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**SOUTHWEST GAS CORPORATION**

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Arizona Corporation Commission  
**DOCKETED**

APR 20 2011

DOCKETED BY

April 19, 2011

Docket Control Center  
Arizona Corporation Commission  
1200 West Washington Street  
Phoenix, AZ 85007-2996

Re: **Docket No. G-01551A-04-0876; Decision No. 68487**

Pursuant to Commission Decision No. 68487 in the above referenced docket and subsequent discussions with the Arizona Corporation Commission Staff (Staff), Southwest Gas Corporation (Southwest) hereby submits for filing an original and thirteen (13) copies of Southwest's Research Allocation Plan for 2011 (Plan).

Finding of Fact No. 37 of the Decision states that..."Gas Research should be funded at the level recommended by Staff, but Southwest Gas should have the flexibility, subject to Staff oversight, to select appropriate entities for use of the research funds." The submitted Plan provides a list and description of the research programs to be funded by Southwest between April 2011 and March 2012. In addition, the Plan includes projects funded between April 2010 and March 2011. This was added last year (April 2010) based on a recommendation from Staff to include a reconciliation report.

Jose Esparza and Paul Gustilo from Southwest, met with Julie Mcneely-Kirwan, Barbara Keene, and Terri Ford from Staff on April 12, 2011, to provide a general update of Southwest's RD&D activities over the past year as well as some of the planned projects for the upcoming year. In addition, a copy of the attached document was provided for review.

Program Highlights

*Transmission Integrity Management*

In June 2010, Southwest demonstrated the use of the Explorer-II in-line inspection robot in Phoenix, AZ. The robot is self propelled and is designed for high maneuverability through pipelines that can not accommodate traditional in-line inspection devices (i.e. smart pigs). The robot was successfully launched inside an 8" live gas transmission line, and once inside, traversed a distance of over 2,000 feet. The robot was able to provide visual images on the condition of the pipe, as well as insight on the general condition of the pipe. Several representatives from Staff and the Pipeline Safety division were present during this demonstration.

Southwest plans on utilizing the Explorer-II again this summer to test new sensors and to test devices that can extend the range of the robot. Future intentions are to be able to use the technology as an assessment tool to comply with federal pipeline safety regulations.



### *Keyhole Technology*

Southwest continues to expand its utilization of keyhole technology as a means to not only reduce excavation costs, but to also enhance customer satisfaction by minimizing pavement restoration areas. Keyhole technology allows underground pipe access through a pavement/soil core that is approximately 18" in diameter. Over the past year, Southwest utilized R&D funding to develop an optimum internal camera system that would allow for the live inspection of 2" plastic pipe through a keyhole.

Southwest uses camera inspection on plastic pipe that is going to be replaced by "splitting" the pipe. Splitting is accomplished by the use of a special device that has blades, and is pulled and/or pushed through the pipe. The challenge is that the splitting tool will not go through fittings that have steel components such as mechanical couplings. The camera identifies these fittings so the replacement effort can be planned accordingly.

The use of the new camera system and the entry system through keyhole, has been demonstrated to a limited extent in Arizona, and has been shown to save time, money, and resources in identifying the fittings with steel components. For 2011 through 2012, Southwest plans to demonstrate the system on a wider scale to further evaluate its benefits.

In closing, if you have any questions or require any additional information, please contact me at (702) 876-7163.

Respectfully submitted,

*Debra S. Gallo* 

Debra S. Gallo, Director  
Government & State Regulatory Affairs

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**Southwest Gas Arizona Research  
2010 Summary Report & 2011 Plan  
April 15, 2011**

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
	<b>Operations Technology Development (OTD) Program</b>						
	<i>Dues (Project Allocation and Administrative Costs)</i>					<b>\$216,108</b>	<b>\$450,000</b>
	<i>Carry over from previous year</i>					\$233,892	\$58,538
	<i>Refunds/Royalties</i>					\$3,084	
	<b>Total Available for Allocation</b>					<b>\$453,084</b>	<b>\$508,538</b>
1	OTD Administrative Costs	GTI				\$33,750	\$33,750
2	(1.8.g) Acoustic Sewer Lateral Locator	GTI	<p>Trenchless pipe installation techniques greatly reduce natural gas pipe installation costs and minimize impact to the environment and general public. Unfortunately, there have been occasions where a gas plastic pipe has been unintentionally installed through a sewer lateral and the operator is unaware of this situation. The intent of this project is to develop acoustic tools/processes. The key challenges to address include: 1) operations in all types of soil under various operating conditions, 2) cost effectiveness of the device, and 3) ease of operation by field crews.</p>	<p>Enhanced safety through a more accurate method of locating sewer laterals. In addition, reduced costs in locating sewer laterals.</p>	<p>3/2011 update - a prototype has been fabricated and tested in controlled environments. Modifications will be made and a field test at a utility site is expected by 3rd or 4th quarter in 2011.</p>		

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
3	(1.h) Hand-held Acoustic Pipe Detector (Phase II & III)	GTI	The objective of this project is to design, build and test a commercial-grade (Phase III), handheld pulse-echo sonic detector capable of detecting and locating small diameter metallic and nonmetallic pipe in all soil types.	Reduced costs in locating non-metallic pipe.	3/2011 update - Search continues for a commercializer of the technology. Significant funding has also been received by PHMSA which will help support additional evaluation and validation of the technology.	\$3,624	
4	(1.10.a) Ethane Only Detector	GTI	Natural gas typically contains 1-5% ethane. When situations require the identification of natural gas is critical (ex., distinguishing between sewer gas or pipeline natural gas), detection of ethane can help verify natural gas is present. This project will develop a handheld instrument which can be utilized rapidly and easily in the field to resolve the absence or presence of ethane as a fingerprint for natural gas whenever the origin of a methane signal is questionable. Optical technology will be utilized.	Reduced costs in distinguishing natural gas vs. other sources of methane.	3/2011 update - breadboard design concept is complete and will be fabricated and tested by 3rd or 4th quarter 2011.	\$5,000	\$4,247
5	(2.7.b) Qualification of Saddle and Electrofusion Joint Designs and Test Methods to Validate Safe Long Term Performance	GTI	The objective of this project is to develop a novel approach to ensure the safe and long-term performance of various types of lateral connections including: saddle heat fusion joints, electrofusion joints, and mechanical joining.	Improved joining procedures and/or joint evaluation, to ensure long term joint integrity.	3/2011 update - long term testing of mechanical fittings is expected to be complete by 2nd quarter of 2011. Work with ASTM standards committees on results of project efforts continues.	\$15,000	

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6	(2.7.d) Cold Adhesive Repair (CAR) and Joining of Polyethylene Pipes with Minimal Surface Preparation	GTI	The primary objective of this project is to develop and commercialize an economical, reliable, and safe technology to quickly and effectively repair damaged and leaky PE gas pipes using modern structural cold adhesives, optimized for low-surface-energy-materials such as PE, that require little surface preparation, cure at typical field temperatures, cure within short periods not exceeding 90 minutes, and do not require any tools, heating, pressure or significant training.	Reduced costs in repairing damages to plastic pipe.	3/2011 update - long term testing methods for cold adhesive is being re-evaluated.		
7	(2.7.e) External Repair Tool for PE Pipe	GTI	The overall objective of this project is to continue the research that Timberline has already conducted to: optimize the design of the repair patch and repair patch material, optimize the design of the mechanical tool to apply the repair patch, and perform appropriate testing and address regulatory codes for the repair patch to be accepted as a repair method for PE pipe.	Reduced costs in repairing damages to plastic pipe. Enhanced safety by allowing the repair of damaged plastic pipe from above ground (i.e not in the ditch)	3/2011 update - a final report is available on initial testing of the patch. Additional testing is being prepared during 1st quarter of 2011.	\$10,000	\$5,779
8	(2.7.g) Composite Pipeline Repair Systems - Analysis of Adhesive Degradation - Permanence of Repair	GTI	This project will include the evaluation of the adhesives used in commercially available composite repair techniques to establish if their performance dictates a "permanent" or "temporary" repair classification for the overall repair system. Composite system repairs depend heavily on the adhesives used to transfer the load from the repaired pipe to the repair system. In order to fully assess the suitability of such repairs (as permanent or temporary solutions), the possibility of degradation of the adhesive over time must be investigated.	Enhanced integrity and possible reduced costs in repairing steel pipe.	3/2011 update - final report expected 2nd quarter 2011.	\$7,254	

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9	(2.8.c) Electrofusion Coupling Guidelines	GTI	Extensive work has been done to develop the electrofusion (EF) joining process and to investigate both the short and long term performance of coupling joint. However, a great deal of dimensional variation can exist with the fit of the coupling onto the pipe due to differences in EF coupling tolerances, tooling, and installer practices. Current industry standards for EF couplings place no limitations on the coupling I.D. tolerances, scrapping limits, or the annular gap. The objective of this project is to develop guidelines to address these issues.	Improved joining procedures and/or joint evaluation, to ensure long term joint integrity.	3/2011 update - final report expected 2nd quarter 2011.		
10	(2.9.e) HP stopping equipment	GTI	To develop "high pressure" inflatable stoppers as an alternative to currently employed stopping equipment for routine and emergency stopping operations on pipe materials such as steel, cast iron, PE, and PVC. New line stopping equipment can address challenging by-pass or pipe shut-off situations. In addition, inflatable stoppers could save significant time and money during day to day operations.	Reduced costs in emergency stopping operations.	3/2011 update - Modifications to the 4-inch and 2-inch bag systems are being made. The 6" system requires significant modifications and a go-no go decision for the 6-inch system needs to be made.	\$10,128	
11	(2.11.d) RSD X-Ray for PE Assessment	GTI	To test feasibility and effectiveness of using off the shelf backscatter x-ray technology for evaluating plastic pipe defects in joints and the pipe itself.	A new NDE system to evaluate integrity of plastic pipe will help enhance integrity and possibly reduce costs in evaluating integrity.	New project for 2011		\$12,000

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12	(4.6.a) Repair Techniques for Low Stress Pipelines	GTI	Testing and assessment of various repair techniques will be conducted to help provide justification for their use as long term repair methods on low stress pipelines allowed by CFR 49 Part 192. Results may help reduce the cost of repairing the steel pipelines by minimizing the need to cut full sections of pipe to make repairs.	Enhanced integrity and possible reduced costs in repairing steel pipe.	3/2011 update - final report available.		
13	(4.7.g) Yield Strength Determination using pipe coupons	GTI	Federal safety regulations establish a minimum yield strength of steel pipe at 25,000 psi if the specifications of the steel pipe are unknown. Current methods to determine actual yield strength are cumbersome in that a pipe section is removed, which typically requires the pipeline to be taken out of service. This project is evaluating the determination of yield strength from small pipe coupons that do not require the pipeline to be taken out of service. If successful, the process developed will provide SWG a more economic option to determine yield strength which would allow SWG to more appropriately address the risks posed by the pipeline.	Reduced costs in determining actual yield strength of in-service pipe.	3/2011 update - final report available. Efforts are now focused on integrating results into industry standards (API 5L)	\$8,458	

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14	(4.8.g) GTI/INSEARCH North American Casing Program (GTI Project)	GTI	All steel pipe in casings that fall within the scope of federal transmission pipeline integrity management regulations, have to be assessed by December 2012. Pipelines in casing are challenging to assess because they are often un-piggable, can not be taken out of service to conduct a pressure test, and have limited external corrosion direct assessment tools that are applicable. The intent of this program is to identify and conduct research projects through the collaboration of all stakeholders that include pipeline operators, federal and state regulators, research organizations, and manufacturers and service providers.	Enhanced safety and integrity of transmission facilities covered under PHMSA's integrity management regulation through the appropriate use of casing assessment methodologies. In addition, possible reduced costs to meeting regulations.	3/2011 update - on-going steps are to continue identifying gaps in research for casing assessment technologies.		
15	(4.8.i) Extended Reassessment Interval Validation Through Dielectric Wax Casing Fill	GTI/Profile	To develop in-situ corrosion monitoring techniques and validation testing associated with the use of dielectric wax used to fill a casing. Monitoring techniques will be used for determining corrosion growth rate and for ensuring the quality and long-term performance of the wax fill. The results of the monitoring techniques could be used to help justify an extend re-assessment intervals for confirmatory direct assessment under integrity management regulations.	Improved understanding of affects of wax fills on corrosion rates. Possible reduced costs to meeting PHMSA integrity management regulations.	3/2011 update - Monitoring of wax fillings continue. Also, integrity of wax fillings were inspected.	\$7,033	\$1,233

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16	(4.9.a) Leak vs. rupture boundary (20 -> 30% SMYS pipelines)	GTI	This project attempts to verify that a lower boundary of 20% SMYS for transmission classification is overly conservative. The work in this project will involve an international incident review and mathematical modeling (if necessary) to demonstrate that a lower boundary of 30% SMYS is more representative of actual leak vs rupture failures. The overall objective of the project will be to provide regulators and operators with information based on sound engineering principles that allows the selection of the most appropriate integrity management process.	Better understanding of risks and consequences of failures on lower stressed transmission pipelines. Results could provide a basis to reduce PHMSA integrity management requirements, thus reducing costs, without sacrificing safety.	3/2011 update - preliminary results are being reviewed by funders of this effort.	\$13,963	
17	(4.9.b) 2" Camera for Live Gas Internal Inspection	TBD	To identify, develop, and/or demonstrate the use of a camera for the internal inspection of 2-inch gas mains without having to shut off the flow of gas and segment the pipe. This will be done by identifying a capable camera and then, working with the manufacturer, making modifications (if necessary) for live gas use. Fittings will also be reviewed and developed if necessary. The device and fittings will be capable of inspecting 2-inch and larger PE, PVC, steel, or cast iron mains.	Reduced costs for inspecting 2" gas mains.	3/2011 update - The Hawthorne camera system was demonstrated successfully. A new stuffing box has been developed and is being utilized by SWG. Project is complete.	\$29,219	

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18	(4.10.a/4.11.c) 4" MFL Tethered Inspection Tool for Unpiggable Pipe	GTI	<p>First phase of this project entailed the demonstration of an existing tethered 4" MFL tool capable of entering transmission pipe in live conditions. Demonstration took place in 2010.</p> <p>The next phase of this project, beginning in 2011, is to develop a new 8" or 12" prototype. The larger size is needed to help utilities assess transmission pipe in casings that fall under the PHMSA integrity management rules.</p>	<p>Application of a new technology to help meet PHMSA's integrity management regulations. In addition, possible reduced assessment costs for steel transmission pipe.</p>	<p>3/2011 update - Additional funding necessary to begin phase 2 (developing a prototype for 8" or 12" pipe).</p>	\$25,183	\$40,000
19	(4.e) Inspection Platforms for Unpiggable Pipelines (NYSEARCH)	NYSEARCH	<p>This is a NYSEARCH effort that is being funded with OTD funds. There are 2 NYSEARCH robotics inspection tools for un-piggable pipe, included in these efforts. One is the development of an Explorer II robot that utilizes an Remote Field Eddy Current (RFEC) sensor for 6" - 8" pipe. The other is for the TIGRE robot that is for 22" - 24" pipe and utilizes MFL technology. Both efforts were initiated due to transmission integrity management regulations promulgated by PHMSA. Distributions companies like SWMG operate transmission pipelines that can not accommodate traditional inline inspection tools (i.e. smart pigs).</p>	<p>Application of a new technology to help meet PHMSA's integrity management regulations. In addition, possible reduced assessment costs for steel transmission pipe.</p>	<p>3/2011 update - SWG is planning another demonstration of an enhanced tool on the same pipeline that was used in June 2010.</p>	\$86,923	

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
20	(5.7.a) Re-Coating with Minimal or No Surface Preparation for Vaults and Other High Moisture Environments (SWG Initiated Project)	GTI	The project will research/develop a coating system that can be applied over gas piping with little or no surface preparation that will prevent atmospheric corrosion.	Reduced costs by reducing the amount of work required to re-coat pipe.	3/2011 update - Final report available. Project complete.	\$4,497	
21	(5.7.p) GPS Consortium (GTI Project)	GTI	The objective of the GPS Consortium Program is to facilitate technology transfer regarding the use of GPS technology for utility operations. The program activities include demonstrations, identification of research needs, workshops, pilot projects, best practices/standards development and general information sharing. A key focus is to establish standards or best practices for GPS data collection and GIS integration processes.	Reduced costs in implementing new GPS and GIS systems or devices.	3/2011 update - new effort for 2011 will include evaluation of integrating high accuracy GPS units with smart phones.	\$15,000	
22	(5.8.e) Development of Standardized Algorithms and Identifiers for Enhanced Material Tracking and Traceability	GTI	The purpose of this project is to develop a series of protocols that can be used effectively by gas distribution companies to more accurately track their underground facilities. The protocols will be developed from standardized algorithms and identifiers to characterize the various components within the gas distribution network (pipe, fittings, and appurtenances). These are then to be integrated within a utility's procurement, design, build, and construction process. Material traceability is important, particularly in the event that products are identified with defects that may affect the integrity of the system.	Standardized traceability among major gas carrying component manufacturers. This could help reduce costs associated with establishing internal tracking processes.	3/2011 update - algorithm is complete and a new stand alone ASTM standard has been approved at all committee levels. Next steps involve testing implementation of the standard as well as integrating new standard into other existing ASTM stds.	\$8,333	\$15,000

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
23	(5.9.c) Mitigating Electrical Interference on CP Systems	GTI	To identify or develop practices that mitigate the effects of electrical interference on cathodic protection (CP) and telemetry systems. In addition to steady state AC interference, transient conditions such as power line faults and lightning strikes will be examined. The evidence for corrosion or damage that is caused by AC interference will also be examined. This project will focus on particular areas evident to LDCs, such as those related to light-rail systems or underground high voltage electric lines.	Enhanced safety by mitigating interference on CP systems. Also, possible reduced costs in mitigating interference.	3/2011 update - Efforts have been delayed due to challenges in identifying equipment for measuring and recording electrical interference.	\$19,980	
24	(5.9.j) Gas Distribution Model (GTI Project)	GTI	The objective of this program is to develop an industry data model and standards for natural gas distribution operators to reduce the cost of software implementation, increase interoperability, and improve data collection efforts. The Gas Distribution Model (GDM) and standards will specify the data structure for operations, assets, field data collection, and regulatory compliance without requiring operators to restructure their existing data model.	Standardized approach in creating distribution risk models. This could help reduce costs in establishing or implementing various types of risk models.	3/2011 update - work continues on the model development.	\$5,000	\$5,000
25	(5.10.g) Indoor Air Quality and Safety Issues	GTI	This effort is to gather historical information and research on indoor air quality and safety issue. This will provide a readily available resource for natural gas operators to help address codes, standards, and guidelines that attempt to dis-allow or discourage gas appliances.	Will help ensure natural gas appliances are treated accurately in codes, standards, and guidelines.	3/2011 update - work continues on gathering information.	\$20,000	

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26	(5.10.k) PODS Documentation and Modularization	GTI	This is a supplement to the gas distribution model, 5.9.j. This funding is to help integrate the work under 5.9.j, with the pipeline open data standards (PODS) association. PODS established standards on data formats.	Standardized approach in creating distribution risk models. This could help reduce costs in establishing or implementing various types of risk models.	3/2011 update - work continues in integrating distribution modeling standards in PODS structure.	\$5,000	\$5,000
27	(5.11.f) PPE Communication Gear	GTI	Emergency situations require reliable and quality communication between crew members. This project will review off the shelf systems currently used by other emergency personnel (i.e. fire/police/military) and determine applicability to the utility industry.	Enhanced safety during emergency situations.	New project for 2011		\$5,000
28	(6.6.a) Keyhole Project	GTI	Keyhole technology provides access to buried pipelines through a hole approximately 18" in diameter. This small size has many advantages including, lower excavation costs and required resources and minimal impact and restoration to pavement. This program evaluates and demonstrates new applications for keyhole technology.	Reduced excavation and restoration costs.	3/2011 update - efforts continue on identifying new applications for key hole technology		\$20,000
29	(6.8.a) GTI Carbon Management Information Center (CMIC)	GTI	The Carbon Management Information Center (CMIC) is intended to serve as a clearinghouse for relevant carbon management information and to develop, where necessary, credible information products and functional tools to meet the needs of investors and their customers. Some deliverable for 2008 include a public-access and members-only website containing technical reports and information on products and a database of energy use profiles of gas, oil and electric end-use technologies for residential and commercial markets	Better understanding of the role natural gas end-use equipment has in reducing overall energy use and in reducing green house gas emissions (i.e. CO2).	3/2011 update - significant efforts on standards activities to help ensure natural gas treated on a source basis.	\$25,000	

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30	(7.8.a) (GTI) Biogas: Guidance for Landfill and Water Treatment Facilities	GTI	This project is primarily being funded by the U.S. Department of Transportation's Pipeline and Hazardous Material Safety Administration (DOT/PHMSA). This project attempts to develop guidance on requirements on accepting biogas from landfills and waste water treatment facilities into natural gas pipelines. This project will include a sample collection and data analysis program to include up to a total of 90 samples (40 raw/20 clean landfill gas, 10 raw/10 clean wastewater treatment biogas and 10 natural gas samples).	Reduction in overall green house gas emissions through the use of renewable gas. Also, local supply of gas may help reduce gas costs to customers.	3/2011 update - partnership with the Solid Waste Association of North America has been established. They will be a key partner in moving forward with developing guidance material.	\$10,000	\$15,000
31	(7.9.c) Biogas: Siloxane Concentrations, Phase I (GTI Project)	GTI	First phase of this effort established a baseline of siloxane presence in pipeline quality gas as well as biogas. The effort also identified factors to consider to develop guidance material on acceptable levels of siloxane in biogas, mainly from landfills and wastewater treatment plants. The objective of the second phase of this effort starting in 2011, is to develop the guidance material on acceptable levels of siloxanes.	Reduction in overall green house gas emissions through the use of renewable gas. Also, local supply of gas may help reduce gas costs to customers.	3/2011 update - Phase 1 report complete and available. Second phase was initiated in 2011.	\$10,000	\$15,000

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32	(7.9.d) Improving Methane Emission Estimates for LDCs - Phase I and II	GTI/Heath	This is in relation to OTD project 7.7.b which addressed pipeline measurement and regulation equipment. This 7.9.d project address emissions from pipelines. Current estimation methodologies for quantifying fugitive and vented methane emissions are broad based and may over or under estimate actual emissions based on an operators pipeline system characteristics. The resulting emission methodologies should ultimately be integrated with existing gas distribution software and system tools to allow for convenient implementation and reasonable methane emissions management practices.	Enhanced standardized GHG emissions reporting. Also, possible reduction in costs associated with tabulating GHG emissions from distribution systems.	3/2011 update - Phase 1 report is available. This phase is complete. Phase II continues under 7.10.c	\$2,292	
33	(7.10.a) Trace Constituents Phase I (GTI Project)	GTI	The purpose of the overall study (Phase I and Phase II) is to more fully understand the trace constituent profile in natural gas, so that more accurate comparison of renewable natural gas with existing natural gas supplies may be facilitated. The natural gas industry will benefit from this study because an updated analytical profile of trace constituents will be amassed, through a sampling and analysis program of natural gas samples collected throughout various regions in the US.	Reduction in overall green house gas emissions through the use of renewable gas. Also, local supply of gas may help reduce gas costs to customers.	Phase 1 final report available. Phase 2 of this effort was initiated in Feb. 2011.	\$5,000	\$10,000

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34	(7.10.b) Odor Fade Guidelines (GTI Project)	GTI	The goal of the project will be to provide a "Practical Pipeline Operator Guide" to manage odor fade issues associated with typical gas system operating conditions and materials of construction. This will include a tested methodology to validate additional combinations of Gas, System, and Material scenarios.	Enhanced safety through the appropriate specification and procedures for ensuring sufficient odorant in distribution systems.	3/2011 update - variables and their impact on odor fade are being identified. Laboratory testing procedures are almost complete.	\$12,940	
35	(7.10.c) Improving Methane Emissions Estimate for LDCs Phase II	GTI	This is a continuation of 7.9.d and will entail field testing using the procedure developed from Phase 1. Field measurements will be compared to previous estimates.	Enhanced standardized GHG emissions reporting. Also, possible reduction in costs associated with tabulating GHG emissions from distribution systems.	3/2011 update - field testing sites using the methodology developed under Phase 1 will take place 3rd or 4th quarter in 2011. SWG may host one of the test sites in AZ.	\$20,000	\$4,633
36	(6.10.b) Other - UTD MIT Study Support on Direct Use of Gas	GTI	The MIT study is being conducted on behalf of DOE. Initially, this study did not consider direct use of natural gas as means of reducing overall energy consumption and a reduction in green house gases. This funding will help MIT expand the scope of the	Help ensure that full benefits of the direct use of natural gas are taken into consideration from an overall energy efficiency and sustainable perspective.	3/2011 update - draft modifications to report are being developed.	\$5,000	

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37	(6.11.b) Safety and Performance of Electric Resistance Welds (PHMSA Co-Sponsor)	GTI/EWI	The objectives of the proposed research is to provide pipeline regulators and operators with an analysis of Low Frequency Electric Resistance Welded pipe material characteristics and a general prediction of failure mechanisms in relation to fracture resistance, aging (deterioration), and operational factors. The effort will also evaluate the effectiveness of current technologies in detecting and monitoring defects in various types of ERW pipe.	Better understanding of the risk factors related to low frequency ERW pipe.	3/2011 update - new proposal	\$25,000	
<b>Credits</b>						\$398,577	\$216,642
<b>OTD Balance</b>						\$4,031	\$4,031
<b>OTD Balance</b>						\$58,538	\$295,927

**NYSEARCH**

38	<b>NYSEARCH Membership Dues</b>					\$40,000	\$40,000
39	Rock Impingement resistance of PE pipe	Hessel Labs	The objective of this project is to determine resistance of polyethylene pipe to rock impingement. New grades of plastic pipe have appeared to more resistant to rock impingement but no thorough evaluations have been conducted.	Enhanced safety and integrity of PE pipe through improved pipe installation procedures (if required)	3/2011 update - a final report available. Project complete.		

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40	Butt Fusion Joint Integrity Program	GTI	<p>This work is being done in conjunction with project OTD-6 (2.7.b) related to lateral joint integrity. A controlled butt heat fusion process will be developed on the basis of comprehensive testing and evaluation using novel test methodologies in order to validate the safe long term performance of PE butt fusion joints over their intended design life. The process will take into account actual in-service stress states through comprehensive computer modeling and empirical testing. Criteria will then be developed to identify suspect joint via short and long term testing. Finally, key criteria for existing and future NDE technologies will be identified.</p>	<p>Improved joining procedures and/or joint evaluation, to ensure long term joint integrity.</p>	<p>3/2011 update - a final report was distributed to project funders in April. Overall study concluded that current processes for ensuring butt fusion integrity are adequate but that further testing is required, which will continue in Phase II.</p>		
41	Gas Quality Impact on Residential Appliances	Environ/GTI	<p>Natural gas received as LNG import gas, has different gas quality characteristics as compared to the natural gas historically received from North American supplies (US and Canada). Import LNG is typically "drier" and hotter than domestic supplies. The impact of the changes in gas quality to residential appliances has been known to cause some safety issues because gas burners are adjusted for a certain range of gas quality specifications. The intent of this project is to help identify the effects of varying gas quality in residential appliances.</p>	<p>Enhanced safety through the use of appropriate interchangeability standards/guidelines for new sources of natural gas.</p>	<p>3/2011 update - a final report is being drafted.</p>		

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
42	Casing risk assessment methodology (M2001-003-B, Phase III)	Malbauer	Integrity management regulations require that transmission pipeline in casings in high consequence areas be assessed. The challenge with casings for distribution companies, is that ECDA and ILI tools are not feasible to utilize. The objectives of the proposed project are to: 1) develop a simple tool for making data validated decisions on assessment or monitoring of cased pipes in HCAs, and, 2) allow a streamlined and formal approach for prioritizing casings inspection activities that can be integrated with other benchmarking and technology developments for this purpose.	Standardized approach to assessing risk of casings. Possible reduced costs in conducting risk analysis of casings.	3/2011 update - the model has been completed and is being used by various operators. Currently, operators who use the model are helping validate with actual data and field activities.	\$17,000	
43	Explorer Demonstration in AZ (robotics demo)	Invondane	The objective of this effort is to field demonstrate the Explorer II in-line inspection robot in a SW/G 8" transmission pipeline facility in Phoenix. This is one of the tools we are funding under OTD-17 and OTD-25 above. The approximate length of the demonstration would include about 3,000 feet of pipe. The sensor technology is a Remote Field Eddy Current (RFEC) which is not commercially used in the industry (i.e. standard is MFL).	Application of a new technology to help meet PHMSA's integrity management regulations. In addition, possible reduced assessment costs.	3/2011 update - a live demonstration of the tool took place in 3,000 ft. of 8" transmission line in Phoenix from June 14-16, 2010. A repeat demonstration in 2011 is being planned with an enhanced tool.	\$147,529	\$40,000
44	NDE inspection technology for PE fusions joints	TWI	The key objective of this effort are to determine the detection capabilities of TWI's existing NDE equipment for 4" and 8" PE butt fusions. In addition, this effort intends to determine critical flaw sizes that impact long term integrity of butt fusion joints. Finally, this effort will include the manufacturing of a new prototype system(s) that will be demonstrated at various utilities.	Enhanced safety and integrity through detection of defective fusion joints.	3/2011 update - There were intentions to fund this project but SWG ended up not funding this effort.		

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
45	NYSEARCH Test Bed Enhancements	NYSEARCH	NYSEARCH has previously established a pipeline test bed in Binghamton, NY. This test bed is used to test and evaluate above ground inspection technologies as well as in-line inspection tools. SWG is providing funding for enhancements to the test bed to allow for future tests of robotic inspection devices.	More thorough evaluation of technologies in development before commercialization.	3/2011 update - improvements to the test bed are planned for 2011.	\$1,877	
46	Green House Gas Calculator	Environ	The objective of the project is to create a user-friendly spreadsheet tool that calculates GHG emissions for selected gas construction and operations functions. The tool will be verified through limited field tests.	More efficient and thorough process for gathering GHG emissions for regulatory reporting purposes.	3/2011 - new project		\$15,000
<b>Subtotal NYSEARCH Allocation</b>						<b>\$206,406</b>	<b>\$95,000</b>

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47	Solar Air Conditioning with Natural Gas back-up		This solar demonstration project will illustrate the value of utilizing solar energy to cool homes, supermarkets, office buildings, factories, etc. Solar will be the primary energy source with natural gas as the back-up. Solar energy would be utilized during daylight hours and natural gas at night or on cloudy days. The purpose of this solar air conditioning demonstration is to show the significant environmental benefits and consumer energy savings potential of the technology.	A potentially more efficient, effective and environmentally friendly way to air condition buildings.	3/2011 update - a new solar tracking device needs to be identified and installed. This will be the focus for 2011	\$32,248	\$20,000
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Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
48	Solar Thermal Domestic Water Heating and Hydronic Space Heating with Natural Gas Backup		The solar thermal domestic water heating and hydronic space heating project will demonstrate the efficient use of solar energy and natural gas to meet the day to day hot water and space heating demands of single family homes. The solar thermal energy will be used as the primary energy source and natural gas will be used as the backup or secondary energy source.	Demonstrates the potential natural gas savings from the use of solar thermal systems.	3/2011 update - the system was installed in a model home in Tucson. The home has been sold and the results of the overall demonstration are being summarized. Project complete.	\$3,000	
49	GHP Prototype w/Stirling Engine combined with EHP (Deluge and 10-ton EHP 13 SEER)		The objective of this project is to evaluate whether additional efficiencies can be gained from overall GHP performance utilizing a stirling engine. A prototype unit will be developed using a stirling engine and an off the shelf 13 SEER electric heat pump. The stirling engine will utilize natural gas as a fuel source.	While this is a proof of concept effort, if proven feasible, such a product would provide additional efficiencies for gas cooling applications.	3/2011 update. SWG has secured the services of Arizona State University and Deluge to help build and analyze the prototype.	\$109,190	
50	Solar Thermal System Equipment Demo		An additional system will be installed for a commercial or residential application to further evaluate actual operations and energy usage from solar thermal systems. While manufacturers have published data on potential energy savings of solar thermal systems, actual savings varies significantly depending on application and use by customers. Evaluation of more systems are required to provide SWG customers a better estimate of potential savings. The location of the installation is yet to be determined.	Demonstrates the potential natural gas savings from the use of solar thermal systems.	3/2011 update - equipment was procured in 2010 and potential demonstration sites are being evaluated. Installation expected in 2011	\$10,190	\$10,000
51	Gas Heat Pump (GHP) Demonstration Project in AZ		The objective of this effort is to further demonstrate the energy savings of Gas Heat Pump (GHP) applications. This project would include the purchase and installation of GHPs at a SWG customer facility. Data monitoring equipment would be added.	Demonstrates potential overall building energy savings by the use of gas heat pumps.	3/2011 update - Packaged Gas Heat Pump (GHP) units have been procured. Currently working with two facilities in Phoenix for installation (1 GHP at each facility)	\$88,113	\$80,000
<b>Subtotal EEITD Allocation</b>						<b>\$242,741</b>	<b>\$110,000</b>

Ref. Number	Organization/Project Name	Research Performer	Project Description	Potential Benefits to AZ Customers	Status	Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
<b>Other</b>							
52	Research consultant - help manage projects, develop proposals	Campbell	SWG will utilize this outside consultant to help manage and/or stay abreast of projects funded. Consultant will also help SWG prepare research proposals, specific to SWG's needs, to present to various research organizations.	Helps provide input on projects funded by SWG to help ensure they are to the benefit of AZ customers.	On-going	\$11,960	\$1,000
53	Safety Vest Evaluation/Testing	SWG	The objective of this project is to help identify appropriate safety vests for field use during natural gas emergencies. Safety vests require reflective coatings, however vests utilized by SWG have experienced color degradation as well as static charges. GTI will evaluate phenomenon behind issues and tests various vests on the market.	Enhanced safety through the application of appropriate safety vests.	New. March 2010	\$3,000	
54	SWG Application of ASME Hardness Testing Procedure	SWG	This project is a continuation of previously funded efforts to complete ASME CRTD-91 "Applications Guide for Determining the Yield Strength of In-Service Pipe by Hardness Evaluation." This new effort will involve actual sampling and testing of in-service pipe.	Reduced costs in determining actual yield strength of in-service pipe.	New - proposed in 2010, implemented in 2011	\$0	\$15,000
55	Pipe Splitting Tool for Joint Trench Applications	TT Technologies	SWG has recently worked with TT in developing a splitting tool with a more streamlined blades to prevent damage to other utilities in close vicinity. This effort involves the purchase of pre-commercialized versions of the tool that has been developed for SWG field evaluation and demonstration.	Reduced costs in replacing existing plastic pipe.	New for 2010-2011.	\$8,400	
<b>Subtotal Other Allocation</b>						<b>\$23,360</b>	<b>\$16,000</b>

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<b>Allocation Summary</b>							
						Apr. '10 - Mar. '11 Funding	Apr. '11 - Mar. '12 Funding
					Total Dollars Allocated	\$688,615	\$671,000
					Total Available Research Dollars Available Dollars	\$688,712	\$688,712
						<b>\$97</b>	<b>\$17,712</b>

**General Notes:**

1	Total authorized collection in Final Order is \$688,712 per year. Funding is collected in a deferred balancing account
2	Proposed projects reflected in current or proposed funding year may change. Some projects may terminate pending progress or proposed projects may not materialize due to lack of support. In addition, research organizations meet and discuss new and existing projects at various times of the year - this document reflects projects and information as of the date of this document.
3	Actual allocation amount may change due to changes in projects described in 2 above or due to number of companies that ultimately fund a project.