



ATCO

The Use of Probability Modelling to Predict PCB Concentrations in Oil-Filled Equipment

Raj Goutam, Supervisor Environment & Land Planning, ATCO Electric

Phase-Out Deadline

- 16 (1) Subject to subsections (2) and (2.1), a person may use the equipment referred to in subparagraphs 14(1)(d)(i) to (iii) until the following dates if the equipment is in use on September 5, 2008:
- (a) in the case of equipment containing PCBs in a concentration of 500 mg/kg or more, December 31, 2009; and
 - (b) in the case of equipment containing PCBs in a concentration of at least 50 mg/kg but less than 500 mg/kg,
 - (i) December 31, 2009, if the equipment is located at a drinking water treatment plant or food or feed processing plant, in a child care facility, preschool, primary school, secondary school, hospital or senior citizens' care facility or on the property on which the plant or facility is located and within 100 m of it, and
 - (ii) **December 31, 2025, if the equipment is located at any other place.**

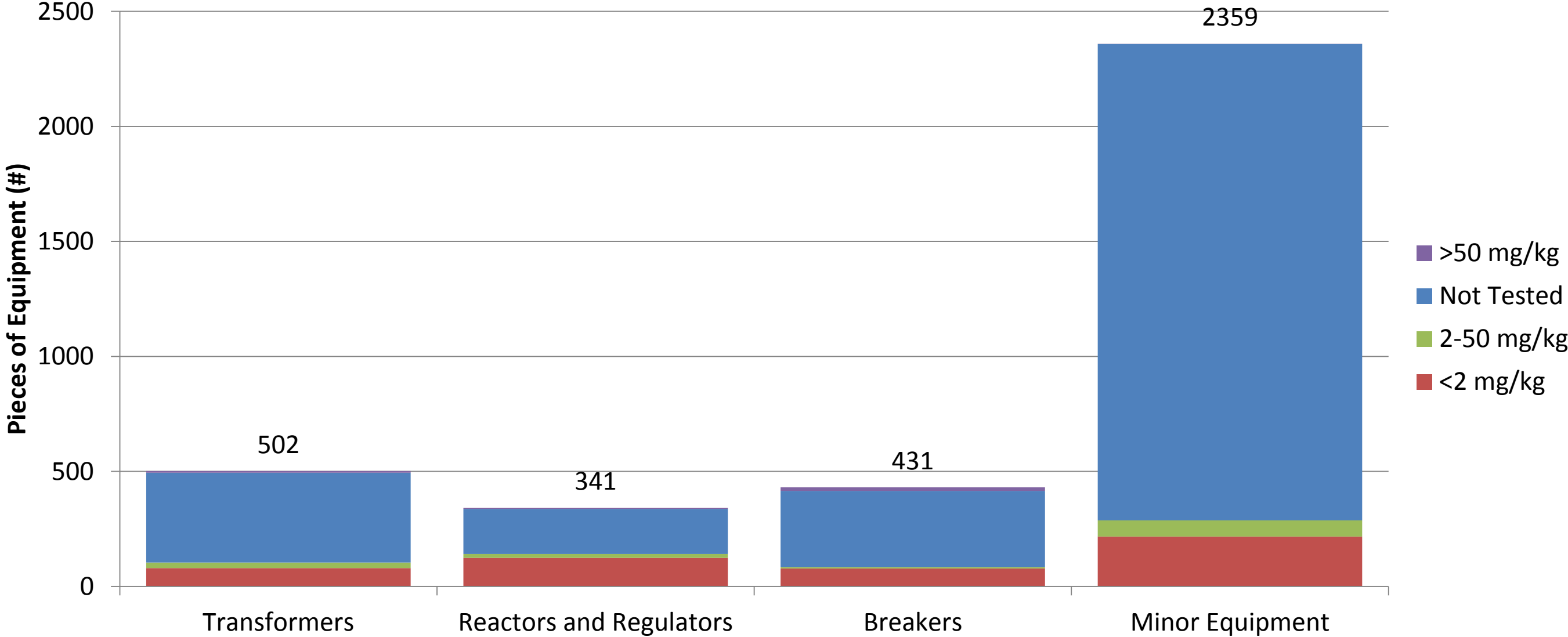
PCB Regulations, SOR/2008-273

Overview of ATCO Electric

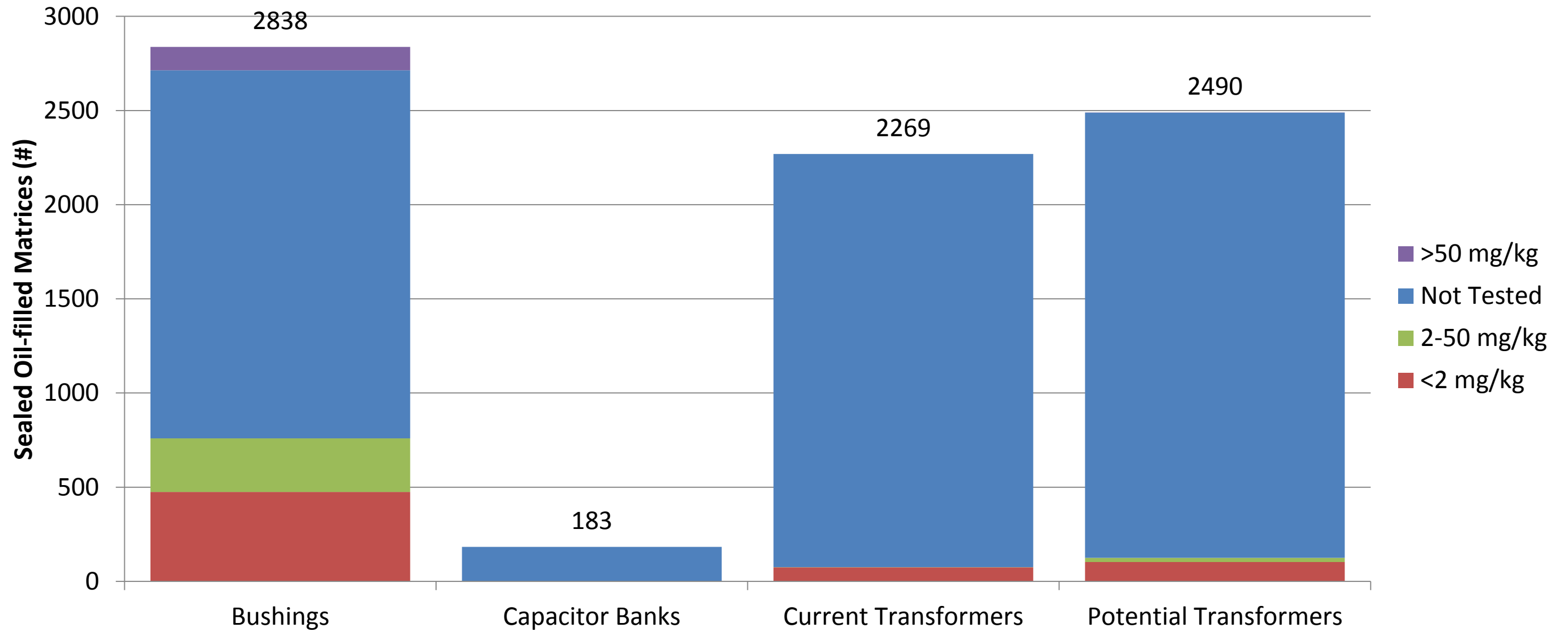
- ATCO Electric builds, owns, and operates electrical transmission and distribution facilities, delivering safe, reliable electricity to more than 227,000 farm, business and retail customers in 245 communities in east-central and northern Alberta. The company also supplies electricity to large industrial and oilfield customers, supporting the development of Alberta's energy-rich industrial sector. On many of these sites, we simply maintain the equipment and do not own the actual property.
- ATCO Electric's electrical system includes approximately 11,000 km of transmission lines and 69,000 km of distribution lines.



Current Oil-Filled Assets



Current Sealed Oil-filled Assets



Challenges and Risks

- Sealed assets & risk of damage to semi-sealed assets
- Challenging outages
- Cost

(3) For the purposes of these Regulations, the concentration and quantity of PCBs shall be determined by a laboratory

- a) that is accredited by a Canadian accrediting body under the International Organization for Standardization standard ISO/IEC 17025:2005, entitled General requirements for the competence of testing and calibration laboratories, as amended from time to time, and the scope of whose accreditation includes the analytical method used to determine the concentration of PCBs in the matrix in which the PCBs are located; or
- b) that is accredited under the Environment Quality Act, R.S.Q., c. Q-2, as amended from time to time, and the scope of whose accreditation includes the analytical method used to determine the concentration of PCBs in the matrix in which the PCBs are located.

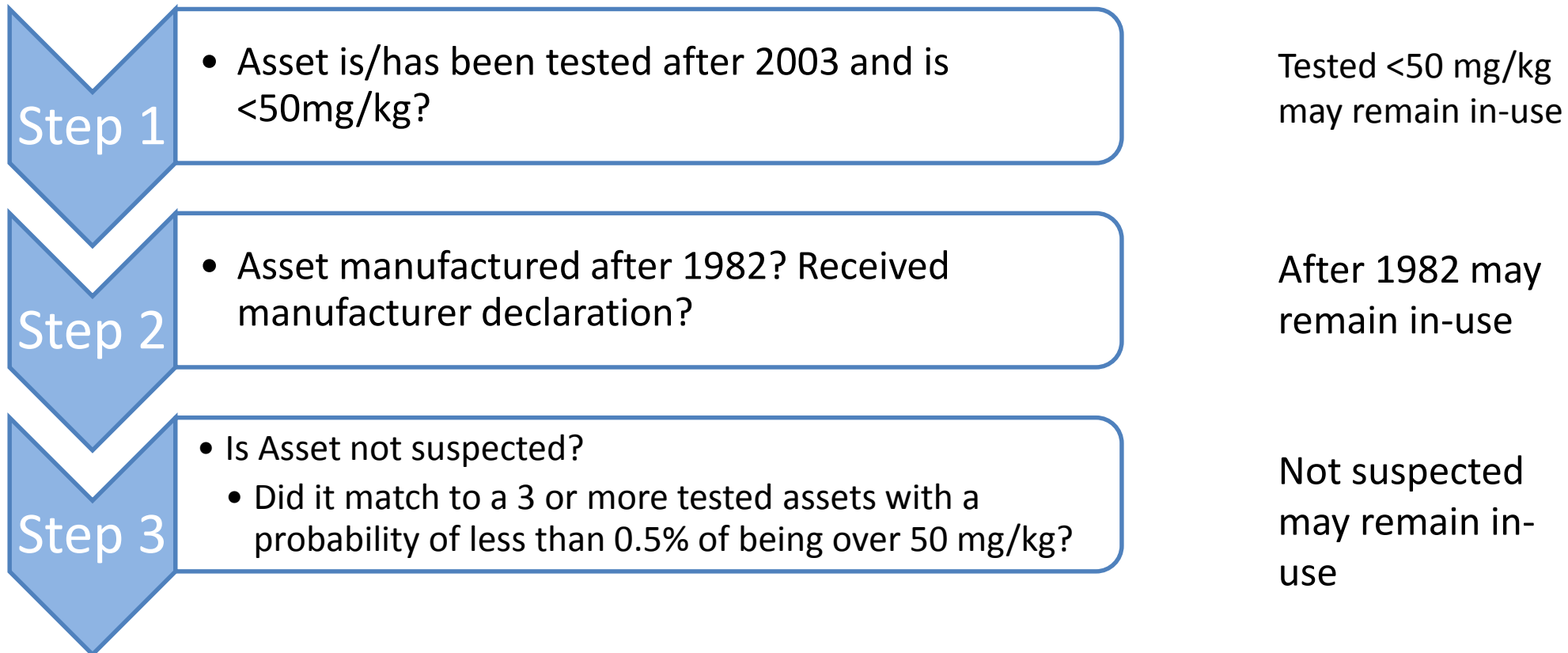
PCB Regulations, SOR/2008-273

Risk Management

- A plan was developed to use a risk based model is driven by prudence
 - As a regulated utility, we are obligated to be prudent with our expenditures
- What is the probability >50 mg/kg
- To minimize risk, assume >50 mg/kg and handle it accordingly unless it is tested
- The risk is that we could miss phasing something out that is PCB contaminated
 - Small oil volumes inside the sealed assets

ATCO Electric's Strategy

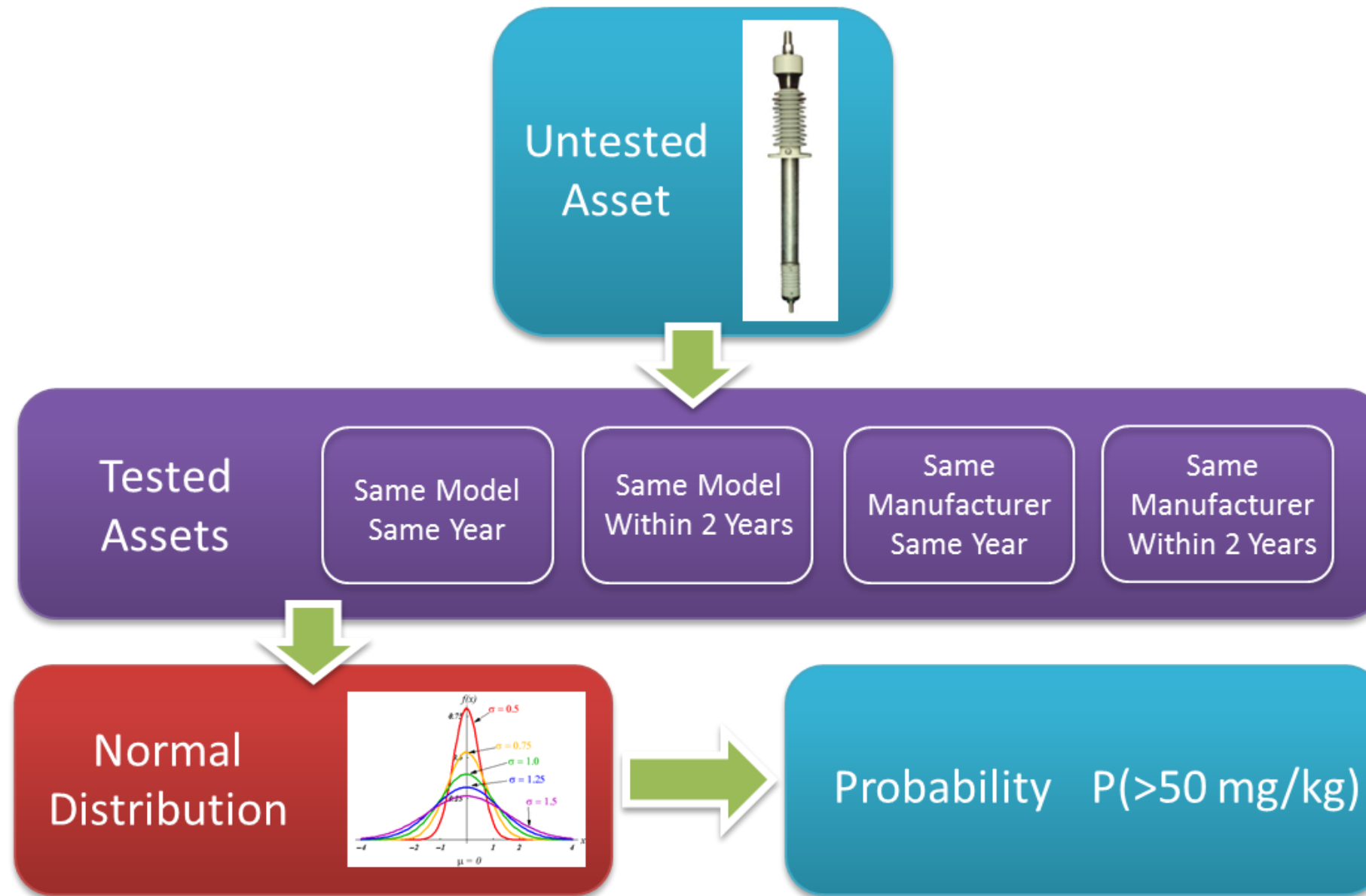
3 Step Approach: Replace all in-use assets except



Options:

1. Test and re-evaluate
2. Replace

ATCO's Strategy – Statistical Modelling

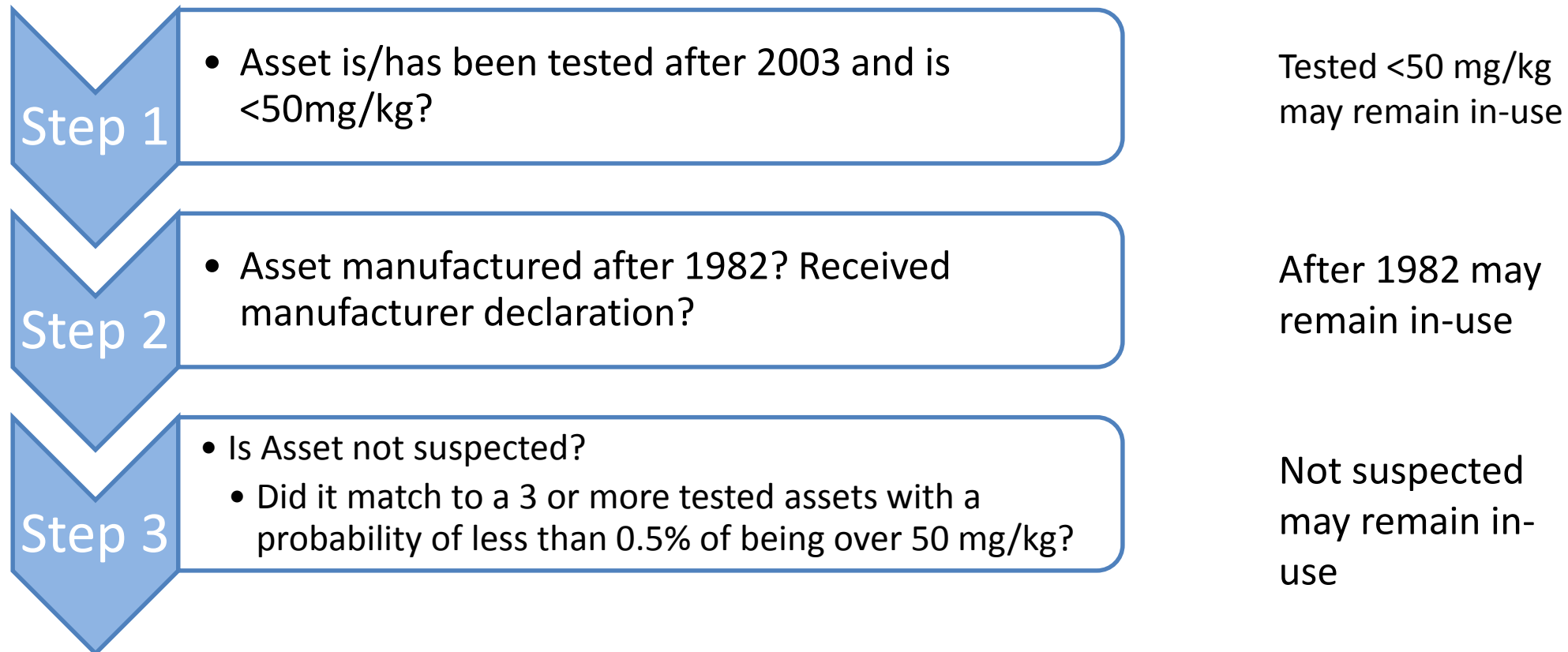


Statistical Modelling Example

Asset Number	Location	Position	Sub	Description	Mftr	Item	Year	Mx PCB Status	Number of Tests	Latest Test Date	Latest Test Result	Test Groups
3002	501VR @ 793S	L1	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	SUNK	0			Not Tested
3003	501VR @ 793S	L2	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	SUNK	0			Not Tested
3004	501VR @ 793S	L3	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	SUNK	0			Not Tested
3005	501VR @ 793S	S1	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	SUNK	0			Not Tested
3006	501VR @ 793S	S2	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	1	2-12-2010	<1.0	Tested <2 mg/kg
3007	501VR @ 793S	S3	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	1	2-12-2010	<1.0	Tested <2 mg/kg
2176	501VR @ 793S		793S	REG 25/33 MVA 25 KV 3 PHASE FPE	FPE	P1690	1972	TESTED	5	7-24-2009	5.5	Tested 2-50 mg/kg

Statistical Modelling Example

3 Step Approach: Replace all in-use assets except

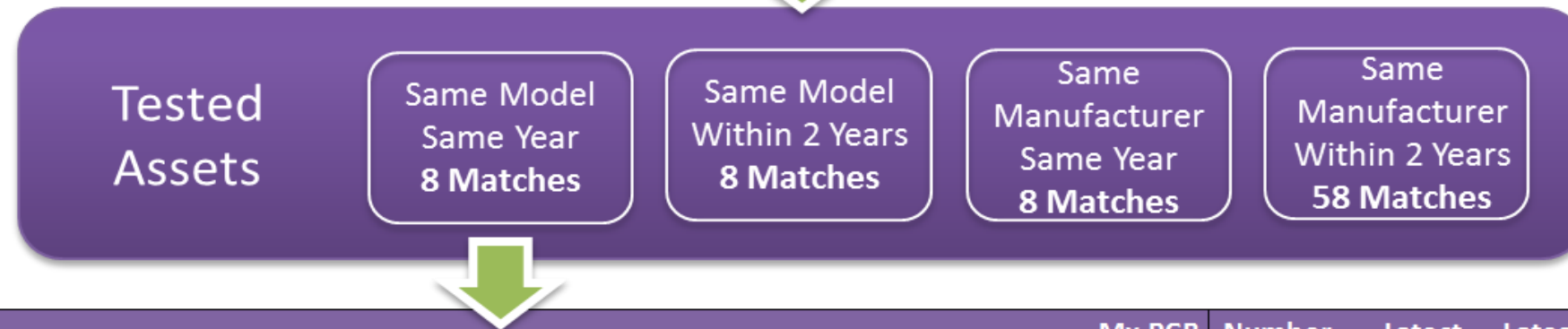


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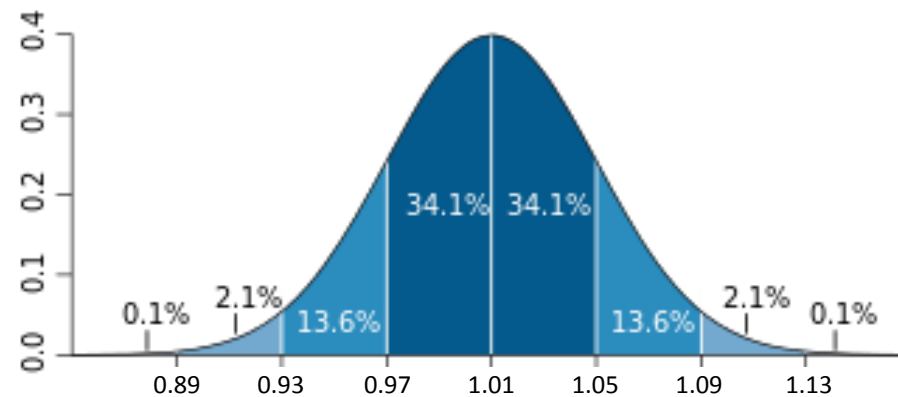


Asset Number	Location	Position	Sub	Description	Mftr	Item	Year	Mx PCB Status	Number of Tests	Latest Test Date	Latest Test Result	Test Groups
2995	REPAIR VEGREVILLE	S3		BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	2	5-1-2014	<1.0	Tested <2 mg/kg
2993	REPAIR VEGREVILLE	S1		BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	2	5-1-2014	<1.0	Tested <2 mg/kg
2992	REPAIR VEGREVILLE	L3		BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	2	5-1-2014	<1.0	Tested <2 mg/kg
2991	REPAIR VEGREVILLE	L2		BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	2	5-1-2014	<1.0	Tested <2 mg/kg
2990	REPAIR VEGREVILLE	L1		BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	2	5-1-2014	1.1	Tested <2 mg/kg
2994	REPAIR VEGREVILLE	S2		BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	1	8-4-2005	<1	Tested <2 mg/kg
3007	501VR @ 793S	S3	793S	BUSHING 25 KV 1200 AMPS GK15 COB	COB	P5248	1972	TESTED	1	2-12-2010	<1.0	Tested <2 mg/kg
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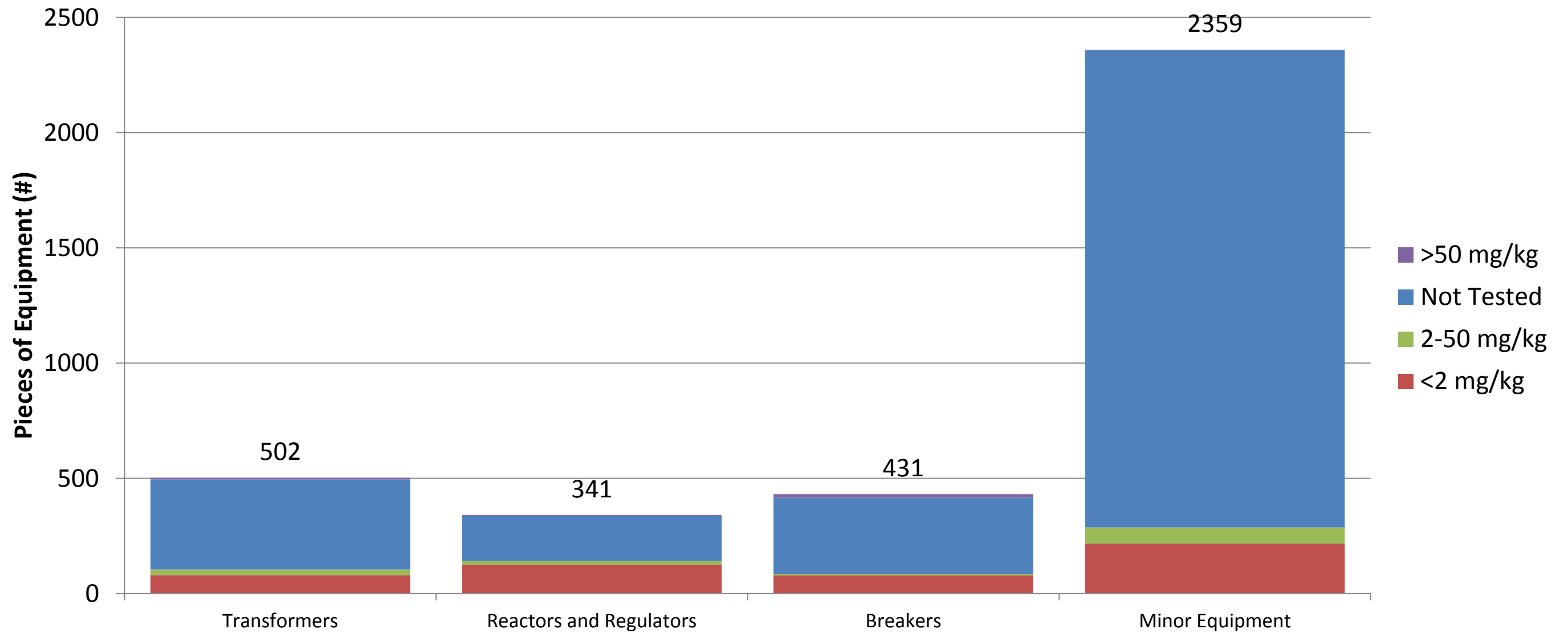
Statistical Modelling Example

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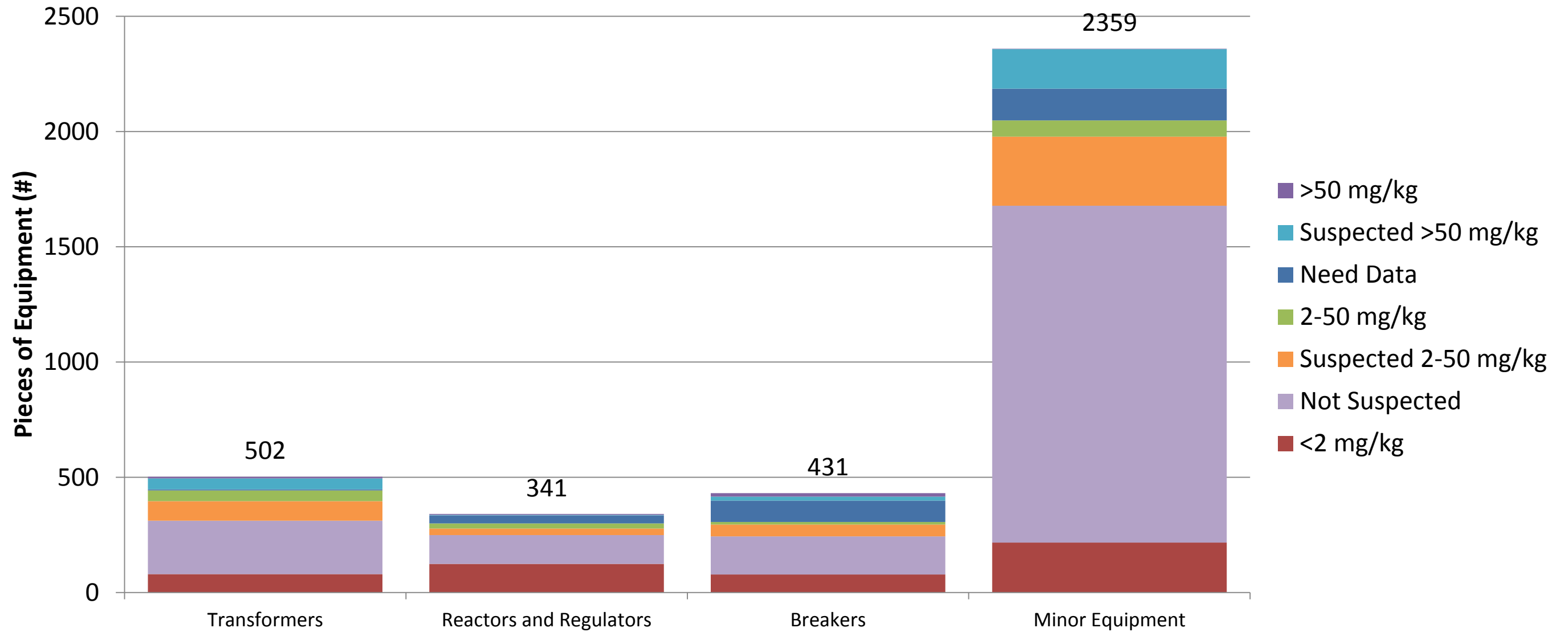
- Average: 1.01 mg/kg
- Standard Deviation: 0.04 mg/kg



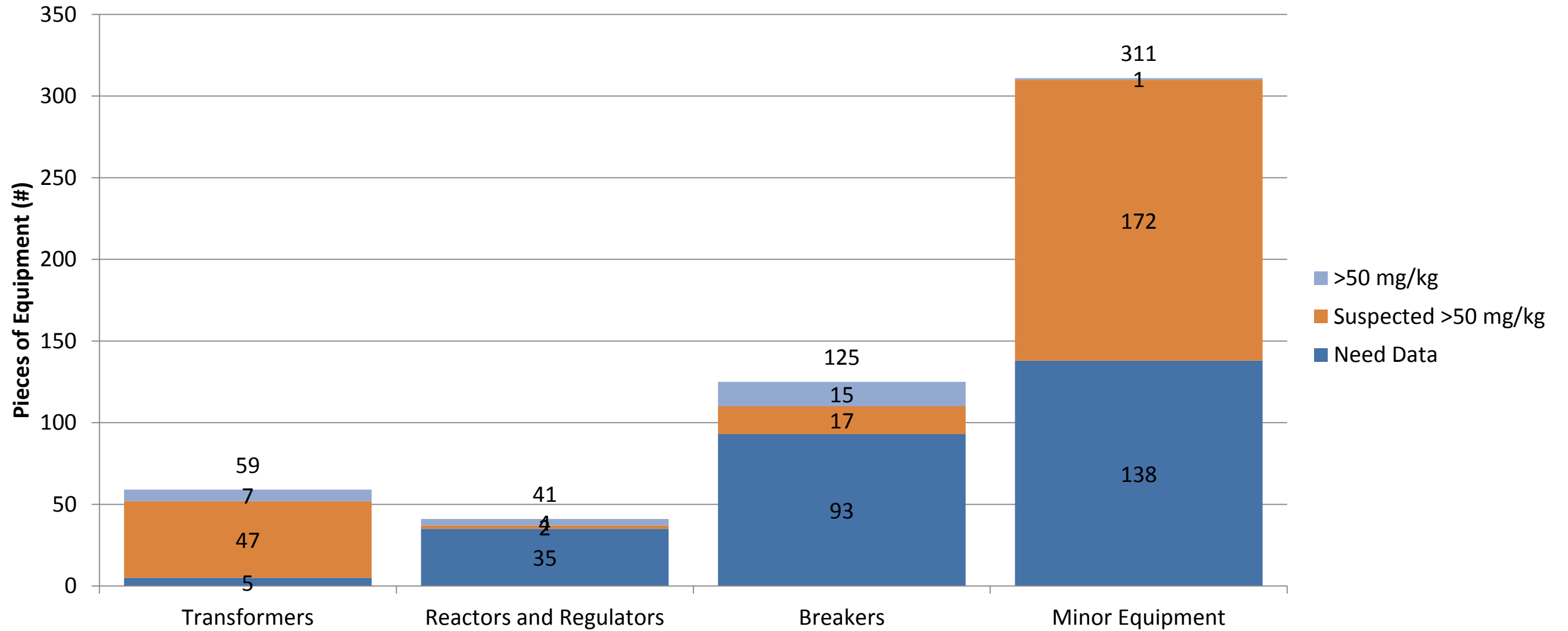
Impact of our Strategy



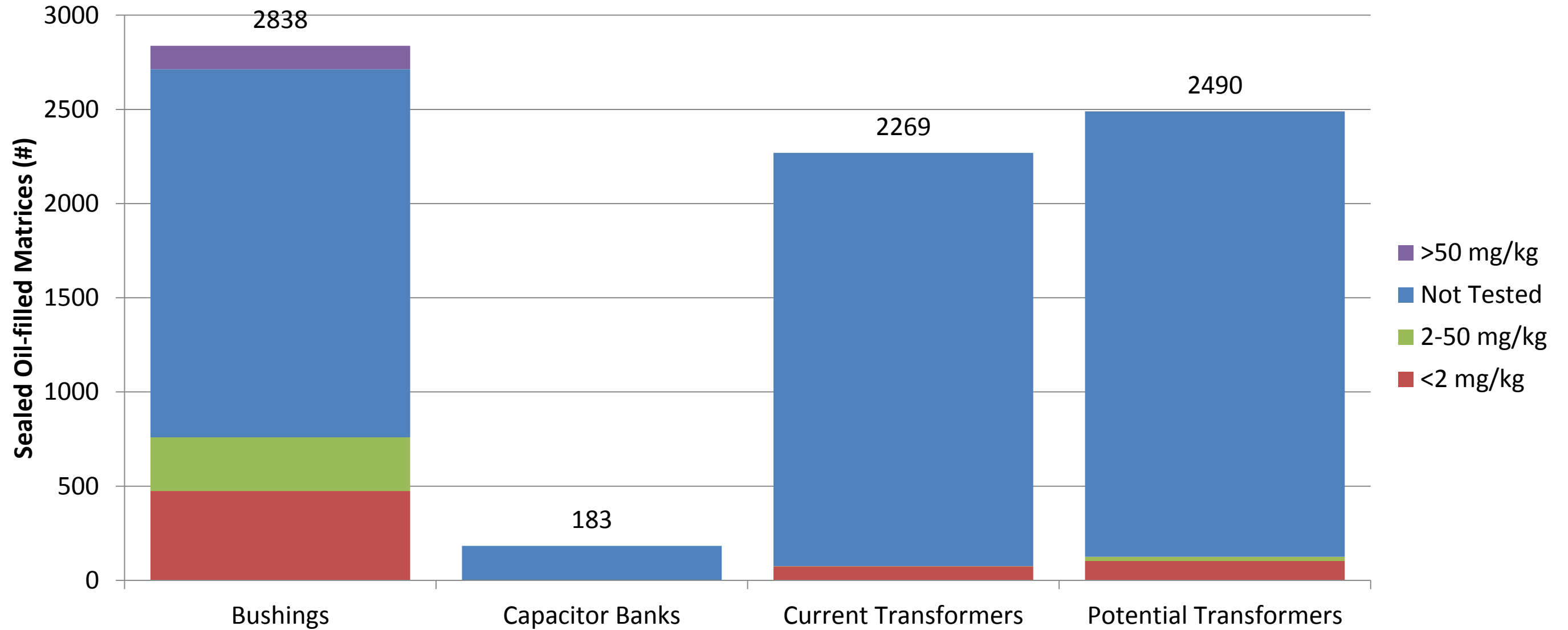
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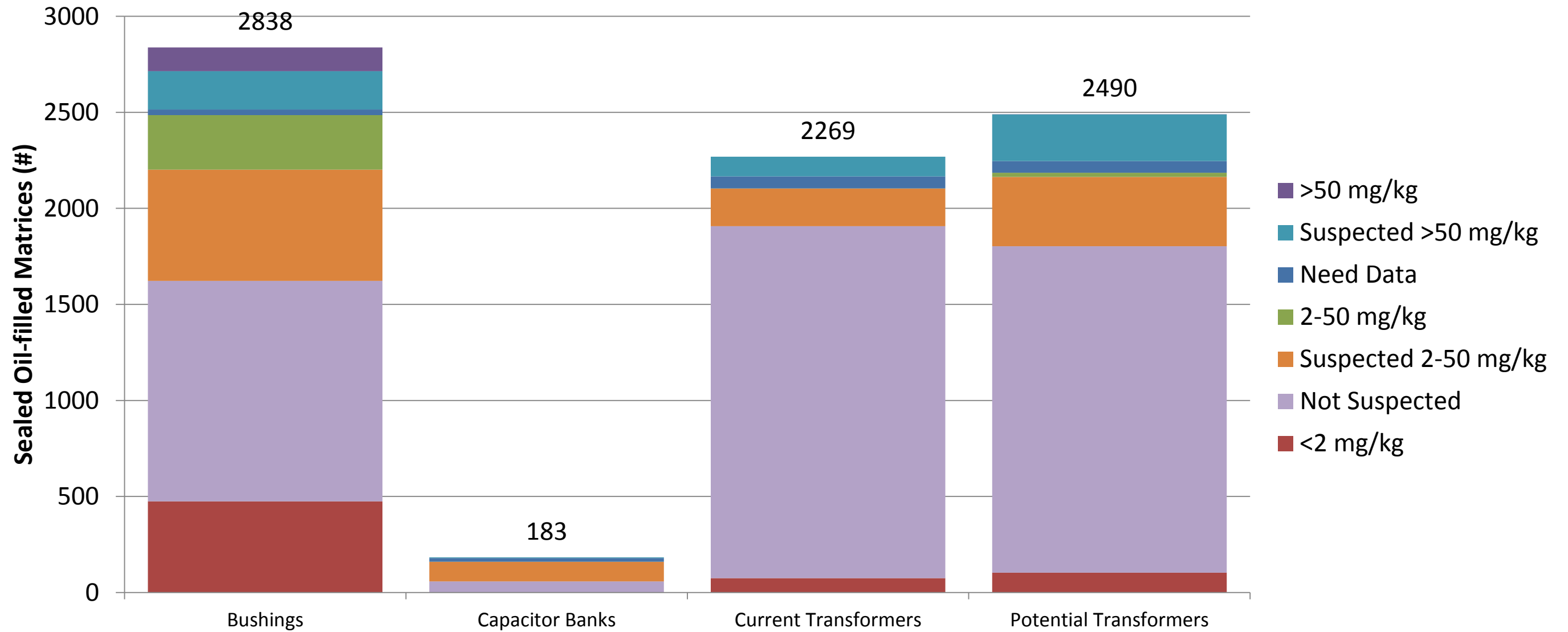
Impact of our Strategy



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Impact of our Strategy



Impact of Our Strategy

	Test Everything & Replace Sealed & >50 mg/kg	Risk Based Approach	Savings
Tests	7136	800	6336
Tests (\$)	\$30 Million	\$5 Million	\$25 Million
Asset Replacement	1420	191	1229
Asset Replacement (\$)	\$170 Million	\$23 Million	\$147 Million
Total (\$)	\$200 Million	\$28 Million	\$172 Million

Other Benefits

- Testing plans generated every month
- Organizing and prioritizing tests based on risk and statistical value
- Skip testing and go straight to replacement
- Projections and better data understanding
- A much more manageable PCB testing and phase-out program
- In storage assets
- Release Response

Release Response

- An additional benefit of this model is that it allows us to quickly assess the risk of a PCB release
 - Risk Analysis
 - Safe work planning
 - Regulatory reporting
 - Analytical testing

Managing On-Going Risk

- Ensuring everything was captured for 2025
 - EMS procedures in place for the management of the assets
 - All untested assets are tested prior to disposal, despite the probability that they likely do not contain PCBs
 - Helps to further strengthen the database
 - If cannot be tested in the field transferred to our PCB storage facility to be tested prior to disposal
 - Compliance with applicable regulations e.g. TDG

The ATCO logo is displayed in a bold, white, italicized sans-serif font. A thick yellow horizontal line is positioned directly beneath the letters. The background of the slide is a photograph of a vast cornfield under a blue sky with scattered white clouds, with a yellow bar at the bottom.

Questions?