EXHIBIT NO. ___(RWS-10)
DOCKET NOS. UE-111048/UG-111049
2011 PSE GENERAL RATE CASE
WITNESS: ROBERT W. STOLARSKI

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-111048** **Docket No. UG-111049**

NINTH EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED REBUTTAL TESTIMONY OF ROBERT W. STOLARSKI ON BEHALF OF PUGET SOUND ENERGY, INC.

JANUARY 17, 2012

2012 Verification Plan

December 21, 2011

PUGET SOUND ENERGY
The Energy To Do Great Things

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Definitions

The following definitions are consistent with current and proposed operating practices by PSE EES staff. Similarly, they are consistent with definitions in the EM&V Framework:

- **EM&V** -- A catch-all term for evaluation activities at the measure, program or portfolio level; can include impact, process, market and cost effectiveness analysis. EM&V is distinguishable from M&V or programmatic M&V as described below. Please refer to the EM&V Framework for a complete description of EM&V activities as part of EES.
- **Evaluation** -- The performance of studies and activities aimed at determining the effects of a program and/or portfolio; any of a wide range of assessment activities associated with understanding or documenting program performance, assessing program or program-related markets and market operations; any of a wide range of evaluation efforts including assessing program-induced changes in energy efficiency markets, levels of demand or energy savings, and program cost effectiveness.
- **Measurement & Verification (M&V) –** The process of determining and validating savings. Per the International Performance Measurement and Verification Protocols (IPMVP), M&V activities are one of four options. However, in this document, the technical definition for developing individual measure savings is just a part of what is being considered as M&V. Here, M&V includes data collection, monitoring, and analysis associated with the calculation of gross energy and demand savings from individual sites or projects. These activities are reviewed and documented to establish the due diligence in achieving accurate energy savings and not the actual savings analysis itself (which is what is outlined in the IPMVP). These set of activities can also be a part of EM&V.
- **Measurement** – Measurement is the activity of collecting energy consumption data over time for use in energy savings analysis. This may include primary research (e.g., billing analysis, metering) for the purpose of determining the energy use/savings of the installed measures.
- **Verification** – A component of overall M&V efforts aimed at verifying installations of energy efficient measures and associated documentation through review of documentation, surveys and/or on-site inspections. Verification activities are the compilation of the processes used to report the suitability of the savings documented for the measure. This may include invoice and/or calculation review as well as on-site inspection.
- **Quality Assurance (QA)** - The purpose of QA is to validate the integrity of the data via an overall management plan or process (such as checklists, audits, standards, and methodology development). QA is process oriented to prevent any errors and is built into the implementation process.
- **Quality Control (QC)** - QC is meant to assess the quality of the analytical data or the tools used for measurement to identify any errors. QC is a subset of QA. QC may include inspections, peer reviews, and tracking database reports that test the process (i.e., did the measure meet the requirements).

Introduction

As articulated in the Measurement & Verification Policies, Guidelines, Protocols & Process document[1] the Verification Team will:

- Provide an on-site independent check of measure installations for various programs within PSE's EES group
- Assist EES Program Implementation teams in on-site verification
  - Checking for contractor quality installation
  - Confirming quantities
  - Confirming model #s
- Ensure that customers and contractors have installed qualifying measures
- Communicate with customers and contractors regarding specifications
- Document and report results of site visits
- Develop proper and consistent on-site verification practices
- Conduct regular checks of tracking reports to assess program progress and accuracy
- Verify accuracy of rebates, coupons, and/or invoices to ensure that the reporting system is accurately recording

The above list reflects the Verification Team's ongoing role in Programmatic Measurement & Verification. Additionally the Verification Team is currently continuing work with KEMA to develop further guidance on Verification protocols. KEMA is positioned to provide support to PSE in the assessment of their Verification team program, to recommend ways to optimize current processes, and to leverage its knowledge of industry best practices from which those recommendations will be made. In the 1st quarter of 2012, PSE will develop a Verification Manual that will document verification responsibilities of PSE's EES staff and verification processes for the Verification Team.

Background:

PSE programs have well established and consistent savings calculation and verification methods but do not generally have detailed documentation on these methods. As goals increase and the program teams expand, PSE programs teams are making efforts to improve the quality of program documentation and energy savings by incorporating higher levels of measurement and verification activities.

Energy savings calculations and application review methods do vary since PSE programs target a wide range of measures. There is a PSE review standard for all rebated applications at the budget and administration level. Invoices, calculation documentation for savings and incentives along with the appropriate checks and site visit summaries must be presented to high level reviewers for approval of

[1] Attachment 2 of the EM&V Framework; Measurement & Verification Policies, Guidelines, Protocols & Processes, January 1, 2012

high dollar amount projects. Each program however, has its own way of calculating savings and creating tools to help program team members stay consistent.

Managing Verification Activities

Efforts to improve M&V can be seen in the creation of a Verification Team within EES to cover multiple programs. The Team is responsible for conducting on-site inspections and invoice reviews to verify installation of rebated equipment. Currently the Team focuses mainly on residential and small business lighting (SBL) programs, many of which historically conducted a small percent of site inspections. These programs are now able to increase inspection rates.

The Verification Team conducts business sector inspections when needed. Program teams are in the process of determining how best to utilize the Verification Team to maximize verification efficiency. Each program provides a list of projects that are eligible for on-site visits, and it is up to the Verification Team to choose an inspection sample from this list.

The Verification team's approval is generally not currently required for incentive payment given that invoices are verified by individual program teams during review. However, the Verification Team will on request of the program implementation manager conduct pre incentive payment verifications.

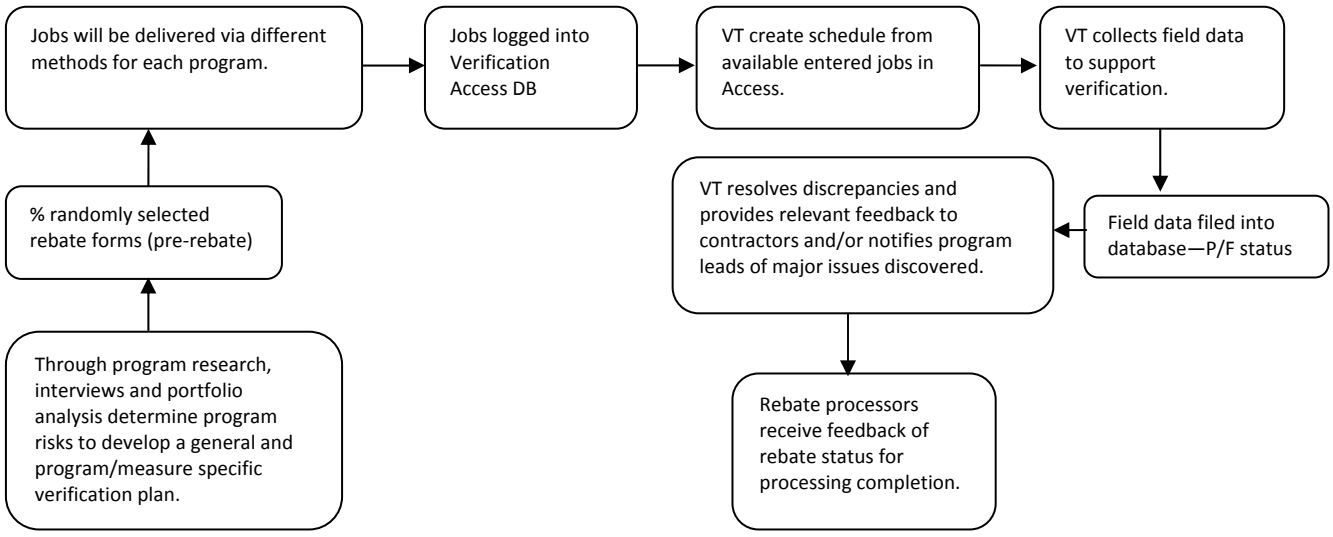
The Verification team has developed inspection templates so that the information type and the level of details captured are consistent at every visit and findings can be communicated to the implementation manager to deal with any problems that occur. Further documentation of the site verification process is in development.

Verification activities can be categorized into three groups: 1), those with a high volume of rebates with per unit energy savings, such as most residential programs and some business programs, and for 2), those with a custom savings estimation and a limited numbers of customers, such as PSE's C&I Retrofit programs. There are differences in the verification processes for the three groups. The different approaches to Verification are described below:

Standardized Approach to Rebate Programs Verification

Each EES rebate program has a different level of on-site verification depending on program needs, risks, and volume of applications received.

Current Rebate Program Verification Process Flow:



PSE's EES Rebate Programs

Rebate programs are generally targeted at large populations of customers, usually Residential programs and some Business programs.

Levels of Verification for Rebate Programs

The Verification Team categorizes rebate measures into three groups, low, intermediate and high risk. Risk is associated to the level of probability that a product doesn't meet qualifications to receive incentives. It can also refer to how or how much savings we are taking for a particular measure. Presently we can assume as qualifications for measures become more complicated the risk for potential inaccuracies increase.

Sample rates include varying levels of inspection rigor according to the level of risks and costs associated with program transactions. By establishing performance metrics this will help identify error tolerance levels and trigger points. This framework will determine the amount of energy savings expected for each program to make recommendations for verification inspections. Recommendations on sampling units, sampling variables, sample sizes for each program/measure is in the works, and expect to have this outlined by 1st quarter of 2012.

Low Risk

- Low rebate levels
- High level of quality control without site verification
- Mature offerings where there is a strong understanding of deliverables by all parties and high level of probability

Intermediate Risk

- Higher rebate values
- Additional qualifiers required to participate
- Simple pilots/new programs
- Programs where low levels of documentation required (new construction example)

High Risk

- Complex pilots
- Complex projects that may include multiple qualifiers/tasks in order to receive incentives
- Very high incentive levels
- Elevated awareness
- Programs that may have initially fallen under first two categories and has been elevated
- PSE programs delivered by 3rd parties
- Programs where safety to PSE customers is an element of the program

The following tables provide a breakout of our current ranking of measures and programs according to risk level:

Low Risk

Storage electric water heaters (.95)	Customer invoice gives us a very high probability product is installed as ordered.
Energy Star Gas Furnace (existing)	Mature product, solid invoicing process, $100 incentive
Energy Star Tankless Water Heater (gas)	Mature product, solid invoicing process, $150-$200 incentive
Energy Star Water Heating (gas)	Mature product, low incentive levels, high probability product is installed as invoiced

Intermediate Risk

Heat Pump Water Heating	New product, multiple qualifiers, intermediate incentive level
Heat Pump	Mature product, multiple qualifiers
New Construction	Low level of documentation required
Ductless Heat Pumps	Mid level incentive, qualifiers
Sizing and Lock Out	Low level incentive, multiple qualifiers, pilot program
Waste Water Heat Recovery System	New program, qualifiers
Fireplaces	Pilot Program, qualifiers
Home Print (complex)	Mid level incentives, multiple qualifiers, newer program with new contractors

High Risk

Conversion to Gas products	High incentive levels, multiple qualifiers
Ground Source HP	High incentive levels, new program
Weatherization	3rd party delivery program
FA to Heat Pump Conversion	High incentive level, new program
Refrigerator recycling	3rd party delivery program
Small Business Lighting	Multiple contractors delivering measures

PSE's EES C&I Custom Programs

In addition to rebate measures, custom calculated energy savings measures make up a large portion of PSE's EES total energy savings in any given year. Custom Energy Calculations must use generally accepted engineering protocols. The business case for a custom project must also include an incentive calculation and cost effectiveness discussion, and a custom M&V Plan. A QC Review by a senior-level engineer is required for all custom measures.

All C&I projects with lighting energy savings of 300,000 kWh per year or greater require additional lighting hours documentation[2]. In practice, Energy Management Engineers (EME) are more diligent in estimating lighting hours for all C&I Lighting custom projects. Metering requirements on other projects is at the discretion of the QC Reviewer and the EME.

All custom C&I incentives require reviews from 1) a designated senior engineering staff QC Reviewer & 2) Manager or delegated signor at time of Custom Grant execution and at time of incentive payment. A 100% review is required for all custom incentives.

PSE EES Third Party Implementer Programs

Verification Team will work with Implementation Team members to ensure that third party implemented programs document their verification process, have minimum requirements for on-site inspections, fully integrate their reporting requirements to be consistent with PSE reports, and conduct random sampling verification of third party projects. While each Third Party Implementer Program will be responsible for its own verification activities, PSE will sample Third Party Implementer Programs to verify their Measurement and Verification is reliable.

[2] An evaluation of C&I Lighting completed in 2007, found that more rigor was required for the estimation of lighting hours for the calculation of reliable energy savings from lighting projects.

Sampling Plan

Sampling rates for individual programs and measures, based on the following criteria, will be included in the Verification Manual to be completed in the 1st quarter of 2012. The following are the steps to be taken in a sampled measurement process:[3]

1. **Define the population.** The first step in a sampled measurement process is to identify the population of interest. This could be all of the equipment affected by a retrofit or all of the buildings participating in a program. Usually an equipment inventory or participant database is available that defines the population.

2. **Decide if the population is homogenous or heterogeneous.** Consider the population and decide if the members are homogeneous or heterogeneous. Do they all have identical or nearly-identical characteristics, or are there characteristics that identify members of the population as unique? Are all fan motors the same size, or do they span 2- to 50-hp? Do all 20-hp motors serve the same purpose, or are some fire pumps and others driving conveyer belts? If the population can be considered homogenous, then use simple random sampling. If the population is heterogeneous, then either divide the population into homogeneous groups and use simple random sampling on each, or apply stratified sampling to the entire population. Where the entire population is comprised of a number of distinct categories (strata), the population can be segregated into these categories or strata. Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected. Strata are selected by considering which categories might have the greatest influence on the primary outcome variable one wishes to measure. Stratified sampling yields a smaller total sample size (and cost), but requires more calculation and evaluation effort.

3**. Define the desired confidence and precision.** Sampled measurement to 10% precision at 90% confidence, but allows some flexibility in the target precision in certain cases is recommended. Where individual measurements are expensive or the populations have large variances (high CV), reducing the acceptable precision results in smaller sample sizes. Because precision is proportional to the square of the sample size, relaxing the precision from 10% to 20% results in a four-fold decrease in sample size. Increasing the precision from 10% to 5% requires a four-fold increase in sample size.

4. **Assume an initial coefficient of variation.** The sample size to achieve a specific precision and confidence depends on the population coefficient of variation CV. But the CV is often not known until after the measurements are taken, so the sample size cannot be determined in advance. To get around this paradox, we must assume a CV value in order to develop a sampling plan. If measurements have been performed previously and the CV is known for the particular characteristic of interest (e.g., residential square footage) one can initially apply the CV determined by earlier research. When estimating the true CV, a statistician should use a default value for the CV of not less than 0.5 for homogeneous samples and 1.0 for heterogeneous samples, until such a time that the population CV can be estimated from the project sample population (PJM 2010, 30). However, the actual CV must be calculated afterwards and compared to the assumed value. (In some cases researchers can continually monitor the CV of the population as the study progresses and additional data is acquired, allowing researchers to add additional samples if necessary.)

5. **Calculate the sample size.** With the population(s) defined and the precision and confidence targets set, calculate the required number of samples for each population or group. Where populations are small or the desired precision is very high, the calculated sample size may be close to or even exceed the

[3] BPA Sampling for Measurement and Verification Reference Guide, September 2011

population size. The sample size can be adjusted using the Finite Population Correction equation, given below.

6. **Select random samples**. From the equipment or participant list, select samples at random until the desired number have been identified. A quasi-random selection process can be used, such as selecting every k^{th} element. Alternatively, a random number generator can be used to select samples.

7. **Implement the measurement process.** Using the randomly selected samples, take measurements or conduct surveys. Occasionally, the identified items may not be able to be measured (people are not home, etc.). Rather than giving up a measurement and reducing the actual sample size, have a plan to provide substitutions in the field (find another room, go to another house, etc.). Researchers and evaluators will typically select an initial pool of randomly drawn elements that is larger than the sample size required for the study. While there is always a concern that substitutions can introduce bias, it is usually better to accept a substitute member than reduce sample size. If the populations are truly homogeneous, substitutions will not introduce bias.

8. **Evaluate results.** For each population or measurement group, calculate: the average value, the standard deviation, the coefficient of variation, and the size of the final sample. Compare the CV of each group – if the actual CV is less than the assumed value, then the desired precision and confidence targets have been met. For each group, calculate the actual precision achieved. If time and budget permit, additional measurements can be taken to increase the sample size and improve the precision. In all cases, report the actual precision achieved.

9. **Learn from experience.** Because the sample size is a function of the assumed CV, use the calculated CV value for next year's sampling plan or for another, similar project researching the same primary outcome variable.

Budget

The forecast Verification Team budget in 2012 for the 4 specialists is roughly $650,000.

Budget Category	Total
Labor and Labor OH	$ 601,000
Vehicles	$ 32,000
Training	$ 10,000
Total	**$ 643,000**

Example of Verification Inspection Form:

PUGET SOUND ENERGY

Single Family Weatherization Retrofit

VERIFICATION FORM

VERIFICATION INFORMATION

Scheduled date: Mon Tues Wed Thurs Fri		QA Specialist RE HMM JM KY	
Day:	2011 Time: AM PM	Verification approval date:	
Confirm Appointment with Ecos:		Access updated ❑	Access #:

CUSTOMER INFORMATION

Customer Name	Address

CONTRACTOR INFORMATION

Contractor/Installer Company	Phone #

QUALIFICATIONS

- ☐ **Must install ENERGY STAR qualified equipment with a 95% AFUE rating or better**
- ☐ **Must be the primary source of heat--Cannot be installed with a new or existing heat pump**
- ☐ **Installed in a single family with 4-units or less attached and individually metered**
  - ☐ **Confirm with customer if manufacturered home, it cannot be a super good cents/Energy Star manufactured home**

VISUAL INSPECTION

- Manufacturer of Equipment
- Model Number of Equipment
- AFUE Rating
- Location of Installed Equipment
- Additional Comments/Suggestions:

ADDITIONAL ENERGY EFFICIENCY OPPORTUNITIES

- ☐ Recommend setting the thermostat to 68°F or lower when you're at home and awake, and lower 7°F to 10°F when you're asleep or away
- ☐ Install and properly set a programmable thermostat
- ☐ Recommend heating system be inspected regularly by a professional to ensure it's operating efficiently and safely
- ☐ Wrap plumbing lines
- ☐ Install Carbon Monoxide Detectors
- ☐ Remove clutter from around furnace area
- ☐ Left EE collateral
- ☐ Take photo of new installed unit(s) for QA documentation

Comments/Notes:

Verification Complete **YES** ☐ **NO** ☐