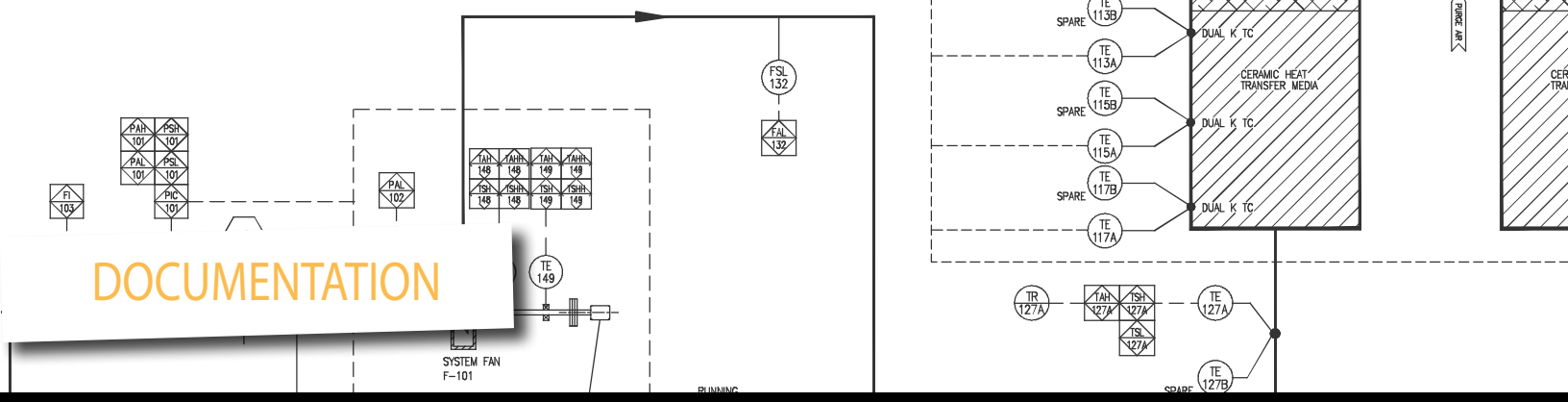


DOCUMENTATION

SPARE PARTS

MAINTENANCE

OPTIMIZATION

ANGUIL™

Oxidizer Service Series

Anguil's Complete Guide to Oxidizer Maintenance & Optimization

Your oxidizer system is a significant investment and long-term commitment to environmental compliance. Unfortunately, there is not a set oxidizer maintenance checklist that will work for everyone. However, there are four major aspects you should carefully consider when crafting your oxidizer system's maintenance plan. Based on Anguil Environmental's popular four-part e-mail series, the Oxidizer Service Series dissects these major maintenance plan components, offering up invaluable advice to ensure system longevity.

Better System Documentation • Stocking Spare Parts • Crafting a Maintenance Plan • Oxidizer System Optimization

Better System Documentation

Part of properly servicing your oxidizer system is maintaining the design documentation associated with that system. When it comes to oxidizer design, National Fire Protection Association (NFPA) standards are considered good practice, and those same standards include requirements that should be used for ongoing oxidizer maintenance and system documentation.

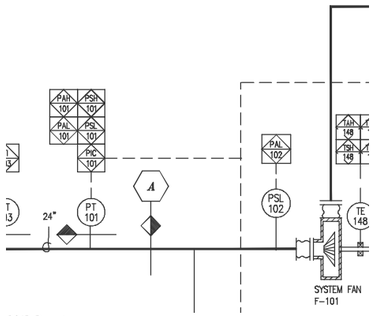
The following are critical design documents oxidizer users should preserve that contain information required by the NFPA to implement an overall system reliability plan. Anguil uses the same documents to build and maintain information to offer value-added service on anyone's oxidizer system, regardless of the original manufacturer. The documents listed with an asterisk (*) are the three most important documents to have on hand and you should always print copies for inside your control panel.

Process and Instrumentation Diagram (P&ID)*
The P&ID is the command drawing that summarizes instrumentation, safety devices, operational limits, and control loops. The P&ID typically provides the oxidizer component tag numbers, as well as the number and type of process exhaust pick-ups for the system. The system utility requirements and performance parameters can be listed as well.

Electrical Schematics*
The electrical schematics provide the detailed connectivity of the entire system and is an important tool used for system troubleshooting. It is critical that the electrical schematics are not only kept readily available, but also revised to keep up with system changes.

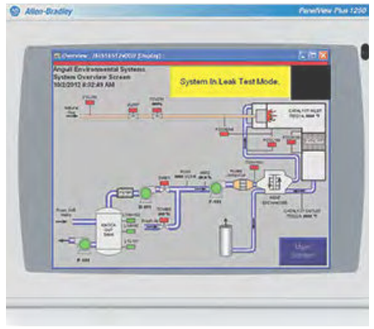
Sequence of Operation / List of Set Points & Alarm Conditions*
The sequence of operation is a step-by-step description of how the oxidizer is designed to operate. It includes: how it starts, how it brings process exhausts on-line, how it maintains airflow and temperature control, and how it safely shuts down. Set points and alarm conditions of the system are also included in this document. It is important to note that this documentation is required per the National Fire Protection Association's NFPA 86: "Wiring diagrams and sequence of operations for all safety controls shall be provided" (From NFPA 86: Standard for Ovens and Furnaces, 2019 Edition – Section 4.1.1.2).

Programmable Logic Controller (PLC) Program
If your system requires a PLC, we recommend you keep a fully documented copy of your PLC program for your records. It is important to know that some oxidizer suppliers may be reluctant to release this information to system end-users because PLC programs can include proprietary control schemes. However, with a signed confidentiality agreement in place, end users should be able to obtain this code. If your oxidizer manufacturer is no longer in business, it is possible to upload the program directly from the PLC, but it may be undocumented and you may need an oxidizer service provider to re-enter the code documentation.



P&ID Drawing

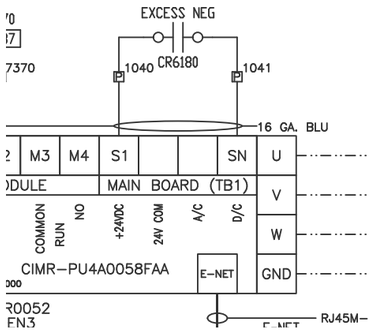
Human Machine Interface (HMI) Program
The HMI (Operator Interface / Operator Touch Screen) is the operator's window into the workings of the oxidizer's PLC. The HMI program goes hand-in-hand with the PLC program to control your oxidizer system by displaying data points from the PLC along with set points and tuning parameters the operator will be allowed to adjust from the HMI. The HMI also provides system status messages and/or alarm messages based on the PLCs outputs. A failed display can leave you essentially blind when it comes to operating your oxidizer system safely. If this happens at an inopportune moment, you want to be prepared to download your HMI program to a replacement display from your spare parts inventory.



HMI Screen

Expected Pressure- Temperature Profile
This is one of the more obscure documents to obtain, however, it is pivotal in the development of a reliability plan for your system. Obtaining this information can be as simple as a small table on the P&ID giving the expected temperature and pressure value at various points throughout the oxidizer. It is critical to know your pressure point values in order to set up a regular inspection plan for your maintenance personnel. Ideally, you should have a table showing expected pressure and temperature data at the common process exhaust airflow amounts your production requires. If this is unknown, ask your system provider to provide data for two conditions: at full-oxidizer airflow capacity and at half-oxidizer airflow capacity. Once provided this information, you will be able to approximate the points in-between when establishing your customized inspection checklists.

Permit Compliance Documents
Compliance documentation requirements vary greatly across local, state, and federal agencies, making it difficult to provide generalized recommendations appropriate for



Electrical Schematic

all operation scenarios. At a minimum, Anguil highly recommends summarizing your permit compliance documentation requirements within a single, concise document that includes minimum and operating temperatures and bypass limitations. This document will keep all parties aware of the key compliance parameters to monitor and record with respect to your oxidizer system.

Bill of Materials / Recommended Spare Parts Lists
A complete bill of materials for your oxidizer system will allow you to obtain the parts you need to maintain system operation. Ideally, the parts listed in the Bill of Materials would be further categorized as "Critical Spare Parts," "Recommended Spare Parts," "Consumable Spare Parts," "Convenience Items," and "Long Lead Times." This allows operators to make an informed decision on the type and quantity of spare parts to stock based on specific production and compliance requirements. Some air permits require that critical spare parts be kept on hand.

Some additional highlights regarding system documentation from the current edition of NFPA 86 Standard for Ovens and Furnaces 2019 Edition include:

4.1.1.1 Plans shall be drawn that show all essential details with regard to location, construction, ventilation, piping, and electrical safety equipment. A list of all combustion, control, and safety equipment giving manufacturer and type number shall be included.

4.1.1.2 Wiring diagrams and sequence of operations for all safety controls shall be included.

7.3.3 Operating instructions that include all of the following shall be provided:
(1) Schematic piping / wiring diagrams
(2) Startup procedures
(3) Shutdown procedures
(4) Emergency procedures
(5) Maintenance procedures

7.3.4 When the original equipment manufacturer no longer exists, the user shall develop inspection, testing, and maintenance procedures.

Stocking Spare Parts

You may be wondering how to get started with categorizing parts and initiating a spare parts program at your plant. Absent of knowing about the operating context of a particular oxidizer system, our best recommendation for building a Spare Parts Program from the ground up is as follows:

1. From the documentation as listed in the Better System Documentation section, gather your P&ID and updated electrical schematics, including panel layout diagrams.
2. Compile a list of your permit requirements, especially as relating to allowable downtime in a given year and bypass allowance.
3. Sit down with an oxidizer service provider such as Anguil. Using the P&ID and control panel diagrams as a guide, tag each system component as falling into one of four categories: CRITICAL, RECOMMENDED, CONVENIENCE, and ORDER AS NEEDED.
4. Show the tagged diagrams to your maintenance personnel and get their feedback on whether their experiences agree with this analysis.
5. Once the parts have been prioritized, they can be priced out and purchased according to the needs of your facility. Keep in mind that many oxidizer manufacturers do have OEM discounts with oxidizer component providers so they can be competitive on providing the right parts for your system.
6. Regularly inventory your stock once parts are purchased and on your shelves. We recommend tying this activity in to your regular maintenance routine.

Spare Parts Program Drivers

Why does your oxidizer spare parts program deserve significant attention? Consider the following:

Uptime
As reliable as oxidizer systems of today can be, upsets will happen with any class of industrial equipment. The downtime associated with any particular upset can easily be dramatically reduced if the right parts are immediately available on site. What is it worth to your company if you can look back over a year and say that downtime was cut in half - or cut even more?

Compliance
Chances are that wording very similar to the

following may already be in your environmental permit: "OPERATOR will stock the recommended spare parts as determined by MANUFACTURER." If not there, this type of wording is definitely making it into the safety regulations governing the design and operation of oxidizer systems. Stocking an appropriate level of spare parts for your oxidizer system may be a code compliance issue for your site.

Defensibility

As mentioned earlier, upsets will happen. When they do, you want to be in a partnership with your local regulatory agency. Regulators across the country are getting tougher and smarter. If you are making the case for leniency in a particular downtime situation, but you cannot demonstrate that you've taken steps to stock the spare parts recommended by your system's manufacturer, you may be seen as not holding up your side of the bargain.

Preparedness

Making the decision to have a well-stocked spare parts inventory is comparable to the same decision that we make in our own personal lives in deciding to have adequate auto, home, or life insurance in place. Nobody looks forward to sending in a payment every month to the insurance company. It is easy and short-sighted to think you are not getting anything back for your money, until you need to use it. For spare parts, this is comparable to having the necessary components available in your stockroom to get your system back up and on-line in a minimum amount of time as opposed to lengthy downtime, lost production revenue, and plant headache due to not having the proper "insurance" in place. After all, having a stockroom full of "unused" spare parts is similar to having purchased several "unused" insurance policies. It is always better to have the appropriate insurance in place should it be needed.

Mission

Anyone that owns and operates an oxidizer system has already made both a significant investment in, and a long-term commitment to, environmental compliance. Clearly, this is already part of your corporate mission statement. Stocking an appropriate level of spare parts for your system is just one part of that same long-term commitment.

Operating Context Matters

Although we stress the importance of a well designed oxidizer spare parts program, we also consider thermal and catalytic oxidizers in their various forms to be dependable technologies. As manufacturers of these systems, we take pride in the reliability of the oxidizers we build and fully expect there to be several years of trouble-free operation. As much as we want to sell large spare parts packages with every oxidizer system, continuously harping on the need for a large contingent of recommended spare parts can seem counterintuitive even to us at times. Designing a recommended spare parts program for a particular customer can be tricky and, unfortunately, also often gets less thought than it deserves. However, there is a concept that can guide the proper approach to your oxidizer spare parts plan. That concept is your specific operating context.

Here is an example that illustrates the idea of operating context in regards to developing a spare parts plan for your oxidizer system. Several years ago, while presenting our final proposal for an oxidizer system to a potential customer, we included a recommended spare parts package valued at approximately $20,000.00. The potential customer was mildly put off by this number. The retort at the time was, "You mean for the amount I am spending on this equipment, I have to buy $20,000.00 worth of parts just to make sure it runs right?"

Later that same week, we attended a pre-bid meeting for another potential customer. During the review of the bid specifications, the presenter stated, "As part of your bid package for this system, we would like to see your recommended spare parts list. Fair warning, anyone that turns in a package less than $20,000.00 will get scoffed at. That would indicate you don't understand our production situation." So in the course of one week, we had met two different potential customers, both somewhat offended by a $20,000.00 recommended spare parts package, albeit for different reasons. The kicker is both potential customers were considering the very same model of RTO!

Happily, both 'potential customers' did eventually become 'customers', and although seemingly at odds with one another, neither customer was technically wrong. The first customer was in an area of the country where the oxidizer system was allowed to be turned off for several months of the year and also allowed oxidizer downtime of up to ten days during the run season. The second customer was located in a non-attainment zone and only allowed up to four hours to finish a current production batch upon an oxidizer upset. At that point for the second customer, all production had to stop until the oxidizer was running again. Clearly, although the model of oxidizer system was exactly the same, the approach to developing a customized

spare parts plan was completely different for these customers – and very permit-driven. Using your operating context will allow you to better construct a plan to keep your equipment running properly.

Crafting A Maintenance Plan

Having documentation and spare parts readily available is a great start to being proactive and maintaining effective system operation, but what if you could catch a potential issue before it becomes one? Whether it is still on the drawing boards or has been on site for years, your air pollution control system represents a significant investment and a long-term commitment to environmental compliance. A well-crafted maintenance plan for your oxidizer will allow you to get the most from your investment over the entire life of the system.

Maintenance Plan Drivers

The following drivers make the decision to implement an oxidizer maintenance plan imperative:

Production Uptime

An informed staff and a transparent maintenance plan will allow for maximum production uptime, prevent costly shutdowns, and enable a prepared response to operational irregularities.

Compliance with Environmental Regulations

Being out of compliance can be costly and a public relations disaster. The language in many air permits require operators to stock spare parts, keep historical service documentation, and maintain the system according to the manufacturer's recommendations.

Compliance with Safety Regulations

Compliance codes often require that safety checks be performed on an annual basis for this class of equipment. Anguil incorporates these safety checks as a part of our 75+ point Preventative Maintenance Evaluation.

Operating Cost Reduction

A good maintenance plan will often pay for itself by ensuring that your oxidizer system is running at peak efficiency and with minimal downtime.

Maintenance Plan Building Blocks

The right maintenance plan for one company might not be the right plan for another. Anguil considers the following to be the building blocks of a comprehensive maintenance plan that can be customized to fit the needs of any operating context. The service components highlighted in **red** are what we consider to be bare minimum maintenance plan essentials while additional recommended options are shown in **blue**.

System Documentation

Gather all your system documentation in one binder. Make sure this documentation is readily available to both system operators and service providers. We recommend storing inside the control panel.

Recommended Spare Parts Package

An Oxidizer Service Provider like Anguil can identify the critical components, recommended components, and convenience items that you should stock to maintain smooth operation of your system and limit production down time.

Annual Full Preventive Maintenance Evaluation (PME)

Often done by an Oxidizer Service Provider like Anguil. This is not just our advice. This is rapidly becoming part of Permit Codes and Compliance - both environmental codes and safety codes. Anguil's standard PME program includes a 2-3 day service visit utilizing a 75+ point checklist to ensure your oxidizer is meeting air pollution control standards and is followed by a formal report for your maintenance records.

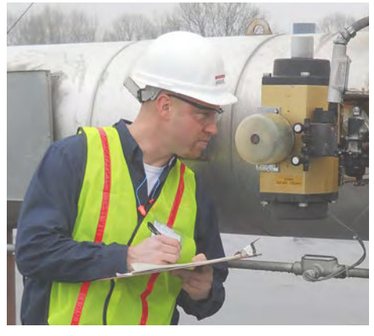
The following four options can be performed in conjunction with a PME visit or ordered separately as stand-alone services:

- **Destruction Removal Efficiency (DRE) Check-ups** An oxidizer service provider like Anguil can check the VOC destruction efficiency of your system with portable testing equipment or via laboratory analysis of air samples. This service keeps you on track with system performance and verifies compliance. It is ideal as a pre-test to help eliminate "surprises" during expensive formal compliance testing.

- **Repeat Operator Training** Maintenance personnel take pride in servicing the equipment if they are familiar with the operation. Years one and two of an oxidizer's life can present different maintenance challenges than years three through fifteen. Repeat training can keep operating personnel prepared to meet evolving service needs. Repeat Operator Training is showing up in the NFPA codes as well.

- **Catalyst Services** At the heart of every Catalytic Oxidizer System is the catalyst bed. Properly maintained, the catalyst bed can provide years of high VOC Destruction at temperatures well under those required for thermal oxidation. Anguil offers a full program of catalyst services including Evaluation and Testing, Rejuvenation, Replacement, and the purchase back of "spent" catalyst for recycling.

- **Split Preventative Maintenance Evaluations** Some facilities have little precious downtime for system repairs, so they want to be prepared with the right parts and contractors to act on repairs immediately when their downtime occurs. They may elect a Split-PME scenario, which starts with a one day system evaluation visit by a Field Service Engineer. A second visit is scheduled and the Field Service Engineer returns with all parts and materials identified in the system



evaluation, prepared to execute on the service recommendations immediately.

Semi-Annual Preventive Maintenance Evaluations

For some, the yearly comprehensive Preventive Maintenance Evaluation is not enough. Overall system balancing, operational cost verification, and inventory of spare parts should be conducted semi-annually. Depending on the complexity of your system, you may wish to contract Anguil to perform this service for you.

Remote Login Capability

Remote log-in could be your lifeline in emergency situations. Establishing this capability is one of the most important things you can do when devising your maintenance plan. Remote Access Capability has recently become a game changer in the oxidizer service world. For the companies and oxidizer systems we service, when the capability is in place, it is both a lifeline during system upsets as well as a "force-multiplier" when our Field Service Engineers are on a particular site. One need only walk into our Service Manager's office during a live-connection event and see two or three additional heads observing the system operation in real-time while conversing directly with our Field Service Engineer on site. It is akin to getting the experience and knowledge of several engineers on site for the price of one. In today's world, no oxidizer end-user should be left behind without this critical safety net in place. Don't wait for an emergency to find out the connection isn't there. Anguil can also perform routine operational checks remotely and potentially identify developing service issues proactively for a fraction of the cost of an on site visit. Adding this service quarterly is rapidly becoming a popular option. For those with this feature, make sure to regularly test your connection.

Operating Cost Review

Do you know exactly how much your system should be costing you to run? Are you getting the most for your operating dollars? Anguil offers an Operating Cost Review Program that can answer these questions for you and provide cost savings recommendations tailored for your oxidizer system.

Operator Log Book

Thorough service history documentation, including a historical account of daily, weekly, and annual inspections, is often an air permit requirement. Like a doctor's medical records, a comprehensive operator log will help diagnose operating irregularities and could prevent costly malfunctions down the road.

Weekly Walk-By Inspections

Typically performed by your own personnel. An Oxidizer Service Provider like Anguil can custom design weekly inspection checklists for your specific oxidizer system.

Deeper Monthly/Maintenance Day Inspection Checklists

For our Monthly Inspections program, we provide a list of the system components needing inspection, independent verification, and/or calibration on a monthly basis. Our goal is to train your maintenance teams to feel comfortable performing the monthly checks on their own.

Custom Maintenance Plans

Developing a custom maintenance plan with an Oxidizer Service Provider can result in a strong service relationship built on trust and long-term oxidizer expertise. Anguil's custom maintenance plans include multi-year deals for individual plants or across multiple facilities. Custom multi-year and multi-facility maintenance plans can offer numerous benefits:

Smooth Equipment Turnover Between Project Engineering and Production Engineering Teams

Many oxidizer systems are purchased via a project engineering team who then must turn the equipment over to production teams. This hand-off can proceed much smoother if the production team sees that there is a service agreement already in place.

Reliable Budgeting

Having a multi-year service plan can take some guesswork out of operational budgeting.

Consistent Service History

Even as plant personnel may turn over.

Knowledge Sharing

Maintaining service history at the plant level can be difficult enough. A corporate level maintenance plan can become a conduit for improved knowledge sharing between plants.

Uphold Corporate Values

Environmental Compliance is often part of your Corporate Level Mission Statement.

Reliability Centered Maintenance

Anguil recently participated in a three-week-long Reliability Centered Maintenance (RCM) evaluation of an oxidizer system. This particular system treats the exhaust from a critical production line in one of the most highly regulated areas of the country. RCM is a landmark maintenance concept defined in John Moubray's book *Reliability-Centered Maintenance* as "a process used to determine the maintenance requirements of any physical asset in its operating context."

For this RCM evaluation, a team of Anguil Personnel along with the facility's maintenance personnel, equipment operators, electrical controls specialists, and EHS staff was assembled and guided by an RCM facilitator. The team went line-by-line through the oxidizer electrical schematics, the sequence of operation, the control programs and the environmental permit requirements to define the system's functions and possible functional failures. Using the framework of the RCM program, the team generated lists of potential redesigns, required procedures, a compulsory spare parts program, and implementation reports for the system as a whole. This was no small task — the final report was over 400 pages long! The evaluation was a significant investment in both money and manpower for both Anguil and the company involved.

The biggest takeaways from this experience were:

- This is the level of training that operators of oxidizer systems deserve but rarely get
- The importance of "Operating Context" in determining a suitable approach to long term maintenance of a particular oxidizer system.

To further illustrate the idea of operating context, consider that oxidizers today are being installed into production scenarios where they:

- May be allowed to be off line for several weeks or months in a given year
- May force the end-user to stop all production immediately when off line, in some cases triggering "Notices of Violation" and fines upon any upset condition
- May be treating exhaust gas streams that are immediately dangerous to life and health
- May be the sole source of heat for the process to which they are attached

Each one of these different operating contexts can play a major role in the final determination of an appropriate maintenance plan for a particular oxidizer system.

Not everyone can afford to go to the lengths of implementing a formal RCM maintenance program for their oxidizer system. There are also plenty of industries with enough historically acquired experience where such an effort may not be required. However, an effective and custom maintenance plan adhering to minimum requirements can be crafted with help from an Oxidizer Service Company like Anguil and customized to your particular operating context. Such a program will prolong the life of your equipment while staying within the restrains of an operating budget.

Oxidizer System Optimization

Setting all of these aspects in place within your overall maintenance plan will help you become proactive in ensuring your system's reliability. However, this does not take into account how much you are spending on a daily basis to operate. So, how much *is* your oxidizer costing you to operate? Do you know how much it *should* be costing you to run if it's running efficiently? A fully optimized oxidizer will help you save money on operating costs, reduce your greenhouse gas footprint, and contribute to your bottom line in very measurable ways.

Optimization Defined

Oxidizer system optimization can fall into two categories. The first is "reactive," meaning you identify and respond to the small inefficiencies that may occur over the life of an oxidizer system. The second would be "proactive." It is our goal that all of the tools we are providing you within this compilation allow you to act proactively, with the goal of you integrating these tools into your overall maintenance plan. Did you know that over the course of a year, unnecessarily treating an additional 1,000 SCFM of process exhaust in an oxidizer system can cost upwards of $10,000.00 with a Regenerative Thermal Oxidizer (RTO) and over $30,000.00 for a Thermal Recuperative Oxidizer? Even making a modest improvement in the Thermal Energy Recovery (TER) of an RTO system as little as 1% can cut natural gas bills by 20% or more.

It is also important to know that most emission abatement systems are designed and installed based on a theoretical projection of future production levels. If an oxidizer remains at a facility for 15-20 years, it is very unlikely that an existing system is optimized for current production conditions, emission characteristics, and process demands. Plant managers owe it to themselves to periodically review the operating costs associated with their oxidizer system. This periodic review will allow for informed decisions about both reactive and proactive efforts, translating directly into lower operating costs. If PMEs or testing of the oxidizer is regularly required and included in your maintenance plan, this is an excellent time to schedule an operating cost review. Operating costs can be

reviewed during monthly or even weekly walk-by inspections and checklists. These inspections are typically performed by your own personnel. However, Anguil can provide you with a checklist for Monthly Maintenance Day inspections of the system components needing inspection, independent verification, and/or calibration on a monthly basis. The more your maintenance team knows about your system and their capability to perform checks like this on their own, the more money you will save, and the more efficient your system will run.

Optimization Strategies

What follows are some general strategies for oxidizer optimization, applicable to a wide-range of system types. With limited historical information, an oxidizer company like Anguil can quickly determine which of the following strategies could be a good fit for you.

Pay Attention To The Percentages

After 5 years of operation, an RTO originally designed for 95% Thermal Energy Recover (TER) could easily slip to 93% TER. This might not sound like a big deal, but that decrease in TER actually equates to a 40% increase in natural gas consumption. Percentage points do accrue over the course of a year, so get to know the critical parameters to watch as your system ages.

Know Your Emission Loading

Especially the amplitude and duration of peaks. The size of an oxidizer is almost always determined by the peak emission levels coming from an application, but it is the average emission loading that dictates operating costs. Estimates for future "worst case scenarios" are made in the design phase to ensure a system is not undersized. After a couple years of operation, examine your actual day-to-day production loading to make sure you are not operating an oxidizer designed to handle a theoretical peak loading which you would in fact never reach.

Know What Oxidizer System Would Be Specified For Your Process Today

Vapor combustion technologies have evolved over the years. Knowing what is specified for your application in today's energy conscious market can illuminate cost effective upgrades to existing equipment. Alternatively, an entirely different oxidation technology may be specified for your application today, so knowing what is currently available can save you from sinking too much money into an outdated oxidizer system.

Improve Primary Heat Recovery

Oxidizers are typically designed with internal heat recovery. Usually, hot purified gases leaving the combustion chamber are used to pre-heat the incoming solvent laden air stream, which is the primary heat recovery of an oxidizer system. Projects improving the primary heat recovery of an oxidizer system offer the quickest payback because they provide additional heat recovery at all times the oxidizer is in service. For example, a coating company increased the primary heat recovery in their RTO and the system is now self-sustaining, meaning no supplemental fuel is required during most operating conditions.

Consider Secondary Heat Recovery

If improving primary heat recovery is not cost effective or oxidizer operating conditions do not allow it, secondary heat recovery may be the best option for conserving the heat input to an oxidizer system. Heat exchangers can be added to the exhaust stack of an existing oxidizer to capture excess stack heat in air, water, or even steam. There are a wide variety of low back-pressure designs that can be added to an oxidizer's stack without requiring a replacement of the oxidizer system fan.

Investigate An Emission Concentrator

Burning air is expensive. In fact, fuel usage for most thermal and catalytic oxidizers will decrease as emission levels increase. If a significant portion of the process air being treated is near ambient temperature with low levels of contaminants, an emission concentrator may be an optimization option for your facility. Often utilized on paint booths and floor sweeps, this technology is capable of absorbing emissions and converting them into a smaller, more fuel rich air stream that reduces the heat input required by a combustion device. Concentrators can increase the capacity of an oxidizer by a factor of 8 to 25 when added upstream of an existing system.

Focus On Combustion Air

Combustion air, in both your oxidizer system and process burners, is often overlooked as a potential area for operating cost savings. Making sure burners are tuned properly and only firing when necessary can make a big difference. With RTOs, there is an additional money saving opportunity to install flameless supplemental fuel injection (SFI) system where combustion air is not needed at all. Also, retrofit options that utilize a heat exchanger to supply combustion air from the chamber or stack.

Conclusion

No matter how well an abatement system is designed and manufactured, it cannot continue to operate at high efficiency levels without maintenance. Small inefficiencies in system operation can lead to large operating expenditures over the course of a year. At today's energy prices, regular calibration of feedback instruments and control loops can pay for itself many times over. All too often, production facilities take the "No News is Good News" approach to their air pollution control equipment when they really should be chasing the benefits of the "Company Stays Green and Saves Green" headlines instead. Building at least a general maintenance and service plan for your equipment with the tools we've provided you will allow for a cost-effective and reliable system that also meets compliance and regulations. Remember, your oxidizer system is a major investment and it is your duty to maintain it for the well-being of your company and for your commitment to environmental compliance.

The Oxidizer Service Series is an adaptation of Anguil's four-part e-mail series, which sought to provide readers with expert advice on oxidizer documentation, spare parts stocking, maintenance planning, and system optimization.

Anguil Environmental provides highly engineered environmental equipment and service solutions helping clients solve complex industrial air and water challenges across the global. For over 40 years, Anguil has been committed to protecting the environment with unmatched engineering, innovative equipment solutions, compliance and service. Our "never walk away policy" delivers an industry-leading customer experience. If you are ready to have a partner passionate in protecting the environment, contact Anguil to learn more - www.anguil.com.

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