Generator Services

Emergency Power:

Preparation is the 'Key' to Success

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P3 Generator Services
(A Power Pool Plus Company)
October 28th, 2014

Emergency Power:

Preparation is the "Key" to Success

- **Topics of Discussion**
  - Background
  - "Super Storm" Sandy Review
  - Purchasing a Generator
  - Maintaining a Generator
  - Conclusion

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Who We Are

- Founded in 1990 as Power Pool Plus
  - Focus on Refrigerated Transport Market
  - Experience in Building and Servicing Large Industrial Generators
- Formed **P3 Generator Services Division** to focus on service business
  - Service, Sales, and Rentals
- Generators under maintenance throughout the tri-state area
  - Nursing Homes
  - Assisted Living Communities
  - Sewage Treatment
  - Water Companies
  - Municipalities
  - *. . . even Crematoriums!*

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Why We ALL Care About Generators

. . . Now . . .

October 22-November 5, 2012

Super Storm Sandy and her Aftermath

(and we won't even mention the October 31st storm of 2011, or Irene!)

Sandy kills at least 117 people in the United States and 69 more in Canada and the Caribbean.

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Super Storm Sandy

October 29, 2012

- Hurricane force winds extend 175 miles out from Sandy's eye, making it much larger than most storms of its type.
- Close to 11 million commuters are without service.
- By evening Hurricane Sandy weakens to a post-tropical cyclone.

November 2, 2012

- The U.S. Energy Information Administration reports that approximately 67 percent of gas stations in metropolitan New York **DO NOT** have gas for sale.

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Super Storm Sandy:
What Went Wrong?

- **No generators at all**
  - October 28th- "Can we rent a generator?"
- **Generators were not properly maintained**
  - 10 year old generator that was maintained by "some guy," yet original fuel filter was still on the unit!
- **Undersized generators**
  - Did absolute minimum to meet requirements but did not account for multi-day outage or "real" business operations.
    - Unit in sr. living complex that did not power the elevators nor fire pumps- average age of building 88yrs. old!
    - Pills being delivered by flashlight to patients huddled in hallways or rec. rooms . . .

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Super Storm Sandy:
What Went Wrong?

- **Generators that were decades old**
  - 1986 Buick with 12,000 miles on it.
    - She might be a peach, *but…*
    - The demand that was put on it was like taking it on I-95 and driving to Key West and back at 75 mph with NO STOPS!
  - Old units required spare parts … .
    - Some no longer available or very long lead times

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Super Storm Sandy:
What Went Wrong?

- **Insufficient fuel supply**
- **Interrupted natural gas supply**
- **Units getting flooded.**
  - Fuel transfer pumps that move fuel from a bulk storage tank to a generator's day tank can be a weak link.
- **Poor/Cheap Quality**

  Units that are better used for home owner applications, were/are being used commercially
  - Lack of parts
  - Lack of support
  - Break downs . . .

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Sandy's Wrath

Water Line

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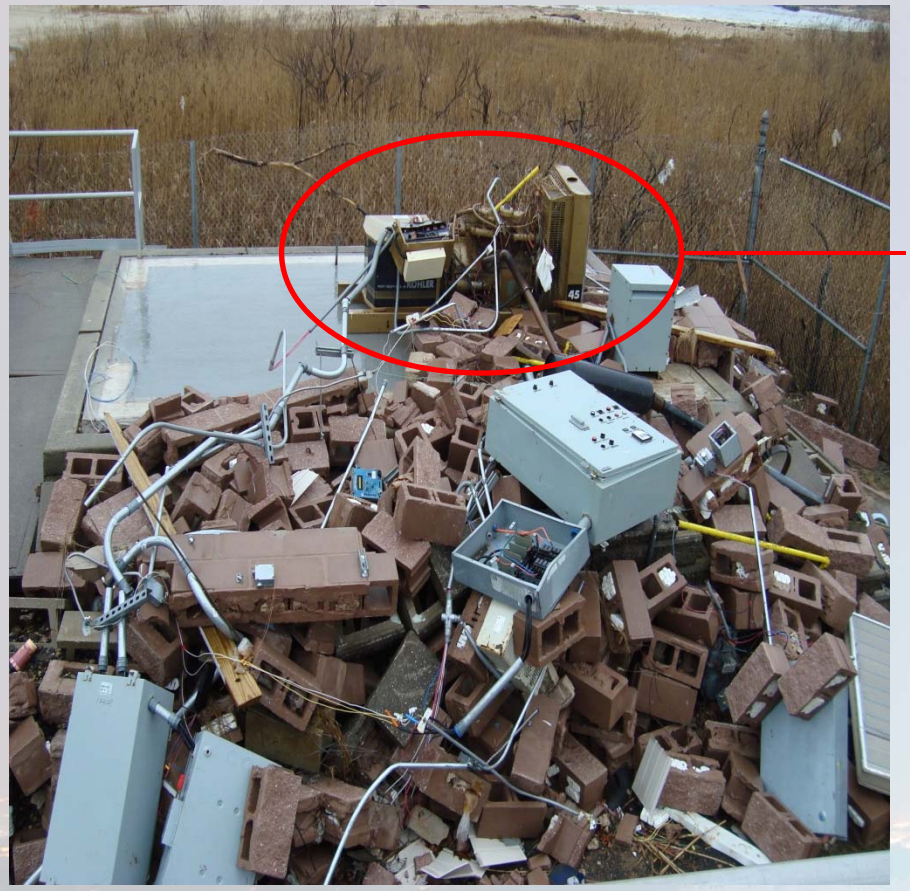
Sandy's Wrath



The remnants of a generator!

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Super Storm Sandy:
*What Went **RIGHT?***

- **Properly maintained units ran well,**
  - Saved the day, and in many cases **– *Saved Lives!***
- **Facilities with back-up power became havens for those without power**
  - Employees living in nursing homes
  - Businesses able to conduct business when many competitors were shut down – Perishable inventories were protected
  - Auditoriums / Community Centers could provide local relief
  - Basic municipal functions continued - water, sewage, etc.
    - "We were very lucky, our town didn't lose power, we had water and sewage . . . ." **NO, your town was simply properly prepared!**

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Considerations
Before Purchasing a Generator

- **Fundamentally, buying a generator is an insurance policy**
  - You "hope" you never need it, but find that when you do, you REALLY want it to work!
    - Why spend $70,000 on this "policy" yet neglect to pay the $1,500 annual premium (maintenance fee?)

And . . .

- **There *IS* a difference between a $50,000 and a $60,000 generator**
    - You likely will not see this difference until you need parts, service, warranty support, etc.

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Considerations
Before Purchasing a Generator

- **Meet with your local government agencies**
  Understand their requirements
    - Flood plain
    - Code Enforcement Approvals
    - Electric Company Approvals
    - EPA approvals/Permitting
    - **DCA approvals!**

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Considerations
Before Purchasing a Generator

- **Size matters, but bigger is *NOT* better!**
  - What devices must have power vs. what are non-essential?
  - MOST importantly, what is the difference in cost between a full facility unit and a partial facility unit?
    - Is this trade off "worth it?"
    - Often any gain in using a smaller unit, is offset by the additional wiring required to isolate specific circuits . . .
  - **Placement Considerations**
    - Will it be accessible?
    - Is sound attenuation a concern?
- **A generator too large for your application is not a wise choice**
  - Unit can "wet stack" (unused/un-burnt fuel can clog exhaust systems, etc.)
  - Leads to poor overall performance
  - Requires a load bank to clear the system

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Purchasing a Generator

- **Beware of the used market!**
  - "Wow, I just got a great deal on a used generator! It's a 1995, but only has 150 hours on it!"
  - Reality - You just bought grandmas 1972 Plymouth, While it only has 16,000 miles on it . . . .
    - How long will the water pump last?
    - What shape is the radiator in?
    - What shape are all the gaskets and seals in?
    - Should another Sandy happen, it will be like getting in this old car, and going 75 mph for 3 days straight . . . . *With no warm up! The question is, will she handle it without incident?*

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Purchasing a Generator

- **Load Bank**

  Any used unit must be load banked and the results carefully reviewed before a decision is made to purchase … or not

  - Load banks are designed to verify the generator's output vs manufacturer's specification.
  - Replicates real "load" on the generator
  - **Existing units can benefit from load bank tests as well.**

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Mobile vs. Stationary

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Mobile vs. Stationary

- **Mobile units**
  - **Pros**
    - Opportunity to make one investment and leverage it over several locations
    - Must meet less stringent EPA guidelines than stationary units
    - Savings in necessary switch gear to connect
  - **Cons**
    - Do not hold much fuel: 24-30 hours maximum
    - Usually will not turn on automatically
    - Coordination is needed to ensure unit, cables, fuel are all available as needed to successfully complete the connection.
    - Critical that supported sites are far enough apart so the likelihood of multiple sites down is limited
    - Requires personnel to be more involved in making the necessary connections
      - Right voltage? Right connection? Line vs. Generator Power is segregated?

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Mobile vs. Stationary

- **Mobile units**
  - **Manual Transfer Switch**

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Mobile vs. Stationary

- **Stationary**
  - **Pros**
    - Requires little involvement- automatically transfers from line power to generator power and back (Automatic Transfer Switch)
    - Can utilize Natural Gas or as much diesel as required
    - Usually is sized to support the full facility
    - All connections are in place
  - **Cons**
    - Held to tougher EPA requirements
    - Limited value to only one site
    - Automatic Transfer switch pricing is high!

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Natural Gas or Diesel?

- **Considering a generator is like anything else**
  - a series of tradeoffs

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Natural Gas or Diesel?

- **Natural Gas**
  - **Good:**
    - Clean burning
    - No fuel to go “bad”
    - No filters to clog
    - Unlimited supply, when flowing
  - **Bad:**
    - “Never back-up one utility with another . . .”
    - Not a very viable solution in the larger horsepower ranges, though that is changing rapidly.
    - Usually more expensive than diesel alternatives
      - Modified Diesel units

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Natural Gas … Diesel?

- **Diesel**
  - **Good:**
    - Completely independent of other utilities
    - You control your destiny (arranging supplies, etc.)
    - Ideal for a variety of horsepower ranges and mobile applications
  - **Bad:**
    - Fuel can eventually go bad,/filters clog
    - Fuel supplies can be compromised
    - EPA/Going Green is making diesel engines more and more expensive, harder to maintain
    - Fuel is expensive compared to Natural Gas

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Gas/Diesel Hybrids – *The Future?*

- **Defined:**
  - A unit which has been modified to allow for either natural gas or diesel operation
- **Opinion:**
  - Too early to tell if this technology is viable
  - Time is needed to further refine solution
  - Today, some manufacturers void their warranty, if these systems are used on their engines

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Safeguarding Your Investment

- **Have a fuel plan**
  - 5 day minimum supply
  - 3 day on-unit supply
- **Have spare filters, belts, hoses, oil, on-site**
  - 90% of basic generator breakdowns involve fuel
    - Stabilizer
    - Cleaner/Conditioner
    - Spare filters
- **Your generator *IS* your insurance policy**
  - Do NOT cut corners, or the entire purpose of having it will be negated!
  - Think of your generator maintenance as your annual premium

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Maintaining a Generator

- **In general . . .**
  - **Generators should be started weekly**
    - Moves fluids/lubricants
    - Keeps seals and gaskets moist
    - Re-charges battery
    - Verifies operational status
  - **Either weekly (or 1x per month minimally), generator should be load tested**
    - Run with connected load on the unit
    - Verifies switch gear is working properly
    - Prevents generator from wet stacking
    - Ensures local personnel are clear on any impact an outage will have

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Maintaining a Generator

- **However, pay attention to air quality.**
  - There are guidelines that prevent the usage of generators on certain days for non-emergency events
    - Testing a generator on days when generators are not permitted to run, **can result in a $10,000 fine!**
    - While automatic exercising helps ensure they are run weekly, it often does not take into effect non-permissible days.

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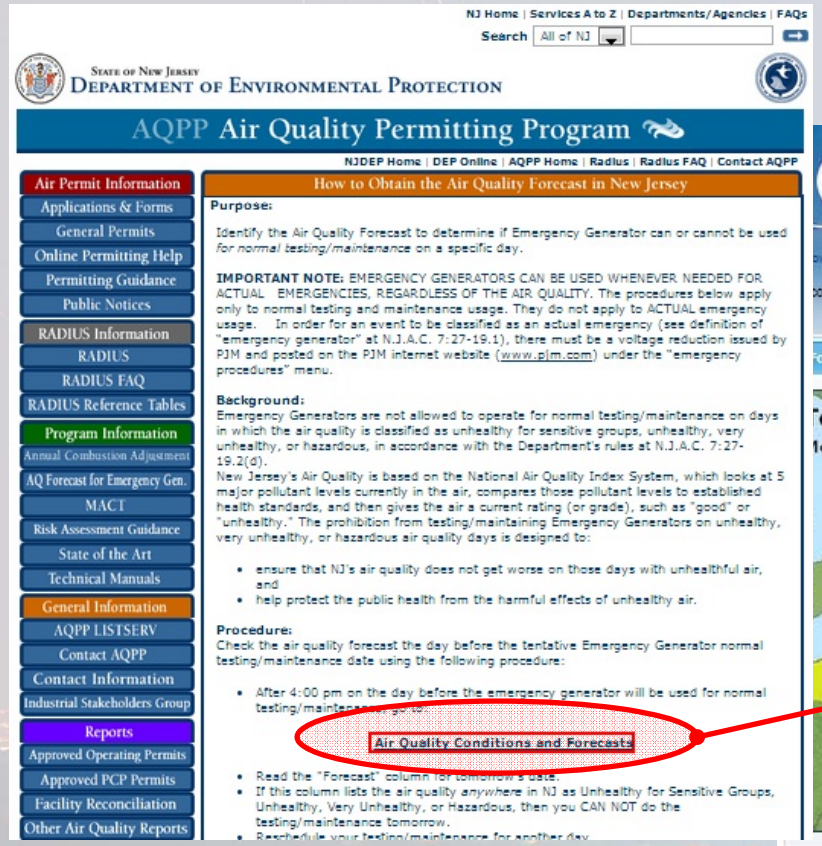
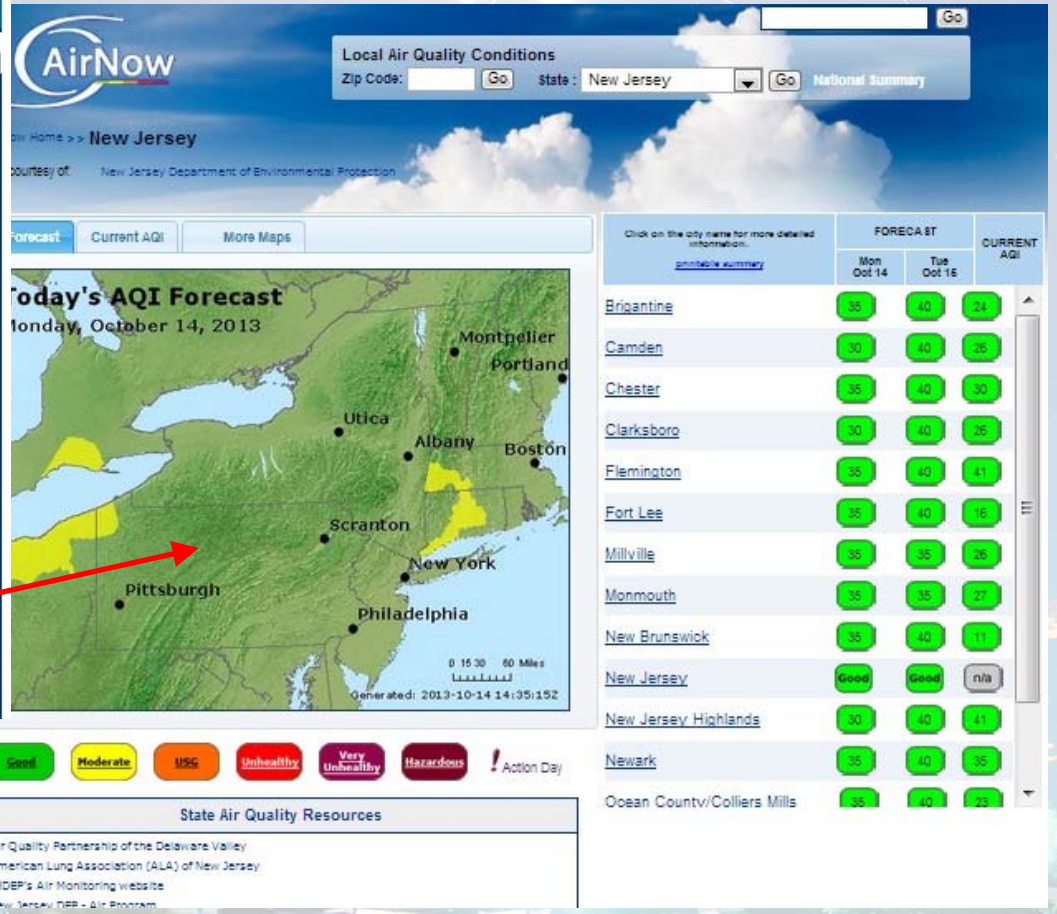
NJDEP Air Quality Program

http://www.nj.gov/dep/aqpp/aqforecast/index.htm





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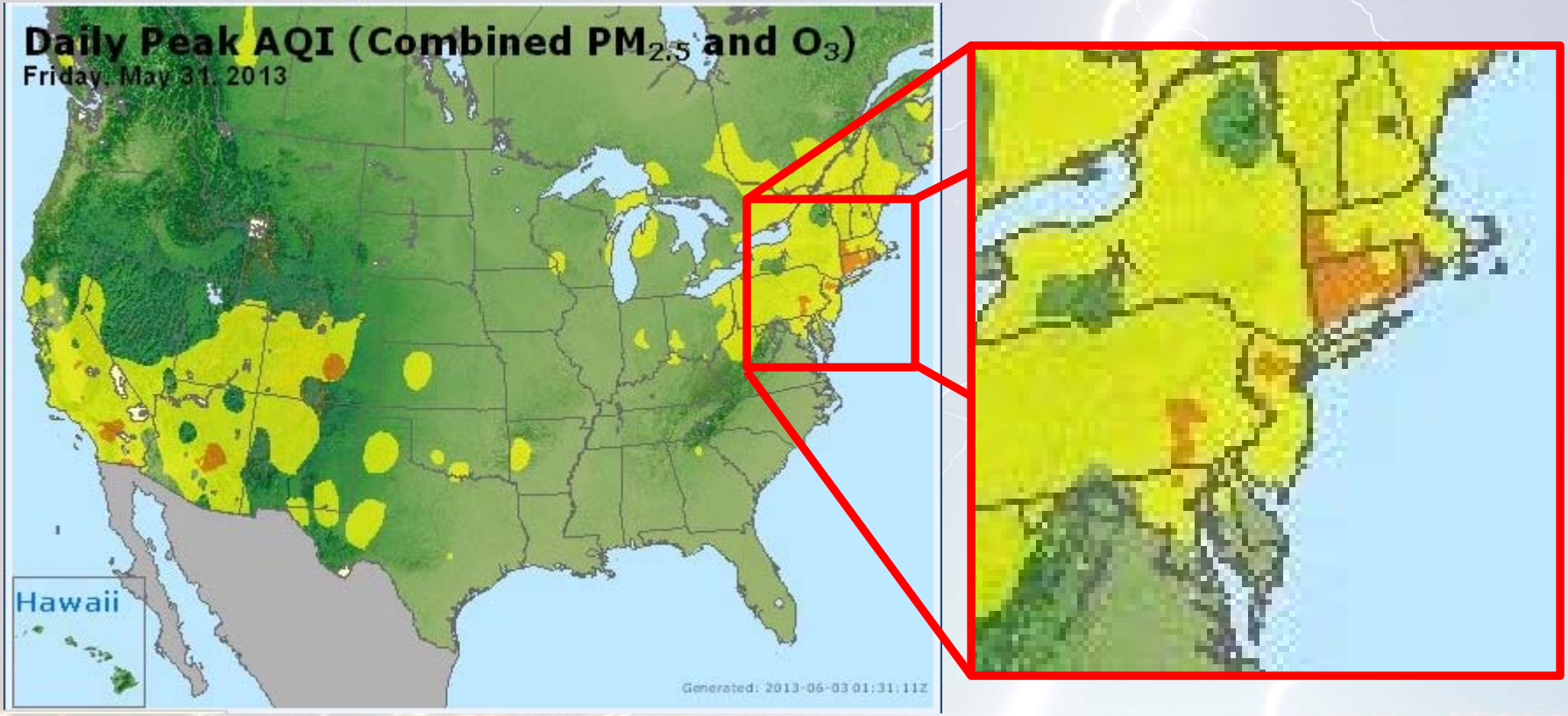
NJDEP Air Quality Program



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Maintaining a Generator

- **Keep Proper Records**
  - **Records should be kept on:**
    - **Weekly exercises/Load Tests- Signed by technician**
      - Should include recorded information (time, duration, temperatures, etc.)
      - Allows local staff to become aware of idiosyncrasies of unit- that strange thumping sound . . . .
    - **Service Provider's work**
      - Inspection Reports
    - **Parts that were repaired/replaced**
      - "Did Bob replace that water pump?"
    - **Items that have not failed but are concerning**
      - Battery is 5 years old, but still tests O.K. Will it work next week?
    - **NJDEP Air quality reports**

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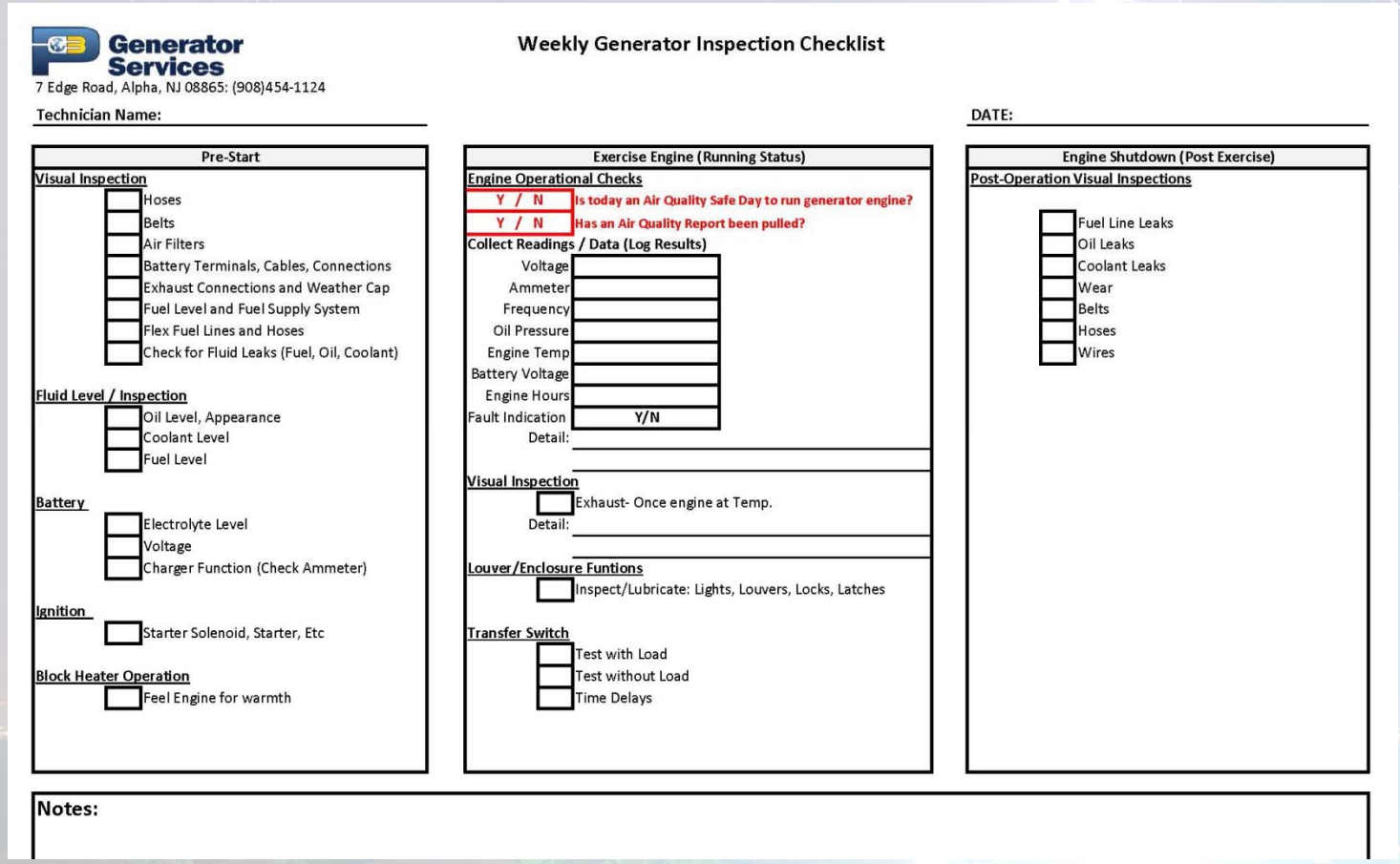
Maintaining a Generator

- **Keep Proper Records**



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7 Edge Road, Alpha, NJ 08865: (908)454-1124

Weekly Generator Inspection Checklist

Technician Name: _____ DATE: _____

Pre-Start

Visual Inspection
- ☐ Hoses
- ☐ Belts
- ☐ Air Filters
- ☐ Battery Terminals, Cables, Connections
- ☐ Exhaust Connections and Weather Cap
- ☐ Fuel Level and Fuel Supply System
- ☐ Flex Fuel Lines and Hoses
- ☐ Check for Fluid Leaks (Fuel, Oil, Coolant)

Fluid Level / Inspection
- ☐ Oil Level, Appearance
- ☐ Coolant Level
- ☐ Fuel Level

Battery
- ☐ Electrolyte Level
- ☐ Voltage
- ☐ Charger Function (Check Ammeter)

Ignition
- ☐ Starter Solenoid, Starter, Etc

Block Heater Operation
- ☐ Feel Engine for warmth

Exercise Engine (Running Status)

Engine Operational Checks
- Y / N Is today an Air Quality Safe Day to run generator engine?
- Y / N Has an Air Quality Report been pulled?

Collect Readings / Data (Log Results)

Voltage	
Ammeter	
Frequency	
Oil Pressure	
Engine Temp	
Battery Voltage	
Engine Hours	
Fault Indication	Y/N

Detail: _____

Visual Inspection
- ☐ Exhaust- Once engine at Temp.

Detail: _____

Louver/Enclosure Funtions
- ☐ Inspect/Lubricate: Lights, Louvers, Locks, Latches

Transfer Switch
- ☐ Test with Load
- ☐ Test without Load
- ☐ Time Delays

Engine Shutdown (Post Exercise)

Post-Operation Visual Inspections
- ☐ Fuel Line Leaks
- ☐ Oil Leaks
- ☐ Coolant Leaks
- ☐ Wear
- ☐ Belts
- ☐ Hoses
- ☐ Wires

Notes:

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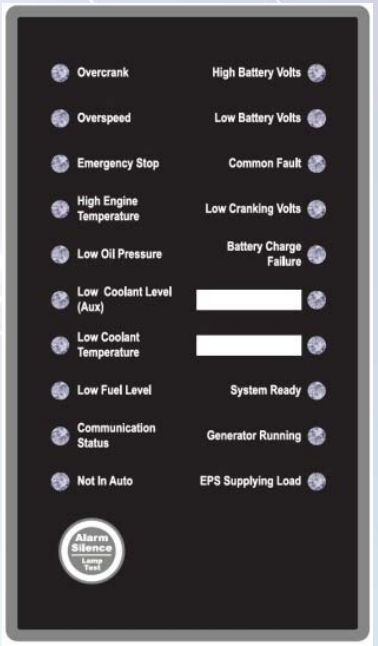
Other Considerations

- **Remote annunciators**
  - Can assist in monitoring the health of the generator outside of the weekly checks
- **Batteries**
  - A common point of failure – How old are they?
- **Battery Chargers**
  - Is it plugged in?
- **Block heaters**
  - Ensure easier cold weather starts and operation
  - Need AC power to function
- **Sound Attenuation**



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Other Considerations

- **Wiring issues**
  - Rodents chewing wires and making nests!

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Other Considerations

- **Load Banking**
  - Verifies the overall health of your generator

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Conclusion

- **Emergency Generators are:**
  - Good for the bottom line
  - A necessary part of any organization's emergency preparedness plan

- **Many Considerations to Purchasing a Generator**
  - Have all the 'Trade-Offs' been weighed?
  - Understanding YOUR options are critical.
  - While selecting the correct generator is Important, ***Properly Maintaining it is critical!***

- **Teamwork is Key to Successful Maintenance**
  - Teamwork is essential between service provider and customer
    - An educated customer that has a fundamental understanding of their system is better able to identify problems beforehand
    - Service Provider, 4 visits / year vs. Maintenance Staff, 365 days / year

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Is YOUR facility ready for the unexpected?

Some Facts to Consider:

Not a single major hurricane, has directly hit the United States in nearly eight years!

And Sandy was “just” a Post Tropical Cyclone.

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Thank You.

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