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PUBLIC

SECOND AMENDED AND COMPOSITE AGREEMENT BETWEEN CONSOLIDATED EDISON COMPANY OF NEW YORK, INC. AND THE NEW YORK POWER AUTHORITY FOR THE OPERATION AND MAINTENANCE OF THE FACILITIES ASSOCIATED WITH ASTORIA ANNEX SUBSTATION 345 KV GAS-INSULATED SUBSTATION

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SECOND AMENDED AND COMPOSITE AGREEMENT (this "Second Composite Agreement") made on the ___ day of July, 2014 by and between Consolidated Edison Company of New York, Inc. ("Con Edison"), a corporation organized and existing under the law of the State of New York and having its principal place of business at 4 Irving Place in the City of New York, New York, and the New York Power Authority ("the Power Authority"), a corporate municipal instrumentality and political subdivision of the State of New York having an office at 123 Main Street in the City of White Plains, New York. Con Edison and the Power Authority are sometimes collectively referred to herein as the "Parties" and, individually, as a "Party".

WHEREAS, Astoria Energy II LLC ("Astoria Energy II") was responsible for the construction of an approximate 500 Megawatt second power block to the electric generating facility at 17-10 Steinway Street, Astoria, NY (the "Second Power Block") pursuant to the easement agreement between Con Edison and Astoria Energy II dated July 2, 2009 all as more particularly described therein (the "Easement Grant");

WHEREAS, Con Edison owns a certain parcel of real property in the City of New York, County of Queens, known as Tax Lot 1, in Block 850, on the Tax Map of the City of New York, County of Queens ("Con Edison Lands");

WHEREAS, Astoria Energy II interconnected the Second Power Block to the Power Authority's existing Q35L & Q35M 345 kV transmission lines, which start at "Con Edison's East 13th Street Substation" (as defined in Article I) (and which have associated dielectric oil cooling lines that enter the "15th Street PURS" and the "15th Street Pressurization Plant" (both as defined in Exhibit A)) and then such transmission and dielectric lines travel under and across the East River and enter and extend under, through and across the Con Edison Lands to manhole 19717 (at which manhole, a portion of the dielectric oil cooling lines extend back onto the Power Authority Property to connect to the "Astoria PURS" and the "Astoria Pressurization Plant" (both as defined in Exhibit A) and, at which manhole, a new extension of the Q35L & Q35M 345 kV transmission lines (and the associated dielectric oil cooling lines) extend, under, through and across the Con Edison Lands (the "Extension"), and end at, and connect to, a new 345-kilovolt SF6 gas-insulated substation (the "Astoria Annex Substation"), constructed by Astoria Energy II on a portion of the Con Edison Lands pursuant to the Easement Grant; the Q 35L and Q 35M 345 kV transmission lines and the associated dielectric oil cooling lines between East 13th Street Substation and the Astoria Annex Substation, which includes the Extension, are hereinafter referred to collectively as the "Q35L & Q35M Transmission Lines";

WHEREAS, on February 1, 2011, Con Edison and Power Authority entered into an Agreement relating to the operation and maintenance of the Astoria Annex Substation, as more particularly described therein (the "Original Agreement");

WHEREAS, Astoria Energy II was to operate, monitor, inspect, repair, perform preventative, corrective and routine maintenance, testing, and protection system operations assessment to the Astoria Annex Substation and other transmission facilities until the "O&M Commencement Date" (as defined in Section 2.1 of the Original Agreement), which was to be the later of March 1, 2011 or the first date that Power Authority satisfied all "Conditions Precedent" (as defined in Section 4.1 of the Original Agreement and Section 4.1(b) in this Second Composite Agreement;

WHEREAS, at a certain point after its construction and prior to the O&M Commencement Date, Astoria Energy II transferred ownership of the Facility to Power Authority, so that the Power Authority was the owner of the Astoria Annex Substation, the Extension, and other transmission facilities and all of the equipment/facilities identified in Exhibit A, attached hereto and made a part hereof ("Equipment"); the Astoria Annex Substation, the Q35L and Q35M Transmission Lines and the Equipment are hereinafter referred to collectively as the "Facility,"

WHEREAS, the Facility did not include any portion of the overhead transmission line and related appurtenances which connect the Second Power Block to the first disconnect switch of the Astoria Annex Substation ("Astoria Energy II's Generator Leads"); and

WHEREAS, after March 1, 2011, the Power Authority requested that Con Edison operate and maintain the Facility for the Power Authority pursuant to the terms and conditions of the Original Agreement, but prior to Power Authority's satisfaction of those certain Conditions Precedent (as defined in Section 4.1 of the Original Agreement); and

WHEREAS, on June 23, 2011, the Original Agreement was amended by a First Amendment ("First Amendment") wherein Con Edison agreed to commence "O&M Services" (as originally defined in Section 4.2 of the Original Agreement) prior to the satisfaction of the Conditions Precedent as defined in the Original Agreement and based upon both the substantive terms and conditions of the Original Agreement, as revised, amended and supplemented by the new terms of the First Amendment all as more particularly set forth in that First Amendment **WHEREAS**, on April 25, 2012, the Parties entered into a Second Amendment to the Original Agreement ("Second Amendment"), all as more particularly described in the Second Amendment;

WHEREAS, pursuant to Section 205 of the Federal Power Act and 18 C.F.R. Section 35.12, Con Edison is required to file the Original Agreement, First Amendment and Second Amendment with the Federal Energy Regulatory Commission ("Commission");

WHEREAS, pursuant to its Order No. 614, the Commission requires that any amendments to a filed agreement be integrated into the agreement prior to its filing, so that the filing consists of one composite agreement that includes all effective terms and excludes non-effective and superseded language;

WHEREAS, the Parties filed an Amended and Composite Agreement, dated January 2013 ("First Composite Agreement") which fully integrated the Second Amendment into the First Composite Agreement; but only partially integrated the First Amendment into the First Composite Agreement and, accordingly, the Parties also filed t a First Amendment to this First Composite Agreement("Revised First Amendment") to cover the provisions of the First Amendment that were not integrated;

WHEREAS, on June 6, 2014, the Commission conditionally accepted the First Composite Agreement and the Revised First Amendment, on the condition that the Parties file a single, updated and amended and Second Composite Agreement;

WHEREAS, as with the First Composite Agreement and the Revised First Amendment, by filing this Second Composite Amendment the Parties have no intention to amend the substance of any of the terms of the Original Agreement, as revised, amended and supplemented by the First Amendment and, the Second Amendment, but merely seek to comply with the Commission's integration requirement by filing this Second Composite Agreement;

NOW THEREFORE, in consideration of the premises, mutual obligations and undertakings set forth herein, the Parties hereto agree as follows:

ARTICLE I
DEFINITIONS

Whenever used in this Second Composite Agreement with initial capitalization, the following terms shall have the meanings specified in this Article. Terms used in this Second Composite Agreement with initial capitalization that are not defined in this Article shall have the meanings specified in this Second Composite Agreement.

"Applicable Legal Requirements" shall mean all duly promulgated applicable federal, state and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority, including but not limited to "Environmental Law", "Environmental Permits", and "Permits" (each as defined herein). In the performance of the "O&M Services" (as defined in Section 4.2), Power Authority will comply with all New York City laws, rules and regulations that are applicable to the Power Authority and/or Con Edison. The Power Authority's compliance with New York City laws, rules and regulations is for the purpose of safeguarding the health, safety and welfare of any persons, the Con Edison Lands and any improvements thereon or there under, and is not to be construed as submission by the Power Authority to jurisdiction by New York City over the Power Authority.

"**Backfeed**" shall mean the supplying or transporting of electrical energy from the Con Edison's transmission/distribution system to the Second Power Block.

"Breach" shall mean the failure of a Party to perform or observe any material term or condition of this Composite Agreement.

"Breaching Party" shall mean a Party that is in Breach of this Composite Agreement.

"Business Day" shall mean Monday through Friday, excluding federal holidays.

"Calendar Day" shall mean any day including Saturday, Sunday or a federal holiday.

"**Con Edison Standards**" means: all Con Edison instructions, specifications, rules, programs, guidelines, policies, practices, and procedures issued by Con Edison, both orally and in writing, in the ordinary course of its business, as may be amended from time to time.

"**Con Edison's East 13th Street Substation**" shall mean the Con Edison substation and associated appurtenances between Avenue C and the FDR (East River) Drive and between 13th and 14th Streets in New York City, NY.

"**Date of Energization**" means the first date that any of the following Equipment is connected to the Con Edison transmission system (the "Energized Components");

a. The Extension (of the two 345 kV transmission feeders Q35L & Q35M) into the Astoria Annex Substation.

b. All new 345 kV SF6 substation bus, circuit breakers and associated equipment associated with the new Astoria Annex Substation.

c. All new 345 kV open air bus, circuit breakers and associated equipment associated with the Astoria Annex Substation.

d. The relocated 345 kV Shunt Reactors (as defined in Exhibit A) in the Astoria Annex Substation.

e. The overhead 345 kV generator leads connecting the new Astoria Annex Substation to the Second Power Block up to and including the generators' synchronizing circuit breakers located in the generation plant site.

f. Any other electrical equipment, including but not limited to, generator lead revenue meters.

"**Environmental Laws**" means: all current and future federal, state and local laws (including common law), treaties, regulations, rules, ordinances, codes, decrees, judgments, directives, orders (including consent orders), Environmental Permits, and obligations and other requirements imposed by any "Governmental Authority" (as defined herein), including New York State Department of Environmental Conservation ("NYSDEC") Technical Administrative Guidance Memoranda and other guidance documents issued or published by any Governmental Authority, in each case, relating to pollution, protection of the environment, natural resources, or protection of human health and safety from conditions in the environment, the presence, "Release" (as defined herein) of, threatened Release of, or exposure to, "Hazardous Substances" (as defined herein), or to the generation, manufacture, processing, distribution, use, treatment, storage, transport, recycling or handling of, or arrangement for such activities with respect to, Hazardous Substances.

"Environmental Liabilities" means: all liabilities, obligations, damages, losses, claims, actions, suits, judgments, orders, fines, penalties, fees, expenses, and costs, relating to environmental conditions or activities, including (i) Remediation costs, engineering costs, environmental consultant and expert fees, laboratory fees, permitting fees, investigation costs, defense costs, and reasonable attorneys' fees and expenses; (ii) any claims, demands, and causes of action relating to or resulting from any personal injury (including wrongful death), property damage (real or personal) or natural resource damage; and (iii) any penalties, fines or costs associated with the failure to comply with any Environmental Law.

"**Environmental Permits**" means: the permits, licenses, consents, approvals, manifests and other authorizations or certifications required by any Governmental Authority having jurisdiction with respect to Environmental Laws relating to the "Remediation" (as defined herein), construction, operations and activities of Con Edison and/or the Power Authority for the Facility and the Con Edison Lands.

"**Good Industry Practice**" means: any of the applicable acts, practices, rules, policies, regulations, or methods from time to time required by any "Governmental Authority" (defined below) or any organization with jurisdiction or authority in respect of the Con Edison Lands whether or not the party whose conduct is at issue is a member thereof, or by any other person acting pursuant to the authority of any such organization. If there are no such applicable acts, practices, rules, policies, regulations, or methods, then Good Industry Practice means: any of the applicable acts, practices, rules, policies regulations, or methods engaged in or approved by a significant portion of the electric utility industry in the United States at the relevant time, including, but not limited to, reliability, operating, planning, and engineering specifications, the Northeast Power Coordinating Council ("NPCC"), the North American Electric Reliability Corporation ("NERC"), the New York State Reliability Council ("NYSRC"), and the New York Independent System Operator ("NYISO").

"**Governmental Authority**" means: any federal, state, or local government, or any court, board, agency, commission, office, or other authority of any nature whatsoever for any governmental unit (federal, state, county, district, municipal, city, or otherwise), specifically excluding the Power Authority, and in all cases whether now or hereafter in existence.

"**Hazardous Substances**" means: (i) any petroleum, petroleum products or byproducts, and all other regulated hydrocarbons (including without limitation, petrochemicals and crude oil), or any fraction thereof, coal ash, radon gas, asbestos, asbestos-containing material, urea formaldehyde, polychlorinated biphenyls, chlorofluorocarbons, and other ozone-depleting substances; and (ii) any chemical, material, substance, product or waste (including thermal discharges and hazardous waste) that is prohibited, limited, or regulated by or pursuant to any Environmental Law.

"Manufacturer's Specifications and Instructions" means: any written vendor /manufacturer standards, specifications, documents, manuals, handbooks, and instructions for all or any portion of the Facility provided by applicable vendor/manufacturer.

"**NERC Reliability Standards**" means: the reliability standards that are promulgated by the NERC, approved by the Federal Energy Regulatory Commission, and implemented by the NPCC, as may be amended from time to time.

"NPCC Criteria Requirements" or **"NPCC Directories**" means: the specific reliability requirements that are promulgated and implemented by the NPCC, for the design, operation and protection of the bulk power system, as may be amended from time to time.

"NPCC Regional Reliability Standards" means: the reliability standards that are promulgated and implemented by NPCC for the design, operation and protection of the bulk power system, as may be amended from time to time.

"Power Authority Property" means: except for the property interests covered by the Easement Grant, as may be amended from time to time, all property interests, both real and personal, at the Astoria Complex located at 31-01 20th Avenue, Astoria, New York 11105, which are owned by the Power Authority, including but not limited to Block 850, Lot 100 and those property interests within the Con Edison Lands.

"**Permits**" means: all certificates, permits, licenses, consents, approvals, and other governmental authorizations (other than Environmental Permits) relating primarily to construction, operations and activities of Con Edison and/or the Power Authority for the Facility and the Con Edison Lands.

"**Power Authority's Contractors**" means: except for Con Edison, any and all of the Power Authority's contractors, subcontractors, agents, invitees, and any other person or entity working for or acting on behalf of the Power Authority in connection with excluded services under this Second Composite Agreement or services outside the scope of this Second Composite Agreement.

"**Preparatory Work and Services**" shall have the meaning ascribed to it in Section 4.2.4

"**Release**" means: any actual or threatened release, spill, emission, emptying, escape, leaking, dumping, injection, pouring, deposit, disposal, discharge, dispersal, leaching, or migration into the environment or within any building, structure, facility, or fixture and/or the exacerbation of any pre-existing condition of Hazardous Substances.

"**Remediation**" means: the investigation (including any feasibility studies or reports), cleanup, removal, abatement, transportation, disposal, treatment (including *in-situ* treatment), management, stabilization, neutralization, collection, or containment of Hazardous Substances and any Release(s), that may be required to satisfy Environmental Laws, in each case, including, without limitation, any closure, restoration or monitoring, operations and maintenance activities, including any engineering or institutional controls, that may be required by any Government Authority after the completion of such investigation, study, cleanup, removal, transportation, disposal, treatment, neutralization, collection, or containment activities as well as the performance of any and all obligations imposed by any Governmental Authority in connection with such investigation, cleanup, removal, transportation, disposal, treatment (including *in situ* treatment), management, stabilization, neutralization, collection, or containment (including any such obligation that may be imposed pursuant to an Environmental permit or a consent order).

"Scope of Work" shall have the meaning ascribed to it in Section 4.2.5.

ARTICLE II
EFFECTIVE DATE, O&M COMMENCEMENT DATE, TERM AND TERMINATION

2.1 **(a) Effective Dates of the Second Composite Agreement.** This Second Composite Agreement shall become effective on the "Commission Effective Date," which shall be the date on which this Second Composite Agreement is accepted or deemed to be effective by the Commission.

The Parties hereby agree that the pursuant to the Commission's conditional acceptance of the First Composite Agreement and Revised First Amendment, by order dated June 6, 2014, the First Composite Agreement and Revised First Amendment supersede the Original Agreement, First Amendment, and Second Amendment and the First Composite Agreement and Revised First Amendment shall remain in effect until the "Commission Effective Date". On and after the Commission Effective Date, the First Composite Agreement and the Revised First Amendment shall no longer be of any force and effect and shall be superseded by this Second Composite Agreement .

The rights and obligations of the Parties that accrue prior to the Commission Effective Date shall be governed by the the First Composite Agreement and the Revised First Amendment. After the Commission Effective Date, the rights and obligations of the Parties shall be governed by this Second Composite Agreement

(b) O&M Commencement Date. Under the Original Agreement, Con Edison's obligation to perform the "Scope of Work" as defined in Sections 4.2.5 of the Original Agreement was not to commence until the later of: (i) March 1, 2011, or (ii) the first date that the Power Authority satisfies all of the "Conditions Precedent" (as defined in Section 4.1 of the Original Agreement) ("Original O&M Commencement Date"). However, because Power Authority requested that Con Edison commence the Scope of Work prior to the Power Authority's satisfaction of the Conditions Precedent as defined in the Original Agreement, the Parties agreed to revise, amend and supplement the terms of the Original Agreement by the First Amendment, and accordingly, the Parties agreed to change the Original O&M Commencement Date and commence O&M Services on June 23, 2011 (hereinafter the "O&M Commencement Date"). The O&M Services are now defined in Section 4.2 of this Second Composite Agreement .

(c) Term of Agreement. This Second Composite Agreement shall remain in effect for a period (the "Term") of twenty (20) years from February 1, 2011 (which is the date the Original Agreement was executed and effective), with the option to extend for ten (10) year periods by agreement of the Parties, unless this Second Composite Agreement is terminated prior to such time in accordance herewith.

2.2 **Termination.**

2.2.1 **Written Notice.** This Second Composite Agreement may be terminated, in whole or in part, by either Party upon at least one year advance written notice without liability to the

other Party for any reason whatsoever, including its own convenience except that no such termination shall have any effect on, and neither Party shall be relieved of, any obligation or liability relating to or arising from this Second Composite Agreement prior to the effective date of such termination.

2.2.1 **End of Term Transition.** In the event that either Party, in whole or in part, terminates this Second Composite Agreement on written notice and/or assigns its rights and obligations under this Second Composite Agreement in accordance with the terms herein, and/or this Second Composite Agreement terminates pursuant to Article XVII - Default, then, at the Power Authority's sole cost and expense, Con Edison shall : (i) turn over test equipment to the Power Authority, and (ii) provide reasonable training to the Power Authority's proposed new operator, pursuant to a commercially reasonable schedule, as agreed upon by Con Edison and the Power Authority, (iii) turn over applicable data and procedures in accordance with and as permitted by the provisions of Article XXI – Confidentiality and (iv) turn over all Minor Spare Parts located within the Astoria Annex Substation to the Power Authority.

2.2.2 **Default.** Either Party may terminate this Second Composite Agreement in accordance with Article XVII Default.

2.3 **Survival.** This Second Composite Agreement shall continue in effect after termination to the extent necessary to provide for costs incurred hereunder; including final billings and payments pursuant to this Composite Agreement; to permit the determination and enforcement of liability and indemnification obligations arising from acts or events that occurred while this Second Composite Agreement was in effect, and for survival of those provisions which specifically survive termination of this Composite Agreement, including, but not limited to, Article XII - Environmental Provisions, Article XIX, Indemnification, and Article XX – No Warranty/Disclaimers.

ARTICLE III
REGULATORY COMPLIANCE

3.1 **NERC Reliability Standards Compliance**. NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements compliance shall be managed pursuant to the following:

3.1.1 The Power Authority represents and warrants that all previous entities owning or operating the Astoria Annex Substation from the Date of Energization to the O&M Commencement Date were registered with the NERC as Transmission Owners (TO) and, if required, as Transmission Operators (TOP).

3.1.2 The Power Authority further represents and warrants that all previous entities owning or operating the Astoria Annex Substation from the Date of Energization to the O&M

Commencement Date have complied with all applicable regulatory requirements, including but not limited to the NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements, as may be amended from time to time, and the Power Authority agrees to provide Con Edison a written confirmation/certification that the Power Authority is in compliance as the Transmission Owner (TO) with any such regulatory requirements, including but not limited to the NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements.

3.1.3 It is expressly understood that the responsibility for managing compliance and the accountability for compliance violations and penalties, if any, related to all NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements applicable to the ownership or operation of the Astoria Annex Substation shall be the exclusive responsibility of the Power Authority, as a registered entity, until such time as Con Edison assumes that responsibility and accountability as the registered entity, as set forth in Section 3.1.4.

3.1.4 In accordance with Article XIX (Indemnification), the Power Authority will indemnify and hold Con Edison harmless, to the extent allowed by law, for all such NERC obligations and penalties, if any, until Con Edison performs the specific test or analysis required by each individual applicable NERC Reliability Standard, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements for the Astoria Annex Substation (hereinafter referred to as the "Compliance Transfer Periods"). It is expressly understood that each individual NERC Reliability Standard, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements contains a specific timeframe when such retesting or analysis must occur. After the Compliance Transfer Periods, Con Edison will assume the responsibility for managing compliance for the specific NERC Reliability Standard, NPCC Reliability Standards, NPCC Directories - and NPCC Criteria Requirements in question and the accountability for compliance violations and penalties, if any, for such individual applicable NERC Reliability Standard, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements. For the individual NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements that the Power Authority has responsibility for managing compliance, maintaining documentation, and the accountability for compliance violations and penalties, during the Compliance Transfer Periods, Con Edison shall provide the Power Authority with documentary evidence required to demonstrate compliance, as identified and requested by the Power Authority, with any and all applicable NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements.

3.1.5 Con Edison agrees to provide Power Authority with all documentation that establishes compliance with any and all such NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements, after the Compliance

Transfer Periods, and at predetermined time intervals. These intervals may be modified by the Power Authority, upon thirty (30) day notice.

3.1.6 Con Edison (and its third party agents) agrees to comply with all requirements applicable to any and all NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements, as may be amended from time to time, after the Compliance Transfer Periods.

3.1.7 **Management of Critical Infrastructure Protection (CIP) Standards:**

a. Prior to the O&M Commencement Date, NYPA will determine whether the Astoria Annex Substation is a Critical Asset and determine the existence of Critical Cyber Assets. If Power Authority determines that the Astoria Annex Substation is a Critical Asset with Critical Cyber Assets, then compliance required by CIP-003 through CIP-009 shall be applied and any required changes to the existing design and operation of the Facility shall be the Power Authority's sole responsibility and performed at the Power Authority's sole cost and expense. In addition, all such design and operational changes required to comply with the obligations of being a Critical Cyber Asset must be completed at least sixty (60) days prior to the O&M Commencement Date. After any and all design and operation changes are completed, Con Edison shall be required to adhere to Con Edison's policies and procedures, and Con Edison shall perform all functional activities related to NERC CIP compliance and shall provide the Power Authority with documentary evidence required to demonstrate compliance, as identified and requested by the Power Authority. After the Compliance Transfer Periods, Con Edison will assume responsibility for managing those protections, maintaining the required compliance evidence, and managing compliance audits in accordance with Con Edison's processes.

b. If the protections required by CIP-002 through CIP-009 are determined by Power Authority, in its sole discretion, to not be necessary until after the O&M Commencement Date, then at Power Authority's direction, Con Edison shall be responsible at Power Authority's sole cost and expense, for establishing and managing the protections required by CIP-002 through CIP-009, and all functional tasks related to NERC CIP Standards. NYPA, as the registered Transmission Owner for the Astoria Annex Substation, will retain responsibility for the determination of whether the Astoria Annex Substation is a Critical Asset and determining the existence of Critical Cyber Assets. Any changes required to upgrade the Facility shall be at the Power Authority's sole cost and expense.

3.2 **Backfeed Requirements.** Prior to any Backfeed, and at the Power Authority's sole cost and expense, the Power Authority will ensure that appropriate revenue meters are installed at appropriate locations in the Facility and that Astoria Energy II has taken all appropriate steps to become a retail electric customer of Con Edison during backfeed.

3.3 **Energization Component Requirements.** Prior to the O&M Commencement Date, the Power Authority shall be solely responsible to insure that the use and/or operation of any or all of the Energized Components do not adversely impact the safe and reliable operation of the Con Edison's transmission systems. In addition, each Energized Component must meet all applicable regulatory requirements including but not limited to the NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements and any other regulations/requirements that govern the design and operation of the bulk electric/power systems

3.4 **Permits.** In accordance with Article VIII– Taxes/Permit Fees, the Power Authority shall be solely responsible pursuant to Applicable Legal Requirements and Good Industry Practice, at its sole cost and expense, to obtain, procure, maintain and update all rights, approvals, consents, Permits and Environmental Permits from Governmental Authority or otherwise, and any other items needed for or relating to the operation and maintenance of the Facility, the O&M Services, and the performance of any obligation of the Power Authority hereunder. Con Edison shall cooperate in good faith with the Power Authority in the processing of Permit and Environmental Permit applications that require signature on behalf of Con Edison or information available only to Con Edison, and, the Power Authority shall reimburse Con Edison for all reasonable out-of-pocket (*i.e.,* third party) expenses incurred by Con Edison.

3.5 Survival: The Parties obligations under this Article III shall survive the expiration or earlier termination of this Composite Agreement.

ARTICLE IV
CONDITIONS PRECENDENT TO THE SCOPE OF WORK; O&M SERVICES; EXCLUDED/LIMITATIONS ON O&M SERVICES

4.1 Conditions Precedent to the Scope of Work. (a) As of the execution of the Original Agreement on February 1, 2011, Con Edison began its performance of certain Preparatory Work and Services as defined in Section 4.2 of this Second Composite Agreement while Con Edison was waiting for Power Authority to satisfy the Conditions Precedent to the Scope of Work. Sometime thereafter, Power Authority requested that Con Edison commence its obligation to perform the Scope of Work , notwithstanding that the Power Authority did not fully meet the Conditions Precedent to Con Edison's good faith satisfaction prior to Con Edison's commencement of the Scope of Work. Accordingly, as of June 24, 2011, Con Edison commenced the Scope of Work, subject to certain revisions, amendments and modifications to the Original Agreement, which are now fully integrated into this Second Composite Agreement. Specifically, as of June 24, 2011, the Parties agreed that there were and are certain operational, environmental and commercial risks to the Parties, Astoria Energy II LLC and other third parties inherent in commencing Con Edison's

obligations to perform the Scope of Work prior to the Power Authority fully meeting the Conditions Precedent to Con Edison's good faith satisfaction (collectively referred to herein as the "Risks"), which Risks relate to and include, but are not limited to,

(i) accepting the Facility in accordance with Section 4.1.2 herein;
(ii) accepting the Shunt Reactors, which is precluded by but is not limited to, the leaking nitrogen and oil condition of Shunt Reactor 2, incomplete maintenance records for the Shunt Reactors, an outstanding joint review of the maintenance records, and the lack of a design and installation of nitrogen alarms on the Shunt Reactors, ("Nitrogen Alarms");
(iii) all proposed operators are not fully Trained, which could affect response time,
(iv) Power Authority's continuing and outstanding obligation to fully comply with Section 4.1.7 of the Composite Agreement "Con Edison's Knowledge of the Facility", by providing the information required therein in a useable format and/or in the required format; the documents received at the Astoria Annex Substation, and signed for turnover on June 16, 2011 are interim documents that will be used to facilitate Con Edison's performance of the O&M Services; these documents, however, do not fully satisfy Section 4.1.7

4.1 (b) Accordingly, as was set forth in the Revised First Amendment, notwithstanding any provision to the contrary contained in the First Composite Agreement the Revised First Amendment, or this Second Composite Agreement, including Con Edison's commencement of O&M Services prior to Power Authority's satisfaction of the Conditions Precedent to Con Edison's good faith satisfaction, Power Authority hereby specifically acknowledges and assumes all risk arising from, relating to and/or connected with the Risks.
In addition, the Power Authority shall continue to adhere to the Conditions Precedent, as appropriate, throughout the Term of this Second Composite Agreement, and Power Authority shall provide to Con Edison (i) working and fully operational Nitrogen Alarms by August 1, 2011, and (ii) full compliance, in a useable format and/or in the required format, of Section 4.1.7 herein by September 21, 2011.

4.1.1 **Ownership.** The Power Authority shall be the titled owner and registered Transmission Owner (TO) of the Facility, and, the Grantee, as a successor and assign, to the Easement Grant in accordance with the terms of the Easement Grant.

4.1.2 **Accepting the Facility.** The Power Authority hereby acknowledges Con Edison's recommended use of its own services to perform all commissioning and testing of the Astoria Annex Substation prior to O&M Commencement Date and prior to the date that Astoria Energy II hired a third party agent to perform all testing and commissioning of the Astoria Annex Substation.

4.1.2.1 The Power Authority shall accept all components of the Facility from Astoria Energy II in accordance with Substation Operation (SSO) Specification 0100-0022/06 and E0- 4022 ("Acceptance Procedures"), attached hereto as (Appendix A & Appendix B respectively) and incorporated by reference herein,

except that the information required to be "verified" therein shall be verified by Astoria Energy II, rather than "SSO". In the event that any additional work is required for the Power Authority to accept the Facility from Astoria Energy II in accordance with the Acceptance Procedure, the Power Authority, at its sole cost and expense, shall perform such required work in order for the Facility to meet the Acceptance Procedure requirements.

4.1.2.2 After the Power Authority accepts the Facility from Astoria Energy II, and prior to the O&M Commencement Date, Con Edison shall accept all components of the Facility from the Power Authority in accordance with the Acceptance Procedures and the "Additional Acceptance Requirements for the Shunt Reactors" as defined below and the terms herein.

4.1.2.3 Prior to Con Edison's acceptance of the Shunt Reactors, Power Authority shall, at its sole cost and expense, (i) comply with Con Edison Standard CE-ES-1003 (attached hereto as Appendix C), (ii) replace all U type bushings therein, (ii) reassemble the shunt reactors with all new gaskets, (iii) perform a dissolved gas in oil analysis ("DGOA"), which shall include but not be limited to, Con Edison and Power Authority's joint review of any prior history of gassing, and (iv) perform a joint review of any maintenance records for the shunt reactors (the "Additional Acceptance Requirements for the Shunt Reactors").

4.1.2.4 In the event that any additional work is required for Con Edison to accept the Facility from the Power Authority in accordance with the Acceptance Procedure and/or the Additional Acceptance Requirements for the Shunt Reactors, the Power Authority, at its sole cost and expense, shall perform any such work.

4.1.2.5 Con Edison shall not be obligated to accept the Shunt Reactors if Con Edison is not reasonably satisfied with Power Authority's compliance with the Additional Acceptance Requirements for the Shunt Reactors. Except for the Shunt Reactors, Con Edison shall not be obligated to accept any other components of the Facility if Con Edison, in good faith, is not satisfied with the compliance of the Acceptance Procedure by either Astoria Energy II or the Power Authority. This process shall be repeated until such time as Con Edison accepts each component of the Facility from the Power Authority in accordance herein. As was set specifically forth in the Revised First Amendment and now restated in this Second Composite Agreement, at Power Authority's request, Con Edison agreed to commence O&M Services notwithstanding that the Facility had not been accepted in accordance with the requirements of Sections 4.1.2.1 – Sections 4.1.2.5 herein

4.1.3 **Commissioning.** Prior to the O&M Commencement Date, all high voltage components of the Facility and their associated auxiliary equipment shall be fully commissioned.

4.1.4 **Inspection.** At least thirty (30) days prior to the O&M Commencement Date, Con Edison shall inspect the Facility to evaluate whether it was constructed and installed in accordance with the Easement Grant. In the event Con Edison determines that the Facility as constructed and installed does not comply with the Easement Grant, the Power Authority, at its sole cost and expense, shall perform such required work in order for the Facility to meet the Easement Grant requirements ("Additional Work"). Within thirty (30) days after notice from the Power Authority that the Additional Work has been completed, Con Edison shall re-inspect the Facility to confirm that the Facility complies with the Easement Grant. This process shall be repeated until such time as Con Edison determines that the Facility complies with the Easement Grant.

4.1.5 **SPCC Plan.** At least thirty (30) days prior to the O&M Commencement Date, the Power Authority shall provide Con Edison with a draft Spill Prevention, Control, and Countermeasure ("SPCC") Plan for Con Edison's review and comment. Provisions relating to Con Edison's implementation of the SPCC Plan, or any subsequent modification of implementation provisions, are subject to Con Edison's approval.

4.1.6 **Certificate of Occupancy**. Prior to the O&M Commencement Date, Power Authority shall be required to provide Con Edison a valid temporary Certificate of Occupancy ("TCO") issued by the New York City Department of Buildings and Power Authority shall be solely responsible, at its sole cost and expense, to renew such TCO until the Power Authority obtains, at its sole cost and expense, a permanent Certificate of Occupancy issued by the New York City Department of Buildings.

4.1.7 **Con Edison Knowledge of the Facility**. The Power Authority shall provide to Con Edison two hard copies and an electronic copy of any and all of (i) a System Description procedure, which shall be subject to Con Edison's review and comment, (so that Con Edison may draft alarm response procedures); (ii) plans developed for operating and maintaining the Facility prior to the O&M Commencement Date for Con Edison's reference only, (iii) plans developed for commissioning and testing of the Facility prior to O&M Commencement Date, including, but not limited to, archived configuration of the protection and automation system, configuration files of the relays, Intelligent Electronic Devices ("IEDs") and Remote Terminal Units ("RTUs"), relay protection system setting sheets, baseline commissioning data for the Facility, including but not limited to, gas insulated switchgear ("GIS"), the reactors, disconnect switches and circuit breakers; (iv) approved commissioning data, (v) as-left settings files or configuration files for the protective relays, IEDs, RTUs, Human Machine Interface (HMI), IMUX, (vi) a Facility Plan/Physical Layout, (vii) two complete paper sets and an electronic copy (formatted for entry on Con Edison's metaphase system) of as-built construction drawings, which shall also include, but not be limited to, the schematics and wiring

prints for all relay protection, automation, ABB GIS, AC/DC load boards, emergency generator, back up design calculations, (viii) Manufacturer's Specifications and Instructions for the Facility, including but not limited to the Shunt Reactors and the "PURS"(as defined in Exhibit A); and (ix) the Power Authority's NERC Compliance criteria.

4.1.8 **Training**. At Con Edison's request, the Power Authority shall be solely responsible to coordinate, provide and pay for all costs relating to operation, maintenance, reliability, troubleshooting, and modification training for supervisors, mechanics, operators and technicians in Con Edison's Substation Operations Department who Con Edison anticipates to be working at any portion of the Facility (including but not limited to all Equipment listed in Appendix A).

4.1.9 **Preventative Maintenance Procedures.** At least sixty (60) days prior to the O&M Commencement Date, Con Edison shall provide the Power Authority a copy of its current preventative maintenance procedures ("PMP") for the Facility, including but not limited to CE-ES-1000 (attached hereto as Appendix D), which shall be subject to the Power Authority's review, comment, and approval. Con Edison and the Power Authority shall work in good faith to review and finalize the PMP ("Finalized PMP") at least 30 days prior to the O&M Commencement Date. The Power Authority has the final authority with regard to extending and/or reducing the periodicity of maintenance and testing beyond the time periods as long as it is consistent with all regulatory requirements, including but not limited to the NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements. The Power Authority retains the right but is not limited to request modifications to the Finalized PMP throughout the Term of this Second Composite Agreement on sixty (60) days prior written notice to Con Edison ("PMP Proposal").

4.1.9.1 The Parties shall work in good faith to review and finalize any PMP Proposal ("Updated PMP") within sixty (60) days of receipt of the PMP Proposal. The Power Authority has the final authority with regard to extending the periodicity of maintenance and/or testing beyond the time periods outlined in the Finalized PMP, or if there is no existing procedure for periodicity of maintenance and/or testing, any rejection of or modification to Con Edison's recommendations.

4.1.9.2 The Power Authority assumes all risk with regard to any modifications it requests and/or requires to the PMPs, the Finalized PMPs, the PMP Proposals and/or the Updated PMP, including, but not limited to, rejections of Con Edison's recommendations and/or any modifications to the PMPs, the Finalized PMPs, the PMP Proposals and/or the Updated PMP, notwithstanding any discussions and/or acceptance by Con Edison.

4.1.9.3 All Finalized PMPs and Updated PMPs shall be consistent with any and all Applicable Legal Requirements, including but not limited to the NERC Reliability Standards.

4.1.10 **Insurance.** The Power Authority will procure all insurance as required by Article XVIII- Insurance herein and fully pay all such premiums.

4.2 **O&M SERVICES.** The Preparatory Work and Services and the Scope of Work shall be referred to collectively in this Second Composite Agreement as the "O&M Services". Con Edison shall perform the O&M Services, at the Power Authority's sole cost and expense, in accordance with Con Edison Standards, which are consistent with, NERC Reliability Standards, NPCC Reliability Standards, NPCC Directories and NPCC Criteria Requirements, the Finalized PMPs, any Updated PMPs and the Power Authority's specific terms as set forth in Exhibit C, with persons who are skilled and trained to perform the O&M Services to the Facility and its components.

4.2.1 In the event of a conflict between Con Edison Standards and either the Finalized PMPs, any Updated PMPs, and/or Power Authority's specific terms as set forth in Exhibit C, the Finalized PMPs, any Updated PMPs and/or Power Authority's specific terms as set forth in Exhibit C shall take precedence and control. In the event of a conflict between any Finalized PMP or any Updated PMPs and Power Authority's specific terms as set forth in Exhibit C, the Finalized PMPs or any Updated PMPs shall take precedence and control. In the event of a conflict between a Finalized PMP and any Updated PMP, the Updated PMP shall take precedence and control.

In the event that Con Edison subcontracts any portion of the O&M Services subject to the Power Authority's approval, and in accordance with Section 4.2.6, Con Edison shall provide such subcontractor(s) with any applicable Con Edison Standards, Finalized PMPs, Updated PMPs and as permitted by the provisions of Article XXI - Confidentiality.

4.2.2 **Access to and Use of the Power Authority Property**. The Power Authority hereby authorizes Con Edison (and any applicable subcontractor) to access and use any portion of the Power Authority Property required by Con Edison, upon reasonable notice to perform the O&M Services, except that no prior notice shall be required in cases of emergency, as determined in Con Edison's sole discretion. Such access and use shall be permitted 24 hours a day, 7 days a week, 365 days of the year. Con Edison and any applicable subcontractor will be required to comply with the Power Authority's site access requirements for security, escort and Power Authority shall cooperate with Con Edison and any applicable subcontractor to ensure Power Authority's compliance with

the preceding sentence. In the event of emergency, Con Edison and/or its subcontractors must immediately notify the NYPA ECC.

4.2.3 **Best Available Retrofit Technology (BART).** Con Edison (and any applicable subcontractor) shall comply with 6 NYCRR Part 248 – Diesel Emissions Reduction Act and Best Available Retrofit Technology (BART).

4.2.3.1 All diesel-powered Heavy Duty Vehicles (HDVs), *greater than 8500 GVW*, owned by, operated by, or leased by Con Edison personnel and/or subcontractor(s) personnel and used in the performance of the O&M work, shall be powered by Ultra Low Sulfur Diesel Fuel (ULSD) and shall utilize BART.

4.2.3.2 Con Edison and any applicable subcontractor(s) shall submit proof of compliance with 6 NYCRR Part 248, including a complete HDV inventory/equipment list of all vehicles, equipment, etc. subject to review and approval by the Authority for submission to the NYSDEC. Power Authority will provide to Con Edison an inventory template, which Con Edison, at its sole discretion, may choose to use. Con Edison shall be solely responsible for all such costs and expenses which resulting from violations and/or fines from the NYSDEC.

4.2.4 **Preparatory Work and Services**. Con Edison shall undertake all work reasonably required to prepare to accept responsibility for the Scope of Work prior to the O&M Commencement Date (the "Preparatory Work and Services"). The Preparatory Work and Services shall include, but not be limited to, Facility inspections, , acceptance of the Facility and any portions thereof, review of materials submitted by the Power Authority, manufacturers and vendors, preparing an Engineering Description of the Astoria Annex Substation, which shall include, but not be limited to, the automation design, the GIS, AC/DC load boards, emergency diesel generator, and the relay system design, training, preparing PMPs, review of the Power Authority's submissions under this Composite Agreement, including but not limited to the comments to the PMPs, PMP Proposals, the SPCC plan, and initial inclusion, modification and maintenance of any and all drawing and design basis information in the Con Edison document control systems.

4.2.5 **Scope of Work.** Except as limited by the "Excluded Services/Limited Services" (as defined in Section 4.3) and subject to the "Conditions Precedent" (as defined in Section 4.1), commencing on the O&M Commencement Date, the "Scope of Work" shall mean that Con Edison shall be responsible to operate, monitor, inspect, and perform ordinary, preventative and corrective maintenance, testing, and protection system operations assessment to the Facility in accordance with the terms of this Composite Agreement.

In addition, because Power Authority did not fully meet the Conditions Precedent to

Con Edison's good faith satisfaction prior to the O&M Commencement Date, additional work and services for the Facility arising therefrom that were not contemplated by the First Composite Agreement shall be required for the Facility, namely, the close out of minor punch list items and the repair of the Shunt Reactors (except for the fire loop replacement on Shunt Reactor 2) ("Additional Work"). Accordingly, notwithstanding the provisions of Section 4.3.7, but in accordance with Sections 4.3.1- Sections 4.3.6, Con Edison shall perform the Additional Work as if the Additional Work was part of the original O&M Services, and in accordance with all the terms and conditions of the Second Composite Agreement. The Additional Work shall hereinafter be deemed to be part of the O&M Services. The Power Authority shall be solely responsible to pay for the Additional Work in accordance with all the terms and conditions of the Second Composite Agreement.

4.2.6 **Subcontracting**. At Power Authority's sole cost and expense, Con Edison may subcontract any portion of the performance of the O&M Services without the prior written approval of the Power Authority as to the work to be subcontracted and/or the subcontractor, which includes, but is not limited to, general maintenance of the Facility, landscaping, minor building repairs, except that Con Edison may not subcontract the portion of the O&M Services that involves operation of Equipment without the prior written approval of the Power Authority as to the work to be subcontracted and/or the subcontractor, except that Con Edison, in its sole discretion, may hire the manufacturer/vendor of any portion of the Facility, to perform O&M Services, including, but not limited to, periodic and corrective maintenance (one-off equipment/ major equipment) of the Facility, and the Power Authority shall be solely responsible for all such costs and expenses.

4.2.7 **Operating Communications- Astoria Annex Substation/ Energy Control Center.** In accordance with Article V - Services and Utilities, the Power Authority shall install and maintain, at its sole cost and expense, two dedicated communication lines between the Astoria Annex Substation and the Con Edison Energy Control Center ("Con Edison ECC") and such other communication lines as are necessary to operate any required fire detection and alarm systems. Con Edison shall maintain continuous communication 24 hours a day, 7 days a week, and 365 days of the year, only through the Con Edison ECC. Con Edison ECC shall notify the designated the Power Authority Energy Control Center ("NYPA ECC") dispatcher, of any emergency situation at the Astoria Annex Substation as soon as practicable. In addition, the Power Authority shall install and maintain, at its sole cost and expense, a regular phone line for all outside calls. The Power Authority shall provide a Con Edison substation frequency band radio system for communication between the Astoria Annex Substation operators and the Con Edison ECC.

4.3 **EXCLUDED SERVICES/ LIMITED SERVICES:** Because the Original Agreement contemplated that Con Edison would be accepting a fully constructed, operational, fully tested and working Facility, the Parties specifically acknowledge and agree that for any work relating

to the Facility (except for the Additional Work) that is currently in progress by a contractor (of any tier) hired by or on behalf of Power Authority, Astoria Energy II LLC, SNC Lavalin, (the "Construction and Commissioning Work"), at Power Authority's sole cost, expense, and risk, Power Authority shall continue to have the Construction and Commissioning Work performed until any and all such Construction and Commissioning Work contracted for has been fully performed pursuant to the terms of any applicable contract. In addition, Power Authority shall be solely responsible and liable for any ensuing issues arising from or relating to the Construction and Commissioning Work and all such Construction and Commissioning Work and ensuing issues shall be deemed to be Excluded Services under the First Composite Agreement, as amended by this Revised First Amendment (and after the Effective Date, this Second Composite Agreement.)

4.3.1 **Construction Defects**. The O&M Services shall not include any operation, monitoring, inspection, preventative or corrective maintenance, testing, or protection system operations assessment relating to construction defects of the Facility, as reasonably determined by Con Edison, except Con Edison will take any immediate action necessary to protect persons and property from harm. The Power Authority shall be solely responsible to promptly correct any such construction defects at its sole cost and expense.

4.3.2 **Capital Expenditures.** The O&M Services shall not include any operation, monitoring, inspection, preventative or corrective maintenance, testing, or protection system operations assessment that requires a capital expenditure, including but not limited to design changes in accordance with Section 4.3.3.

4.3.3 **Design Changes.** The Power Authority acknowledges that portions of the 15th Street and Astoria Pressurization Plants, 15th Street and Astoria PURS and Shunt Reactors are near end of service life and may require future capital upgrades. Con Edison shall use commercially reasonable efforts to perform corrective maintenance to such equipment; however, the Power Authority acknowledges that a capital expenditure may be required. In the event a design change is required, the Power Authority shall submit such design change to Con Edison for its review and comment. The Power Authority shall be solely responsible to pay for any costs relating to designing, constructing, installing and implementing the design change. This shall apply to any and all such design changes.

4.3.4 **Revenue Metering.** Maintenance and calibration of the revenue metering instrumentation, and Phase 1 Back-up Analog Telemetry equipment to the NYISO will be performed by the Power Authority. Con Edison shall be notified at least two business days prior to such scheduled calibrations and Con Edison reserves the right to witness the work pursuant to the Article XXII - Right to Inspect/Observe Testing.

4.3.5 **RTUs**. Con Edison shall operate and maintain the Power Authority's "Data and Control RTU" and the Power Authority's "Data Only RTU".

4.3.6 **Spare Parts.** The Power Authority assumes sole responsibility to purchase, procure, stock and restock any and all spare parts, including, but not limited to the "Major Spare Parts" listed in Exhibit D, so that there is at least one spare for each major component and other long lead items in use at the Facility at all times, and also including, but not limited to, minor spare parts and regular consumables ("Minor Spare Parts") as indicated in Exhibit D, and "Other Parts and Equipment" as defined in Section 4.3.6.2. Except for Minor Spare Parts and Other Parts and Equipment, both of which Con Edison shall maintain in the Astoria Annex Substation, the Power Authority shall be solely responsible to maintain any and all spare parts not stored at the Astoria Annex Substation. The Power Authority may ship the Minor Spare Parts and Other Parts and Equipment directly to Con Edison. All title and risk of loss to any Minor Spare Parts and Other Parts and Equipment shall remain with the Power Authority until delivery to the Astoria Annex Substation. Con Edison will review and use reasonable efforts to define the required Minor Spare Parts needed to support the day-to-day operation of the Facility.

4.3.6.1 The Power Authority shall be solely liable for any loss to any third party and/or any loss or failure to the Facility arising from or relating to any failure to procure and provide to Con Edison any and all spare parts, including Minor Spare Parts, on a timely basis. Without limiting the generality of the preceding sentence, in the event of an emergency, the Power Authority authorizes Con Edison to utilize any installed spares in the Facility, including circuit breakers and disconnect switches.

4.3.6.2 "Other Parts and Equipment" shall be any and all test equipment specified by Con Edison's SSO Department. The Power Authority shall be solely responsible for all costs and expenses for the future repairs or replacement of the test equipment as required.

4.3.6.3 Con Edison may request, by written notice to the Power Authority, to modify the inventory of Minor Spare Parts and/or Other Parts and Equipment to be maintained at the Astoria Annex Substation, and the Power Authority shall respond in writing within thirty (30) days of its receipt of Con Edison's request. In the event the Power Authority does not respond within the time provided, such request shall be deemed to be granted by the Power Authority.

4.3.6.4 All spare parts purchased by the Power Authority for the Facility shall be held at the Power Authority's Warehouse in Astoria, for exclusive use on Facility equipment. Con Edison shall not use these items for Con Edison equipment unless Con Edison obtains the Power Authority's prior written approval. If Con Edison uses any of the Power Authority spare parts for something other than the Facility, Con Edison must promptly replace such

spare parts at its own cost. Con Edison shall be solely liable for any loss to any third party and/or any loss or failure to the Facility arising from or relating to the use of the spare parts by Con Edison. At Power Authority's sole cost and expense, Con Edison assumes sole responsibility for maintaining the Minor Spare Parts and Other Parts and Equipment stored at the Astoria Annex Substation.

4.3.7 **Performance of Excluded Services/ Limited Services.** For any excluded or limited services, the Power Authority shall be solely responsible, at its sole cost and expense, to take such prompt action as may be required to ensure the continued regular operation of the Facility.

4.3.7.1 In the event that Con Edison chooses to perform work or to provide equipment or services which are not part of the O&M Services, it shall be at the Power Authority's sole cost and expense and subject to a separate written agreement negotiated between the Parties.

4.3.7.2 In the event that the Power Authority hires a third party to perform work or to provide equipment or services to the Facility which are not part of the O&M Services, it shall be at the Power Authority's sole cost and expense. In addition, the Power Authority and the Power Authority Contractors shall comply with Con Edison's Standards, including but not limited to, Con Edison's "General Rules and Regulations," "General Instructions Governing Work on System Electrical Equipment" and the rules and procedures of Con Edison's SSO and STO Departments, including, but not limited to, a Con Edison employee holding all substation work permits and e-HASP requirements.

ARTICLE V
SERVICES AND UTILITIES

5.1 Con Edison shall, subject to the terms and conditions of a separate License Agreement and/or amendment to the Easement Grant, in a form acceptable to Con Edison in its sole discretion, allow the Power Authority to use and occupy certain land at the Con Edison Lands, as preliminarily shown on the Survey, attached hereto as Exhibit E, as required to permit subsurface and/or aerial rights for telecommunications facilities, including phone lines and communication lines, water lines, for potable water protection, two (2) 27 kV feeder(s) for light and power, which shall be owned by Power Authority from the Y connection of the Con Edison System to the Astoria Annex Substation, power supply from the Power Authority's transformers to the PURS, and the extension of dielectric oil cooling lines for the Q35L & Q35M Transmission Lines. In obtaining the light and power for the Facility, Power Authority shall obtain and pay for unbundled delivery service from Con Edison. Con Edison shall provide the unbundled delivery service to the Power Authority under Con Edison's Delivery Service Rate Schedule, PASNY No. 4, as it may be revised or superseded from time to time.

The charges for the Con Edison delivery services referenced herein shall be based on quantities of electricity that are delivered to the Facility and that are metered at the revenue meters. All such utility/services facilities shall be owned by the Power Authority and shall be maintained by Con Edison pursuant to the terms and conditions of this Composite Agreement.

5.2 Prior to the O&M Commencement Date, the Power Authority shall install, at its sole cost and expense, (i) its own water meter at the Astoria Annex Substation, (ii) its own revenue/electric meters for equipment in the Astoria Annex Substation, (iii) its own revenue/electric meter for the PURS and Pressurization Plants at the Power Authority Property associated with Q35L & Q35M Transmission Lines and (iv) at other locations as Con Edison reasonably requests for the Facility. On or before the O&M Commencement Date, ownership of all such revenue meters shall be transferred to Con Edison. The Power Authority shall establish accounts for any services/utilities, including services, specified in Section 5.1 as applicable, in its own name. The Power Authority shall be solely responsible to pay for any and all such services directly to the provider of such services.

ARTICLE VI
COMPENSATION

6.1 **Costs and Expenses**. The Power Authority will reimburse Con Edison for all costs and expenses associated with its O&M Services, including, but not limited to, its Preparatory Work and Scope of Work and related services, equipment, materials, expenses , and any work, services, or materials Con Edison provides in an emergency without the Power Authority's request in accordance with Con Edison's accommodation services charges that are established in accordance with the Public Service Commission tariff, as such tariff may be amended or superseded. The accommodation services charges in effect as of the Effective Date of this Second Composite Agreement are included hereunder Appendix E. Upon request, Con Edison shall provide the Power Authority courtesy copies of its tariff prior to the O&M Commencement Date and upon the Power Authority's request thereafter.

6.1.1 Prior to the O&M Commencement Date, Con Edison will provide the Power Authority a good faith estimate of the anticipated costs and expenses for the Preparatory Work and Services, which is attached hereto as Exhibit F.

Prior to the O&M Commencement Date, Con Edison will provide the Power Authority a good faith estimate of the anticipated costs and expenses for the Scope of Work (on a monthly and/or annual basis), which shall assume ordinary operating conditions for the first calendar year of O&M Services. Following the first calendar year of its O&M Services, and not later than June 30 of each year thereafter, Con Edison shall endeavor to provide the Power Authority with a budget and work plan/schedule for the upcoming calendar year.

The parties agree that a good faith estimate of the anticipated operation and maintenance

costs for the Astoria Annex Substation is Thirty Thousand Dollars ($30,000) per month for the first ten years of the Term ("Initial Monthly Estimate"). The parties agree that the Initial Monthly Estimate is only an estimate and does not include any unanticipated, out of the ordinary expenses, or expenses relating to an emergency nor does it limit Power Authority's obligation in Section 6.1 to reimburse Con Edison for all costs and expenses associated with the O&M Services.

Power Authority acknowledges that any estimates, preliminary budget information, and/or budgets provided hereunder are subject to change due to various factors within or outside of Con Edison's control, including but not limited to, system conditions, storms, equipment failure, inadvertent failure to include costs, changes to Applicable Legal Requirements, and/or changes to the O&M Services as service progresses. Accordingly, notwithstanding Con Edison's provision of any estimate, preliminary budget information and/or budget, the Power Authority shall reimburse Con Edison for all of the costs and expenses that Con Edison incurs in providing the the O&M Services, which includes, but is not limited to, the cost of labor, materials, and third-party services. For corrective maintenance and for system conditions, which may not be foreseeable, all labor hours are to be billed at the "Accommodation Billing Rate" (defined below).

6.1.2 Following the first calendar year of O&M Services, Con Edison shall endeavor to provide the Power Authority with a five (5) year work plan/schedule for the Facility for the upcoming five (5) years, including preliminary budgeting information.

6.2 **Labor**. Con Edison uses a fully-costed rate called an accommodation billing rate ("Accommodation Billing Rate") to invoice outside customers for actual labor hours worked. The Accommodation Billing Rate includes, but is not limited to, vacations and other permitted absences (non-productive time), premium payments for overtime, allowance for pension and health insurance costs, payroll taxes and all other payroll related benefits, worker's compensation insurance costs and administration costs. The Accommodation Billing Rate uses the internal "man-hour" rate as a basis for the above calculation. In addition, reasonable and customary administrative overheads ("A&G") and gross receipt taxes are charged in accordance with established tariffs. Upon request, annually or with each change, Con Edison shall provide the Power Authority courtesy copies of the Accommodation Billing Rate schedules and the Fringe Benefits rate, as such rates may change from time to time. Con Edison's A&G as approved in the New York State Public Service Commission Tariff ("NYS PSC Tariff") is 4.0% and is subject to change.

6.2.1 In order to meet the Power Authority's invoice scheduling constraints under other agreements between the Parties, Con Edison has historically invoiced the Power Authority using an equivalent accommodation rate by manually adding established provisions for overheads and indirects to the man-hour rate. This practice has been agreeable to both parties and is preferred in some cases because it allows for full disclosure of components of the Accommodation Rate.

6.2.2 During the term of this Composite Agreement, it is anticipated that Con Edison will implement a new invoicing software that will enable automated invoicing at Accommodation Billing Rates and it will no longer be necessary or feasible to continue the manual practice currently referenced in Section 6.2.1 above, to calculate equivalent rates. Upon implementation of this software, Con Edison will provide the Power Authority with a supplemental schedule that clearly indentifies the various components of each Accommodation Billing Rate to a substantially similar level of detail that exists in the billing practices between the Parties as of the date of this Composite Agreement. Upon request, annually or with each change, Con Edison shall provide the Power Authority courtesy copies of this supplemental schedule.

6.3 **Materials.** Current replacement cost, actual invoice cost, or Con Edison Unit Cost as applicable, Con Edison's stores and handling rate (if applicable) as approved in the NYS PSC Tariff is 14.50%. Upon request, Con Edison shall provide the Power Authority courtesy copies of the tariff. Con Edison's rate for storage and handling is subject to change from time to time.

6.4 **Con Edison Vehicles**. Con Edison's hourly accommodation billing rates in effect at the time of use.

6.5 **Other Equipment or Services**. Other equipment, services, janitorial services, grounds keeping, security, gate repair and other ancillary services, and any outside contractors required for performance of the work, Con Edison's actual cost or billing rates, as applicable, plus the A&G rate, if applicable, as such rates are changed from time to time.

6.6 **Con Edison Engineering and Design.** Hours taken to make initial inclusion, modification and maintenance of any and all drawing and design basis information in the Con Edison document control systems.

6.7 **Sales Taxes**. The Power Authority is exempt from New York State sales tax and vendors should be instructed to not include sales tax in their invoice charges.

6.8 **Equipment Failure.** In the event of equipment failure or any failure at the Facility, the Power Authority shall be solely responsible to pursue any applicable claims for warranty and/or reimbursement from the manufacturer, vendor, contractors who built the Facility or otherwise. The Power Authority shall not delay payment of a Con Edison invoice during the pendency of any such claim.

ARTICLE VII
REPORTING AND INVOICING

7.1 Con Edison will submit invoices for O&M Services performed by Con Edison within thirty days following the end of each calendar month for the work performed and costs incurred during the month.

7.2 For the performance of any O&M Services that Con Edison typically tracks on its work management system (Maximo), Con Edison, by its Substation Operations Department, shall generate and electronically deliver to the Power Authority such Maximo reports within thirty (30) days after such work is performed. The Power Authority representative identified to receive these reports is Robert Schwabe, Robert.schwabe@nypa.gov, 914-287-3794.

7.3 Invoices, either on their face or by attachment, will show:

7.3.1 Direct charges; the cost of Con Edison labor, including hours worked; the cost of Con Edison supplied materials and supplies.

7.3.2 With regard to contracted services used, within ninety days after Con Edison receives the invoices and any other supporting documentation from the contractors, Con Edison shall provide the Power Authority the cost of contracted services used, including any invoices and other supporting documentation.

7.3.3 A&G overheads that are included in direct charges, including the rate applied and the calculation of the overhead amount.

7.3.4 Fringe Benefits overheads that are included in direct charges, including the rates applied and the calculation of the Fringe Benefit overhead components.

7.3.5 Invoices will be submitted to the Power Authority at the following address:

Accounts Payable Department
123 Main Street
White Plains, New York 10601
RE: Astoria Annex Substation

cc: SENY Transmission Asset Manager

7.4 With reasonable advance notice, the Power Authority will have the right, within two (2) years after charges have been invoiced, to examine Con Edison's books and records to verify the accuracy of the charges under this Composite Agreement.

ARTICLE VIII
TAXES/PERMIT FEES

8.1 The rates and/or prices set forth in this Second Composite Agreement do not include any federal, state or local license, privilege, sales, use, excise, gross receipts, value added or other like taxes which may now or hereafter be applicable to, measured by or imposed upon the services, goods and/or materials furnished hereunder and/or any payment due or collected for such services, goods and/or materials. Con Edison will notify Vendors that the Power Authority is exempt from taxes; the Power Authority agrees to reimburse Con Edison for any such taxes which the Power Authority is responsible to pay. The rates and/or prices set forth in this Second Composite Agreement also do not include any charge or fee for any Permits, Environmental Permits, governmental or non-governmental authorizations, consents or permits, approvals that may be required in connection with any services, goods and/or materials furnished hereunder. The Power Authority agrees to pay any such charges and fees and to reimburse Con Edison for any such charges and fees which Con Edison is required to pay.

ARTICLE IX
PAYMENT

9.1 Payment of each invoice will be due from the Power Authority within thirty (30) calendar days after receipt.

9.2 All payments shall be made in the form of immediately available funds by wire transfer to a bank account specified by Con Edison or in such other form as may be reasonably requested by Con Edison. The wired funds will be deemed timely paid if received by the bank by close of business on or before the due date of the payment.

9.3 All invoices that the Power Authority fails to pay when due will be subject to interest. Interest will be computed from the date payment was due at the rate specified in Section 2880 of the Public Authorities Law between the dates payment is due and is made. If the due date for any payment falls on a national or the Power Authority holiday or on a Saturday or Sunday, payment will be accepted as timely on the following business day; however, if payment is not received on the following business day, interest will be computed from the day payment was due, the Power Authority's Prompt Payment Policy attached hereto as Appendix F, as may be amended from time to time, shall apply. Upon the Power Authority's request, Con Edison shall provide the Power Authority with affidavits stating that the invoices for labor, equipment, services and materials have been paid in full. The Power Authority may withhold payment to Con Edison pending receipt of satisfactory affidavits.

ARTICLE X
WASTE MANAGEMENT

10.1 Within sixty (60) days of the effective date of this Composite Agreement, Con Edison shall submit a Waste Management Plan that identifies the routine maintenance wastes that are expected to be generated from O&M activities at the Astoria Annex Substation and the approximate frequency and quantities of such waste generation. Con Edison shall provide the name of a designated contact person for notification purposes for the management and handling of wastes from the Astoria Annex Substation. The Power Authority shall provide the name of a designated contact person for notifications regarding such waste.

10.2 The Power Authority shall be responsible for obtaining an EPA identification number for the Astoria Annex Substation, if required. Con Edison shall provide and execute any documents requested by the Power Authority in support of obtaining an EPA identification number for the Astoria Annex Substation operations.

10.3 Con Edison shall manage wastes generated from O&M activities in accordance with Environmental Laws. Only wastes generated from the Astoria Annex substation O&M operations may be stored on-site. Con Edison shall notify the Power Authority within seven (7) days of waste generation to enable the Power Authority to make the appropriate arrangements for off-site transportation and disposal of wastes. The Power Authority shall arrange for transportation and disposal of the waste within thirty (30) days of being notified by Con Edison of waste generation.

10.4 In the event of a scheduled maintenance activity that is expected to generate a large amount of waste that cannot be staged on-site due to space constraints, Con Edison shall notify the Power Authority at least thirty (30) days prior to the scheduled date, so that the Power Authority can make necessary arrangements for transportation and disposal of the waste. Wastes generated from this type of activity shall be coordinated with the Power Authority in such manner as to allow that shipment to be made using a Part 364 transporter to a the Power Authority-approved TSDF, and the Power Authority contact person to be present on-site at the time of shipment to sign the manifest, bill of lading, or other shipping paper.

10.5 Con Edison shall provide the Power Authority with the Hazardous Waste Emergency Response Preparedness information required in 6 NYCRR Part 372.2 (a) (8) (iii) (e), (emergency phone numbers, location of nearest fire extinguisher, spill kit, alarms, etc.) for the Astoria Annex Substation, and shall maintain a current and updated posting of this information on-site adjacent to the designated hazardous waste storage area, if required. Con Edison shall maintain spill kits and other emergency response equipment, if necessary, at the Astoria Annex Substation. In the event of a Release of hazardous waste, Con Edison shall take immediate action to contain and control the Release, and will promptly notify the Power Authority of the Release and the actions taken.

ARTICLE XI
STORM WATER MANAGEMENT FOR POST-CONSTRUCTION WATER QUALITY CONTROL

Notice of Intent (NOI) forms and Storm Water Pollution Prevention Plans (SWPPP) are prepared and submitted to NYSDEC for regulated facilities in order to obtain a NYSDEC SPDES Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activities (GP-0-06-002). Separate substations, those not associated with a steam electric generating facility, are not a designated regulated sector by NYSDEC and are therefore not required to obtain coverage nor prepare such documents. Additionally, there is no point source discharge of pollutants to Waters of the State or a Municipal Separate Storm Sewer System (MS4). Post construction storm water controls are achieved by passive measures (natural infiltration) for non-containment areas. Notwithstanding the foregoing, in the event of changes in Applicable Legal Requirements relating to storm water, non-point source, or point source discharges, Power Authority shall take all necessary steps to comply at its sole cost and expense.

ARTICLE XII
ENVIRONMENTAL PROVISIONS

12.1 Release Reporting Requirements:

(a) The Parties agree that in the event that either Party discovers on or about the Easement Area (as defined in the Easement Grant, as may be amended) or the Facility any condition or incident reasonably believed to trigger any of the reporting obligations set forth in Section 12.1 (b), the discovering Party shall use commercially reasonable efforts to provide relevant information as quickly as practicable to the other Party by telephone or email, followed by written confirmation.

(b) The Power Authority shall report to the proper Governmental Authorities any reportable Releases within the time required by applicable federal, state, local, and Environmental Laws, or Power Authority requirements, provided that if Con Edison is the discovering party, it provides the Power Authority with relevant information regarding such Release within sufficient time for the Power Authority to make such notification. In the event that Con Edison does not receive confirmation and documentation (e.g. by e-mail or facsimile) that the Power Authority has reported such reportable Release within the time required by applicable federal, state, local, and Environmental Laws, or Power Authority requirements, Con Edison may report such Release. If any penalties are assessed against Con Edison by a Governmental Authority due to the Power Authority's failure to report the Release within the time required under applicable Environmental Law, the Power Authority shall indemnify Con Edison for any such assessed penalties pursuant to Section 12.5 of this Composite Agreement.

(c) In the event that Con Edison discovers on or about the Easement Area or the Facility any condition or incident reasonably believed to trigger any of the reporting obligations set forth above, Con Edison shall promptly take all actions reasonably necessary to control and contain the release as are consistent with applicable federal, state, local, and Environmental Laws, or Power Authority requirements and the Spill Prevention, Control and Countermeasure Plan, and as necessary to safeguard the health, safety or welfare of any persons, the Con Edison Lands and any improvements thereon or

there under (including the Facility), from any such conditions. This Section 12.1 (c) does not change any rights or obligations of the Parties with respect to Remediation under Section 12.2.

12.2 Remediation:

(a) The Power Authority shall be responsible for the performance of any Remediation required under applicable federal, state, local, and Environmental Laws, or Power Authority requirements or as determined by any Governmental Authority, in order to address (i) the existence or suspected existence of Hazardous Substances in, on, or under the Easement Area that are discovered or encountered as a result of the Additional Work, Risks, Power Authority's ownership or operation of the Facility or the performance of O&M Services under this Second Composite Agreement (each, a "Discovery"); and (ii) any Release or threatened Release in, on, under, over or migrating to, from or through the Con Edison Lands or the Facility caused by or relating to the Power Authority's ownership or operation of the Facility or the performance of the O&M Services under this Second Composite Agreement (the "Required Remediation"). The Power Authority shall promptly take all actions as are necessary to perform (a) Remediation of any such Release or Discovery, and (b) such other work as may be required by any Governmental Authority to safeguard the health, safety or welfare of any persons, the Con Edison Lands and any improvements thereon or there under (including the Facility), from any Release or threatened Release or Discovery. In the case any Remediation is required, the Power Authority shall be responsible for restoring the affected portion or portions of the Con Edison Lands, together with any and all affected soil and groundwater, to the functional and topographical condition that existed prior to the Release and Remediation, as well as to the condition required by Environmental Laws, and as necessary to satisfy the requirements of any Governmental Authority exercising jurisdiction with respect to the Con Edison Lands for such Release or Discovery.

(b) Any Remediation required to be performed by the Power Authority pursuant to Section 12.2 (a) above, may be performed by Con Edison if: (i) the Parties agree that Con Edison shall perform some or all of such Remediation; or (ii) Con Edison is required to perform the Remediation by a Governmental Authority.

(c) In the event that Con Edison performs any Required Remediation, the Power Authority shall pay to Con Edison 100% of all of its costs and expenses associated with such Remediation.

(d) In connection with any Required Remediation, the Party performing the Remediation shall provide the non-performing Party with copies of all work plans required by a Governmental Authority. In addition, the performing Party shall keep the non-performing Party apprised of the status of any such Remediation. The Parties will each use commercially reasonable efforts to cooperate with each other in order to minimize each Party's costs related to any Required Remediation necessary to satisfy applicable Environmental Law obligations and securing closure of any such obligations.

12.3 SPCC Plans:

(a) The Power Authority shall be responsible for: (i) Preparing, submitting and maintaining the SPCC Plan for the Facility as set forth in Section 4.1.4; (ii) Ensuring that the SPCC Plan is kept current with Environmental Laws; (iii) Assuring that the permanent oil containments comply with

Environmental Laws; and (iv) Conducting periodic inspections of the Facility to monitor compliance with the SPCC Plan.

(b) Con Edison shall be responsible for implementation of the SPCC Plan so long as Con Edison has had an opportunity to review and approve the implementation sections of the SPCC Plan as set forth in Section 4.1.4. Con Edison shall inspect potential spill areas on a weekly basis and keep a permanent log of such inspections which log will be available for inspection by the Power Authority.

12.4 Community Right to Know

(a) Chemical Inventory: Con Edison shall develop and maintain an inventory of all chemicals and hazardous substances, subject to reporting requirements under the Community Right To Know Law, stored or used at the facility by [insert date]. Con Edison shall notify the Power Authority within five (5) business days whenever a new such chemical or hazardous substance is brought on to the facility or whenever such chemical or hazardous substance is removed from the facility.

(b) Risk Management Plan: The Power Authority shall be responsible for:

i. Preparing, submitting, and maintaining the Risk Management Plan ("RMP") for the Facility in compliance with Environmental Laws; and
ii. Conducting periodic inspections of the Facility to monitor compliance with the RMP.

At least thirty (30) days prior to the O&M Commencement Date, the Power Authority shall provide Con Edison with a draft RMP for Con Edison's review and comment. Provisions relating to Con Edison's implementation of the RMP, or any subsequent modification of implementation provisions, are subject to Con Edison's approval.

Con Edison shall be responsible for the implementation of the RMP so long as Con Edison has had an opportunity to review and approve the implementation sections of the RMP.

(c) Material Safety Data Sheets: The Power Authority shall obtain and submit Material Safety Data Sheets ("MSDS") for any Extremely Hazardous Substance ("EHS") present at the facility in an amount equal to or greater than its Threshold Planning Quantity ("TPQ") or any OSHA hazardous substance present at the facility in an amount equal to or greater than 10,000 pounds to the State Emergency Response Commission ("SERC"), the Local Emergency Planning Committee ("LEPC"), and the local fire department within three (3) months of their acquisition.

(d) Emergency Coordinator: The Power Authority shall appoint an Emergency Coordinator and shall notify the SERC and the LEPC of such appointment within 60 days of an EHS being present at the facility in an amount equal to or greater than such EHS's TPQ.

(e) Facility Inventory Forms and 209-U Forms: After the O&M Commencement Date, the Power Authority shall be responsible for the filing of all Facility Inventory Forms ("FIF"), 209-U forms and any other forms relating to the disclosure of hazardous substances that may be required under Applicable Law and for the payment of all associated filing fees, and shall provide: Con Edison with a copy of each such filing. Con Edison shall be responsible for providing Power Authority with information related to the chemical inventory under Con Edison's custody and control at the Facility in sufficient time to allow Power Authority to complete the required forms.

12.5 Environmental Indemnification:

(a) The Power Authority shall indemnify, defend, and hold harmless Con Edison, its affiliates and their respective directors, officers, shareholders, and employees (collectively, the "Con Edison Indemnified Parties") for any and all Environmental Liabilities arising out of or in connection with (i) the existence of or any actual or threatened Release or Discovery on, over, above, under or around the Easement Area and any migration of such Hazardous Substances on, to or through the Con Edison Lands; (ii) any initial control and containment of a Release in the Easement Area; (iii) Required Remediation; (iv) the Additional Work, (v) the Risks, and (vi) the transportation and disposal of any and all wastes from the Facility and the Easement Area, as well as any and all wastes subject to Required Remediation on the Con Edison Lands that occurs from the date of the Power Authority ownership of the Associated Equipment forward. This obligation shall include the burden and expense of defending all claims, suits and administrative proceedings and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the Con Edison Indemnified Parties.

12.6 Environmental Notices:

(a) Except as expressly provided in this Article XII, all notices and other communications required or contemplated under this Article XII shall be in writing and shall be delivered by United States Postal Service, by Federal Express or other private courier service or hand delivered, or e-mailed to:

If to the **New York Power Authority**:

Name: John Kahabka

Address: 123 Main Street
White Plains, NY 10601-3170

E-mail: John.Kahabka@nypa.gov

Telephone: 914-681-6308

If to **Con Edison**:

Name: Con Edison SSO Manager

Address: Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, NY 10003
E-mail: Hudmana@coned.com
Telephone: 212-460-6564

12.7 Survival: The Parties obligations under this Article XII shall survive the termination or expiration of this Composite Agreement.

ARTICLE XIII
SF6 GAS EQUIPMENT

13.1 Certain Power Authority-owned equipment at the Facility will contain sulfur hexafluoride ("SF6") gas (the "SF6 Gas Equipment"). During the construction or commissioning of the Facility, any leakage of SF6 gas from the equipment or otherwise, shall be calculated by the Power Authority's vendor or contractor and reported to the proper Governmental Authority by the Power Authority. Prior to Con Edison's acceptance of the Facility, the Power Authority will certify that all SF6 Gas Equipment is free of leaks and that any SF6 emissions that occurred during construction or commissioning of the Facility have been reported to the proper Governmental Authority. Con Edison shall have the right to conduct its own check of the equipment and Facility to ensure that the SF6 equipment has been delivered free of leaks. Con Edison shall report any leaks that are discovered to the Power Authority and Con Edison will be responsible for fixing the leaks.

13.2 Responsibilities of the Parties with respect to SF6 Gas Equipment

13.2.1.1 The Power Authority's Responsibilities

As set forth in detail on Exhibit C, the Power Authority shall be responsible for: (i) supplying all equipment that is necessary to maintain, test and replace any SF6 Gas Equipment at the Facility; (ii) pursuant to Section 4.1.8 above, provide all training it requires for the handling of SF6 Gas Equipment to Con Edison personnel at the Power Authority's sole cost and expense; and (iii) reporting to the proper Governmental Authorities all releases and losses of SF6 gas to the environment.

13.2.2 Con Edison's Responsibilities

As set forth in detail on Exhibit C, Con Edison shall be responsible for (i) handling all SF6 gas and SF6 Gas Equipment at the Facility in a manner that minimizes releases; and (ii) for tracking SF6 gas usage and releases at the Facility; and (iii) for reporting such usage and releases of SF6 gas to the environment to the Power Authority. Con Edison will only permit personnel who are

the aware of the risks associated with SF6 gas and the need to minimize leaks and releases of SF6 gas to work on the SF6 Gas Equipment.

ARTICLE XIV
COMPLIANCE MODIFICATIONS AND UPGRADES

14.1 In the event that the Facility requires any construction, alteration, modification to comply with Applicable Legal Requirements ("Compliance Modifications and Upgrades"), the Power Authority at its sole cost and expense, shall engineer, procure equipment, and perform the construction, alteration and modification for the Compliance Modifications and Upgrades in accordance with Good Utility Practice, Con Edison Standards and other reasonable conditions required by Con Edison.

14.2 The Power Authority shall provide for coordination for Con Edison review of plans, construction oversight, and reimbursement to Con Edison for all such costs and expenses.

14.3 The Power Authority shall deliver to Con Edison "as built" drawings, plans, information, and any other documents that are reasonably required by Con Edison, and provide, at the Power Authority's sole cost and expense, all training to assure that Con Edison is equipped and prepared to perform the Scope of Work hereunder.

14.4 Con Edison shall approve and accept for operation and maintenance the Compliance Modifications and Upgrades to the extent engineered, procured, and constructed in accordance with this Article XIV- Compliance Modifications and Upgrades; thereafter, the Power Authority shall transfer operation and maintenance of the Compliance Modifications and Upgrades to Con Edison and operation and maintenance of such Compliance Modifications and Upgrades shall be included within Con Edison's Scope of Work, except to the extent limited in writing by the Parties.

ARTICLE XV
SUPERSEDENCE

15.1 So long as this Second Composite Agreement shall remain in effect it supersedes any applicable, conflicting portions of the Astoria Unit 6 Operating Agreement dated January 9, 1981 and any subsequent amendments.

ARTICLE XVI
FORCE MAJEURE

16.1 Except for obligations to make payments when due, each party shall be excused from performance under this Second Composite Agreement to the extent the party is prevented from or delayed in performing for any reason beyond its reasonable control, including, but not limited to, acts of God, acts or failures to act of any governmental authority or of the other party, accidents, strikes or other labor disputes, declared or undeclared wars, riots, inclement

weather, fires, floods, failures or delays of sources of supply and failures or delay in transportation.

ARTICLE XVII
DEFAULT

17.1 **General.** No Breach shall exist where such failure to discharge an obligation (other than the payment of money) is the result of Force Majeure as defined in this Second Composite Agreement or the result of an act or omission of the other Party. Upon a Breach, the non-Breaching Party shall give written notice of such to the Breaching Party. The Breaching Party shall have thirty (30) Calendar Days from receipt of the Breach notice within which to cure such Breach; provided however, if such Breach is not capable of cure within thirty (30) Calendar Days, the Breaching Party shall commence such cure within thirty (30) Calendar Days after notice and continuously and diligently complete such cure within ninety (90) Calendar Days from receipt of the Breach notice; and, if cured within such time, the Breach specified in such notice shall cease to exist.

17.2 **Right to Terminate.** If a Breach is not cured as provided in this Article XVII, or if a Breach is not capable of being cured within the period provided for herein, the non-Breaching Party shall thereafter have the right to declare a Default and terminate this Second Composite Agreement by written notice at any time until cure occurs, and be relieved of any further obligation hereunder and, whether or not the Parties terminate this Composite Agreement, to recover from the Breaching Party all amounts due hereunder, plus all other damages and remedies to which they are entitled at law or in equity. The provisions of this Article will survive termination of this Composite Agreement.

ARTICLE XVIII
INSURANCE

18.1 The Power Authority shall procure and maintain the following insurance at its own expense throughout the Term of this Composite Agreement, with at least the monetary limits specified. The insurance shall be placed with insurance companies acceptable to Con Edison. Policy deductibles and/or self insured retentions on any insurance required by this Article XVIII shall be permitted only if such deductibles and/or self insured retentions are commensurate with Good Utility Practice. The Power Authority shall be required to notify Con Edison in writing of any increase in policy deductible and/or self insured retention at least thirty (30) days prior to the effective date of any such policy deductibles/self insured retention so that Con Edison can give the Power Authority notice of any objection(s). The parties shall work in good faith to resolve any such objection(s) to the proposed policy deductibles.

18.1.1 Commercial General Liability Insurance, including contractual liability ("CGL") with limits of $35,000,000 on a claims first made policy. The Authority may elect, at its option, to self insure the first $2 million in coverage. The insurance shall contain no exclusions for explosion, collapse of a building or structure, or underground hazards.

The insurance policy or policies shall name Con Edison and Consolidated Edison, Inc. as additional insureds.

18.1.2 Comprehensive Automobile Liability Insurance ("CAL"), covering all owned, non-owned and hired automobiles used by the Contractor or any Subcontractors, with limits of $1,000,000 per occurrence for bodily injury or death and $500,000 per occurrence for property damage or a combined single limit of $1,000,000 per occurrence.

18.1.3 Statutory workers' compensation insurance as required by all applicable laws and employer's liability insurance, including in respect of accidents and occupational diseases, with a limit of not less than $1 million per accident for each person and a policy limit of not less than $1 million for each occupational disease.

18.1.4 For all of the insurance required by this Article XVIII, except workers' compensation and CAL, Power Authority shall name both Consolidated Edison, Inc. and Consolidated Edison Company of New York, Inc. as additional insureds for the full specified limits required herein, and such insurance shall be primary and non-contributory coverage as to such additional insureds. All insurance policies of the Power Authority required herein shall include waivers of subrogation in favor of Consolidated Edison, Inc. and Consolidated Edison Company of New York, Inc.

18.1.5 Power Authority shall, or Power Authority cause Astoria Energy II to, procure and maintain Builders Risk Insurance, including boiler and machinery coverage, covering the Astoria Annex Substation on an all risk basis, including flood and earth movement coverage, on a full replacement cost value basis until final completion, successful testing and acceptance of the Second Power Block and the Astoria Annex Substation.

18.1.6 The Power Authority shall procure and maintain Property Insurance, including boiler and machinery coverage, covering the Astoria Annex Substation on an all risk basis, including flood and earth movement coverage, on a full replacement cost value basis to cover the Astoria Annex Substation for the Term of this Composite Agreement;

18.2 At least thirty (30) days prior to the O&M Commencement Date, the Power Authority shall furnish Con Edison with Certificate(s) of Insurance covering all required insurance, signed by the insurer or its authorized representative, certifying that the required insurance has been obtained. Such certificates shall state that the policies have been issued and are effective, show their expiration dates, and state that Con Edison is an additional insured with respect to all coverage's enumerated in paragraph 18.1 above. Power Authority shall provide Con Edison with at least fifteen (15) days' written notice prior to the effective date of cancellation of the insurance or of any changes in policy limits or scope of coverage.

18.3 Con Edison shall have the right to require the Power Authority and, as applicable, to cause the Power Authority to request Power Authority's Contractors to provide reasonable increases to

the policy limits of all CGL insurance and CAL insurance provided that no such increases shall be made within the first four (4) years of the Term of this Composite Agreement.

18.4 The Power Authority agrees that this is an insured contract. The insurance required herein is intended to cover Con Edison for its own liability (except for liability stemming from Con Edison's own sole gross negligence) or any other cause of action in any claim or lawsuit for bodily injury or property damage arising out of the Additional Work, Risks, O&M Services and/or this Second Composite Agreement.

18.5 For purposes of interpretation or determination of coverage of any policy of insurance or endorsement thereto, Power Authority shall be deemed to have assumed tort liability for any injury to any Power Authority Contractors, Con Edison or any contractors hired by Con Edison arising out of the performance of the work, including injury caused by the partial or sole negligence of Con Edison (except for liability stemming solely from Con Edison's own gross negligence) and notwithstanding any statutory prohibition or limitation of Power Authority's obligations hereunder.

18.5.1 The Power Authority's Contractors shall be required to procure and maintain Workers' Compensation and Employer's Liability insurance, CAL with limits not less than $1,000,000 per occurrence and CGL with limits not less than $5,000,000 per occurrence and such insurance may be satisfied through primary and excess policies and must name Con Edison and Consolidated Edison Inc as additional insureds. The Power Authority's contractors and subcontractors must name Con Edison and Consolidated Edison Inc. as additional insured's. Con Edison's contractors and subcontractors hired for any portion of the performance of the O & M Services shall be required to procure and maintain Workers' Compensation and Employer's Liability insurance, CAL with limits not less than $1,000,000 per occurrence and CGL with limits not less than $5,000,000 per occurrence and such insurance may be satisfied through primary and excess policies and must name the Power Authority as an additional insured. Con Edison's and NYPA's contractors and subcontractors' insurance will be primary and non-contributory to any insurance carried by NYPA or the Con Edison or Consolidated Edison, Inc.. All insurance policies of the Power Authority's Contractors and Con Edison's contractors and subcontractors' shall include waivers of subrogation in favor of the Power Authority, Consolidated Edison, Inc. and Consolidated Edison Company of New York, Inc.

18.6 Certificates of insurance identifying the Insurance required by this Article XIX shall be sent to:

Consolidated Edison Company of New York, Inc.

4 Irving Place, New York, NY 10003

Attention: Insurance/ Risk Manager's Department, 2nd Floor

New York the Power Authority

123 Main Street

White Plains, New York 10601

Attention: Insurance/Risk Management, 16th Floor

ARTICLE XIX
INDEMNIFICATION, NO CONSEQUENTIAL DAMAGES, OUTAGES

19.1 **Indemnification/Limitation of Liability.** To the fullest extent permitted by law, the Power Authority shall indemnify, defend, and hold harmless Con Edison, its trustees, officers, employees, and agents (collectively, the "Protected Parties") from and against any and all direct claims, actions, liabilities, damages, costs, and expenses (including without limitation attorney fees and other legal costs and expenses), whether based in contract, tort or otherwise, which are asserted, suffered, or incurred by any person or entity (including the Power Authority and the Protected Parties) and which arise from, relate to, or are connected with (i) the services, goods and/or materials furnished by Con Edison hereunder or performed by contractors hired by Con Edison, including, but not limited to, the O&M Services (ii) any act or omission of the Power Authority and/or the Power Authority's Contractors, (iii) the Additional Work, (iv) the Risks as defined in the entire section 4.1 (v) Compliance Modifications and Upgrades, and/or (vi) any and all violations of NERC Reliability Standards, NPCC Reliability Standards, FERC, NPCC Directories and/or NPCC Criteria Requirements that occurred prior to the O&M Commencement Date and/or during the Term, until Con Edison has assumed the obligation to comply with each individual NERC Reliability Standard, as provided for in section 3.1 herein, and (vi) a breach of this Second Composite Agreement by the Power Authority, including but not limited to, any breach of Power Authority's warranties and representation contained herein .

To the fullest extent permitted by law, the Power Authority hereby irrevocably and unconditionally agrees to release and forever discharge the Protected Parties from any and all liability for any violations of NERC Reliability Standards, NPCC Reliability Standards, FERC, NPCC Directories and/or NPCC Criteria Requirements and to waive any and all rights to recover any costs, fines and/or penalties from the Protected Parties or any of them in the future for the period prior to Con Edison assuming the obligation to comply with such NERC Reliability Standards.

19.2 **No Consequential Damages.** To the fullest extent permitted by law, neither the Protected Parties nor the Power Authority shall be liable, whether in contract, tort (including negligence, gross negligence, and strict liability), or otherwise, for any special, indirect, incidental, or consequential damages (including but not limited to damage, loss, liability, costs, and expenses resulting from loss of use, loss of business or business opportunities, loss of profits or revenue, costs of capital, loss of goodwill, claims of customers, claims of unrelated companies and other third parties, cost of purchased or replacement power, and like items of special, indirect, incidental, or consequential loss and damage) asserted, suffered, or incurred by any person or

entity (including the Power Authority and the Protected Parties), which arise from, relate to or are connected with the services, goods and/or materials furnished by Con Edison hereunder regardless of whether or not such damages, loss, liability, costs or expenses are caused in whole or in part by the acts or omissions (including negligence, gross negligence or willful acts) of the Protected Parties or any of them. The damages referred to in this Paragraph 19.2 are hereinafter referred to as the "Consequential Losses." To the fullest extent permitted by law, the Power Authority hereby irrevocably and unconditionally agrees to release and forever discharge the Protected Parties from any and all liability for any Consequential Losses and to waive any and all rights to recover any Consequential Losses from the Protected Parties or any of them in the future. To the fullest extent permitted by law, the Protected Parties hereby irrevocably and unconditionally agree to release and forever discharge the Power Authority from any and all liability for any Consequential Losses and to waive any and all rights to recover any Consequential Losses from the Protected Parties or any of them in the future.

19.3 If a court of competent jurisdiction determines that any provision or application of any provision of 19.1 or 19.2 of this Article XIX is unenforceable, the cumulative liability of the Protected Parties with respect to anything done in connection therewith (whether such liability is based on contract, tort (including negligence, gross negligence, and strict liability) or otherwise, shall not exceed the price of the services, goods and/or materials on which such liability is based. If a court of competent jurisdiction determines that any provision 19.1 or 19.2 of this Article XIX or the preceding sentence of this Paragraph 19.3 is unenforceable, such court shall limit the operation of such provision so as to give it the effect intended to the fullest extent permitted by law.

19.4 **Manpower Limitations/ Con Edison Emergencies.** Con Edison's obligation to furnish the O&M Services shall, at all times (including, without limitation, during any period after which work has commenced to furnish such services, goods or materials), be subject to the availability of Con Edison personnel to furnish such services, goods or materials, taking into account the services, goods or materials to be furnished to the Power Authority and the need for Con Edison personnel to furnish services, goods or materials relative to Con Edison's electric, gas and/or steam systems, which availability shall be determined in the sole discretion of Con Edison. Without limitation of any provision of this Second Composite Agreement that excuses or limits liability, any failure or delay by Con Edison in furnishing any services, goods or materials due to such unavailability of Con Edison personnel (such unavailability being determined in the sole discretion of Con Edison) shall be excused and shall not give rise to any liability. Con Edison will endeavor to provide the Power Authority with such advance notice as may be practicable under the circumstances of the unavailability of its personnel as described in this Paragraph.

19.5 **Outages.** Since actual scheduled outages to perform work at the Facility are subject to NYISO approval, such approval is beyond the control of Con Edison, and Con Edison shall not in any fashion be liable to the Power Authority or any third parties for any delay in the NYISO's approval of such Facility scheduled outages. If an emergency situation (including without

limitation, a blackout or facility outage that could result in load loss) should occur on its system that would require diversion of the personnel performing the O&M Services, then such emergency will be deemed a Force Majeure event and treated in accordance with the Force Majeure provisions of this Composite Agreement. In addition, Con Edison will not be liable for any delay or NYISO outage denial that is related to the Power Authority's responsibilities under this Second Composite Agreement or otherwise. the Power Authority acknowledges and agrees that any outage may be cancelled by Con Edison on little or no notice, or for any reason whatsoever, with Con Edison having no liability

19.6 **Coordination and Communication with the NYISO.**

19.6.1 **Removal of equipment from service and coordination of scheduled outages.** All scheduled work at the Facility shall be scheduled utilizing Con Edison's Outage Scheduling System. Such outages will be coordinated by Con Edison Substation Operations' Planning Department. If regular and routine maintenance requires a full or partial outage of the Facility, Con Edison shall use reasonable efforts to schedule such work to reasonably coincide with planned plant or Facility outages. Con Edison shall notify the NYISO of all scheduled, forced or emergency outages at the Facility on behalf of the Power Authority as outlined in the Outage Scheduling Policy section of the NYISO Outage Scheduling Manual. Con Edison shall notify the Power Authority, either verbally or in writing, of all upcoming scheduled outage work at the Facility.

19.6.2 **Generator Derates and Basepoints.** Con Edison shall adhere to standard communication protocols between the NYISO and Astoria Energy II via the Con Edison Energy Control Center as established by the NYISO communication protocols for communication between generating facilities and the NYISO, as may be amended from time to time.

19.6.3 **Additional Third Party Generators.** At the point when the Power Authority reasonably determines that it is likely that a third party generator may interconnect to the Astoria Annex Substation, the Power Authority shall provide Con Edison prompt written notice of same and Con Edison shall be allowed to participate, at reasonable intervals, in the discussions between the Power Authority and any such third party Generator. In addition, at reasonable intervals, Power Authority shall provide written notice of the status of negotiations between the Power Authority and the proposed interconnection of any third party generator to the Astoria Annex Substation.

19.7 Notwithstanding anything to the contrary in this Article XIX, Power Authority and Con Edison agree that Article XII of this Second Composite Agreement, rather than Article XIX, shall govern the matters that are the subject of such Article XII in accordance with the terms set forth in Article XII.

19.8 The provisions and obligations of this Article XIX shall survive the expiration or earlier termination or of this Second Composite Agreement.

ARTICLE XX
NO WARRANTY/ DISCLAIMERS

20.1 Con Edison shall have no responsibility for any matter caused by the acts or omissions of others, including any improper installation, construction, testing, maintenance, repair, modification or operation of the Facility or any portion thereof on which Con Edison has rendered O&M Services.

20.2 ANY GOODS OR MATERIALS THAT MAY BE FURNISHED BY CON EDISON HEREUNDER ARE SOLD AS IS AND WHERE IS. Any description of the goods contained in any document relating to this sale is for reference purposes only and is not intended to be construed as a warranty relating to condition or completeness.

20.3 THE FOREGOING APPLICABLE WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE), ALL OF WHICH OTHER WARRANTIES ARE HEREBY DISCLAIMED.

20.4 Notwithstanding anything contained herein to the contrary, any inspection of the Facility or acceptance of the Facility by Con Edison, either before, during or after construction or installation thereof, does not constitute any representation, warranty, or assumption of liability by Con Edison, or any release of the Power Authority's obligations or warranties hereunder, or under the Easement Grant or any other contract, with respect to any aspect thereof whatsoever.

20.5 Approval by Con Edison of any document, plan, design, including but not limited to, SPCC plans, SWPPP, Permits, Environmental Permits, remediation plans, or any other item, shall not in any way release the Power Authority or the Power Authority's Contractors from its or their own responsibilities and obligations required by this Second Composite Agreement or otherwise, including but not limited to, Applicable Legal Requirements, Environmental Laws, Environmental Permits, Good Industry Practice, or other good and reasonable professional conduct, nor shall such approval by Con Edison constitute an assumption by Con Edison of any responsibility in any way, shape, or form.

20.6 All questions concerning interpretation of the Con Edison Standards shall be referred to the appropriate Con Edison Department, whose determination shall be conclusive.

ARTICLE XXI
CONFIDENTIALITY

21.1 All specifications, drawings, technical information, reports, estimates, preliminary budget information and budgets furnished by Con Edison and/or third parties retained by Con Edison

or the Power Authority in connection with this Second Composite Agreement are intended for the sole use of the Power Authority in determining the completeness of the work performed and for use in the continued operation and/or maintenance of the Facility. Except as required by law, disclosure by the Power Authority to third parties of documents created by Con Edison and/or third parties retained by Con Edison is prohibited without the prior written consent of Con Edison. All specifications, drawings, technical information and reports furnished by the Power Authority or its contractors in connection with this Second Composite Agreement are intended for the sole use of Con Edison in connection with its performance under this Composite Agreement. Disclosure by Con Edison of such documents to third parties is prohibited without the prior written consent of the Power Authority.

ARTICLE XXII
RIGHT TO INSPECT/ OBSERVE TESTING

22.1 The Power Authority shall notify Con Edison at least two (2) business days in advance of its maintenance and calibration of the revenue metering equipment, and Con Edison shall have the right to observe such work.

22.2 Con Edison may exercise these rights from time to time as it deems necessary upon reasonable notice to the Power Authority. The exercise or non-exercise by Con Edison of any such rights shall not be construed as an endorsement or confirmation of any element or condition of the Facility.

22.3 The Power Authority may exercise these rights from time to time as it deems necessary upon reasonable notice to Con Edison. The exercise or non-exercise by the Power Authority of any such rights shall not be construed as an endorsement or confirmation of any element or condition of the Facility (witness of testing or process management, i.e.; NERC, EPA, RGGI, etc.).

ARTICLE XXIII
ACCESS

23.1 **Access**. The Power Authority's or the Power Authority's Contractors' access to the Con Edison Lands and the Facility shall be subject to Con Edison's control and security requirements, including but not limited to identification cards, OSHA cards, etc..

ARTICLE XXIV
CHANGES

24.1 Con Edison reserves the right at any time to make changes to its O&M Services if such changes are not inconsistent with this Second Composite Agreement. Such changes may include increases in periodicity of the PMPs, changes to repair or service methodology, the number of personnel assigned, tool usage, repair or fabrication methods, supervision assigned and/or work hours and other similar changes.

ARTICLE XXV
AMENDMENTS

25.1 No amendment to this Second Composite Agreement shall be valid or binding unless in writing and signed by authorized representatives of the Parties.

ARTICLE XXVI
ASSIGNMENTS; SUCCESSORS

26.1 This Second Composite Agreement shall bind, and inure to benefit of, the respective successors and assigns of the parties hereto. This Second Composite Agreement may not be assigned or transferred by either party, in whole or in part, without the written consent of the other, not to be unreasonably withheld. Any purported assignment or transfer without such consent shall be void. It shall be a condition of any assignment that the assignee agree in writing to perform the obligations of the assignor under this Second Composite Agreement. Assignment shall not relieve the assignor of responsibility for the performance of its obligations or liabilities incurred prior to the date of assignment.

ARTICLE XXVII
ENTIRE AGREEMENT

27.1 This Second Composite Agreement, as it may be amended in accordance with Article XXV hereof together with the Easement Grant, contains the entire agreement and understanding of the Parties with respect to the subject matter hereof. Except as provided in Section 2.1, any other prior or contemporaneous understandings oral or written affecting the subject matter of this Second Composite Agreement are merged into this Second Composite Agreement. This Second Composite Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which taken together shall constitute one in the same instrument, it being understood that Con Edison and Power Authority need not sign the same counterpart. The Second Composite Agreement and any counterpart thereof may be delivered by fax or email and, if this Second Composite Agreement or any counterpart thereof is delivered by fax or email, they shall together with the signature(s) or copies of the signature(s) thereon, be treated for all purposes as originals that have been delivered.

ARTICLE XXVIII
CONFLICTING DOCUMENTS

28.1 **Conflicting Documents**. Solely with respect to the Parties' obligation with respect to this Second Composite Agreement, to the extent, if any, that this Second Composite Agreement and any specifications, plans, drawings and other documents that may be incorporated herein conflict with the Easement Grant, the terms of this Second Composite Agreement and any specifications, plans, drawings and other documents that may be incorporated herein shall take precedence and govern. All rights and remedies provided by this Second Composite

Agreement and the Easement Grant, shall, unless otherwise specified herein, be deemed to be cumulative so as to exist in addition to one another and to any other rights and remedies provided by law.

ARTICLE XXIX
GOVERNING LAW; SEVERABILITY

29.1 This Second Composite Agreement shall be governed by and constructed in accordance with the laws of the State of New York. If any provision or portion thereof of this Composite Agreement, of the application thereof to any persons or circumstances, shall to any extent be invalid or unenforceable, the remainder of this Composite Agreement, or the application of said provision or portion thereof to any other persons or circumstances, shall not be affected thereby, and each provision of this Second Composite Agreement shall be valid and enforceable to the fullest extent permitted by the law.

ARTICLE XXX
HEADINGS

30.1 The Article and Section headings herein are for convenience and reference only, and in no way define or limit the scope and content of this Second Composite Agreement of in any way affect it provisions.

ARTICLE XXXI
NO THIRD PARTY RIGHTS

31.1 Nothing in this Second Composite Agreement, express or implied, is intended to confer on any person, other than the parties hereto, their successors or assigns, any rights or remedies under or by reason of this Second Composite Agreement.

ARTICLE XXXII
NOT PARTNERS

32.1 Con Edison shall be an independent contractor in the performance of the O&M Services hereunder. Nothing contained in this Second Composite Agreement shall be construed to make the parties partners or joint ventures or to render either party liable for the debts or obligations of the other. No right of supervision, inspection, requirement or approval or other provision of this Second Composite Agreement and no conduct of the parties shall be construed to create a relationship of principal and agents, partners or joint ventures between the parties, or joint employers of the Power Authority's Contractors.

ARTICLE XXXIII
NOTICES

33.1 Except where otherwise specifically provided in this Second Composite Agreement, including but not limited to Article XII, Environmental Notices, any notice, demand or request required

or authorized by this Second Composite Agreement shall be in writing and will be deemed to have been duly given if mailed by United States registered or certified mail (return receipt requested), postage prepaid, if to Con Edison, to:

Consolidated Edison Company of New York, Inc.
4 Irving Place New York, New York 10003
Attention: Vice President Substation Operations
And: Vice President System & Transmission Operations

With a courtesy copy to:

Consolidated Edison Company of New York, Inc.
4 Irving Place New York, New York 10003
Attention: General Counsel

And if to the Power Authority, to:

New York Power Authority
Clark Energy Center
6520 Glass Factory Road
P/O Box 191
Marcy, NY 13403
Attention: Vice President-Transmission

With a courtesy copy to:

New York Power Authority
123 Main Street
White Plains, New York 10601
Attention: General Counsel

The addresses and persons to be notified may be changed at any time by similar notice.

ARTICLE XXXIV
WAIVER

34.1 No delay or omission by either party to exercise any right or power accruing upon a non-compliance or failure of performance by the other party shall impair that right or power or be construed to be a waiver thereof. A waiver by either party of any of the covenants, conditions or agreements hereof to be performed by the other party shall not be construed to be a waiver of any subsequent breach hereof or of any covenant or condition contained in this Second Composite Agreement.

IN WITNESS THEREOF, the parties have executed this Second Composite Agreement by their duly authorized representatives as of the date first written above.

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

By: _____
Name: Aubrey Braz
Title: Vice President Substations Operations

NEW YORK POWER AUTHORITY

By:_____
Name:
Title: Vice President Transmission

ARTICLE XXXIV
WAIVER

34.1 No delay or omission by either party to exercise any right or power accruing upon a non-compliance or failure of performance by the other party shall impair that right or power or be construed to be a waiver thereof. A waiver by either party of any of the covenants, conditions or agreements hereof to be performed by the other party shall not be construed to be a waiver of any subsequent breach hereof or of any covenant or condition contained in this Second Composite Agreement.

IN WITNESS THEREOF, the parties have executed this Second Composite Agreement by their duly authorized representatives as of the date first written above.

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

By: _____
Name: Aubrey Braz
Title: Vice President Substations Operations

NEW YORK POWER AUTHORITY

By: _____
Name: Philip F. Tosa
Title: Vice President Transmission

Exhibit A:

List of Equipment* for O&M Services

List of equipment contains CEII material and has been deleted from public version of agreement.

Exhibit B:

SF6 Equipment Tracking Cylinder Log

Location:_____

Date	Cylinder Serial #	Actual weight before maint.(lbs) (A)	Actual weight after maint.(lbs) (B)	Gas added to equipment (A-B)	Equipment description

Exhibit C:

Power Authority Terms and Requirments

Terms Relating to the O&M Services

Pursuant to Power Authority's request, the Astoria Annex Substation shall be generally kept unstaffed and Con Edison shall provide any staffing at the Astoria Annex Substation for its O&M Services as required by Article IV of this Agreement.

Terms Relating to the Tracking and Reporting of SF6 Gas Usage and Emissions at the Facility

The Astoria Annex Substation will contain Sulfur Hexafluoride (SF6) gas. Due to the Power Authority's commitment to the Climate Registry and in anticipation of the Environmental Protection Agency's proposed mandatory gas reporting rule, the Power Authority recognizes the need to track the SF6 gas inventory, additions and losses of SF6 gas to the Power Authority equipment. Accordingly, Con Edison will be responsible for tracking the inventory, additions and losses of SF6 gas in the Power Authority equipment, in connection with the Astoria Annex Substation on the following terms and conditions:

1. Con Edison shall handle all SF6 gas and SF6 Gas Equipment in a manner to minimize releases.

2. Only personnel who are familiar with the risks and the need to minimize leaks and releases of FS6 gas will be permitted to work on SF6 Gas Equipment.

3. As provided in Section 4.1.7 above, the Power Authority shall provide to a selected group of Con Edison mechanics and supervisors training required by the Power Authority for personnel working with SF6 Gas Equipment.

4. Con Edison shall weigh the Power Authority-owned SF6 gas containing cylinders, using certified scales purchased by the Power Authority for Con Edison's use, by the end of the first quarter of the then current year to establish a beginning year weight.

5. Con Edison shall weigh the SF6 gas containing cylinders before and after each maintenance activity, and record the weights, and such additional information as is agreed between the Power Authority and Con Edison, in Con Edison's work management system, Maximo. The report will be presented in a form similar to the example attached as Exhibit B.

6. The Power Authority shall purchase and provide for Con Edison's use a weight scale that is accurate to within 1%. Thereafter, Con Edison shall be responsible for ensuring that the weight scale is re-calibrated according to the manufacturer's recommendations, or at least annually. In the event a new scale has to be purchased, it shall be at the Power Authority's sole cost and expense.

7. Con Edison shall submit to the Power Authority on a monthly basis the cylinder log(s) and a summary of the weight of SF6 gas added to and/or removed from the Power Authority equipment as recorded in the Maximo work management system. This submission is required by the 15th of the following month.

8. Subject to Con Edison's prior review and approval, the Power Authority shall provide inspection and maintenance specifications for the maintenance of the Power Authority-owned SF6 Gas Equipment which Con Edison will implement. Con Edison shall retain documentation recording any leaks found on the SF6 Gas Equipment.

9. The Power Authority shall purchase and provide the SF6 gas cart subject to Con Edison's prior review and approval, for exclusive use at the Power Authority's Facility or otherwise as specified by the Power Authority the Power Authority shall provide inspection and maintenance specifications for maintenance on the Power Authority-owned SF6 gas cart which Con Edison will implement.

10. To aid in the detection of leaks of SF6 gas from the Power Authority Gas Equipment, Con Edison shall be aware that the Power Authority owns and can and provide to Con Edison for use, an SF6 camera that is designed to function in indoor applications. The Power Authority will make this equipment available within 24 hours of a request. Con Edison will retain documentation evidencing that the gas SF6 Gas Equipment and cart is not leaking.

11. Con Edison shall ensure that all SF6 gas-containing spare equipment is kept under positive pressure and not leaking. If the positive pressure is from SF6 gas, these items will need to be part of the SF6 inventory.

12. Con Edison shall not intentionally or knowingly release SF6 gas to the atmosphere, except as necessary in connection with sampling for chemical analysis of the SF6 gas.

13. Monday through Friday, Con Edison shall notify the Power Authority within 24 hours of a release of more than 100 pounds of SF6 to the atmosphere by contacting: [the Power Authority to provide name, email and telephone number of contact person].

14. Alarms on all SF6 Gas Equipment will be connected to the Con Edison Energy Control Center and to the Power Authority Generating Station.

15. Con Edison shall submit to the Power Authority by January 31 of each given year, the sum total of SF6 gas added to the Power Authority-owned SF6 Gas Equipment during the preceding year. If no SF6 gas was added, that shall be stated explicitly on the submission.

Exhibit D:

"Minor Spare Parts", "Major Spare Parts", and "Other Parts and Equipment"

List of spare parts and other parts and equipment contains CEII material and has been deleted from public version of agreement.

EXHIBIT E:

Survey for Easement Agreement

The survey contains CEII material and has been deleted from public version of agreement.

EXHIBIT F:

Good Faith Estimate of Preparatory Work and Services

APPENDIX A

Con Edison SSO specification 0100-0022/06

APPENDIX B

Con Edison Specification EO-4022 Testing of Acc Feeders Operating at 69kv through 345kv

APPENDIX C

Con Edison ES-1003 Installation and Test Specification for Oil Immersed Power Transformers, Reactors and Regulators

APPENDIX D

Con Edison ES-1000 Preventative Maintenance (PMP)

APPENDIX E

Con Edison 2010 Accommodation Services Charges

APPENDIX F

Power Authority Prompt Payment Policy

EXHIBIT F:

Good Faith Estimate of Preparatory Work and Services

	QTY	Units	Unit	Total	Rate	Cost	
COMMISSIONING/START-UP COSTS:(NOT incl. PST)							
Operator Training	12	80	hr	960	116.9	112224	
Mechanic Training	10	40	hr	400	116.9	46760	
PST Technician Training	14	80	hr	1120	116.9	130928	
Drawing Review- Technician	2	160	hr	320	116.9	37408	
Trip Check Template Development- Technician	2	80	hr	160	116.9	18704	
ProTest Database Development-Technician	2	320	hr	640	116.9	74816	
Bomb Search Plan	1	1	Vendor	1	3500	3500	
SSO Maintenance Procedures for GIS equipment	1	1	Vendor	1	5000	5000	
						$ 429,340	TOTAL COMMISSIONING Costs Including PST, TGroup and ASM
MONTHLY COSTS (NTE):							
1 Operator 5day/wk 8 hr/day	1	160	hr	160	116.9	18704	
Monthly compliances (fire extinguisher, eyewash, emerg. lighting	2	8	hr	16	116.9	1870.4	
Monthly facility maint (pump out reactor moats, lighting, etc)	2	8	hr	16	116.9	1870.4	
janitorial service contract	1	1	ls	1	700	700	
exterminator service contract	1	1	ls	1	100	100	
landscaping service contract	1	1	ls	1	200	200	
bottled water service	1	1	ls	1	30	30	
Consumables such as paper and toner for printers, pens, toilet paper, paper towels, soap, trash bags, cleaners, wire ties, etc.:	1	1	ls	1	100	100	
						$ 23,575	
ADDITIONAL ANNUAL PERIODIC COSTS							
Quarterly battery, rectifier compliance inspection	4	32	each	128	116.9	14963.2	

Quarterly Chem Lab tech charges oil sampling of reactors	4	8	each	32	181.2	5798.4	
Semi-Annual SF6 bus sampling:	2	8	each	16	116.9	1870.4	
Semi-Annual Chem Lab tech charges SF6 bus sampling	2	16	each	32	181.2	5798.4	
ASM summerization/winterization compliance of emergency diesel generator	2	32	each	64	116.9	7481.6	
SSM summerization/winterization compliance of circuit breakers, reactors	2	64	each	128	116.9	14963.2	
Annual fire detection inspection and servicing	1	8	each	8	116.9	935.2	
Annual Fire Inspection - Vendor	1		ls	0	TBD		
Annual stray voltage survey	1	8	hr	8	116.9	935.2	
						$ 52,746	
ADDITIONAL ANNUAL PST COSTS/ PREVENTATIVE MAINTENANCE							
Periodic Relay Calibrations (every 6 years) per Bus (4)	2	160	hr	320	116.9	37408	
Periodic Trip Checks (every 6 years) per Bus (4)	4	320	hr	1280	116.9	149632	
						$ 187,040	
This estimate does not include longer-term periodic maintenance of the station equipment, i.e. DT of circuit breakers, PMs for disconnect switches, etc.							
This estimate does not include any vendor costs associated with the building management system or security system.							

SUBSTATION OPERATIONS
PROCEDURE

SUBJECT: ACCEPTANCE OF EQUIPMENT INSTALLATIONS	
PROCEDURE NO.: 0100-0022/06	**DATE ISSUED: 10/09**
REVISED BY: J. CALANDRINO/T. O'CONNOR	**PAGE: 1 of 22**
	APPROVED: SANJAY BOSE

1.0 PURPOSE

1.1 To provide guidance and check lists for use by Substation Operations to assure construction projects will be completed in conformance with Engineering specifications, and will be consistent with Substation Operations practices and procedures.

2.0 APPLICATION

2.1 This procedure applies to Substation Operations management.

3.0 DEFINITIONS

3.1 None

4.0 PROCEDURE

4.1 Project Initiation and Planning

a. An SSO landlord representative is assigned to the Project Team to act as liaison with all groups concerned with the project and participate in walk downs.

b. Conceptual drawings are reviewed for conformance with SSO operating and maintenance requirements.

c. Meetings are convened by the Project Manager to review the following:

- Scope of work and physical changes proposed
- Project estimate and schedule
- ***Recommended spare parts list***
- ***Recommended new equipment vendor training***
- Field conditions
- Outage and tie-in requirements

4.2 Construction and Installation

a. The Substation Operations landlord representative visits the work site as required and performs the following:

(1) As project deficiencies or discrepancies are identified, discuss these with the Project Manager, Project Engineer, Construction and Engineering Department representatives and determine corrective action.

(2) Conduct visual inspections to ensure that work is progressing properly.

(a) Major equipment (i.e. circuit breakers, transformers, reactors, circuit switchers) should be monitored for discrepancies prior to acceptance. Special needs (i.e. platforms, steps, and signage) should be identified.

(b) Communication systems should be evaluated to ascertain whether new or existing communication lines will be utilized.

(3) Training Evaluations

(a) Training employees on new equipment (circuit breakers, protective relay systems, etc.) should be performed prior to equipment being placed in service.

(b) Training sessions (by vendors, DOJT or TLC) shall be scheduled.

(4) Record Updating

(a) Information pertaining to any new auxiliary systems or equipment (i.e. emergency diesel generators, dielectric fluid facilities, circuit breakers, etc) that will be added to the MAXIMO equipment database should be forwarded to the SSO Asset Management Group prior to acceptance.

(b) Bomb Search Plans and station layout prints shall be reviewed and updated as necessary.

b. When the project has progressed to approximately within two months of the scheduled service date or the Construction representative estimates that the field work is 50% complete, whichever comes first, the Substation Operations landlord representative meets the Construction Manager on site to review the following:

- Construction status
- Tests performed
- Equipment acceptance criteria/data

c. The SSO landlord representative, Construction representative, Project Engineer and PST prepare a final project punch list to verify the Construction Group or their contractors address all outstanding items. Equipment checklists (Exhibits A, B, C, D, E, ***H, I and J***) should be used to develop the punch list.

d. The landlord representative reviews the punch lists at least weekly with the Construction Representative and ensures all items are completed.

e. If discrepancies affect the safety of personnel or the operation of equipment, ensure the discrepancies are corrected prior to placing the equipment in service.

f. If discrepancies can be completed without future system outages, coordinate with the Construction Representatives and establish a schedule for completion of the discrepancies.

4.3 Project Completion

a. Verify any required B&A's have been developed and distributed to the District Operator and the Station Control Room.

b. ***Verify SCADA system high tension operating diagrams (HTODs) on screen are correct before accepting equipment.***

c. When all operational checks and tests have been completed, the Construction and landlord representatives should complete the Progress Report (Exhibit F).

d. Forward the Progress Report to the Project Manager to submit to the Scheduling District Operator.

e. The Area Manager ensures that complete nameplate data is entered into the Maximo database. ***This should be added during construction and installation.***

f. ***Equipment signage must be correct before accepting the equipment for service.***

g. ***Relay systems must have the approved relay settings applied from relay protection Engineering. Verify relay system signage is accurate before accepting the system.***

h. ***Verify telecommunication systems for relay and/or SCADA are correct.***

i. The Area Manager issues an "Acceptance Letter" acknowledging acceptance of the new or replaced facilities for operation. (See Exhibit G for a sample "Acceptance Letter").

(1) Indicate on the "Acceptance Letter" form if load checks or load readings are required.

(2) The letter is forwarded to the Senior System Operator, the Manager of the Sequence Group at the SSO Control Center, the Project Manager and the Area Construction Manager.

(3) A copy of the letter is sent to the SSO Maximo Manager and the Control Center Shift Manager.

j. When the equipment installations have been accepted, the Substation Operations Area Manager is given the following:

- All pertinent drawings
- Manufacturers manuals
- Special tools and operating devices supplied as part of the equipment

k. The drawings, manuals, and construction data ***are maintained*** on file ***in hard copy or electronically*** for the life of the equipment.

5.0 RESPONSIBILITIES

5.1 The Area Manager or designee is responsible for the following:

a. Ensuring projects, and any associated changes, are within budget and funded.

b. Assigning SSO Area personnel to act as the Area Substation Operations representative for the project.

c. Dispositioning conflicts associated with the resolution of discrepancies.

d. Issuing Acceptance Letters.

e. Ensuring nameplate data is entered into Maximo ***during construction and installation.***

f. ***Ensuring training is provided on all new equipment.***

5.2 The landlord representative is responsible for the following:

a. Ensuring potential projects are identified and assisting Engineering in the development of project documents.

b. Acting as the Area Substation Operations representative for the project.

6.0 EXHIBITS

6.1 Exhibit A - Substation Operations Department Checklist for Installation of High Voltage Circuit Breakers

6.2 Exhibit B - Substation Operations Department Checklist for Installation of High Voltage Transformers

6.3 Exhibit C - Substation Operations Department Checklist for Installation of 138kV, Mark V S&C Circuit Switcher

6.4 Exhibit D - Substation Operations Department Checklist for Installation of High Speed Ground Switch

6.5 Exhibit E - Checklist for installation of relay panels

6.6 Exhibit F - System Operation Department Progress Report

6.7 Exhibit G - Acceptance Letter

6.8 ***Exhibit H - New Equipment Acceptance Checklist***

6.9 ***Exhibit I - New Station Acceptance Checklist***

6.10 ***Exhibit J - Substation Operations Department Checklist for installation of Low/Medium Voltage Station Equipment***

6.11 ***Exhibits A thru J - printable versions available on the SSO website***

SSO Forms and Data Sheets List - Policy and Administration

7.0 REFERENCES

7.1 ***Central Operations Procedure COP 10-0-5 "Project Management"***

7.2 System Operations Procedure ***SO-07-4*** "Requirements for Energizing New Facilities"

7.3 System Operations Procedure ***SO-09-14*** "Updating Feeder Prints, Vault Prints and Operating Diagrams

EXHIBIT A

HIGH VOLTAGE CIRCUIT BREAKER CHECKLIST

STATION _____ POSITION _____

	Completed By/Date	Verified by SSO	Verification Date
1. Bushing Power Factor			
2. Grading Capacitors			
3. Pre-insertion Resistors			
4. Contact Resistance			
5. CT Tests			
6. Control Wire Megger			
7. Control Circuit Operation			
8. Timing			
9. Hi-Pot			
10. Relay Trip Tests			
11. ***Approved Relay Settings Applied***			
12. Gas/Air/Oil Pressure Switches			
13. Air/Gas Safety Valves			
14. Leak Tests			
15. Air/Gas/Oil Dielectric: PPM, kV			
16. Bushing Oil Level			
17. C.T. Junction Box Seal			
18. Control Cabinet			
19. Insulators Clean			
20. Controls Properly Identified			
21. Paint Condition			
22. Housekeeping			
23. Alarms			
24. ***Signage is Correct***			

EXHIBIT B

HIGH VOLTAGE TRANSFORMER CHECKLIST

STATION: _____ **POSITION:** _____

	Completed By/Date	Verified by SSO	Verification Date
1. Bushing Power Factor			
2. Winding Power Factor			
3. Hi-Pot			
4. CT Tests			
5. PT Tests			
6. Control Wire Megger			
7. Winding Impedance			
8. Turns Ratio			
9. Oil Level Gauges			
10. Oil Temp. Gauges			
11. Sudden Pressure Relay			
12. Pressure Relief Device			
13. Tapchanger Inspection			
14. Tapchanger Smoothness:			
15. Vacuum Interrupter Hi-Spot			
16. No Load Tapchanger Setting			
17. Phasing Test			
18. Relay Trip Checks			
19. ***Approved Relay Settings Applied***			
20. Oil Tests			
21. Cooling Fans and Pumps			
22. Deluge System			
23. Insulators Clean			
24. Controls Properly Identified			

EXHIBIT B
(Cont'd)

HIGH VOLTAGE TRANSFORMER CHECKLIST

STATION: _____ POSITION: _____

	Completed By/Date	Verified by SSO	Verification Date
25. Leak Check	_____	_____	_____
26. Paint Condition	_____	_____	_____
27. Housekeeping	_____	_____	_____
28. Alarms	_____	_____	_____
29. ***Signage is Correct***	_____	_____	_____

EXHIBIT C

138KV, MARK V S&C CIRCUIT SWITCHER CHECKLIST

STATION: _____ POSITION: _____

Reference: EI-1006-2

		Completed by/Date	Verified by SSO	Verification Date
1.	Overall Micro Ohms - Max. 750			
2.	2 GAP Unit Micro Ohms - Max. 350			
3.	Internal Shunting Resistor Micro Ohms 220 to 300			
4.	Megger Control Wiring			
5.	Position Indicator: Gray - Closed Yellow - Open			
6.	Operations Counter OK			
7.	SF6 Gas Pressure Indicator: Red - Low Gray - Normal			
8.	Electrical Interlock for Manual Operation			
9.	Switch Position: Red - Fully Closed Green - Fully Open			
10.	***Signage is correct***			

REMARKS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

EXHIBIT D

HIGH SPEED GROUND SWITCH CHECKLIST

STATION: _____ POSITION: _____

Reference: EI-1016

		Completed by Date	Verified by SSO	Verification Date
ORIGINAL TYPE 138 kV				
1.	Leak Test at 15 PSIG	_____	_____	_____
2.	SF6 Gas Dewpoint (-27°F)	_____	_____	_____
3.	Advance Pressure Sw: 7.5 PSI	_____	_____	_____
4.	Critical Pressure Sw: 2.5 PSI	_____	_____	_____
5.	Closing Time - Max. 5 cycles	_____	_____	_____
6.	Hi-pot: 230kV DC 5 min.	_____	_____	_____
7.	Mechanism Latch OK	_____	_____	_____
8.	Operate Via Relays	_____	_____	_____
9.	***Approved Relay Settings Applied***	_____	_____	_____
10.	***Signage is Correct***	_____	_____	_____

Remarks:

ORIGINAL TYPE 69 kV				
1.	Leak Test at 30 PSIG	_____	_____	_____
2.	Nitrogen Dewpoint (-20°F)	_____	_____	_____
3.	Advance Pressure Sw: 15 PSI	_____	_____	_____
4.	Critical Pressure Sw: 12 PSI	_____	_____	_____
5.	Closing Time - Max. 5 cycles	_____	_____	_____
6.	Hi-pot: 130 kV DC - 5 min.	_____	_____	_____
7.	Mechanism Latch OK	_____	_____	_____
8.	Operate Via Relays	_____	_____	_____

EXHIBIT D

HIGH SPEED GROUND SWITCH CHECKLIST

9. Approved Relay Settings Applied	_____	_____	_____
10. Signage is Correct	_____	_____	_____

Remarks:

EXHIBIT D
(Cont'd)

TYPE CPG 138 kV HIGH SPEED GROUNDING SWITCH CHECKLIST

STATION: _____ POSITION: _____

Reference: EI-1016

	Completed by Date	Verified by SSO	Verification Date
1. Leak Check at 75 PSIG	_____	_____	_____
2. SF6 Dewpoint (-45°F)	_____	_____	_____
3. Pressure Switch - 40 PSI	_____	_____	_____
4. Closing Time - Max. 5 cycles	_____	_____	_____
5. Hi-pot 230kV DC - 5 min.	_____	_____	_____
6. Mechanism Latch OK	_____	_____	_____
7. Verify Target Positions:	_____	_____	_____

	Open & Reset	Closed
Indicating light	Green	Red
Viewing window at lower end of interrupter	Green "Open"	Red "Closed"
Viewing window on shunt trip device	Red	No flag
Yellow or Red paint marks on shaft hub	RH side Mark	LH side Mark

8. Operate Via Relays	_____	_____	_____
9. ***Approved Relay Settings Applied***	_____	_____	_____
10. ***Signage is Correct***	_____	_____	_____

Remarks:

_____

_____

EXHIBIT E

RELAY PANEL CHECKLIST

STATION: _____ **PANEL ID:** _____

		Completed By Date	Verified by SSO	Verification Date
1.	Accessibility: Relays Targets Switches Indicators	_____	_____	_____
2.	Panel Layout	_____	_____	_____
3.	Nameplate/Identification: ***Signage is Correct*** Relays Switches Indicators	_____	_____	_____
4.	Wiring, Bundled, Tied, Fireproofed	_____	_____	_____
5.	States Blocks, Condition Accessible	_____	_____	_____
6.	Relays mounted level, Covers intact	_____	_____	_____
7.	Lamp Covers Intact	_____	_____	_____
8.	Doors Operate Properly	_____	_____	_____
9.	Cubicle Lighting	_____	_____	_____
10.	Housekeeping	_____	_____	_____

Remarks:

_____

_____

_____

_____

_____

_____

EXHIBIT F

PROGRESS REPORT

Station: _____ Proposed Service Date: _____

B&A Drawing No.: _____ Date: _____

Equipment: _____

Scope of Work: _____

Signs and Identification

IDENTIFICATION OF STATION EQUIPMENT SHALL NOT BE REPEATED WITHIN THE SAME SUBSTATION (THE SAME HIGH TENSION OPERATING DIAGRAM.)

Ensure Proper Identification of:

Supervisory System _____ Equipment feeder phases _____

Equipment signage _____

Operational Checks and Tests

Deluge System	_____	Circuit Breakers	_____
Interlock System	_____	Disconnect Switches	_____
Alarm System	_____	Circuitry Wiring	_____
Data Logging	_____	Cathodic Protection	_____
Oil System	_____	Relay System	_____
Nitrogen System	_____	Air System	_____
Relay Systems	_____	***Telecom Equipment***	_____

All items above have been checked and equipment is ready for Final Testing.
SSO Construction Representative _____

Final Checks Prior to Placing Equipment/Feeder in Service

Equipment Installation Complete: _____

Test Letter/ Date: _____

Relay System Checked & Tested: _____

Hipot Test Completed: _____ Date _____

Phase Test Completed: _____ Date _____

Load Test Completed: _____ Date _____

In Service: _____ Date _____

SSO Area Representative: _____ Date _____

EXHIBIT F
(Cont'd)

Miscellaneous:

B&A's_____

Preliminary HTOD diagram_____

Operator Training_____

Maintenance Spare Parts_____

Special Needs: i.e. platforms, steps_____

EXHIBIT G

Acceptance Letter

(Use with SSO Procedure 0100-0022)
(Use with SO Procedure *SO-07-04*)

Project: _____
Station: _____
Equipment: _____

This is to acknowledge that the facilities listed below are acceptable for operation based on the following.

- All operational checks and required tests (with the exception of phasing and/or load checks which will be performed after the equipment is energized) have been completed with satisfactory results.
- The protection for these facilities has also been tested and approved and has been inspected to verify that all control switches are in the normal operating position thus indicating that it is armed and ready for normal service.

Based on these results, the identified organization below accepts the facilities listed below and acknowledges that they are suitable and ready to be energized and placed in service.

ACCEPTING ORGANIZATION: _____ **Date Acceptance Effective:** __/__/__.

Equipment Status: all equipment listed below is open and grounded.
All portable grounds are identified, visible and stop tagged.
Combinations will be forwarded in a separate memorandum.

DESCRIPTION OF FACILITY	STATION	60 HZ MAP DESIGNATION

ADDITIONAL INFORMATION:

_____
_____
_____
_____

Attachments:

.....
.....

Cc: Copies To: (to be distributed at ECC by Senior System Operator)

District Operator
Operations Center Shift Manager
.....

EXIBIT H

NEW EQUIPMENT ACCEPTANCE CHECKLIST

STATION: _____ Equipment: _____

		Completed By/Date	Verified by SSO	Verification Date
1	All Work Permits are complete	_____	_____	_____
2	All testing is complete	_____	_____	_____
3	Equipment has been inspected	_____	_____	_____
4	Signage is correct	_____	_____	_____

IDENTIFICATION OF STATION EQUIPMENT SHALL NOT BE REPEATED WITHIN THE SAME SUBSTATION (THE SAME HIGH TENSION OPERATING DIAGRAM.)

5	Training is complete	_____	_____	_____
6	MAXIMO update is complete	_____	_____	_____
7	B&A's issued	_____	_____	_____
8	High Tension Operating Diagram and SCADA System Updated	_____	_____	_____
9	Acceptance Letter issued	_____	_____	_____

EXHIBIT I

NEW STATION ACCEPTANCE CHECKLIST

STATION: _____ *Equipment:* _____

	Completed By/Date	Verified by SSO	Verification Date
Transmission Equipment			
1 Transformers			
2 Phase Angle Regulators			
3 Reactors			
4 High Voltage Breakers			
5 Circuit Switchers			
6 Disconnect Switches			
7 Ground Switches			
8 Potential Devices			
9 Deluge System			
10 PURS/Pumphouse			
11 Other_____			
Distribution Equipment			
1 Transformers			
2 Switchgear			
3 Circuit Breakers			
4 Ground and Test Devices			
5 Deluge System			
6 Potential Devices			
7 Capacitor Banks			
8 Other_____			
Protective Systems			
1 Protective Relay Systems			
2 Approved Relay Settings Applied			
3 Start Up/Shut Down Panel			
4 Load Shedding Panel			

EXHIBIT I

(Cont'd)

5	Human Machine Interface (HMI)			
6	Supervisory Systems			
7	Digital Fault Recorder (DFR)			
8	Station Event Recorder (SER)			
9	CCVT/CCPD's			
10	Other_____			

Station Equipment

1	Mimic Board			
2	Alarm Panel			
3	AC/DC Load Boards			
4	Rectifiers			
5	Batteries			
6	Station L&P			
7	Emergency Diesel Generator			
8	Fire Protection Systems			
9	Communication Equipment			
10	Station Lighting			
11	Perimeter Fencing/Gate			
12	Station Security Systems			
13	Station Operator Console			
14	Other_____			

Final Inspection

1	All Work Permits are complete			
2	All testing is complete			
3	Equipment has been inspected			
4	Signage is correct			

IDENTIFICATION OF STATION EQUIPMENT SHALL NOT BE REPEATED WITHIN THE SAME SUBSTATION (THE SAME HIGH TENSION OPERATING DIAGRAM.)

5	Training is complete			
6	MAXIMO update is complete			

EXHIBIT I

(Cont'd)

7	*Acceptance Letters issued*	_____	_____	_____
8	*B&A's issued*			
9	*High Tension Operating Diagram and SCADA System Updated*	_____	_____	_____
10	*Other*_____	_____	_____	_____

EXHIBIT J

LOW/MEDIUM VOLTAGE STATION EQUIPMENT ACCEPTANCE CHECKLIST

STATION: _____ *Equipment:* _____

	Completed By/Date	Verified by SSO	Verification Date
Distribution Equipment			
1 Switchgear/Cubicles			
2 Circuit Breakers			
3 Ground and Test Devices			
4 Test Sets & Test Leads			
5 Potential Devices			
6 Capacitor Banks			
7 Other_____			
Protective Systems			
1 Protective Relay Systems			
2 Approved Relay Settings Applied			
3 Start Up/Shut Down Panel			
4 Load Shedding Panel			
5 Human Machine Interface (HMI)			
6 Supervisory Systems			
7 Other_____			
Station Equipment			
1 Mimic Board			
2 Alarm Panel			
3 Communication Equipment			
4 Other_____			

EXHIBIT J
(Cont'd)

Final Inspection

1	*All Work Permits are complete*	_____	_____	_____
2	*All testing is complete*	_____	_____	_____
3	*Equipment has been inspected*	_____	_____	_____
4	*Signage is correct*	_____	_____	_____

IDENTIFICATION OF STATION EQUIPMENT SHALL NOT BE REPEATED WITHIN THE SAME SUBSTATION (THE SAME HIGH TENSION OPERATING DIAGRAM.)

5	*Training is complete*	_____	_____	_____
6	*MAXIMO update is complete*	_____	_____	_____
7	*Acceptance Letters issued*	_____	_____	_____
8	*B&A's issued*	_____	_____	_____
9	*High Tension Operating Diagram and SCADA System Updated*	_____	_____	_____
10	*Other*_____	_____	_____	_____

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
4 IRVING PLACE
NEW YORK, N.Y. 10003

SPECIFICATINO EO-4022
REVISION 5
JANUARY 2004

TESTING OF AC FEEDERS OPERATING AT 69 KV THROUGH 345 KV

TRANSMISSION FEEDERS ENGINEERING
CENTRAL ENGINEERING

FILE: SYSTEM OPERATION
MANUAL NO. 5

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TESTING OF AC FEEDERS OPERATING AT 69 KV THROUGH 345 KV

1.0 PURPOSE

1.1 To specify tests required on alternating current feeders on the Consolidated Edison System, which shall be performed prior to placing a feeder into service. The tests shall be applied to feeders that will be energized for the first time, feeders which have been subjected to repairs following a fault, feeders which have been removed from service for other work and to existing dead cable which will be placed back in service.

1.2 This specification does not cover:

1.2.1 Fault locating.

1.2.2 High potential testing of station electrical equipment and circuits in generating stations and substations unless such equipment is part of a feeder as defined in Paragraph 4.6 below. (See Specification EI-1002)

2.0 DISTRICTS APPLICABLE

This specification is applicable to all districts.

3.0 APPLICATION

Following are the tests for AC feeders. Refer to Section 6.0 for tests applicable to a particular feeder type.

3.1 Ammeter Clear Test. See Exhibit II for details.

3.2 High Potential Test. See Exhibit I for details. This test does not apply to solid dielectric feeders.

3.3 Operational Test (solid dielectric feeders only).

3.4 Jacket Test (solid dielectric feeders only)

3.5 Megger Test

4.0 DEFINITIONS

4.1 Ammeter Clear Test – The application of a low voltage AC to feeder to indicate the presence or absence of short circuits or grounds on the feeder.

4.2 High Potential Test – The application of a specific DC voltage to cable and equipment to assure the insulation is in serviceable condition.

4.3 Operational Test – The application of a rated AC voltage to solid dielectric cable and equipment (with no load on the feeder) for 24 hours, to assure the insulation is in serviceable condition. This test applies only to solid dielectric feeders.

4.4 Jacket Test – The application of a specific DC voltage to the jacket of a solid dielectric cable to determine the condition of the jacket.

4.5 Megger Test – The application of 1000 volts DC for 5 minutes, between one conductor and ground with the other conductors grounded, to measure insulation resistance.

4.6 Feeder – An electric cable system consisting of a cable or cable sections joined together by cable joints and cable terminations.

4.7 Access Cover – A welded or bolted removable cover, which permits access to electrical connections that are normally enclosed in a chamber or a tank.

5.0 REQUIREMENTS

5.1 New Installations and Repaired Feeders

5.1.1 New feeders, feeders that have been repaired following a fault or a test failure, and feeders that have been removed from service for the addition of apparatus or rearranging equipment shall be tested as follows:

- ☐ Ammeter Clear Test as described in Paragraph 6.1 and Exhibit II.
- ☐ High Potential Test as described in Paragraph 6.2 and Exhibit I. This test does not apply to solid dielectric feeders.
- ☐ Operational Test as described in Paragraph 6.3. This test applies only to solid dielectric feeders.
- ☐ Jacket Test as described in Paragraph 6.5. This test applies only to solid dielectric feeders in which there is a conductive or semi-conductive layer over the cable jacket or the outer surface of the cable jacket can be grounded through the creation of a grounding medium such as submerging the cable in water.

5.1.2 Exceptions

- Ameter Clear Test may be omitted by the operator having jurisdiction in those instances where all applied grounds were removed and visually verified as being removed.

- Ammeter Clear Test may be omitted by the operator having jurisdiction in those instances where high speed ground switches that may have operated are reset and verified as being open.

- Ammeter Clear Test on high voltage transmission cables may be omitted by the operator having jurisdiction in those instances where a scheduled High Potential Test is to be performed on cable prior to energization and return to service.

- High Potential Test for 138 kV and higher voltage open wire circuits, no tests are required. If work is performed by other than Company forces, the Transmission Line Maintenance (TLM) Section shall inspect the feeder prior to energizing to assure the removal of all grounds.

- High Potential Test shall not be performed for any solid dielectric cables except as described in Paragraph 6.4.

5.2 Dead Cable

A segment of dead cable that will be added to an existing feeder operating at 69 kV to 345 kV shall be tested after splicing as part of the entire feeder as described in Paragraph 5.1 above.

6.0 TESTS ON FEEDERS

6.1 Ammeter Clear Test

An alternating current ammeter clear test is made by applying 120 volts, 60 hertz derived from a grounded neutral source, to each conductor of a feeder through an ammeter and resistor adjusted to limit the short-circuit current to 5 amperes. The test is applied to each conductor separately while the other conductors are grounded at the point where the test is applied.

6.2 High Potential Test – Paper Insulated Cables

Paper insulated cables include high pressure fluid filled (HPFF), high pressure gas filled (HPGF), and medium and low pressure fluid filled cables.

6.2.1 New paper-insulated cable to be placed in service shall receive a High Potential Test.

6.2.2 Before restoring an existing paper insulated feeder to service, a High Potential Test shall be made if any of the following work was done:

- ☐ Repair of feeder failure (in service or during test) in the cable, joint, or termination
- ☐ Removal of access covers on existing connected apparatus
- ☐ Addition of an apparatus to feeders requiring the removal of access covers
- ☐ Addition of dead cable (See Paragraph 5.2)
- ☐ Making up all station potheads
- ☐ Work on low pressure fluid-filled and high-pressure pipe-type or self-contained type cables that involves the removal of a joint sleeve or exposure of the cable insulation

6.3 Operational Tests – (solid dielectric feeders only)

6.3.1 Following the installation of a new solid dielectric feeder, an Operational Test shall be performed as follows: the rated AC operating voltage shall be applied, without any load on the cable, and kept at this voltage for 24 hours. Application of the AC voltage shall be in accordance with EO-4150, "Procedure for De-energizing or Energizing 500 kV, 345 kV, 230 kV, and 138 kV Transmission Feeders." If no failure occurs during this testing period, the system is ready for service.

6.3.2 Before restoring an existing solid dielectric feeder to service, an Operational Test shall be performed if any of the following work was done:

- ☐ Repair of feeder failure (in service or during test) in the cable, joint, or termination
- ☐ Addition of dead cable (See Paragraph 5.2)
- ☐ Making up any potheads terminating any phase of the feeder.

6.4 High Potential Test – Hybrid System:

When a hybrid system, i.e., a combination of paper insulated and solid dielectric cables existing on a feeder (such as Feeders 701 or 702), the requirements specified in Paragraph 6.2 of this specification shall apply.

6.5 Jacket Test – (solid dielectric only)

A 10 kV DC voltage is applied for one minute between the metallic sheath and ground. Each phase is tested separately. Jacket Test shall be performed both before and after the installation of the cable to determine the integrity of the jacket.

6.6 Megger Tests

A 1000 volt DC Megger test set can be used to measure the insulation resistance of a feeder. The test is applied to each conductor separately while the other conductors are grounded at the point where the test is applied. The minimum satisfactory insulation resistance can be found in Specification EI-1002, Table I.

7.0 OPERATION OF APPARATUS PRIOR TO TESTS

Prior to high potential tests and Megger tests on AC feeders, the following operations shall be performed as required on the indicated apparatus:

Apparatus	Operation
Station transformer, potential transformer, regulator, load ratio transformer, lightning arrester, shunt reactor or shunt capacitor	Disconnect apparatus. If the disconnecting facilities do not exist, refer this condition to Electrical Engineering for corrective action or alternative operation.
Auto-transformer, phase angle regulator and voltage regulator operating at 69 kV or above	See Note C in Exhibit I.
Transformer	If the winding to be tested is "Y" type, disconnect neutral ground connection. If disconnecting facilities do not exist, refer this condition to Electrical Engineering for corrective action or

	alternative operation.
Grounding Transformer	Remove ground connection from high voltage side of neutral bushing and close short circuiting switch on low voltage side. If a short-circuiting switch does not exist, refer this condition to Electrical Engineering for corrective action or alternative operation.
Coupling capacitor and potential device	Close the primary ground switch of the coupling capacitor or potential device.

8.0 CALIBRATION OF MOBILE TEST EQUIPMENT

The high potential test equipment on the test truck shall be:

8.1 Operated with sphere gaps attached, which have been set at an air gap spacing (in millimeters) determined from graphs used for calculating the distance. It shall be set at a voltage no greater than 10% above the required test voltage.

8.2 Tested annually by the Technical Services Department to check the calibration of the metering equipment.

9.0 LEAKAGE MEASUREMENT OF TEST FACILITIES

9.1 Prior to the application of a high potential test, leakage measurements of the test facilities shall be made at the high potential test voltage for five minutes.

9.2 Upon the completion of a high potential test, leakage measurements of the test facilities shall be made at high potential test voltage for five minutes.

9.3 If the elapsed time for making a test on a feeder should exceed three hours, additional leakage measurements shall be made on the test facilities at approximately three hour intervals.

10.0 REFERENCE

The following specifications are listed for reference:

EI-1002 "Specification for Proof Testing of Station Electrical Equipment and Circuits," filled in EI Standards Manual.

EO-4019 "Testing of AC Feeders Operating at 2.4 to 33 kV," filled in System Operation Manual No.5.

EO-10808 "Adding or Replacing Insulating Oil in Network Distribution Equipment," filled in Operation and Maintenance of Equipment, Manual No.1.

ATTACHMENTS

11.0 EXHIBIT I: Voltage and Leakage Current Limits for High Potential Tests of 69 kV to 345 kV Facilities.

12.0 EXHIBIT II: Ammeter Clear Test

Reza Ghafurian, Manager
Transmission Feeders Engineering
Central Engineering

Donald Chu, Manager
Substation Equipment Engineering
Central Engineering

Yingli Wen / Mujahid Mian

REVISION 5	FILE:
Elimination of High Potential Tests for solid dielectric cables Additional exceptions to Ammeter Clear Tests (Clause 5.1.2) Editorial changes. Review Date: 01/2009	System Operations Manual No.5

EXHIBIT I

VOLTAGE AND LEAKAGE CURRENT LIMITS FOR HIGH POTENTIAL TESTS OF 69 KV TO 345 KV FACILITIES

(Refer to Paragraph 7.1 for apparatus to be disconnected prior to test).

11.1 HIGH POTENTIAL TESTS

11.1.1 All tests shall be for 5 minutes.

11.1.2 Acceptable DC leakage current is 5 milliamperes.

11.1.3 The following test values shall be used when applying a high potential test to the 69 kV and 345 kV feeders:

NOMIMAL VOLTAGE BETWEEN CONDUCTORS (VOLTS)	DC TEST VOLTAGE (KV) (SEE NOTE A)	REMARKS (SEE NOTES B, C, E & F)
69,000	130	Between phase and ground with the other two phases grounded. Each phase tested separately. See Note C.
69,000 (Transformer on feeder that cannot be conveniently disconnected).	130	Between all three conductors connected together and ground.
138,000	230	Between phase and ground with the other two phases grounded. Each phase tested separately. See Notes C and D.
138,000 (Transformer on feeder that cannot be conveniently	230	Between all three conductors connected together and ground.

disconnected.)

345,000	540	Between phase and ground with other two phases grounded. Each phase tested separately. See Notes C, E and F.

11.2 DISCHARGING CABLE STORED ENERGY

11.2.1 Upon completion of tests on each phase and with the DC test set still connected to the cable, the supply voltage to the test set shall be reduced to zero and the cable stored energy allowed to discharge. The decay in the residual DC voltage of the cable, as monitored by the test set voltmeter, shall be recorded at two-minute intervals until the voltage level, not higher than those listed below are reached. The cable shall then be grounded using the station ground switch.

Nominal Operating Feeder Voltage, kV	DC Voltage to Ground at which Station Ground Switch may be closed, kV
345	200
138	80
69	40

11.2.2 If the test set is equipped with a high resistance grounding device, this device may be used in accordance with manufacturer's recommendations to accelerate the decay of the cable voltage to the values specified above.

NOTES

(Referenced under "REMARKS" on Page 10.)

NOTE A

(1) It is required that normal pressure be maintained for at least four (4) hours on any low pressure fluid-filled cable operating at 69 kV or above, before high potential testing.

(2) Whenever any work is done on a pipe-type cable feeder, which requires new cable, it is required that normal pressure be restored and maintained for twenty-four (24) hours before high potential testing.

(3) Whenever any pipe-type cable is subjected to reduced pressure operation for more than 15 minutes (as specified in the appropriate pumping plant operating

procedure), it is required that normal pressure be restored and maintained for a period of six (6) hours before high potential testing.

(4) The pipe of any pipe-type or solid dielectric feeder, or the sheath of any self-contained or solid dielectric type feeder shall be grounded at each end of the circuit prior to making high potential tests. This ground may consist of (a) a permanent ground connection; (b) a permanent ground through a cathodic protection battery or resistor; or (c) a temporary protective ground.

(5) See also the following specifications:

EO-6059	"Emergency Procedure for Low Pressure Fluid-Filled Cable"
EO-6065	"Emergency Procedure for 69 kV, 138 kV and 345 kV High Pressure Fluid-Filled Pipe-Type Cable Feeders"
EO-6200	"Emergency Procedure for 69 kV and 138 kV High Pressure Gas-Filled Pipe-Type Cable Feeders"

(6) For the 345 kV SF6 gas insulated underground bus at Buchanan, refer to Specification EO-6140 entitled: "Operation and Maintenance of 345 kV SF6 Insulated Underground Bus."

NOTE B

To determine whether or not a fault exists when a feeder trips, it is permissible to make a test between all conductors connected together and ground, provided the capacity of the available test set is adequate. If the capacity of the test set is not adequate, this test may be made at reduced voltage.

NOTE C

Before testing any of the 69 kV, 138 kV or 345 kV feeders, any voltage regulator, phase angle regulator or autotransformer associated with the feeder shall be disconnected. When it is not practical to disconnect the above equipment and it is necessary to test the above equipment with the feeder, the test value shall be limited to 345 kV DC for 5 minutes. Before testing under this condition, all potential transformers must be disconnected.

NOTE D

138 KV PIPE-TYPE CABLE

1.0 The initial high potential test for 138 kV pipe-type cable terminating in SF6 enclosed potheads shall be covered in a separate memorandum.

Subsequent high potential tests for pipe-type cable terminating in SF6 enclosed potheads shall be as follows:

1.1 The pothead links shall be disconnected and the pipe-type cable tested separately with a high potential test. The high potential test shall be at 230 kV DC for five (5) minutes in accordance with the standard procedure.

1.2 After satisfactory completion of the cable high potential test, the pothead link shall be connected and the SF6 bus with the pipe-type cable tested jointly as follows:

- Install the metal clad bus links at the metal clad potheads.
- Replace the pothead shields.
- Evacuate the bus to 200 microns and hold for four (4) hours.
- Fill pothead enclosure with SF6.
- Let stand for four hours and check the dew point. A dew point of minus 13 degrees F is acceptable for test purposes but it must be improved to minus 22 degrees F prior to being placed in service. Dew point shall be measured at operating pressure.

The feeder shall be high potential tested at 230 kV increments from 20 kV to 230 kV holding for one (1) minutes at each step. Hold at the 230 kV level for one (1) minute and then reduce to zero volts.

NOTE E

345 KV PIPE-TYPE CABLE

1.0 The initial high potential test for 345 kV pipe-type cable terminating in SF6 enclosed potheads shall be covered in a separate memorandum. Subsequent high potential test for pipe-type cable terminating in SF6 enclosed potheads shall be as follows:

345 kV – Where Pothead Links Exist

2.0 At stations where pothead links exist, the following procedure shall be followed:

2.1 The pothead links shall be disconnected and the pipe-type cable tested separately with a high potential test. The high potential test shall be at 450 kV DC for five (5) minutes in accordance with the standard procedure.

2.2 After satisfactory completion of the cable high potential test, the pothead link shall be connected and the SF6 bus with the pipe-type cable tested jointly as follows:

- Install the metal clad bus links at the metal clad potheads.
- Replace the pothead shields.
- Evacuate the bus to 200 microns and hold for four (4) hours.
- Fill pothead enclosure with SF6.
- Let stand for four (4) hours and check dew point. A dew point of minus 13 degrees F is acceptable for test purposes but it must be improved to minus 22 degrees F prior to being placed in service. Dew point shall be measured at operating pressure.
- The feeder shall be high potential tested at 325 kV for one (1) minute as follows:

The voltage shall be increased in 20 kV increments from 10 kV to 310 kV holdings for one (1) minute at each step. The voltage shall then be increased from 310 kV to 325 kV in accordance with the standard procedure. Hold at the 325 kV level for one (1) minute and then reduce to zero volts.

345 kV – Where Pothead Links Do Not Exist

3.0 At present there are no locations without pothead links.

NOTE F

When terminations manufactured by the Ohio Brass Company are part of a 345 kV feeder, the acceptable high potential DC test voltage shall be 475 kV. To reduce the possibility of external flashover before reaching the acceptable voltage level, the top and bottom metal parts of the termination shall be covered with two layers of 345 kV rated rubber blankets or with rubber tire inner tubes.

The following feeders have Ohio Brass Company terminations as of July 1, 2000.

Feeder	From / To	Ohio Brass Terminations
Q35L	Astoria to East 13th Street	Astoria end
Q35M	Astoria to East 13th Street	Both ends
B44	Farragut Bus Section 10W to Farragut SE Yard	Both ends except "C" phase at Section 10W
M55	West 49th Street to East 13th Street	East 13th Street End

EXHIBIT II

AMMETER CLEAR TEST

12.1 MAXIMUM LIMITS

12.1.1 If the ammeter reading obtained during an ammeter clear test is in excess of the following values, the feeder shall not be placed in service until the cause of the high reading has been determined and if necessary eliminated:

Nominal Operating Feeder Voltage, kV	Normal Maximum Allowable Ammeter Clear Test Reading, Amperes
345	0.5
138	0.5
69	0.3

NOTE: Current reading in excess of those specified may be accepted if consistent with results of previous tests on the feeder.

12.2 INTERPRETATION OF READING

12.2.1 The following tabulation shall be used as a guide to interpret reading of an alternate current ammeter clear test.

Condition of Feeders	Approximate Ammeter Reading (Amperes)
Feeder grounded	3-5
Phase-to-phase short circuit	3-5
Short circuit on low voltage side of substation transformer	2-3

12.2.2 If any of the following types of transformer are connected to the feeder when the ammeter clear test is made, an abnormally high reading will be obtained:

- Three-phase transformer or autotransformer banks with a three-legged core with a feeder winding wye-connected and the neutral grounded.

- Wye-delta transformer banks with the neutral grounded, where the wye winding is connected to the portion of the feeder on which the ammeter clear test is being made.

Location	Bank	Probable Current Reading With Ammeter Clear Test (Amperes)
All	138 kV Transformers	4.0

End of Specification

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
4 IRVING PLACE
NEW YORK, NEW YORK 10003

ENGINEERING SPECIFICATION

CE-ES-1003

INSTALLATION AND TEST SPECIFICATION FOR OIL IMMERSED POWER TRANSFORMERS, REACTORS AND REGULATORS

SECTION I – GENERAL AND TECHNICAL REQUIREMENTS

REVISION 11

MAY, 2009

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SECTION I – GENERAL AND TECHNICAL REQUIREMENTS

1.0 SCOPE

1.1 This specification applies to all new and existing oil filled power transformers, series reactors, shunt reactors and phase angle regulators at substations and generating stations owned by the Consolidated Edison Company of New York, Inc., hereafter the Company.

1.2 This specification covers the receiving, handling, installation, testing, preparation for storage and dry out of all new units, as well as, testing and dry out for existing units requiring field repairs.

1.3 Elaborate and specialized tests are performed on the equipment at the factory to insure integrity of design and workmanship. It is the intent of this specification to insure the condition of the unit at the time it is ready for service is essentially the same as when it left the factory.

2.0 APPLICABLE STANDARDS AND REFERENCES

2.1 The following codes and standards from these organizations are applicable to this specification.

2.1.1 Institute of Electronic and Electrical Engineers (IEEE).

2.1.2 Occupational Health and Safety Administration (OSHA).

2.1.3 American Society of Testing Materials (ASTM).

2.1.4 CE-ES-1024 Preparation for Transformer Internal Inspection.

2.1.5 EI-1005 Transformer Preparation for Long Term Storage.

2.1.6 SSO Procedure 0800-14 Permit Required Confined Space.

2.1.7 National Electric Code (NEC).

2.1.8 National Electric Safety Code (NESC).

3.0 CONTRACT DRAWINGS, SUPPLEMENTAL SPECIFICATIONS, AND MATERIALS LISTS

3.1 Not Applicable.

4.0 QUALITY ASSURANCE

4.1 Not Applicable.

5.0 PROJECT DESCRIPTION AND SITE CONDITIONS

5.1 This specification applies to all capital projects and maintenance work on transformers, reactors and phase angle regulators.

5.2 For maintenance work that requires partial draining of the transformer, such as replacing secondary bushings or repairing leaks near the cover, it is important to prevent major insulation systems from being exposed. If major insulation is exposed, the transformer must be drained and refilled under vacuum. The Equipment and Field Engineering section will provide guidance for the specific requirements for projects involving partial draining.

6.0 GENERAL SAFETY AND ENVIRONMENTAL CONSIDERATIONS

6.1 Contractors shall follow all applicable OSHA rules and regulations, as well as all applicable federal, state and local rules, codes and laws. In addition, the Contractor shall follow all guidelines as specified in the site specific Environmental, Health and Safety Plan.

6.2 Company personnel shall follow all applicable corporate Environmental, Health and Safety policies, procedures and instructions.

6.3 The following general safety procedures are to be followed while performing work under this specification:

6.3.1 The transformer tank must be adequately grounded before doing any work. Ground all bushings to the tank as soon as they are installed on the transformer.

6.3.2 Ground all of the oil handling equipment.

6.3.3 Ground the vacuum pump.

6.3.4 For entry into any piece of equipment, follow confined space procedure 0800-14.

6.3.5 See Section II, Part 1 for the procedure to enter transformers with nitrogen preservation systems.

6.3.6 See Section II, Part 2 for the procedure to enter transformers with conservator tanks.

6.3.7 See Section II, Part 3 for the procedure for grinding, cutting or other mechanical means of removal welds on transformer tanks.

6.3.8 See Section II, Part 4 for the procedure to weld on a transformer tank.

6.3.9 When inside the tank, tie off tools with linen tape or a non-loose fiber equivalent.

6.3.10 Keep a fire extinguisher on the site.

6.3.11 Do not smoke on or inside the transformer.

6.3.12 All personnel going on top of, or inside the tank, shall remove all loose objects from their person and clothing before stepping onto or entering the tank. Clean shoe covers shall be put on before entry into the tank.

6.3.13 Fall Protection shall be used when working on top of the transformer.

7.0 RECEIPT INSPECTION AND TESTING

7.1 On receipt of the transformer, reactor or regulator at the railroad, truck or barge site, check the Shipping Bill of Material and outline drawing against the materials received. Make sure that everything shipped with the unit has arrived in good condition, before the unit is removed from the rail car, truck or barge. The following items shall be observed and the indicated tests performed:

7.1.1 Verify that the unit has not shifted from the original loading position, either end-wise or sideways.

7.1.2 Verify that the anchoring rods or the spring loaded tie rods have not been bent, loosened or broken.

7.1.3 Check for visual external damage to the unit's case, cover, valves, cooler valves or any other external accessories mounted on the unit during shipment.

7.1.4 Check that the unit has a positive dry air pressure in its tank. Check with a pressure vacuum (compound) gauge to be sure.

7.1.5 If the unit was shipped oil filled, check for any apparent oil leaks.

7.1.6 Check that the impact register does not have a recording of Zone 3 or above for horizontal impact or 0.4G or above for vertical impact. For electronic recorders, remove the recorder and send to Central Engineering for analysis.

7.1.7 Take a dew point reading. If the tank has a negative or zero pressure, then pressurize the tank to 2 pounds with dry air and take a dew point reading after 8 hours. Record the ambient temperature and the relative humidity.

7.1.8 Take an oxygen and combustible gas content reading to verify that the unit and its compartments have at least 20 percent oxygen. There shall be no measurable combustible gas content. If not, purge the unit until those conditions are met.

7.1.9 Perform an insulation resistance test (Megger) on each core at 1000 Volts DC for 1 minute. Record the reading.

7.1.10 A Receipt Inspection report (Attachment 1) should be completed and kept in the history folder of the equipment.

7.2 Notify the Section Manager of the Equipment and Field Engineering Department in Central Engineering or his designee immediately of any abnormal conditions, including the impact register recording, dew point readings, negative or zero pressure reading on the tank and insulation resistance reading of the core ground. An internal inspection is normally required

and will be made by representatives of the Central Engineering Substation Equipment Engineering section, in accordance with Specification No. CE-ES-1024, latest revision.

7.3 Following the above inspection, pressurize the unit to 2 psig with tested dry air and maintain pressure at all times until the unit is oil filled for service.

7.4 Once the transformer has reached an acceptable location, the following tests shall be performed. Typically these tests will be performed at the Astoria Spare Equipment Yard:

7.4.1 Before mounting the bushings, ground the mounting flange and make insulation resistance and high voltage power factor tests, using a Doble test set, on the bushings. Insulation resistance readings should be 2000+ megohms and the power factor reading should be ***0.5*** percent or less. Compare the capacitance with the manufacturer's nameplate figure.

7.4.2 Check the polarity of the current transformers, measure the current transformer insulation resistance and perform low voltage impedance tests. The insulation resistance should exceed 1.0 megohms.

7.5 If any of the above tests, show unsatisfactory results, immediately notify the Substation Equipment Engineering Section of the Central Engineering Department.

8.0 STORAGE AND PREVENTIVE MAINTENANCE

8.1 See EI-1005, latest revision for proper storage of transformers, phase angle regulators and reactors.

9.0 RIGGING, HANDLING AND PLACEMENT

9.1 Evaluate the best method of moving the unit for each particular location. The following should be considered for each method of rigging:

9.1.1 Rigging by Lifting with Slings

a. Lifting lugs and eyes are normally provided for lifting the complete transformer. Some lugs and eyes can be used to lift the transformer while it is oil-filled and some cannot. Consult the manufacturer's instruction book for details.

b. The lifting lugs and eyes are designed for a vertical lift only.

c. Use lifting cables of appropriate length and size; balance the cables for an even lift.

d. To prevent buckling of the tank walls during lifting, a spreader may be required. Consult with the manufacturer's instruction book for details.

e. Consult the nameplate or the manufacturer's instruction book for the weight of the transformer.

9.1.2 Rigging by Skidding or Rolling

a. If moving cannot be accomplished by crane, the units may be skidded or moved on rollers, slip plates or jack rail system, depending on the compatibility of the unit base design and the type of surface on which it is to be moved. Consult the manufacturer's instruction book for the recommended method.

b. The unit shall always be moved while in an upright position unless otherwise specified in the manufacturer's instruction book.

9.1.3 Rigging by Raising with Jacks

a. Transformers can be raised by jacks, only if jack bosses or jacking pads have been provided.

b. Consult the manufacturer's instruction book or manufacturer's drawings for proper jack positioning. The use of jacks on any other part of the transformer could cause costly damage and must be avoided.

10.0 INSTALLATION AND HOOKUP

10.1 Installation of Bushings and Internal Connections

10.1.1 Transformers should not be opened on days of high relative humidity (60% or higher). If moisture enters the transformer insulation or the insulating oil, it will reduce the dielectric strength and may ultimately result in the failure of the transformer. Dry-out periods will be prolonged if the unit is exposed to excessive humidity.

10.1.2 If the surrounding air is warmer than the transformer, moisture will condense on the exterior of the tank. Allow the transformer to stand until all signs of external condensation disappear from the tank before opening the tank cover or manhole.

10.1.3 While the tank is open for internal work, maintain a sufficient flow of dry air into the tank to achieve a slight positive pressure on the tank.

10.1.4 To avoid dropping any objects into the transformer, anyone working above the open transformer tank must remove all loose articles from his pockets. All tools must be tied with clean cotton or linen tape securely fastened either to the outside of the transformer tank or to the clothing of the mechanic in the tank. If any object is dropped into the transformer and cannot be retrieved, notify the Substation Equipment Engineer or his designee immediately. Foreign material inside the tank can cause immediate or delayed failure.

10.1.5 Proper PPE must be worn when entering the transformer.

10.1.6 Bushings should be handled as prescribed by the manufacturer of the bushing. In general, however, they should be lifted in a vertical position during installation. The bushings should be rigged from the flange. Do not rig bushings such that the weight is supported the porcelain. Detailed instructions for handling the high voltage bushings are included in the bushing crate or in the manufacturer's instruction book. Reference should be made to the appropriate document.

10.1.7 Generally, bushings have either draw-lead or stud type connections. For the draw-lead type, it is usually required that the lead be pulled through the bushing as the bushing is lowered onto the bushing flange. Consult the manufacturer's instruction book for the type of bushing provided and the procedure for installing it.

10.1.8 Many different types and shapes of gaskets may be used on the bushing flange when the bushing is installed. Specific instructions are provided by the manufacturer in the instruction book.

10.1.9 The bushing's internal and external surfaces should be absolutely clean and dry when installed. Cleaning should be accomplished with denatured alcohol applied with a lint-free cloth.

10.1.10 Gaskets and gasket recesses should be carefully cleaned. Inspect for any defects.

10.1.11 Gaskets should be carefully placed and uniformly clamped, so that tight seals are formed.

10.1.12 Current carrying connections should be thoroughly cleaned and solidly bolted, except that Belleville-type washers used to maintain bolt pressure should not be torqued beyond what is required to flatten them. Torque values can be obtained from the manufacturer's instruction book for the bolt size and material used. Consult Equipment Engineering if the torque value is not known.

10.1.13 The mechanical loading applied to the ends of bushings should not exceed their design limit. Refer to the manufacturer's instruction book for the permitted loadings.

10.2 Cooling Equipment and Piping

10.2.1 Radiators, oil piping, valves, fittings and flex connections should be thoroughly cleaned and flushed with clean oil before being fitted to the transformer.

10.2.2 If there is any sign of condensation, rust or water formation in the expansion tank, cleaning and flushing will be required before oil filling can proceed. Do not open the expansion tank hand-hole cover during inclement weather.

10.2.3 Make sure that all gaskets are properly seated on the gasket seats at the time of the installation.

10.2.4 When gaskets are used in a vertical plane, gasket cement may be required to hold the gasket in place.

10.2.5 If oil to water heat exchangers are provided, it is recommended that the water passage be drained and pressurized with nitrogen before drawing a vacuum on the transformer.

10.2.6 See Section II, Part 4 for welding on the transformer tank. Permission from the Substation Equipment Engineer or his designee must be obtained for any welding.

10.3 Other Accessories

10.3.1 The no-load tap changer, oil level gauge, temperature gauges, and other accessories should be assembled in accordance with the manufacturer's instruction book.

10.3.2 The top oil temperature and the hot spot temperature alarms should normally be set as follows:

	Transformers Rated for 55°C Rise	Transformers Rated for 65°C Rise	
Alarm	Transformer	Transformer with 1 Alarm Level	Transformer with 2 Alarm Levels
Top Oil Temperature	90	100	90/110
Hot Spot Temperature	115	125	115/135

NOTE

Shunt reactor alarms should be set 10 degrees higher than shown above.

10.3.3 Temperature gauges should be adjusted to operate the cooling equipment in accordance with the manufacturer's instruction book.

10.3.4 Check the operation of the oil level gauge before sealing the tank. Make sure all other gauges have been properly calibrated.

10.3.5 Connect and energize all heater circuits in the control cabinets when they are received at the installation site.

10.3.6 Record the nameplate data from each bushing. The nameplate data for bushings that are connected to BPDs must be sent to Relay Protection Engineering.

11.0 SUPPORT SYSTEM INSTALLATION

11.1 Not Applicable.

12.0 INTEGRITY AND PRE-OPERATIONAL TESTING

12.1 Tap Changer Inspection – Substation Operations

12.1.1 Advance notification should be given to the Substation Operations Transformer Group by the Department installing the transformer to coordinate the effort to inspect the Load Tap Changer Mechanism. A tap changer inspection report must be sent to the Substation Equipment Engineer.

12.1.2 When vacuum interrupters are supplied, test them in accordance with the manufacturer's instructions.

12.1.3 A copy of the tap changer inspection report should be kept in the history folder of the equipment.

12.2 Leak Check

12.2.1 After the radiator, bushings and internal connections have been made, perform a leak check as follows:

a. Pressurize the complete system to 5 lbs with tested dry air. The conservator compartments ***shall*** not be included in the pressure test or vacuum process. Shut off the air supply and check for leaks. A 1/2 lb. drop in 24 hours is acceptable. Record the pressure, tank temperature, and time at the start and finish of the 24-hour period.

NOTE

Temperature variations between the initial and the final pressure reading (after the 24-hour period) are critical to Central Engineering's analysis or the data.

b. If a leak is suspected, check all gasketed joints, valves, flanges and fresh welds for leaks using a liquid soap solution or other approved non-corrosive leak detector.

NOTE

If leaks are not fixed, moisture will be drawn through the leak areas into the transformer while it is under vacuum. This will contaminate the transformer insulation, and prolong the dry-out period.

c. After all leaks have been eliminated, pressurize the tank for 24 hours. Then, simultaneously take dew point, tank pressure and temperature readings from the bottom of the tank. If the results indicate that a leak still exists, then repeat step 12.2.1.b.

12.2.2 Notify the Substation Equipment Engineer or his designee for approval of the above readings.

12.3 Testing Before Dry-Out

12.3.1 The test below can be done while the leak checks performed in Paragraph 12.2 are being done. The transformer may either be dry air or nitrogen filled.

CAUTION

DO NOT OPERATE THE TAP CHANGER OR MAKE ANY ELECTRICAL TESTS WHILE THE TRANSFORMER IS UNDER VACUUM.

a. Make an insulation resistance test at 1000 Volts DC for one minute on each winding. The windings not under test must be grounded. For autotransformers, the high voltage and low voltage windings are tested together. The neutral ground connections for Wye windings shall be removed for this test. Minimum satisfactory readings are shown in Table 1 and Table 2.

b. Make an insulation resistance test at 1000 Volts DC for one minute on all current transformer secondary windings, fan motors, oil pump motors and control wiring. Minimum satisfactory readings are given in Table 1 and Table 2. Do not apply this voltage to solid-state annunciator equipment supplied with the unit.

c. ***Perform Saturation Tests on each CT by applying AC voltages in incremental steps until the current shows a dramatic increase.***

d. Perform a tap progression test for all multi-ratio CTs.

e. ***Perform a Polarity & Ratio test on all CTs.***

f. For transformers with no-load tap changing equipment, make a ratio check on all positions of the no-load tap changer with the load tap changer set in the neutral position. The no-load tap changer shall then be set on the tap specified by the Substation Equipment Engineer and normally supplied in the test memorandum covering the unit.

g. For transformers with the load tap changing equipment, make a ratio check ***on all positions*** of the load-tap changing equipment, with the no load tap changer, if one is furnished, set at the tap specified above.

NOTE

Oil must cover hydraulic buffers (if they are present) in the tap changer compartments for operation of the LTC mechanism.

h. Perform a smooth voltage test over the entire range of the LTC and observe whether the voltage varies smoothly over the entire range of the LTC. Use a chart recorder to observe and preserve this record.

i. Make a low voltage single-phase excitation impedance test on the transformer windings with the LTC on the neutral position. Repeat the test with the LTC on either the ***1-raise***, 15-raise and 16-raise or ***1-lower, 15-lower and 16-lower*** positions.

j. Determine the phase relationship between the high voltage and low voltage windings. Refer to the nameplate diagram for the proper phase relationship.

k. A copy of all test data must be sent to and approved by the Substation Equipment Engineer or his designee before initiating the dry-out procedure.

12.4 Dry-Out and Oil Handling

12.4.1 No external bus connections to the transformer are to be made up until the oil filling operation is completed. All windings are to be shorted and grounded.

12.4.2 The vacuum dry out equipment should be assembled as shown on Attachment 2 ***for transformers with contactor type LTCs or Attachment 3 for transformers with diverter type LTCs***. The number of joints in the vacuum assembly and the distance between the transformer and cold trap should be minimized. The hose between the transformer and cold trap should be run so there are no low points, where fluid can collect and block the vacuum hose.

12.4.3 Prepare the transformer as follows:

a. Pressure Relief Device: A pressure relief device, suitable for vacuum, must be connected to the transformer during the vacuum process. Qualitrol PRDs are rated for full vacuum. If the existing PRD is not rated for vacuum, it should be removed and a Qualitrol PRD installed. An adapter plate may be required to install the Qualitrol device.

b. Sudden Pressure Relay (SPR): Do not pull vacuum on the SPR. The SPR can be removed for the vacuum process or isolated by installing an oversized blank gasket. Do not rely on the valve for isolation.

c. Combustible Gas Monitor: Do not pull vacuum on the combustible gas monitor. The sensor should be removed for the vacuum process or isolated by installing an oversized blank gasket. Do not rely on a valve for isolation.

d. Separate oil expansion tanks, such as conservator or Atmoseal tanks, ***must*** be isolated from the main tank for the vacuum process. ***To*** isolate these compartments, install an oversized blank gasket in one of the flanges in the oil piping and reconnecting the flange. Make sure the gasket is visible so it will be noticeable later for removal. ***Do not rely on valves to isolate the oil expansion tank.***

e. Equal vacuum should be pulled on the main tank and LTC compartments, provided each compartment is rated for full vacuum. Newer units may have valves installed to tie the various compartments together. On older units, the compartments can be connected together using black iron pipe or vacuum hose. Consult the manufacturer's Instruction Book to determine if each compartment is rated for vacuum. If any uncertainty exists or unequal vacuum must be pulled, consult the Substation Equipment Engineer for advice.

f. Auxiliary Heater Equipment: During cold weather it may be necessary to heat the tank using heaters or other devices. An enclosure can also be provided using tarpaulins to contain the heat around the periphery of the transformer and facilitate the drying process. Consult Central Engineering for advice.

CAUTION

CAUTION SHOULD BE TAKEN TO PREVENT FIRE FROM HEATERS.

g. Dry ice and Alcohol Requirements: Five gallons of alcohol and 150 lbs of dry ice will be needed for the initial charge of the cold trap. About 300 to 500 lbs of dry ice will be needed each day thereafter to maintain the -120°F temperature of the cold trap depending on whether heat or hot oil is used in the dry-out. A suitable storage chest should be provided for the dry ice.

h. Handling of Dry Ice and Alcohol: Add alcohol in the thimble of the cold trap. Break the dry ice into pieces about 4" square and add slowly to the alcohol.

CAUTION

USE GLOVES AND WEAR EYE PROTECTION WHEN HANDLING DRY ICE AND ALCOHOL. ALWAYS ADD DRY ICE TO ALCOHOL, NOT THE REVERSE.

CAUTION

DO NOT CARRY DRY ICE IN ENCLOSED VEHICLES.

i. Do not make any electrical tests or operate the tap changer while the transformer is under vacuum.

12.4.4 Leak Check on Pump and Cold Trap Assembly

a. Close the vacuum valve on the tank side of the cold trap. Start the vacuum pump and check for leaks on the pump and cold trap assembly. The system should reach 50 microns in a few minutes. If not, check for leaks.

b. Start vacuum on main tank: Open the vacuum valve (slowly) on the tank side of the cold trap and evacuate the transformer to 1 mm absolute pressure or less. Check for leaks if 1 mm of vacuum is not obtained within six hours.

c. Hourly recordings: Record hourly readings of ambient, winding and oil gauge temperatures, vacuum gauge readings etc. on the Daily Transformer Dry-out Log Sheet (Attachment 3).

12.4.5 Procedure for Taking a Cold Trap Reading

a. Cold trap readings are generally required once every six hours from start of the dry-out to final oil fill. However, the frequency for taking the cold trap readings may be altered at the direction of the Substation Equipment Engineer or his designee after several readings have been taken. The amount of ice on the cold trap during the first few cold trap readings will aid in determining whether the frequency should be shortened or lengthened.

b. Make a vacuum leak check on the main tank while taking a cold trap reading. Close Vacuum Valve V1 and observe the vacuum rise. This vacuum pressure rise should not exceed ***100***-250 microns in a 30-minute interval. ***The exact value to be achieved will be specified by Engineering. The value depends upon the age, type and size of the transformer.. If the specified*** value is exceeded, check for leaks.

> **NOTE**
>
> Moisture will be drawn through any leak areas into the transformer while under vacuum, prolonging the dry out period.

c. Close the vacuum valves, V2 and V3, stop the vacuum pumps and break the vacuum in the cold trap through the air bleeder valve.

d. Remove the thimble as quickly as possible. Be careful not to spill any alcohol from the thimble. Scrape the frost to melt and measure the amount of water and oil collected in fluid ounces. Record this value on the Daily Transformer Dry-out Log Sheet (***Attachment 4***). Notify the Substation Equipment Engineer or his designee of the results on a daily basis.

e. Replace the thimble in the cold trap as soon as it has been scraped clean. Add alcohol and dry ice as necessary, observing the precautions noted in paragraph No. in 22.2.6. Reseal the cold trap.

f. Start the vacuum pump. Open Valves V2 and V3 and evacuate the system down to pump capability or below transformer vacuum. Open Vacuum Valve V1 at the tank and continue the pumping process. Change oil in the vacuum pump as required in the pump manufacturer's instructions.

> **NOTE**
>
> Never leave the vacuum pump running unattended

g. Continue the above procedure of vacuum cold trapping until the unit is dried out. This is typical when the amount of moisture extracted levels off for 2 consecutive days with a vacuum reading of 1 mm or less. The dryness determination shall be made by the Substation Equipment Engineer.

12.4.6 Use Of Hot Oil Treatment Plant For Dry-Out

a. Many transformers can be dried more efficiently and rapidly with the use of a hot oil treatment plant with the high vacuum cold trapping procedure described above. The desirability of using the hot oil treatment plant depends on such factors as transformer dew point, the average ambient temperature at the time of dry-out, the prior history of the unit (length and condition of storage, and the amount of exposure to atmosphere of the unit during installation), the voltage class and design of the unit and the need for a rapid dry-out. The Central Engineering Equipment Engineer will specify if hot oil circulation is required.

b. The procedure to be used for hot oil dry-out differs somewhat depending on the type and design of the transformer being dried out. Before oil is added for hot oil circulation, a vacuum of 1000 microns or less should be established and held for a minimum of 24 hours. Cold trap readings should be level or decreasing.

c. Core Form Units: Hot oil should be circulated from the top of the unit (at a point remote from the vacuum line and with the use of a splash plate) to the bottom drain valve. The amount of oil to be used depends on the height of the major insulation systems within the tank. This insulation should not be covered without oil during the dry-out. The oil should enter the top of the unit at no more than ***180°F. Once the transformer heats up, the oil should return from the transformer to the oil processing rig at a temperature of at least 140 Deg C.*** This circulation should be continued until acceptable cold trap readings have been achieved.

> **NOTE**
>
> An oil circulation booster pump capable of 30-foot vertical suction must be used to achieve oil flow. The booster pump must be placed very close to the transformer.

d. Shell Form Units: In a shell form unit, the unit must be dried out in two steps. First an amount of oil to be specified by the Substation Equipment Engineer or his designee is circulated in the same manner as for core type units. After the cold trap readings have reached an acceptable level for 24 hours, the oil must be removed from the tank exposing the bottom insulation to the high vacuum. This removal of oil may require the partial breaking of the vacuum with tested Dry Nitrogen. After re-establishing the vacuum, the cold trap readings must then level off (for 24 hours) to less than the value achieved during oil circulation.

e. In either case, a final Dew Point may be required before oil filing may proceed. The Central Engineering Equipment Engineer or his designee should be consulted.

12.4.7 Vacuum Filling the Unit on Completion of Dry-Out

a. All 345 and 138 kV Class Transformers are to be vacuum filled via a hot oil treatment plant. 69 kV Class Transformers are to be vacuum filled via a hot oil treatment plant if the average daily ambient temperature is less than 50 Deg F. If the Daily ambient temperature is above 50 Deg F, hot oil treatment may be waived at the discretion of the Central Engineering Substation Equipment Engineer.

b. Oil used for filling transformers should meet the criteria set forth in Table No. 3.

c. The oil line should be connected to the upper splash plate connection or other oil-fill connection valve provided on the tank. The oil should not enter the bottom of the tank.

d. Do not allow transformer oil to enter the vacuum pump during the oil fill process.

e. Thick-wall Tygon tubing should be used to monitor the oil level during the oil fill. The tubing must be connected at the bottom and top of the unit.

f. A minimum vacuum of 1 mm must be maintained for 345 kV and 138 kV voltage class transformers during the entire vacuum oil filling process. A minimum of 2 mm must be maintained for lower voltage class transformers. If the above minimum vacuum requirements cannot be maintained during oil filling, it will be necessary to stop or restrict the oil filling rate while an acceptable vacuum reading is re-established.

g. If the vacuum is lost during the oil filling process, the oil in the transformer must be removed and the vacuum fill process restarted. The tanks should be pressurized with nitrogen until vacuum is ready to be established.

h. Filtered oil should be admitted via a regulating valve, which maintains a positive oil pressure external to the tank at all times. The transformer vacuum should be maintained as specified above.

i. The filling rate should never exceed 1,500 gallons per hour, or 25 gallons per minute.

j. Oil Fill Procedure For Units With Nitrogen Preservation System

(1) Fill the unit to the "High" mark on the liquid level gauge to compensate for contraction of the oil as it cools.

(2) The vacuum should be maintained for three hours after the tank is full or after the oil filling is stopped.

(3) Break the vacuum with dry nitrogen.

> **NOTE**
>
> If the selector and/or the tap changer compartment(s) are also to be vacuum oil filled, DO NOT break the vacuum on the main tank until all compartments are oil filled. Observe the precaution mentioned in Paragraph No. 22.2.3 (Pressure Differential).

(4) Let the transformer sit idle for 12 hours, before energizing or testing, to absorb residual gas and thoroughly impregnate the insulation. This "wait" may be reduced to the time required for the temperature to stabilize if the unit has been vacuum, hot oil filled.

(5) Final oil level should be measured and adjusted to agree with the nameplate.

k. Oil Fill Procedure for Units with Expansion Tank Oil Preservation System.

> **NOTE**
>
> Refer to the appropriate manufacturer's instruction book for a more detailed description.

(1) Prior to starting the dry-out, it is recommended to inflate the air cell in the conservator tank and inspect the integrity of the air cell by removing a cover plate on the conservator tank.

(2) Vacuum oil-fill the main tank to a level 12" below the top cover or to the "HIGH" mark on the main tank liquid level gauge, if provided.

(3) Hold the vacuum for 3 hours. The LTC compartments may be filled while holding the vacuum on the main tank.

(4) After the 3-hour wait time, break vacuum with tested dry nitrogen or dry air.

(5) Restore the piping connections to the conservator tank to normal.

(6) Tie the Non-Return Check Valve (Elin valve, Sergi or equivalent) to the conservator tank in the open position.

(7) Remove the vacuum hose connection and splash plate, if one was used. Restore all equipment on the main tank cover to normal.

(8) Inflate the air cell to approximately 1/2 psig. Monitor the air cell pressure while the conservator is being filled. The pressure should be maintained between 1/2-1 psig.

(9) Open the following bleed valves on the expansion tank and the main tank:

- Vent valves and the pressure-vacuum bleeder (expansion tank)
- Manhole covers (main tank)
- Bushing adaptors (main tank)
- Pressure relief device (main tank)
- Test valve on gas detector relay (if supplied)

(10) The conservator can be filled by either continuing to pump oil into the main tank, if there is an oil fill valve, or pump oil directly into the conservator tank through an accessible drain valve.

(11) Continue to add oil and close each vent when a steady stream of oil is present. Once the vent valves are closed, they should not be reopened.

(12) When the final vents on the conservator tank are closed, the oil fill is complete.

(13) Restore the Non-Return Check valve to the normal operating position.

(14) Remove the Tygon tubing used to monitor the oil level.

(15) Measure the oil level by dip-sticking the conservator bag and compare the oil level to the nameplate for the given oil temperature. Adjust the oil level according.

(16) Restore the conservator breather vent to the normal configuration.

12.5 Final Tests and Checks Before Service

12.5.1 The following tests and checks shall be performed prior to energization.

a. Oil samples should be taken and sent to the Astoria Chemical Laboratories to verify that the oil meets the criteria specified in Table 3.

b. ***Make high voltage power factor tests, using a Doble test set, on the high voltage and low voltage windings, individually on each with the other windings grounded. These tests should include the terminal bushings. Report these test results to the Substation Equipment Engineer or his designee. While making these tests, record the ambient temperature and relative humidity.***

c. Make an insulation resistance test at 1000 volts DC for one minute followed by a dielectric proof test for five minutes on each winding, in accordance with the procedures outlined in Specification No. EI-1002, latest revision. The dielectric proof test values and minimum satisfactory insulation resistance shall be specified in Table 1 (new equipment) and in Table 2 (equipment previously in service). These tests shall be made under the following conditions:

(1) The windings not under test shall be short circuited and grounded.

(2) The external bus and/or cable connections should not be made up to the transformer until all tests have been completed.

(3) All current transformer secondaries shall be grounded through their normal relay circuits. If these circuits are not made up, the current transformer secondaries shall be short circuited and grounded at their terminal connections without disturbing the existing connections. These temporary grounds shall be removed after the tests are completed.

(4) Phasing test: A separate memorandum will be issued by the Substation Equipment Engineering Section of the Central Engineering Department on the phasing procedure to be used, if one is required.

(5) Final checks on auxiliary equipment: Check the operation of the auxiliary equipment such as circulating pumps, fans or flow meters, in accordance with the manufacturer's instructions. The manufacturer may require a running period before transformer energization. If this is the case, it will be so stated in the manufacturer's instruction book and these requirements must be observed.

13.0 INITIAL OPERATIONS AND FUNCTIONAL TESTING

13.1 The following tests shall be performed immediately following energization:

13.1.1 Load checks shall be made to check the relay protection and parallel operations.

13.1.2 The Automatic Voltage Regulating Controls (CMVM) should be tested and adjusted after the transformer is in service. The tap changer should remain in manual control until the CMVM is tested.

13.1.3 Oil samples for gas-in-oil analysis shall be taken within 24 hours after the energization of the transformer and shall be sent to the Astoria Gas Testing Laboratory for a complete gas analysis. Notify the Substation Equipment Engineer or his designee of the results of this analysis. Periodic gas sampling shall continue in accordance with Specification No. EI-1018, latest revision, "Periodic Gas Sampling of Power Transformers."

TABLE 1

INSULATION RESISTANCE AND DIELECTRIC PROOF TEST VALUES FOR NEW EQUIPMENT

Normal Phase-to-Phase Operating Voltage (Volts)	Megger Minimum Satisfactory Insulation Resistance in Megohms for 1 Minute	DC Dielectric Proof Test Voltage to Ground for 5 Minutes (kV)
Up to 1000	1	None
2300-4000	15	19
6000-8000	25	25
11000-15000	30	34
16000-23000	45	50
24000-34500	60	70
45000	90	95
69000	100	*140 for 350 kV BIL
138000	200	*185 for 450 kV BIL
	200	*230 for 550 kV BIL
345000	500	*465 for 1050 kV BIL

* WYE connected windings having graded insulation systems must be tested at a value consistent with their rated neutral insulation level. For 110 kV BIL the test value is 34 kV DC.

TABLE 2

INSULATION RESISTANCE AND DIELECTRIC PROOF TEST VALUES FOR EQUIPMENT ALREADY IN SERVICE

Normal Phase-to-Phase Operating Voltage (Volts)	Megger Minimum Satisfactory Insulation Resistance In Megohms for 1 Minute	DC Dielectric Proof Test Voltage to Ground for 5 Minutes (kV)
Up to 1000	1	None
2300-4000	4	7
6000-8000	8	15
11000-15000	15	25
16000-24000	30	40
27000-34500	30	50
45000	60	70
69000	75	*105 for 350 kV BIL
138000	150	*135 for 450 kV BIL
	150	*170 for 550 kV BIL
345000	375	*345 for 1050 kV BIL

* WYE connected windings having graded insulation systems must be tested at a value consistent with their rated neutral insulation level. For 110 kV BIL the test value is 25 kV DC.

NOTE: 138 kV Smit and Waukesha transformers should only be tested at the 450 kV BIL level even though the transformers are rated 550 kV BIL.

TABLE 3 ACCEPTABLE CRITERIA FOR OIL TO BE USED FOR FILLING AND PRIOR TO ENERGIZATION		
	345 kV	**ASTM Method**
Dielectric Breakdown	35 kV minimum	D877
Dielectric Breakdown	25 kV minimum (0.040" gap)	D1816
Power Factor at 25 Deg C	0.05% maximum	D924
Power Factor at 100 Deg C	0.5% maximum	D924
Neutralization	Acidity .03 maximum	D974
Water Content	15 ppm maximum	D1533
Gas Content When Specified	0.5, or as specified	D831, D2945, D1827
Color	1.0 maximum	D1500
Condition – Visual	Clear	D1524
Interfacial Tension	40 minimum	D971
138 kV		
Same as 345 kV except 20 parts per million water content		
	Below 138 kV	
Dielectric Breakdown	30 kV minimum	D877
Dielectric Breakdown	25 kV minimum (0.040" gap)	D1816
Power Factor at 25 Deg C	0.1% maximum	D924
Power Factor at 100 Deg C	0.5% maximum	D924
Neutralization	0.03 maximum	D974
Water Content	30 ppm maximum	D1533
Color	1.0 maximum	D1500
Condition – Visual	Clear	D1524
Interfacial Tension	40 minimum	D971

SECTION II SUPPLEMENTAL PROCEDURES

PART 1

PROCEDURE FOR PERSONNEL ENTERING TRANSFORMER WITH NITROGEN PRESERVATION SYSTEM

1.0 APPLICATION

1.1 This section applies to all personnel who enter main tanks, selector compartments and contactor compartments of oil immersed transformers with nitrogen preservation systems, where entry is made via a manhole. Where possible, a minimum of two manhole covers should be removed.

1.2 The Astoria Chemical Laboratory shall test and certify the initial atmospheric conditions in the compartments test and certify gases for purging, and test and certify compartment atmospheric conditions before personnel entry.

1.3 This section does not apply for entry into transformer selector and contractor compartments where large compartment doors may be opened or removed and the compartment purged by atmospheric venting. However, the compartment atmosphere shall be checked for at least 20% oxygen by volume.

2.0 TESTING OF THE PURGING GAS SUPPLY

2.1 Before injecting the appropriate purging gas into the transformer, perform the following tests:

2.1.1 Verify that the dry air supply contains between a minimum of 20% and a maximum of 24% oxygen with a 0.05% or less, combustible gas content by volume.

2.1.2 Verify that the nitrogen gas supply contains less than 0.5 oxygen with 0.05% or less, combustible gas content by volume.

3.0 PROCESSING OF THE TRANSFORMER

3.1 Before personnel may enter the transformer, the following testing and purging procedure is to be followed.

3.1.1 Ground all transformer windings and tanks and shut off the transformer's nitrogen preservation supply at the nitrogen cylinder cabinet. Allow 10 minutes for the gas inside the transformer or compartments to stabilize.

3.1.2 Make a combustible gas and oxygen content test on the gas in the transformer compartments.

3.1.3 Process the transformer compartment, dependent on the combustible gas content, as indicated below. Install compound pressure gauges on all of the compartments under treatment.

a. Combustible gas content is: 0.5% by volume

(1) After verifying that the transformer compartments can withstand full vacuum (refer to the manufacturer's instruction book) evacuate the gas space above the oil to a vacuum of 5 millimeters or lower for a period of 1/2 hour, using extreme fire prevention caution in the vicinity of the vacuum pump outlet.

(2) Break the vacuum with tested dry nitrogen gas and raise the pressure to 1.5 psig.

(3) After establishing an internal pressure of 1.5 psig, shut off the nitrogen supply and allow the compartment atmosphere to stabilize for 10 minutes.

(4) After the 10-minute stabilizing period, perform a combustible gas and oxygen content test. If the 0.5 maximum is not met, repeat Steps 1 and 2 above, until it is achieved.

(5) After obtaining a 0.5% or less combustible gas and a 2.0% or less oxygen content, remove all of the oil.

(6) Displace the oil with tested nitrogen gas, keeping a 1.5 psig positive pressure on the compartment constantly.

(7) When all of the oil has been removed, shut off the nitrogen gas supply and allow the compartment atmosphere to stabilize for 10 minutes.

(8) After the 10-minute stabilizing period, make a combustible gas and oxygen content test. If the combustible gas content is greater than 0.5%, repeat Steps 1, 2 and 3.

(9) Break the vacuum with tested dry air and establish 1.5 psig of positive pressure in the compartment. Make a combustible gas and oxygen content test to verify that the combustible gas has remained less than 0.5% and that the oxygen content is greater than 20%. Vacuum treatment and break the vacuum with tested dry air until these two conditions are met.

(10) After establishing an internal atmosphere of .5% or less of combustible gas with oxygen content of 20% or greater, break the transformer compartment or compartments positive pressure via a vent valve, and adjust the inlet flow pressure regulator to no more than 5.0 psig. All compartments shall be at "Zero" psig. Proceed to remove the transformer compartment manhole cover. Exercise caution while removing the cover until the seal is broken.

(11) The unit's atmosphere must now be sampled before entry by lowering the atmosphere sensing head or sampling line into the compartment at different levels to verify that a minimum oxygen content of 20% and a combustible gas content of less than 0.5% exists at all levels. In addition, a portable device must be brought into the compartment with the entrant to continually monitor the internal atmosphere for a minimum or 20% oxygen and the presence of any combustible gasses.

> **NOTE**
>
> Entry into transformer compartments by Company personnel or any personnel on Con Edison premises is subject to the requirements of all Regulatory, Industry and Company safety practices.

b. Combustible gas content above the oil is less than 0.5% by volume.

(1) Purge the nitrogen gas space above the oil via a vent valve with tested dry air for a 1/2 hour period.

(2) Shut off the dry air supply, close the vent and allow the gas space to stabilize for 10 minutes.

(3) After the 10-minute stabilizing period, perform an oxygen content test. The oxygen content should be 20% by volume or greater. Also verify that the combustible gas content is still below 0.5%. If either condition is not met repeat Steps 1, 2 and 3 above.

(4) On establishing a gas space which has minimum oxygen content of 20% and a combustible gas content of less than 0.5 levels by tested dry air. Break the transformer compartment or compartments positive pressure via a vent valve and adjust the inlet flow pressure regulator to no more than 5 psig. All compartments shall be at "Zero" psig.

(5) Proceed to remove the transformer compartment manhole cover. Exercise caution while removing the cover until the seal is broken. The required oil level shall be verified by visual observation.

(6) The unit's atmosphere must now be sampled before entry by lowering the atmosphere sensing head or a sampling line into the compartment at different levels to verify that a minimum oxygen content of 20% and a combustible gas content of less than .5% exists at all levels. In addition, a portable device must be brought into the compartment with the entrant to continually monitor the internal atmosphere for a minimum of 20% oxygen and the presence of any combustible gasses.

NOTE

Entry into transformer compartments by Company personnel or any personnel on Con Edison premises is subject to the requirements of all Regulatory, Industry and Company safety practices.

3.1.4 Maintain the inlet flow pressure regulators at 5.0 psig, when the compartment is open to protect against ambient moisture contamination.

PART 2

PROCEDURE FOR PERSONNEL ENTERING TRANSFORMER WITH CONSERVATOR TYPE PRESERVATION SYSTEM

1.0 APPLICATION

1.1 This section applies to all personnel who enter the main tank, selector compartments and contactor compartments of oil immersed transformers having conservator or atmoseal preservation systems where entry is made via a manhole. Where possible, a minimum of two manhole covers should be removed.

1.2 The Astoria Chemical Laboratory shall test and certify the initial atmospheric conditions in the compartments test and certify gases for purging, and test and certify compartment atmospheric conditions before personnel entry.

1.3 This section does not apply for entry into transformer selector and contactor compartments where large compartment doors may be opened or removed and the compartment purged by atmospheric venting. However, the compartment atmosphere shall be checked for at least 20% oxygen by volume.

2.0 TESTING OF THE PURGING GAS SUPPLY

2.1 Before injecting the appropriate purging gas into the transformer, perform the following tests:

2.1.1 Verify that the dry air supply contains between 20% and 24% oxygen with a 0.05% or less, combustible gas content by volume.

2.1.2 Verify that the nitrogen gas supply contains less than 0.5% oxygen with a 0.05% or less, combustible gas content by volume.

3.0 PROCESSING OF THE TRANSFORMER

3.2 Before personnel may enter the transformer, the following testing and purging procedure is to be followed:

3.1.1 Ground all transformer windings and tanks.

3.1.2 Process the transformer compartment dependent on the combustible gas content, as indicated below. Install compound pressure gauges on all of the compartments under treatment.

a. Total Combustible Gas Content in the Oil is Greater Than 2000 ppm.

(1) Withdraw three oil samples and three gas samples from each transformer compartment for analysis by the Astoria Chemical Laboratory for combustible content.

(2) Close the conservator or atmoseal valves to the transformer compartments and drain the conservator or atmoseal tank via the drain valve.

(3) Drain the transformer compartment of all oil. Displace the oil with tested dry nitrogen gas, keeping 1.5 psig positive pressures on the compartment constantly.

(4) When all of the oil has been removed, shut off the nitrogen gas supply and allow the compartment atmosphere to stabilize for 10 minutes.

(5) After the 10 minute stabilizing period, make a combustible gas and oxygen content test.

> **NOTE**
>
> If the combustible gas content is above 0.5% by volume, proceed to Step 6. If the combustible gas content is below 0.5% by volume, proceed to Step 7.

(6) After verifying that the transformer compartments can withstand full vacuum (refer to the manufacturer's instruction book) evacuate the compartment's gas space to a vacuum of 5 mm or lower for a period of 1 1/2 hours, using extreme fire prevention caution in the vicinity of the vacuum pump outlet. Break the vacuum and pressurize the compartment to 1.5 psig with tested dry nitrogen. Repeat the combustible gas content test. If the 0.5% maximum is not met, repeat this step until it is achieved.

(7) Upon establishing an atmosphere in the compartment having a combustible gas content of 0.5% or less, pull a vacuum on the compartment and hold for 1/2 hour.

(8) Break the vacuum with tested dry air and establish a 1.5 psig positive pressure. Make a combustible gas and oxygen content test to verify that the combustible gas has remained less than 0.5% and that the oxygen content is greater than 20%. If necessary, repeat the vacuum treatment and break the vacuum with tested dry air until these two conditions are met.

(9) After establishing an internal atmosphere of 0.5% or less of combustible gas. With oxygen content of 20% or greater, break the compartment's positive pressure via a vent valve, and adjust the inlet flow pressure regulator to 5.0 psig. All compartments shall be at "Zero" psig. Proceed to remove the compartment's manhole cover. Exercise caution while removing the cover until the seal is broken.

(10) The unit's atmosphere must now be sampled before entry by lowering the atmosphere sensing head or a sampling line into the compartment at different levels to verify that a minimum oxygen content of 20% and a combustible gas content of less than 0.5% exists at all levels. In addition, a portable device must be brought into the compartment with the entrant to continually monitor the internal atmosphere for a minimum of 20% oxygen and the presence of any combustible gasses.

> **NOTE**
>
> Entry into transformer compartment by Company personnel or any personnel on Con Edison premises is subject to the requirements of all Regulatory, Industry and Company safety practices.

b. Total Combustible Gas Content is Less than 2000 ppm

(1) Close the conservator or atmoseal valves to the transformer compartments.

(2) Displace the oil to the required level with tested dry air, keeping a positive pressure of 1.5 psig on the transformer constantly. Break the compartment pressure via a vent valve. After opening the vent valve, adjust the inlet flow pressure regulator to 5.0 psig. All compartments must be at "Zero" psig.

(3) Proceed to remove the transformer compartment manhole cover. Exercise caution while removing the cover until the seal is broken. The prescribed oil level shall be verified by visual observation.

(4) The unit's atmosphere must now be sampled before entry by lowering the atmosphere sensing head or a sampling line into the compartment at different levels to verify that a minimum oxygen content of 20% and combustible gas content of less than 0.5% exists at all levels.

(5) If the oxygen content is below 20%, thoroughly purge the gas space above the oil for 1 hour. After 1 hour of purging with dry air, shut the dry air supply and the vent valve. Allow the gas space to stabilize for 10 minutes. Repeat this step until the desired levels are achieved.

(6) Upon establishing an atmosphere in the compartment of 20% or greater of oxygen and less than 0.5% of combustible gas, personnel entry is permitted. In addition, a portable device shall be brought into the compartment with the entrant to continually monitor the internal atmosphere for a minimum of 20% oxygen and the presence of any combustible gasses.

NOTE

Entry into transformer compartment by Company personnel or any personnel on Con Edison premises is subject to the requirements of all Regulatory, Industry and Company safety practices.

3.1.3 Maintain the inlet flow pressure regulator at 5.0 psig when the compartment is open to protect against ambient moisture contamination.

PART 3

PROCEDURE FOR CUTTING, GRINDING OR WELD REMOVAL ON TRANSFORMER TANKS

1.0 APPLICATION

1.1 This Part applies to units where removal of a welded manhole cover is required for entry by cutting, grinding or other mechanical means.

1.2 The atmosphere in the compartment shall be monitored during the cutting or grinding process.

2.0 PURGING PROCEDURE

2.1 Make a combustible gas and oxygen test on the transformer using the latest Astoria Chemical Laboratory procedures. If either the combustible gas or the oxygen content is above 0.5% or 2% respectively, vacuum withdrawal of the gas above the oil must be made with a 20" vacuum or less for a period of 1/2 hour. Use extreme fire caution in the vicinity of the vacuum pump outlet. Break and refill the space in the transformer tank with tested dry nitrogen. Using the instruments designated as above, repeat the combustible gas and oxygen content tests. If the 0.5% and 2% maximum requirements are not met, repeat this step until the requirements are met.

2.2 If the transformer has oil in it, ground the tank and windings and remove all of the oil. Displace the oil using nitrogen, keeping a positive pressure on the transformer tank continuously. Repeat combustible gas and oxygen content tests and if below 0.5% and 2% respectively, the opening operation can proceed. If above 0.5% or 2% repeat the vacuum process given in Step 1 described in the previous paragraph and repeat the combustible gas and oxygen tests until less than 0.5% and 2%, of combustible gas and oxygen respectively is obtained.

3.0 GRINDING, CUTTING AND WELD REMOVAL OPERATIONS

3.1 Weld removal or cutting by oxyacetylene torch or electric arc is not permitted unless the joint is sealed on the inside with 450 cement and panel.

3.2 Reduce the combustible gas and oxygen content of the gas to 0.5% and 2% maximum, respectively as outlined in Paragraph No. 9.1. Adjust the nitrogen pressure to a minimum of 1 psig as measured by a gauge on top of the transformer in the immediate vicinity of the operation with a slight bleed off at the opposite point of the transformer. Mechanical clamping shall be applied to the section being opened to keep the weld joint gas losses to a minimum and reduce fire hazards.

3.3 The area where grinding or cutting will occur must have the paint removed in accordance with the company's safety and environmental procedures.

3.4 Before the start of the operation, establish a fire watch equipped with portable CO2 extinguishers. A bucket of 450 cement or panelag for plugging weld leaks and several wet fiberglass blankets for fire control must also be available.

3.5 During the operation combustible gas and oxygen tests, using the latest Astoria Chemical Laboratory procedures will be made every 15 minutes to verify that the combustible gas and oxygen in the transformer is below 0.5% and 2% respectively. It is imperative that during the cutting operation, no slag be permitted into the transformer. After the operation is completed, any web trimming must be done with a chisel or grinder. Release the tank pressure to atmosphere before breaking the web.

3.6 Appropriate welding supervision must be on the job site during all operations. If the welder has any reservations during the operation, he will immediately stop the operation and consult with his supervisor and the engineer assigned to the job.

3.7 If entry is required for inspection or work, the entry procedures and precautions in Paragraph 3 or 6 depending on the type unit, shall be followed.

PART 4

PROCEDURE FOR WELDING ON TRANSFORMER TANKS

1.0 APPLICATION

1.1 This Part applies to units where welding is required to be performed on the main tank or LTC compartments.

1.2 If the compartment is gas-filled, the gas space shall be monitored during the welding process, however, it is preferable to perform the welding operations with oil in the compartment behind the area to be welded.

2.0 WELDING

2.1. The inside wall of most transformers is painted with various types of paints. Weld repair must carefully performed to avoid overheating the inside wall surface and thus causing peeling and carbonization of the paint. Carbonized particles may inversely affect the dielectric properties of the oil and thus the performance of the transformer.

2.2 To avoid overheating the internal paint, it is recommended to perform welding with oil inside the compartment behind the area to be welded.

2.2 Welding should be performed to minimize the heat input to the transformer tank to protect the interior surfaces from paint carbonization. The following techniques can be used to minimize the heat input:

2.2.1 Use the lower end of the current range for the welding rod type and size selected.

2.2.2 Use short weld runs.

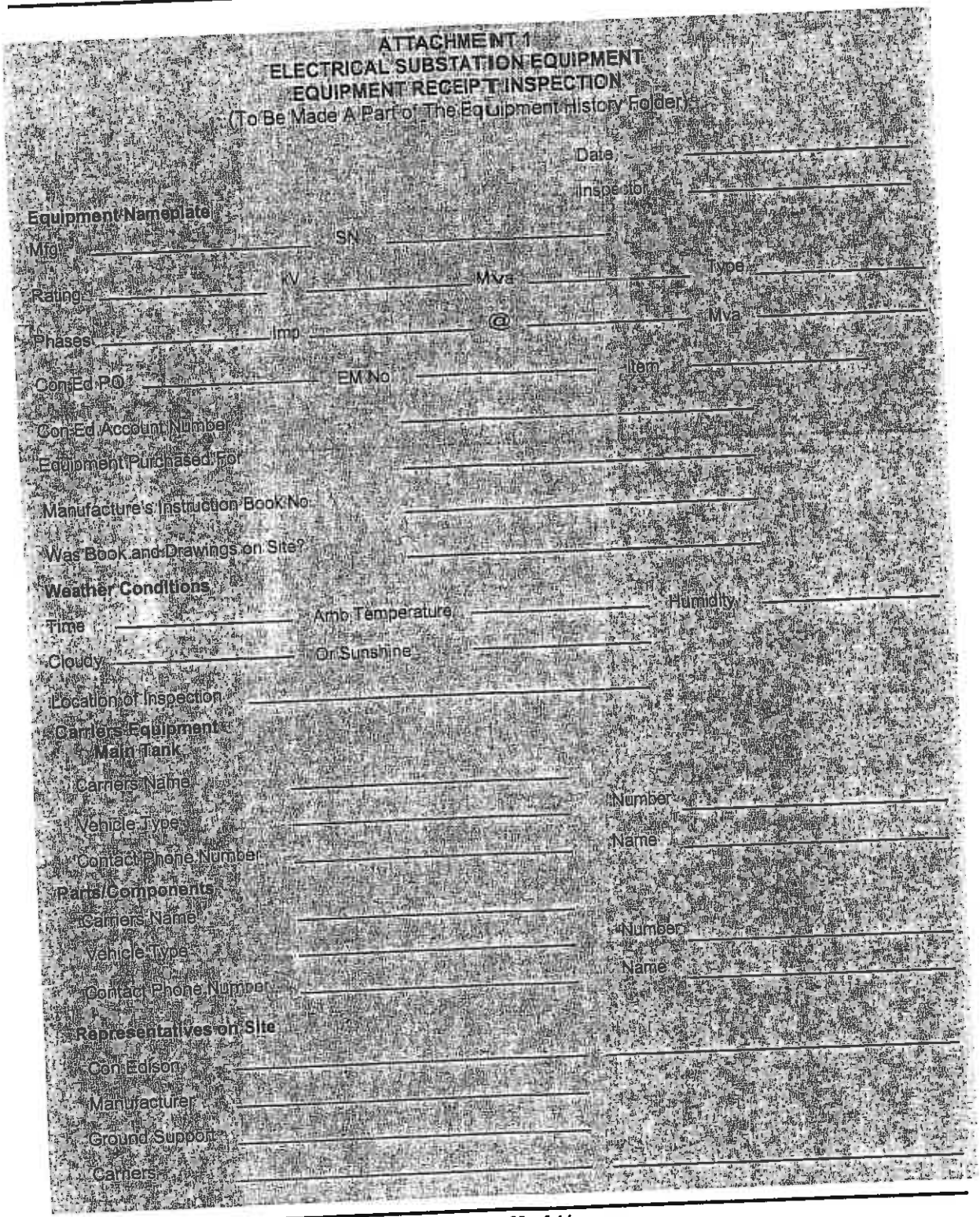
2.2.3 Stagger the weld locations to allow for cooling.
(i.e. Do not use long continuous weld runs).

2.2.4 Deposit a maximum fillet weld size of 3/16" in a single pass. For larger fillet welds, use multiple passes.

2.2.5 The area where welding is to be performed must have the paint removed in accordance with the company's safety and environmental procedures.

2.2.6 If the tank behind the weld area is sufficiently full off oil to completely cover the weld area, then monitoring of the transformer is not required during the weld operations.

2.2.7 A fire watch must always be present in accordance with company procedure.



ATTACHMENT 1
ELECTRICAL SUBSTATION EQUIPMENT
EQUIPMENT RECEIPT INSPECTION
(To Be Made A Part of The Equipment History Folder)

Date _____
Inspector _____

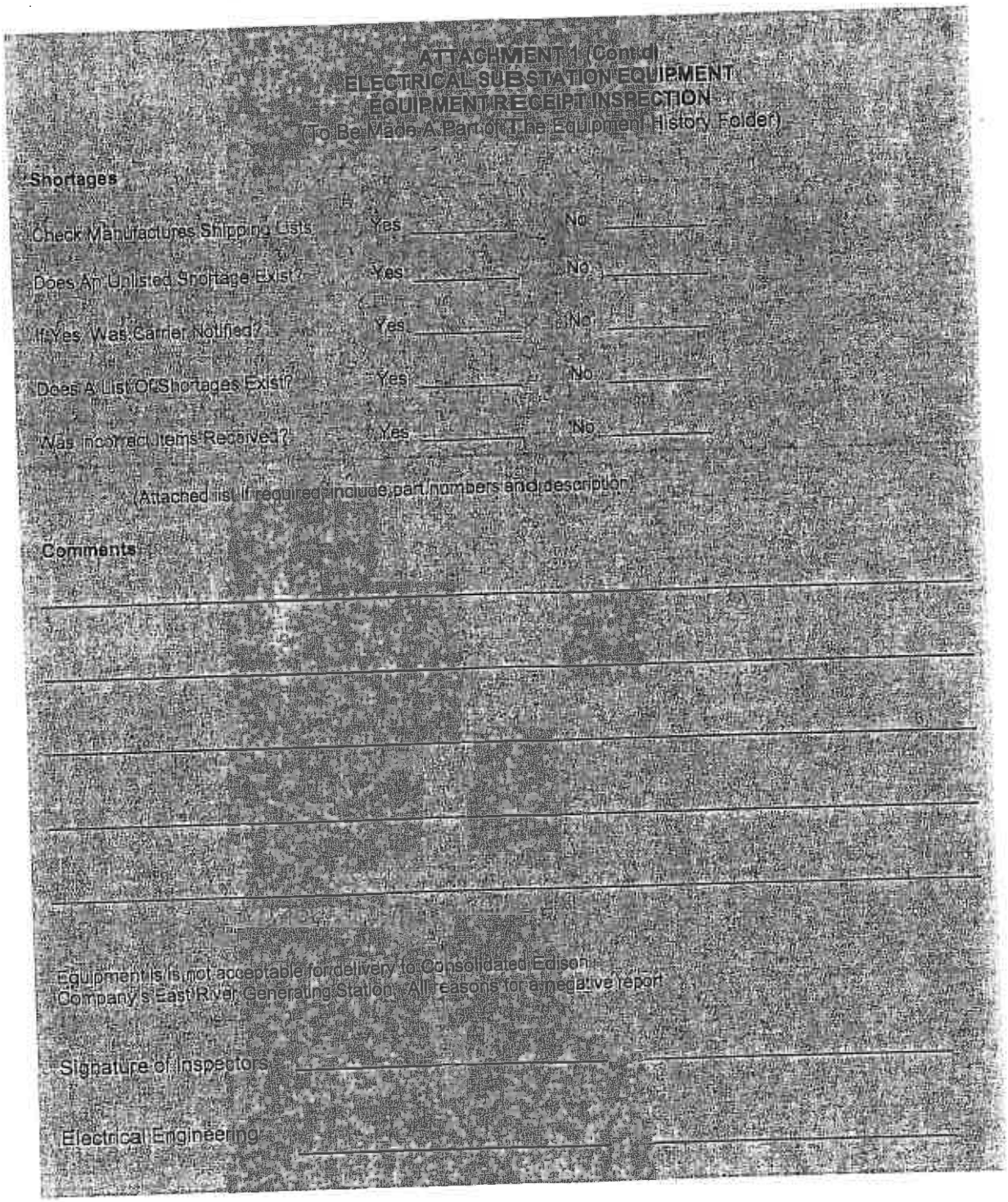
Equipment Nameplate
Mfg _____ SN _____ Type _____
Rating _____ KV _____ Mva _____ Mva _____
Phases _____ Imp _____ @ _____
Con Ed PO _____ EM No _____ Item _____
Con Ed Account Number _____
Equipment Purchased For _____
Manufacture's Instruction Book No _____
Was Book and Drawings on Site? _____

Weather Conditions
Time _____ Amb Temperature _____ Humidity _____
Cloudy _____ Or Sunshine _____
Location of Inspection _____

Carriers Equipment
Main Tank
Carriers Name _____ Number _____
Vehicle Type _____ Name _____
Contact Phone Number _____

Parts/Components
Carriers Name _____ Number _____
Vehicle Type _____ Name _____
Contact Phone Number _____

Representatives on Site
Con Edison _____
Manufacturer _____
Ground Support _____
Carriers _____



ATTACHMENT 1 (Cont'd)
ELECTRICAL SUBSTATION EQUIPMENT
EQUIPMENT RECEIPT INSPECTION
(To Be Made A Part of The Equipment History Folder)

Shortages

Check Manufactures Shipping Lists Yes _____ No _____

Does An Unlisted Shortage Exist? Yes _____ No _____

If Yes, Was Carrier Notified? Yes _____ No _____

Does A List Of Shortages Exist? Yes _____ No _____

Was Incorrect Items Received? Yes _____ No _____

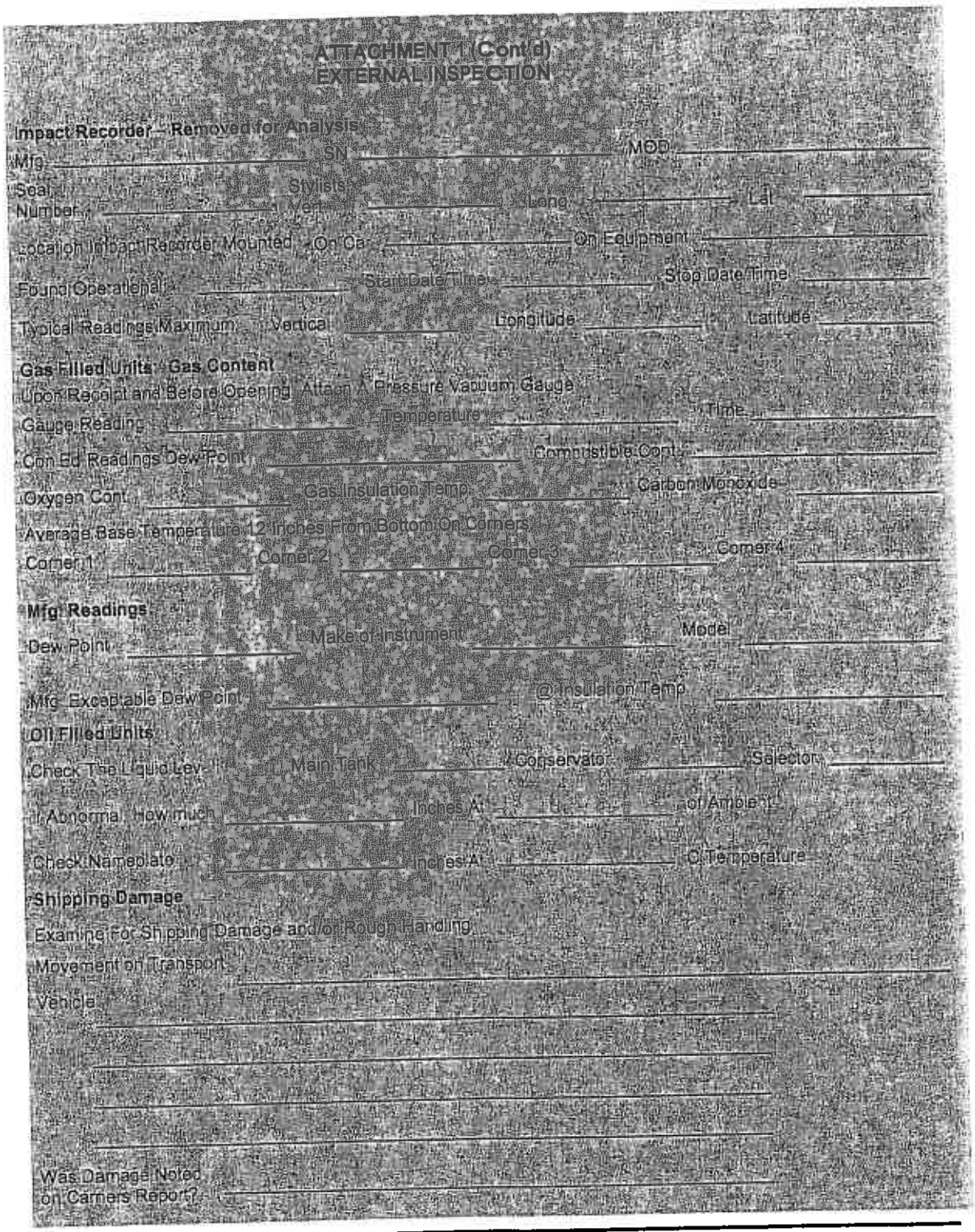
(Attached list, if required, include part numbers and description)

Comments

Equipment is is not acceptable for delivery to Consolidated Edison Company's East River Generating Station. All reasons for a negative report

Signature of Inspectors _____ _____

Electrical Engineering _____ _____



ATTACHMENT 1 (Cont'd)
EXTERNAL INSPECTION

Impact Recorder – Removed for Analysis

Mfg _____ SN _____ MOD _____

Seal Number _____ Stylistic Vert _____ Along _____ Lat _____

Location Impact Recorder Mounted On Ca _____ On Equipment _____

Found Operational _____ Start Date Time _____ Stop Date Time _____

Typical Readings Maximum Vertical _____ Longitude _____ Latitude _____

Gas Filled Units - Gas Content

Upon Receipt and Before Opening Attach A Pressure Vacuum Gauge

Gauge Reading _____ Temperature _____ Time _____

Con Ed Readings Dew Point _____ Combustible Cont _____

Oxygen Cont _____ Gas Insulation Temp _____ Carbon Monoxide _____

Average Base Temperature 12 Inches From Bottom On Corners

Corner 1 _____ Corner 2 _____ Corner 3 _____ Corner 4 _____

Mfg Readings

Dew Point _____ Make of Instrument _____ Model _____

Mfg Acceptable Dew Point _____ @ Insulation Temp _____

Oil Filled Units

Check The Liquid Lev Main Tank _____ Conservator _____ Selector _____

If Abnormal How much _____ Inches At _____ of Ample C

Check Nameplate _____ Inches At _____ C Temperature

Shipping Damage

Examine for Shipping Damage and/or Rough Handling

Movement on Transport Vehicle _____

Was Damage Noted on Carriers Report? _____

ATTACHMENT 1 (Contd)
INTERNAL INSPECTION

Refer to the latest manufacturers instruction for details, explain any defects by identifying parts/pieces defective by phase and nearest tag numbers, location, etc.

Physical Examination
Examine lead supports for cracked or broken members.

Defect Found: Yes _____ No _____

Look for broken or loose bolts.

Defect Found: Yes _____ No _____

Check that steel bolts are secure and for possible breakage.

Defect Found: Yes _____ No _____

Check that clamping to the tank brackets are tight and do not show any movement or missing parts. (Movement is observed by a black oily grease like substance or scrapings of metal).

Defect Found: Yes _____ No _____

ATTACHMENT 1 (Cont'd)
INTERNAL INSPECTION

Inspect cables for torn or chafed insulation

Defect Found: Yes _____ No _____

Inspect all current transformer assemblies to make sure clamping plates are secure and for any signs of movement within assemblies

Defect Found: Yes _____ No _____

Check the coil clamping blocks / jackbolts / dash pots / wedges / spacers for tightness

Defect Found: Yes _____ No _____

Check for dirt or foreign material within tank. Was dirt of Magnetic nature (If dirt / loose material found, describe details)

Defect Found: Yes _____ No _____

Visually inspect the de-energized tap changer by rotate tap changer through all tap positions

Defect Found: Yes _____ No _____

ATTACHMENT 1 (Cont'd)
INTERNAL INSPECTION

Visually inspect the load tap changer as per manufactures instruction

Defect Found: Yes _____ No _____

Check core grounds at 1000 Volt DC for 1 minute by opening strap connections

Results:

Main Core _____ Meg Ohms, Frame _____ Meg Ohms _____

Series Core _____ Meg Ohms, Frame _____ Meg Ohms _____

Preventive Auto _____ Meg Ohms, Frame _____ Meg Ohms _____

Other _____

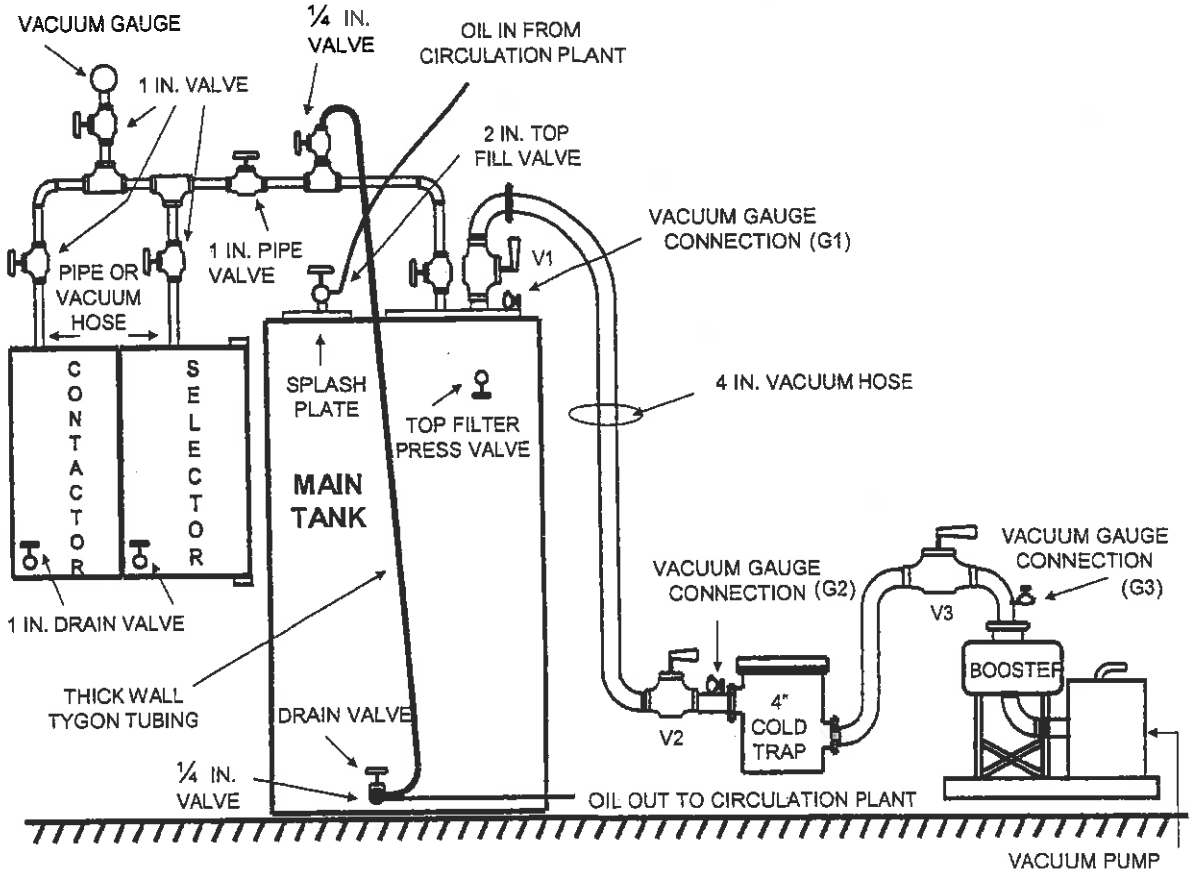
Release Unit

Transformer was pressurized to _____ PSIG dry air Ambient Temperature _____
All Covers removed are to be leak checked.

COMMENTS:

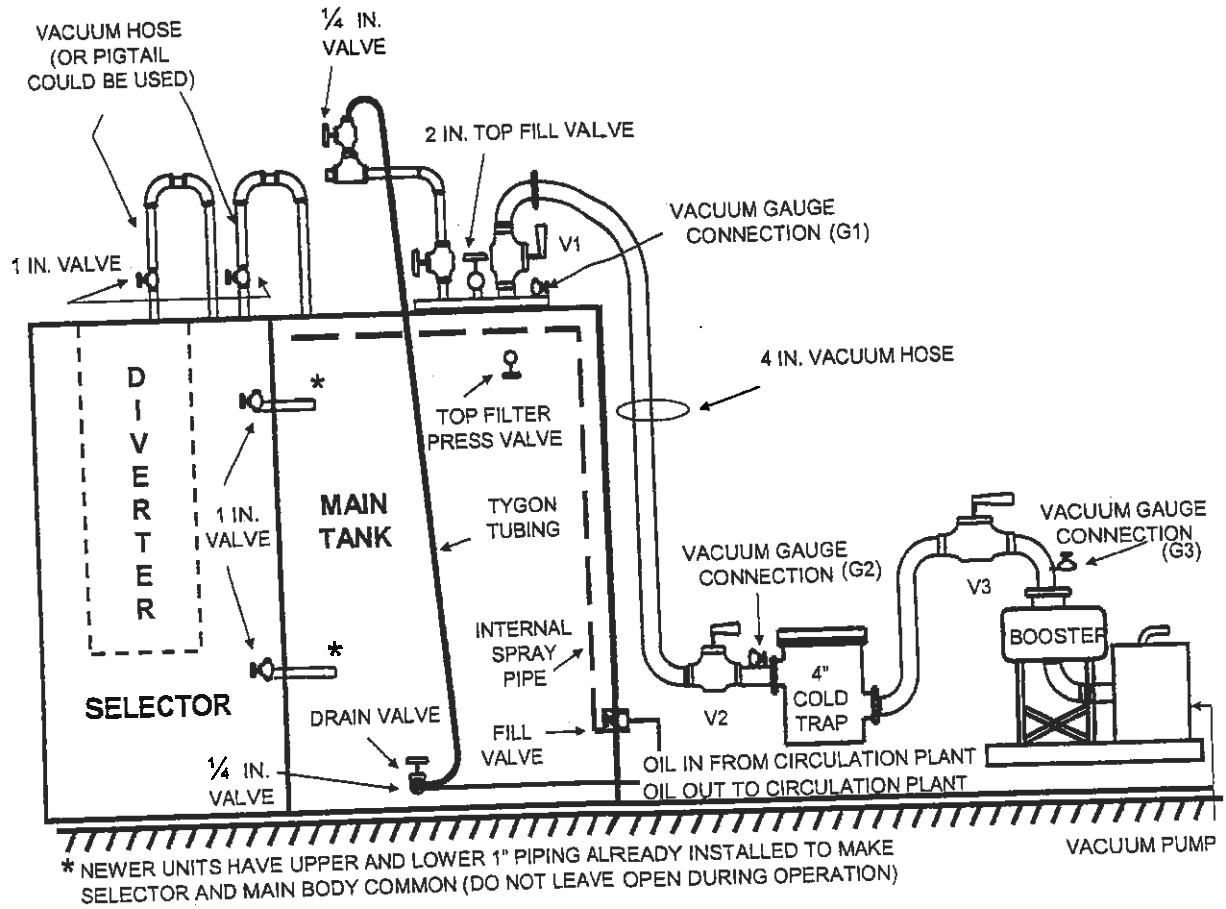
ATTACHMENT 2

Assembly of Vacuum Equipment for Transformers with Contactor Type LTCs



ATTACHMENT 3

Assembly of Vacuum Equipment for Transformers with Diverter Type LTCs



{ATTACHMENT 4} DAILY TRANSFORMER DRY-OUT LOG

EQUIPMENT ID: DATE/DAY:

TIME	CELSIUS		Fahrenheit	VACUUM MAIN TNK	VACUUM COLD TRP	VACUUM VAC PUMP	COLD TRAP READINGS		VACUUM RISE		OIL TREATMENT PLANT (FAHRENHEIT)			GALLONS OF OIL IN TANK	MECHANICS ON DUTY
	WINDING TEMP Luxtron	Winding TEMP Qualitrol	AMBIENT TEMP				OZ OF WATER	OZ OF OIL	START	FINISH	OIL TEMP IN	OIL TEMP OUT	FLOW MTR READNG		
12:00 AM															
1:00 AM															
2:00 AM															
3:00 AM															
4:00 AM															
5:00 AM															
6:00 AM															
7:00 AM															
8:00 AM															
9:00 AM															
10:00 AM															
11:00 AM															
12:00 PM															
1:00 PM															
2:00 PM															
3:00 PM															
4:00 PM															
5:00 PM															
6:00 PM															
7:00 PM															
8:00 PM															
9:00 PM															
10:00 PM															
11:00 PM															

DAILY TRANSFORMER DRY-OUT LOG

EQUIPMENT ID:		DATE/DAY:	

COMMENTS

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
4 IRVING PLACE
NEW YORK, NEW YORK 10003

ENGINEERING SPECIFICATION

CE-ES-1000

PREVENTIVE MAINTENANCE INSPECTION OF ELECTRIC STATION EQUIPMENT

SECTION I – GENERAL AND TECHNICAL REQUIREMENTS

REVISION *07*

AUGUST, 2010

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Effective Date:	8/6/2010

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SECTION I – GENERAL REQUIREMENTS

1.0 SCOPE

1.1 **Purpose** – This specification describes the recommended minimum schedule for Preventative Maintenance Inspections of station electrical equipment. It is compiled as a guide for operating and maintenance personnel who are responsible for the optimum operation of this equipment. This specification also provides guidance for the use of diagnostic testing and condition monitoring as key components of the Preventative Maintenance Program for selected major electrical station equipment.

1.2 **Policy** – The need for preventive maintenance is generally related to elapsed time and/or the number of operations. The specific time at which a particular piece of equipment requires maintenance varies as a function of its design, individual past history and service conditions. Any strictly periodic or operations passed criteria for maintenance must accordingly be conservative. Diagnostic testing and condition based monitoring, where available, can be used to more accurately indicate the need for maintenance of a particular piece of equipment and accordingly will generally increase the time interval or number of operations between major maintenance activities. Where diagnostic test procedures have been developed or where condition based monitoring systems exist, they shall be utilized in this Maintenance Program to determine the need for more extensive activities. The Central Engineering, Steam Business Unit, Substation Operations, Customer Services and Protective Systems & Test Departments shall comply with this procedure to ensure that the reliability of station equipment is maintained in the most cost and time effective manner.

1.3 General

1.3.1. The Preventative Maintenance guidelines set forth in this specification have been formulated from industry standards, manufacturer's recommendations, current industry and Company practice, past experience and the recommendations of an Engineering/Substation Operations Joint Task Force on Equipment Maintenance and Inspection Procedures. The guidelines are attached to this specification as Attachment I and provide for Preventative Maintenance and Inspections that are generally related to time, number of operations and/or results of diagnostic tests or condition monitoring. This specification and attachment shall be periodically revised to reflect actual equipment performance. An essential part of the Diagnostic/ Preventative Maintenance Program is the retention of accurate and detailed history and maintenance records. Computer data files must be maintained so that individual equipment maintenance history and diagnostic and condition monitoring data can be reviewed to establish deterioration trends. These trends may provide the basis for modifying the maintenance strategy for this equipment. In special cases involving critical or specialized equipment, where more stringent schedules have been developed, those schedules shall be adhered to in lieu of the schedules set forth in the attached listing.

1.3.2 Inspections on all equipment should be completed as per the specified time periods (+/-10%) for each specific piece of equipment. ***Circuit breaker diagnostic testing may go +20% without being considered over-due.***

1.3.3 Specific requirements for high voltage circuit breakers,

a. If, due to various factors including outage limitations, project coordination, manpower or funding allocation, the diagnostic test cannot be completed prior to the time limits, it should be discussed with the circuit breaker Peer team (see Section 2.6.4 for Peer team description) at least 6 months prior to the due date. The Peer team will assess the condition of the circuit breaker to determine if a reduced scope of testing may be used in order to validate that the circuit breaker will continue to operate within its design specifications. The reduced scope may reduce the outage time so the testing can be performed. If not, then the Peer team may grant a one time extension, up to a maximum of 12 months, based upon various factors including; maintenance history, current operating condition, equipment design etc.

b. If a diagnostic test was scheduled but must be canceled due to system conditions, contact the circuit breaker Peer team for approval to delay the inspection. The team will review the equipment and determine if it is acceptable to grant an extension until system conditions permit but in any event no longer than 12 months. The scope of the diagnostic testing may be altered as well.

c. Once the Peer team establishes that a circuit breaker is targeted for an overhaul or replacement it shall be completed within 2 years from their report. If it cannot be completed in that time frame then diagnostic testing may be used to extend this time frame up to a maximum of 2 additional years.

1.4 **Location** – The equipment covered by this specification is located in or used in conjunction with the Company's Substations and Generating Stations.

2.0 APPLICABLE STANDARDS AND REFERENCES

2.1 Institute of Electronic and Electrical Engineers (IEEE).

2.2 American National Standards Institute (ANSI).

2.3 National Electric Manufactures Association (NEMA).

2.4 National Electric Code (NEC).

2.5 National Electrical Safety Code (NESC).

2.6 Definitions

2.6.1 External Diagnostic Testing – Identifying an existing or impending abnormality by performing specific out of service tests without removal of the dielectric medium or invasion of the enclosed dielectric system. Some of these tests are described in greater detail in paragraph 9.00 below.

2.6.2 Internal Inspection – Identifying an impending or existing abnormality by direct inspection or measurement of components within the enclosed dielectric system.

2.6.3 Condition Monitoring – Identifying an impending or existing abnormality by continuous or periodic in-service measurements.

2.6.4 Peer Team – An established group of subject matter experts (SME's) from various departments formed to promote and standardize best practices in the maintenance, testing, and proactive condition monitoring of a specific piece of equipment.

3.0 CONTRACT DRAWINGS, SUPPLEMENTAL SPECIFICATIONS, AND MATERIALS LISTS

3.1 Not Applicable.

4.0 QUALITY ASSURANCE

4.1 Not Applicable.

5.0 GENERAL SAFETY AND ENVIRONMENTAL CONSIDERATIONS

5.1 All company personnel shall follow all applicable Con Edison Environmental, Health and Safety (EH&S) policies, procedures and instructions. ***This includes but is not limited to the following:***

5.1.1 Con Edison Blue Book "General Instructions Governing Work on Electrical Systems"

5.1.2 CEHSP S05.01 – Hazard Assessment and Personal Protective Equipment

5.1.3 CEHSP S05.03 – Personal Protective Equipment – Protective Clothing

5.2 All Contractor personnel shall follow all applicable OSHA rules and regulations, and all other federal, state and local laws, rules and regulations. ***This includes but is not limited to the following:***

5.2.1 OSHA Subpart A – General

5.2.2 OSHA Subpart I – Personal Protective Equipment

5.2.3 OSHA Subpart S - Electrical

6.0 TEST EQUIPMENT AND CALIBRATION CRITERIA

6.1 Not Applicable.

7.0 TEST FREQUENCY

7.1 Maintenance and Inspection Criteria for Electrical Station Equipment Tables 1-5, provide the maintenance and testing intervals and criteria for electrical station equipment.

8.0 PRECAUTIONS

8.1 The instruction manuals for all devices shall be read and reviewed by the individuals performing all tests. All safety instructions within these manuals, as well as those identified in Section 5.0, General Safety and Environmental Considerations, shall be followed.

9.0 TEST METHODS

9.1 External Diagnostic Testing

9.1.1 Various tests have been developed which assist the user in determining the serviceability of equipment. These diagnostic tests can often be used to determine if internal inspections or repairs are required.

9.2 Breaker External Diagnostic Tests

9.2.1 SF6 Gas Test – Moisture Level

a. Moisture level is a direct measurement of the dielectric medium's water-vapor content. The water-vapor content will affect the breakdown level of the dielectric. By measuring moisture level a determination can be made of need to process insulating medium.

9.2.2 SF-6 Gas Test – Hydrogen Fluoride Level

a. SF6 gas will decomposes when exposed to arcing or corona discharge. A positive test result for HF indicates the presence of arcing or corona.

9.2.3 Micro-Ohm Test

a. Micro-ohm tests measure the resistance across a closed interrupter or bus connection. Test results aid in determining the condition of all current carrying components and also help verify the integrity of all bolted connections, alignment, penetration, spring tension and contact wear.

9.2.4 Power Factor

a. Power factor tests determine the integrity of the insulating system by measuring the ratio of resistive to capacitive leakage currents on dielectrically stressed components. The presence of contaminants or the degradation of the insulating material will affect this ratio. (The ratio is expressed as a percent.)

9.2.5 Capacitance Test

a. Many circuit breakers require grading capacitors to control the distribution of voltage across series contacts. These capacitors are composed of several capacitors internally interconnected. Deviation in the capacitive value of the grading capacitor indicates capacitor degradation or damage.

9.2.6 Timing and Velocity Tests

a. Timing test utilizing motion analyzers verify the breaker's main (and resistors if so equipped) contacts are opening and closing in the correct time and velocity and with the correct relationship to each other. Timing tests are referenced to the initiation of current in trip and close coils. Travel and velocity tests verify that all of the mechanical operating system components are correctly aligned and adjusted. The test result provides information regarding the operation of shock absorbers, operating rod displacement and velocity, operating linkage adjustment and coordination of various mechanical actions with the closing and/or opening of the breakers contacts. Prior test results are important for comparison purposes.

b. Intrinsic circuit breaker timing may be obtained through the use of various other devices such as protective relays, digital fault recorders (DFR's) or other circuit breaker monitoring devices (Kelman P2 Profile, Incon Optimizer etc.). While these devices do not measure contact velocity they can measure interrupting time, trip circuit voltage and current, all of which can help determine that the circuit breaker is operating properly. Past data is very important when using these methods for trending and comparison.

9.2.7 Other Tests

a. Particular breaker types may have other specific tests that are diagnostic in nature. Example – General ATBs – Air consumption test.

9.2.8 Circuit Breaker Test Evaluation

a. The success of the diagnostic testing and condition monitoring programs shall periodically be reviewed by the circuit breaker peer team to determine if changes need to be made to this maintenance program. The Peer team shall track and trend specific performance indicators such as operation and maintenance histories, failures, cost, environmental and safety factors to evaluate the effectiveness of the program.

9.3 Transformer Diagnostic Testing

9.3.1 The major insulation systems in power transformers use oil impregnated paper or other cellulose based insulating materials. ***Routine tests of the oil (oil quality and dissolved gas-in-oil analysis) are performed to determine the integrity of the transformer and its internal condition.*** The concentration and types of dissolved gases found can be symptomatic of various abnormal conditions both within the transformer's main tank as well as in the load tap changing compartments. ***Testing for furans in the oil can also be used to try to determine the condition of the insulating paper. Special dielectric tests, such as*** power factor testing ***or SFRA tests can also be*** useful in determining the condition of the insulating system. Use of these diagnostic tools requires accurate ***records*** of unit specific history.

9.3.2 Transformer Test Evaluation – The results of the diagnostics tests in paragraph 9.3.1 shall be reviewed by Central Engineering and the various Operating Departments (or Peer team) and a determination made as to their affect on the preventative maintenance program schedule for specific units.

9.4 Miscellaneous Transmission Equipment Diagnostic Testing

9.4.1 Infrared and power factor testing of miscellaneous transmission equipment provides diagnostic data that can help to determine its condition. It is important to note that infrared testing needs to be performed with the equipment in service and carrying load.

9.4.2 Miscellaneous Transmission Equipment Test Evaluation – The results of the tests in Section 9.4 may be useful in establishing deterioration trends that can be used to determine maintenance requirements.

9.5 Condition Monitoring

9.5.1 Continuous on-line monitoring and periodic on-line tests are effective methods for determining the condition of the equipment and the need for maintenance. The inspection periodicity for equipment considers our existing practice for on-line monitoring. For transformers, the type of condition monitoring used for each specific LTC is determined by the ability of the condition monitoring to detect directly or indirectly the condition of the normally wearing components. As in-service condition monitoring becomes available for various types of equipment, its use can safely permit extending maintenance intervals. This is predicated on the ability of the monitoring system to detect directly or indirectly the condition of the normally wearing components. Some of the attached guidelines indicate greater operations or longer times between maintenance activities when condition monitoring is available. This is predicated on the conscientious use of an approved monitoring system. If conditioning monitoring is used to extend the periodicity for any equipment as written in this specification it shall be reviewed and approved by Engineering and clearly documented in the equipment database.

10.0 TEST DOCUMENTATION

10.1 All data taken during any measurements and/or tests shall be recorded in a computerized database. All test data not within specification shall be forwarded to Central Engineering for final evaluation. The accuracy and completeness of the data is critical because it will be used for trending analysis and ultimately revising the periodicity guidelines in this specification. Test records shall be maintained for the life of the equipment.

11.0 ACCEPTANCE CRITERIA

11.1 Central Engineering personnel will review all test data that is not within clearly defined acceptance criteria and make all decisions regarding the acceptance of the test results and the serviceability of the associated equipment.

12.0 TEST ANALYSIS

12.1 Central Engineering personnel will review all test data and make any determinations if the electrical equipment has to be re-tested or repaired.

SECTION II – TEST DATA AND ACCEPTANCE REQUIREMENTS AND SUPPLEMENTAL SPECIFICATIONS

MAINTENANCE AND INSPECTION CRITERIA FOR ELECTRICAL STATION EQUIPMENT

TABLE 1

LARGE POWER TRANSFORMERS, REGULATORS AND REACTORS

Item	Periodicity	Remarks
External Inspection	Monthly	Include the following items to be maintained in a computerized database: Tap changer counter readings, oil level per compartment, oil and winding temperatures, maximum oil and winding temperatures, alarms and discrepancies found. The Maximum indicators should be reset after the levels are recorded
Cooling Equipment	Annual – Pre Summer	All cooling system components and controls checked for proper operation.
Oil Properties	Annual	Moisture, Dielectric, Acidity, Color, Furan content
Dissolved Gas in Oil	Spec EI 1029	Includes all oil filled compartments
Load Tap Changers	Per Table 1 Below	By type as indicated in Table 1. Exceptions to generic types are specifically noted.

TABLE 2

LOAD TAP CHANGER MAINTENANCE CRITERIA

Type LTC	Operations	Years	
Type 1 Area Substation	40,000	8	
Type 1 Transmission station	40,000	10	
Type 2	60,000	10	
Type 3	60,000	10	
Type 3 With TM-100 monitor	No Requirement	No Requirement	See Note 1
Type 4	***60,000***	***10***	
Type 5	***No Requirement***	***No Requirement***	***See Note 1***
Type 6	***60,000***	***12***	

DEFINITIONS:

Type 1 = Reactive with separate contactor and selector compartments.
Type 2 = Reactive with vacuum contactor in common compartment.
Type 3 = Resistive with separate, diverter and selector compartments.
Type 4 = Resistive with common compartment.
Type 5 = Resistive with Vacuum interrupters.
Type 6 = Type LRT-500

Note 1: Some type 3 LTCs and all type 5 LTCs are equipped with an on-line monitoring system such as the TM-100/***TapGuard*** that will determine when maintenance is required. There is no requirement to inspect these LTCs based on operations or time.

TABLE 3

LOAD TAP CHANGER BY MODELS AND TYPES

LTC Manufacturer	Model	Type
Allis-Chalmers	TLB	1
Allis-Chalmers	TLC	1
Federal Pacific	TC34M	1
Ferranti	TR	1
General Electric	LRT-59	1
General Electric	LRT-81	1
General Electric	LRT-9	1
General Electric	***LRT-68***	1
General Electric	LRT-69	1
Pennsylvania, McGraw, Cooper	394	1
Pennsylvania, McGraw, Cooper	442	1
Pennsylvania, McGraw, Cooper	996	1
Molony	MH	1
Westinghouse	URT	1
Westinghouse	URT-HC	1
Westinghouse	UTH	1
Westinghouse	UTR	1
General Electric	LRT-300	2
General Electric	LRT-400	2
General Electric	LRT-500	***6***
Reinhausen	RMV-II	2
Pennsylvania, McGraw, Cooper	397D	2
Westinghouse	UVT	2
Westinghouse	UVW	2
ASEA	UCG RT	3
ASEA	UTB	3
Hitachi	LR-N	3
Reinhausen	D3-200	3
Reinhausen	GI	3
Reinhausen	M	3
Reinhausen	T	3
Reinhausen	R	3
Trafo-Union	CRNDS-702	3
Trafo-Union	MLPN77	3
Federal Pioneer	***TC-34-2***	3
ASEA	UZE	4
Waukesha etc.	UZD	4
Reinhausen	VRC	5
Reinhausen	VRF	5

TABLE 4

SUBSTATION POWER CIRCUIT BREAKERS

Circuit Breaker Type	Condition monitoring	Diagnostic Testing Years	Diagnostic Testing Oper.	Periodic Maintenance Years	Periodic Maintenance Oper.	Overhaul Years	Dewpoint Years
13, 27, 33 kV							
Air magnetic				6			
Vacuum				*10*			
SF6				10			
Fixed Air Blast				5	200		
Oil				5			
G&T Devices				*2**			
Cap/Reac. Banks				1			
For SiKap Cap Banks				*10*			
138kV							
All oil		5	200			10	
All oil		Annual Oil Testing					
All other HV circuit breakers (69-345 kV)		See requirement below					

** Prior to each summer, all G&T breakers shall have their records checked to ensure that they are available for service with no outstanding work orders.*

ALL HIGH VOLTAGE (69-345 kV) CIRCUIT BREAKERS MAINTENANCE REQUIREMENTS

2.2 The frequency for preventative maintenance and testing all 69-345 kV circuit breakers is as follows:

2.2.1 Minimum diagnostic test (DT) data obtained every five years to ensure breaker operability. In addition, circuit breaker lubrication must be completed during this time frame. The required data for the 5 year minimum DT includes the following tests:

a. Timing/velocity either directly from a motion analyzer or indirectly from other sources, i.e. digital fault recorder, relays, or other devices.

b. Contact resistance

c. Power factor. ***This is required only on circuit breakers with grading capacitors across the contacts.***

d. SF6 gas testing

e. Circuit breaker specific items as described in the maintenance strategy document.

2.2.2 Full diagnostic testing as per SSO diagnostic test procedures (700 series) every ten years.

a. In addition to the above requirements, a circuit breaker maintenance ranking tool shall be utilized as a guide to establish the need for major maintenance or additional diagnostic testing on all high voltage circuit breakers. SSO is responsible to record and maintain all information as listed in the program. On an annual basis SSO personnel and Engineering (Peer team) shall meet to review the ranking of all high voltage circuit breakers to establish a long range maintenance plan. Maintenance can vary from minor specific maintenance to a full overhaul or replacement. The team is responsible to document the decisions in regard to the maintenance that was chosen for each particular circuit breaker. All circuit breakers in the top 20% of the ranking system must be reviewed and considered for maintenance. Each circuit breaker that is ranked in the top 5% but is not chosen to have maintenance performed in the upcoming 18 month period shall be documented justifying why maintenance was not chosen for that particular circuit breaker. Historical information and accurate record keeping is vital in the decision making process for maintenance on a particular breaker. On-line and off-line diagnostic test results can help acquire the information required to make informed decisions regarding the need for maintenance for each circuit breaker. These test results should be heavily considered when the maintenance plan is determined by the Peer team.

b. The maintenance ranking program is used as a long range planning tool and as such the maintenance recommendations shall be looking ahead 6-24 months. This will allow outages to be scheduled, parts to be obtained, manpower to be planned etc. Once the Peer team has issued the yearly maintenance report the recommendations shall be completed within a 24 month period. If not completed within that time frame, the circuit breaker will be recognized as overdue for maintenance.

c. The use of condition based monitoring may also to be used to alert when a circuit breaker requires more immediate attention. The Peer team is responsible to review any condition based monitoring alerts to determine the health of the breaker and recommend the requirements for maintenance or additional testing. The methods used to collect the condition monitoring data will vary from breaker to breaker and may include but is not limited to the following methods:

(1) Specific breaker monitoring devices
(Example: 138 kV ABB PM-63 circuit breaker)

(2) Digital fault recorder analysis

(3) Use of Protective relays

(4) Other circuit breaker monitoring tools (Examples: Kelman P2 Profile, Incon Optimizer, ABB Sentinel etc.)

d. It is recognized that all circuit breakers and their importance to the system are not equal. Therefore, a unique PM schedule and testing protocol may be implemented for any particular circuit breaker. The Peer team is responsible to document the deviation from the standard guidelines and the justification for the change.

e. Circuit breakers that have well established condition monitoring technologies do not require strict adherence to the time/counter based maintenance guidelines above. If the circuit breaker's condition, as determined by the monitoring technology and validated by the peer team, is determined to be within predetermined criteria, the required maintenance may be postponed. As other monitoring tools become available and are installed on circuit breakers their maintenance schedules may be altered accordingly.

NOTE

In order to transition from a time based program to a performance based program a maintenance strategy document was written by the Peer team. These guidelines shall be followed for 2009 and 2010. The Peer team shall issue the maintenance recommendations for the 2011 breaker maintenance program no later than June 2010.

1.0 ADDITIONAL CIRCUIT BREAKER REQUIREMENTS

1.1 208 and 440 Volt circuit breakers shall be inspected during outages of associated equipment.

1.2 All 69 kV through 345 kV circuit breakers shall be operated at least once a year.

1.3 ITE 345 kV circuit breakers shall be operated once every 180 days.

TABLE 5
MISCELLANEOUS ELECTRICAL EQUIPMENT

	Equipment		Maintenance Interval/Specification
1	**Control Batteries**	Lead Acid	Per CE-ES-1034
		Nickel Cadmium	Per CE-ES-1035
2	**Battery Chargers**	Automatic voltage control	3 Months
		Voltage check	6 Months
3	**Cathodic Protection**		Per Gas Operations Procedure G-6202-7
4	**Surge Arresters**		Monthly visual inspection.
5	**Capacitor Voltage Transformer**		With associated equipment trip checks or where 3% voltage deviation is detected.
6	**Potential Transformers**		With associated equipment trip checks or where 2% voltage deviation is detected.
7	**Open Bus, Insulator & Supports**		Annual thermal image survey and visual inspection for damage.
8	**Metal-Clad Bus**	Transformer Bus Run	***Perform maintenance and testing*** In conjunction with associated transformer LTC inspection. ***If the transformer LTC has no periodic inspection frequency, perform every 10 years.*** Note: In service condition monitoring techniques may also be used in place of the insulation resistance test.
		Syn Bus	***10 years.*** ***NOTE: This is a newly established requirement in Revision 7 of this specification. Inspections should be scheduled to meet this requirement going forward.***

TABLE 5 (CONT'D)
MISCELLANEOUS ELECTRICAL EQUIPMENT

	Equipment		Maintenance Interval/Specification
9	**Disconnect Switches**	Infra-Red analysis	Annual S/S thermal image survey, individually as operated.
		Periodic Maintenance	On a semiannual basis Substation Operations personnel will meet with Equipment and Field Engineering personnel to determine those disconnect switches that require maintenance, repair or replacement activity. Considerations to be used in the determination include but are not limited to: criticality of application, prior maintenance history, and scan history including the frequency of need to exercise the switch, safety concerns, outage availability and obsolescence. In order to effectively make this determination, Substation Operations shall maintain unified databases of all disconnect switches which will include: location, manufacturer & model and availability of parts required to perform maintenance and repair activities. Substation Operations and Equipment & Field Engineering shall use their best judgment to determine the particular switches that require attention as well as the attention required which could be: simple repair of broken components, routine maintenance, full overhaul or complete replacement. It is anticipated that at least 5% of all disconnect switches will require attention in a given year.
10	**High Speed Ground Switches**		Operation checks in conjunction with associated trip checks. Maintenance with LTC inspection.
11	**Circuit Switchers/*Interrupters***		Operation checks in conjunction with associated trip checks. Maintenance with LTC inspection or 5 years.
12	***Capacitor Bank Switching Equipment: Vacuum Switches/Cap Switchers***		***Every 3 years***
13	**Motor Generator Sets**		2 Months
14	**Interlocks**		Checked as associated equipment operated.

TABLE 5 (CONT'D)
MISCELLANEOUS ELECTRICAL EQUIPMENT

	Equipment		Maintenance Interval/Specification
15	**High Voltage Test Equipment**		Annually
16	**High Voltage Detectors and Test Sticks**		Annually
17	**Hot Stick For Portable Ground Application**		Annually
18	**Data Logging Equipment**		Protective Systems Test Policy
19	**Supervisory Equipment**		Protective Systems Test Policy
20	**Load Shedding Equipment**		Protective Systems Test Policy
21	**Protective Relays**		Protective Systems Test Policy
22	**Oscillographs and Digital Fault Recorders**		Protective Systems Test Policy
23	**Transformer Deluge Systems**		During outages for Maintenance, Perform annual full-flow (wet) testing of deluge system in accordance with General Safety Instruction 14.05, Corporate Safety Procedures and SSO-0500-0008.
24	**Smoke or Fire Detection Systems**		Annually
25	**Oil Cooling Plants**	Air/Oil	In accordance with applicable SSO Procedures.
		Air/Water/Oil	In accordance with applicable SSO Procedures.
26	**Oil Pressurization Plants**		In accordance with applicable SSO Procedures.
27	**Feeder Potheads**		Infrared and visual inspections in accordance with CE-TS-6045 and CE-TS-6250.
28	**Dry type Feeder and Bus Reactors**		10 Years – General cleaning and inspection for damage.

TABLE 5 (CONT'D)
MISCELLANEOUS ELECTRICAL EQUIPMENT

	Equipment		Maintenance Interval/Specification
29	**SF6 Insulated Bus without partial discharge monitors.** **SF6 bus with partial discharge monitors.**		***Semi-annually – Test for HF. If gas has been added since the previous sample, then also test the Dew Point.*** Annual partial discharge measurement and analysis.
30	**Air Compressors and Dryers**		Weekly blow down or semi annually if equipped with condition monitoring. (Run time, Dryness)
31	**Nitrogen Storage Equipment**		Annually
32	**Alarm Annunciators**		Operation Check Per watch or per station visit.
33	**AC and DC Transfer Switches**		Annually
34	**Capacitor Bank (Outdoor)**		***Operator check per watch or station visit for blown fuses and/or leaking cans.*** ***Perform the following annually:*** 1. ***Infrared inspection with the cap bank in service.*** 2. ***Visual inspection of fuses, cans and general area.*** 3. ***Inspect integrity of enclosure (fence) to prevent animal intrusion.*** ***.Every 5 years perform all maintenance tasks described in SSO procedure 0500-0029.*** ***Every 10 years perform capacitor can and fuse measurements using ABB (or equivalent) CB10 test device.***
	Capacitor Bank (Metal Enclosed)		Every 3 years in accordance with SSO procedure 0500-0003.
35	***Diesel Generator***		***As per SSO procedure 0300-0701.***
36	***ABB SF6 Type ELK-04 145 kV***		***Inspection – 8 years***

TABLE 5 (CONT'D)
MISCELLANEOUS ELECTRICAL EQUIPMENT

	Equipment		Maintenance Interval/Specification
	Circuit Breaker		***Maintenance – 20 fault operations or 5000 operations***
37	***ABB SF6 Type ELK-04 Motor Operated Disconnect/Ground Sw.***		Inspection – 8 years Maintenance – 5000 operations
38	**ABB SF6 Type ELK-04 Fast Acting Ground Switch**		.Inspection – 8 years Maintenance – 2000 operations or 2 closing operations onto short circuit
39	***HVB SF6 Type FLT-EEA Disconnect Switch***		

Consolidated Edison Company of New York, Inc.
2010 Accommodation Billing Schedule Rates

			2010 Regular	2010 Overtime
CA- 2E		ELECTRIC OUTSIDE PLANT	117.55	133.10
CA- 2S		STEAM OUTSIDE PLANT	127.55	143.10
CA - 3G		GAS INSIDE AND OUTSIDE PLANT (formally known as GA - 2G & GA - 4 - CGO)	140.45	156.75
CA- 4A		CENTRAL ENGINEERING (SUBSTATION & TRANSMISSION ENGINEERING)	109.40	-
CA - 4 - MS		MAINTENANCE SERVICES	102.15	117.25
CA-4 - SO/PST		SUBSTATION OPERATION INSIDE PLANT AND PROTECTIVE SYSTEMS ACCOMODATION WORK (formally known as GA - 4 -SO & GA- 12)	116.90	134.45
CA- 5L	*	TRANSMISSION LINE MAINTENANCE	137.55	159.30
CA- 5U	*	UNDERGROUND TRANSMISSION	129.70	146.20
CA- 5M	* formally combined	UNDERGROUND TRANSMISSION & LINE MAINTENANCE	**(replaced with 5L & 5U)**	
CA - 6		TECHNICAL SERVICE LABS	107.10	123.05
CA - 7		TRANSFORMER SHOP	146.10	162.50
CA- 9		TRANSPORTATION OPERATIONS, MAINTENANCE & CRANES AND RIGGING (COMBINED)	127.90	145.95
CA- 11		TRANSFORMER ANNUAL MAINTENANCE COSTS	*(Schedule attached)*	
CA- 13		ELECTRIC METER BUREAU	153.25	171.60

CA- 14		CHEMICAL TESTING LAB	181.20	201.30
CA- 21		FOR NON-PROFIT ORGANIZATIONS ELECTRIC, GAS & STEAM OUTSIDE PLANT	57.95	76.50
CA- 22		CONSTRUCTION MANAGEMENT	183.05	203.25
CA-23	New	CONSTRUCTION BUILDING STATION & ENVIRONMENTAL SUBSTATION & TRANSMISSION	119.50	140.55
CA- 80		DIVISION ENGINEERING	93.50	110.85
CA - 81		TRANSMISSION PLANNING	103.25	-
CA - 82		TRANSIT AUTHORITY	***(Schedule on file)***	
CA - 83		RESEARCH & DEVELOPMENT	197.95	-
CA - 84		AUDITING	126.90	-
CA - 85	New	ENERGY SERVICES - ACCOUNT EXECUTIVE GROUP	102.50	-
CA - 86	New	IR - Tech Planning	120.45	-

Footnotes:

Material Costs: All materials will be billed at average storeroom prices plus a storeroom handling charge of 14.50%. New York State and Local Sales and Use Tax will be added where applicable.

Transportation Costs: Use of transportation vehicles will be billed at current industry standard rates.

Outside Contract Work: Outside contract work will be billed at the actual cost to the Company.

Use of Large Tools and Work Equipment: Such use will be billed at current industry standard rates.

Corporate Overheads (covers Engineering and Administrative & Supervisory "A&S" expenses) and Gross Receipts Taxes "GRT" - Accomodation Work. In addition to

the above costs, the following percentages will be added to the total foregoing items based upon the location:

New York City	22.89%
Yonkers	23.71%
New Rochelle, White Plains, Mount Vernon, Briarcliff Manor and Other Westchester cities and villages	21.21%
Buchanon and other Westchester communities	20.00%

Note: When Engineering Services are directly billed, the Corporate Overhead for Administrative and Supervisory is 4.0%, plus GRT. GRT rates are subject to change to reflect current costs.

New York City	6.50%
Yonkers	7.22%
New Rochelle, White Plains, Mount Vernon, Briarcliff Manor and other Westchester cities & villages	5.05%
Buchanan and other Westchester communities	4.00%

Corporate overheads and Gross Receipts taxes - Property Damages

All Areas	20.00%

When the labor cost for engineering or drafting is separately stated, corporate overhead for administration and inspection is 4% plus Gross Receipt Taxes.

Salvage Credit for Material Removed: When the Company agrees to accept the material and allow salvage credit against the total bill, credit will be allowed at average storeroom price, less salvaging cost. If the material is not suitable for re-use on the Company's system, credit will be allowed at scrap value.

New York State and Local Sales Tax will be added to the total bill when applicable.

Price Revision: The various rates indicated may be revised as conditions warrant. The labor scale specified in the rates may be adjusted in the event of a retroactive change in the wages of the class or classes of employees engaged in the work.

Sales Tax On Total Invoice (Unless Exempt*)		Effective 6/1/2010
New York City	8.875%	
Mount Vernon, Yonkers, & New Rochelle	8.375%	
White Plains	8.125%	8.375%
All Other Westchester	7.375%	

Exemption Categories

A) Capital Improvements (need certificate)
B) Non-Profit & Governmental Organizations and Transit Authority
C) Direct Payment Permit (need certificate)
D) Materials used for Resale (need certificate)
E) Materials used for Manufacturing (need certificate)

If you have any questions call Marietta Deluca (212) 460-2705, David Singh (212) 460-3077, or Yvette Jackson-Brown (212) 460-6858.

A. GENERAL

1. This statement is intended to establish rules and regulations as required under Section 2880 of the Public Authorities Law describing the policy of the Power Authority of the State of New York (the "Authority") to promptly pay all proper invoices submitted by any Contractor. Subject to the conditions and exceptions set forth in Section 2880 and herein, in the event any proper invoice is not paid promptly, the Authority shall be liable for the payment of interest on late payments. This policy shall apply to all Contracts entered into on or after April 30, 1988.

B. DEFINITIONS

1. "CONTRACT" means an enforceable agreement entered into between the Authority and a Contractor.

2. "CONTRACTOR" means any person, partnership, private corporation or association: a) selling materials, equipment or supplies or leasing property or equipment to the Authority; b) constructing, reconstructing or repairing buildings, highways or other improvements for or on behalf of the Authority; or c) rendering or providing services to the Authority pursuant to a Contract.

3. "DESIGNATED PAYMENT OFFICE" means the office designated by the Authority to which a proper invoice is to be submitted by a Contractor.

4. "PROPER INVOICE" means a written request for a Contract Payment that is submitted by a Contractor to the Authority's designated payment office setting forth the description, price and quantity of goods, property or services delivered or rendered in accordance with the terms of the Contract, in such form and supported by such other substantiating documentation as the Authority may reasonably require.

5. "RECEIPT OF AN INVOICE" and "INVOICE RECEIVED DATE" mean (a) the date on which proper invoice is actually received in the designated payment office, or (b) the date on which the Authority receives the purchased goods, property or services covered by the proper invoice, whichever is later. With regard to final payments on construction contracts, (b) shall mean the date on which all the Contract Work has been accepted as completed by the Authority in accordance with the Contract terms.

6. "SET-OFF" means the reduction by the Authority of a payment due a Contractor by an amount equal to the amount of an unpaid legally enforceable debt owed by the Contractor to the Authority.

C. RESPONSIBILITY FOR PROMPT PAYMENT

1. The Authority's Controller shall have the responsibility for the implementation of the Prompt Payment Policy and the prompt payment of all proper invoices under the general guidance and supervision of the Executive Vice President & Chief Financial Officer.

D. PROMPT PAYMENT PROCEDURE

1. A Contractor shall request payment under a Contract by submitting a proper invoice to the Authority at its designated payment office at the time and in the manner specified in the Contract.

2. The Authority shall have fifteen (15) calendar days after receipt of an invoice at its designated payment office to notify the Contractor of certain facts and conditions, including but not limited to those listed below, which, in the opinion of the Authority's Controller, justify extension of the statutory payment period.

   a) there is a defect in the delivered goods, property or services;

   b) there is a defect in the invoice;

   c) there are suspected defects or improprieties of any kind the existence of which prevent the commencement of the statutory payment period;

   d) prior to payment, a statutory or contractual provision requires an inspection period or an audit to determine the resources applied or used by the Contractor in fulfilling the contract terms;

   e) a proper invoice must be examined by the federal government prior to payment;

   f) the Authority is prevented from making payment by reason of the filing of a lien, attachment, other legal process or requirement of law.

   Any time taken to satisfy or rectify any such facts or conditions shall extend the date by which contract payment must be made in order for the Authority not to become liable for interest payments by an equal period of time.

3. Should the Authority fail to notify a Contractor of such facts and conditions within fifteen calendar days of the invoice received date, the number of days allowed for payment of the corrected proper invoice will be reduced by the number of days between the fifteenth day and the day that notification was transmitted to the Contractor. Should the Authority, in such situations, fail to provide reasonable grounds for its contention that a fact or condition justifying a time extension exists, the date by which contract payment must be made in order for the Authority not to become liable for interest payment shall be calculated from the invoice received date.

4. The Authority shall make payment within forty five (45) calendar days after the invoice received date. Effective July 1, 1989, the Authority shall make payment within thirty (30) calendar days, excluding legal holidays, after invoice received dates occurring after that date.

5. Except for the payments described in Paragraph E, every payment by the Authority to a Contractor pursuant to a Contract is eligible for interest should the Authority fail to make such payment within forty five (45) days after the invoice received date for contracts entered into between April 30, 1988 and June 30, 1989 and within thirty (30) days for contracts entered into on or after July 1, 1989.

6. The Authority shall not be liable for interest on any retention amounts withheld by the Authority in accordance with the terms of the Contract.

7. Interest shall be computed at the rate set by the state tax commission for corporate taxes pursuant to paragraph one of subsection (e) of section 1096 of the tax law, but the Authority shall not be liable for payment of interest when such interest is less than ten dollars.

8. The Authority has available funds in its custody to pay all interest penalties.

E. EXCEPTIONS

1. Payments are not eligible for interest when they are due and owing by the Authority:

   a) under the eminent domain procedure law;

   b) as interest allowed on a judgement by a court pursuant to any provision of law other than section 2880 of the Public Authorities Law;

   c) to the federal government; to any state agency or its instrumentalities; to any duly constituted unit of local government including but not limited to, counties, cities, towns, villages, school districts, or any of their related instrumentalities; to any other public authority or public benefit corporation; or to its employees when acting in, or incidental to, their public employment capacity;

   d) in situations where the Authority exercises a legally authorized set-off against all or part of the payment due the Contractor.