1.0 INTRODUCTION

This document contains the Minimum Approach Distance (MAD) requirements for each employee who performs work on, or near, energized electrical utility line or utility line equipment. This document applies to all New Brunswick Power employees and contractors acting on behalf of NB Power who work in proximity to energized electrical utility line or utility line equipment. Management shall ensure that NB Power employees and contractors acting on behalf of the company follow these requirements.

2.0 SCOPE

Any employee working on or near energized electrical utility line or utility line equipment.

3.0 REFERENCES

NB OHS General Regulation 91-191	New Brunswick Occupational Health and Safety Regulation 91-191 Part XV: Section: 289
CAN/ULC S801	Standard on Electric Utility Workplace Electrical Safety for Generation, Transmission, and Distribution
Corporate Safety Manual	
CSA Z462	Workplace Electrical Safety
Form 399	MAD authorized person COP
Form 400	MAD Qualified person

4.0 TERMS AND DEFINITIONS

Authorization	approval of the person or persons responsible for the equipment to be worked on or used, and for the work to be carried out. No person shall perform work on or near NB Power apparatus that may affect the normal operation of that apparatus without first obtaining authorization from the Operating Station.
Authorized Person	it is recognized that, in a specific work situation, a person who is not a Qualified Person may be required and specifically authorized to work **near** exposed energized electrical apparatus. In these situations a specific code of practice shall be detailed for the Authorized Person and approved by a Qualified Electrical Person or Station/Controlling Authority, and followed by the Authorized Person. It may be deemed necessary to have a Qualified Electrical Person present to monitor the Authorized Person's work.

Barricade	an obstruction such as tape, cones, or A-frame type wood or metal structures intended to provide a warning about and to limit access to a hazardous area.
Barrier	a physical obstruction which is intended to prevent contact with energized circuits or, to physically prevent access to other hazardous areas, and to prevent unauthorized access to a work area. Barriers are used to maintain the minimum electrical hazard distance between the worker and the energized part or between the worker and ground. They can be used on lines or equipment at any voltage provided proper minimum electrical hazard distance is observed. Barriers are not relied on for electrical insulation but act only as physical barriers.
Contact Area	within arm or tool reach.
Cover-up Equipment	equipment designed to protect persons from brush or inadvertent contact to energized parts in a specific worksite. Many different types are available to cover conductors, insulators, dead-end assemblies, structures and apparatus. Cover-up material might be either flexible or rigid.
Direct Supervision	the zone within which the Safety Employee in Charge can still safely supervise the work in progress by ensuring all their responsibilities are satisfied.
Electrician	A person who meets the requirements of section 11 or 24 of New Brunswick Regulation 84-165 under the Electrical Installation and Inspection Act. At NB Power, Electricians perform work on electrical apparatus under 750V nominal voltage.
Exposed	not enclosed, not insulated, not isolated, not guarded nor otherwise covered. Excludes, cable trays, trenches, conduit, cover-up equipment, etc. Note: Insulation on energized conductors shall not be depended upon for protection. Such conductors shall be treated as bare wire and handled accordingly. Exceptions: Any cable with a grounded metallic sheath or shield. Only Qualified Electrical Persons are authorized to identify exceptions.
Insulating Tool	a tool or device designed primarily to provide insulation from an energized part or conductor. It can be composed entirely of insulating materials (i.e., conductor cover, hot stick, insulating tape, etc.).
Minimum Approach Distance (MAD)	the minimum distance in air to be maintained between any part of the body of a worker, including any object (except appropriate tools for live working) being directly handled, and any parts at different potential. (Formerly Safe Working Distance/Safe Limits of Approach)
Minimum Approach Distance Qualified Person	(MAD Qualified Person) – A person who has been trained in technical and safe work practices with respect to Minimum

	Approach Distances. This person will be trained, both in theory and in practice, to recognize hazards associated with working around energized electrical utility line, utility line equipment and electrical apparatus in switchyards, terminals, substations. The person shall have successfully completed both the theory and practical components of NB Power Minimum Approach Distance course (code S137). Once training has been completed, managerial authorization is required to monitor other employees work in regards to Minimum Approach Distances. See Appendix C – Form#0400 MAD Qualified Person Form for more detail.
Near	distance from energized electrical utility line or utility line equipment less than Table 1, Column C in Appendix A.[1]
Operating Station	the station which co-ordinates the operation of the Transmission and Distribution system in order to ensure continuous and satisfactory service to customers. a) Power System Operations (PSO) co-ordinates the operation of the Generating Stations, Transmission lines, Switching Stations, and Terminal Stations. b) Distribution System Operations (DSO) co-ordinates the operation of the Distribution System and Substations.
Pole Setter	a person who has successfully completed the NB Power Pole Setters Course (code P218), or a course offered by another organization that is equivalent in content.
Qualified Electrical Person	a person who is the holder of a certificate of qualification issued under the Apprenticeship and Occupations Certification Act for the operating lineman trade, construction lineman trade, distribution construction lineman trade, or a person who is registered as an apprentice for one of the above trades and working under the supervision of a holder of certification in the trade. At NB Power, Qualified Electrical Person applies only to Certified A Linepersons, Electrical Mechanics, Power Line Technicians, Relay Technicians, and their apprentices. **Only Qualified Electrical Persons have NB Power authorization to work on energized electrical utility line, or utility line equipment.**

[1] Based on NB General Regulation 91-191, section 289.

Qualified Person	Occupational Health and Safety Regulation 91-191, Section 286 defines Qualified Person, and for NB Power purposes means: a) Electrician for apparatus under 750V nominal voltage. b) Qualified Electrical Person for work on energized electrical utility lines or utility line equipment. c) Utility Arborist for arboricultural work near energized electrical utility lines or utility line equipment. d) Minimum Approach Distance Qualified Person or Authorized Person for any other work near energized electrical utility lines or utility line equipment. Pole Setters for pole setting work near energized electrical utility line or utility line equipment.
Station/Controlling Authority	Operations superintendent or the designated alternate capable of providing authorization for work near energized apparatus.
Unqualified Person	a person who is neither a Qualified Electrical Person nor Minimum Approach Distance Qualified Person nor Authorized Person. The Unqualified Person shall maintain the Occupational Health and Safety Regulation's required clearance from exposed energized apparatus unless they are under the direct supervision of a Qualified Electrical Person, or an authorized Minimum Approach Distance Qualified Person.
Utility Arborist	a person who has successfully completed a course in arboricultural electrical safety offered by Safety Services NB, or a course offered by another organization that is equivalent in content.
Utility Line Equipment	all equipment which is located on the high voltage side of the unit output transformer (in terms of Generation).

5.0 ROLES AND RESPONSIBILITIES

5.1 Employer

- Understand the minimum approach distances requirements
- Ensure employees are trained and competent

5.2 Employee

- Attend training as required
- Follow minimum approach distance requirements.

6.0 STANDARD

Minimum Approach Distance (MAD) is the distance from exposed energized apparatus to a person, where the risk of electrical flashover has been reduced to an acceptable level. The term "distance" refers to the air gap between exposed energized apparatus and grounded[2] objects, such as a person's body, or any conductive object handled by that person. Observing MAD reduces the risk of electrical flashover, and this safe distance from exposed energized apparatus shall be maintained by all persons, including conductive tools or objects handled by those persons. The tables in Appendix A represent the NB Power approved Minimum Approach Distances each group of personnel can work safely from exposed energized apparatus. For additional information see Appendix D.

6.1 Minimum Approach Distances for Personnel and Equipment

The tables in Appendix A represent the NB Power approved Minimum Approach Distances each group of personnel can work safely from exposed energized apparatus. The distances stipulated in - Table 1 apply to personnel including any tools or equipment that they may be handling. These distances can only be reduced when Qualified Persons are performing approved live work procedures or by the placement of appropriately rated protective cover up and/or barriers over the exposed energized apparatus.

6.1.1 Using the Minimum Approach Distances Table 1

When planning the work, ensure distances set forth in the attached Tables are maintained at all times. Allowances shall be given for all planned and/or unplanned movement of workers, tools and equipment. When a Qualified Person establishes the Minimum Approach Distances for employees and equipment the **furthest practical distance** should be stipulated. (Example, for a Qualified Electrical Person working near 138kV, the Minimum Approach Distance is 3'7"; however, if work can be completed safely from 10' away, the Qualified Electrical Person should stipulate 10' as the minimum approach distance on the tailboard conference form.)

The Minimum Approach Distances of - Table 1 apply to:

a. Qualified Electrical Persons.

[2] Ground potential or another phase in the case of barehand work.

b. Utility Arborists, Pole Setters and MAD Qualified Persons.
c. Unqualified Persons.

6.1.2 Qualified Electrical Persons

Qualified Electrical Persons performing live work shall follow the requirements of the appropriate live work procedures. Where the live work procedures do not specifically address Minimum Approach Distances, nor make use of cover-up equipment, a Qualified Electrical Person shall use the Minimum Approach Distances as specified in - Table 1, Column A[3]

6.1.3 Utility Arborists, Pole Setters

Utility Arborists and Pole Setters performing their work near exposed energized apparatus shall maintain the distances set out in - Table 1, Column B, for all work with un-insulated tools.

6.1.4 MAD Qualified Persons

MAD Qualified Persons performing work near exposed energized apparatus shall maintain the distances set out in - Table 1, Column B, for all work, with any tool. For additional information see Appendix C, Form#0400 MAD Qualified Person Form.

6.1.5 Unqualified Persons and Equipment

Unqualified Persons and Equipment shall not perform work near exposed energized apparatus unless monitored by and under the direct supervision of a Qualified Electrical or MAD Qualified Person. See section 6.5 for details on Minimum Approach Distance monitoring of worksites.

6.2 Using the Minimum Approach Distances of Table 2, 3 & 4

The Minimum Approach Distances of - Table 1 can be reduced when;

a) Qualified Electrical Persons are performing approved live work procedures which specifically address Minimum Approach Distances, and/or make use of cover-up equipment.
b) Utility Arborists are performing work procedures using insulated tools.
c) Pole Setters are performing approved live work procedures which specifically address Minimum Approach Distances, and/or make use of cover-up equipment.
d) By the placement of appropriately rated protective cover up on/over the exposed energized apparatus.
e) By the placement of suitable barriers on/over the exposed energized apparatus.
f) By the placement of suitable barricades between the exposed energized apparatus, and the work site.

[3] For Qualified Electrical Persons performing live work on circuits, and MAD Qualified Persons working near exposed fixed circuits 300V and below, the Minimum Approach Distance is no contact.

Under no circumstances will Unqualified Persons, while being supervised by a Qualified Electrical Person, or as an Authorized Person, be permitted to work closer to exposed energized apparatus than the distances outlined in Table 2, Column A.

6.2.1 Qualified Electrical Persons

Qualified Electrical Persons performing approved live work procedures shall follow the requirements of the appropriate live work procedures. The distances in Table 2, Column A, are the Minimum Approach Distances for those approved live work procedures which

a) specifically address Minimum Approach Distances,
b) make use of cover-up equipment, or
c) stipulate the employee shall not reach, slip, touch, fall or bring any conducting object within, when cover-up of the appropriate rating is not available (i.e., 138, 230, 345kV).

Table 3 contains the Absolute Minimum Approach Distance for Qualified Electrical Persons performing Barehand Work.

6.2.2 Utility Arborists

Utility Arborists performing work procedures using insulated tools may use those tools up to the distances outlined in Table 4, Column A. The Utility Arborists body shall still maintain the distances as set out in -Table 1, Column B. The Utility Arborist may only work on trees near exposed live apparatus as outlined in Table 4.

6.2.3 Pole Setters

Pole Setters performing approved live work procedures may work up to the distances outlined in Table 2, Column B, when using approved cover-up equipment. These distances relate to the equipment pole setters will use during pole setting operations, as typically pole setters will not be required to position their bodies near exposed live apparatus.

6.2.4 Using Cover-up

When using cover-up material, or insulating barriers that are properly rated for the operating voltage, the distance from the worker to the task location may be reduced. The Table 2 Minimum Approach Distances should be maintained in the area where these are applied or used. An exception to this is when the worker is using an approved live work procedure. (Barehand Work Methods, Rubber Glove Work Methods.) Only Qualified Electrical Persons are authorized to identify exceptions.

6.2.5 Using Barriers

Barriers are not relied on for electrical insulation, but act only as physical barriers. The use of barriers that physically limit the worker's inadvertent movement can reduce the Minimum Approach Distance between the worker and the energized or grounded

parts. Barriers closer than the distances outlined in - Table 1 can only be approved by a Qualified Electrical Person who shall designate how and where the Barriers will be used.

6.2.6 Using Barricades

Barricades are used to provide a visual warning/indication of the Minimum Approach Distance. They do not physically limit the worker, but can be positioned so the employee shall not reach, slip, touch, fall or bring any conducting object within the Minimum Approach Distance. Barricades closer than the distances outlined in - Table 1 can only be approved by a Qualified Electrical Person who shall designate how and where the Barricades will be used.

6.3 Using an Authorized Person Code of Practice

It is recognized that in a specific work situation a person who is not a Qualified Person may be required and specifically authorized to work near exposed energized electrical apparatus. Examples include janitorial staff who work in specific work locations, and snow plow operators who work in specific yards. In these situations, an Authorized Person may work under a specific code of practice which shall be detailed for the Authorized Person and approved by a Qualified Electrical Person or Station Authority, and followed by the Authorized Person. See Appendix B for more information Form#0399 Minimum Approach Distance Authorized Person Code Of Practice Form.

6.4 Minimum Approach Distances for Equipment (Including Aerial Devices)

Tables 1 & 2 of Appendix A include the NB Power approved Minimum Approach Distances which equipment can be used safely from exposed energized apparatus. These distances represent the closest distance each group is permitted to use, or supervise the use of, equipment to exposed energized apparatus. Additional considerations will exist depending on the nature of the equipment. For all equipment used closer to exposed energized apparatus than the distances of - Table 1, Column C, the following shall apply;

a) A Qualified Electrical Person, Station Authority or authorized Minimum Approach Distance Qualified Person shall establish the Minimum Approach Distances, and any additional forms of protection required for that piece of equipment. The distances and forms of protection shall be communicated to all workers at the site and documented on the tailboard conference form.

b) Only persons under the direct supervision of an NB Power Qualified Electrical Person or authorized Minimum Approach Distances Qualified Person shall operate equipment closer to exposed energized apparatus than - Table 1, Column C. When working closer than - Table 1, Column B, work shall be under the direct supervision of an NB Power Qualified Electrical Person. Alternatively, after the installation of an appropriate barrier by an NB Power Qualified Electrical Person, an Authorized person may operate equipment when following a Authorized Person Code of Practice.

c) All equipment in the work area near exposed energized apparatus shall be grounded and bonded in accordance with standard work methods or according to established safe grounding and bonding procedures.

The distances stated in the tailboard conference form shall be strictly followed for all parts of the equipment such as booms, hoisting cables and loads. Allowances shall be made for planned and unplanned movements such as boom movements and hoisting cable sway.

6.5 Monitoring Minimum Approach Distances at the Worksite

This section details the requirements for providing work site protection related only to Minimum Approach Distances. The employee required to monitor the minimum approach distances is not necessarily responsible for safety related to other aspects of the work.

6.5.1 Monitoring Minimum Approach Distances at NBP Work Sites

This section applies to NB Power crews, contractors and subcontractors working near energized electrical utility line or utility line equipment with an NB Power employee monitoring the minimum approach distances on site. The purpose of this section is to detail special circumstances where directly and continuously monitored Unqualified Persons may work closer to exposed energized apparatus than the distances specified in - Table 1, Column C.

6.5.2 Monitoring NB Power Minimum Approach Distances: Qualified Electrical Person

When continuous and direct supervision by an NB Power Qualified Electrical Person is in effect at the site, the Minimum Approach Distances, and any required forms of protection shall be established by the monitoring NB Power Qualified Electrical Person. The distances and forms of protections shall be communicated to all employees at the site and documented on the tailboard conference form.

Contractor employed Qualified Electrical Persons will be permitted to work up to the distances in - Table 1, Column A, to exposed energized apparatus, and up to the distances in Table 2, Column A, when following approved live work procedures, or with the use of appropriately rated cover-up equipment. Note: Contractor Qualified Electrical Person cannot work ‘on’ NB Power energized electrical utility line or utility line equipment, except as indicated in Standard Operating Practices.

Under no circumstances will Unqualified Persons be permitted to work closer to exposed energized apparatus than the distances outlined in Table 2, Column A.

When establishing minimum approach distances for employees and equipment the **furthest practical distance** should be stipulated. (Example, at 138kV minimum distance is 3’7”; however, if work can be completed safely from 10’ away, Qualified Electrical Person should stipulate 10’ on the tailboard conference form.)

6.5.3 Monitoring NB Power Minimum Approach Distances: Minimum Approach Distance Qualification

Persons providing Minimum Approach Distances monitoring under a MAD Qualification, require additional training based on the nature of the work. At a minimum, the MAD Qualified Person must be familiar with the nature of the work. Only persons with the appropriate qualifications and managerial authorization can provide direct supervision of work in regard to Minimum Approach Distances.

An NB Power employee, operating under MAD Qualification and Authorization, may supervise Unqualified Persons who may be required to work closer to those distances stipulated in - Table 1, Column C up to the distances of Column B. The work area shall be limited to exposed energized equipment with fixed circuit parts such as circuit breakers, reclosers, transformers, bus-work, etc.

When continuous and direct supervision by an NB Power MAD Qualified Person is in effect at the site, the Minimum Approach Distances, and any required forms of protection shall be established by the monitoring NB Power MAD Qualified Person. The distances and forms of protection shall be communicated to all workers at the site and documented on the tailboard conference form.

Contractor employed Qualified Electrical Person will be permitted to work no closer to exposed energized apparatus than - Table 1, Column A.

When establishing minimum approach distances for employees and equipment the furthest practical distance should be stipulated. (Example, at 138kV minimum distance is 6’; however, if work can be completed safely from 10’ away, MAD Qualified Person should stipulate 10’ on the tailboard conference form).

6.6 Work Sites without NB Power Supervision

This section applies to contractors and sub-contractors working for NB Power on or near energized electrical utility line or utility line equipment, in non-access-controlled areas, where continuous NB Power supervision is not in effect. The purpose of this section is to identify special circumstances where directly and continuously supervised Unqualified Workers may work closer to exposed energized apparatus than the distances specified in - Table 1, Column C.

In addition to the requirements of this document, an appropriate level of safety in accordance with the following requirements shall be met by contractors when working in proximity to exposed energized apparatus:

6.6.1 Work at Distances Greater than - Table 1, Column C, from energized apparatus

Where Column C distances can be maintained at all times from any exposed energized apparatus, the minimum requirements for site safety will be:

a) A mandatory site safety orientation given to all persons;

b) Clear identification of all exposed energized apparatus discussed and documented on the tailboard conference form;

The use of a Code of Practice, exclusion zones, warning/caution tape, danger signs or other barricade, may be required.

6.6.2 Work at Distances Less than - Table 1, Column C, but further than Column B, from energized apparatus

Where Column C distances cannot be maintained, but the work can be carried out without encroaching on Column B distances from exposed energized conductors or apparatus, the minimum safety requirements will be:

a) Continuous site supervision by a Qualified Electrical Person. Qualified Electrical Person's certification shall be obtained from the contractor prior to the commencement of work;

b) A mandatory site safety orientation given to all Persons;

c) Clear identification of all exposed energized apparatus discussed and documented on the tailboard conference form;

d) The Authorized Person Code of Practice approved by an NB Power Qualified Electrical Person or Station/Controlling Authority, detailing the Minimum Approach Distances, any restrictions and all necessary precautions.

e) The contractor shall at all times have a designated person in charge on site who's responsibility will be to ensure that the stipulated distances outlined in the code of practice are always maintained from exposed energized equipment.

The use of exclusion zones, warning/caution tape, danger signs or other barricade, may be required;

6.6.3 Work at Distances Less than - Table 1, Column B, from energized apparatus

Where work requires encroachment beyond the minimum approach distances stipulated in - Table 1, Column B, the work shall be carried out only by Qualified Electrical Persons in accordance with - Table 1, Column A. Qualified Electrical Person's certification shall be obtained from the contractor prior to the commencement of work. If the work requires encroaching beyond - Table 1, Column A distances, cover-up equipment or barriers shall be installed.

6.7 External Organization Worksites (Non-NB Power)

This section applies to persons working for an External Organization, but near NB Power electrical utility line or utility line equipment. Worksite protection for contractors or the general public can be provided through the use of a clearance permit, or the application of cover-up equipment. In either case the external organization's person(s) responsible for the worksite are required to complete NB Power Form 1155, "Request for Limited Worksite Protection" to obtain NB Power permission to work near NB Power electrical utility line or utility line equipment.

7.0 APPENDICES

Appendix A - Table 1 - Minimum Approach Distances for Personnel & Equipment

Table 2 - Minimum Approach Distances for Personnel and Equipment when using Cover-up Equipment/Barriers

Table 3 - Minimum Approach Distances for Qualified Electrical Persons when Performing Barehand Work

Table 4 - Utility Arborist's Working Distances

Appendix B - Non Mandatory Authorized Person Code of Practice Guide

Appendix C - Non Mandatory Minimum Approach Distances Qualified Person Requirements

Appendix D - Non Mandatory Minimum Approach Distances General Information

Appendix E – Minimum Approach Distance Competency Assessment

Appendix F – Minimum Approach Distance Competent Evaluator

DOCUMENT APPROVAL/REVISION RECORD

Rev #	Date	Revision Summary	Author	Reviewed By	Approved By
00	2013/04/08	New Standard	Andrew Warren	N. Allen M. Boucher Kirk Howard R. Pelletier P. Sisk D. Vautour P. Young R. Zinke	G. Boyd
01	2021/06/08	Formerly HSS-III-16 New format Scope Responsibilities Safety Employee In Charge definition	Andrew Warren	S. Pond N. Allen	R. Condon
02	2022/05/10	Appendix C – added exemption from MAD course and refresher for people with extensive knowledge, training and experience	Nancy Allen Andrew Warren	H. Georgiadis	R. Condon
03	2025-07-10	Appendix C, D, E, F Competency Assessment / Evaluator	Andrew Warren / Nancy Legere	TH&S Team	R. Roy

Director of

Total Health & Safety

Appendix A – Minimum Approach Distance Tables

Table 1 - Minimum Approach Distances for Personnel & Equipment[*,†]

	A[‡]		B[α]		C[β]	
Voltage (Phase to Phase)	Qualified Electrical Persons[γ]		MAD Qualified Persons, Utility Arborists, Pole Setters		Unqualified Persons[**]	
	ft	m	ft	m	ft	m
Up to 750V[4]	1ft	0.31m	2ft	0.6m	3ft	0.9m
750V to 15kV	2ft 1in	0.65m	3ft	0.9m	12ft	3.6m
16kV to 25kV	2ft 7in	0.77m	4ft	1.2m	12ft	3.6m
26kV to 69kV	3ft 3in	0.95m	5ft	1.5m	12ft	3.6m
70kV to 138kV	3ft 7in	1.09m	6ft	1.8m	17ft	5.2m
139kV to 230kV	5ft 3in	1.59m	7ft	2.1m	17ft	5.2m
231kV to 345kV	8ft 6in	2.59m	12ft	3.7m	20ft	6.1m

* Cranes, excavators, dump trucks, man lifts, tools, etc.
† Distances are phase to ground clearance for selected phase to phase voltage.
‡ Based on IEEE Std 516-2009
α Based on NB OHSA General Regulation 91-191, section 371
β Based on NB OHSA General Regulation 91-191, section 289
γ Certified A Lineperson, Electrical Mechanic, Power Line Technician, Relay Technician, and their apprentices.
** Minimum Approach Distances for Unqualified person/Equipment can be reduced when under the direct supervision of a Qualified Electrical or MAD Qualified Person.
4 Minimum Approach Distances for Qualified Electrical Persons and MAD Qualified Persons are to avoid contact for exposed fixed circuits 300V and below.

Table 2 – Minimum Approach Distances for Personnel and Equipment* when using Cover-up Equipment/Barriers†

	A‡		B		C	
Voltage (Phase to Phase)	Qualified Electrical Persons$^{\gamma}$		MAD Qualified Persons, Utility Arborists, Pole Setters		Unqualified Persons**	
	ft	m	ft	m	ft	m
Up to 750V	No Contact	No Contact	No Contact	No Contact	No Contact	No Contact
750V to 15kV	2in	0.04m	3ft	0.9m	4ft††	1.2m††
16kV to 25kV	7in	0.16m	4ft	1.2m	4ft††	1.2m††
26kV to 69kV	1ft 3in	0.39m	5ft	1.5m	12ft	3.6m
70kV to 138kV‡‡	2ft 7in	0.78m	6ft	1.8m	17ft	5.2m
139kV to 230kV‡‡	4ft 3in	1.28m	7ft	2.1m	17ft	5.2m
231kV to 345kV‡‡	7ft 6in	2.28m	12ft	3.7m	20ft	6.1m

* Cranes, excavators, dump trucks, man lifts, tools, etc.
† Distances are phase to ground clearance for selected phase to phase voltage.
‡ Based on IEEE Std 516-2009
γ Certified A Lineperson, Electrical Mechanic, Power Line Technician, Relay Technician, and their apprentices.
** Minimum Approach Distances for Unqualified person/Equipment can be reduced when under the direct supervision of a Qualified Electrical or MAD Qualified Person.
†† Form 1155 is required for Unqualified persons working without supervision.
‡‡ Cover-up equipment for these voltage ratings may not be available. These distances are the absolute Minimum Approach Distances for these voltages and work procedures must be performed in such a way that employees shall not violate these distances. Work procedures must be performed in such a way that the employee shall not reach, slip, touch, fall or bring any conducting object within these distances.

Table 3 – Minimum Approach Distances for Qualified Electrical Persons[γ] when Performing Barehand Work[‡]

Nominal Voltage Phase to Phase	Phase to Phase		Phase to Ground	
	ft	m	ft	m
69kV	5ft	1.53m	3ft	0.92m
138kV	7ft	2.14m	4ft	1.22m
230kV	10ft	3.05m	6ft	1.83m
345kV	14ft	4.27m	8ft	2.44m

γ Certified A Lineperson, Electrical Mechanic, Power Line Technician, Relay Technician, and their apprentices.
‡ Based on IEEE Std 516-2009

Table 4 – Utility Arborist's Working Distances[α,†]

	A		B		C		D	
Voltage (Phase to Phase)	A Utility Arborist's Insulated Tool		Distance of Portion of Tree from Energized Electrical Utility Line or Equipment					
			Where Employee is Using an Uninsulated Object		Where Employee is Using an Insulated Object without an Insulated Aerial Device		Where Employee is Using an Insulated Object with an Insulated Aerial Device	
	ft	m	ft	m	ft	m	ft	m
Up to 750V	6in	0.15m	1ft	0.3m	No contact	No contact	No contact	No contact
750V to 15kV	1ft	0.30m	2ft	0.6m	1ft	0.30m	No contact	No contact
16kV to 25kV	1ft 6in	0.45m	2ft 6in	0.75m	1ft 6in	0.45m	No contact	No contact
26kV to 69kV	3ft 4in	0.90m	5ft	1.5m	3ft 4in	1.0m	2ft 6in	0.75m
70kV to 138kV	4ft	1.2m	6ft	1.8m	4ft	1.2m	3ft	0.90m
139kV to 230kV	5ft	1.5m	7ft	2.1m	6ft	1.8m	5ft	1.5m
231kV to 345kV	10ft	3.0m	12ft	3.7m	11ft	3.4m	10ft	3.0m

α Based on NB OHSA General Regulation 91-191, section 371
† Distances are phase to ground clearance for selected phase to phase voltage.

Appendix B - Authorized Person Code of Practice Guide

Non - Mandatory

The Authorized Person Code of Practice should be used for those work tasks where an employee may be required to perform basic repetitive work tasks ‘near’ exposed energized apparatus. Examples include janitorial staff who work in specific work locations, and snow plow operators who work in specific yards. The Code of Practice shall be completed by a Qualified Electrical Person or Station/Controlling Authority and should outline the associated electrical hazards in the work area for the Authorized Person and provide the necessary controls for those hazards.

Typically a Code of Practice will be used for a single location, for a specific person, for a specific job task. However, it is acceptable to create a Code of Practice for a group of individuals, or for multiple locations, and multiple job tasks. For multiple persons, all persons must be in attendance for orientation by the Qualified Electrical Person. For multiple locations, the locations must be similar in nature, and must be detailed on the Authorized Person Code of Practice form. For multiple job tasks the Code of Practice must specify all work to be done. A Code of Practice must be specific to the task(s) at hand.

Examples of the use of a Code of Practice for multiple locations would be chemical technicians who replace eye wash stations, and are required to access areas closer to the exposed energized apparatus than unqualified persons. It may also be acceptable to use the Code of Practice to allow basic work tasks to occur across one large work location, such as an entire yard. In these situations it is advised that the persons complete the Minimum Approach Distances Course (theory only), in conjunction with having an Authorized Person Code of Practice form.

It is expected that the Authorized Person Code of Practice shall be kept on file by the signing supervisor and a copy issued to the “Authorized Person”. The “Authorized Person” copy shall be kept in an accessible place for future reference, for a snow plow operation that may be in the dash of the truck.

Énergie NB Power

Form 0399
2012.07.26

MINIMUM APPROACH DISTANCE AUTHORIZED PERSON CODE OF PRACTICE

EMERGENCY INFORMATION	
Telephone Contact: (ECC or Station Authority)	

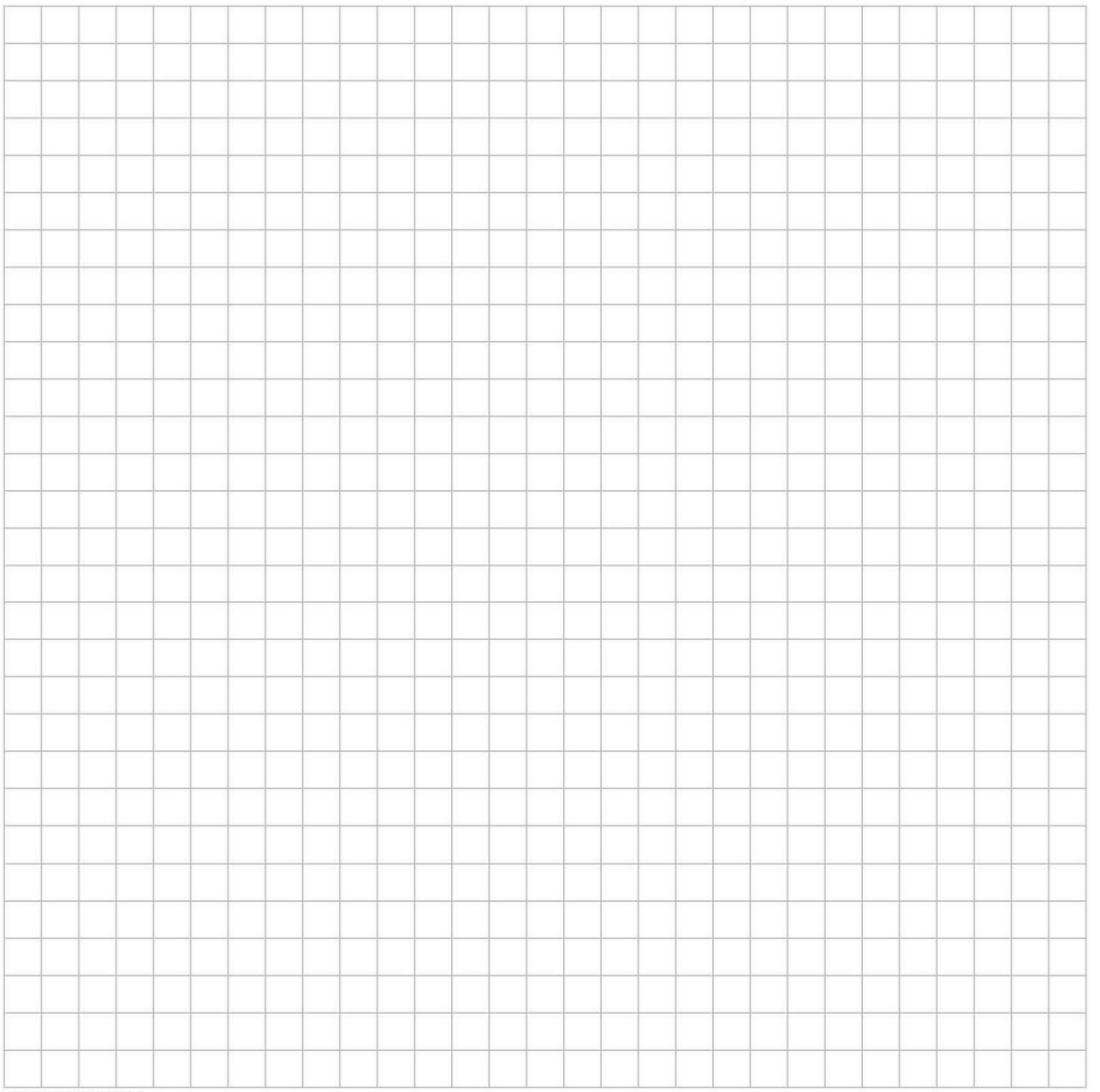
LOCATION INFORMATION	
Terminal Number:	Date:
Substation Number:	
Switchyard:	
Other:	

HAZARD INFORMATION:		
1.	What is the voltage?	
2.	What is the minimum safe working distance?	
3.	Has this distance been identified with a barricade?	
4.	Is cover-up equipment required? Can it be applied?	
5.	Are physical barriers (insulated or otherwise) required?	
6.	Is it practical to barricade/tape off the hazard area?	
7.	Are there any other hazards? (List below in work description)	

WORK DESCRIPTION:

SIGNATURES:	
Qualified Electrical Person / Station Authority:	Date:
Authorized Person(s):	Date:
Authorized Person's Supervisor:	Date:

WORK AREA DRAWING



INSTRUCTIONS

This document is intended to provide a person(s) with the necessary information to safely work within the Minimum Approach Distances of exposed energized apparatus. A Qualified Electrical Person, or Station Authority, is required to complete this form and inform the individual of the hazards and necessary precautions at the worksite. Once completed the individual may choose to accept the responsibility of an Authorized Person, and shall follow this Code of Practice for the designated work activities within the work area of the Code of Practice. The individual's supervisor's acceptance of the Code of Practice is also required. No other work, or work areas are to be associated with this Code of Practice. If a change occurs at the worksite, or the Authorized Person has any questions or concerns, they should stop the work, and contact the Qualified Electrical Person/Station Authority or have a new Code of Practice created.

Appendix C - Minimum Approach Distances Qualified Person Requirements

Supplementary

Minimum Approach Distance Qualified Persons must successfully complete a competency review in accordance with form HS10 (Minimum Approach Distance Competency Assessment) or refresher training S137R every 3 years. Employees unable to successfully complete the competency review must complete the full S137- MAD training before reattempting the competency review.

The trainers of MAD can deem a supervisor as competent to perform a competency assessment using Form HS11 (Minimum Approach Distance Competency Evaluator). The trainer must observe the supervisor performing a competency assessment before deeming them competent and enter the “MAD Competent Evaluator” in LMS.

The MAD Qualified Person will be trained, both in theory and in practice, to recognize hazards associated with working around energized electrical utility line, utility line equipment and electrical apparatus in switchyards, terminals, substations. The person shall have successfully completed both the theory and practical components of NB Power’s MAD course before being permitted to work unescorted near energized utility lines or apparatus. To monitor other employees work in regards to Minimum Approach Distances an employee must have management approval to supervise others.

In the case of Generation Stations, Station Management shall delegate a person to complete the Minimum Approach Distances Qualified Person form for orientation in place of a Qualified Electrical Person. This person shall complete Minimum Approach Distances training and have “Train the Trainer”. This trainer may provide MAD training to employees in all companies of NB Power. Persons receiving training at a Generation Station and having completed Form 0400 shall be considered competent to work near energized utility lines or equipment at any NB Power facilities.

There are situations where employees who have extensive knowledge, training and experience of working in the substations and terminals (ex: electrical engineers) may seek exemption from taking the MAD course and competency review. This exemption as stated in option 3 of Form 400 must be signed off and approved by either the Director (T/D, Pt. Lepreau) or Manager (Generation).

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Form 0400 2013.03.22		Page 1 of 2

Purpose

The purpose of this form is to document the practical assessment of employee competency related to Minimum Approach Distances. A managerial supervisor may deem an employee competent based on knowledge, training and/or experience in recognizing the hazards that exist related to field work around live equipment in the utility industry.

Instructions

Managerial Supervisor shall establish the competency of the employee to perform field work around live equipment used in the electrical utility industry by:

1) Deeming the employee competent based on previous work experience, or
2) Through the completion of a series of site orientations to verify the employee's knowledge. (The number of yards required for field orientation is at the manager's discretion), or
3) If the employee has extensive knowledge, training and/or experience working in substations / terminals (ie: Electrical Engineers that are responsible for designing the substations / terminals), the employee may be exempted from the periodic refresher training. This exemption must only be approved by a Director (CSD & Transmission / Lepreau) or Manager (Generation).

Approval Options: (Choose the Appropriate One)	Approver's Initials	Employee's Initials
1) Managerial Supervisor deems employee competent in Minimum Approach Distances and in recognizing the hazards associated with working around exposed energized apparatus in the electrical utility industry, taking into consideration substation, terminal, distribution, and transmission line work.		
2) Employee has completed the requested number of site orientations and been instructed, on site, how to observe the minimum approach distances, while working around hazards and equipment used in substation, terminal, distribution line and transmission line work. (complete page 2)		
3) Director (T/DCS/Lepreau) or Manager (Generation) take full accountability in acknowledging this employee has extensive knowledge, training and experience to warrant the exemption of the Minimum Approach Distance (S137R) 3 year refresher.		
Employee Name (Print & Sign): _____	Employee Number: _____	
Approved by: Name (Print & Sign): _____	Date: _____	

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Field Orientation Location (Terminal, Substation, Line Number, Microwave Site, etc.)			
Site*:	(1)	(2)	(3)
Orientation by†:			
Date:			

Employee has demonstrated ability in how to identify:	(1)	(2)	(3)
a) Vandalism i.e. broken grounds.	☐	☐	☐
b) Battery Room hazards i.e. acids, fumes.ǂ	☐	☐	☐
c) Breakers & Reclosers: voltages and safe distances.	☐	☐	☐
d) Cable trays: where located and safe crossing areas for vehicles.	☐	☐	☐
e) Cables: locations and safe distances to terminators.	☐	☐	☐
f) Capacitors: voltages and the safe distances.	☐	☐	☐
g) Circuit Switchers.	☐	☐	☐
h) Compressor room hazards i.e. noise, moving parts, and high temperatures.	☐	☐	☐
i) Conductor/Buss: voltages and safe distances.	☐	☐	☐
j) Relays and associated hazards.	☐	☐	☐
k) Restricted areas, if any.	☐	☐	☐
l) Power Transformers: voltages and safe distances from power	☐	☐	☐
m) Padmount Transformers: voltages and safe distances.	☐	☐	☐
n) Potential Transformers: voltages and safe distances.	☐	☐	☐
o) Current Transformers: voltages and safe distances.	☐	☐	☐
p) Site safety equipment, address, and emergency contact information.	☐	☐	☐
q) General or unique hazards i.e. trip/fall hazards.	☐	☐	☐
r) Hazards related to other apparatus such as, metering units, etc.	☐	☐	☐
s) Noise hazards from air breakers or other equipment.	☐	☐	☐
t) Induction hazards	☐	☐	☐

Comments: _____

_____

_____

_____

_____

_____

* If more than 3 site orientations are required, indicate in comment field and attach additional sheets.

† Orientation shall be performed by a Qualified Electrical Person, or Trainer designated by Station/Controlling Authority.

ǂ Do not enter Battery Room unless necessary.

Appendix D - Minimum Approach Distances General Information

Non-Mandatory

The term “distance” is used to represent the electrical distances between energized parts and grounded objects (i.e., Minimum Approach Distance, MAD). There are two acceptable methods for calculating MAD available to utilities, the IEEE method and the IEC method. Both methods give approximately the same MAD values for the same worksite conditions. NB Power has made use of the IEEE Standard 516-2009 method of calculation for MAD.

Work near live apparatus should be discontinued while there is any indication of lightning, see NB Power Corporate Safety Manual. Workers should realize that overhead ground wires and structure grounds were designed to protect the system and associated equipment, not to protect the maintenance worker from possible effects of lightning.

Minimum Approach Distances in Substation

There are situations where the manufacturer’s operating electrical air gap for substation equipment may be less than the required Minimum Approach Distance for the voltage being worked. (No ergonomic factor would be necessary for equipment air gaps.) Therefore the length of insulation on a piece of equipment should not be depended upon for establishing Minimum Approach Distances to that piece of equipment.

Procedural Considerations for Minimum Approach Distances

The hierarchy for an unqualified person who needs to perform work near exposed energized apparatus is:

1. De-energize the work site
2. Monitoring by a Qualified Electrical Person or MAD Qualified Monitor
3. Authorized Person Code of Practice
4. Become a MAD Qualified Person

At NB Power it is recommended that all employees whose job role may expose them to energized electrical utility line or utility line equipment take course S137 Minimum Approach Distances. This course covers the basic concepts of electricity, basic hazards electricity creates in the electrical utility industry, such as shock hazards, noise hazards, basic safety procedures in yards, and to the types of equipment in yards. Persons who are required to enter yards on their own require a completed Form 0400, which is recorded in the Learning Management System as S137Q if persons are subject to a competency review or refresher training every 3 years, or S137QX if persons are exempted from the competency review (limited use). Completion of Form 0400 may occur immediately following the initial training of S137, or at any later date as required.

Point Lepreau Generating Station

PLGS Electrical Safety Guide GU-08300-0009 covers the PLGS site requirements regarding Minimum Approach Distances and alternate processes available to PLGS staff regarding qualification for yard access.

Appendix E – Minimum Approach Distance Competency Assessment

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Minimum Approach Distance Competency Assessment

Form/Formulaire #: HS10
Revision: New
2025-07

Employee Name: _____ (print) Employee #: _____

Department _____ Date: _____

The evaluator is responsible for correct performance of activities and shall immediately STOP or redirect the employee if a safety issue arises.

Competence: Correct response for knowledge and task specific critical steps.

Employee has demonstrated knowledge in:	Performance	
	Competent	Needs Improvement
a. Correct yard entry requirements (Inspect for vandalism, contact controlling authority, rubber gloves for vehicle gate).	☐	☐
b. Their minimum approach distance for NBP voltages.	☐	☐
c. How to identify voltage of equipment in their area.	☐	☐
d. Identifying equipment in their area.	☐	☐

Did the student successfully complete all portions of this evaluation? ☐ Yes ☐ No

Reassessment required? ☐ Yes ☐ No

Evaluator Name: _____ (print) _____ (sign)

Department: _____ Date: _____

Employee Acknowledgement of Assessment

_____ (sign) Date: _____

Feedback: If the employee being evaluated needs improvement on a particular task, the evaluator must make recommendations in the feedback section on how the employee will gain knowledge / practice and make plans for reassessment.

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Appendix F – Minimum Approach Distance Competent Evaluator

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Form/Formulaire #: HS11
Revision: New
2025-07

Minimum Approach Distance

Competency Evaluator

Purpose:

This activity is to document individuals conducting competency assessments for Minimum Approach Distances (MAD) are qualified and competent to do so.

This evaluation assesses a demonstration of knowledge and skills to ensure personnel are qualified to independently enter a substation or terminal maintaining the minimum approach distances for their work.

The MAD Competency Evaluator must:

- Either be Electrically Qualified or be MAD Qualified
- Must demonstrate knowledge of the items below
- Be observed (at least one time) and successful at conducting a competency check and signed off.

Competency Evaluator being tested:		Employee #	
Job Title:		Date:	

The evaluator is responsible for correct performance of activities and shall immediately STOP or redirect the employee if a safety issue arises.

Employee has demonstrated competency in performing a competency check with an employee covering:	Performance	
	Competent	Needs Improvement
a. Correct yard entry requirements (inspect for vandalism, contact controlling authority, rubber gloves for vehicle gate).	☐	☐
b. Minimum approach distance for all NBP voltages.	☐	☐
c. How to identify voltage of equipment in their area.	☐	☐
d. Identifying equipment in their area.	☐	☐

Did the competency evaluator successfully complete all portions of this evaluation? ☐ Yes ☐ No

Reassessment required? ☐ Yes ☐ No

Evaluator Assessor Name: _____ _____
(print) *(sign)*

Department: _____ Date: _____

Feedback:
