Exhibit No. ___(MSK-1T)

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

DOCKET NO. UE-111882

DOCKET NO. UG-14___

DIRECT TESTIMONY OF

M. SAMI KHAWAJA

REPRESENTING

THE CADMUS GROUP, INC.

RE: AVISTA'S ENERGY EFFICIENCY PROGRAMS

I. INTRODUCTION

Q. Please state your full name, business address, and company name.

A. My name is M. Sami Khawaja, and my business address is 720 SW Washington Street, Portland, OR 97205. My employer is The Cadmus Group, Inc.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to present the findings of our evaluations of the Avista energy efficiency programs for the 2012-2013 time periods.

Q. Describe Cadmus' approach to conducting evaluations of Demand Side Management (DSM) programs.

A. Cadmus strongly believes that the best value evaluators can provide is real-time feedback to program managers. Real-time feedback allows for continuous improvements and course corrections as needed. We have worked closely with Avista's Planning, Policy, and Analysis (PPA) and Implementation teams to implement recommended corrections from the beginning of the evaluation. We also worked closely with the stakeholders represented in the various technical and policy groups.

Q. Describe Avista's energy efficiency internal Organization structure.

A. Avista has created two distinct groups for the purpose of delivery of DSM programs. One team is directly responsible for implementing the programs (Implementation team) and another is responsible for planning and analysis (PPA team). We reported directly to the PPA team. In April 2014, the PPA and implementation teams began reporting to a central manager.

Q. Are you sponsoring any exhibits in this proceeding?

A. Yes. I am sponsoring Exhibit No.__(MSK-2) that presents our 2012 and 2013 electric portfolio impact evaluation, Exhibit No.__(MSK-3) which is the 2012 natural gas impact report already submitted in 2013, Exhibit No.__(MSK-4) that presents our 2013 natural gas impact evaluation, and Exhibit No__(MSK-5) which is the 2012-2013 portfolio-wide process evaluation.

Q. Please describe your qualification.

A. I hold a doctorate degree in Economics and Systems Science. I have been conducting demand side management program impact and process evaluations since 1983. I am the author of the *Electric Power Research Institute Impact Evaluation Guide*, coauthor of the *International Performance, Measurement, and Verification Protocols*, coauthor of the *Environmental Protection Agency National Action Plan for Energy Efficiency Impact Evaluation Guide*, and author of over 30 papers on evaluation issues. I have taught over 40 evaluation and cost-effectiveness workshops nationally and internationally. I am one of the Association for Energy Service Professionals trainers. I am currently an adjunct professor of economics at Portland State University.

Q. Describe your current and previous job responsibilities.

A. I am currently an executive consultant for The Cadmus Group and previously managed the Energy Service Division for five years (a group of 200 energy professionals). In 1998 I started an energy efficiency evaluation and planning firm called Quantec. The company grew to 60 professionals and was purchased by Cadmus

in 2008. Prior to that I held various positions at other consulting firms, PacifiCorp, and Portland State University.

Q. Describe your involvement in the review of Avista DSM programs.

A. The Cadmus Group was retained by Avista to serve as the third-party independent evaluator of its 2012 and 2013 DSM programs. As such, we conducted impact and process evaluations of the programs in the residential, nonresidential, and low income sectors. The evaluations covered both electric and natural gas programs.

Q. Were the evaluations prepared in accordance with industry standards?

A. Yes. All evaluations were conducted in a manner meeting industry standards and established protocols. These include: (1) International Program Measurement and Verification Protocols: Concepts and Options for Determining Energy and Water Savings Volume 1, January 2012; (2) Model Energy Efficiency Program Impact Evaluation Guide: A Resource of the National Action Plan for Energy Efficiency, November 2007; (3) Electric Power Research Institute: Guidebook for Energy Efficiency Program Evaluation, Measurement, and Verification, 2008; and (4) the Department of Energy Uniform Methods Protocols, 2013**.**

Q. Have you conducted similar portfolio-level evaluations before?

A. Yes. Under my supervision, Cadmus has recently completed similar portfolio-level evaluations for the following electric and natural gas utilities:

1. Ameren UE Missouri.
2. Ameren Illinois Utilities.
3. Questar (Utah).

4. California Public Utilities Commission.
5. DTE Energy (Michigan).
6. Consumers Energy (Michigan).
7. Salt River Project (Arizona).
8. PacifiCorp (Oregon, Washington, Idaho, and Utah).
9. Progress Energy (Carolinas).
10. PECO (Pennsylvania).
11. PPL (Pennsylvania).
12. Dayton Power & Light (Ohio).
13. Empower (Maryland).
14. Focus on Energy (Wisconsin)

Q. Have your evaluations elsewhere been reviewed by Public Utility Commissions or state-level evaluators?

A. Yes. In all cases listed in the previous question, the evaluations were either reviewed and approved or are in the process of being reviewed and approved by the various representative utility commissions.

Q. Please describe any data collection and activities associated with the evaluation.

A. Full impact evaluations for natural gas and electric were performed for low income, residential, and non-residential sectors within the portfolio. The low income impact evaluation used natural gas, electric and conversion measures billing analysis using the entire population of 2012 participants and results were applied to 2013 participants. The non-residential impact evaluation performed 198 site and/or metering visits, individual site billing analyses, simulation modeling, and general

engineering calculations. Teams of engineers spent several weeks in the field at different points in 2013 and 2014. The residential impact evaluation was informed by billing analyses of the weatherization program, conversion program, and manufactured homes duct sealing program participants. A participant and control group billing analysis was performed for the residential behavior program as well. Savings analysis utilizing the Regional Technical Forum (RTF), Avista's 2012 Technical Reference Manual (TRM), and engineering analyses was performed on all measures, including the lumen equivalents method in conjunction with RTF inputs for lighting savings. Over 1,000 phone surveys were conducted for the residential measure verification and over 2,000 general population surveys. Significant effort by Cadmus engineers and senior staff went into modifying unit energy savings (UES) values in the TRM where necessary.

The process evaluations completed 1,005 residential participant, 2,210 residential general population, 201 nonresidential participant, 140 nonresidential non-participant, and 150 low income participant surveys. The evaluations also included 20 contractor interviews, as well as interviews with several implementation contractors, Avista PPA and implementation staff. The process topics covered included participant feedback, program management and design, trade ally input, data tracking, marketing and outreach, a detailed analysis of nonresidential realization rates and tariff compliance, and a benchmarking of industry best practices. Details on each of these evaluation activities and results can be found in the associated Cadmus reports: Avista 2012-2013 Washington Electric Impact Evaluation Report, Avista 2013 Washington

Gas Portfolio Impact Evaluation, and Avista 2012-2013 Process Evaluation Report all submitted on May 15, 2014, and Avista 2012 Washington Gas Portfolio Impact Evaluation already submitted in 2013.

Q. Please summarize the Company's electric energy efficiency-related savings for this time period.

A. As shown below in Table 1, 120,636 MWh of gross energy savings were acquired through Avista's Washington DSM projects between January 1, 2012, and December 31, 2013. The electric portfolio had a realization rate of 97%.

Table 1. Reported and Evaluated Electric Savings

Segment	Reported Savings (kWh)	Gross Evaluated Savings (kWh)	Realization Rate
Residential	26,655,717	24,070,178	90.3%
Nonresidential	70,809,941	67,649,637	95.5%
Low Income	1,111,766	1,516,238	136.4%
CFL Contingency	21,179,368	21,179,368	100.0%
Residential Behavior	4,636,392	6,220,493	134.2%
Total	**124,393,184**	**120,635,914**	**97.0%**

Q. What are the electric energy savings by program?

A. The 2012 and 2013 program years' gross savings are summarized in Table 2 by program.

Table 2. Evaluated Electric Savings by Program

Sector	Program	Evaluated Gross
Low Income	Non-Conversion	450,233
	Conversion	1,066,005
Nonresidential	Site Specific	27,323,956
	Prescriptive	32,985,879
	EnergySmart Grocer	7,339,802
CFL Contingency	Residential	16,289,799
	Nonresidential	4,889,569
Residential	Behavior	6,220,493
	MHDS	2,815,805
	ES Products	156,087
	ES Homes	59,284
	Second Refrigerator/Freezer Recycling	983,369
	Geographic Events CFLs	261,030
	Simple Steps	16,059,081
	Weatherization/Shell	277,710
	Water Heater	37,397
	HVAC	819,515
	Conversions	2,600,900
TOTAL		**120,635,914**

Q. Did Avista achieve its filed electric goals for the two-year time period?

A. Yes, the both the Washington Integrated Resource Plan (IRP) and I-937 goals were satisfied in the 2012-2013 biennium (See Tables 3 and 4 below).

Evaluation of the 2012-2013 portfolio was challenging due to:

- Multiple statements and sources of goals (I-937, Avista's Integrated Resource Plan, and Avista Business Plan).
- Varying definitions of savings (e.g., gross versus net, Regional Technical Forum adjusted market baseline unit energy savings, evaluation based estimates).

- Different means of achieving the goals (e.g., fuel conversion counts toward the IRP electric savings but not toward I-937).
- Different programs are not included under certain goals.

The goals are portfolio-level targets, so in order to conduct sector-level comparisons, Cadmus adopted the Avista Business Plan goals by sector, and applied those proportions to the I-937 and IRP targets. The tables also show saving achievements for the portfolio excluding the CFL Contingency and residential Behavior programs. I-937 and IRP goals are still exceeded.

Table 3. I-937 Goals and Evaluated Savings

Sector	Savings Goal (kWh)	Achieved (kWh)	Achievement Rate
Residential	22,596,781	44,586,457	197.3%
Nonresidential	51,209,063	70,993,666	138.6%
Low Income	2,396,157	450,233	18.8%
Total	**76,202,000**	**116,030,356**	**152.3%**
Excluding CFL Contingency and Residential Behavior	**76,202,000**	**88,630,495**	**116.3%**

* Achieved savings do not include fuel switching measures.

Table 4. IRP Goals and Evaluated Savings

Sector	Savings Goal (kWh)	Achieved (kWh)	Achievement Rate
Residential	22,483,207	46,617,306	207.3%
Nonresidential	50,951,680	72,539,206	142.4%
Low Income	2,384,113	1,516,238	63.6%
Total	**75,819,000**	**120,672,750**	**159.2%**
Excluding CFL Contingency and Residential Behavior	**75,819,000**	**93,272,889**	**123.0%**

*Achieved savings includes all savings.

Q. Please summarize the Company's natural gas energy efficiency-related savings for this time period.

A. As shown below in Table 5, over 1,218,000 therms of energy savings were acquired from the Washington DSM projects between January 1, 2012, and December 31, 2013. The two-year natural gas portfolio had a realization rate of 97%.

Table 5. Expected and Evaluated Natural Gas Savings

Sector	Reported Savings (Therms)	Gross Evaluated Savings (Therms)	Realization Rate
Residential	581,862	566,843	97.4%
Nonresidential	623,900	608,953	97.6%
Low Income	47,342	42,700	90.2%
Total	**1,253,104**	**1,218,496**	**97.2%**

Q. What were the natural gas energy savings by program?

A. The 2012-2013 program savings are summarized in Table 6 by program.

Table 6. Natural Gas Evaluated Savings by Program

Program Name	Evaluated Gross Savings (Therms)
Low Income	42,700
Nonresidential Prescriptive	170,661
Nonresidential Site Specific	438,292
ENERGY STAR Products	7,647
Heating and Cooling Efficiency	439,652
Weatherization/Shell	79,254
Water Heater Efficiency	4,265
ENERGY STAR Homes	3,657
Manufactured Homes Duct Sealing	29,973
Simple Steps, Smart Savings	2,395
Total	**1,218,496**

Q. Did the company achieve its reported natural gas goals for the two-year time period?

A. No, the Washington IRP goal was not satisfied for 2012 and 2013. Table 7 below shows the IRP goals and evaluated savings.

Table 7. IRP Goals and Evaluated Natural Gas Savings

Sector	Savings Goal (Therms)	Gross Achieved (Therms)	Achievement Rate
Residential	915,332	566,843	61.9%
Nonresidential	1,619,486	608,953	37.6%
Low Income	99,548	42,700	42.9%
Total	**2,634,366**	**1,218,496**	**46.3%**

Q. What recommendations resulted from the residential impact and process evaluations?

A. We recommend the following related to Avista's residential programs:

- Avista should consider updating its per-unit assumptions of recycled appliances to reflect the evaluation.
- If clothes washer rebates are reinstated, Avista should track them all within the electric program unless there is a large penetration of natural gas dryers.
- Increase measure level detail capture on applications and include in the database. Specific additional information should include energy factors or model numbers for appliances, baseline information for insulation, and home square footage, particularly for the ENERGY STAR Homes program.
- Consider tiered incentives by SEER rating as higher SEER systems generally require ECM fan motors to achieve certain SEER ratings.

- Avista should continue to promote its efficiency programs in the home energy reports for the residential behavior program, as the reports increase the rate of efficiency program participation and savings.
- Avista should consider performing additional research about the peak-coincident demand savings from the behavioral program to determine whether the residential behavior program is cost-effective relative to existing residential load control programs.
- Avista should consider researching the percentage of Simple Steps, Smart Savings bulb purchase that are installed in commercial settings. This could increase the average installed hours of use and increase program savings.
- Avista should consider completing a lighting logger study within its territory if the results of the second phase of analysis of the Residential Building Stock Assessment study are believed to not accurately represent usage in Avista's territory.
- Perform a billing analysis on ENERGY STAR homes using a non-participant comparison group once enough homes have participated under the new requirements to justify performing the work. This research could be used to demonstrate the achieved savings through energy efficiency construction practices.
- Consider researching the current variable speed motor market activity to determine if this measure should continue as a stand-alone rebate or be packaged with other equipment purchases.
- Avista should consider increasing the amount of data tracked as part of the Manufactured Homes Duct Sealing Program, including such fields as Avista customer account number.
- Avista may consider performing a targeted billing analysis for weatherization participants who use *both* electricity and natural gas to heat their homes.

- High-efficiency natural gas furnaces continue to provide the largest portion of savings for the residential portfolio. The last billing analysis performed was in 2011 on PY 2010 participants, so those results could be re-estimated in the next evaluation.
- Once the natural gas portion of the Manufactured Homes Duct Sealing Program participation has reached sufficient size, consider conducting a billing analysis of the natural gas heated homes.
- Continue exploring new program designs and delivery mechanisms that leverage the national expertise of experienced third-party implementation firms, such as Home Performance with ENERGY STAR.
- Continue testing new program designs and measure offerings through the use of pilots.
- Depending on the cost-effectiveness of the measure offering, consider expanding the Residential Behavior program and implementing measures to track the methods these customers use to save energy.
- As part of the transition to the new data tracking system, consider aligning program and measure names with offerings articulated in annual business plans and other planning materials.
- Consider ways to encourage repeat participation (such as marketing targeted at previous participants and online profiles that reduce application paperwork).
- Develop a transparent process for assessing measure or program cost-effectiveness and communicating results internally. Consider ways to ensure high-quality cost-effectiveness analysis that aligns with industry best practices, such as obtaining an objective third-party review of current cost-effectiveness screening processes.
- Continue Avista's commitment to customer satisfaction, but monitor:
    - Increased staffing costs; and

- Impacts of more generous application requirements on application package completeness and customer freeridership.

- Utilize survey results from this evaluation and other data collection activities to understand which audiences are more likely to participate in Avista programs.

Q. What recommendations resulted from the nonresidential impact and process evaluations?

A. We made the following recommendations related to Avista's non-residential programs:

- Avista should create a quality control system in addition to the Top Sheets to double-check all projects with savings over 300,000 kWh and 10,000 therms.
- Consider working with participants to accelerate the process of claiming energy savings and paying the project incentive. Preferably this should happen within one year of measure installation, depending on Avista's requirements for post-installation data on the particular project.
- Avista may want to consider tracking and reporting demand reduction to better understand measure load profiles and peak demand reduction opportunities.
- Update prescriptive measure assumptions and sources on a regular basis.
- Streamline its file structure to enable reviewers to more easily identify the latest documentation.
- Continue to perform follow-up measure confirmation and/or site visits on a random sample of prescriptive projects (at least 10%).
- Consider flagging sites for additional scrutiny when the paid invoice does not include installation labor.

- Avista may consider adding a flag to their tracking database to automatically calculate the unit of energy savings per dollar (kWh/$ or therm/$) to provide a quick check to identify extreme outliers.
- In the case of redundancy, Avista may want to consider incenting pump projects through the Site-Specific Program to more accurately characterize the equipment operating hours.
- Avista may want to adopt modeling design guidelines to set minimum standards, such as The Energy Trust of Oregon guidelines.
- Avista should continue efforts to define and document program processes. Cadmus understands that a reorganization of the DSM group has occurred concurrent to the delivery of this report. This change may be an opportunity for fresh perspectives, clarified responsibilities, and improved coordination within and between teams. We believe unifying the organizational structure under central leadership is a step in the right direction and may help alleviate some previously documented issues with internal communications.

In addition to the reorganization, Cadmus recommends that Avista develop standardized processes within the DSM group, including clear delineation of roles and precise description and assignment of all processes and responsibilities for both residential and nonresidential programs. All affected parties should be included in formalizing and standardizing the DSM group's processes, roles, and responsibilities. Further, all parties must formally agree to clearly delineated responsibilities under the new organizational structure. While these activities need to be prescriptive and precise, we caution that the resulting structure should still allow some flexibility: increased clarity, transparency, and accountability should serve to enhance program delivery and customer satisfaction.

- Consider taking action to strengthen the use of program materials. Consider providing trade allies with printed program information flyers or brochures to give to customers. Maintaining up-to-date information for trade allies is critical when they are the key party delivering the program's message and participation details.
- Identify underserved industries, and seek opportunities to target outreach to specific underserved industries:
  - Investigate overall customer industry distribution.
  - Compare to participant industry distribution.
  - Develop targeted outreach strategies for any underserved sectors.
- Continue to monitor the effectiveness of the site-specific project review process and refine as needed. Cadmus recommends implementing the following to ensure continued improvement:
  - All large prescriptive or site-specific projects reporting savings over a threshold of 300,000 kWh or 10,000 therms should undergo a complete QA/QC review prior to incentive payment in addition to the standard Top Sheet review process. Typically, a QA/QC process reviews engineering calculations, verifies inputs, checks payback period and incentive payments for reasonableness, and ensures compliance with program requirements and tariff rules. In order to align with the above recommendation regarding program management and implementation, Cadmus recommends that Avista determine and document the specific requirements and steps in the QA/QC process through a collaborative process that will ensure accountability and balance needs for efficiency and customer satisfaction.
  - Conduct an external third-party review of Top Sheets, including reviewing a random sample of completed Top Sheets for completeness and accuracy. These were not reviewed as part of the

current process evaluation, but should be included in the next process evaluation. Review should not only verify the presence of the Top Sheets, but also the quality and accuracy of the information provided.

Q. What recommendations resulted from the low income impact evaluations?

A. We make the following recommendations related to Avista's low income programs:

- Use a control or comparison group in future billing analyses.
- Continue funding building shell retrofits.
- Include high-use customers in program targeting.
- Track and compile additional data from agency audits.
- Obtain a full list of weatherization measures from agencies.
- Consider using models that combine both the Washington and Idaho programs to increase sample sizes.
- Consider performing a quantitative, non-energy benefit analyses.

Q. Based on the process evaluation findings, were the programs delivered efficiently?

A. Yes, compared to similar undertakings by other utilities, they were.

Q. Please summarize your testimony.

A. I believe the Avista evaluation addresses all measurement and verification needs in accordance with industry and regulatory standards. Impact evaluation on the 2012 and 2013 program years verified electric savings exceeding both IRP and I-937 goals, but the natural gas 2012 and 2013 program years did not achieve

the IRP goal. The process evaluation revealed that the programs are run efficiently and some areas for improvement exist.

Q. Does that complete your pre-filed direct testimony?

A. Yes, it does.