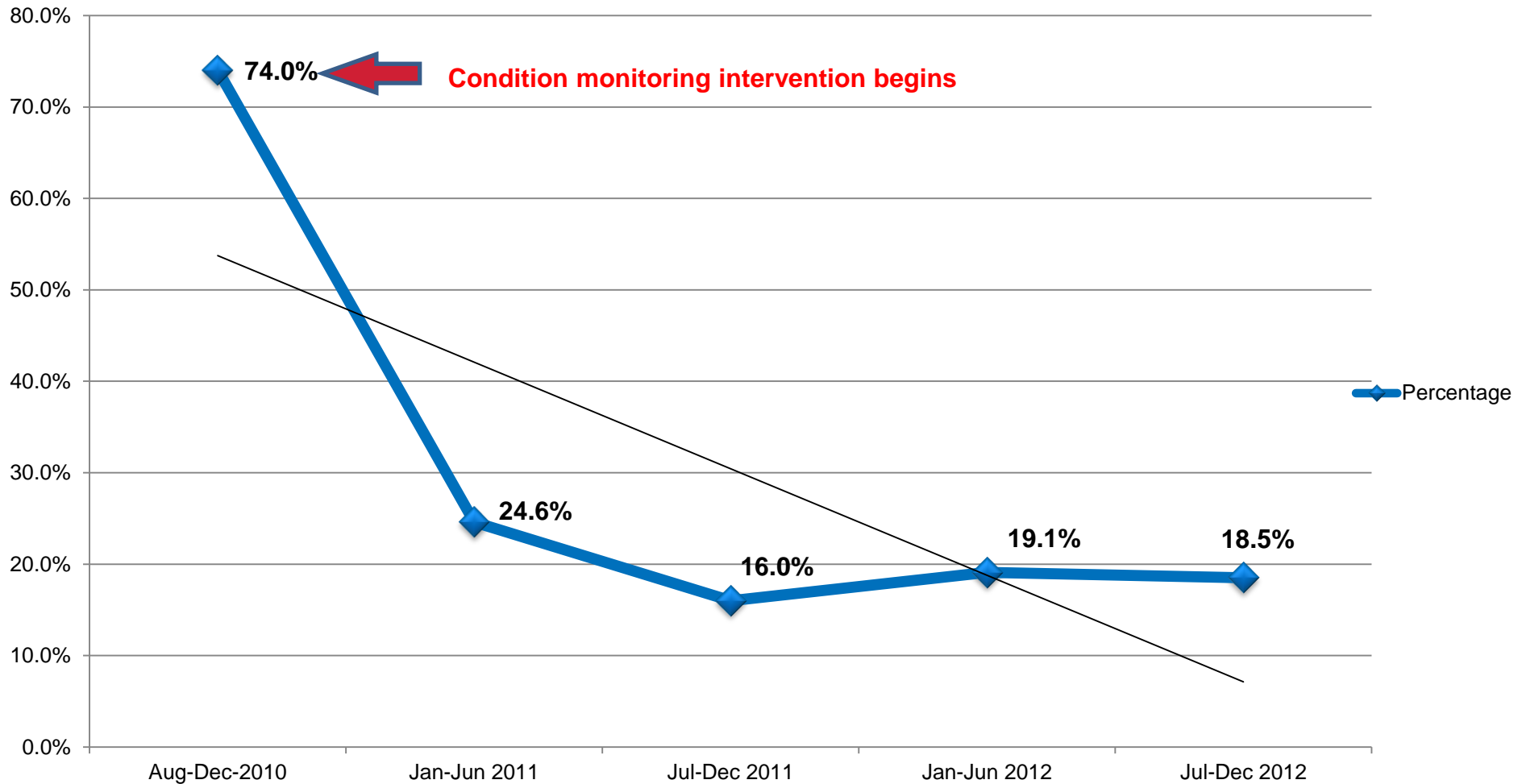
- From August 2010 through the December 2012 period (28 months), **15,170** samples were analyzed.
- Average of 1.8 tests per year for each vehicle.
- Data continues to be collected and analyzed on a quarterly basis.

MUNICIPAL FLEET: Data Tracking Results

Number of oil changes were significantly reduced

Samples Exhibiting Unnecessary Oil Drain Intervals

(August 2010 - December 2012)

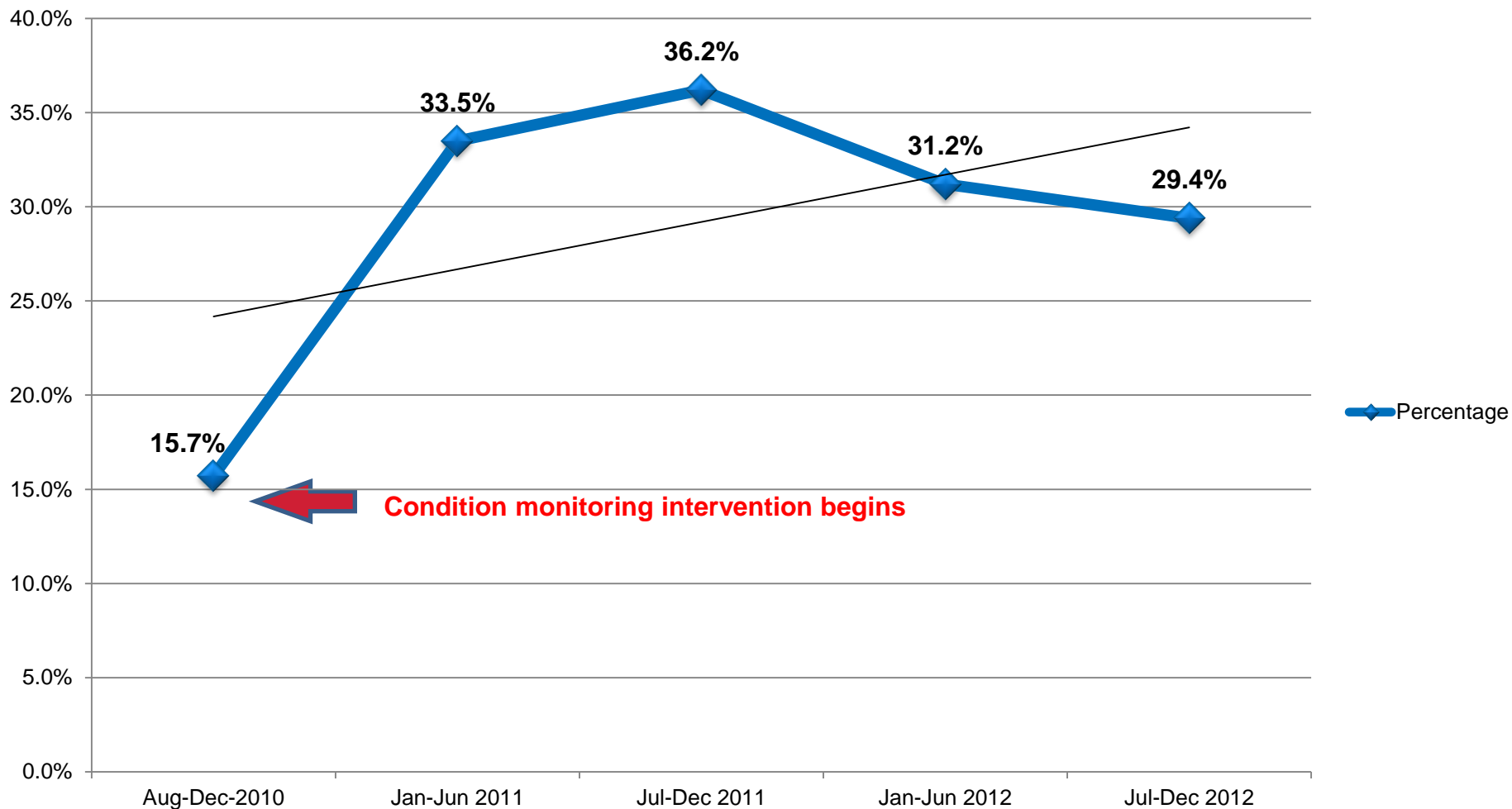


Source: Company Records

Number of vehicles with over extended oil have been declining since July 2011

Samples Exhibiting Over Extended Drain Intervals

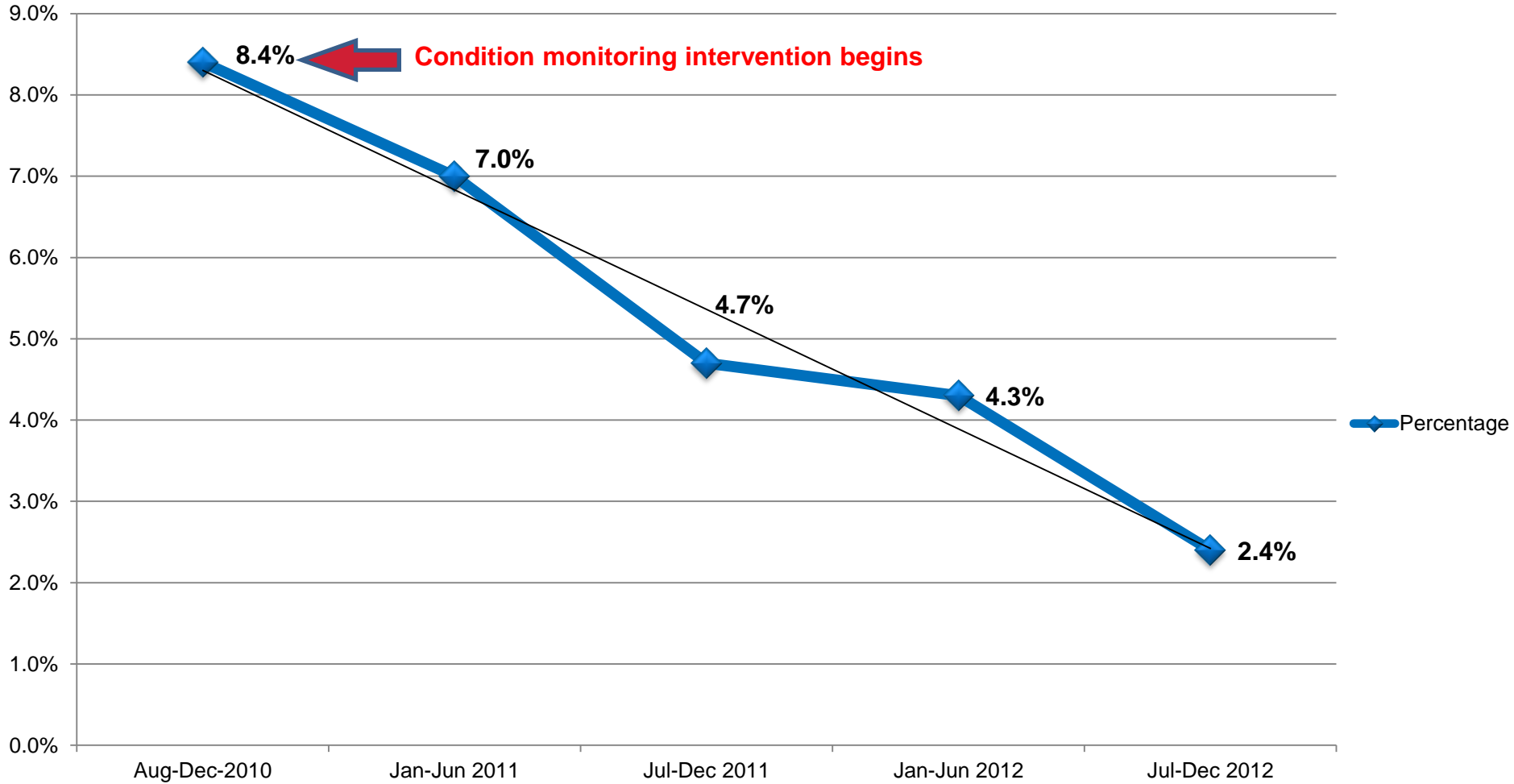
(August 2010 - December 2012)



Number of engine coolant leaks significantly reduced

Samples Exhibiting Engine Coolant Leaks

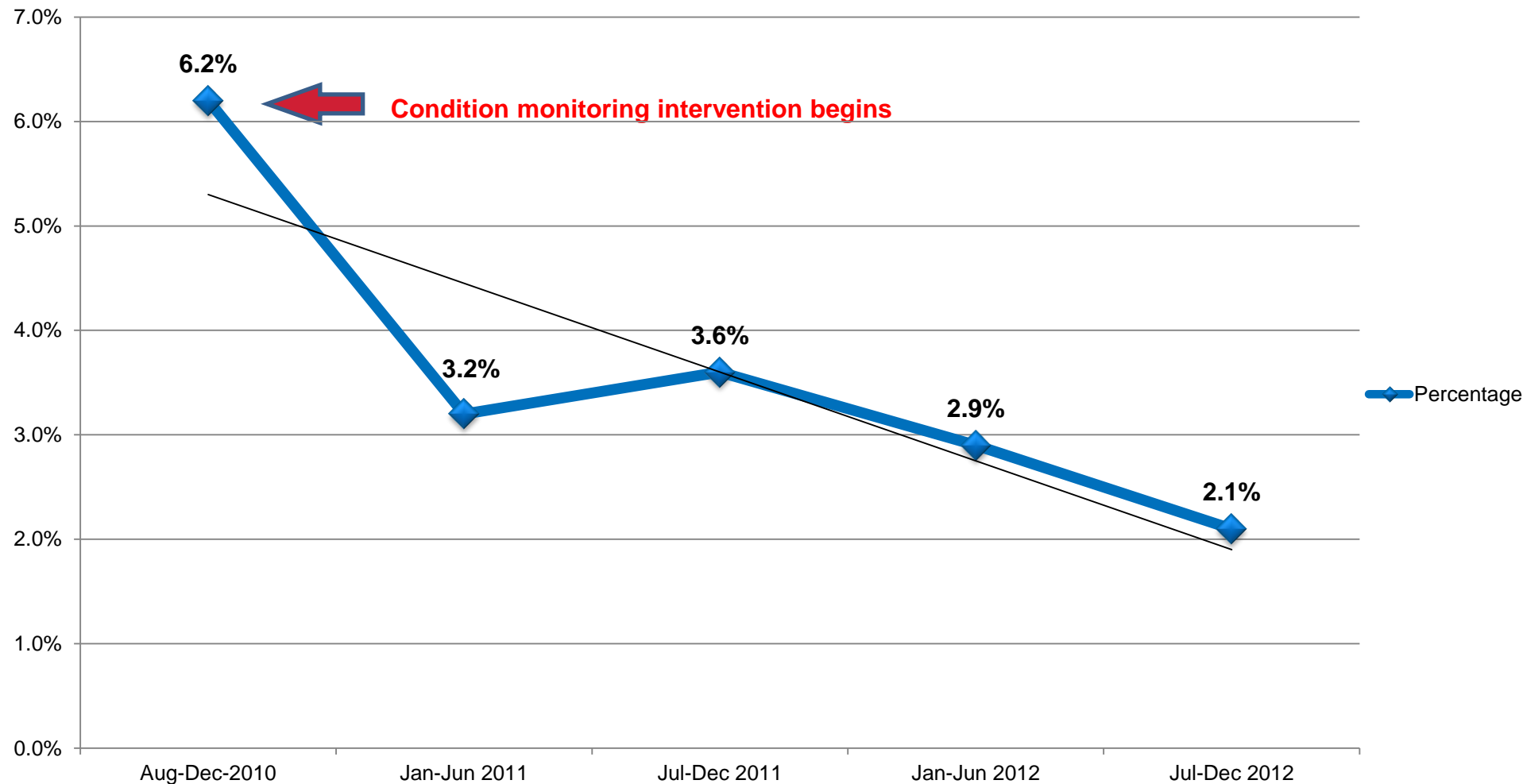
(August 2010 – December 2012)



Number of engines with abnormal wear significantly reduced

Samples Exhibiting Abnormal Engine Wear

(August 2010 - December 2012)



QUALITATIVE OR ANECDOTAL INPUT

Interview With Municipal Executive

INCREASE IN THE NUMBER OF TESTS

- “...we do significantly more testing now than when we used to send them out for analysis because of the convenience of doing it right here, right now.....”
- “...program incorporated analysis into every servicing....and tests now done randomly for other components not previously tested such as differentials, gearboxes, and generator lubes...”

CHANGES APART FROM THE OIL TESTING PROGRAM

- After the initial 90 days of “base line” analysis, oil drain extension testing fine-tuned the optimum oil changes schedule for each specific vehicle.
- After the initial 18 months, synthetic oil was added to the test to determine it’s impact on oil change intervals.

Press Interview:* Retired Executive

Equipment Maintenance Division

INITIAL INTEREST IN FLUIDS ANALYSIS EQUIPMENT PURCHASE

- “...Began in 2007 with fuel reduction study done in conjunction with local university.....”
- “...Completed in 2009, the outcomes of the study helped the City identify ways to safely extend oil cycles, without risking damage to vehicle engines.....”

INVESTMENT PAY-OUT FOR 4 ANALYZERS

- “...within the first six months of implementation, we matched the amount spent on equipment (analyzers) in savings...it was a true return on our investment...”

* Source: January 2012 article in *Government Fleet Magazine*

Press Interview:* Retired Executive

Equipment Maintenance Division (Continued)

RESULT OF OIL INITIATIVES

- “...The City’s oil testing resulted in fewer unscheduled visits to the shop, less equipment downtime, and a 49% decrease in oil changes...”
- “...safely extended oil drain cycles to 6,000 miles instead of 3,000 for our bus fleet...”

OPERATING EXPENSE REDUCTIONS

- “...Reduced annual oil usage by 50,000+ quarts and over 5,000 filters (2011 Vs. 2009)...” (in today’s dollars, conservatively over \$387,300 in materials savings)**

Press Interview:* Retired Executive

Equipment Maintenance Division (Continued 2)

LABOR SAVINGS

- “...And that’s not all. By reducing vehicle downtime and improving labor utilization, the City also has experienced a reduction cost Vs. their operating budget...”

CRITICAL RELIABILITY BENEFITS

- “...The City’s strategy around oil has also ensured that the equipment used to provided essential services (e.g. fire, police, emergency, etc.) run efficiently and are always road-ready...”



V. What We Know

Findings For Both Truck and Municipal Fleets

CONVENIENCE ENABLES CBM PROTOCOL

- Monthly sample analysis increased for both fleets.
- Neither were willing to implement a comprehensive CBM protocol, with continuous testing and trending analysis, while sending samples out to a lab.

EARLY PROBLEM DETECTION PROVIDES MAXIMUM BENEFIT

- Initially, problems identified at critical levels, requiring expensive repairs to elevate the overall fleet condition.
- Once CBM was initiated, early detection allowed for lower cost repairs while equipment was still in service bay.

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Findings For Both Truck and Municipal Fleets (continued)

EARLY PROBLEM DETECTION PROVIDES MAXIMUM BENEFIT (continued)

Statistically significant reduction in Operating cost

- **COOLANT LEAKS:** Early detection allowed for repair before catastrophic failure resulted in road breakdown and/or engine overhaul/replacement.
- **FUEL DILUTION:** Minor repairs improve engine performance, and reduces engine wear.
- **ABNORMAL ENGINE WEAR:** Early detection allows for proactive maintenance thereby extending the useful life of equipment.
- **OVEREXTED OIL:** Although oil drain interval extension can reduce operating cost, if overextended, the savings will be eliminated by reduced engine performance, increase in breakdowns, increase in unscheduled repairs and the shortening of useful life of equipment.

Findings For Both Truck and Municipal Fleets (continued -2)

SAFELY EXTEND OIL DRAIN INTERVAL

- Both fleets are now enjoying the benefits of longer drain intervals (Reduced purchases of new oil and filters, reduced cost of disposing of used oil and filters, better utilization of labor by not doing unnecessary oil changes, and increased vehicle uptime by not getting unnecessary services).

TIME NEEDED TO SAFELY IMPLEMENT OIL DRAIN EXTENSION PROTOCOL

- Implementation can vary based on size of fleet and type of ownership (serviced by owner or by fleet service provider)
- Economically feasible for Truck service provider to test equipment a minimum of 4 times per year. Optimal protocol established within 12 months.
- Municipalities, with considerably larger and more diverse fleets, can usually only do two tests per year per vehicle. Full implementation 18-24 months.



VI. What We Conclude

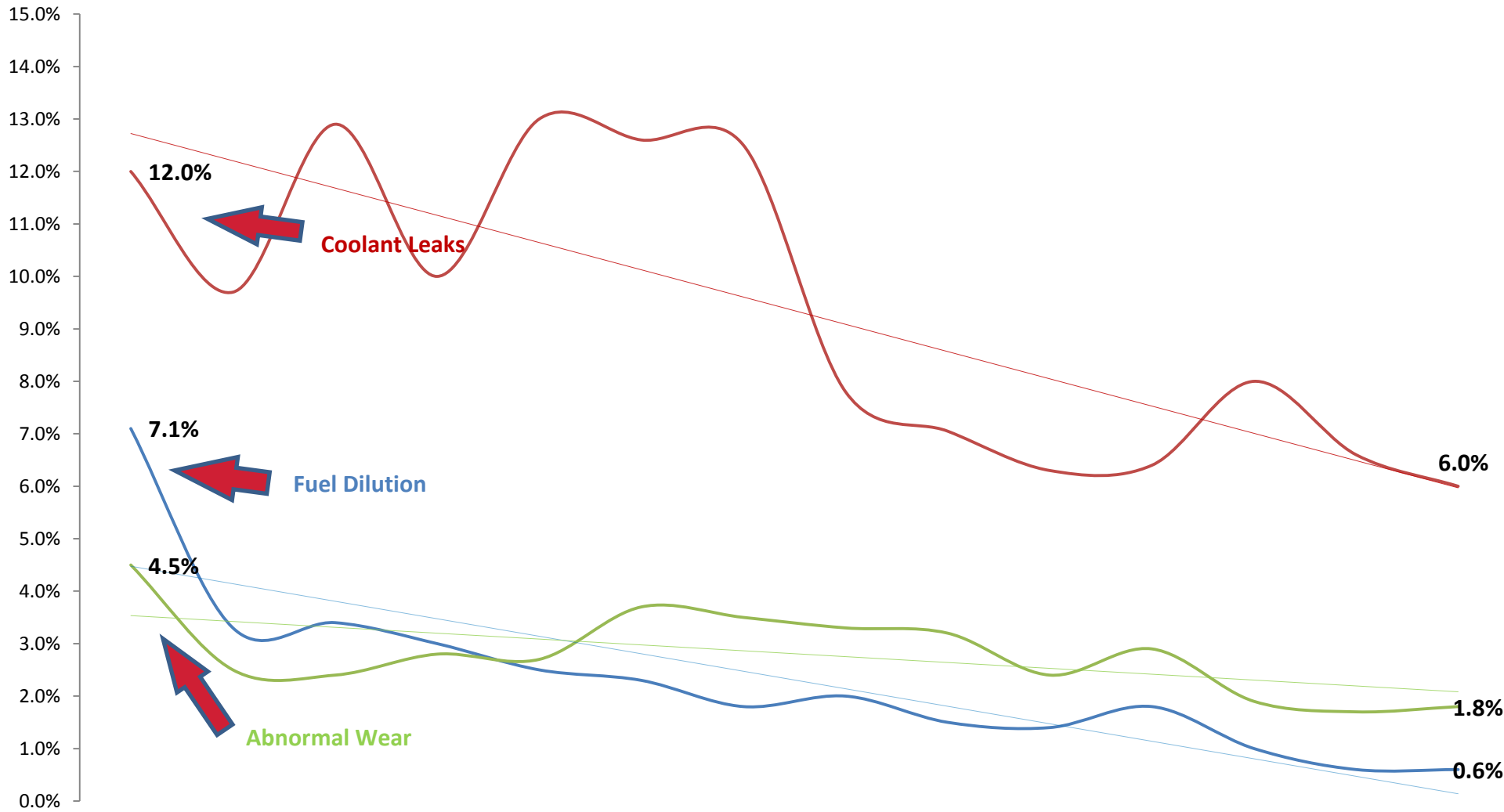
Conclusions - Equipment Pay Back

APPROXIMATE INVESTMENT PAYBACK

- **Truck Service providers** can realize as little as 3-4 months to payback investment.
 - On average, they experience a 17—20% lift in parts and repairs service revenue because they identify needed repairs while equipment is in their service bay.
 - Incorporation of fluids analysis in service contract bids yields a higher success rate
- **Municipalities** realize as little as 6-9 months to payback investment.

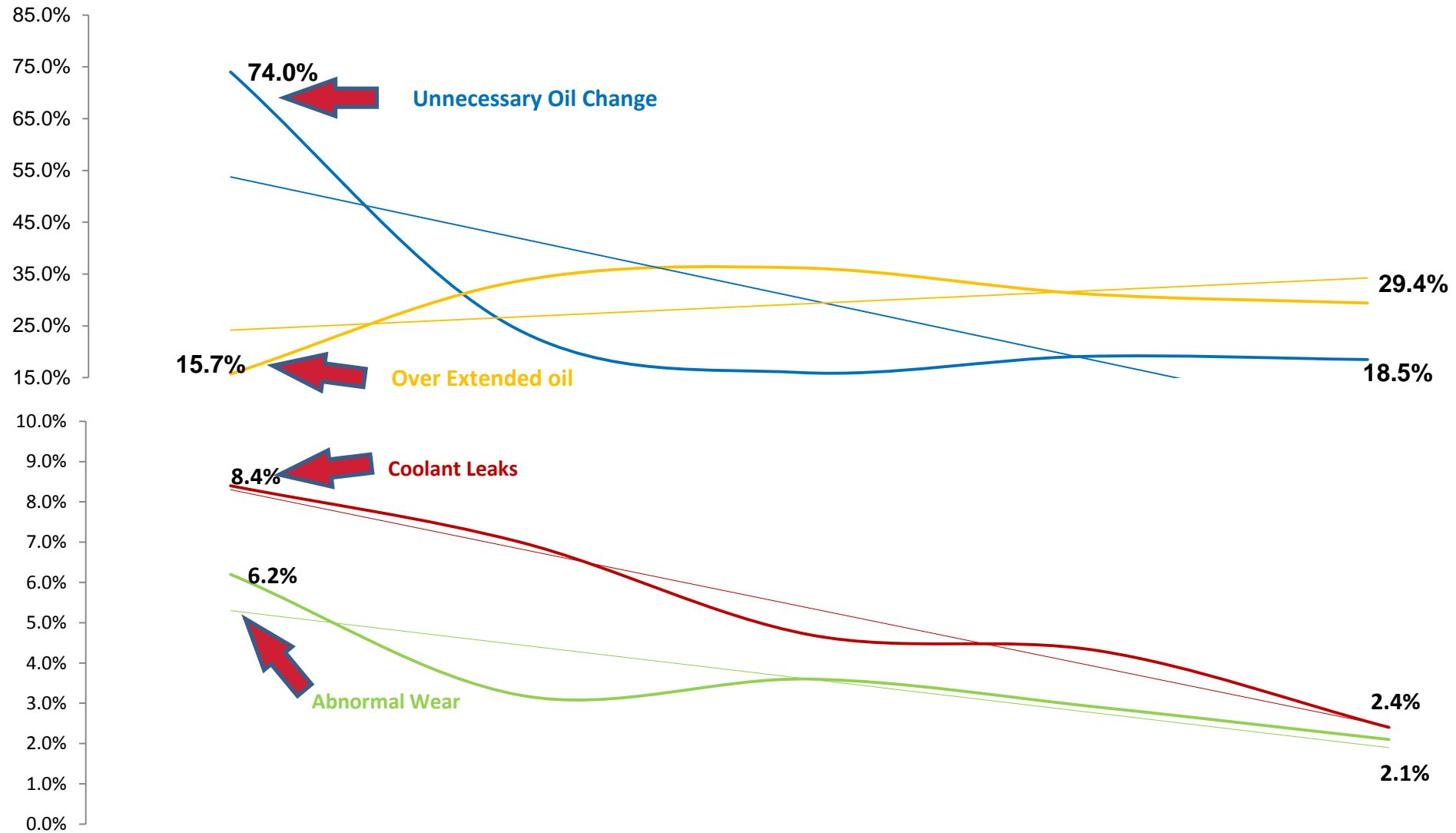
Conclusions - Truck Fleet

EARLY PROBLEM DETECTION SIGNIFICANTLY REDUCES OPERATING COSTS



Conclusions - Municipal Fleet

EARLY PROBLEM DETECTION SIGNIFICANTLY REDUCES OPERATING COSTS





We're revolutionizing oil testing with the world's
only automated oil analyzers

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