Notes from April 14, 2011 DOE Fugitive Emissions Working Group Meeting

Site Sustainability Plan Analysis (Josh Silverman, FEWG Chair)

HS-22 reviewed all of the Site Sustainability Plans (SSPs), and analyzed 11 from sites with large SF_6 inventories for commonalities, best practices, alternatives, and challenges to reducing fugitive emissions. These 11 sites include those that have large inventories but small emissions. The review showed that sites are still working through improvements to fugitive emission accounting methods; while the 2010 inventory was much better than 2008, improvements are still being made. The analysis noted that a variety of mass balance approaches are being used throughout the DOE complex; this is appropriate and expected. Some of these accounting methods have the added benefit of identifying maintenance needs to repair leaky equipment.

Sites reported FY10 emissions decreases ranging from 16.5% to 97% compared to FY08, largely from efforts to reduce SF_6 emissions. (These values do not include the Power Administrations, which do not prepare SSPs.) These dramatic decreases are attributed to reductions in purchases, leak detection and repair activities, rebuilding of circuit breakers, and installation/use of recapture equipment. Sites identified several potential SF_6 substitutes, and ASHRAE has issued position papers that identify N_2O as a valid tracer gas substitute. However, these uses of SF_6 represent a very small portion of the total SF_6 used throughout DOE, and more significant reductions will occur as a result of improved SF_6 management practices.

Highlights from the SSPs include:

- ANL set an ambitious and achievable 90% reduction goal
- LLNL incorporated SF_6 into its EMS
- PPPL incorporated routine daily rounds to improve identification of leaks and prioritize repairs
- Both PPPL and SLAC regularly weigh gas cylinders to improve fugitive emission accounting
- Y-12 decreased fugitive emissions by 97% between FY08 and FY10 (unknown if reduced solvent use or purchasing)

Recommendations:

- Incorporate fugitive emissions into their EMS programs
- Conduct opportunity assessments for processes with significant fugitive emissions (sites that have conducted opportunity assessments often found cost-effective opportunities).
- Include fugitive emissions reduction goals, and a description of activities planned or completed, in their 2011 SSPs.

Question from the field: Has there been any thought to putting together a best practices or lessons learned document describing the different inventory management practices and the benefits of each?

> Answer: This is a good idea. Many of the site presentations at FEWG meetings contain this information. The Chair offered that by the next FEWG meeting HS-22 will be ready to share Award nominations and will put together a quick inventory management lessons learned document.

Departmental Strategic Sustainability Performance Plan: Fugitive Emissions Update (Josh Silverman)

The Chair had previously provided to the FEWG the text submitted to the SPO for the Goal 1 fugitive emissions portion of the 2011 SSPP. HS-22 submitted the draft section to meet the SPO's deadline of Friday, April 8, 2011. The SPO planned to circulate a complete SSPP draft for comment the week of April 18, 2011. There will then be about a month for review of the complete document before completing the DOE internal management review and submitting the SSPP to OMB at the start of June.

The Chair pointed out the planning table on pages 2-3: fugitive emissions decreased by approximately 39% from FY08 to FY10, and the Chair proposed a DOE fugitive emissions reduction goal of 50% by 2012. Given the reductions achieved by FY10, the Chair thinks that this is an achievable goal, but requests feedback from the FEWG members as to whether the goal is too high, too low, or just right. The Chair also invited other comments on the content of the section provided to the SPO. The Chair noted that the scope of the reduction goal includes only industrial process emissions and industrial fugitive emissions (not onsite wastewater treatment and onsite landfill emissions).

Questions from the field: How does this 39% fugitive emissions reduction affect progress toward the overall DOE emissions reduction goal?

> Answer: This 39% reduction represents more than 20% of progress toward DOE's overall 28% reduction goal. In FY10, the fugitive emissions reduction reduced total DOE emissions by nearly 6%. If DOE reduces its fugitive emissions by 50%, this will contribute 7%, or one-fourth, to the overall reduction goal of 28%.

On pages 4-5 of the draft text, HS-22 added a series of good news emissions reduction stories and on page 5 elaborated on the high return on investment associated with reducing fugitive emissions. The Chair is not aware of any capital expenses for emissions reduction equipment (the pieces of equipment that have been purchased have been considered low cost expenditures), and asks that sites contact him if any capital expenses were incurred to achieve

emissions reductions. Clearly, the return on investment for reducing fugitive emissions is very favorable. DOE is reducing GHGs at a very low cost per MTCO2e reduced.

Question: Are you still looking for more success stories?

> **Answer:** Yes, always! The SSPP can include stories about what happened in FY10 and about plans for the future (subject to guidelines set forth by program offices). Also, it is never too early to begin packaging the success stories for future award submissions.

Changing EPA Policies for Fugitive Emissions Reporting: Larry Stirling (HS-22)

EPA has granted a petition to reconsider fugitive emissions from modifications subject to Prevention of Significant Deterioration (PSD) requirements. In the 1977 Clean Air Act, Congress identified 26 source categories for which fugitive emissions were considered when assessing the applicability of PSD requirements, (i.e. new installations or modifications). In 1984, EPA issued a rule in which fugitive emissions were considered for any modification subject to PSD requirements. Thus, a facility must consider fugitive emissions from a new installation or modified existing source if it is in one of the 26 source categories; a facility must consider fugitive emissions from a modified existing source if it is not in one of the 26 source categories.

In 2008, EPA issued a new rule restricting the consideration of fugitive emissions for PSD applicability to only the original 26 source categories. Thus, a facility that is not in one of the 26 source categories would no longer have to quantify fugitive emissions to determine applicability of PSD requirements. At the request of an environmental advocacy group, EPA reconsidered the 2008 rule that restricted fugitive emissions to the 26 source categories. EPA has formed a working group to review the existing rules and Clean Air Act and issue a final decision regarding the 2008 rule. In the interim, EPA has stayed the 2008 rule and continues to count fugitive emissions from all modifications towards the PSD applicability thresholds.
If a DOE site is subject to PSD, then fugitive emissions should be considered if modifications are made to existing equipment. Since EPA will be including greenhouse gas (GHG) emissions in determining PSD applicability after July 1, 2011, the final rule could impact more DOE sites. Air issues, including fugitive emissions rules and GHGs, are discussed in more detail as part of the Clean Air Working Group (CAWG). Contact Larry, Josh, or anyone in HS-22 to be added to the CAWG distribution list.

Site Presentation: Chuck Carlson (Brookhaven National Laboratory)

The Brookhaven Tandem Van de Graaff Facility **(See PowerPoint attachment previously sent to FEWG members.)**

- There are two Tandem Van de Graaff accelerators located at Brookhaven National Laboratory (BNL)

- The primary mission of these two accelerators is to support the Relativistic Heavy Ion Collider and the NASA Space Radiation Laboratory complex. The accelerators are also available for public research on a cost-recovery basis.
- History: the accelerators were built in the 1960s and installed at BNL in 1970; the facility began as a low energy nuclear facility and used a N_2/CO_2 blend as the insulating gas; in 1973, BNL began adding SF_6 to the insulating gas at 1% concentration and discovered that this improved voltage capabilities; in 1981, the accelerators were upgraded to 15+ MV using an increased concentration of SF_6 and hardware improvements
- During the 1981 upgrade:
    - BNL tested various insulating gas mixtures, settling on SF_6~ 46%, N_2~ 44%, CO_2~ 6% and O_2~ 4%
    - Driven by the cost of SF_6, recognition of the need to minimize losses, and the density of SF_6, the whole gas handling system was upgraded, including pumps, connections, and seals
- Calculated annual SF_6 emissions:
    - Total from opening the accelerators for maintenance (3 times/year for each): ~5.5lbs
    - Total annual loss (calculated from measured pressure loss): ~64 lbs SF_6 lost/year
- The piping network required to move the insulating gas around BNL is extensive – 592 potential leak locations
- Each cylinder in the gas storage area is individually valved
- Monitoring and maintenance activities at BNL are extensive:
    - The system as a whole is monitored for SF_6 leaks using SenTech IR monitoring – 2 systems are installed with locally designed plumbing/sampling capabilities and an added calibration system
    - Alarms, levels, and locations of leaks detected by the SenTech units are monitored 24/7 within the control room – if nobody is in the room and a leak happens, the computer automatically alerts appropriate personnel
    - The SenTech system is calibrated semi-annually
    - The entire system is manually checked for leaks annually
    - Every 5 years the valves are cycled out for recalibration – some of these have been coming back leaking at lower pressures and having to be sent back for a second recalibration
    - BNL uses a TIF hand-held detector for monitoring doors and relief valves during SF_6 pumping – users have been very happy with this equipment
- BNL designed, fabricated, and fast acting insulation gas containment ball valves at the ends of the accelerator tubes to contain the SF_6 in the case of accelerator tube failure.

Questions from the field:

Have the BNL accelerator tubes failed?

Answer: Yes, but fortunately not when pressurized. The failure identified the need to design the ball valves in case it happened again when pressurized.

How much SF_6 is contained in the tanks at Tandem Facility?

Answer: Approximately 45,000 lbs. (Reminder from the Chair that BNL only loses 64lbs of this per year!)

Has BNL ever had a contamination incident and had to vent everything?

Answer: No, BNL has been fortunate and never had to vent the system to atmosphere. BNL has also never had an accidental venting.

On a side note, Chuck shared with the FEWG that he had just received a quote on SF_6 from a vendor. The current price of SF_6 is in the $5/lb range.

The next FEWG meeting is tentatively scheduled for Thursday, May 12, 2011 from 11am until Noon ET. The May agenda may include a summary of E-star award nominations received and a presentation from the field.

Contact information:

Josh Silverman, FEWG chair	josh.silverman@hq.doe.gov	202-586-6535
Jeff Eagan	jeff.eagan@hq.doe.gov	202-586-4598
Corey Buffo	corey.buffo@hq.doe.gov	202-586-9661
Larry Stirling	john.stirling@hq.doe.gov	202-586-2417
Chuck Carlson	ccarlson@bnl.gov	631-344-5261