INTRODUCTION

The Millennium Pipeline Project is a proposed interstate natural gas pipeline that consists of 442 miles of natural gas pipeline extending from the Canadian border in Lake Erie to an interconnection with the local gas distribution facilities of Consolidated Edison Company of New York, Inc. (Con Ed) in New York City. The fundamental purpose of the Project is to transport up to 700,000 dekatherms (Dth) of natural gas per day to various delivery points in New York State. Half of the natural gas to be transported (350,000 Dth per day) would be destined for markets in New York City, while the remainder would be delivered to markets in New York State and elsewhere in the Northeast through the existing interstate pipeline grid.

The Project is located in New York's coastal zone because of proposed construction across Lake Erie and the proposed river crossing of the Hudson River at Haverstraw Bay. The New York State Department of State (NYSDOS) has been assigned the review of projects in New York State that are jurisdictional under the Coastal Zone Management Act. The proceeding before the NYSDOS commenced on November 20, 1998, when Millennium filed with the NYSDOS its consistency certification, a completed NYSDOS consistency form, an analysis of the Project's consistency with New York State's Coastal Management Program (CMP), and a copy of Millennium's Federal Energy Regulatory Commission (FERC) application and environmental report. On May 9, 2002, the NYSDOS completed its review and issued a decision which concluded that the Millennium Project was not consistent in certain respects with New York's CMP. Significant to the NYSDOS decision was concern about the proposed crossing of the Hudson River and the potential for alternatives to that crossing location. Millennium appealed that decision to the Secretary of Commerce on June 7, 2002 and filed its initial brief on August 12, 2002. In a brief filed with the U.S. Department of Commerce on October 16, 2002, the NYSDOS proposed a number of alternative Hudson River crossings for the Project. Many of the same alternatives, as well as some additional alternatives, were proposed by the Villages of Croton-on-Hudson and Briarcliff Manor, NY (the Villages) in a subsequent amicus brief filed with the Department of Commerce on October 23, 2002. The Villages' amicus brief was also accompanied by a "Feasibility Evaluation" of the proposed alternatives that was prepared by O'Brien & Gere Engineers, Inc. (O'Brien & Gere).

Millennium has retained the engineering firm of Michael Baker, Jr., Inc. (Baker) to review and critique the alternatives proposed by the NYSDOS and the Villages as well as the "Feasibility Evaluation" prepared by O'Brien & Gere. In this regard, Baker has been providing Professional Consulting Engineering and Construction Management Services to the pipeline industry for over 50 years. A detailed description of these services is contained in the Experience Section of this report. For the past several years, Baker has been responsible for the preparation of maps showing gas transmission pipelines under contract with the Office of Pipeline Safety, U.S. Department of Transportation. Baker is currently working as a Consultant to the Office of Pipeline Safety, assisting it in the development of regulations for pipeline integrity for liquids and gas pipelines. When issued, all pipeline operators would have to comply with these regulations. This broad base of experience in all facets of the natural gas pipeline industry uniquely qualifies Baker to comprehensively evaluate the proper location for pipeline facilities. Baker's review, analysis, findings, and conclusions of those alternatives are presented in the sections that follow. A discussion of the FERC certificated route is also included.

In addition to the FERC certificated route, a total of 9 different routes containing 14 separate segments running south of the proposed Millennium pipeline system in Rockland and Westchester counties, and 6 different routes containing 9 separate segments running north of the same proposed Millennium pipeline system were reviewed.

Baker's staff, familiar with the permitting, design and construction of linear utilities such as high pressure, large diameter gas transmission pipelines, reviewed aerial photography and topographic maps and made several detailed on-site field reviews of all the separate routes and their respective segments. The purpose of the field review was to identify field conditions that would affect the permitting, design, construction, safety and operations and maintenance of the pipeline if situated on the subject routes. The individual cost to construct each of these routes was not specifically addressed; however, the various constraints identified would certainly increase the construction cost, conceivably to the point where it would be uneconomical to build. Other constraints such as those that affect the environment, topography, and type of development, inhabited areas, and constructability were noted. Since all of the alternative routes had multiple feasibility constraints which adversely effect and/or prevent their construction, Baker did not analyze them further and calculate the various lengths and acreages that would be affected during construction and operation. It should be noted that the route and segment descriptions provided by the NYSDOS and the Villages in their briefs were extremely vague. For example, no specification was given as to where the pipeline would be in the routing alternative description "follow the Palisades Interstate Parkway right-of-way south" provided by the NYSDOS at page 104 of its initial brief. This could be interpreted to mean next to the PIP ROW on either side, just within the PIP ROW on either side, or anywhere in between. The differences are significant, 'next to' on either side would mean routing the pipeline literally through hundreds of homes; 'just within' either side would mean removing acres of mature park forest that screens the roadway from the residences; and 'anywhere in between' would mean complete interference with the road surface or the attendant drainage facilities. Similarly, "follow the Thruway right-of-way", or "along or near the Tennessee Pipeline right-of-way", or "along the CSX right-of-way" would have equally significant consequences. However, in order to conduct a thorough investigation, Baker assumed the most appropriate location for the facilities along or in proximity to the various suggested alternatives. As will be discussed below, often there was no feasible alternative location.

Each of the 15 different routes was evaluated on a stand-alone basis, as a pipeline is a continuous structural conduit, and each of its segments must be feasible in order for the route as a whole to be viable. Importantly, in organizing segments into routes that could satisfy the need for continuity in a pipeline system, it became readily apparent that many routes contained the same segments. Just as a chain is only as strong as its weakest link, a proposed pipeline route is only as feasible as its least feasible segment. Each route and segment has an individual analysis and discussion within this report. Almost all the alternatives suffer from the same feasibility constraints of not having sufficient workspace to construct, operate and maintain the pipeline facilities. A pipeline construction spread operates as a moving assembly line performing specialized procedures in an efficient, planned sequence. Attachment 1, Figure 1 details the various operations required to complete construction and restoration of the pipeline facilities. Twenty-four inch pipeline construction requires a construction work area (CWA) that is approximately 75 feet wide if the area is relatively flat. Attachment 1, Figure 2 depicts how the construction equipment utilizes this workspace. It is essential that equipment be able to work

side by side with adequate space for passing and efficient construction of the facilities. Ideal field conditions may allow short sections of the pipeline to be installed on narrower workspace, but an adequate staging area and suitable access would still be required in the vicinity. A 50-foot permanent right-of-way (ROW) to permit safe pipeline operation and maintenance is required regardless of the area used for construction.

A broad base of knowledge in the natural gas pipeline industry is necessary to properly investigate and evaluate natural gas pipeline routes. Of paramount concern is the requirement to locate natural gas facilities where they can be safely and effectively constructed, operated, and maintained. Routing considerations must also include the potential effects on the natural and human environment as well as the cost to construct and maintain the facilities. Some of the standard conditions and restrictions that are consistently observed in the industry include:

- Railroad companies typically will not allow pipeline construction activities to be any closer than 10 feet to the nearest rail and will require greater separation distances in fill areas. Because the ballast for the rail line is considered a fill area and is an engineered structure to support the rail facilities, construction is prohibited in ballast areas.

- When paralleling an existing pipeline, the minimum separation distance from the existing pipeline is 25 feet, and heavy equipment movement is not permitted in the immediate proximity of the existing pipeline.

- When paralleling existing pipeline in rocky areas, the minimum separation distance from the existing pipeline is 50 feet, and heavy equipment traffic is not permitted in the immediate proximity of the existing pipeline.

- When paralleling existing electrical transmission lines, the separation that is required between the towers and the pipeline is dictated by the standards of the power utility industry. These standards are intended to protect the integrity and safety of the pipeline and electrical facilities. Among other protective devices, electrical transmission lines are constructed with grounding wires to dissipate lightning strikes. Modern pipelines are constructed with cathodic protection to protect the pipeline from corrosion.

It is often the case that a route will completely satisfy one or two of these requirements but be lacking for the balance. In such a case, the route should be discarded and suitable alternatives investigated. Design, permitting, and construction for overhead electrical transmission lines differ greatly from underground pipelines. The conductors of the transmission lines can span from tower to tower with minimal impact to wetlands, timber cutting, roads, railroads, operations and maintenance access, blasting, and are able to traverse along side hill conditions. On the other hand, an underground pipeline will have a greater impact to all of these conditions which creates additional burden on the environment and the public. Constructing a pipeline along a side hill is a condition that is avoided because of the risk to the pipeline due to potential earth slides which could result in a breach of the pipeline integrity.