Comparison of Risk-Based Leak Survey Implementations

PICARRO

WHITE PAPER

No matter the regulatory environment, Picarro's natural gas asset management solution enables natural gas distribution compliance leak survey that can be truly risk-based in its approach. A recent trend within the natural gas industry has been to increasingly take a risk-based approach to asset management, in this case, leak survey, shifting survey schedules from periodic to being more driven by the particular risk profile of the infrastructure in a given localized area. Here, we consider two slightly different approaches implemented at two different US utilities – each approach having been developed by each utility under different state regulators and with different financial considerations. Both of these approaches can drive more risk out of the infrastructure, faster, without increasing leak survey or repair costs.

The first is an approach that uses Picarro's patent-pending Risk Ranking Analytics and relies on looking at the risk of individual leaks and prioritizing them. These analytics prioritize leak indications based on potential risk. This approach accomplishes the important business objective of significantly increasing the reduction of risk (by remediating more hazardous leaks per year) while keeping overall leak survey and leak repair budgets constant. This approach optimizes the detection and remediation of hazardous leaks leaks for same investment of resources.

Using these analytics, the Picarro system favors showing indications for methane plumes that are most likely to result from important leaks. In other words, the system is less sensitive to low-risk leaks, and more sensitive to higher-risk leaks. O&M cost is saved primarily in lower leak repair and monitoring costs (since fewer inconsequential leaks are added to the backlog). The resulting O&M that is saved can then be used in conducting Picarro advanced mobile leak survey on *more* of the infrastructure than would normally be done in a survey cycle. The increased territory coverage therefore identifies *more* hazardous leaks per year *at the same cost* of traditional survey and keeps the leak backlog under control. Using this type of risk-based leak survey, the velocity at which risk is removed from the infrastructure is higher than it could be by using traditional survey, but within the same budget.

LEAK DISTRIBUTION			
Annual Leaks Found & Repaired	Traditional Survey	Picarro Survey with Analytics	% Change
Grade 1 Below Ground	322	419	+ 29%
Grade 2 Below Ground	1,106	1,395	+ 25%
Grade 3 Below Ground	3,192	3,055	- 5%
Grade 3 Above Ground	9,380	4,914	- 48%
Total	**14,093**	**9,784**	**- 31%**
Cost			
Survey	$2,110,075	$1,912,635	-
Repair	$20,019,107	$20,216,547	-
Total Leak Survey & Repair	$22,129,182	$22,129,182	-

Figure 1. Leak grade distributions and costs associated with Traditional leak survey as compared to Picarro advanced leak survey using Risk Ranking Analytics. The analytics are tuned to preferentially detect higher-hazard leaks and be less sensitive to lower-hazard leaks, removing more risk yet operating within existing budgets.

The second approach relies – not on assessing the risk of individual *leaks* as above – but on using the Picarro system to conduct methane monitoring of the distribution system and relies on using methane data to estimate the leak density within an area. This method relies on efficiently developing an understanding of which areas to focus leak survey resources on first. This accomplishes the important business objective of helping to forecast budget and labor requirements (often subcontractors) and provide a prioritized operational approach.

This monitoring is undertaken for sections of the territory that have not been surveyed within the current leak survey cycle. In other words, if 1/3 of the territory is leak surveyed (infrastructure that is either on a one-year or three-year survey cycle) then the remaining 2/3 will be monitored by the Picarro system – methane emissions data is taken in a manner that does not measure individual leak indications and does not offer a perspective of risk on any individual leak, so as to mitigate the requirement to act on this information. Rather, it provides a "methane map" on a larger area scale – methane data would be aggregated over grids perhaps half a square mile in area. This provides a risk perspective on the asset infrastructure, very similar to how a pipeline risk (DIMP) model is used today and differs from DIMP mainly in that it provides a more real-time and contextual view of risk.

This geographic methane emissions data, in some cases combined with existing pipeline risk models, is then used to forecast which areas are likely to have the highest density of leaks – and beyond that – which areas are likely to have the highest density of *hazardous* leaks. The relative risk of each grid within the 2/3 of the territory is then used to prioritize which 1/3 of grids should be surveyed in the coming leak survey cycle. This concentrates precious leak survey resources on the grids with the highest risk, and removes hazardous leaks at a rate higher than before and within the same budget as traditional survey. The cost savings comes mainly from the fact that grids measured annually that continue to have the very lowest risk (and forecasted to have nearly zero leaks) can be scheduled for leak survey at a backstop frequency of between 3-5 years. The cleaner the infrastructure gets, the greater number of zero-leak maps which incur less annual survey and leak repair costs.

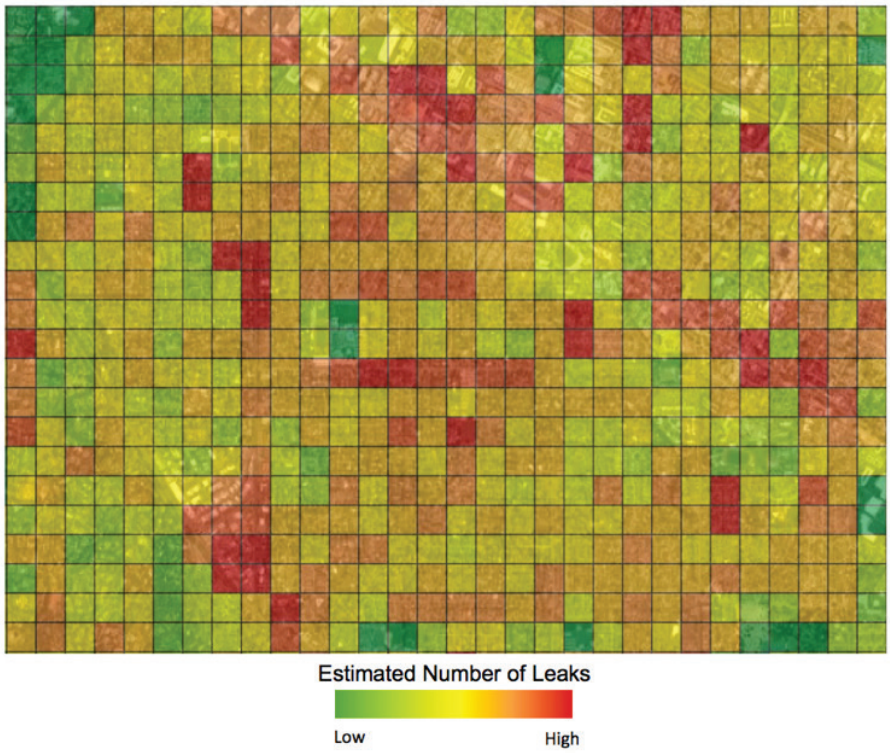

Figure 2. Below-ground leak density within grids as estimated by Picarro methane measurements and associated analytics. Desirable grid sizes often vary from a few city blocks to a square mile for example). Grids with high predicted leak density are prioritized for more frequent leak survey and those with low predicted leak numbers are surveyed less frequently. Methane data is collected across the entire infrastructure approximately every year to enable this analysis.

By using methane data collected on a natural gas infrastructure, along with Picarro's analytics, there are a variety of ways utilities have operationalized risk-based leak survey frameworks. Such approaches to leak survey fit well with other risk-based asset management programs and can make use of the same methane data and analytical tools developed by Picarro.

These two implementations of risk-based leak survey management were the results of extensive and deep collaboration between the Picarro data analytics and application development teams and our key industry strategic partners. Our teams have worked collaboratively with multiple utilities on other customized projects and Picarro welcomes such engagements with our customers.

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