The meeting was opened by Chairman Susan Shoemaker Benedict at 4:00 p.m. with a quorum present.

**Welcome and Introductions:** All meeting attendees provided a short introduction of themselves.

**Declarations of Conflict of Interest and Ex Parte Communication:** In order to remove any doubt of impropriety, the following task force and/or sub-committee members have declared interests. Bob McDaniel – Business Development Coordinator, G.O. Hawbaker, Inc. supplying contract work for drilling companies; Susan Shoemaker Benedict – property owner with expected gas industry development; Steve Greer – Senior Project Manager with Arm Group, Inc., sub-contractor/consultant to various companies involved with the gas drilling industry; Ken Hall – actively involved with property lease management; Greg Myers – Senior Engineer/Senior Geologist, DMS Environmental Services, providing...
services to the oil and gas industry; Joe Hart – employed by HRT, Inc. & PA Brine, who serve as sub-contractors to the natural gas industry; John Ferguson – employed by Columbia Gas of PA; Dean Lawrence – realtor with commercial real estate activity of interest to the natural gas companies; John Rodgers – banker with Fulton Bank providing financial services to the gas industry; and Steve Lyncha – engineer with HRG providing consulting and engineering services to the industry and Colleen Williams working in business development for HRG resulting in frequent consultations with the industry.

Approval of Prior Meeting Notes:

Following a motion by Ken Hall and seconded by Tim Ziegler, the minutes of the January 9, 2012 meeting were approved as presented.

Announcements:

- Larry Wess, PA School Study Council, provided information and registration forms for the March 15, 2012 workshop titled “Understanding and Preparing for Marcellus Shale Impacts in Your School District”. The purpose of the workshop is to provide educators, administrators and community stakeholders with informational resources that can aid them in making decisions to minimize the challenges and maximize the benefits associated with rapid gas development and community change. The workshop will be held at the Nittany Lion Inn, University Park, PA.

Citizen Comment: None offered.

Presentation: “Penn State’s Switch Away From Coal to Natural Gas” presented by Paul Moser, Superintendent -- Steam Services, Penn State University.

Much of the information presented by Paul is contained in the attached document, “Steam Services”. Additional points of interest:

- The primary responsibility of Penn State’s two power plants is to produce steam to service approximately 200 buildings on campus. The primary source of steam is the West Campus Steam Plant. The East Campus Steam Plant essentially serves as a “peaker plant” to supplement the system and is essential for campus demand during a total loss of power.
- East Campus Steam Plant (ECSP): primary source of fuel is natural gas with #2 fuel oil as a backup. It operates at 70% efficiency.
- West Campus Steam Plant (WCSP) is fueled by coal and natural gas and operates at 50-60% efficiency.
- Conversion of the WCSP from coal to natural gas is driven by the need to meet air emission standards. Flue gas emissions from the 4 coal-fired boilers are filtered through a baghouse, which will be removed after the conversion to natural gas.
- The current natural gas supply line capacity to campus is insufficient to meet the expansion requirements.
  - Six variable routes have been charted for extending the NG pipeline to the WCSP but none have been selected.
- By 2015, it has been projected that the University will only purchase 67% of their electricity demand. The other 33% will be NG generated on campus.
- In response to a question from the audience, the Columbia Gas representatives in attendance confirmed that their company has the capacity to supply the needed natural gas.

Old Business:

- Mobile Energy Education Training Lab: covered under the Education Committee Report

New Business: None offered.

Committee Reports:
**Economic Development:**

Stan LaFuria presented Guideline Document #6 – “Alternative Fuel Consideration for Fleet Applications” to the task force for their input and recommendations. All members had previously received the document via email with a request to review it prior to the meeting.

On a motion by Ken Hall and seconded by Steve Greer, the task force members approved the document, as presented, for submittal to the Centre County Board of Commissioners for their consideration and authorization to distribute.

Upon approval by the Board of Commissioners, this document will be posted to the Centre County Government / Natural Gas Information webpage and sent directly to fleet operations in the county.

**Education:**

Todd Taylor made the following three announcements on behalf of the committee:

- **Saturday, April 14th** – CPI will host the Centre County Public Issues Forum, “The Marcellus Shale – What Does It Mean For Us?” The event will extend from 9 a.m. to 3 p.m.
- **Thursday and Friday, April 19th and 20th** – MEET-U Trailer and Career Fair at CPI. Hours of operation will be available for both school attendance and public visitation.
- The US Department of Labor has awarded a $500 million grant to Marcellus ShaleNET for education and training. As part of the Clinton, Centre, Clearfield Consortium, CPI will be offering CDL Training through this program.

**Environment:**

Tim Ziegler provided a report summarizing the committee meeting that was held immediately prior to the task force meeting with Paula Ballaron, Susquehanna River Basin Commission, and David Jostenski, Chief of the Water Use Assessment Section of PA DEP. Due to the timing of this meeting, there was no opportunity for the committee to synthesize the following information into a plan of action. Tim’s report focused on information for community water system providers who may be interested in selling water to the natural gas industry.

- **Stream Augmentation for Better or More Convenient Water Withdrawal Points:** Permit issues may preclude the ability to achieve this.
- **Unused Water Sources:** Possibilities exist.
- **Optimal Withdrawal Points:** Essentially this would be a county-wide plan that would evaluate the most preferred (based on criteria yet to be established) locations for water withdrawal.
- **Use of residual wastewater rather than drinking water** was discussed but at the present time DEP will not permit use of wastewater through their permitting process.

**Public Policy, Planning and Legal Issues:** No Report.

**Meeting Schedule:**

- **CCNGTF:** March 12, 2012 at CPI at 4 p.m. (Second Monday, Monthly)
  - Program: “Air Quality / National Energy Technology Laboratory” by Natalie Pekney, Environmental Services Division.
  - Election of Officers.
- **Economic Dev. Sub-Committee:** March 8th at 7:30 a.m. – Willowbank Building, 3rd Floor
- **Environmental / Infrastructure Sub-Committee:** March 1st at 9 a.m. – Willowbank, 3rd Floor

**Meeting Adjourned:** The February meeting of the Centre County Natural Gas Task Force was adjourned at 5:45 p.m.
Welcome to Steam Services. Steam Services consists of 46 technical service and staff employees, 2 power plants, and the campus-wide utility distribution systems for steam, condensate return, natural gas and compressed air. Together, the coal-fired West Campus Steam Plant [WCSP] and the natural gas fired East Campus Steam Plant [ECSP] provide steam to the university.

**West Campus Steam Plant**

WCSP was constructed in 1929. It consists of four 1960’s vintage coal-fired boilers each rated at 110,000 pounds per hour steam production and one 1947 vintage coal-fired converted to natural gas fired boiler rated at 45,000 pounds per hour. All condensate returning from campus flows to WCSP. Water treatment includes polishing softeners for condensate return water and ion exchange softeners with reverse osmosis demineralization for makeup water. Makeup percentages range from 25% to 35%.

Flue gas emissions from the coal-fired boilers are filtered through a baghouse consisting of 2,112 Gore-Tex membrane bags each 23.5 feet long by 8 inches in diameter. Sulfur Oxide emissions are controlled by compliance coal.

Two 1930’s vintage backpressure steam turbines rated at 2.5 mW and 3.5 mW generate electricity to serve Penn State’s emergency power needs. Power generated by the turbines amounts to less than 6% of PSU’s total power needs. However, the power generated by the turbines amounts to 100% of PSU’s emergency power needs. Turbine-driven equipment throughout the plant produces low-pressure steam for campus.

**East Campus Steam Plant**

ECSP was constructed in 1972. It consists of two 1970’s vintage packaged natural gas/oil boilers each rated at 100,000 pounds per hour and one combustion turbine with heat recovery steam generator installed in 2011.

The ECSP is fully controllable from the WCSP. However with the installation of the CT/HRSG the plant is now staffed full-time.

Since all condensate returning from campus goes to WCSP, the ECSP is a 100% makeup facility. Makeup water is treated with ion exchange softeners and reverse osmosis demineralizers.

I hope you enjoy yourself on your tour today.

Paul Moser, PE, CEM
Superintendent, Steam Services
Home Page: http://www.opp.psu.edu/about-opp/divisions/ee/util/steam-services

Plant Locations:
- **WCSP** Corner of West College Avenue and Burrowes Road
- **ECSP** Porter Road between Park Avenue and College Avenue

Fast Facts:
- **2010/11 Data**
  - Buildings Served by the Steam Distribution System: more than 200
  - Heating Area: 14.1 million sqft.
  - Steam Generated: 1,412,050,134 pounds
  - Peak Steam Generated: 397,000 pph [Jan. 24, 2011]
  - Peak Daily Coal Consumed: 368 tons
  - Coal Consumed: 71,255 tons
  - Natural Gas Consumed: 135,727 mcf
  - No. 2 Fuel Oil Consumed: 7,469 gallons
  - Bottom Ash Generated: 7,533 tons
  - Fly Ash Generated: 1,283 tons

Employees:
- Total Full Time Employees: 46
- Supervision and Staff: 6
- Technical Service: 40
- Staff Assistants: Tammy Maslanik, Carla Ruscio

Power Plant Operations [Supervisor: Gene Kurtz]
- 6 Lead Operators
- 6 Operator Mechanics
- 6 Boiler Operators
- 6 Coal/Ash
- 2 Laborers

Power Plant Maintenance [Supervisor: Tim Thomas]
- 1 Lead Mechanic – Al Haagen
- 2 Mechanics
- 3 Meter Technicians
- 1 Electrician
- 1 Preventive Maintenance Mechanic

Steam Distribution. [Supervisor: John Molnar]
- 1 Lead Mechanic – Jim Smith
- 5 Mechanics
- 1 Meter Technician

Fuels

**Coal**
- Type: Bituminous Coal – Primarily Appalachian Region
- Average Amount in Stock: 5,900 tons
- Heat Content: 13,600 dry
- Sulphur Content, Avg.: < 2.0%
- Coal Cost: $125.50 per ton
- Energy Cost: $4.60 per mmBtu

**Gas**
- Type: Natural Gas
- Heat Content: 1,073 Btu/cf
- Burner Tip Cost: $7.00 per mcf
- Energy Cost: $6.86 per mmBtu

**Oil**
- Type: #2 Fuel Oil
- Storage Capacity: 350,000 gallons
- Heat Content: 142,000 Btu/gal
Delivered Cost $3.50 per gallon
Energy Cost $24.65 per mmBtu

West Campus Steam Plant

The WCSP provides Low [13 psig] and Medium [150-170 psig] pressure steam to Penn State’s University Park Campus. Steam is used for heating, cooling, dehumidification and processing. Processing includes such uses as energy for cooking, experimental work, and laundry.

Low-pressure steam comes from backpressure steam turbines that drive pumps, fans and generators.

Steam Generation

Steam is generated in 4 coal-fired, water-tubed boilers and one gas fired water-tubed boiler. Each coal-fired boiler is rated at 110,000 pounds of steam per hour [pph]. The gas-fired boiler can deliver about 45,000 pph.

Superheated steam is delivered to the main plant header at 240 psig, 540 °F. Steam is distributed to the plant for heating and sootblowing and to the campus distribution system.

Coal is burned on vibrating grate stokers. Each coal-fired boiler can be co-fired with natural gas up to about 25%. The natural gas burners are primarily used for startup and shutdown of the boilers but are also used when coal gets wet.

Water Quality

Raw water is supplied from 2 sources: Campus Water [primary] and Borough Water [backup]. Ion exchange water softeners remove calcium and magnesium hardness. Ground water has about 350 ppm of hardness. This is reduced to 0 ppm through the softeners. Soft water is then treated by a Reverse Osmosis deminerilazation system. Ground water has about 550 ppm of total dissolved solids. The RO system reduces this to less than 10 ppm tds or more than 98% reduction which dramatically reduces boiler blowdown losses.
Electricity Generation

The WCSP is served by two 1930's vintage Elliot steam turbine generators rated at 2.5 mW and 3.5 mW each.

Electric generation is proportional to the low-pressure steam demand of campus. Annual electrical production amounts to less than 6% of the campus electrical demand but 100% of the emergency power requirements for the university.

Electric Generating Equipment [located at WCSP]:

<table>
<thead>
<tr>
<th>Generator</th>
<th>Unit #2</th>
<th>Unit #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>2500 kW</td>
<td>3500 kW</td>
</tr>
<tr>
<td>Speed</td>
<td>3600 rpm</td>
<td>3600 rpm</td>
</tr>
<tr>
<td>Voltage</td>
<td>4160 volts</td>
<td>4160 volts</td>
</tr>
<tr>
<td>Cooling</td>
<td>Air</td>
<td>Air</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Elliott</td>
<td>Elliott</td>
</tr>
<tr>
<td>Date Installed</td>
<td>1938</td>
<td>1949</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turbine</th>
<th>back-pressure</th>
<th>back-pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>3600 rpm</td>
<td>3600 rpm</td>
</tr>
<tr>
<td>Steam Temp.</td>
<td>530 Degrees F</td>
<td>530 Degrees F</td>
</tr>
<tr>
<td>Steam Pressure</td>
<td>250 psig</td>
<td>250 psig</td>
</tr>
<tr>
<td>Exhaust Steam Press.</td>
<td>13-psig</td>
<td>13 psig</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Elliott</td>
<td>Elliott</td>
</tr>
<tr>
<td>Date Installed</td>
<td>1938</td>
<td>1949</td>
</tr>
<tr>
<td>Horsepower</td>
<td>3353</td>
<td>5360</td>
</tr>
<tr>
<td>Controls</td>
<td>Electronic</td>
<td>Electronic</td>
</tr>
</tbody>
</table>
Emissions Control

The Baghouse, Chimney and Induced Draft [ID] fans were installed in 1986 greatly decreasing particulate emissions from the plant.

Baghouse data is provided below.

The Chimney is 194 feet tall. The access platform is located 110 feet above grade. The top inside diameter is 8 feet. The bottom outside diameter is 22 feet.

Opacity emissions are monitored at the access platform location. The chimney has two main structural components: a brick outer column of curved-faced brick and an independent full-height brick lining.

Three ID fans provide draft for the 4 coal-fired boilers. They are driven by 700 horsepower steam turbines. Draft pressure at the inlet to the fans is about –14 inches-H$_2$O. The pressure drop across the baghouse changes with boiler load and ranges from about 3 to 5 inches-H$_2$O.

Manufacturer: American Air Filter
Model: Amertherm 11-240 Type 8
Negative press
Gas Volume: 242,600 ACFM at an inlet temp of 393°F (designed to support 350,000 pph boiler cap)
Cloth Area: 106,170 sq. ft., 2:01 ratio
Compartments: Eleven (11) compartments with one pyramid hopper per compartment
Bag Arrangement: 192 Gore-Tex bags per compartment for a total of 2,112, 8" diameter, 23'-6" long. Forty-eight (48) thimbles are capped off in each compartment. Gore-Tex bags installed in 1993 and replaced in 2005.
Cleaning: Reverse air, cleaning initiated by the collection cycle timer or by the high-differential switch
Bypass Features: High inlet air temperature, 450°F
High collector differential press (8" wg) (from inlet to outlet)
Loss of electricity
Loss air pressure, 70 psig
Manually by selector switch
Coal Handling

The Coal Handling system consists of a covered lay down yard that can store about 7,000 tons of coal. The above grade [active] portion of the pile stores about 5,000 tons of coal. An additional 2,000-3,000 tons are stored below grade.

Tri-axle trucks carrying about 23 tons per load deliver coal daily. In winter heating conditions the plant receives 20-30 trucks of coal per day from 7am to 2 pm.

Coal is dumped into a hopper that feeds a skip hoist. The skip hoist is original plant equipment installed in 1930. Its counter-weighted incline carrying system delivers about 1,500 pounds of coal per trip to the coal-bunker.

A 900-ton bunker located inside the plant supplies coal to each of the boilers by gravity or by chain system referred to as the Under Bunker Conveyor system. Stock feeders weigh and deliver coal to the boiler distribution hoppers that feed the stoker beds.

The schematic on the next page shows how coal moves through the system to the boilers.

Ash Handling

Bottom and Fly ash are handled in separate systems.

A steam-venturi vacuum system conveys bottom ash. An air blower system conveys fly ash.

Both bottom and fly ash are stored in silos located inside the plant. Ashes are unloaded using a wet system for dust suppression.

Bottom ash meets beneficial use criteria set by Pennsylvania Department of Environmental Resources [PA DEP]. It is used locally for road maintenance. It is also used by a contractor for manufacturing architectural concrete blocks.

Fly ash is disposed in a local landfill.
East Campus Steam Plant

The ECSP was placed in service in 1972 with two packaged D-Boilers each rated at 100,000 lb/hr firing either natural gas or no.2 fuel oil. In 2011, a Combustion Turbine with Heat Recovery Steam Generator (CT/HRSG) was added. The HRSG has a steaming capacity of 32,000 lb/hr unfired and 117,000 steaming capacity fully fired with ductburners. ECSP has no low-pressure steam generation capability. It provides 100-150 psig steam to campus only.

Originally designed to provide steam during peak heating demands, the CT/HRSG now operates continuously generating at least 32,000 lbs/hr with the HRSG unfired. The ECSP plant also provides all of the campus steam needs during the annual WCSP plant outage normally scheduled in August.

ECSP boilers can be controlled both locally and remotely from WCSP. When the CT/HRSG is operating, ECSP is staffed 24/7 with one operator. When the CT/HRSG is out of service, ECSP is controlled from WCSP. Boilers are placed on line and taken off line by an operator. Operators conduct a walk around of the plant at least once every shift. Boilers have all the normal safety devices and can also be shutdown remotely from WCSP.

Feedwater pumps and air compressors can be started and stopped from WCSP. Since all condensate is returned to the WCSP, ECSP requires 100% makeup water. It is provided by the campus water system and is treated by ion exchange water softeners and reverse osmosis demineralizers.

Location: Porter Road between Park Avenue and College Avenue

Steam Generation:

<table>
<thead>
<tr>
<th>Boilers 1 and 2</th>
<th>Combustion Turbine</th>
<th>Heat Recovery Boiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Keeler</td>
<td>Solar</td>
</tr>
<tr>
<td>Date Installed</td>
<td>1972</td>
<td>2011</td>
</tr>
<tr>
<td>Type</td>
<td>Package D-type</td>
<td>Taurus 70</td>
</tr>
<tr>
<td>Capacity</td>
<td>100,000 pph</td>
<td>7 mW</td>
</tr>
<tr>
<td>Conditions Fuel</td>
<td>220 psig, Saturated</td>
<td>12,470 volts</td>
</tr>
<tr>
<td>Primary Fuel</td>
<td>Natural Gas</td>
<td>natural gas</td>
</tr>
<tr>
<td>Backup Fuel</td>
<td>#2 Fuel Oil</td>
<td>#2 Fuel Oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>none</td>
</tr>
</tbody>
</table>
Compressed Air:

<table>
<thead>
<tr>
<th></th>
<th>Unit #1</th>
<th>Unit #2</th>
<th>Diesel Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Screw</td>
<td>Screw</td>
<td>Screw</td>
</tr>
<tr>
<td>Capacity SCFM</td>
<td>1500</td>
<td>1250</td>
<td>450</td>
</tr>
<tr>
<td>Drive</td>
<td>Electric Motor</td>
<td>Electric Motor</td>
<td>Diesel Engine</td>
</tr>
<tr>
<td>Drive Horsepower</td>
<td>300</td>
<td>300</td>
<td>152</td>
</tr>
<tr>
<td>Discharge Pressure</td>
<td>100 psig</td>
<td>125 psig</td>
<td>100 psig</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Gardner-Denver</td>
<td>Gardner-Denver</td>
<td>Gardner-Denver</td>
</tr>
</tbody>
</table>

Fuel Consumption 2010/11 at the East Campus Steam Plant:

- Gas: 105,000 mcf
- Oil: 22,000 Gallons
- Oil in Stock: +200,000 Gallons

Utilities Distribution

The Utilities Distribution Crew is responsible for steam, condensate, compressed air, and natural gas.

The system consists of approximately 17 miles of steam distribution piping, 8 miles of direct buried piping and 4 miles of tunnels. There are 176 manholes.

The natural gas distribution system complies with Federal Department of Transportation Pipeline Gas regulation Part 192.