Capacity Expansion Study

For The

Gowanus and Narrows Generating Stations

Prepared For

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1.0 Introduction and Methodology

In accordance with Task Order No. 001 between Astoria Generating Company, L.P. (Astoria) and Burns and Roe Enterprises, Inc. (BREI) dated July 27, 2007, BREI has completed a Conceptual Capacity Expansion Study to assist Astoria in developing an overall capacity expansion strategy for the Gowanus and Narrows Generating Stations; and to identify any critical hurdles that must be overcome to facilitate adding capacity at these sites. The scope of this study included the following individual tasks:

a) BREI conducted an evaluation of both sites considering survey data and existing equipment layouts to identify available onshore and pier locations that would be suitable for new barge and/or land based capacity additions.

b) Based on this evaluation, six layout concepts were developed for each site considering both land and barge options. The objective of this evaluation was to determine the maximum reasonable level of capacity that could be installed at each site while considering construction, operation, and maintenance requirements, maintaining the existing barge generation capacity in service, and independent of possible electrical export or gas delivery constraints. These concepts considered the use of either GE LM6000 "Sprint", GE LMS100, or Pratt & Whitney's FT8 "SwiftPac" combustion turbine generator sets.

c) Following a joint Astoria/BREI review of these layout concepts, three options were selected by Astoria for further evaluation (land based at Gowanus and barge mounted at Narrows). These options include: a.) three LM6000's at Gowanus, b.) one LM6000 and one LMS100 at Gowanus, c) double LM6000 barge mounted units at Narrows.

d) BREI then developed Order of Magnitude comparative cost estimates, performance estimates, and stack emissions estimates for each of these selected options.

e) A recommended approach was developed for Astoria to evaluate the ability of the ConEd electrical grid to accept additional capacity from Gowanus and/or Narrows without congestion; and to identify what system upgrades may be required, and at what cost, to evacuate the full additional electrical capacity identified in this study.

f) Report to Astoria any other pertinent information and data identified during the course of this study.

2.0 Conceptual Layouts

Following a site inspection visit and initial kickoff meeting, BREI prepared conceptual layout drawings for adding generation capacity considering the following basic requirements: First, all existing Frame 5 barge based capacity is to be kept in operation both during construction of the new facility and once the new capacity goes into operation. The new

combustion turbines would be of simple cycle configuration with dual firing capability utilizing natural gas and No. 2 fuel oil. Water injection, high temperature SCR and CO catalysts will be required for control of NOx and CO emissions. No new No. 2 Oil storage capacity will be provided; the existing barge and land based storage facilities (Gowanus and Narrows respectively) will provide adequate fuel oil storage capacity for both the existing and new capacity. Demin water (for NOx control and LM6000 "Sprint" intercooling injection) will be produced in trailer mounted rental DI plants with offsite resin regeneration. The Electrical interconnections are assumed to be located at the plant existing ConEd tie points at an export voltage of 138kV. Gas is assumed to be available at 300 psig at the site battery limits. The following Combustion Turbines were considered in this evaluation: GE LM6000 "Sprint" (nominal 48 MW), Pratt & Whitney's 52 MW "Swiftpac", and the GE LMS100 intercooled combustion turbine (nominal 100 MW capacity). Due to balance of plant plot space requirements, the LMS 100 was only considered for land based applications.

The following provides a summary of the layout concepts developed during this phase of the study. Copies of BREI's layout sketches are included as Appendix 1 of this Report.

2.1 Narrows Conceptual Layouts

1. Option 1 (BREI Sketch No. SKM-200): Pratt & Whitney Swiftpac (2xFT8's with a common generator) located in the area of abandoned mounded fuel oil tanks, gas compressor located adjacent to the existing gas metering house (nominal 52 MW capacity).

2. Option 2 (BREI Sketch No. SKM-201): Two GE LM6000 Sprint units located in area of abandoned mounded fuel oil tanks, miscellaneous support equipment in abandoned fuel oil unloading area. (nominal 96 MW capacity).

3. Option 3 (BREI Sketch No. SKM-202): One GE LM6000 Sprint located in the area of the abandoned fuel oil unloading area with miscellaneous support equipment near area of abandoned mounded fuel oil storage tanks. (nominal 48 MW capacity).

4. Option 4 (BREI Sketch No. SKM-203): One GE LM6000 Sprint barge mounted with barge moored to a new "T" shaped pier extension at the west end of the existing pier. The ammonia tank, gas compressor and demin trailers would be located onshore in the abandoned fuel oil unloading area. Demin water storage would be on the barge or as an alternate, land based. (nominal 48 MW capacity).

5. Option 5 (BREI Sketch No. SKM-204): Two barge mounted LM6000 Sprint units moored to a new "T" shaped pier extension. The two CTG's would be mounted on either a single barge or two barges transported separately and then mechanically joined. The ammonia tank, gas compressors and demin trailers would be located onshore in the abandoned fuel oil unloading area. Demin

water storage would be on the barge (or as an alternate, land based) (nominal 96 MW capacity).

6. Option 6 (BREI Sketch SKM-205): Two LM6000 Sprint units mounted on separate barges and moored to the north and south sides of a new east - west pier extension. The ammonia tank, gas compressors and demin trailers would be located onshore in the abandoned fuel oil unloading area. Demin water storage would be on the barge (or as an alternate, land based) (nominal 96 MW capacity).

2.2 Gowanus Conceptual Layouts

1. Option 1A and 1B (BREI Sketches SKM 210, Sheets 1 and 2): Two alternate configurations for locating three LM6000 Sprint units located in the South Pier area with adjacent balance of plant (nominal 144 MW capacity).

2. Option 2 (BREI Sketch SKM 211): Combination of one LMS100 unit and one LM6000 Sprint (with common stack) located in the South Pier area with adjacent balance of plant (nominal 148 MW capacity).

3. Option 3 (BREI Sketch SKM 212): Two barge mounted LM6000 Sprint units on single or double joined barges with land based facilities located on the South Pier (nominal 96 MW capacity). This barge location would require demolition and removal of submerged spoils reported to be located west of the south pier.

4. Option 4 (BREI Sketch SKM 213): Four barge mounted LM6000 Sprint units on multiple joined barges with land based facilities located on the South Pier (nominal 192 MW capacity). This barge location would require demolition and removal of submerged spoils reported to be located west of the south pier. Further evaluation of the feasibility of the fabrication and transport of this barge configuration would also be required.

5. Option 5 (BREI Sketch SKM 214): Two barge mounted P&W Swiftpac units on multiple joined barges with land based facilities located on the South Pier (nominal 102 MW capacity). This barge location would require demolition and removal of submerged spoils reported to be located west of the south pier. Further evaluation of the feasibility of the design and transport of this barge configuration would also be required.

6. Option 6 (BREI Sketch SKM 215): Two LM6000 Sprint units located one the south and one to the north of the existing administration and control building (nominal 96 MW capacity). These units could be either barge mounted or placed in filled areas. This option would require further evaluation of water depth, dredging requirements, and the feasibility (permitability) of land filling these areas to support a land based installation.

3. Preferred Layout Options

Based on a joint review of the layout concepts described in Section 2 above, Astoria selected two land based options at Gowanus and barge mounted options at Narrows for further evaluation, including the development of Order of Magnitude cost estimates. The selected concepts include: a) three LM6000's at Gowanus, b) one LM6000 and one LMS100 at Gowanus, and c) two LM6000 barge mounted units at Narrows. The evaluation criteria considered for selecting these concepts included:

- The Gowanus "South Pier" area provides an open area without existing encumbrances for the placement of approximately 140 - 150 MW of new capacity. It may be possible to expand this area to the west by landfill to provide room for an additional LM6000 bringing the additional capacity of this option up to approximately 192 MW.

- Barge siting at Gowanus presents many challenges as compared to Narrows. Issues include the possible need to dredge and remove submerged spoils, the need to relocate existing fuel barges, interference concerns with existing barges, and the possibility of "land locking" existing power barges with the installation of new power barges.

- The onshore areas at Narrows would be of higher cost and riskier to develop for CTG installation as compared to the Gowanus South Pier. This is due to the need to remove the abandoned mounded fuel tanks and other structures. The close proximity of local businesses and residence, permitting and noise control requirements, and community relations, further complicates onshore siting options at Narrows.

- New barge placement at Narrows is more attractive than at Gowanus considering the relative ease of new pier construction and open water access for new barge placement. Barge placement would require only limited onshore balance of plant equipment installation in the area of either the abandoned mounded fuel oil tank or fuel unloading area.

Conceptual layout and design details (developed to the extent necessary for the purpose of layout space allocation) for the preferred Narrows and Gowanus options include the following:

3.1 Narrows Barge Options

The extent of Astoria's water rights (south and west of the existing power barges), and the need to maintain barge access to the fuel unloading pier north the existing power barges, limits the amount of barge capacity that can be installed. BREI has determined that a maximum of two barge mounted LM6000's can be accommodated given these constraints.

Two pier configurations were considered including a "T" shaped extension at the end the existing pier and extending the existing pier to the west. With the pier extension, two separate power barges would be moored, one on either side of the pier. With the "T" configuration, either a single dual LM6000 barge or two rafted barges (mechanically joined after shipment) would be moored in the north - south direction. While BREI believes that there may be some nominal cost savings associated with the "T" configuration, the east-west pier extension has been selected for this study. This is based on several factors including Astoria's preference; and better on-pier accessibility for barge, turbine, and generator maintenance. The pier extension would be approximately 50' wide by 200' in length to accommodate two nominal 200' X 80' barges. Details of utility routing (gas, oil, water, ammonia) on both the new and existing piers will be determined in future detailed design studies.

Located on each barge would be an LM6000 Sprint with fuel oil and water injections skids and associated mechanical and electrical modules, exhaust breeching with high temperature SCR and CO catalysts, exhaust stack, ammonia dilution and vaporization skid, GSU transformer with secondary containment, electrical switchgear and MCC equipment, CEM's system and enclosure, air compressor equipment, fin fan coolers and associated glycol/water based cooling water pumps (for generator and lube oil cooling), oil water separators and other required pollution control equipment. Dematerialized water storage would be provided either on the barge or on shore. Due to corrosion concerns, on-barge demin water storage would be provided in a separate tank located under deck. Refer to BREI Sketch Drawing SKM-205, Sheet 1, for this arrangement.

Associated on shore supporting equipment including the aqueous ammonia storage tank, gas compressors (one for each LM6000) and demineralized water trailers would be located in the area near First Avenue where the retired truck fuel oil unloading area is located. The gas compressors would be installed in a building for noise control. Each gas compressor would be provided with a fin fan cooler. The LM6000 e requires gas in the range of 650-700 psig, with a flow of approximately 7500 scfm. Given dual fuel capability, redundant gas compression was not included.

Ammonia storage for the SCR would consist of a horizontal ASME Section VIII pressure tank, approximately 12,000 gallons capacity which would be provided with secondary containment. A 19% solution of aqueous ammonia, considered acceptable to the NYFD would be used. Aqueous ammonia delivery would be adjacent to First Avenue. Demin trailer parking would also be accessible from First Avenue.

It is envisioned that a new gas supply line may need to be routed to the site. The line will require a capacity of approximately 15,000 scfm in order to handle two (2) LM6000's. For this study, and for gas compressor sizing estimates, it is assumed that natural gas would be available at a nominal 300 psig

Each LM6000 would require approximately 45 gpm of demineralized water for water injection. A city water line to handle a capacity of approximately 100 gpm with a minimum interface pressure of 60 psig will be required. The 60 psig pressure requirement considers

pressure losses for the cation/anion/mixed bed vessels located on the demineralized water trailers. If this pressure cannot be provided raw water booster pumps would need to be provided.

Fuel oil consumption for each LM6000 is approximately 40 gpm. Therefore, an additional flow of 80 gpm from the existing tankage will be required for two (2) LM6000's. Based on current fuel oil storage capability at Narrows, this should not be an issue. New fuel oil forwarding pumps and transfer piping are assumed to be required. Refer to BREI Sketch Drawing SKM-205, Sheet 2, for the suggested onshore equipment arrangement.

3.2 Gowanus South Pier Options

LM6000 Sprint Option

The preferred option for the Gowanus "South Pier" site includes three (3) individual LM 6000 Sprint's as shown on BREI Sketch # SKM-210, Sheet 2.

Each LM 6000 unit would incorporate a high temperature SCR and CO catalyst system with individual 80' (nominal) exhaust stacks. A CEMS system would be provided for each stack. Each SCR module would be provided with its own ammonia dilution skid. It should be noted that SCR dilution air injection for SCR cooling is not required with the LM6000 exhaust gas temperature (nominally 800F - 850F). Two (2) storage tanks for 19% aqueous ammonia, each with a capacity of approximately 12,000 (each) gallons would be provided onsite. Four (4) ammonia forwarding pumps, one (1) for each LM 6000 and one (1) common spare would be provided.

An air compressor building would be provided with two (2) 100% capacity oil free rotary screw air compressors, one (1) twin tower dryer and one (1) vertical air receiver.

Space has been allocated for two (2) demineralized water trailers and one (1) field erected demineralized water storage tank. Four (4) demin water forwarding pumps would be provided, one (1) pump per machine plus one (1) common spare.

Three (3) 100% capacity gas compressors, each with its own fin-fan cooler, would be provided and located adjacent to the existing gas metering station. It is envisioned that all three (3) gas compressors would be located in an enclosed building for noise control. Given dual fuel capability, redundant gas compressors were not included. The Gowanus plant was provided with natural gas capability during the 1990's. Gas lines are run to barges #3 and #2 and there is a stub up connection blanked off for future connection to barge #1. Therefore, it appears that there is sufficient remaining natural gas supply capacity for this option. However, gas compression will be required.

Utility requirements for each LM 6000 unit are approximately as follows:

- #2 fuel oil 40 gpm
- demineralized water injection 45 gpm

- natural gas 7500 scfm at a pressure range of 650 to 700 psig

A Control Building would be provided on site to serve as the Control Room facility for each LM 6000 as well as for the Balance of Plant (BOP) equipment. The Control Room would be provided with a Distributed Control System (DCS) for overall supervisory control.

LMS100 / LM6000 Sprint Option

The second land based option for Gowanus includes one (1) LMS100 and one (1) LM 6000. The LMS 100 machine is rated at a nominal 100 MW, total output for this option would be approximately 148 MW. This configuration is shown on BREI Sketch # SKM-210, Sheet 2.

The site configuration considerers the LMS 100 and LM6000 sharing a common stack to conserve space and capital cost. Auxiliary support systems would be similar to those provided the 3 x LM6000 configuration except the LMS100 intercooler heat exchanger requires the addition of an evaporative type mechanical draft cooling tower in order to achieve the higher simple cycle efficiencies.

While the LM/LMS offers the benefit of higher efficiency and slightly higher site output when compared to the LM6000 only option, the following tradeoff's need to be considered when comparing these benefits to the LM6000 based configuration:

- Loss of commonality of combustion turbine and generator spare parts.

- The LMS100 requires higher gas supply pressure and therefore a larger and different gas compressor (compared to the LM6000). Common sparing of gas compressors or parts is not feasible.

- The LMS100 is a new generation machine with the first unit just entering commercial operation (Groton Generation Station, South Dakota). As such, insurance underwriters will most likely consider the first units to carry prototype or new technology risk premiums resulting in higher premiums, higher deductibles and the possibility of additional policy coverage exclusions for at least the first 8,000 hours of successful commercial operation.

- The LMS100 HPC intercooler heat exchanger requires a mechanical draft evaporative cooling tower versus fin-fan coolers to maintain equipment efficiency. The approximate heat rejection duty for this cooling system is 125,000,000 Btu/hr. The estimated city water make-up water and blow down requirements for the cooling tower are on the order of 265 gpm and 50 gpm respectively.

4.0 Indicative Cost Estimates

4.1 Gowanus Land Based Options

4.1.1 Basis and Assumptions

Based on the Gowanus land based layout concepts developed in this study, Burns and Roe has developed indicative order of magnitude installed cost estimates for the following combustion turbine configurations:

1. A base line single GE LM6000 located in the Gowanus South Pier area.

2. Three GE LM6000's with common balance of plant facilities located in the Gowanus South Pier area.

3. A single LM6000 and single GE LMS100 with common balance of plant facilities located in the Gowanus South Pier area.

The Thermoflow Inc. GT PRO "PEACE" cost estimating module was utilized as a screening tool to develop baseline indicative cost estimates for these configurations. The PEACE generated cost estimates were then validated for the Gowanus site specific requirements by:

1. Adjusting the equipment lists and equipment costs based on expected balance equipment scope and recent procurement experience.

2. Adjusting the labor rates and productivity factors to reflect current experience with NYC craft.

3. Increasing engineering, procurement, commissioning and start-up budgets based on our recent involvement on the FPL Jamaica Bay (Queens, NY) Pratt & Whitney Swiftpac project.

4. Developing discount factors to reflect multiple unit savings that may be realized by sharing common balance of plant equipment; and from engineering and construction economies.

5. Comparison with other recent NYC peaker installations.

Burns and Roe estimates that the level of accuracy of the estimates included in this report are on the order (-) 15% / +30%. The major basis and assumptions included in these estimates include the following:

- Use of GE LM6000 "SPRINT" and LMS100 packaged CTG's with dual fuel packages.
- High temperature SCR and CO catalyst package with nominal 80' stack.
- No new oil tankage, but with new fuel oil forwarding pumps and new fuel oil transfer piping (from the barges).
- Single 100% gas compressor for each CTG based on a minimum 300 psig suction pressure.

- Separate 138 kV step-up transformers for each CTG.
- Balance of electrical switchyard adjacent to the CTG package.
- Allowance provided for new buried power cables from the high side of the step-up transformers to the location of the existing ConEd switchyard.
- Demin water produced in a trailer mounted rental demin plant.
- Gas interconnect on the South Pier adjacent to the CTG location.
- Mechanical draft cooling tower (LMS100 only).
- No special foundation requirements with spread footings assumed.
- Contractor's costs, including fee and profit of 10% based on a turn-key fixed EPC price and fixed schedule contract.
- Purchase of the CTG's by USPG/Astoria and turn-over of this equipment to the contractor at NTP for erection and commissioning.
- Separate guarantees provided by GE for CTG performance and delivery; and from the EPC contractor for BOP aux loads, and completion schedule.
- Pricing based on a late 2006 EPC NTP without escalation (present day).

Costs not included in Burns and Roe's estimate include:

- Budget cost for initial CTG spare parts stocking.
- Initial cost (paid to GE) should Astoria elect to join either the GE lease engine program or engine rotable component program.
- Other Owners costs including:
    - Interest During Construction
    - Legal and other financial costs
    - Gas/Electric utility interconnection and offsite utility system upgrade costs
    - Owners Engineering costs, administration costs, and development fee
    - Land or Right-of-Way purchase costs

4.1.2 Order of Magnitude Installed Costs

Single GE LM6000 "SPRINT" Installation

For the Single LM6000 and associated BOP located on the Gowanus "South Pier", BREI estimates the order of magnitude installed cost to be on the order of $850/kW based on a nominal net plant output of 48 MW.

Multiple LM6000 "SPRINT" Installation

Using the single LM6000 estimate as a baseline, BREI developed discount factors to reflect multiple unit savings that may be realized by sharing common balance of plant equipment; and from engineering and construction economies. One factor not considered in this evaluation is the possibility that Astoria may be able to negotiate a multiple unit discount with GE for the purchase of multiple LM6000's and/or LMS100's.

To develop a baseline discount factor, BREI developed a list of balance of plant equipment that can be readily shared by multiple units (air compression, water treatment, tankage and piping systems) with dedicated CEMS, gas compression, and electrical systems for each individual CTG. The estimated savings that may be realized with this level of equipment sharing plus engineering and construction economies is on the order of 7% to 10%. The resulting order of magnitude installed cost estimate is from $765/kW to $790/kW for the 3 X LM6000 configuration.

Further savings may be possible with further sharing of equipment that might include the gas compressors, CEM systems, step-up transformers and other hi-voltage equipment. However, to determine the feasibility of these additional savings, a more detailed preliminary design study would first need to be completed.

LM6000 "SPRINT" Plus LMS100 Configuration

For the Single LMS100 and associated BOP located on the Gowanus "South Pier", BREI estimates the order of magnitude installed cost to be on the order of $790/kW based on a nominal net plant output of 96MW. In combination with an LM6000, and without considering a multiple unit discount, the blended cost of the LM6000/LMS100 plant would be on the order of $810/kW based on a nominal output of 144MW with the same level of estimate accuracy as noted above.

While a multiple unit balance of plant discount should also apply in this case, BREI does not recommend applying a discount factor for this configuration at the conceptual level of design development. This recommendation is based on a variety of factors including, most importantly, the higher level of construction and engineering cost uncertainty due to the very limited industry experience base with the LMS100; and the different BOP support requirements for both units.

4.1.3 Comparative Plant Installed cost Estimates

As part of our cost estimate development, BREI compared the estimates developed for Astoria to two NYC peaking plants that have been installed within the past 5 years, including the 11 NYPA LM6000 peakers and the FPL Jamaica Bay (Queens) Pratt & Whitney 52 MW Swiftpac which are further described below. Based on this comparison, and considering the general downward trend in pricing for this type of CTG peaker installation since 2000 - 2001, the cost estimates developed for this study appear to be within reason, and is possibly conservative.

FPL Jamaica (Queens) Bay Peaking Plant

Burns and Roe provided both detailed design & engineering, and procurement services to FPL during their execution of the Jamaica bay peaking plant. FPL self performed this project acting as General Contractor. Burns and Roe is in the position to provide certain order of magnitude information on this project as follows:

- The project was completed in October, 2003. Given the fall completion timing, FPL was not facing a peak season in-service deadline, and the project was constructed without owner directed construction acceleration. This can force pricing up as a result of overtime costs and productivity losses, and was a significant issue that plagued the NYPA projects.

- Major equipment was purchased in the 2001 time frame at the tail end of the peak of the power construction boom, but before there were significant reductions in major equipment pricing. Combustion turbines prices have come down by as much as 20% since that point in time. However, the construction contracts were negotiated and entered into during the industry down.

- Jamaica Bay is very similar to the land based Gowanus option, but with the use of a Pratt & Whitney 52 MW Swiftpac instead of the LM6000. The project included dual fuel firing with both high temperature SCR, CO catalyst, gas compression, etc. However, there were some significant differences including oil new storage and the upgrading of an unloading pier for oil barge receipt.

- The project, being within the NYC city limits, was constructed by the same union locals as the NYPA peakers and future additions at Gowanus or Narrows.

When adjusting the Jamaica Bay scope to make it consistent with a single LM6000 at Gowanus, the installed price was in the $840/kW to $880/kW range. However, as FPL self performed, contractors soft cost are not fully reflected in this price. Total project cost including the oil unloading pier, unloading facilities, oil tankage, and other costs was reported to be some 10% to 20% higher.

Project construction and labor relations during construction were relatively uneventful. However, there were some issues with IBEW Local 3 which required that prefab electrical console terminations (part of the Swiftpac package that had been wired in Pratt & Whitney's non-union fabrication shops) be un-terminated when the equipment arrived onsite, and re-terminated in the field. This underscores the need to develop and maintain a good relationship with local craft before the project, and if at all possible to negotiate a Project Labor Agreement (PLA) before the project commences to address this type of issue before project execution.

NYPA In-City Peaking Plants

The New York Power Authority (NYPA) constructed 11 LM6000 peakers at 7 locations (6 in-city and one on Long Island) that went into service in June, 2001. The projects were constructed with Slattery Skanska as General Contractor and DMJM Harris acting as Project and Construction Manager; the published cost was $1,080/kW. However, most intelligence indicates that actual price with field change orders may have been as high as $1,300 to $1,400/kW. These costs do not include NYPA's soft costs or land costs.

When comparing the NYPA projects to a future project at Astoria, several factors must be considered. First, both equipment purchases and construction contracts were negotiated and entered into in the 2000 - 2001 time frame at the peak of the power construction boom when turbine prices alone were 20% to 25% above current pricing (a nominal $70/kW - $90/kW premium over today's prices for the CTG's alone based on LM6000 pricing).

Further, NYPA did not receive its NYDEC Air Quality Permits to Construct until February of 2001. With a June, 2001 summer peak period in-service obligation, the project was faced with extremely short 5 month construction schedules at 7 independent locations from the time of initial earth work to Commercial Operation. This forced a very aggressive 7X24 hour around the clock construction effort in parallel at multiple sites. As a result, labor productivity was much lower than expected and significant construction cost overruns resulted. Therefore, it is difficult to directly compare the NYPA projects to Astoria, or to consider them indicative of future in-city project pricing trends.

4.1.4 Supplemental Pricing Information

Incremental Cost For Pile Foundations

As an installed cost sensitivity, BREI developed an order of magnitude cost estimate for the incremental cost for pile foundations at the Gowanus site (in lieu of spread footings which forms the basis for the estimates presented above). This estimate is based on the Jamaica Bay Project which is located on fill with very poor soil bearing capability. With the Pratt & Whitney Swiftpac foundation loadings being similar to those for an LM6000, this provides a good basis for a comparative order of magnitude estimate; and probably represents a worst for Gowanus since all major equipment including tanks, gas compressor stack, SCR, and CTG at Jamacia Bay required pile foundations. The incremental cost is on the order $1.3MM over that for spread footings for a single LM6000 based project. For the LMS 100 BREI would recommend using $2MM as an order of magnitude incremental cost. For reference, and not necessarily representative of the Gowanus foundation design requirements, 250 X 70' auger cast piles were installed at Jamaica Bay at a cost of roughly $74/foot.

Major Equipment Indicative Pricing

The Following table provides a summary of the indicative major equipment costs for both the LM6000 and LMS100 100 based plant configurations. The data as presented has been extracted from the GTPRO PEACE cost estimates; and while representative, cannot be compared directly to the installed cost estimates included in this report. Prices are FOB, Jobsite, based on current pricing without escalation.

Table 4.0 Indicative Equipment Pricing		
Plant Configuration	1 X LM6000	1X LMS100
1.0 Specialized Equipment		
1.1 Combustion Turbine	$15,120,000	$34,800,000
1.2 SCR, CO Catalyst & Stack	$ 2,760,000	$ 5,150,000
1.3 Fuel Gas Compressors	$ 635,000	$ 1,375,000
1.4 CEMS System	$ 385,000	$ 385,000
1.5 Distributed Control System	$ 325,000	$ 420,000
1.6 Step-Transformer	$ 725,000	$ 1,250,000
1.7 Other High Voltage Equipment	$ 200,000	$ 950,000
1.8 Buried High Voltage Cable	$ 2,300,000	$ 3,400,000
1.9 Cooling Tower (LMS100 only)		$ 685,000
2.0 Other Equipment	$ 950,000	$ 1,300,000
Total Equipment	**$23,400,000**	**$49,715,000**

4.2 Narrows Power Barge Cost Estimate

In order to develop an order of magnitude cost estimate for new power barges at Narrow's, BREI develop separate cost estimates for the power barge itself and for the onshore balance of plant components including the pier extension.

For the power barge, budgetary pricing for new deck barge fabrication and outfitting with an LM6000 Sprint was obtained from The Power Barge Corporation who is a power barge outfitter with substantial LM6000 outfitting experience, located in Houston, Texas. A copy of their proposal and power barge outfitting qualifications and experience is included in As Appendix 2 of this Report. Their budgetary price of $650/kW ($31,200,000 per barge based on a nominal 48MW output) includes the following:

1. New construction of a deck barge of approximately 200' X 80' at a non-union gulf coast yard.
2. Full outfitting (installation) of equipment on the barge by union craft at the gulf coast yard. The installation would carry full union tags and stamps. The scope of equipment installed on the deck barge would include:

    a. LM6000PC Sprint Dual fuel package
    b. LM6000 inlet filter house
    c. LM6000 skid mounted equipment including fin fan coolers, water injection skid, oil skid, fire protection systems, etc.
    d. Air compressors and driers
    e. High temperature SCR/CO catalyst module and 80' stack
    f. SCR ammonia dilution and vaporization system

g. CEMS
h. Step-up transformer (138 kV) with secondary oil containment
i. High voltage take-off structure
j. MCC's, electrical switchgear and local controls
k. Below deck demin water storage tank
l. Pollution control equipment for the barge including oil water separator

3. Wet towing from the gulf coast fabrication yard to Brooklyn, New York.

The on shore balance of plant components and services include:

1. Gas compressors, compressor building and coolers
2. Ammonia offloading facilities and ammonia storage tank
3. Balance of the high voltage equipment
4. Demin trailer parking area and demin water storage tank
5. Onshore ammonia, water and fuel oil forwarding systems
6. Onshore high voltage power export, auxiliary power and controls cabling, ammonia, oil, and water piping and barge interface facilities
7. Onshore facilities engineering and construction costs
8. Commissioning and Start-up support services
9. Nominal 50' X 200' pier extension

The costs for this equipment and services, excluding the pier, were extracted from the onshore equipment estimates developed for Gowanus as described in Section 4.1. The estimated turnkey cost for the onshore equipment component including construction, engineering, commissioning/start-up support for a two barge project is estimated to be on the order of $18,000,000 which includes a $5,000,000 allowance for designing and constructing the pier extension. The resulting all-in order of magnitude cost for the two power barge project at Narrows is $80,400,000, or $837/kW based on a nominal output of 96 MW.

5.0 Thermal Performance Estimates

BREI developed thermal performance estimates for both the LM6000 Sprint and LMS100 at the Gowanus/Narrows site conditions at the ambient temperatures requested by Astoria (Tables 5.1 and 5.2 below). In developing these estimates, BREI obtained the most recent cycle deck data from GE Energy to develop gross performance estimates at the generator terminals. The GT PRO performance estimating software was then run to develop estimated plant auxiliary loads (including transformer losses, gas compression, fans, pumps and other balance of plant equipment), and net plant performance estimates. LMS100 auxiliary loads also include the intercooler heat rejection system's relatively substantial cooling tower fan and circulating water pump loads.

Table 5.1 **GE LM6000 Sprint Estimated Performance**						
Fuel Type	**Natural Gas**			**#2 Fuel Oil**		
Ambient Conditions	30F 40%RH	60F 60%RH	90F 60%RH	30F 40%RH	60F 60%RH	90F 60%RH
Gross Power (kW)	50,807	48,454	42,627	50,784	47,031	42,165
Net Power (kW)	49,593	47,370	41,642	50,030	46,293	41,470
Plant Aux. Loads (kW)	1,214	1,084	985	754	738	695
LHV Gross Heat Rate (BTU/kWh)	8,374.8	8,538.0	8,712.8	8,469.2	8,634.7	8,841.5
LHV Net Heat Rate (BTU/kWh)	8,579.9	8,733.4	8,918.9	8,596.9	8,772.5	8,989.7
Fuel LHV Input (mmBTU/h)	425.5	413.7	371.4	430.1	406.1	372.8

Table 5.2 **GE LMS100PA Estimated Performance**						
Fuel Type	**Natural Gas**			**#2 Oil**		
Ambient Conditions	30F 40%RH	60F 60%RH	90F 60%RH	30F 40%RH	60F 60%RH	90F 60%RH
Gross Power (kW)	101,154	102,567	96,569	101,508	99,660	89,007
Net Power (kW)	96,072	97,443	91,588	97,255	95,417	84,831
Aux.& Losses (kW)	5,082	5,124	4,981	4,253	4,243	4,176
LHV Gross Heat Rate (BTU/kWh)	7,773.3	7,841.7	8,001.5	7,817.1	7,922.9	8,146.6
LHV Net Heat Rate (BTU/kWh)	8,184.5	8,254.1	8,436.7	8,159.0	8,275.3	8,547.6
Fuel LHV Input (mmBTU/h)	786.3	804.3	772.7	793.5	789.6	725.1

6.0 Emissions Performance Estimates

Turbine exhaust and post control stack emissions estimates for both the LMS100 and LM6000 Sprint are summarized in Tables 6.1 and 6.2 below. In developing these estimates, BREI obtained the most recent cycle deck data from GE Energy to develop the turbine exhaust emissions estimates. The post control stack emissions estimates are based on GE provided data considering the use of both high temperature SCR and CO catalysts. While GE does not guarantee stack emissions, data provided is representative of the level of control being required for these CTG's in recent air permits. While GE has stated that SCR and CO catalyst vendors are willing to guarantee this level of control, further direct discussions with catalyst vendors are recommended. It should be noted that in the case of both the LMS100 and LM6000, turbine exhaust temperature is low enough (in the 750F to 850F range), such that dilution (cooling) air injection is not required to temper the exhaust gas upstream of the high temperature SCR.

Table 6.1
GE LMS100 Estimated Emissions

Fuel	**Natural Gas**			**Fuel Oil**		
	Turbine Exhaust Condition			**Turbine Exhaust Condition**		
Ambient Temperature	30F	60F	90F	30F	60F	90F
Operating Condition	Base Load	Base Load	Base Load	Base Load	Base Load	Base Load
NO_x (PPM / lb/hr)	25/79	25/81	25/78	42/137	42/137	42/126
CO (PPM / lb/hr)	183/354	155/308	139/264	169/336	148/293	129/236
VOC (PPM / lb/hr)	10/10.5	8/8.4	6/6.7	53/52	44/43	37/33
	Estimated Stack Conditions (Post Control)			**Estimated Stack Conditions (Post Control)**		
Ambient Temperature	30F	60F	90F	30F	60F	90F
Operating Condition	Base Load	Base Load	Base Load	Base Load	Base Load	Base Load
Stack Mass Flow (lb/sec)	474.9	468.9	443.4	475.1	461	424.1
Stack Temp. (degrees F)	741	771	799	764	792	815
NO_x (PPM / lb/hr)	2.5/7.9	2.5/8.1	2.5/7.8	5/16.3	5/16.3	5/15.0
CO (PPM / lb/hr)	6/11.6	6/11.9	6/11.4	6/11.9	6/11.9	6/11.0
NH_3 (PPM)	5	5	5	10	10	10
VOC (PPM / lb/hr)	7/7.4	7/7.4	6/6.7	10/9.8	10/9.9	10/8.9
PM10 (lb/hr)	10	10	10	80	80	80

Notes:

1. All emissions concentrations expressed in PPMVD@15% O2.
2. Estimated emissions, not to be used for permitting purposes.
3. PM10 emissions estimates include SCR particulate contribution.

Table 6.2
LM 6000 SPRINT Estimated Emissions

Fuel	Natural Gas			Oil		
	Turbine Exhaust Condition			Turbine Exhaust Condition		
Ambient Temperature	30F	60F	90F	30F	60F	90F
Operating Condition	Base Load	Base Load	Base Load	Base Load	Base Load	Base Load
NO_x (PPM / lb/hr)	25/43	25/40	25/38	42/74	42/70	42/65
CO (PPM / lb/hr)	49/51.01	24/23.77	10/9.57	6/6.56	6/6.20	6/5.69
VOC (PPM / lb/hr)	7/3.88	3/1.45	2/1.77	3/1.4	3/1.32	3/1.22
	Estimated Stack Conditions (Post Control)			Estimated Stack Conditions (Post Control)		
Ambient Temperature	30F	60F	90F	30F	60F	90F
Operating Condition	Base Load	Base Load	Base Load	Base Load	Base Load	Base Load
Stack Mass Flow (lb/sec)	308.1	284.5	269.9	308.9	290.9	269.3
Stack Temp. (degrees F)	800	834	840	810	827	848
NO_x (PPM / lb/hr)	2.5/4.3	2.5/4.0	2.5/3.8	5/8.8	5/8.3	5/7.7
CO (PPM / lb/hr)	6/6.2	6/5.9	6/5.7	6/6.56	6/6.20	6/5.69
NH_3 (PPM)	5	5	5	10	10	10
VOC (PPM / lb/hr)	7/3.88	3/1.45	2/1.77	3/1.4	3/1.32	3/1.22
PM10 (lb/hr)	4	4	4	50	50	50

Notes:

1. All emissions concentrations expressed in PPMVD@15% O2.
2. Estimated emissions, not to be used for permitting purposes.
3. PM10 emissions estimates include SCR particulate contribution.
4. Credit not give for VOC reduction achieved in the CO catalyst.
5. GE Cycle Deck estimated emissions data shows uncontrolled LM6000 CO emissions to be a constant 6ppmvd@15% O2 when firing number 2 oil. No credit has been taken in the post control stack CO emissions estimates in the table above for further CO reductions. BREI suggests further review of the GE Cycle Deck predicted CO emissions rates by Astoria's environmental consultant since CO emissions would be expected to increase as ambient temperature decreases.

7.0 Electrical Interconnections and System Impacts

NYISO has implemented several procedural changes recently which make it somewhat more difficult to freely access existing system and system impact data/studies; and to access data that would allow one to draw independent conclusions with regard to system congestion, load flows, and the ability to inject additional electrical energy into the grids controlled by NYISO without detailed computer modeling.

The process now requires that an interested party submit a formal system data request, which BREI has done on the behalf of Astoria. The data CD provided by NYISO contains system

data that is filed annually with FERC in "Form 715" format. This data is updated annually and was last submitted to FERC on 4/15/06. BREI will provide Astoria with a copy of the NYISO data CD under separate cover. The data CD includes current NYISO "base case" load flow and short circuit data. However, the data is formatted for input into one of two modeling simulation programs (GE's PS-LF and PTI's PSS software) and cannot be interpreted manually. BREI's licensed ETAP software is not capable of modeling the NYISO provided data; BREI can provide continuing assistance to Astoria considering the following approaches:

The first approach would be to independently model the ConEd grid using the NYISO data with either the PTI or GE software to estimate the additional export capabilities without ConEd system congestion. The second approach would be to make a formal request to NYISO for a System Impact and Reliability Study (SRIS). The SRIS would establish Astoria's position in the planned new capacity queue and Astoria's cost allotment for any required system upgrades, but would take longer to complete than the independent model route.

While BREI does not have the capability to run either the PTI or GE software, we can support either approach. We have modeling consultants who we work with that are licensed and trained to run the PSS simulation, or alternatively if Astoria elects to request NYISO to perform an SRIS study, we can support Astoria in developing the required data for the a NYISO SRIS application.

8.0 Other Information and Data

During the course of this study, BREI has identified other information and data considered to be of value to Astoria in their development of capacity expansion projects at either Gowanus or Narrows. Following is a brief summary of this information along with BREI's recommendations for further study.

1. **LMS100 Availability:** GE Energy have advised that they now have 25 firm orders for the LMS100. Delivery slots for orders placed now will be no earlier than June, 2008. Considering Astoria's desired June, 2009 in-service date, LMS100 availability may become an issue unless reserve commitments are made with GE to support a delivery date no later than late summer 2008.

2. **High Temperature SCR Design Life:** As noted in the body of this report, due to the relatively low temperature of the LM6000 and LMS100 combustion turbines (750F – 850F), supplemental exhaust dilution cooling air injection is not required for the high temperature SCR. However, SCR catalyst life is directly proportional to operating temperature. Catalyst vendors have been predicting a 10 year catalyst life in LM6000 applications based on 3,500 hr/year of operation; however with the lower LMS100 exhaust temperature, preliminary indications are that the expected life may be as high as 15 years resulting in lower SCR life cycle costs for the LMS1000. Discussion with catalyst vendors regarding both catalyst life estimates and available guarantees should be initiated.

3. **Existing Power Cable Capacity at Narrows:** Astoria questioned whether the capacity of the existing "in-plant" high voltage buried oil filled power cables could be increased by adding a forced chilling system to support the new capacity (and potentially eliminate the need to trench between the pier and substation). This question can be studied further upon receipt of plant design data including, cable routing plans, rating of the exiting cables, and a one line diagram. However, based on the age of the facility, we believe that the existing cables are static oil filled where the oil acts as dielectric insulating fluid and enhances heat transfer between the cable to the outer casing and surrounding earth. If this is the case, forced cooling would require trenching for the addition of a parallel pipe to provide a return path for a closed loop oil circulating system, plus the addition of the chilling or heat rejection system. Recently, forced or circulating oil systems have become more common. While the level of possible incremental capacity is highly site and installation specific, BREI have studied chiller installations on existing forced circulation cable systems where capacity upgrades of as much as 40% have been realized. We are currently the Owners Engineer on one such project also located in the NYISO control area.

4. **Gowanus Foundation Design:** Given the lack of available geotechnical data, foundation design requirements for the Gowanus South Pier site cannot be definitively determined. It is recommended that a limited geotechnical study be conducted to determine soil bearing capabilities, foundation design requirements, and to determine the possible existence of any existing subsurface foundations or other structures that might negatively impact foundation design or installation costs. The estimated costs for completing a limited evaluation in sufficient detail to define the type of foundations required would be on the order of $30,000 including sub-contract costs for 8 to 10 exploratory soil borings.

5. **High Pressure Gas Connections – Narrows Power Barges:** Hudson River tidal activity requires the use of flexible connections for water, ammonia, oil, and gas between the barge and pier. Of specific concern is the identification of a design for the high pressure natural gas (650 – 750 psig) connection that is both reliable, and acceptable to the New York Fire Department (NYFD). A system we believe will satisfy these requirements is the use of a high pressure armored hose rather than a ball or swivel joint. Once such system is the “Technip” flexible pipe manufactured by Coflex. The Technip flexible pipe systems have ratings as high as 7,500 psig, have a long and reliable service history; and are used widely in North Sea gas field applications. A copy of Technip’s brochure is included as Appendix 3 of this report.

6. **Labor Relations and GE equipment Warrantees:** As noted in this report, there were some issues with IBEW Local 3 during the construction of the Jamaica Bay project wherein Local 3 required that prefab electrical console terminations (part of the Swiftpac package that had been wired in Pratt & Whitney’s non-union fabrication shops) be un-terminated when the equipment arrived onsite, and re-terminated in the field. GE have advised that Local 3 forced the same process during construction at

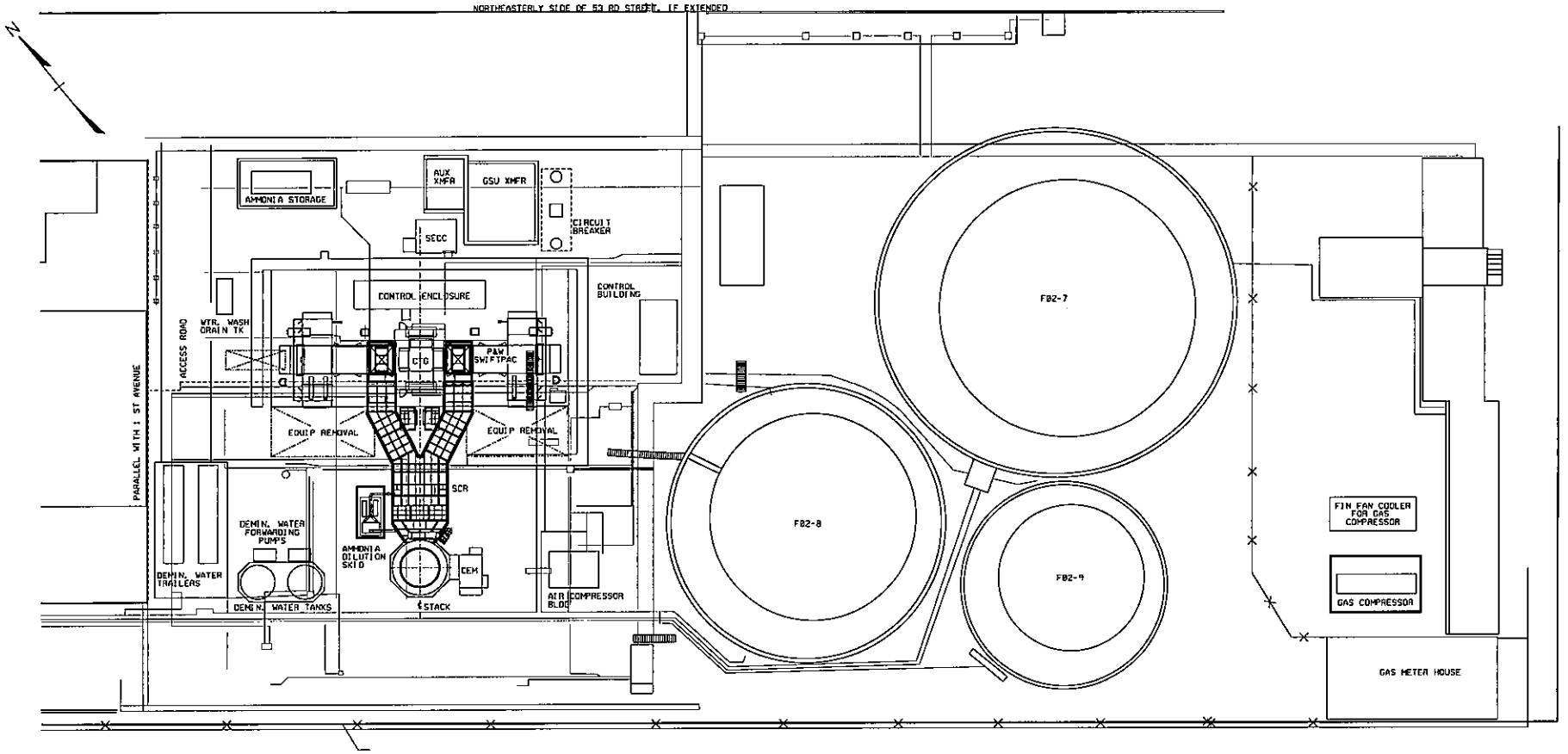
some, but not all of the NYPA LM6000 peaker locations. GE took a position during this debate allowing this work only on power cabling at 125 volts and above; and maintained that any re-termination of low voltage I&C cabling would result in GE voiding their equipment warrantees. The IBEW capitulated to this requirement. However, this underscores the need to develop and maintain a good relationship with local craft before the project, and if at all possible to negotiate a Project Labor Agreement (PLA), especially with the IBEW before the project commences to address this type of issue before project execution.

APPENDIX 1
Conceptual Layout Sketches

For the
Capacity Expansion Study at
Gowanus and Narrows Generating Stations

NOTES

1. OUTPUT FOR OPTION 1 IS 52MW



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Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE WMC

STATE ENGINEER NO. PROFESSIONAL NUMBER

Engineering Review		
Discp	Engr	Date
Mech		
Elec		
Civil		
Strch		
Instr		
Drawn	Designed	Checked

Lead Engineer Date

Scale 1"=20'-0

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
LAND BASED OPTION 1

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002625

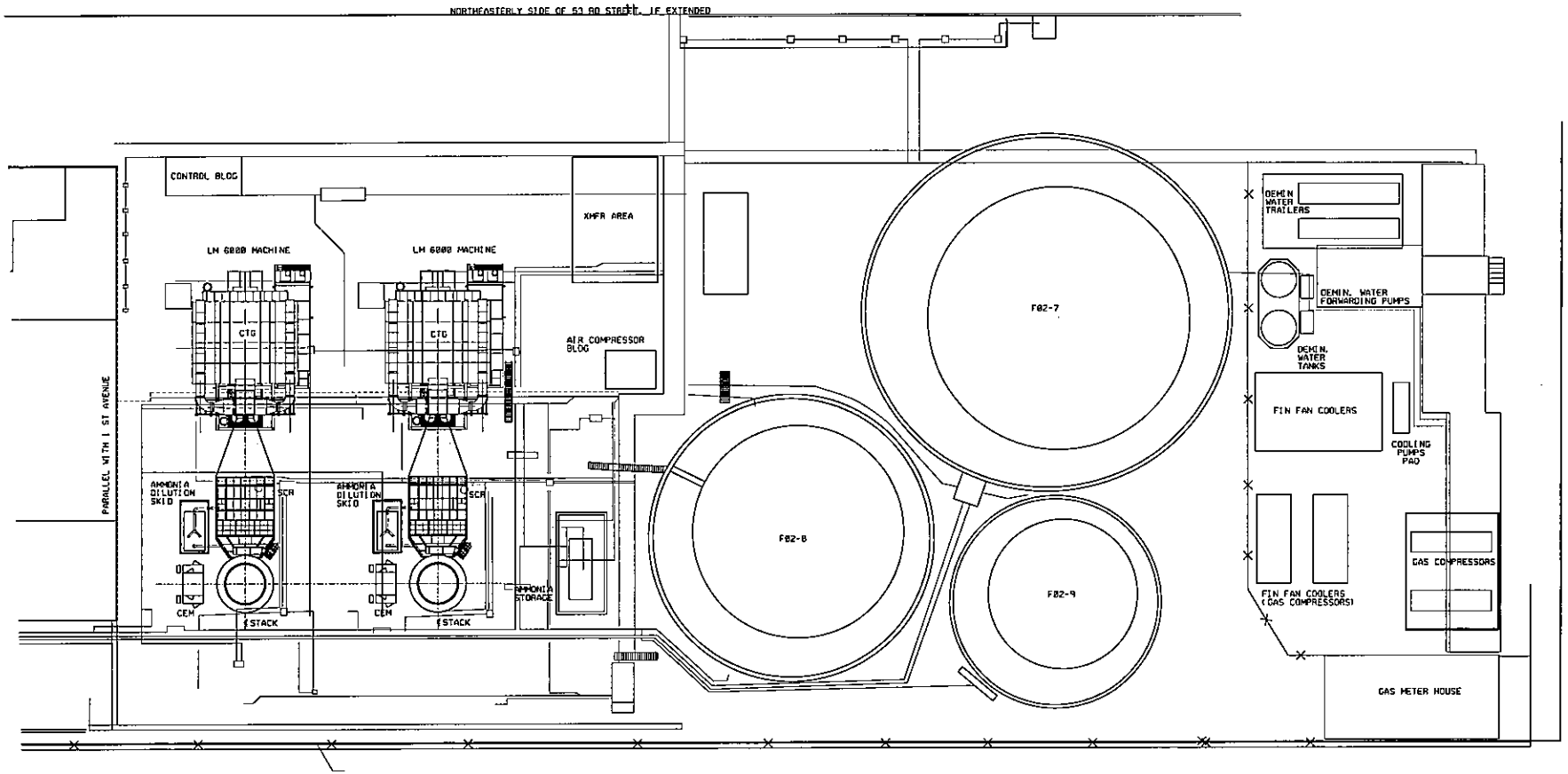
Approved for Construction Work Order 2778

Chief MECHANICAL Engineer

Drawing No. SKM200 Sh Rev A

NOTES

1. OUTPUT FOR OPTION 2 IS 2X40MW+60MW



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For Comment				
For Bid				
For Fabrication				
For Construction				

PE SEAL

STATE PROFESSIONAL ENGINEER NO. NUMBER

Engineering Review		
Elect	Engr	Date
Mech		
Civil		
Struct		
Arch		
Instr		
Drawn	Designed	Checked
Lead Engineer		Date
Scale 1"=20'-0"		

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
LAND BASED OPTION 2

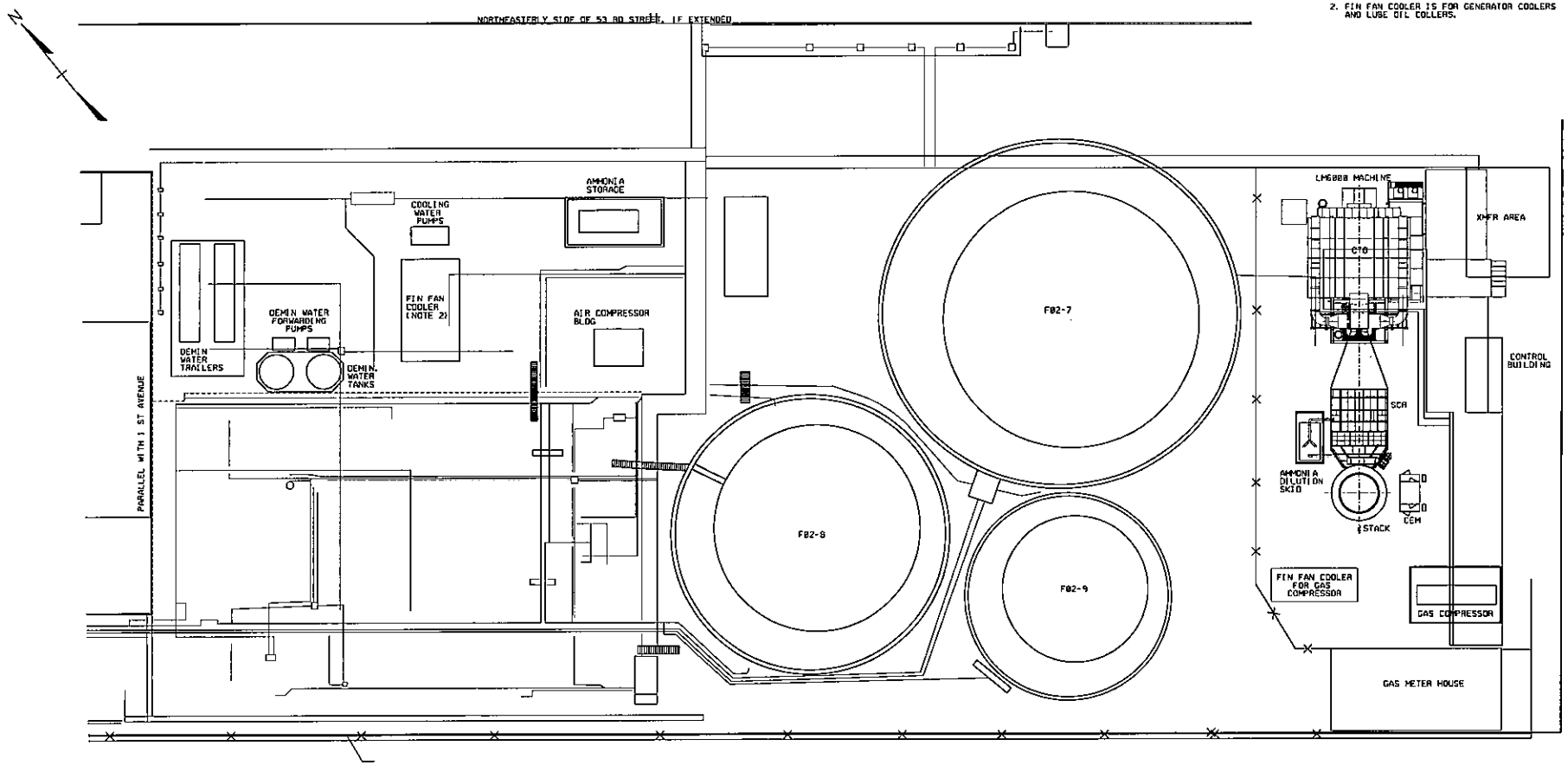
BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 000265

Approved for Construction	Work Order	Drawing No	Sh	Rev
Chief MECHANICAL Engineer	2778	SKM201		A

STATUS: 8-9-06

NOTES

1. OUTPUT FOR OPTION 3 IS 48MW
2. FIN FAN COOLER IS FOR GENERATOR COOLERS AND LUBE OIL COOLERS.



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1" = 28.9'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE NAME

STATE PROFESSIONAL ENGINEER NO. NUMBER

Engineering Review		
Discip	Engr	Date
Mech		
Elec		
CIVIL		
Engr. Instr		
Drawn	Designed	Checked
Lead Engineer		Date
Chief Mechanical Engineer		Date

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
LAND BASED OPTION 3

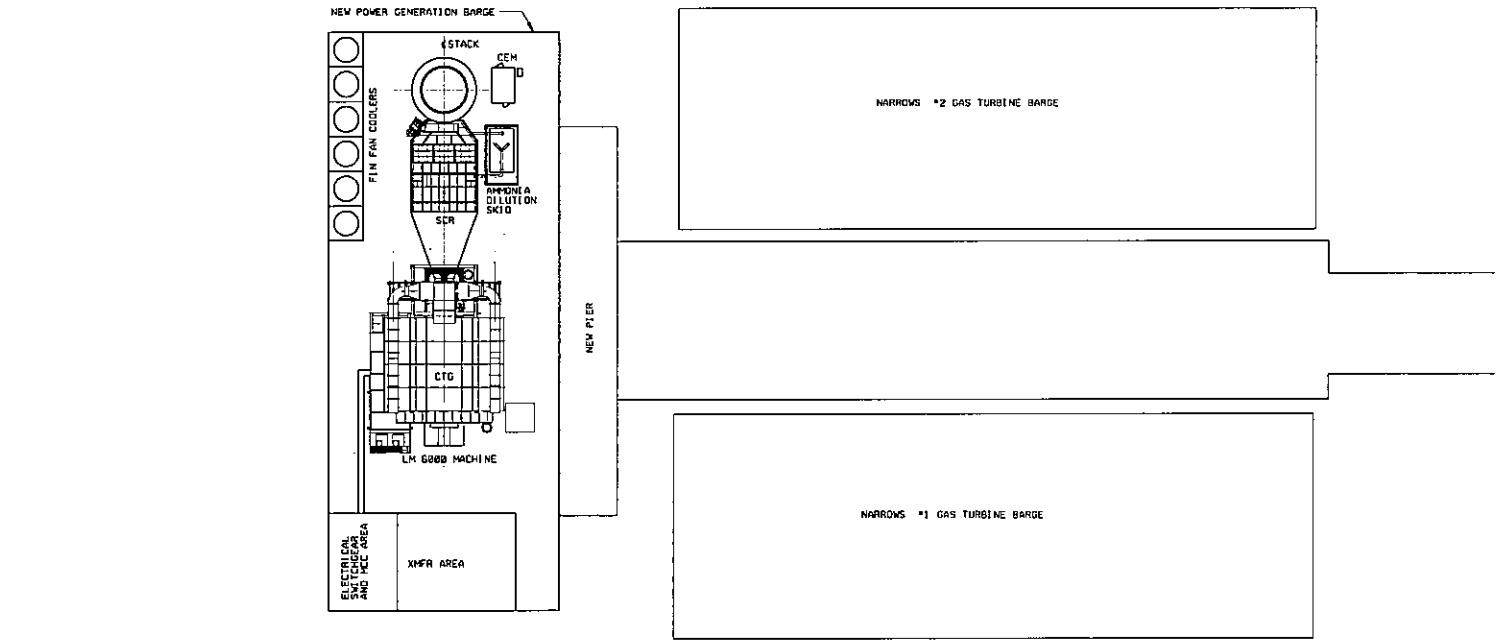
BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002675

Approved for Construction	Work Order	Drawing No	SH	Rev
Chief Mechanical Engineer	2778	SKM202		A

STATUS: 8-9-06

NOTES

1. OUTPUT FOR OPTION 4 IS 40MW. THIS OPTION CAN BE COMBINED WITH ANY OF THE LAND BASED OPTIONS.
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED IN ABANDONED FUEL OIL UNLOADING AREA ADJACENT TO FIRST AVE. SEE DRAWING SKM203 SH2.
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE OR LAND BASED.
4. NEW BARGE DIMENSIONS ARE APPROXIMATELY SAME AS EXISTING POWER GENERATION BARGES (200' X60')



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Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control

Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication	X			
For Construction	X			

PE Seal

STATE ENGINEER NO. PROFESSIONAL NUMBER

Engineering Review

Disc.	Sign	Date
Mech.		
Elec.		
Civil		
Arch.		
Instr.		

Drawn Designed Checked

Lead Engineer Date

Chief Mechanical Engineer Date

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 4

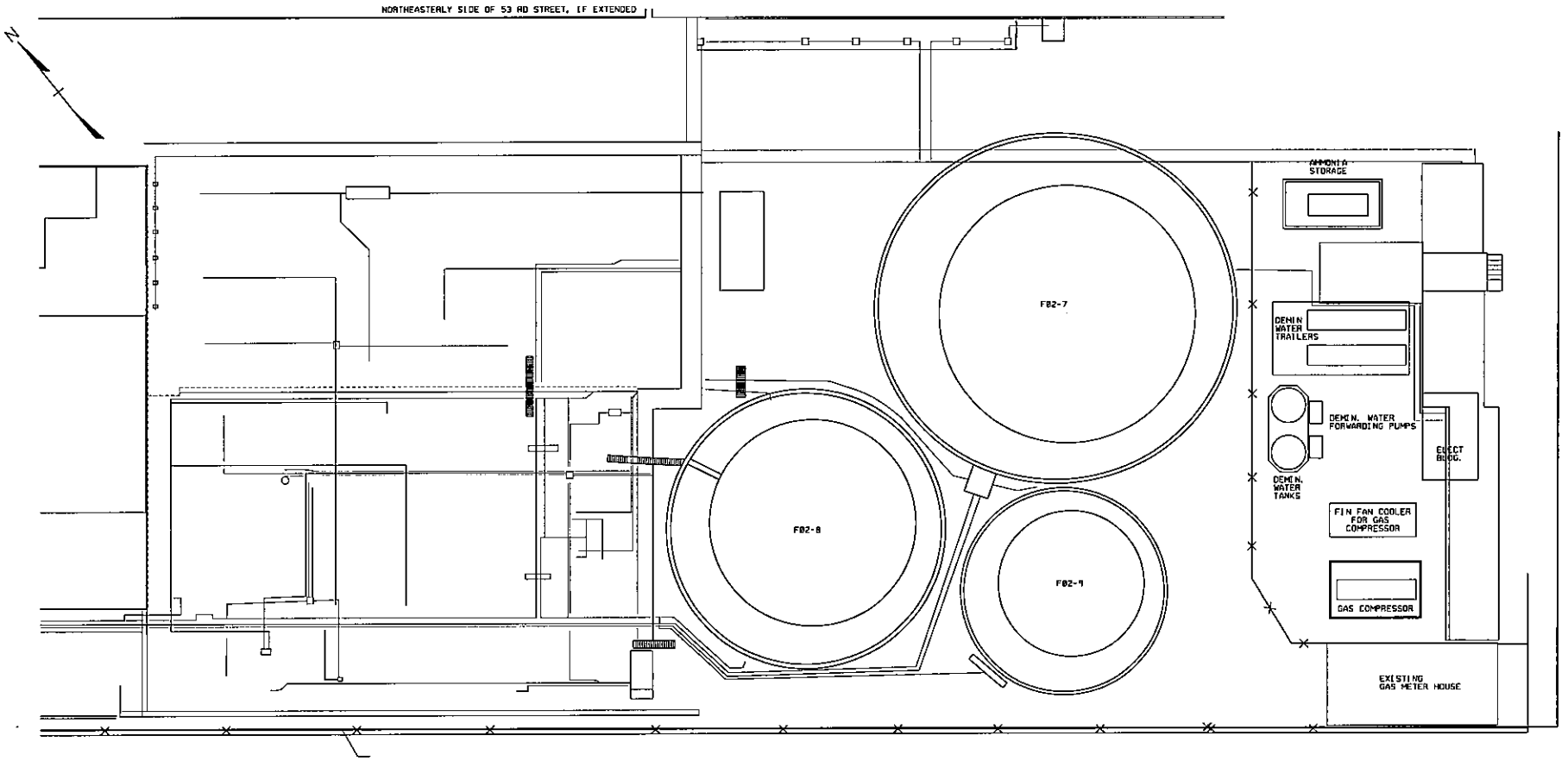
BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002525

Approved for Construction | Work Order 2778 | Drawing No SKM203 | Sh 1 of 2 | Rev C

STATUS: 8-17-86

NOTES

1. SEE DRAWING SKM203 SH1.



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Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control

Purpose	Approved By	Date	Released By	Date
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For Bid				
For Fabrication				
For Construction				

STATE PROFESSIONAL ENGINEER NO. NAME

Engineering Review

Elec	Engr	Date
Mech		
Struc		
Civil		
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Instr		

Drawn | Designed | Checked

Lead Engineer | Date

Scale 1"=20.0'

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 1

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors • Oradell, NJ
New York Certificate of Authorization No. 0002529

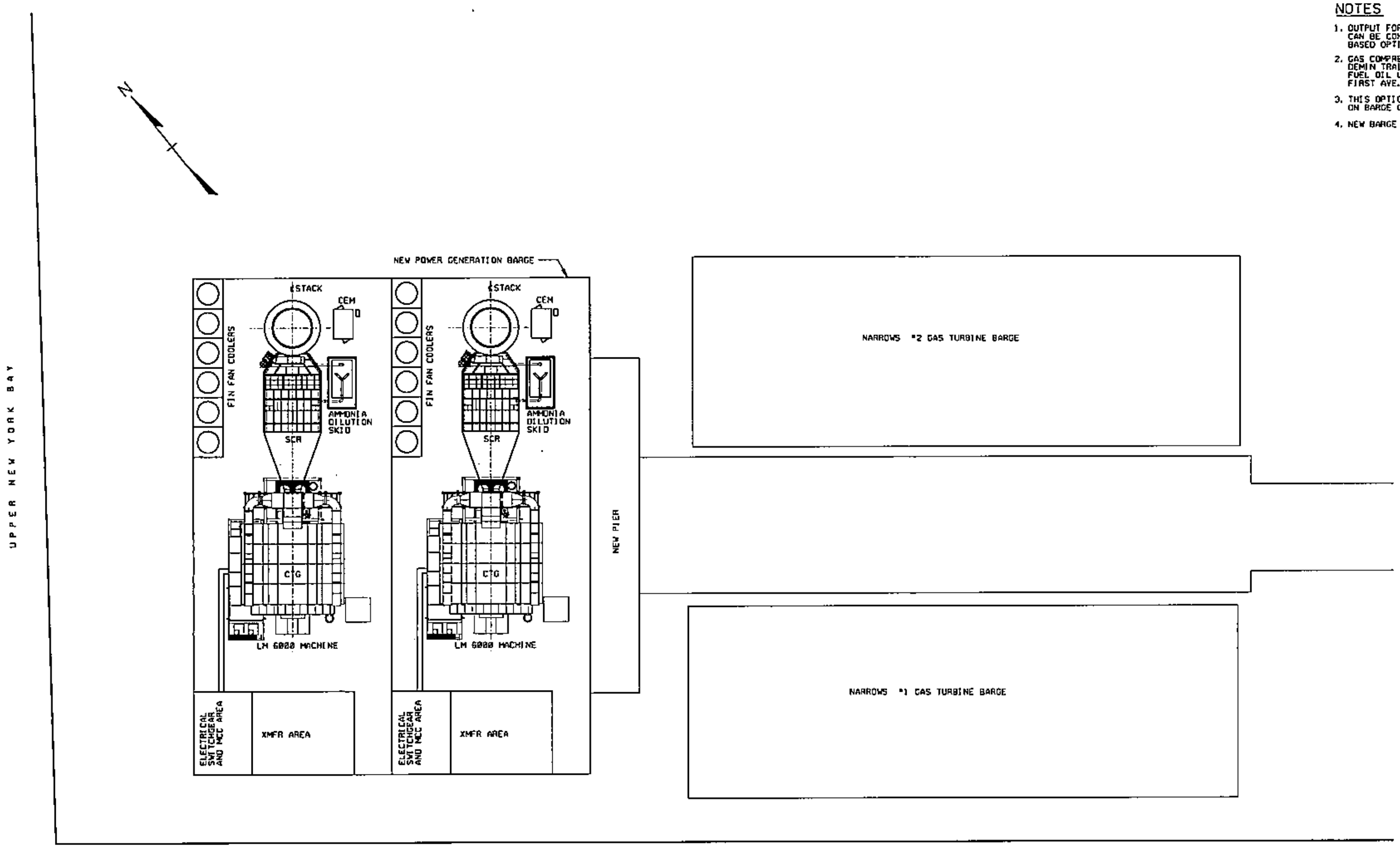
Approved for Construction | Date
Chief Mechanical Engineer

Work Order 2778 | Drawing No SKM203 | Sh 2 OF 2 | Rev B

STATUS: 8-17-86

NOTES

1. OUTPUT FOR OPTION 5 IS 80MW. THIS OPTION CAN BE COMBINED WITH ANY OF THE LAND BASED OPTIONS.
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED IN ABANDONED FUEL OIL UNLOADING AREA ADJACENT TO FIRST AVE. SEE DRAWING SKM204 SH2.
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE OR LAND BASED.
4. NEW BARGE DIMENSIONS ARE APPROXIMATELY (200' X160')



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Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE NAME

STATE ENGINEER NO. PROFESSIONAL NUMBER

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn | Designed | Checked

Lead Engineer | Date | Scale 1"=20'-0

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

**GENERAL ARRANGEMENT
WATER BASED OPTION 5**

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002625

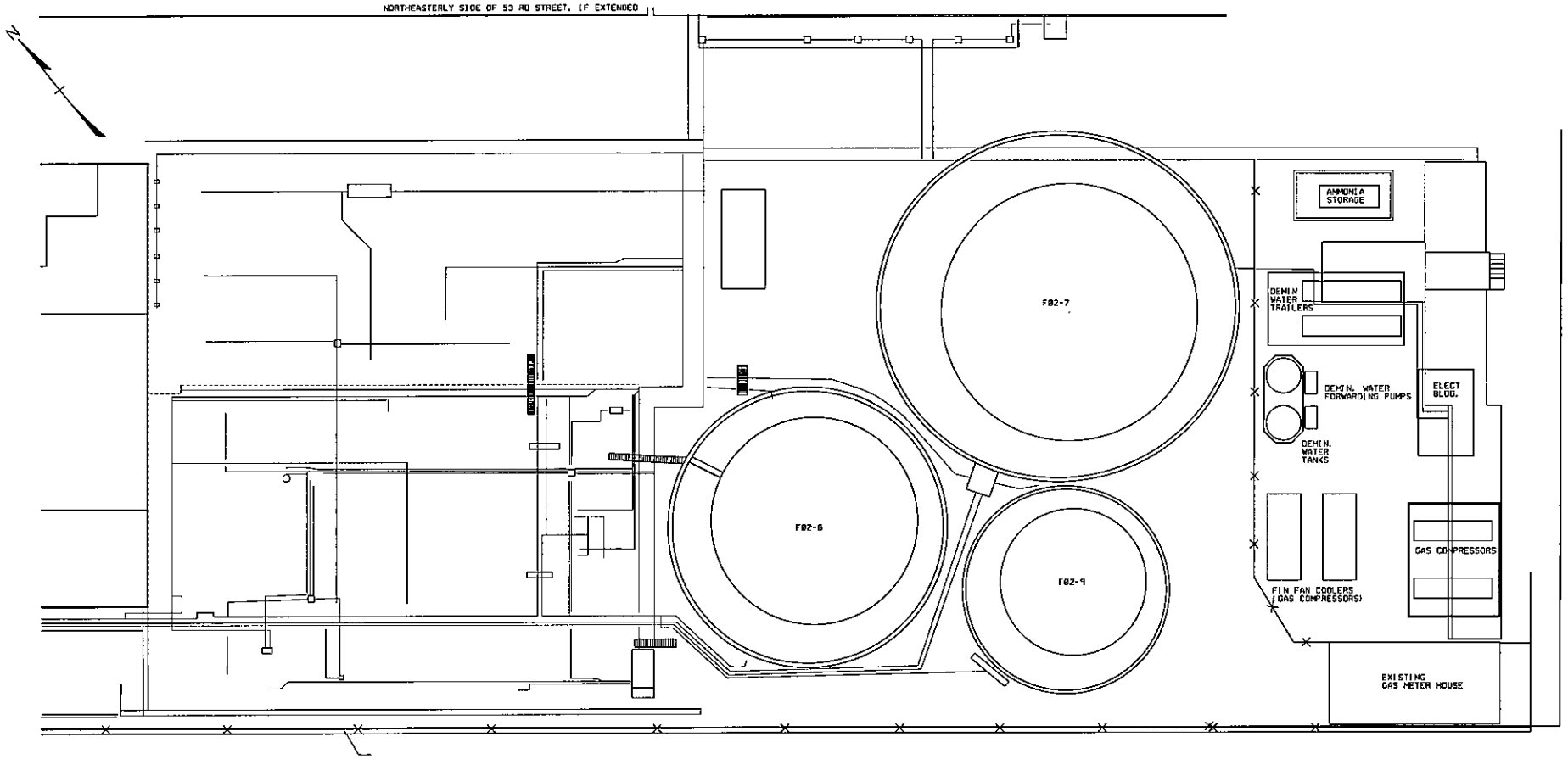
Approved for Construction | Chief MECHANICAL Engineer

Work Order	Drawing No	Sh	Rev
2778	SKM204	1 of 2	C

STATUS: 6-17-06

NOTES

1. SEE DRAWING SKM204 SH1.



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Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control	Approved By	Date	Released By	Date
Purpose				
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE NAME

STATE ENGINEER NO. PROFESSIONAL NUMBER

Engineering Review	Engr	Date
Elec		
Mech		
Elec		
Civil		
Arch		
Instr		
Drawn	Designed	Checked
Lead Engineer		Date

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 5

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0007625

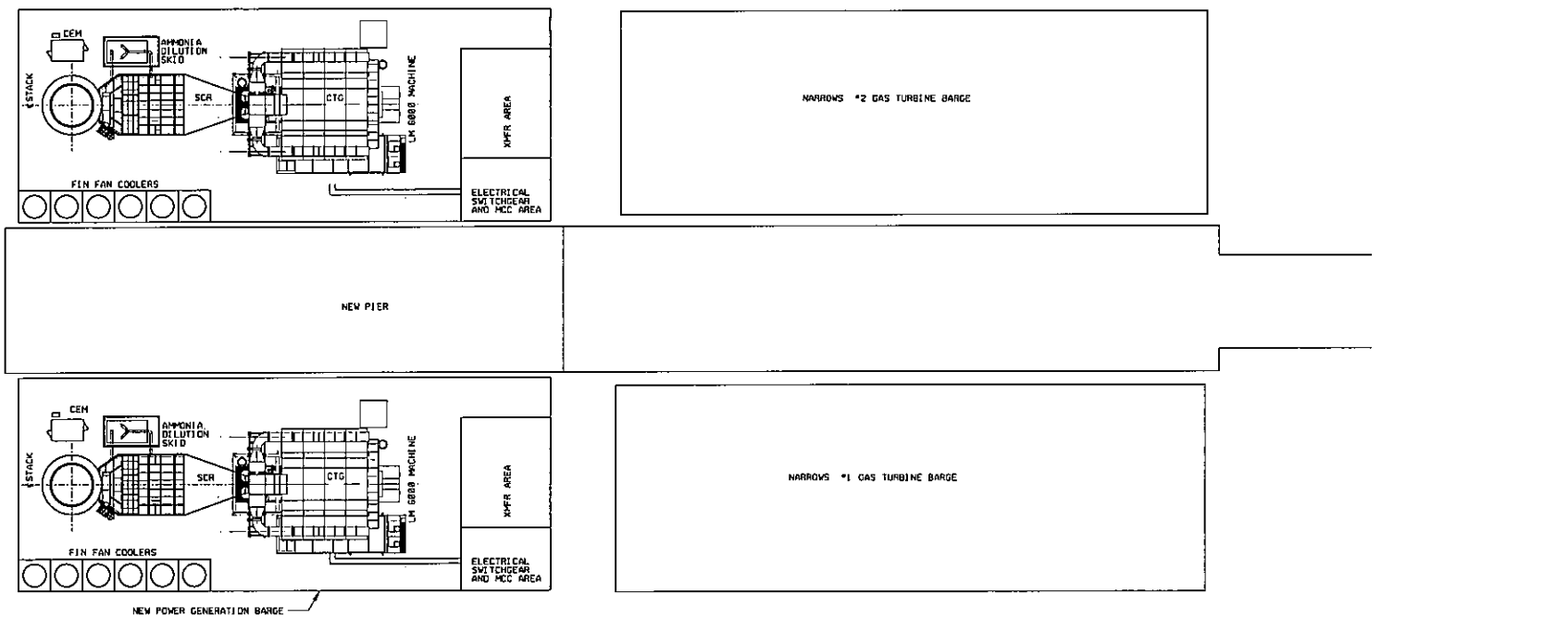
Approved for Construction
Chief MECHANICAL Engineer

Work Order	Drawing No	Sh	Rev
2778	SKM204	2 OF 2	B

STATUS: 8-17-06

NOTES

1. OUTPUT FOR OPTION 6 IS 80MW. THIS OPTION CAN BE COMBINED WITH ANY OF THE LAND BASED OPTIONS.
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED IN ABANDONED FUEL OIL UNLOADING AREA ADJACENT TO FIRST AVE. SEE DRAWING SKM205 SH2.
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE OR LAND BASED.
4. TWO (2) NEW BARGES DIMENSIONS ARE APPROXIMATELY 200'X68' EACH



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Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control

Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE NAME

STATE ENGINEER NO. PROFESSIONAL ENGINEER

Engineering Review

Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn Designed Checked

Lead Engineer Date

Approved For Construction Date

Chief Mechanical Engineer

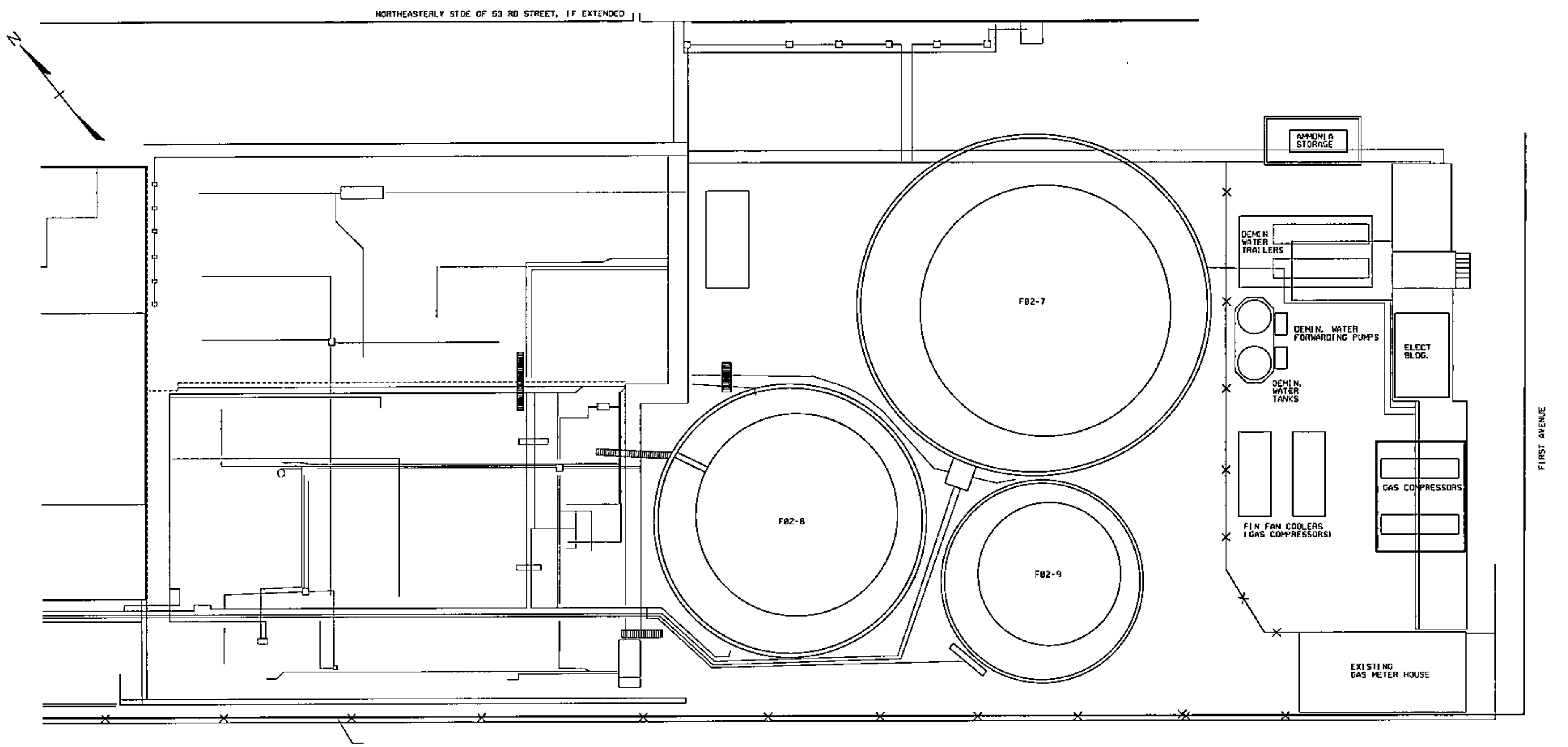
NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 6

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 000625

Work Order 2778 | Drawing No SKM205 | Sh 1 OF 2 | Rev B

STATUS: 8-17-06



NOTES

1. SEE DRAWING SKM205 SH1.

GRAPHIC SCALE

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1" = 20.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control

Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication	X			
For Construction	X			

PE NAME

STATE ENGINEER NO. PROFESSIONAL NUMBER

Engineering Review

Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn | Designed | Checked

Lead Engineer | Date | Scale

NARROWS GENERATING STATION
33RD STREET & FIRST AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 6

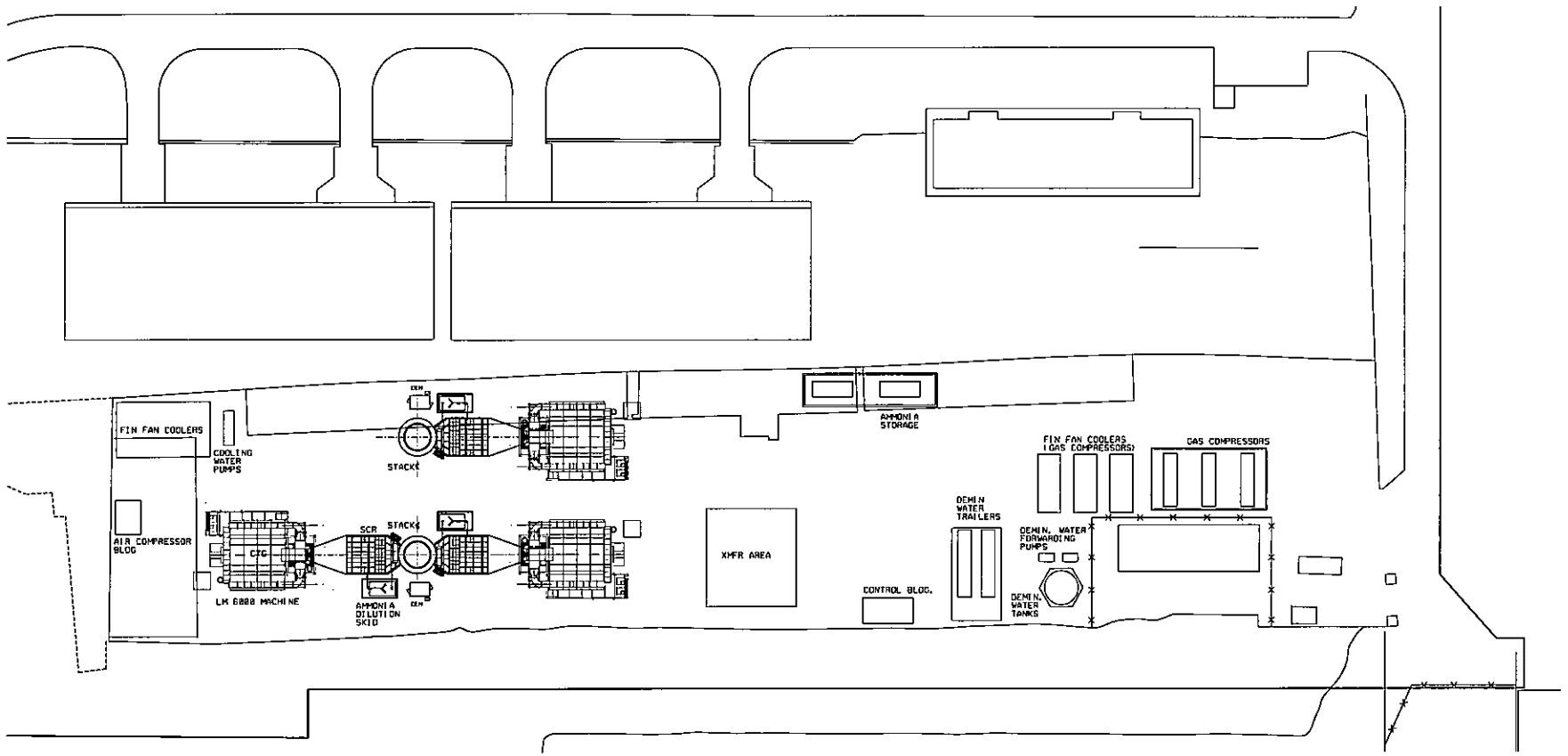
BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002525

Approved for Construction: Chief MECHANICAL Engineer
Work Order: 2778
Drawing No: SKM205
Sh: 2 OF 2
Rev: B

STATUS: 6-17-06

NOTES

1. OUTPUT FOR OPTION 1 IS 3X40MW+120MW



GRAPHIC SCALE

0 15' 30' 60' 90'

1"=30.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

K MAE

STATE PROFESSIONAL ENGINEER NO. NUMBER

Engineering Review		
Discp	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		
Drawn	Designed	Checked
Lead Engineer	Date	

GOWANUS GENERATING STATION
2ND STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
LAND BASED OPTION 1A

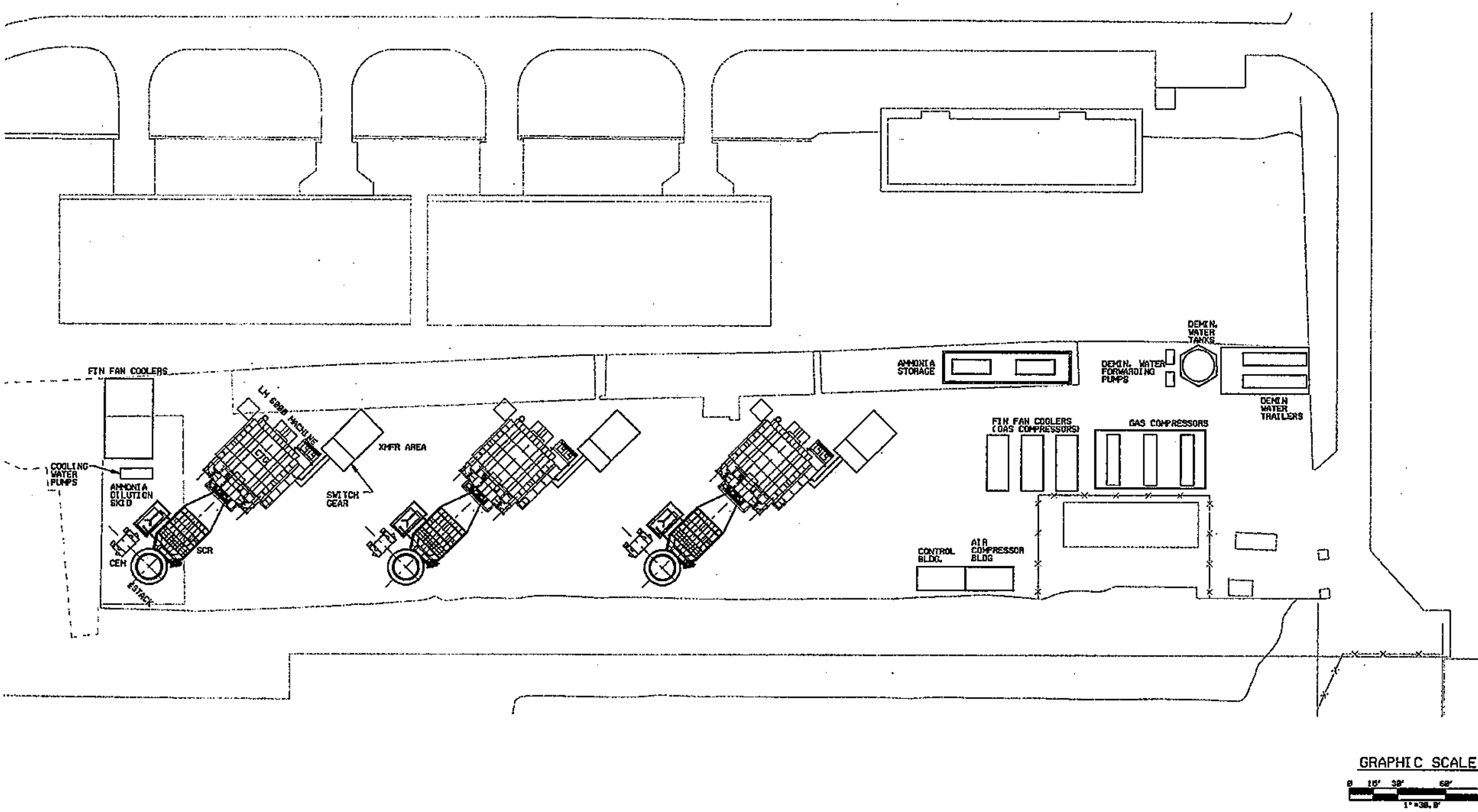
BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002525

Approved for Construction	Work Order	Drawing No	Sh	Rev
Chief Mechanical Engineer	2778	SKM210	1 OF 2	A

STATUS: 6-18-00

NOTES

1. OUTPUT FOR OPTION I IS 3X40MW=120MW



Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

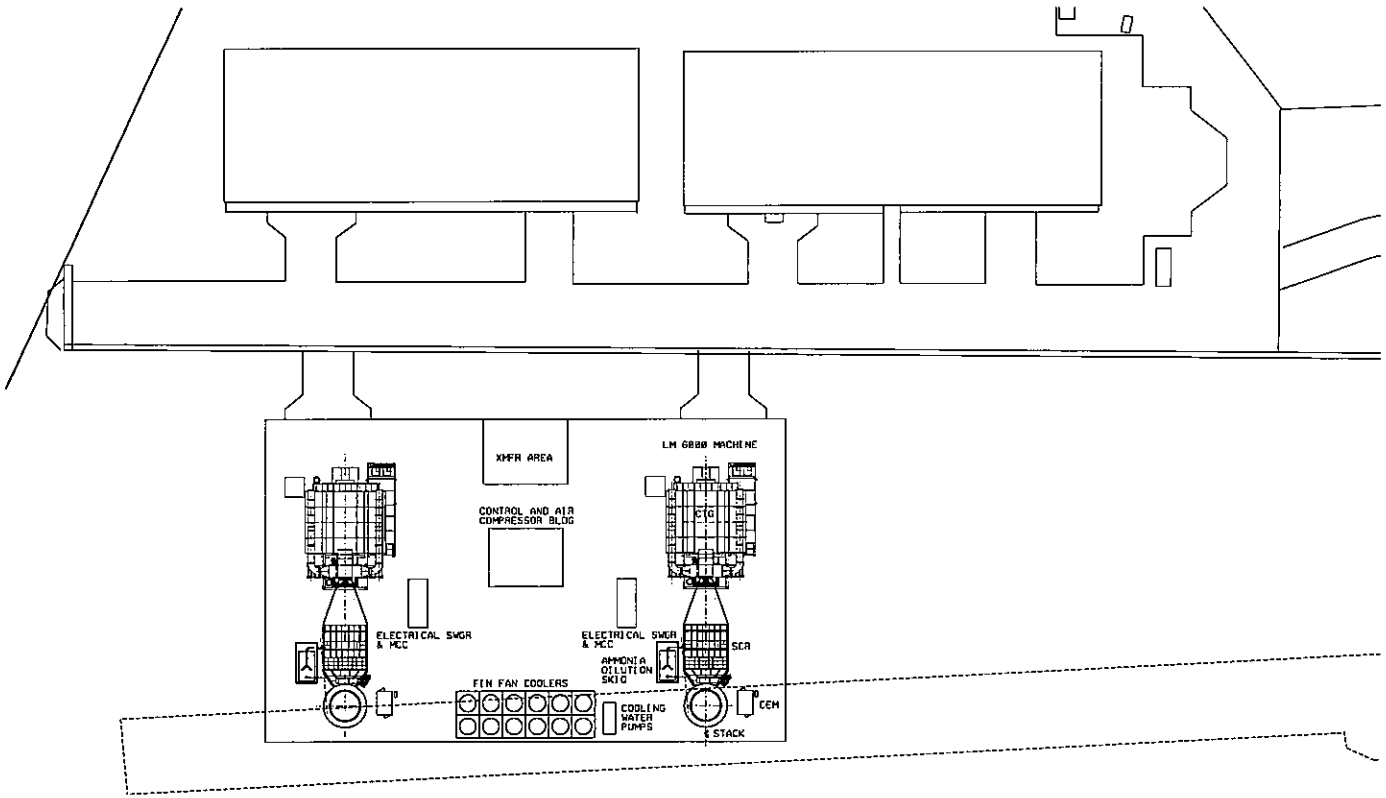
Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		
Drawn	Designed	Checked

GOWANUS GENERATING STATION
29TH STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
LAND BASED OPTION 1B

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No.0002685

Lead Engineer	Date	Approved for Construction	Work Order	Drawing No	Sh
	Scale	Chief Mechanical Engineer	2778	SKM210	2 OF 2



NOTES

1. OUTPUT FOR OPTION 3 IS 80MW
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED ON LAND
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE.
4. NEW BARGE DIMENSIONS ARE APPROXIMATELY 270' X 167'

GRAPHIC SCALE

0 15' 30' 60' 90'

1" = 30.0'

Rev NO	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE MARK

STATE PROFESSIONAL ENGINEER NO. NUMBER

Engineering Review		
Elec	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn | Designed | Checked

Lead Engineer | Date

Approved for Construction | Chief MECHANICAL Engineer

GOWANUS GENERATING STATION
29TH STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 3

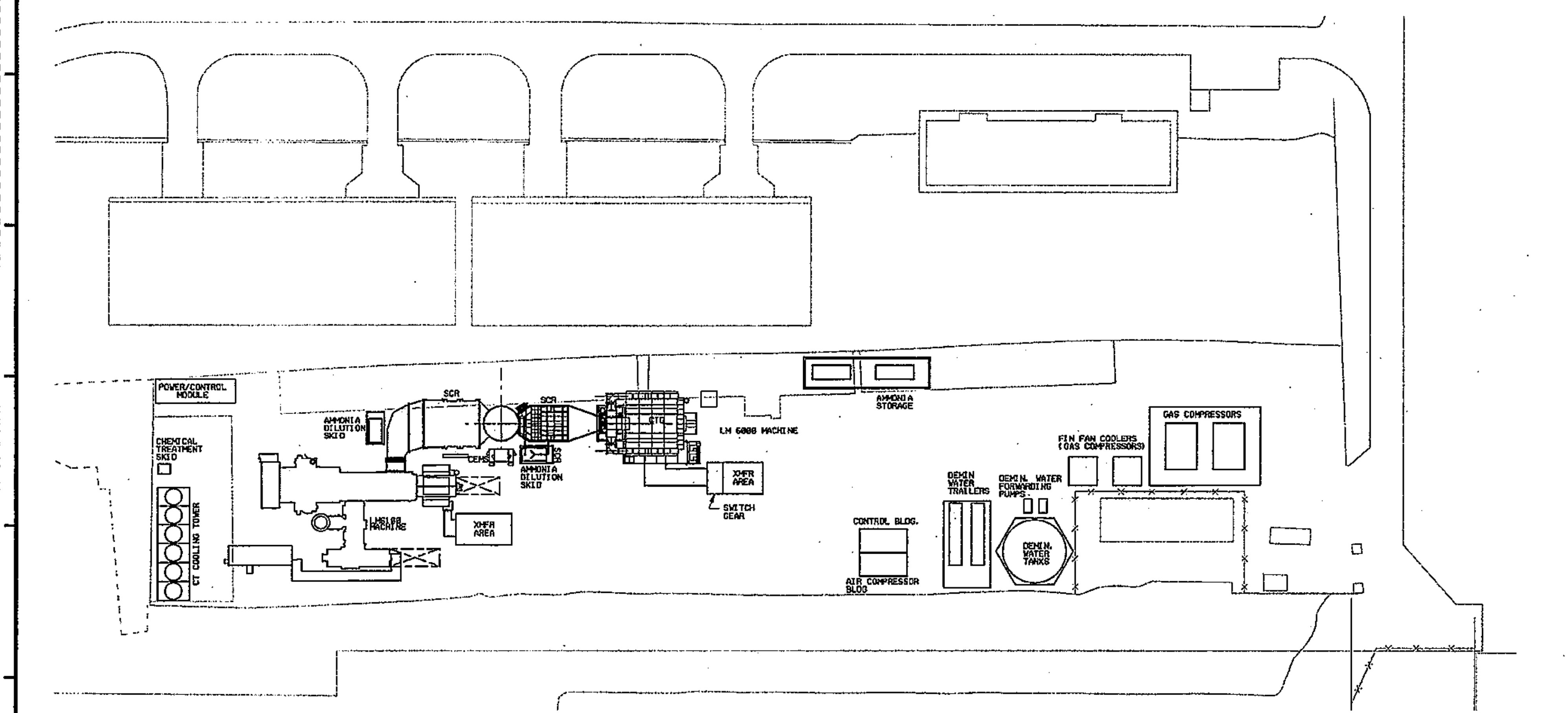
BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0002625

Work Order	Drawing No	Sh	Rev
2778	SKM212		A

STATUS: 8-14-06

NOTES

1. OUTPUT FOR OPTION 2 IS 140MW (LMS 100-100MW; LM6000-40MW).



GRAPHIC SCALE

0 15' 30' 60' 90'

1" = 30.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE NAME

STATE | PROFESSIONAL
LICENSE NO. | NUMBER

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		
Drawn	Designed	Checked

Lead Engineer | Date | Scale

Approved for Construction

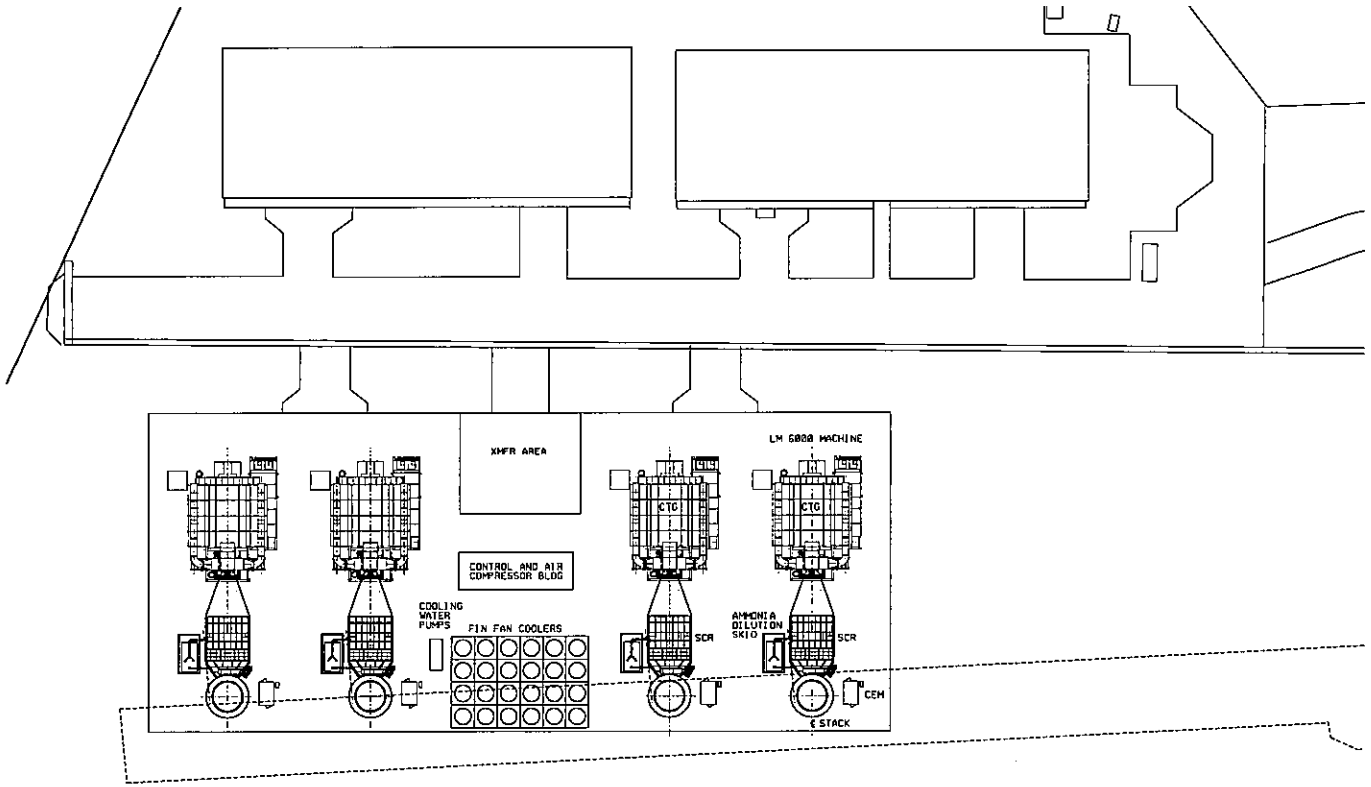
Chief MECHANICAL Engineer

GOWANUS GENERATING STATION
29TH STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
LAND BASED OPTION 2

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 000206

Work Order	Drawing No	Sh
2778	SKM211	



NOTES

1. OUTPUT FOR OPTION 4 IS 168MW
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED ON LAND
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE.
4. NEW BARGE DIMENSIONS ARE APPROXIMATELY 398' X 167'

GRAPHIC SCALE

0 15' 30' 60' 90'

1" = 30.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE WHE

STATE ENGINEER NO. PROFESSIONAL NUMBER

Engineering Review		
Discp	Engr	Date
Mech		
Elec		
Civil		
Struc		
Instr		
Drawn	Designed	Checked
Lead Engineer		Date
Chief Mechanical Engineer		Scale

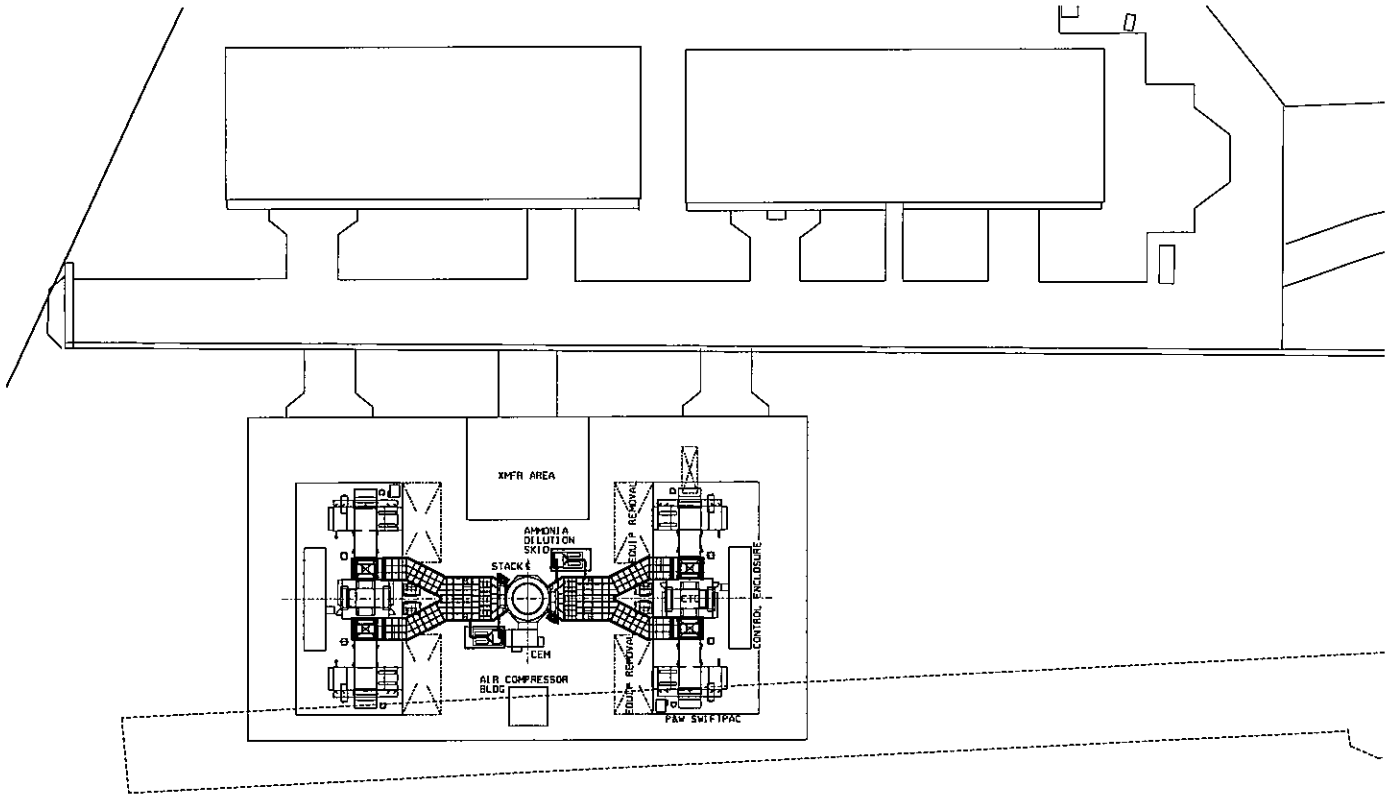
GOWANUS GENERATING STATION
24TH STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 4

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 000625

Approved for Construction	Work Order	Drawing No	Sh	Rev
	2778	SKM213		A

STATUS: 8-14-86



NOTES

1. OUTPUT FOR OPTION 5 IS 110MW
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED ON LAND
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE.
4. NEW BARGE DIMENSIONS ARE APPROXIMATELY 298' X 167'

GRAPHIC SCALE

0 15' 30' 60' 90'

1" = 30.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control	Approved By	Date	Released By	Date
Purpose				
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

PE NAME

STATE PROFESSIONAL ENGINEER NO. NUMBER

Engineering Review	Engr	Date
Elec		
Mech		
Civil		
Arch		
Instr		

Drawn | Designed | Checked

Lead Engineer | Date

Approved for Construction | Date

Chief MECHANICAL Engineer

Scale 1"=30'-0

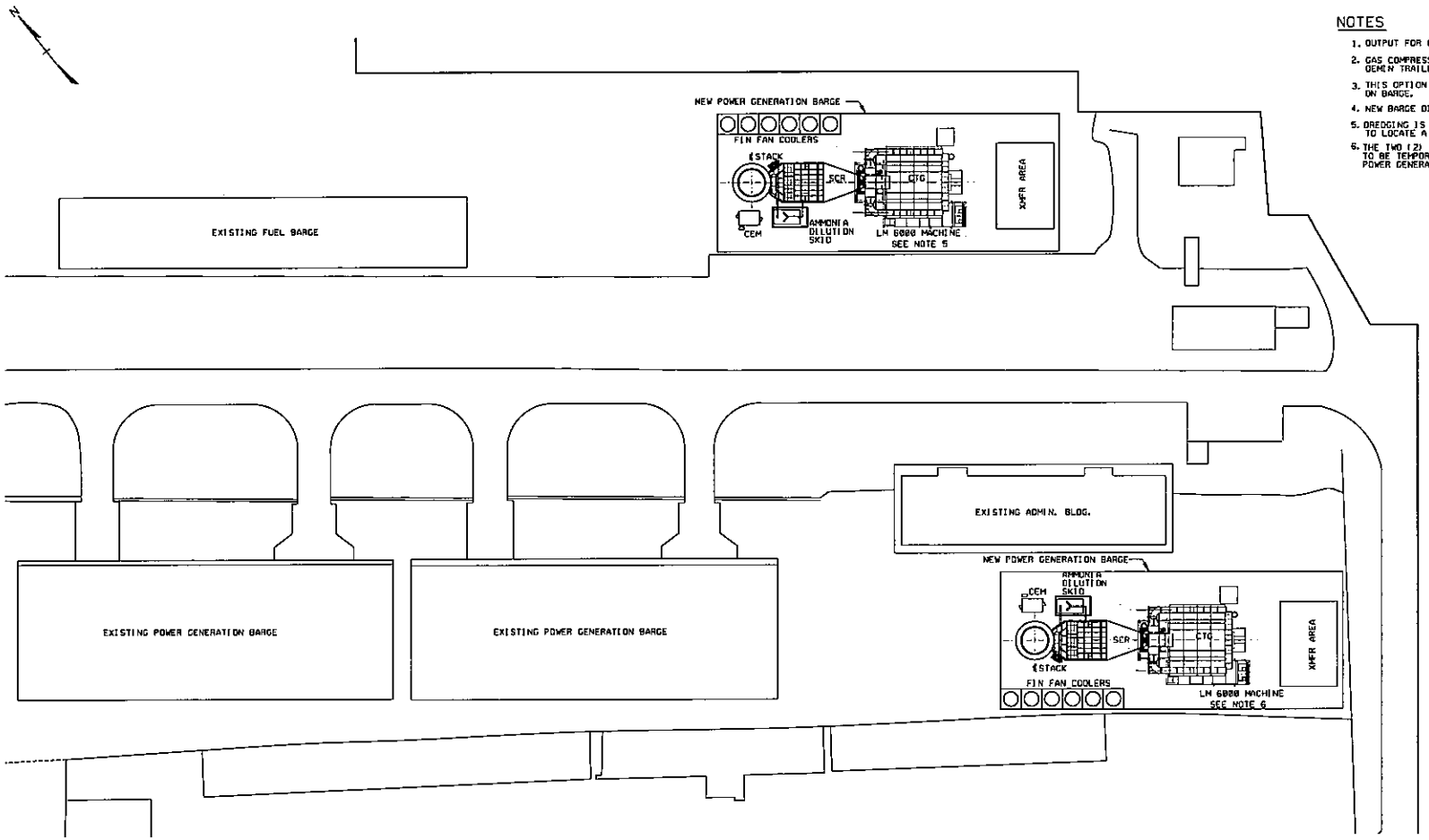
GOWANUS GENERATING STATION
29TH STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 5

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 0007635

Work Order 2778 | Drawing no SKM214 | Sh | Rev A

STATUS: 8-14-06



NOTES

1. OUTPUT FOR OPTION 6 IS 80MW
2. GAS COMPRESSOR, AMMONIA STORAGE TANK AND DEMIN TRAILERS ARE LOCATED ON LAND
3. THIS OPTION CONSIDERS DEMIN WATER STORAGE ON BARGE.
4. NEW BARGE DIMENSIONS ARE APPROXIMATELY 200' X 80'
5. DREDGING IS REQUIRED (AMOUNT NOT KNOWN) IN ORDER TO LOCATE A POWER GENERATION BARGE IN THIS AREA.
6. THE TWO (2) EXISTING POWER GENERATION BARGES NEED TO BE TEMPORARILY REMOVED IN ORDER TO LOCATE A NEW POWER GENERATION BARGE IN THE AREA.

GRAPHIC SCALE

0 15' 30' 60' 90'

1" = 30.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
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PE SEAL

STATE PROFESSIONAL ENGINEER NO. NUMBER

Engineering Review		
Disc	Engr.	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn | Designed | Checked

Lead Engineer | Date

Chief MECHANICAL Engineer | Scale NONE

GOWANUS GENERATING STATION
29TH STREET & 2ND AVENUE
BROOKLYN, NEW YORK

GENERAL ARRANGEMENT
WATER BASED OPTION 6

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
New York Certificate of Authorization No. 000525

Approved for Construction	Work Order	Drawing No	Sh	Rev
	2778	SKM215		A

STATUS: 8-15-06

APPENDIX 2
The Power Barge Corporation Budgetary Quote

For the
Capacity Expansion Study at
Gowanus and Narrows Generating Stations

PROPOSAL

Presented to:

Burns and Roe

For

NYC Power Barge Project

ProEnergy SERVICES
"Experience our Energy"

The Power Barge Corporation

September 22, 2006

Table of Contents

Section I Executive Summary

The Power Barge Corporation (TPBC) and ProEnergy Services ("ProEnergy") are pleased to offer this power barge proposal for Burns and Roe for a 96 MW New York City located Power Barge Project. The proposal provides an indicative price and scope of supply for two LM6000PC Sprint simple cycle power barge.

Given the clients requirements for union trade labor for erection and outfitting, we have assembled a team that combines The Power Barge Corporation's gas turbine power barge expertise with ProEnergy Services LM6000PC Sprint centerline and outfitting management, and JV Industries, a union outfitting shop in Texas.

After reviewing East and Gulf Coast production capacities and pricing, we have selected to propose a Gulf Coast program. Engineering and long lead procurements will take the first month of the project schedule. The deck barge fabrication will take about 7 months assuming parallel construction utilizing a non-union fabrication yard. During this time period we assume that the, gas turbines, GSUs, SCR/COs would be delivered. Installation of the power islands, SCR/CO and all auxiliaries would be performed by union shop labor in Texas. Outfitting of an LM6000PC Sprint will take about 3 months.

Given the mix of Gulf of Mexico union and non-union labor, and the relaxing of shipyard availability, our indicative pricing is $650 a kW of nominal rated installed capacity. This estimate does not include Site engineering, preparation, installation or interconnect.

This proposal comprises a detailed description of:
- The Power Barge Corporation's Profile and History
- ProEnergy's Corporate Profile and History
- Project Descriptions and Scope

The core EPC management team of The Power Barge Corporation and ProEnergy Services will set out all procedures and controls required for coordinating and routing documentation, design and engineering information, technical interfaces and correspondence as required ensuring the following:

- Planning and scheduling all project activities.
- Coordinating project activities with vendors and client.
- Coordinating project interfaces with client.
- Monitoring and reporting all project activities.
- Producing progress reports and schedules.

- Providing Project Management
- Providing contract management.

The Power Barge Corporation is the world's leading gas turbine power barge EPC contractor. **ProEnergy** is a company comprised of some of the most experienced construction and commissioning service providers in the world. We believe our blend of prior experience, "hands-on" technical knowledge, solid processes, extensive, construction, installation, operations and maintenance experience, and broad corporate management experience makes us uniquely qualified to provide services to the client, focusing on safely maximizing plant and equipment reliability, availability, and performance while maintaining the highest safety standards and exceeding environmental requirements.

In addition, our collective management team has worked previously for all of the major gas turbine manufacturers and has an in-depth understanding of both technical and commercial considerations associated with the New York City power project.

In addition, ProEnergy is able to support the project in the post commissioning phase through its four business lines, including original equipment manufacture trained Operations and Maintenance Services, Technical Advisors, Controls Specialists, Training Specialists, and Maintenance support services.

We look forward to reviewing this proposal with you and discussing with you the value ProEnergy Services and The Power Barge Corporation can bring to your organization and projects.

Section II The Power Barge Corporation & ProEnergy Services Overview

2.1 The Power Barge Corporation Profile and History

The Power Barge Corporation concept began in 1990 as a subsidiary of General Dynamics, Electric Boat Company (nuclear submarine program). In a joint venture with Westinghouse, a product line of gas turbine simple and combined cycle power barges was developed. Since then, The Power Barge Corporation has evolved into a privately held consultancy and niche EPC firm specializing in power barges.

The Power Barge Corporation staff has worked in the gas turbine power barge business since 1990 in project development support, engineering, design and construction of power barges. The Power Barge Corporation has enjoyed close working relationships with Siemens, General Electric, Wartsila, MAN B&W, and Kvaerner Masa Marine (now Aker Marine).

Past experience includes contract work on the following gas turbine power barges providing, consulting, engineering and design, or full EPC services:

30 MW General Electric Frame 6B simple cycle power barge
EPC for 2 delivered power barges
48 MW Westinghouse combined cycle power barge to work with 98 MW unit
Design with one unit under construction
48 MW Westinghouse W251B11 simple cycle power barge
Design for one unit delivered
70 MW Westinghouse W251 B11 combine cycle power barge
Design
98 MW Westinghouse W251B11 x 2 simple cycle power barge
Design for two units delivered
100 MW Pratt & Whitney FT4C-3F x 3 simple cycle power barge
Project Management/construction for one unit delivered
100 MW General LM6000PC Sprint simple cycle power barge
Design contract – under review
105 MW Westinghouse W501 D5/A simple cycle power barge
Design for two units delivered
185 MW General Electric Frame 7EA combined cycle power barge
Consulting engineering services – operational unit
220 MW General Electric LM6000PC x 4 simple cycle power barge
Consulting engineering services – operational unit

Clients include El Paso, AES, Enron, Keppel Energy, Hyundai Engineering and Construction, Westinghouse, Sermetech/TTS, Alvarez & Marsal, Exxon Mobile and many project developers.

2.2 ProEnergy Corporate Profile and History

ProEnergy Services is an integrated service company with broad domestic and international experience. Established by a dedicated group of seasoned energy professionals in response to a growing need within the energy industry for a cost-effective, safe, reliable service group with high quality standards, ProEnergy provides a broad spectrum of services to the global energy industry.

Through its four lines of business, 1) Construction and Installation, 2) Operations and Maintenance, 3) Professional Services, 4) Field Services, and 5) Technical Services, ProEnergy contributes to our client's projects' profitability by providing cost effective power plants and services, while maintaining the highest standards of quality.

Our team is committed to the energy industries, and is comprised of industry experts who posses the global experience, knowledge, financial depth, and a reputation for exceeding our clients expectations, anywhere in the world. Our backgrounds include a wide variety of skill sets and experience which allows us to quickly understand your needs and provide innovative solutions. The value we can bring begins in the development stage of a project, through construction and start-up, and continues through the long term operations and maintenance of a facility.

Exceeding customer expectations is what sets apart the commercial successes of our era from the commercial failures. The business world today continues to evolve and the success or failure of organizations are often tied to their ability to remain focused on customer satisfaction, driving to reduce overhead so as to provide real value, and remaining dedicated to exceeding the expectations of their clientele. ProEnergy Services holds forth that same vision as the model for its success. At ProEnergy Services, we are dedicated to providing a level of service which eclipses our competitors... we do it better! We are passionate about client satisfaction, committed to lower costs, which we pass on to the consumer, and dedicated to exceeding our clients' expectations. It is this commitment that has allowed us to grow throughout the down turn in the energy market.

2.3 Quality

Everything we do at The Power Barge Corporation and ProEnergy to remain as world-class companies is based upon delivering a reliable plants and services, free of defects, in a timely manner. We understand that our Customer's facilities must be available on schedule, and must be reliable to meet their anticipated business goals. Prior to mobilizing to a project, the team develops an initial plan and schedule based upon past project experience. During performance of the services, we execute to pre-established criteria and standards utilizing established check-lists and procedures.

2.4 Experience – ProEnergy Corporate & Management

To date, ProEnergy has secured projects both domestically and internationally in the following core areas:

- Construction and Commissioning
- Project Management
- Centerline installation services
- Comprehensive long-term Operations &Maintenance
- Asset Management
- Mobilization Services
- Training
- Technical Writing Services

- Turbine Maintenance and Diagnostic, Field Engineering Support
- Controls and Operations Support
- Field Service Inspections
- Consulting Services
- Outage Support

The extensive experience ProEnergy's management team possesses has been gained by working with, and directly for, the following:

- Project Owners
- Utilities
- Third party service providers
- Architect – Engineering – Construction firms
- Original Equipment Manufacturers such as General Electric, Siemens-Westinghouse, Stewart and Stevenson, Pratt & Whitney, Alstom, and Mitsubishi.
- Financial organizations and investment groups.

2.5 ProEnergy Services Support Organization

Located in the ProEnergy offices in Houston, Texas, Sedalia, Missouri and Atlanta, Georgia, specialists in engineering, construction operations, accounting, personnel, marketing, purchasing, and other disciplines assume responsibility for projects both domestic and international in an early stage. In this way, both technical and regulatory expertise is provided in addition to assistance with quality, safety, administration, training and environmental programs. The concept behind this support is to 1) allow the project personnel to focus on safely and efficiently performing their duties, and 2) to minimize the staff required under each contract and allow the client to share in economies of scale.

Our corporate staff reflects professionals from the energy industry, with engineering, construction, maintenance, operations, and startup experience. The philosophy of the corporate staff is one of immediate and comprehensive support for the projects and plants we provide services to; we remain available 24 hours a day, 7 days a week, 365 days a year.

Section III Work Scope

3.3 2 x 48 MW power barges in a General Electric LM6000PC Sprint Simple Cycle

Firm Fixed with Assumptions to be clarified

3.3.1 Technical Specification

General Plant Description
The LM6000PC Sprint Power Barge Project consists of two (2) 48 MW gas turbine simple cycle power barge to be located in New York City harbor within an existing power barge complex. Each gas turbine power barge will have (1) LM6000PC Sprint gas turbines, SCR/CO, related SCR auxiliaries, CEMS, fuel gas and water injection auxiliaries, 138 kV substation and a control room.

The Plant's main power producing equipment will consist of one General Electric LM6000PC Sprint packaged gas turbine. The plant is designed to deliver a nominal plant output of approximately 50MW at a lagging power factor of 0.8 at ISO conditions.

To meet the operating requirements, the two LM6000s will be erected, each on a single deck barge. The equipment will be mounted on or within the barge.

The barge will be constructed by the American Bureau of Shipping (ABS) as a Deck Cargo Barge (Rivers Class). Concurrent with the construction activities to be performed at the aforementioned shipyard the preparation and installation of non-barge mounted equipment and the barge mooring system will take place at the Site as provided by others. Flag requirements are to be determined.

LM6000 Gas Turbine Generator Set
The LM6000PC Sprint is a simple-cycle, 2-shaft gas turbine derived from the core of GE's highest thrust, highest efficiency aircraft engine, the CF6-80C2. The Low Pressure Turbine, High Pressure Compressor, High Pressure Turbine and Combustor of the LM6000 are virtually identical with their aircraft CF6-80C2 counterparts. This use of flight-proven parts, produced in high volume, contributes to the low initial cost and high efficiency of the LM6000.Major Components of the LM6000 turbine are:

- Variable inlet guide vane section (VIGV)
- 5-stage low pressure compressor (LPC)
- 14-stage variable geometry high pressure compressor (HPC) .
- Annular combustor
- 2-stage air cooled high pressure turbine (HPT)
- 5-stage low pressure turbine (LPT)
- Accessory Drive Gear Box

The LPC is driven through a concentric drive shaft by the 5-stage LPT, forming the low pressure rotor. The high pressure rotor is formed by the 14-stage HPC, driven by the 2-stage HPT. The high pressure "core" is formed by the HPC, combustor and HPT section. Instead of a separate power turbine, as used on previous engines, the LM6000 uses the Low pressure Turbine (LPT) to power the output shaft. Driving with the LPT simplifies the engine and improves fuel efficiency. The LM6000 gas turbine drives a generator through a flexible dry type coupling connected to the front, or "cold", end of the LPC shaft.

The generator is an air cooled, self-ventilated, cylindrical rotor machine. It is a two pole synchronous generator with a brushless excitation system and a permanent magnet pilot exciter. The generator utilizes an open, drip-proof design and is enclosed in a housing which reduces average noise levels to 90 dB(A) at one meter from unit and one and one-half meter above grade. The rotor is supported by two split sleeve bearings which are lubricated with a pressurized mineral oil system. The generator has a design life of 25-30 years, utilizes Class F insulation and is sized to operate with diode failure alarm, flux limiter, over-excitation limiter, volts per Hz control, under excitation limiter, auto follower & null balance, auto transfer to manual control Class B temperature rise. The generator is capable of absorbing the site rated power output of the gas turbine for base load operation throughout the entire ambient temperature range of the application. The generator is capable of a 110% power overload for 2 hours out of every 24 hours of operation with no loss of operating life. The generator is also capable of withstanding a 30% overload current for 1 minute.

Air Inlet System
The air inlet system protects the gas turbine, generator and equipment compartments from the effects of airborne dirt and foreign object damage.

- Minimizes maintenance requirements and frequency of filter replacement

Noise Control
The standard equipment enclosure and air inlet silencer reduce near field noise to 90 dB(A) at one meter from the enclosure and one and one-half meters above grade. Noise emanating from the gas turbine generator set will comply with ANSI B133.8 at 120 meters (59 dB(A)).

Auxiliary Equipment Skid
For convenience of installation, General Electric has assembled the turbine auxiliary subsystems into a single baseplate module which mounts next to the gas turbine baseplate. The auxiliary equipment module includes:

- Hydraulic Start pump, reservoir and controls
- Water Wash reservoir and connections

- Gas Turbine stainless steel lube oil reservoir and filters

Control, Monitoring and Electrical System

The control and monitoring system for the General Electric LM6000 generator set provides a highly reliable, operator friendly package. The System components include:

- Turbine Generator Unit Control Panel
- Control Batteries and Charger Assembly
- Gas turbine wet gauge panel and water wash panel (local)
- Generator wet gauge panel (local)

The Woodward NetCon 5000 unit control panel is the primary control point for the system. The Woodward NetCon 5000 provides the following primary functions:

- Fuel Management System
- Light-Off Fuel Gas Control
- Acceleration Control
- Deceleration Control
- Temperature Control
- Speed Governing

The gas turbine wet gauge panel is mounted on the turbine enclosure and provides process readouts and safety devices necessary for maintenance. The panel uses solid state electronics and is suitable for installation in a non-hazardous control room. The control panel includes analog meters for key parameters, control switches and push buttons for operator commands, a programmable, microprocessor based sequencer. a CRT display, and RS232, LAN and Mod bus ports.

Additional Auxiliary Equipment Supplied

- SCR/CO Pollution Control/Stack
- Ammonia Dilution and Vaporization Skid
- CEMS
- Closed Cooling Water System (Fin Fan)
- Station and Instrument Air System
- Fire Protection and Detection System
- Demineralized Water Injection System
- Oily Water Treatment Systems
- Sewage Treatment System

- Building Systems Heating Ventilation and Air Conditioning Systems
- Plumbing and Drainage Systems

Electrical Systems
The Electrical System consists of the following:

- 138 kV System
- Main Generation System
- Medium Voltage System
- Low Voltage System
- DC and UPS System
- Grounding and Cathodic Protection
- Lighting and Receptacles .
- Power Barge Communications Systems
- Cable System
- Raceway System

General Control System Design Basis
The Plant instrumentation and control systems shall be designed to aid the Plant operator in achieving safe. reliable and economic operation of all equipment in the Plant and to minimize the number of operators required. The various control systems, including the LM6000 Turbine Digital Control Systems. SCR/CO Controls Systems and a Balance-of-Plant Control System shall be operated locally..

Local controls furnished with the equipment packages will be interfaced with these control systems for alarm and monitoring purposes, as required by the system design. Plant start-up, shutdown, and operation will be conducted by the Plant operators locally or remotely in the shore control room, as required, with the aid of manually and automatically controlled local control equipment. Areas of local and! or remote control involved in startup, shutdown, and operational annunciation and monitoring of the Plant include:

- LM6000 Gas Turbine-Generator(including Water NOx Injection and Water Wash)
- SCR/CO
- CEMS
- Auxiliary Cooling and Cooling Water Systems
- Service and Instrument Air
- Uninterruptible Power and DC Systems.
- Fuel Gas Forwarding
- Fire Protection Systems
- 138 kV Switchyard
- 480 V Switchgear
- 480 V Motor Control Centers

Control Room
The switchgear/local control building is a structure containing the electrical equipment room and the control room.

The air conditioned control room will house the LM6000 Turbine Digital Control Systems and a Balance-of-Plant PLC based Control System.

The LM6000 Turbine Digital Control System is described under the Gas Turbine-Generator section. The SCR/CO/CEMS PLC based control system consists of a control termination cabinet and an operator man-machine interface. The Balance-of-Plant PLC based control system consists of a control termination cabinet, an operator man-machine interface, and two (2) printers.

In addition, other panels and cabinets such as the Fire Protection Panel and Transformer Protection Panel may also be located in the control room as required.

Naval Architectural Description
The naval architectural features of the Plant include providing the required equipment support structure, barge, foundations, storm water drainage, and fencing as required supporting the Plant's objectives.

The power generating units will be mounted on a single barge. The barge is a standard cargo barge with some local structural modifications to suit the equipment requirements. A shielding deck will be installed in the area of the gas turbines, approximately one (1) meter above the barge deck to serve as a walkway as well as a sun shield to minimize temperature distortions of the barge deck. At the Site the barges will be moored and commissioned by others.

3.3.2 New Construction

The Power Barge Corporation and ProEnergy Services will provide overall project management; engineering and design expertise; issue all tenders for equipment procurement; provide expediting and inspection services; arrange for freight forwarding and delivery to the power barge; install and erect all equipment and materials on the power barge.

For this project the scope of work is broken out as follows during the construction phase:

<u>The Power Barge Corporation Scope:</u>

- Naval Architecture and Marine Engineering
- Project Management
- Deck Barge Fabrication and Structural Modifications
- Under deck modifications (structural/storm tank/oily water separator)

- Gas Turbine Foundation(1 LM6000PC Sprint)
- SCR/CO Structural Foundation
- GSU Foundation
- Elevated operating deck/guard rails and misc. structure and containment

ProEnergy Scope:

- Project Engineering and Project Management
- LM6000PC Sprint GTG 60 Hz gas fuel
- Fuel Gas piping
- SCR/CO, auxiliaries and CEMS
- I&C, LV, MV HV systems
- Central Control Room/Work Shop
- 138 kV substation
- Demineralized Water Booster Skid
- Inlet air filter system
- Warranty engineer
- Warranty/Guarantee

To ensure complete coordination of the overall project throughout the various stages of implementation from design through to completion, the project organization will include a core management team. The Project Executive heads the core team and has complete responsibility for the project's execution from contract signing to final acceptance and will ensure the appropriate company resources are applied to the project. Reporting directly to the Project Executive is the Project Manager who will be responsible for the day-to-day management of the project team and ensuring that the contract is fulfilled within the completion dates and to the satisfaction of the Customer. The ProEnergy project manager will be the primary point of contact on the project. Reporting directly to the Project Manager will be the Design Engineering Subcontractor, Project Engineer, Site Manager, GT Technical Advisor, Start-up Manager, and the Mobilization Manager. Additional personnel assigned to the project as well as subcontractors will report through these individuals.

The core management team will set out all procedures and controls required for coordinating and routing documentation, design and engineering information, technical interfaces and correspondence as required to ensure the following:

- ♦ Planning and scheduling all project activities.
- ♦ Coordinating project activities.

- Coordinating project interfaces.
- Monitoring and reporting all project activities.
- Producing progress reports and schedules.
- Providing site Management and Coordination.
- Providing contract management.

The Power Barge Corporation and ProEnergy are committed to accomplishing the engineering, procurement, fabrication, construction, and commissioning of this project within the targeted schedule, at the targeted cost with high quality and reliability in full compliance with laws, industry codes and standards, and Customer requirements.

The ProEnergy corporate Quality Program will be utilized including our standard procedures and instructions adapted specifically for this project. These procedures have been developed and enhanced through use on past and present successful projects.

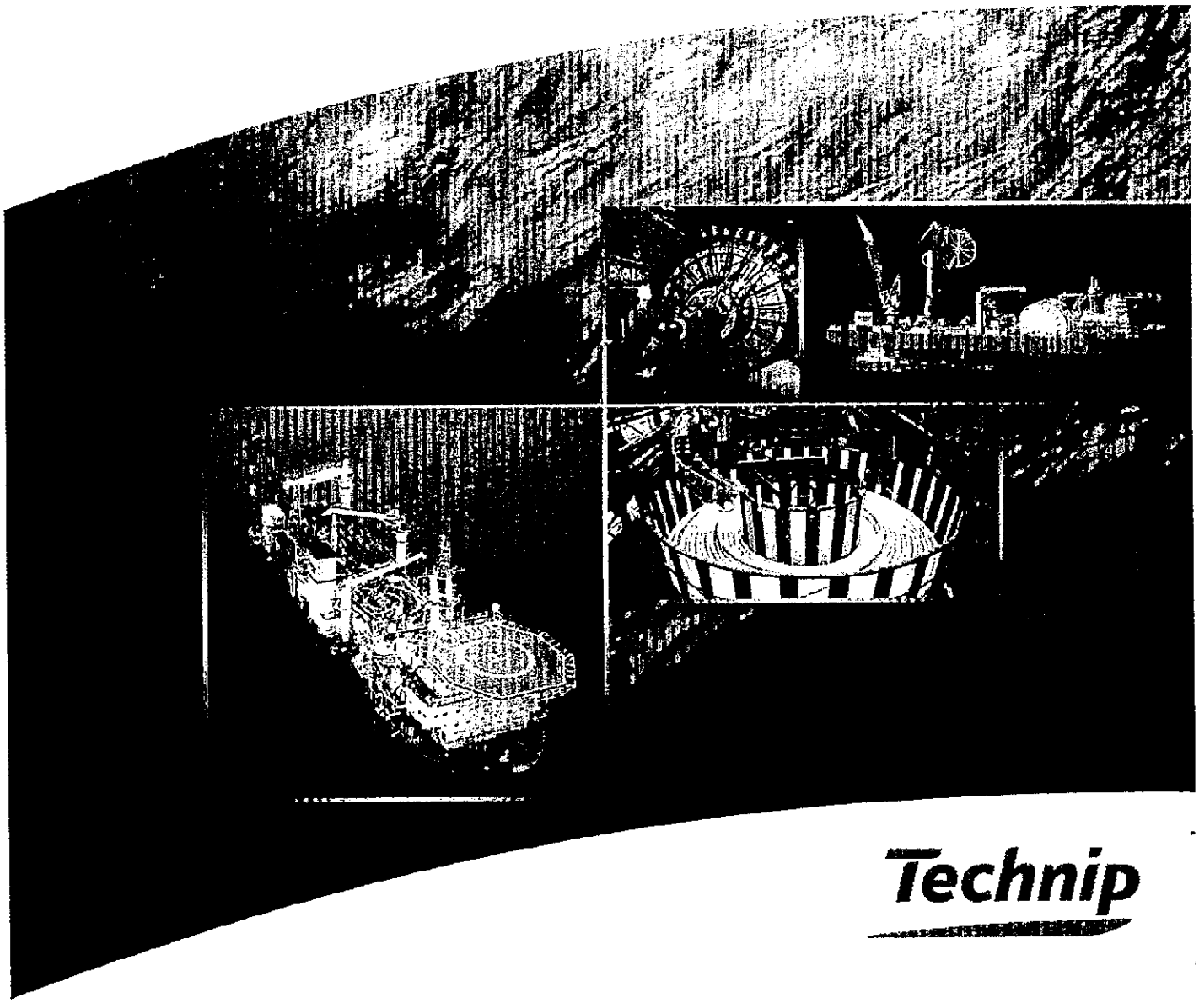
This Quality Program provides effective integration, planning, monitoring, and control of the activities performed in all facets of the project. It will provide the framework for effective communication and coordination of the interfaces between the Project Team, Project Suppliers, and the Customer.

APPENDIX 3
Coflex "Technip" Flexible Pipe Information

For the
Capacity Expansion Study at
Gowanus and Narrows Generating Stations

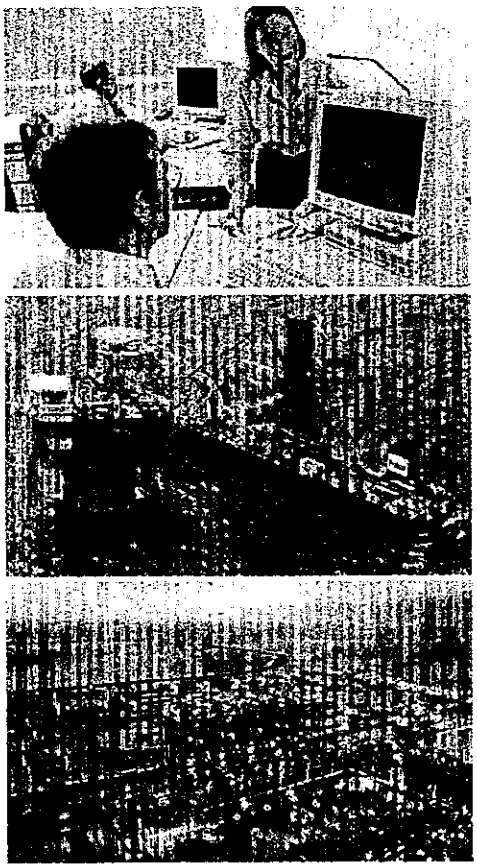
Technip technologies and products

Flexible pipe



Technip

Technip Profile



Listed on the Euronext Paris and New York Stock Exchange

Revenues: 5.4 billion euros in 2005

Over 21,000 people worldwide

One of the five world leaders in oil and gas, and petrochemical engineering technologies and construction services

4 business segments

Offshore SURF

(Subsea, Umbilicals, Risers & Flowlines)

- Design, manufacturing and supply of deepwater products (flexible and rigid pipelines, umbilicals, ROVs, riser systems)
- Subsea construction and pipelaying

Offshore Facilities

- Engineering and fabrication of fixed platforms for shallow waters and floating platforms for deep waters

Onshore and Downstream

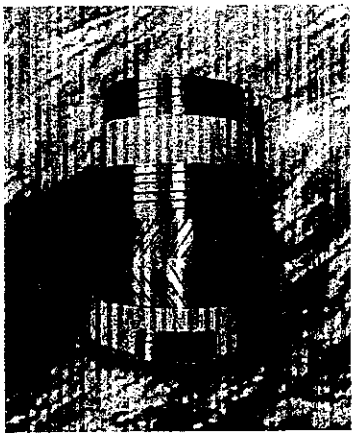
- Gas treatment and liquefaction, Gas-To-Liquids (GTL)
- Oil refining (refining, hydrogen, and sulfur units)
- Onshore pipelines
- Petrochemicals (ethylene, aromatics, olefins, polymers)

Industries

- Fertilizers, chemicals and pyrotechnics
- Life sciences
- Metals and mining
- Cement
- Building and infrastructure

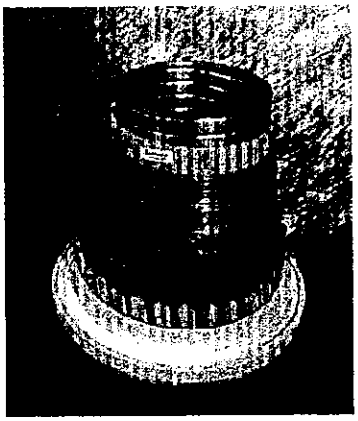
Flexible pipe

Technip offers a broad range of services in engineering, manufacturing, installation and retrieval of flexible pipe systems with the most advanced integrated solutions for deepwater and ultra deepwater field developments.



Standard Technip Flexible structure

Technip is the most experienced provider of integrated solutions for subsea field developments, based on a broad range of field-proven products and services. Early in the 70's, Technip pioneered flexible pipe technology and used it to provide its clients with ever-higher levels of reliability and quality, even in the world's harshest and deepest offshore environments.



Sample of an IPB*
(Integrated Production Bundle)

For over 30 years our high pressure flexible products have provided offshore operators with reliable and efficient subsea solutions worldwide. To date, more than 7,000km of high-pressure flexible pipe have been installed throughout the world.

Our products are versatile, corrosion-resistant and compliant, and they are easy and quick to install, retrieve and reuse for marginal or evolutive field architectures, thus environmentally friendly.

They have carved out their place not only for floating facilities but even in the shallow and medium water markets that were once the exclusive domain of rigid steel flowlines. With internal diameters ranging from 2" to 19", flexible pipes are the product of choice for infield lines.

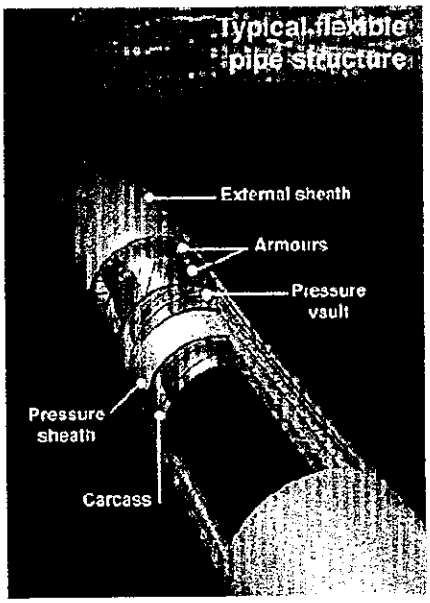
At the same time, the flexible pipe's versatility and ability to evolve with the industry will continue to ensure its place within the deepwater and ultra deepwater markets that characterize the new step in offshore field developments.

* *Proprietary technology.*

What is flexible pipe?

A fit-for-purpose structure

A flexible pipe is made up of several different layers. The main components are leakproof thermoplastic barriers and corrosion-resistant steel wires. The helically wound steel wires give the structure its high-pressure resistance and excellent bending characteristics, thus providing flexibility and superior dynamic behaviour. This modular construction, where the layers are independent but designed to interact with one another, means that each layer can be made fit-for-purpose and independently adjusted to best meet a specific field development requirement.



Main characteristics

FLEXIBILITY

Flexibility is the distinctive property of flexible pipe. A typical 8" internal diameter (ID) flexible pipe can safely be bent to a radius of 2m or less. This is the reason why flexible dynamic risers have been the catalytic technology for floating production systems.

This flexibility is also important for flowlines laid on difficult seabed conditions. Flexibility makes it possible to spool the pipe on a reel or in a carousel for efficient and quick transportation and installation.

INSTALLABILITY

Because the flexible pipe comes in a continuous length, laying speed commonly averages 500m per hour. Separate sections are connected on deck during installation, eliminating the need for any intermediate riser base structure or subsea connections. This elimination of interfaces reduces risk in operation.

MODULARITY

The independent layers of a flexible structure enable it to be tailored to the precise needs of a specific development. Simple flexible pipes for medium pressure water transport comprise only four layers. The most complex flexible pipes may have up to 19 layers.

Beyond the basic fluid barriers and stress-resistant tendons, additional layers can be included to prevent wear between steel layers (in dynamic applications) or to provide improved thermal insulation ("standard" flexible pipe already has a much better insulation coefficient than that of steel pipe).

Besides including new plastic or steel layers within the product, it is also possible to assemble plastic hoses, electrical cables or optical fibers around a flexible pipe to produce an Integrated Service Umbilical (ISU*), or include active heating for flow assurance in deepwater to produce an Integrated Production Bundle* (IPB).

In 2001/2002, Technip participated in the DEMO 2000 JIP, demonstrating its ability to supply heat traced flexible, including gas lift tubes and temperature monitoring optical fibers within the same line. Heat tracing and monitoring allow temperatures to be perfectly tuned within the core production flexible in order to meet flowing or cool down requirements. This type of flexible pipe provides an "all-in-one" solution for deepwater applications.

* *Proprietary technology*

Flexible pipe: a cost-effective solution

The combination of flexibility, installability, modularity, corrosion resistance and reusability, pressure resistance and versatility explains why flexible pipe is a cost-effective solution.

Versatility and re-usability

Modularity enables flexible technology to cover very different applications:

- flexible products already installed in water depth down to 1,890m
- Kill & Choke line for drilling (up to 15,000 psi)
- drain pipe & foam lines for onshore refinery applications
- RTP (Reinforced Thermoplastic Pipe) for land applications.

Even more important, it means that the flexible pipe structure is constantly evolving to meet stringent field specifications:

- higher pressures (up to 7,200 psi for a 9" ID, up to 10,000 psi for a 7.5" ID) on dynamic riser applications
- higher temperatures (up to 130°C)
- enhanced insulation through thick foam fillers laid on SZ machine
- active heating
- designs available for ultra deepwater (down to 2,500m).

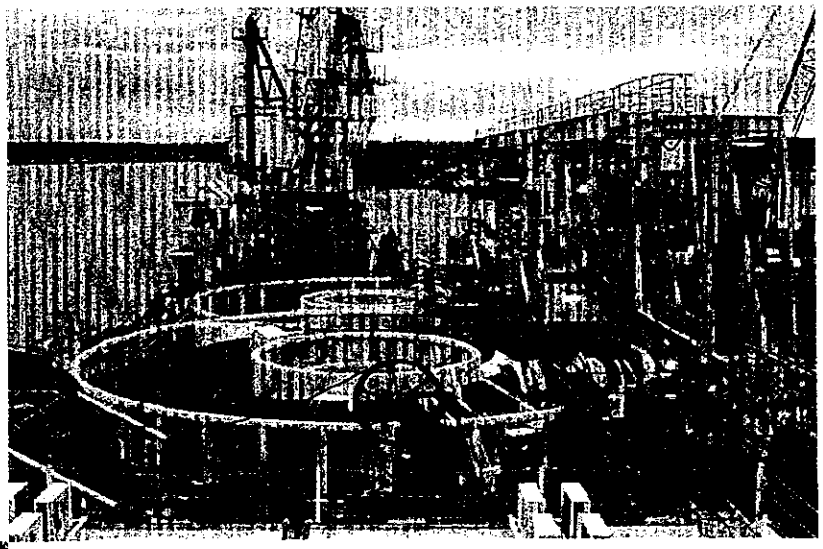
Moreover, flexible pipe is the only product, environmentally friendly, which can be recovered and reinstalled several times to be used successively for several marginal or evolutive field architectures as regularly done for years by Petrobras in Brazilian waters.

Corrosion resistance

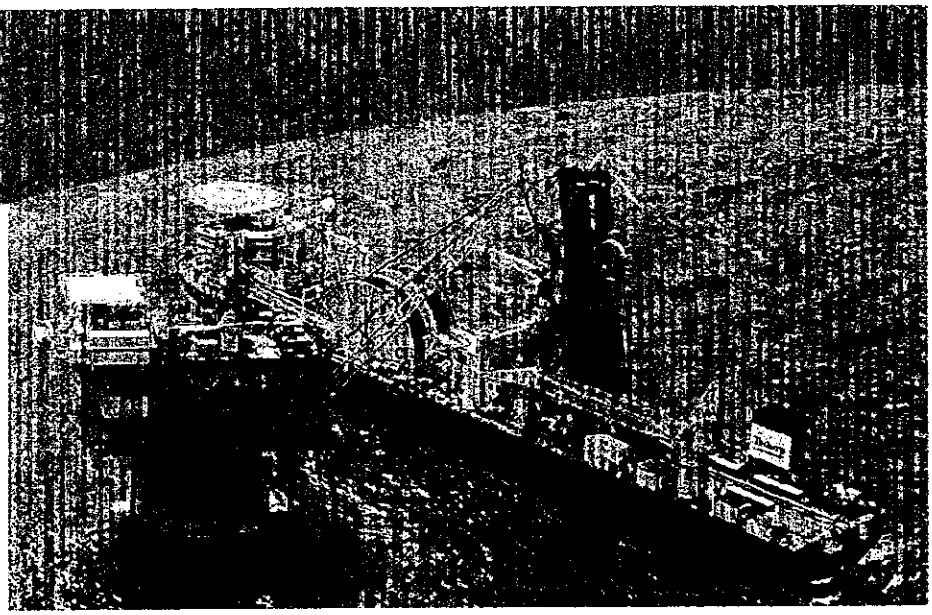
Since the steel tendons are not in direct contact with the conveyed fluid, they do not require the same corrosion resistance as steel pipe. This means that our design experience and knowledge of gas diffusion through thermoplastic materials enable us to use carbon steel where the equivalent rigid pipe application would require much more expensive corrosion-resistant alloys.

Pressure resistance

Flexible pipes resist all fluid pressures currently encountered in the most severe subsea applications. Again, the modularity of the flexible pipe manufacturing process enables us to adjust thickness, shape and number of steel wire layers to meet the specific requirements of our clients.



Flexible pipe: an environmentally friendly product



Providing the best suited solutions for our clients' field developments

The worldwide reference

In the early 70's, Technip pioneered flexible pipe design, manufacture and installation, and has now accumulated more than 30 years of field-related in-depth experience. Our aim and strategy is to base our leadership on technological differentiation and, in that respect, the flexible pipe product is our historical reference. We are committed to researching new solutions to better serve our clients' needs. We introduced Coflon®, Crossflex®, Gammaflex®, various types of Cofoam® insulation materials, both Zeta and Teta vault profiles, the Vertical Laying System, Steep Wave® and Pliant Wave® riser configurations, midwater arch configurations and buoyancy modules, Integrated Service Umbilicals® and multibore risers. Technip has also developed most of the analytical and numerical tools used to design, test and monitor flexible flowline and riser systems.

Today, this drives us to find the most reliable and client-focused solutions for the deep and ultra deepwater challenges that lie ahead.

The widest range of services

Technip is the only offshore contractor that seamlessly integrates design, engineering, manufacturing and installation services to its clients' benefit. It is the staff of our local business units who regularly interfaces with our clients worldwide. Technip's Product Engineering Division (PED) co-ordinates flexible pipe-related engineering within our regional business units.

Among other facilities that manufacture umbilicals and ROVs, Technip currently operates two flexible pipe plants:

- Flexi France (Le Trait, France) the Group's largest plant and;
- Flexibras (Vitória, Brazil).

We own and operate a large fleet of dynamically positioned vessels, three of which are dedicated to flexible pipe-lay The Deep Blue, the latest addition to the Technip fleet, is the only vessel of her class to lay both flexible and rigid pipes (reel-lay and J-lay) in 2,500m water depth.

In addition, Technip is also the leading supplier of reeled rigid pipe solutions worldwide. All these assets and capabilities are integrated by our unique Project Management organisation. It enables us to compare and optimize the solutions we offer to our clients and provide the optimum flowline and riser systems, rigid or flexible for any offshore development (see map on page 8).

Field experience and milestones

1973 First flexible pipe installed in Congo for Elf Emeraude

1974 First flexible flowline in the North Sea on Mobil Beryl

1976 First dynamic flexible riser in Brazil on Petrobras Garoupa

1978 First flexible riser with heat tracing in Indonesia on Conoco Udang

1982 First flexible riser with thermal insulation

1986 First dynamic flexible riser system installed in the North Sea on Balmoral Sun Oil

First flexible pipe with a Coflon® pressure sheath in the North Sea and Spain

1987 Largest diameter of flexible riser (19" ID) on Statoil Statfjord C

1988 New depth record for flexible riser (567m) in the Gulf of Mexico on Conoco Jolliet

1989 First flexible pipe with a Crossflex® pressure sheath

1992 First installation using the VLS (Vertical Laying System) on Saga Snorre

1994 First flowline (16" ID, 3.5km) manufactured in carousel

First ISU® (Integrated Service Umbilical) on Norsk Hydro Troll

1997 New depth records for flowline (1,709m) and riser (1,390m) in Brazil on Petrobras Marlim Sul

1998 First flexible riser with a Teta pressure armour on Norsk Hydro Visund and Enterprise Oil Pierce

2000 New depth record for flowline (1,883m) on Petrobras Roncador

2002 Installation of the deepest flowline (1890m) on Petrobras Roncador

First project using 46mm thick insulation fillers - Agip Abo (550m) in West Africa

2004 First qualification for 2,000m WD (DIP test offshore Brazil, 7" and 9" ID risers)

2005 Installation of the deepest riser (7.5" ID - 10,000 psi for water injection) in 1,890m for BP Thunder Horse in the Gulf of Mexico

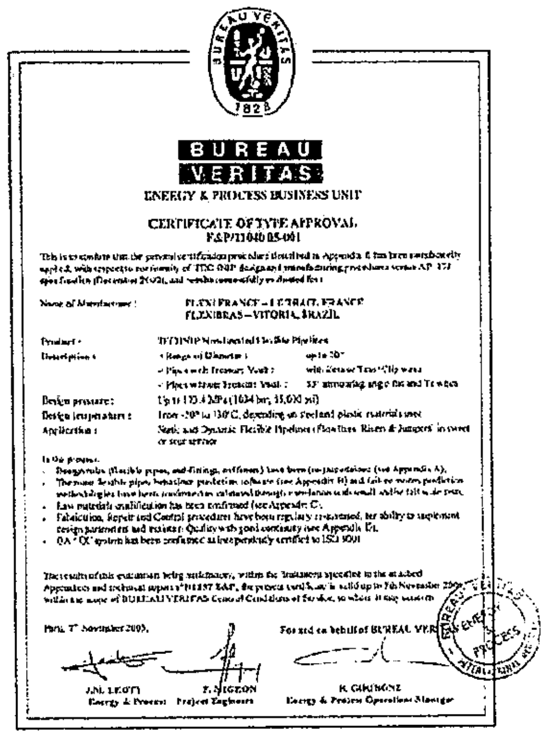
BV certification 15,000 psi

Since 1972, the yearly OTC award for companies has been honouring the one company (amongst operators and contractors) that has significantly contributed to the offshore oil and gas industry. In that respect, we obtained the 1995 OTC award for the design, manufacture and installation of flexible steel pipe used in floating production systems, deepwater developments and high pressure pipes for drilling and well servicing.

Excellence

In addition to manufacturing and supply activities, Technip offers solutions tailored to clients' needs. With our long offshore field experience and our intimate knowledge of the technical challenges faced by flexible pipes, we can and do deliver the highest quality flexible products available anywhere in the world.

All Technip activities are placed within an integrated Quality System which ensures that our organisation, manufacturing process, product solutions and services are reliable and efficient. The Group is certified ISO 9001 and its flexible pipe plants have received the API 17J certification for the design and manufacture of unbonded flexible pipe. The Group is applying permanent improvement processes throughout its organisation.


BUREAU VERITAS

ENERGY & PROCESS BUSINESS UNIT

CERTIFICATE OF TYPE APPROVAL

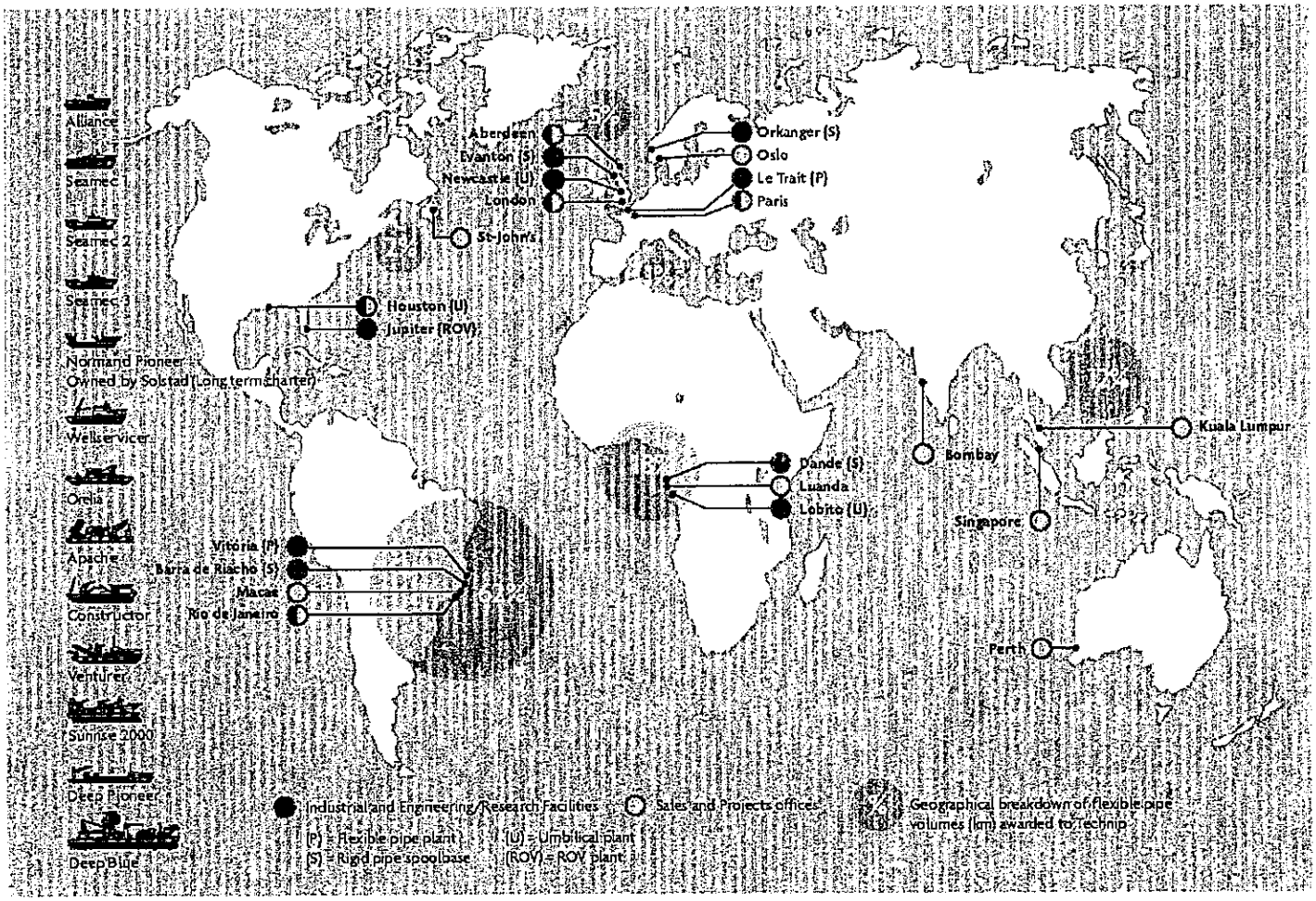
Name of Manufacturer: FLEXI FRANCE – LE TRAIT, FRANCE / FLEXIBRAS – VITORIA, BRAZIL

Design pressure: Up to 103.4 MPa (1034 bar, 15,000 psi)

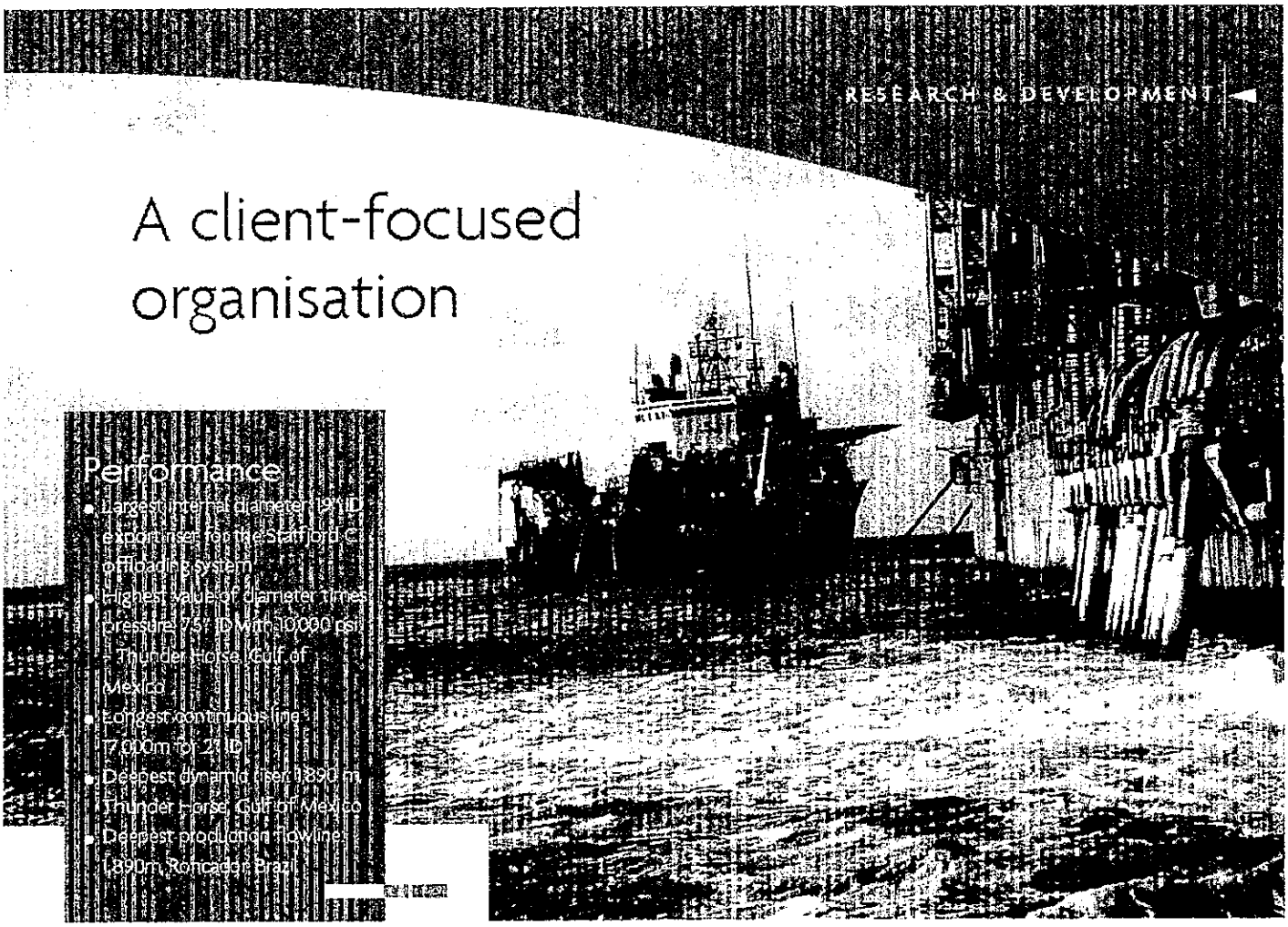
For and on behalf of BUREAU VERITAS

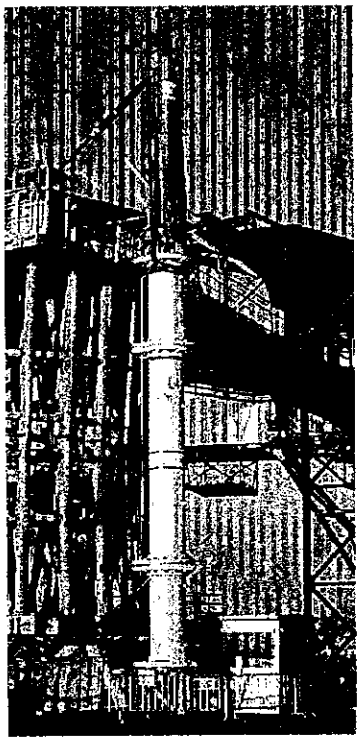
A worldwide presence and experience

To-date, more than 7,000km of Technip flexible pipe have been manufactured and installed worldwide.



A client-focused organisation





Engineering and design operations

A client-oriented company dedicated to optimising cost-effectiveness and technology

Research & Development

Technip spends yearly over USD 20 million on flexible pipe in its research centers. The Product Engineering Division has full responsibility for Technip's flexible pipe R&D program, and is equipped with a full range of test facilities, including a state-of-the-art laboratory for advanced material testing and analysis, making it possible to simulate realistic service conditions on actual pipe samples.

The R&D activity is oriented towards extending the current product range by introducing new products and materials. Cost reduction and manufacturing quality is a permanent and parallel objective of these efforts. When a given development has come to fruition, its qualification testing is frequently carried out under the auspices of a JIP (Joint Industry Program). This enables key operators to participate in the transition between the development phase of an application and the "real" marketable and industrial phase.

Complex development projects are carried out within dedicated task forces. This was the case for Technip's integrated Ultra Deep Water development program. This task force developed a new generation of flexible pipes primarily for deep and ultra deepwater.

Engineering

The Group engineering organisation responds to and meets two main challenges: being close to our clients in order to answer their needs while at the same time ensuring a sustained level of engineering excellence is available in all parts of the Group. This is achieved through a combination of:

- local engineering departments in each business unit, able to perform most engineering tasks related to a project, within the project teams
- a centre of excellence located in Le Trait (France), sharing the same site as the main flexible pipe manufacturing facility.

This Product Engineering Division (PED) ensures support to the business units, consolidates the experience acquired throughout the Group and develops new products and materials via a robust and innovative R&D program. Information exchange between the business units is routed via PED which consolidates the knowledge and ensures a reliable and efficient engineering service across the Group.

Pipe Integrity Management

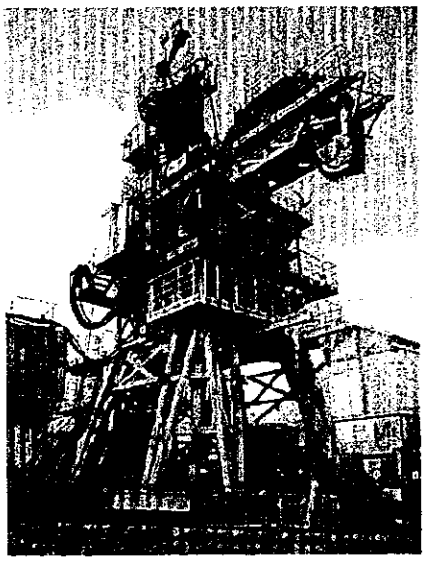
The lifetime of offshore field developments can be as long as 20 to 30 years. Operators must have continuous focus on their assets throughout the field's life. Hence, monitoring of the operational data is key in assessing integrity and ensuring safe and optimal operation of the pipeline system. In cooperation with Force Technology, Technip has set up a Pipe Integrity Management (PIM) system where relevant operational "data monitoring" and inspection results are gathered into a database, treated and analysed. A Risk Based Inspection program is also established and various support services can be included. A PIM system has recently been implemented for a major field development project in the North Sea, Norwegian sector.

Manufacturing

Manufacturing is organised under a global factory policy whereby the two flexible pipe factories of Le Trait (France) and Vitória (Brazil) are managed in an approved and similar manner, by applying common quality and safety Group standards.
As the manufacturing centre of excellence, Flexi France, the Le Trait plant, has the facilities and capability to produce the widest range of flexible pipes. It is where all our innovative pipe designs are first manufactured and tested. Flexibras, our flexible pipe manufacturing plant located in Vitória (Brazil), has primarily been established to supply the local market but can also supply flexible pipe internationally.

Installation

Because of our integrated approach to flexible pipe technology, we have always considered installation as a part of our core business activity and we have always ensured that our vessels and equipment are designed to install the flexible products we have developed and manufactured. The Sunrise 2000, the Constructor and our ultra deepwater vessel, the Deep Blue, are specialist installation vessels, which in terms of deck layout and installation equipment, benefit from the Group's intimate knowledge of the flexible pipe product and which have therefore become key to our ongoing success. The Deep Blue's PLS (Pipe Lay System) can also install rigid pipe, either by reel lay or J-lay.
As far as equipment is concerned, we have developed and patented the VLS (Vertical Laying System). The system allows for the efficient installation of flexible flowlines and risers in deepwater and harsh environments. The utilisation of the VLS makes it safer to lay flexible lines especially when equipped with intermediate connections, buoyancy modules or other ancillaries.
Technip's installation innovations have now extended to fabrication of a new PPS (Portable Pipelay System) design which can be used on several vessels, thereby adding another vessel to our installation fleet for flexible pipe



Vertical Laying System (VLS)

Towards ultra deepwater

Ultra deepwater extends from 1,000 to 3,000m and beyond. Our 1997 world depth record in Brazil was achieved using traditional Technip structures and standard materials.

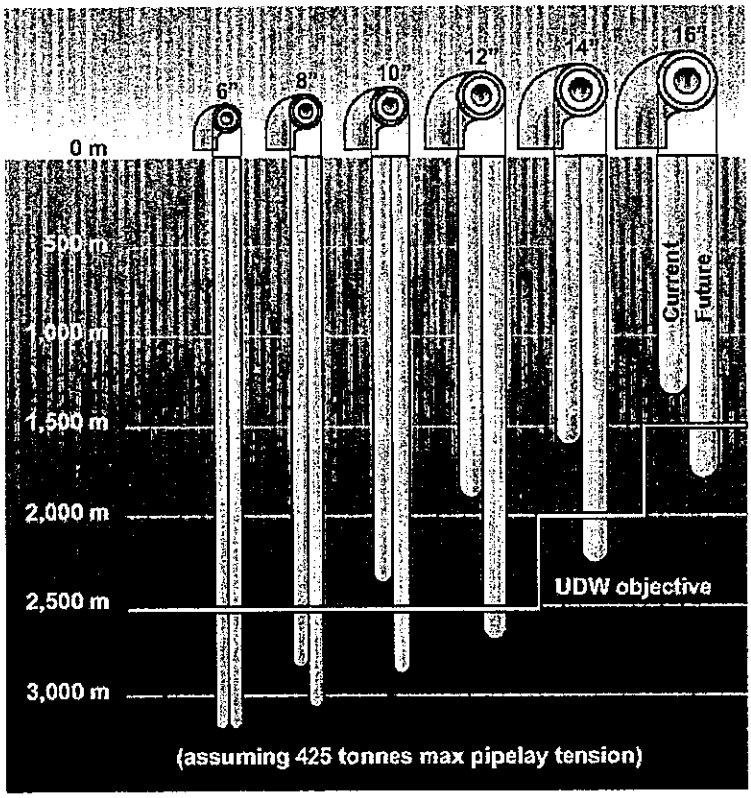
Technip further extended the operational experience with the installation in 2002 of 6" insulated production flowlines in 1,890m of water and with Deep Immersion Performance full scale tests (DIP) performed offshore Brazil in 2004 (7" and 9" ID tested in 2,100m of water depth).

Full use is being made of the modularity of flexible pipes and the Group's capacity to efficiently and effectively evolve them. In the case of the ultra deepwater developments, it is the steel layers that are most affected and each improvement answers a specific client-led challenge:

- internal carcass for collapse resistance
- pressure vault for collapse and weight reduction
- tensile armours for weight reduction.

Another significant area is active heating and this is being addressed by adapting the field-proven ISU® concept to the circulation of hot water around the central core of the pipe. Other more peripheral lines can be used for gas lift. Thus, the ISU® lines with multi-functions are gathered in a single line and become the Integrated Production Bundle (IPB) to guarantee flow assurance even for the deepest fields.

Ultra deepwater flexible pipe: Current and future capabilities



In deep and shallow waters, the Technip flexible pipe technology will continue to be a core component supporting the evolution of the subsea oil industry and we will therefore be in a position to offer our clients high quality and cost-effective solutions tailored to their very needs.

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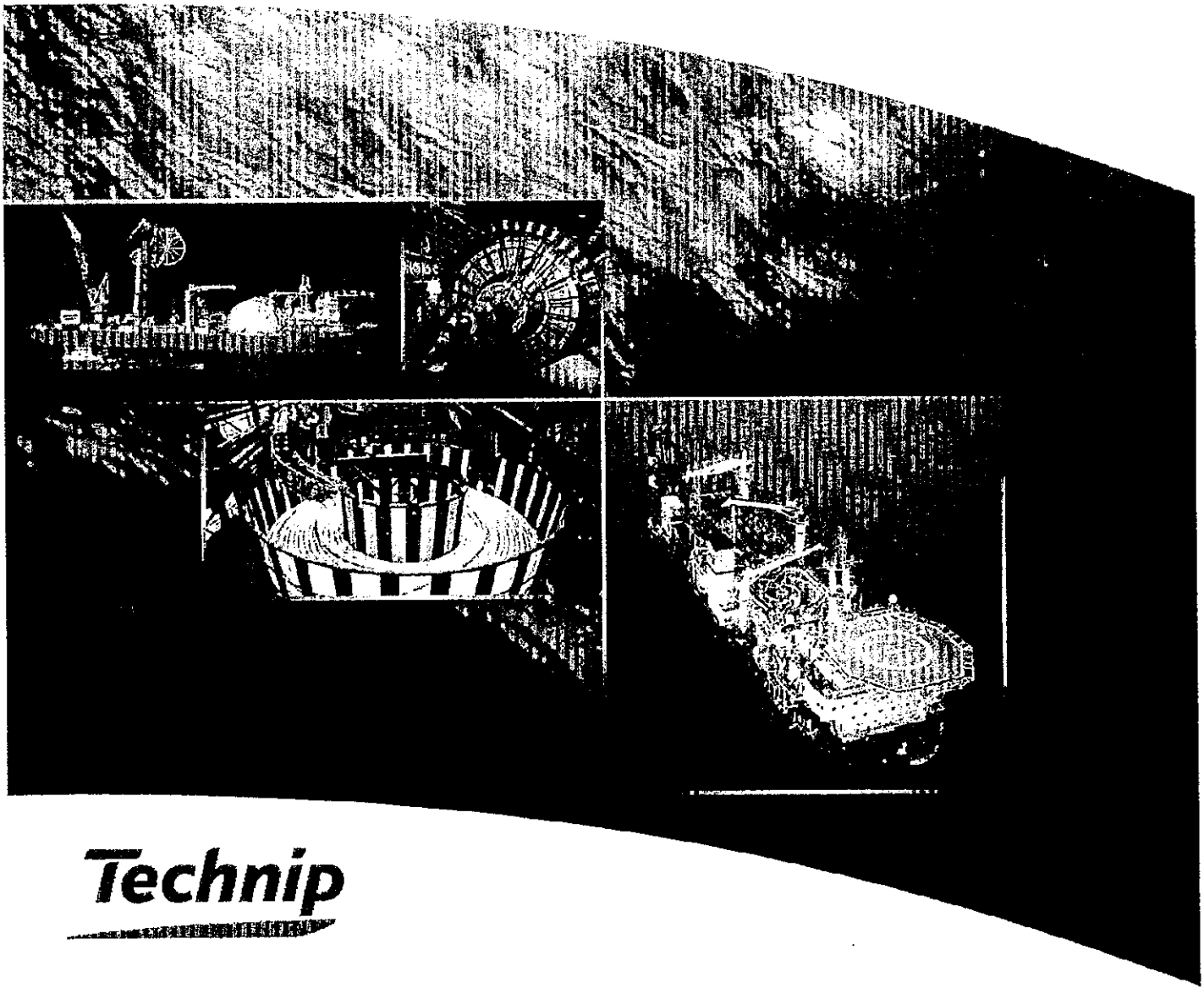
Technip - public relations department - August 2006 - photo credits: Technip

With a workforce of over 21,000 people, Technip ranks among the top five corporations in the field of oil, gas and petrochemical engineering, construction and services. Headquartered in Paris, the Group is listed in New York and Paris. The Group's main operations and engineering centers and business units are located in France, Italy, Germany, the UK, Norway, Finland, the Netherlands, the USA, Brazil, Abu-Dhabi, China, India, Malaysia and Australia. In support of its activities, the Group manufactures flexible pipes and umbilicals, and builds offshore platforms in its manufacturing plants and fabrication yards in France, Brazil, the UK, the USA, Finland and Angola, and has a fleet of specialized vessels for pipeline installation and subsea construction.



Technip