Q. Please state your name and business address.

A. My name is Edward Ecock and my business address is 4 Irving Place, New York, New York 10003.

Q. By whom are you employed and in what capacity?

A. I am employed by Consolidated Edison Company of New York, Inc. ("Con Edison" or the "Company") as the Department Manager of Gas and Steam Research and Development.

Q. Please describe your educational background.

A. I graduated from the City College of the City University of New York with a Bachelor of Engineering degree in Mechanical Engineering in 1976. I earned a Master of Science degree in Mechanical Engineering from the Polytechnic Institute of New York in 1981, and a Master of Business Administration degree from Pace University in 1986. I am also a licensed Professional Engineer in the State of New York.

Q. Please describe your work experience.

A. I have been employed by Con Edison for thirty-three years and have held various engineering and managerial positions in both engineering and research and development ("R&D").

Q. Please generally describe your current responsibilities.

A. As the Department Manager of Gas and Steam R&D, I am responsible for developing products to enhance the safety, productivity, and operations of the Con Edison gas and steam organizations. I manage the R&D projects associated with gas and steam as well as corporate Environmental Health & Safety ("EH&S"), guide their development and manage the associated R&D budget. To accomplish this, I oversee four engineers dedicated to gas, steam, and EH&S project management.

Q. Do you belong to any professional societies or organizations?

A. Yes, I am a member of the American Society of Mechanical Engineers.

Q. Please summarize your testimony.

A. My testimony explains the forecasted level of steam R&D expenditures for the rate years, which essentially continues spending at recent historical expenditure levels. The program changes result in a decrease to projected annual R&D expenditures of $56,000 in 2011, as well as increases of $44,000 in 2012, and $19,000 in 2013. Thus, the proposed spending levels for Steam R&D for the three rate years are $795,000, $839,000 and $858,000, for Rate Years 1, 2 and 3, respectively.

Q. Was the document Exhibit __ (EE-1), entitled "RESEARCH AND DEVELOPMENT COSTS - ALLOCABLE TO STEAM," prepared under your direction and supervision?

A. Yes, it was.

MARK FOR IDENTIFICATION AS EXHIBIT __ (EE-1)

Q. Please explain this exhibit.

A. As shown on Exhibit __ (EE-1), planned expenditures for the rate year ending September 30, 2011 are estimated to be $795,000, a decrease of approximately $56,000 from actual spending in the historic year. For rate year ending September 30, 2012, the planned expenditures are $839,000, an increase of $44,000 as compared to the rate year ending September 30, 2011, and for rate year ending September 30, 2013, the planned expenditures are $858,000, an increase of $19,000 as compared to the rate year ending September 30, 2012.

Q. Please explain the planned level of expenditures.

A. We are attempting to hold the line at approximately the "historical year" level even though this represents a reduction of approximately $250,000 from rate year spending levels under the current rate plan. That plan, adopted by the Commission in Case 05-S-0376, provided for approximately $1.1 million annually for

steam R&D. Considering the overall level of the current rate request, we believe that the planned level of expenditures for the three-year period, that closely reflects the historic year level, is the appropriate expenditure level to pursue projects that are necessary for safe and reliable service and otherwise address the needs of the Steam Operations department at this time.

NEED FOR R&D

Q. Please describe the purpose of Con Edison's Steam R&D program.

A. Con Edison's Steam R&D program is designed to pursue projects that improve the provision of safe and reliable service by developing and demonstrating new processes/methods or technologies to enhance operations and business practices. The program seeks out projects useful to our service territory that the industry as a whole is either not addressing or not addressing quickly enough. Our program aims to

- Reduce or minimize operations and maintenance costs with new technologies or alternative procedures;
- Maintain or enhance the reliability of steam service to customers; and

- Enhance environmental excellence and the safety and well being of our employees and customers as well as improve public safety.

Q. Please describe the internal program.

A. Our internal R&D program primarily focuses on matters that are unique to the Company's steam system. We focus on the development of selected products and methods that would improve steam generation efficiency and reduce combustion emissions, and which address the system's aging infrastructure. For example, manhole structures are not vented and consequently retain high temperatures and humidity that, in addition to collected runoff and salt, corrodes equipment and the very walls of the manhole structure itself. Rebuilding these structures would be prohibitive so instead we work to develop other ways to maintain the necessary infrastructure. In the steam generation area, we focus on ways to improve plant efficiency, and reduce combustion emissions. Most of our steam generation plants date from the 1950's and 1960's. This equipment makes it challenging to meet emissions standards since they burn oil and natural gas and may not be as efficient as newer plants. There are only a handful of other utilities that burn these fuels so consequently,

there is a limited market for technology developers to create improvements in reducing emissions from these fuels. Therefore, we seek out and attempt to develop solutions on our own or with some of the other utilities that share a common problem. I discuss below our efforts to work collaboratively on these problems where possible.

Q. Why does the Company continue to find it necessary to undertake the development and demonstration of new technologies?

A. Our steam system is the largest steam distribution system in the country, originally established in 1882. Its high operating temperatures and pressures and delivery system in a very congested underground urban environment make it unique. Its location beneath the streets of New York City also poses considerable challenges, both due to the density of use by other utilities under the streets but also due to the City's desire to limit access to the system in order to move traffic. Also, as mentioned above, the fuels that we burn are not common among other steam generators. Thus, providing safe and reliable steam service for our customers requires our own investment in the tools needed for this unique system.

Q. Could you please comment further on the specific challenges posed for maintaining a steam system underground in Manhattan?

A. Yes. As I noted above, to reduce traffic congestion while at the same time reducing lanes available for traffic by opening bike lanes, New York City prefers that the Company limit opening up streets to have access to its system. The City's Department of Transportation ("DOT") has very restrictive requirements for street access. The Company must often work underground during limited time frames, generally at night or on weekends. In addition, due to heightened noise restrictions, the opportunity to work at night has been even more constrained. At the same time, the Company's workload underground has increased with the need to maintain and, in some cases, replace our steam infrastructure. Thus, it is increasingly difficult for the Company to physically do that work. These are driving factors to our program's effort to develop the tools to work underground without always needing to dig an open trench.

Q. Beyond securing access to the system, are there particular difficulties associated with excavation for access to the steam system?

A. Yes. As a general matter, open trench excavation in New York City is costly and causes traffic congestion, combustion emissions (from trenching equipment as well as vehicles), and safety risks to pedestrians and workers. For steam excavations, those difficulties are exacerbated because the steam mains are generally deeper in the ground and the excavations require shoring due to their depth. As such, the excavations are more costly, require more time, and pose more safety and environmental risks than other street excavations.

PAST SUCCESSES

Q. Has R&D developed any successful projects through the years?

A. You bet. The Company has a long history of successful R&D project completion, which I describe below.

Q. Are all R&D projects successful?

A. No. It is the nature of R&D that some projects do not result in a successful outcome. Recognizing that reality, most projects are conducted in phases to minimize investment in projects which, as they develop, appear less likely to be successful.

Q. Can you predict which R&D Projects will be successful and work only on them?

A. No one can do that but we try. When R&D analyzes project opportunities, we consider many factors, including probability of success, potential for commercialization and deployment, estimated costs and potential benefit in providing service to customers. We seek to prioritize our project work considering these factors. Also, we try to work on projects that combine attributes for cost, probability of success and potential benefit.

Q. Please describe how projects are identified, researched and deployed into the Company's operations.

A. The R&D group works very closely with the Steam organization's personnel to identify areas in which there is a need for new processes, methodologies and technologies. Once a potential product is identified, we obtain a sponsor within the Steam organization, who estimates the project's potential benefits to be used for authorizing funds. The Steam organization provides employee support for field demonstrations and implementation of new products. A close working relationship and cooperation between R&D and Steam is critical to developing successful programs.

Q. Does Con Edison coordinate steam research projects with outside organizations and steam utilities?

A. There are only a handful of utilities in the country that have a steam distribution system and none have the distribution capacity or network size that Con Edison has. There are several campus systems that provide steam or hot water, but these are small and few in number. This means that there are few potential collaborators. We have found that the best resource is EPRI. Accordingly, Con Edison has joined three of EPRI's programs related to steam generation. As our relationship grows in the EPRI Generation Sector, there will be more opportunities to collaborate with EPRI and its members on steam generation projects. I emphasize that EPRI's programs are limited to steam generation. EPRI has no programs that address steam distribution.

Q. Please describe any additional collaborative R&D efforts the Company undertakes.

A. Con Edison is an active member of the International District Energy Association ("IDEA"), which is an organization that strives to serve the district heating industry by creating network opportunities, information exchange, and providing educational training. We recently attempted to initiate a collaborative research funding mechanism through the Association, but the majority of the members are small (campus-type

facilities) and the availability of R&D funding is limited. Recently, we have been able to share information with Compagnie Parisienne de Chauffage Urbain ("CPCU"), a large district heating company serving Paris, France, on manhole structure designs, and condensate formation and behavior, in an effort to address some problems in these areas. The CPCU has indicated an interest in collaborating with us on condensate behavior studies. While we have some hope to work with international steam systems, none of those systems operate under pressure or temperatures comparable to the high pressure and temperatures in our system.

Q. Please explain why, with these various collaborative efforts, the Company needs an internal R&D program for steam.

A. Even if the initiatives with EPRI and IDEA develop, or we are successful in developing other collaborative partners, such as CPCU, and the collaborative research provides valuable new perspectives and ideas, these efforts cannot and will not substitute for an internal program focused on our specific needs. The potential R&D from such efforts could not replicate the experience and practical job knowledge that has been

gained by our R&D staff working with operating personnel because the types of projects that would aid our unique system, as I described above, simply would never be viewed as applicable to other steam district companies.

Q. Please describe some recent successful projects conducted under the Company's internal Steam R&D program.

A. There have been a number of recent successful Steam R&D projects at various stages of development.

During 2008 and 2009, an Ener-G-Rotor device was designed and developed to recover waste heat from waste steam, steam condensate, or flue gas from the steam generation process and convert it to electricity. A 5kW "beta" version (2ND generation prototype) of the device was manufactured and successfully tested in the shop in preparation for field testing at a Con Edison site scheduled for the fourth quarter of 2009. This device will be tested to determine its ability to convert waste heat to electricity by absorbing waste steam from a barometric tank, and absorbing it in a closed-loop refrigerant cycle that will supply expanded refrigerant gas to an efficiently designed rotor generator. If successful, the device will recover

waste heat, produce electricity, and remove an unsightly plume.

Q. Please continue.

A. Working with Cooper Union, we successfully developed and tested prototypes of thermoelectric devices that use thermal energy from the steam main and convert it to electric power. These devices are designed to provide power to future monitoring sensors and data transmitters that will be installed in the manholes thus eliminating the need to install separate power cables from external sources.

Q. Can you describe any other successful work?

A. Yes. In 2008 and 2009, research was conducted, and a prototype was developed and tested, to purge debris from steam traps and condensate piping in a safe and noise-free manner. The device proved so successful in several of our manholes that the unit was capitalized.

Q. Were there any capitalization credits in the historic year that lowered O&M expense during the historic year?

A. Yes. The R&D department received a $23,000 credit from the operating department for capitalization for a steam trap debris removal device, explained below, that was deemed used and useful.

Q. Please explain the capitalization credit.

A. When an operating organization accepts an R&D project into commercial use as "used and useful," only the costs associated with the project's commercial, productive use are considered for capitalization. Accordingly, the entire cost of an R&D project is never capitalized.

Q. For projects that resulted in useful products, do you have an approximation of the percentage of the spending that was capitalized?

A. Over the past five years, this was the only project that resulted in a capitalized product, and only approximately 34 percent of the total expenditures for that project were capitalized. The other 66 percent remained as an R&D operating expense.

Q. Are all successful R&D products capitalized?

A. No, many of the results of R&D projects are prototypes that do not go into commercial, productive use but rather become the model underlying specifications and purchase orders for new equipment by various Company operating departments from third party manufacturers. While these prototypes are an important part of the R&D process, they are not constructed in a way that is durable enough to place them into commercial operation. Therefore, the associated costs of development and

earlier prototype units remain as operating expenses within the R&D department.

Q. Do you believe that applying a capitalization credit in establishing the revenue requirement for R&D is appropriate?

A. No, credits are merely an accounting mechanism. By capitalizing costs, the Company simply transfers money from one department to another. In effect, the customer operations department pays R&D for some portion of the work. As a whole, the Company is no better or worse off because the same costs are incurred being either capital or O&M. More importantly, over a five-year period, Steam only received one capitalization credit for $23,000. This is not something that occurs regularly for steam and should not be included as an adjustment to the revenue requirement for steam.

CURRENT AND FUTURE STEAM R&D PROJECTS

Q. Please describe the process you employed to developing your Rate Year forecast.

A. The program plan presented in a rate filing reflects a combination of specific projects and targeted programs that are necessary to improve safe and reliable service. Some of the projects are a continuation of

ongoing efforts, while others are new initiatives. The new initiatives are more conceptual in nature than ongoing projects because these initiatives are at an early stage where proof of concept has not yet been proven. During the period leading up to the Rate Year, the Company endeavors to match the current needs of Company operations with opportunities for solutions. In all cases, an analysis of candidate projects is made, with potential advantages reviewed against financial resources required for successful development, to arrive at the right amount of investment. A cost/benefit analysis is performed for all projects over $50,000. Emphasis is placed on projects with the possibility of near- and mid-term benefits, but we are also mindful of long-term programmatic issues that need to be addressed. This general approach facilitates a comparison of various candidate technologies and aids in project selection and prioritization.

Q. Please describe the major current on-going steam-related R&D projects.

A. There are a number of ongoing Steam R&D projects that focus on various issues affecting Steam Operations. For example, in connection with steam main condensate

detection and monitoring, we have recently been working with the NASA Jet Propulsion Lab to develop a sensor that can detect and monitor steam condensate as it forms in the steam main, so that an operator can react to a potential water hammer condition before it arises. The sensor will be designed to harvest its energy needs directly from the steam main via thermal electric conversion, and be designed to withstand the extreme environment of the manhole structure, which sees temperatures of 300 degrees Fahrenheit and 100 percent relative humidity.

Q. Please continue.

A. In connection with steam manhole water monitoring, we have been working with Stevens Institute to develop a fiber optic sensor that will detect and monitor water collecting in a manhole and transmit an alarm back to the operator before the water encapsulates the equipment and creates higher-than-design condensate formation in the steam main.

Q. Please explain the concern for condensate in the mains.

A. Condensate forms in steam mains as the steam cools below its dry saturated temperature. The system is designed to remove a calculated amount of condensate through steam traps as it is generated. If off-design

conditions occur such as excessive flooding external to the main, and/or malfunctioning traps, then enough condensate may accumulate in the steam main to develop a potential water hammer condition. Detection and monitoring the condensate accumulation in the steam main may help mitigate potential water hammer conditions.

Q. You have used the term "water hammer" several times in your testimony. Can you explain what this refers to?

A. Water hammer refers to a phenomenon that can occur under certain conditions in a steam distribution main, when there is an excess of condensate at a certain sub-cooled temperature that envelopes a steam bubble causing it to collapse and creating an internal pressure surge that can rupture the steam main.

Q. Please continue to describe other ongoing projects.

A. Many of these projects were started after Case 07-S-1315 and are still being developed. We are working on a number of manhole related projects, including: (i) testing various valve materials for long-term use in manholes; (ii) development of a composite cover with various sensors and transmitters incorporated into the cover; and (iii) investigation into use of a non-rocking manhole cover that will eliminate cover wear

and reduce nuisance noise chatter. We are also developing a predictive model for water hammer prevention. This model will provide the operator with location(s) of potential hazardous conditions that could lead to water hammer as they develop and allow for proactive remediation. We are continuing development of a welding robot ("WISOR") that can inspect and weld pipe from inside the pipe to seal against steam leaks, which could reduce the amount of trenching normally associated with this type of work. I described above the reasons for reducing the need for open trenching in New York City.

Q. Are there any other ongoing projects?

A. Yes. We continue to work on the development of a prototype thermal powered device to power sensors and transmitters in a manhole. As we continue to install more sensors in the manholes to monitor our equipment, there is a need to provide a source of energy to power the sensors and data transmitters. Batteries do not last long and require a replacement program. This device will eliminate the need to install batteries or electric cable to power the sensors or data transmitters. Finally, as explained earlier, we are working to demonstrate and field test the 5kW Ener-G-

Rotor waste heat recovery device. This effort to field test the equipment follows from a successful demonstration in the vendor's shop.

Q. What are some of the new R&D projects to be pursued in the Rate Year?

A. In addition to continuation of the ongoing steam R&D projects described in my testimony, during the Rate Year R&D will focus on technologies that may help predict, and possibly mitigate conditions that could lead to water hammer; better understand effects of various water treatments on steam distribution; and reduce CO_2 emissions. These initiatives include:

1) Development and demonstration of a water treatment model that could be used to study the various effects of boiler water chemistry and treatment methods on the steam distribution system. This effort would attempt to design and develop an engineering model that would analyze various chemical treatments of boiler feedwater and determine what effects the resulting steam chemistry has on the steam distribution mains. The projected expenditures for this project are $300,000 during the rate years.

2) Development of a physical flow model to study

steam condensate flow behavior. This effort will provide us with a better understanding of steam condensate behavior in the steam distribution piping, and will allow us to better predict where condensate will accumulate. The projected expenditures for this project are $25,000 during the first rate year.

3) Research and conduct studies on methods to reduce CO_2 emissions from our steam generation stations. The projected expenditures for this project are $200,000 during the rate years.

Q. Does this conclude your testimony?
A. Yes, it does.

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
RESEARCH AND DEVELOPMENT COSTS - ALLOCABLE TO STEAM

($ x 1000)

Title	Historical Year Ending 6/30/2009	Rate Year Ending 9/30/2011	Variance	Rate Year Ending 9/30/2012	Variance	Rate Year Ending 9/30/2013	Variance
BASE PROGRAM							
ADMINISTRATION							
SALARIES AND WAGES	$ 118	$ 119	$ 1	$ 124	$ 5	$ 129	$ 5
OTHER EXPENSES	16	15	(1)	15	-	16	1
PATENT SEARCHES IN CONNECTION WITH COMPANY R&D TECHNOLOGY APPLICATIONS	10	11	1	11	-	11	-
DEVELOPMENT OF R&D DEPARTMENT WEBSITE	-	5	5	-	(5)	-	-
TOTAL ADMINISTRATION	**144**	**150**	**6**	**150**	**-**	**156**	**6**
INSTITUTIONAL							
EPRI GOBIG COST COMPETITIVENESS	-	10	10	10	-	10	-
EPRI COMBUSTION TURBINE, HRSG, AND STEAM & WATER CHEMISTRY PROGRAMS	107	115	8	124	9	127	3
TOTAL INSTITUTIONAL	**107**	**125**	**18**	**134**	**9**	**137**	**3**
INTERNAL PROGRAM							
MONITORING OF STEAM TRAPS IN GAS TUNNEL (See Note 2)	31	-	(31)	-	-	-	-
DEMONSTRATION OF GROUND PENETRATING RADAR	17	-	(17)	-	-	-	-
ELIMINATE STEAM TRAP DEBRIS VIA STEAM MAIN PURGE	(2)	-	2	-	-	-	-
ACCELERATED CORROSION TESTING	15	-	(15)	-	-	-	-
TESTING LEAK SEALANT PROCESS	7	-	(7)	-	-	-	-
CORROSION TESTING THERMAL ALUMINUM SPRAY	8	-	(8)	-	-	-	-
RETROFIT STEAM MANHOLE WITH VENTED DESIGN	8	-	(8)	-	-	-	-
FEASIBILITY STUDY FOR A PREDICTIVE MODEL FOR WATER HAMMER	16	-	(16)	-	-	-	-
PROOF OF CONCEPT DEMONSTRATION OF A PREDICTIVE WATER HAMMER MODEL	-	25	25	-	(25)	-	-
W.I.S.O.R. (WELDING AND INSPECTION STEAM OPERATIONS ROBOT)	13	-	(13)	-	-	-	-
DEMONSTRATION OF ENER-G-ROTOR	43	-	(43)	-	-	-	-
DEVELOPMENT OF STEAM DETECTION ANALYTICS FOR MONITORING CAMERA	5	-	(5)	-	-	-	-
DEVELOPMENT OF THERMOELECTRIC MODULES FOR STEAM MANHOLE INSTF	47	-	(47)	-	-	-	-
THERMOELECTRIC MODULES FOR STEAM MANHOLE INSTRUMENTATION - COI	-	60	60	25	(35)	-	(25)
STEAM EXPO	-	-	-	25	25	-	(25)
DEMO OF HIGH STRENGTH COATINGS FOR MAIN VALVES	-	10	10	10	-	10	-
DEVELOPMENT AND TESTING OF A MANHOLE COVER MONITORING SYSTEM	-	10	10	10	-	10	-
EXPLORATION AND DEVELOPMENT OF ADDITIONAL PIPE INSPECTION TECHNOLOGIES	-	10	10	10	-	10	-
EXPLORATION AND DEVELOPMENT OF MORE ACCURATE LEAK DETECTION	-	10	10	10	-	10	-
STEAM TRAP DESIGN AND ENHANCEMENT PROGRAM	62	-	(62)	-	-	-	-
STEAM CONDENSATE DETECTION AND MONITORING IN STEAM MAINS - PHASE I	290	-	(290)	-	-	-	-
DEMONSTRATION OF FAC SHIELDS FOR HRSG TUBES	30	-	(30)	-	-	-	-
DEMONSTRATE THE USE OF STEAM CONDENSATE FOR URBAN GARDENS	18	-	(18)	-	-	-	-
R&D OF TESTING PROTOCOLS FOR STEAM MAIN REPAIR LINERS	-	15	15	-	(15)	-	-
THERMAL POWERED STEAM VORTEX METERS PHASE III	20	-	(20)	-	-	-	-
THERMAL POWERED STEAM VORTEX METERS PHASE - COMMERCIALIZATION	-	50	50	25	(25)	-	(25)
DEVELOPMENT AND TESTING OF TRANSPORT AND CAPTURE METHODS OF	(40)	-	40	-	-	-	-
DEMONSTRATION OF A TRANSIENT PRESSURE MONITOR	-	20	20	-	(20)	-	-
WATER TREATMENT MODELING	-	50	50	75	25	25	(50)
STEAM CONDENSATE FLOW BEHAVIOR TESTING IN STEAM MAIN MOCK-UP	-	25	25	-	(25)	-	-
DEMONSTRATION OF IN-SITU CORROSION MONITORS	-	15	15	15	-	-	(15)
STEAM REMOTE MANHOLE TRAP MONITORING	12	20	8	25	5	-	(25)
DEVELOPMENT AND TESTING OF A PREDICTIVE WATER HAMMER MODEL	-	50	50	75	25	175	100
STEAM CONDENSATE DETECTION AND MONITORING IN STEAM MAINS - PHASE II	-	20	20	-	(20)	-	-
STEAM CONDENSATE DETECTION AND MONITORING IN STEAM MAINS - PHASE III	-	30	30	150	120	100	(50)
DEMONSTRATION OF REMOTE WATER LEVEL MONITORING IN STEAM MANHOLES (Phase II - Commercialization)	-	50	50	50	-	100	50
DEMONSTRATION OF ENER-G-ROTOR (Phase II - 50kW)	-	25	25	-	(25)	-	-
CO2 REDUCTION STUDIES	-	25	25	50	25	125	75
TOTAL INTERNAL PROGRAM	**600**	**520**	**(80)**	**555**	**35**	**565**	**10**
TOTAL BASE PROGRAMS = TOTAL ADMIN.+ TOTAL INST. + TOTAL INTERNAL	**$ 851**	**$ 795**	**$ (56)**	**$ 839**	**$ 44**	**$ 858**	**$ 19**

NOTES:
1) Rate year amount excludes escalation.
2) Incorrectly charged to Steam. Charges were correctly moved to Gas in 8/09 & 9/09