Notes from June 9, 2011 DOE Fugitive Emissions Working Group Meeting

Updates and Discussion of Fugitive Emissions Programs in 2011 DOE SSPP (Josh Silverman, FEWG Chair)

DOE submitted its SSPP to OMB for review on June 3. Much of the proposed language shared with the FEWG during the May meeting was included in the SSPP. Highlights from the section about fugitive emissions are:

- TJNAF, ANL, LLNL, and PPPL were specifically listed as examples of success stories
- FEWG activities are promoted as one of the keys for reaching Scope 1&2 GHG reduction goals
- DOE-wide fugitive emissions were 42% less in 2010 compared to 2008
- FY2011 goal is to continue reductions to 45% of 2008 emissions
- FY2012 goal is to continue reductions to 50% of 2008 emissions

Headquarters recognizes that much of the work to reduce fugitive emissions has already been completed and wants to engage members of the FEWG in discussions about potential additional reductions as well as known operational changes that have the potential to increase emissions. These discussions will inform future emissions planning and will be instrumental when the SPO updates the SSP guidance later this summer. The Chair requests input from the members of the FEWG concerning how fugitive emissions should be included in the SSPs. ANL shared during the call that they included text about the importance of reducing GHGs in the opening text of their SSP. Other sites are requested to contact Josh Silverman or Jeff Eagan to provide input and/or volunteer to participate in the SSP guidance revision process.

The Chair announced that LLNL won the first ever fugitive emissions *ES*tar award for the SF_6 reduction efforts of the Site 300 X-Ray project.

LLNL SF_6 Management (Warren Rued, Lawrence Livermore National Laboratory)
(See PowerPoint attachment previously sent to FEWG members.)

Warren Rued presented information to the FEWG about SF_6 uses, accounting and management efforts, and reduction efforts at LLNL. SF_6 is used in a number of applications throughout the laboratory including:

- Power distribution equipment – 2,136 lbs in use in main switch gear and 89 sectioning switches – another 1,000 lbs SF_6 is stored in cylinders
- Research power supplies

    - Accelerators – 13,000 lbs SF_6 used in 2 main accelerators, 1,000 lbs used in smaller accelerator, an additional small accelerator may come online in the future (state-of-the-art SF_6 collection equipment will be installed prior to resumed operation of the second smaller accelerator) – another 6,000 lbs SF_6 is stored in cylinders
    - X-ray heads and Electron microscopes – approximately 4,500 lbs SF_6 in storage containers (quantity in equipment is not tracked)
- Other research applications – approximately 1,000 lbs SF_6 in storage containers; the SF_6 used in these applications is the smallest quantity and the hardest to track
    - As an atmospheric or hydrologic tracer gas
    - Semiconductor chip research – 123 lbs SF_6 in storage containers in addition to the 1,000 listed above; some of the SF_6 is converted during the process

Historical SF_6 emissions are not well known; prior to 2005 purchasing data is the only usage information because emissions were not tracked. Based on rough estimates, emissions prior to 2005 were probably in the 100s to 1000s of lbs of SF_6 annually. Most of these emissions were from the accelerators, electrical production/distribution equipment, and large-scale R&D equipment.

In response to various state and federal climate change-related regulations, LLNL has developed and updated various management-level documents to address GHGs, including reduction of SF_6 emissions. In 2010, LLNL prepared the SSP, which committed LLNL to prepare a separate SF_6 Management Plan. The SF_6 Management Plan was completed in May 2011, and documented existing SF_6 uses, current and future efforts to reduce SF_6 emissions, and provided the framework for management of existing and future SF_6 uses. Specific SF_6 reduction goals were added to LLNL's GHG Environmental Management Plan (EMP) (part of ISO 14001 compliance). LLNL has committed to reducing SF_6 use to the extent practical, recognizing that there are no viable substitutes for many of the experimental applications on site.

Site-wide reduction commitments include eliminating operations where available, reducing the storage inventory, and making significant efforts to capture and reclaim the SF_6. Area specific reduction efforts include:

- Site 300's X-Ray project (*ES*tar award winning project) has made major reductions in SF_6 usage by adding gas scrubbers to the process (increases the useable lifetime of the SF_6), adding a portable reclamation cart, and adding electronic scales to track SF_6 usage. A proposed future change to further limit SF_6 losses is to move the valves closer to the filters, which will reduce the total amount of SF_6 that has to be evacuated when a filter needs to be changed. In addition to saving SF_6, these changes have resulted in labor

savings as well because using cleaner SF_6 results in the equipment needing to be cleaned less often.

- The B190 CAMS accelerator was previously the largest source of SF_6 emissions at LLNL. The age and design of the transfer system lead to losses of a couple hundred lbs of SF_6 during every transfer (up to 10 transfers per year). The transfer process has been proceduralized to include consistent, system-wide use of sniffers during every transfer, allowing for the immediate identification and fixing of leaks. LLNL has provided a $50,000 award to make additional proposed improvements: rebuilding one of the gas compressors (to remove the greatest threat of catastrophic loss), replacing old valves on the gas transfer system, and purchasing a dedicated gas recovery cart for the smaller accelerators.
- The Maintenance and Utilities Service Division has replaced utility system circuit breakers with vacuum interrupting breakers that do not require SF_6, added SF_6 recovery systems for maintenance on the switchgear, and revised maintenance procedures to include pressure monitoring that would indicate a possible leak.

Site-wide SF_6 management changes have included adding reduction goals to the EMP, adding work control processes, adding SF_6 to the chemical tracking system using bar codes to track movement of cylinders, updating purchasing procedures to require environmental management approval for purchases of SF_6, and increased emissions and inventory reporting efforts to maintain compliance with CA regulations. The SF_6 purchase approval requirement ensures that LLNL environmental management is aware of the locations and uses of SF_6 throughout the site. Additional SF_6 handling and disposal training is also being provided site-wide.

Managing SF_6 Emissions at ANL (Gregg Kulma, Argonne National Laboratory)
(See PowerPoint attachment previously sent to FEWG members.)

Gregg Kulma presented an update of SF_6 management practices at ANL. (ANL was one of the first sites to present SF_6 management information to the FEWG in 2010.) SF_6 users at ANL include electrical switch gear, electron microscopes, accelerators, and Van de Graaf generators. Looking forward, some of these users are planned to increase operations, some to decrease, and some to stay about even.

ANL reported purchasing 7,800 lbs of SF_6 in 2008. In FY 2010, ANL used the mass balance calculation to determine that 1,400 lbs of SF_6 were emitted. These emissions reductions are due in part to using the more accurate calculation methodology, but are also due to the actions of the newly formed (in 2010) SF_6 users group, which closely examined equipment and processes

for leaks using newly purchased sniffers and other leak detecting equipment and provided the information to the facility managers

The Argonne Wakefield Accelerator (AWA) is the largest emitter of SF_6 at ANL (805 lbs in FY2010). The AWA is a series of small linear accelerators, each containing 10-20 lbs of SF_6. Currently, all of the gas placed into the AWA is eventually lost. The SF_6 users group is focusing on the AWA because it is already the largest emitter and a 5x expansion of the AWA is planned for the near future, increasing the need to figure out how to avoid SF_6 emissions now. Equipment currently working through the procurement process include a Dilo recovery cart ($77,000, should result in almost 100% recovery) and scales to weigh cylinders as they enter and leave ANL. The users group is also looking into purchasing a smaller portable recovery system for use by multiple small SF_6 users. The option currently being considered will cost $15,000-20,000.

A simple survey of SF_6 users was recently conducted to keep the focus on emissions and maintain an open dialogue with the users. The survey results indicated that the leak detection equipment had been helpful, identified met and unmet needs for achieving emissions reduction needs (for example, one group ordered a gas recovery system and another needs to hire a pipefitter contractor), and provided information about plans to reduce SF_6 emissions.

The Chair thanked both presenters and emphasized to the FEWG the simplicity and usefulness of conducting such surveys at other sites.

Jeff Eagan invited all sites to share their efforts with the FEWG, and noted that sharing does not necessarily require a full presentation.

The next FEWG meeting is tentatively scheduled for Thursday, August 11, 2011 from 11am until Noon ET.

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