

# East Hartford Public Schools

Mark F. Zito, Ed. D., Superintendent of Schools



December 9, 2011

To: Dr. Zito, Superintendent of Schools

From: Albert Costa, Director of Facilities

RE: Questions Regarding TriGen-Plant and Main Electrical Switch

I am in receipt of Councilor Thompson's additional questions regarding the referenced matter.

Within this letter, I have attempted to provide as much detail to bring clarity to this matter. I want to begin by saying that the equipment we are referring to is complex in nature and discussions by ink and paper do not generally yield clarity. Therefore, in addition to my responses herein, I would like to offer a personal walk through of the Electric Switch Room and the Tri-Gen Plant to anyone interested. Secondly, and on a positive note, we have been able to get the equipment manufacturer to step up the production time of the Main Electric Switch and are pleased that an installation date has been set for January 28, 2012 with the installer and CL&P.

Lastly, I noticed that within some of Councilor Thompson's questions, the word "equipment" is referenced, however he is not specific as to which equipment, therefore I want to preface the following. There is a 4000 amp Main Electric Switch which serves the entire High School and it is the main disconnect to the building. In an entirely separate building (see photo#1) there is the Tri-Generation Plant. This plant operates 24/7 when in grid power mode and will only run on stand-alone-generation (SAG) mode (for shelter purposes) after a series of manual steps have been followed. Those procedures have been in place since the generation plant was designed and I have included that as part of your request. Staff has been trained on the operational steps and the process is overseen by Supervisors and myself.

Without over simplifying the process, transferring to SAG is similar to what a homeowner would perform, (except for the Kirk Key) only at a larger scale. First, the main electrical breaker and all sub panel

breakers in the electrical room are shut off; then the Kirk Key is removed and we walk outside to the Generator plant; the Kirk Key is then inserted on the Generator panel which allows the generator to become ready; once the generator reads "Ready" we walk back to the Electrical Room and begin to turn on circuits, one at a time (based on what areas we need for the Shelter) and following the written protocol (see Attachment A); as we turn on breakers, we monitor the kW Meter in the electrical room so we are certain to stay below 200kW. The generator can handle up to 240kW or it will shut down on overload safety, much like any generator.

On 8/27/11 we ran on SAG with continuous operation for 13 hours. The process to go from grid power, shut down and transfer circuits to SAG was extremely successful. We followed the procedures as outlined in the operational instructions and we had our on-call electrician present to assist in the manual transfer.

Below are my responses to Councilor Thompson's specific questions. I have also included photos to hopefully bring further clarity to his questions.

***Q1: What is broken? The main shut off or the Kirk Key? \*Kirk Key is the safety key to prevent back feed from Generator.***

A1: The 4000 amp main shut off is broken. The Kirk Key interlock is not broken.

Note: The statement "Kirk Key is the safety key to prevent back feed from Generator" is partly correct. The Tri-Gen has additional safety components that will not allow it to turn on if there was a back feed from the main switch. Therefore as the Main Switch was discovered to be broken the generator was not able to run and no back feed condition was possible.

***Q2: When did it break?***

A2: We discovered the Main Electric Switch to be damaged after power was lost during Hurricane Irene. The Main Electric Switch (see Photo#3) was determined to be damaged on the morning of 8/29/11 when Square D (manufacturers of the equipment) and our on call electrical contractor was dispatched to the building while grid power was lost due to the storm. The switch is over 50 years old.

***Q3: Who are the employees that work on or run this equipment?***

A3: If you are referring to the Main Switch, we have an In-House Electrician that has mostly operated the switch over the years (following our written protocol) or we use an On-Call Electrician. This process is

overseen by supervisors. If you are referring to the Tri-Generator, we have a service agreement with United Technologies/Carrier Corporation to operate the equipment and maintain it. They monitor the Tri-Gen 24/7.

***Q4: Are they all licensed or trained to run this equipment?***

A4: In terms of operating the Main Switch, there is no licensing requirement. We supervise our In-House Electrician or On-Call Electrical Contractor to ensure the written protocol (Attachment A) is followed. In terms of operating the Tri-Generator, we rely on UTC/Carrier to assist us in the manual procedure to get to SAG. UTC Power has provided written procedures (Attachment B) and onsite training to follow in the event we choose to perform the manual process ourselves. It is important to note that the UTC Tri-Gen plant has fail safe devices that will not allow the generator to run if the Main Switch is not in proper position or if too many circuits are transferred.

***Q5: Would they be available to answer questions regarding the Co-Gen Generator?***

***Who trained them?***

A5: Absolutely. We received operational training from UTC Power consisting of the steps shown in Attachment B. The building owner is responsible for steps within the Electrical Switch room (Attachment A).

***Q6: Did you have anyone monitoring the equipment while it was running? If yes whom?***

A6: On 8/27/11 our In-House Electrician was not available and we contacted our On-Call Electrician to assist in the manual transfer of circuits by following the written protocol. We arrived at 8am and by 9am the Tri-Generation plant was operating off the power grid on SAG. The process was extremely successful that morning and the generator remained in continuous operation for 13 hours. Regarding your monitoring question, there is a kW meter that allows you to turn on circuit breakers (based on the areas needed for the shelter) and it shows how much kW load you are transferring to the generator. On that day all areas requested for the shelter were running at a load of about 150kW which is well under the allowable 240kW. There is no requirement to remain at the building to monitor the Electric Switch or any circuits. Once the circuits are transferred no monitoring is required of the electric gear. In terms of the generator, UTC/Carrier monitors the plant 24/7. There is also a building custodian that remains in the building as well as shelter workers during emergency times. They have the ability to contact Supervisors if needed.

***Q7: Do you have a written record of testing and maintenance?***

A7: If you are referring to the Main Electrical Switch, there are no written records nor are we aware that maintenance is required on the switch. There is no placard on the panel that indicates required maintenance. If you are referring to the Tri-Generation plant, maintenance is performed under the UTC Power/Carrier contract. We can provide that to you.

***Q8: How many times a year do you run on generator power or test it?***

A8: The Tri-Gen plant runs 24/7 in parallel to grid power and produces electricity that would otherwise be pulled from the grid. We operate on SAG on emergency purposes. Because the generator runs 24/7 there is no requirement to test it.

***Q9: Do you have a written action plan in case of an emergency?***

A9: Yes. See Attachments A and B.

***Q10: Who is making the repairs presently?***

A10: Square D Manufacturing, All Phase Electric and Pasquarelli Electric.

***Q11: Should this have gone out to bid? (\$50,000 expenditure)***

A11: As this constitutes an emergency repair and we are dealing with existing Square D equipment, it is an appropriate expense under Board policy. Further, it is my understanding that the referenced vendors have State DAS contracts.

***Q12: Have you pulled any permits from town for repairs?***

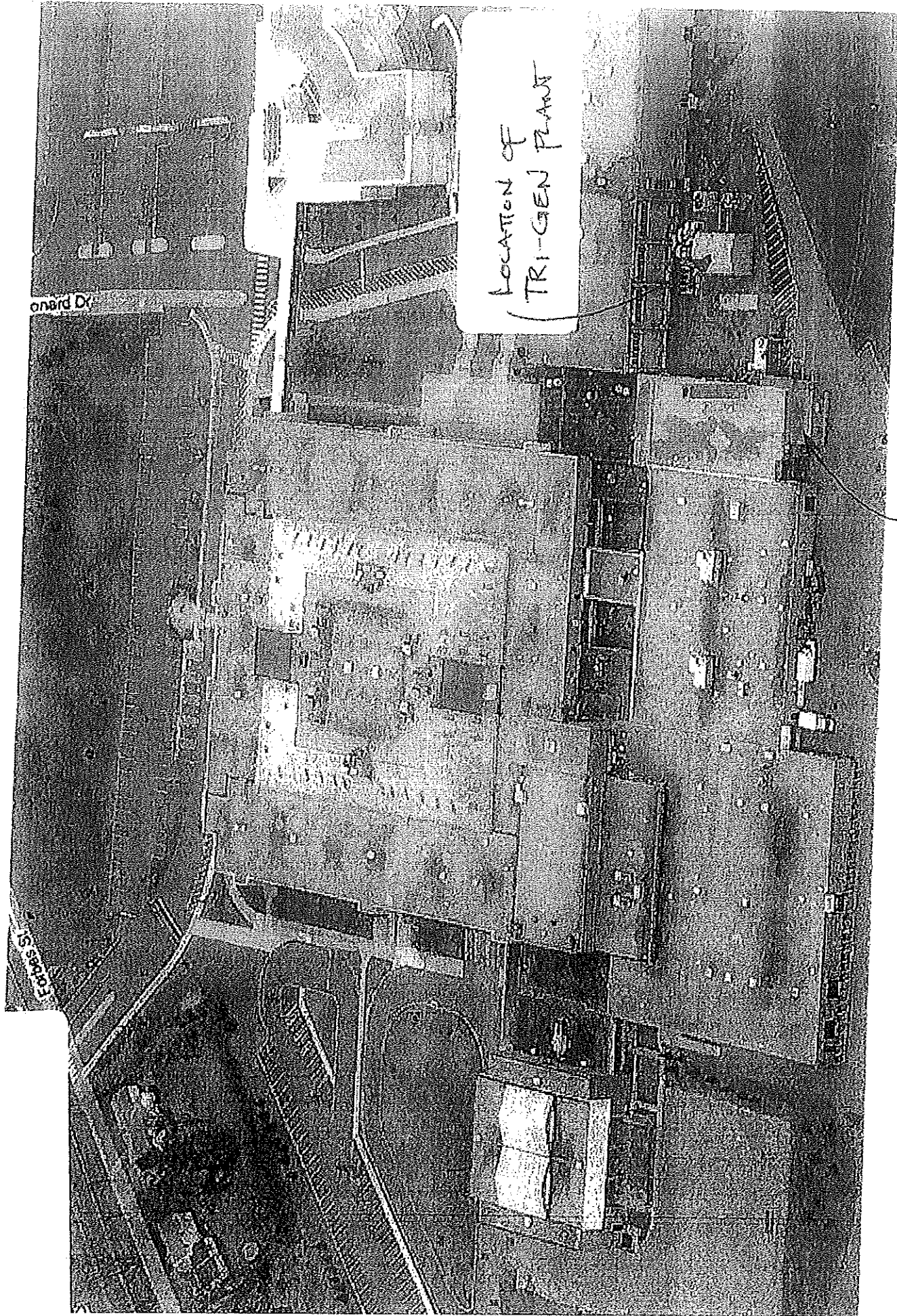
A12: Permits will be pulled by the installing contractor once engineered drawings are completed and prior to the installation of the new switch.

I hope the responses and the attachments have brought some clarity to the matter.

Encl.

CC: Dan Ford, Supervisor of Maintenance

PHOTO #1



East Hartford High School



LOCATION MAIN  
ELECTRIC SWITCH

LOCATION OF  
TRI-GEN PLANT

East Hartford Dr

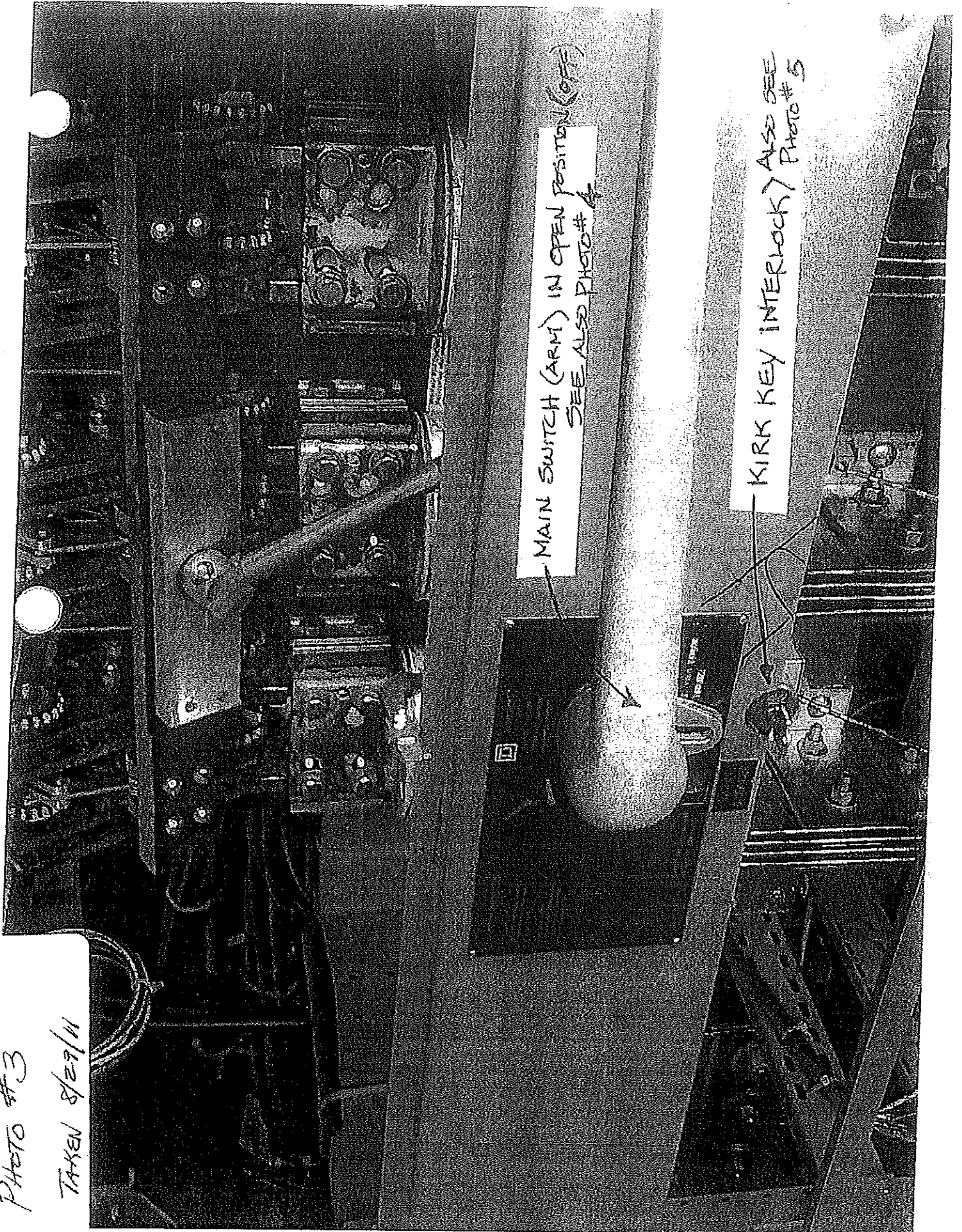
PHOTO #2

NOTES: AS OF 8/30/11

- SWITCH (ARM) SHOWN DAMAGED
- SWITCH (ARM) MECHANISM LEFT DISCONNECTED.
- ELECTRIC GEAR MANUALLY CONNECTED BY "SPARE D" BEFORE CLIP ENERGIZED. (SEE ALSO PHOTO #6)

PHOTO #3

TAKEN 8/29/11



MAIN SWITCH (ARM) IN OPEN POSITION (OFF)  
SEE ALSO PHOTO #4

KIRK KEY INTERLOCK  
ALSO SEE PHOTO #5

PHOTO # 4

NOTE:

SWITCH (ARM)  
POSITIONS:

- 11 O'CLOCK = CLOSED  
(ON)
- 2 O'CLOCK = OPEN  
(OFF)

◀ KIRK KEY INTERLOCK  
SEE ALSO PHOTO # 5



KIRK KEY INTERLOCK

NOTE:

- KEY & LOCK POSITION IS SAME AS IN PHOTO #
- LOCK IS (AND WAS) FUNCTIONAL
- LOCK WAS IN LOCKED POSITION TO PREVENT SWITCH (ARM) FROM BEING MOVED TO CLOSED (POWER ON) POSITION.

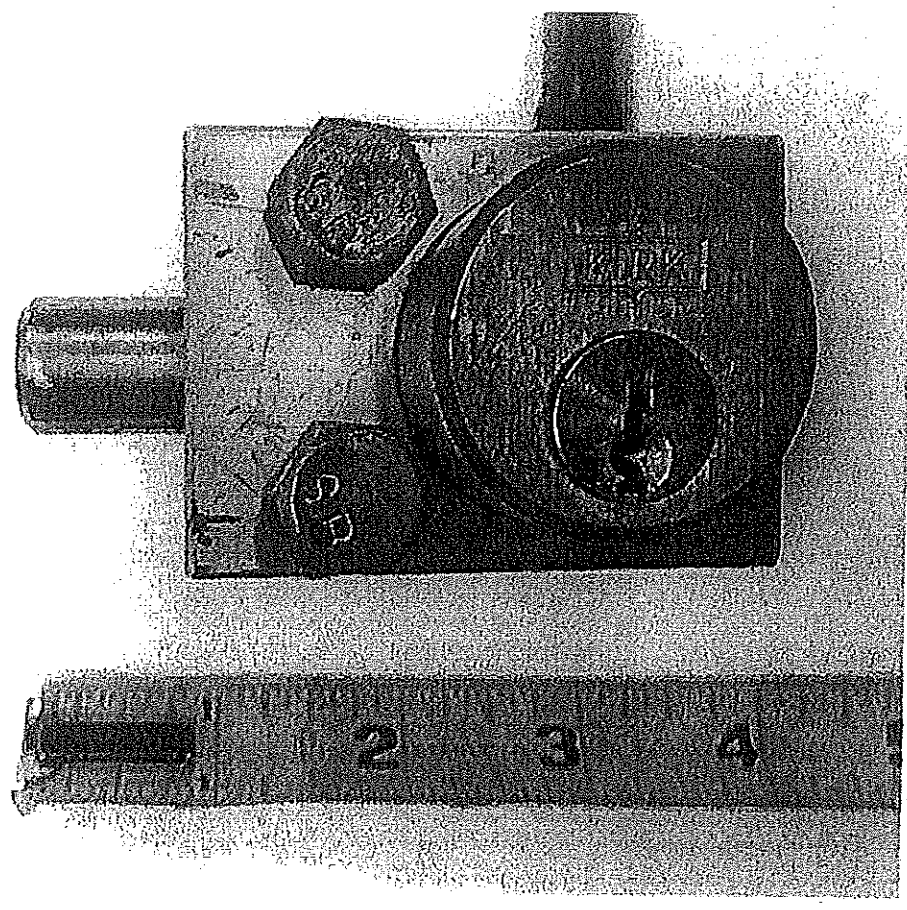


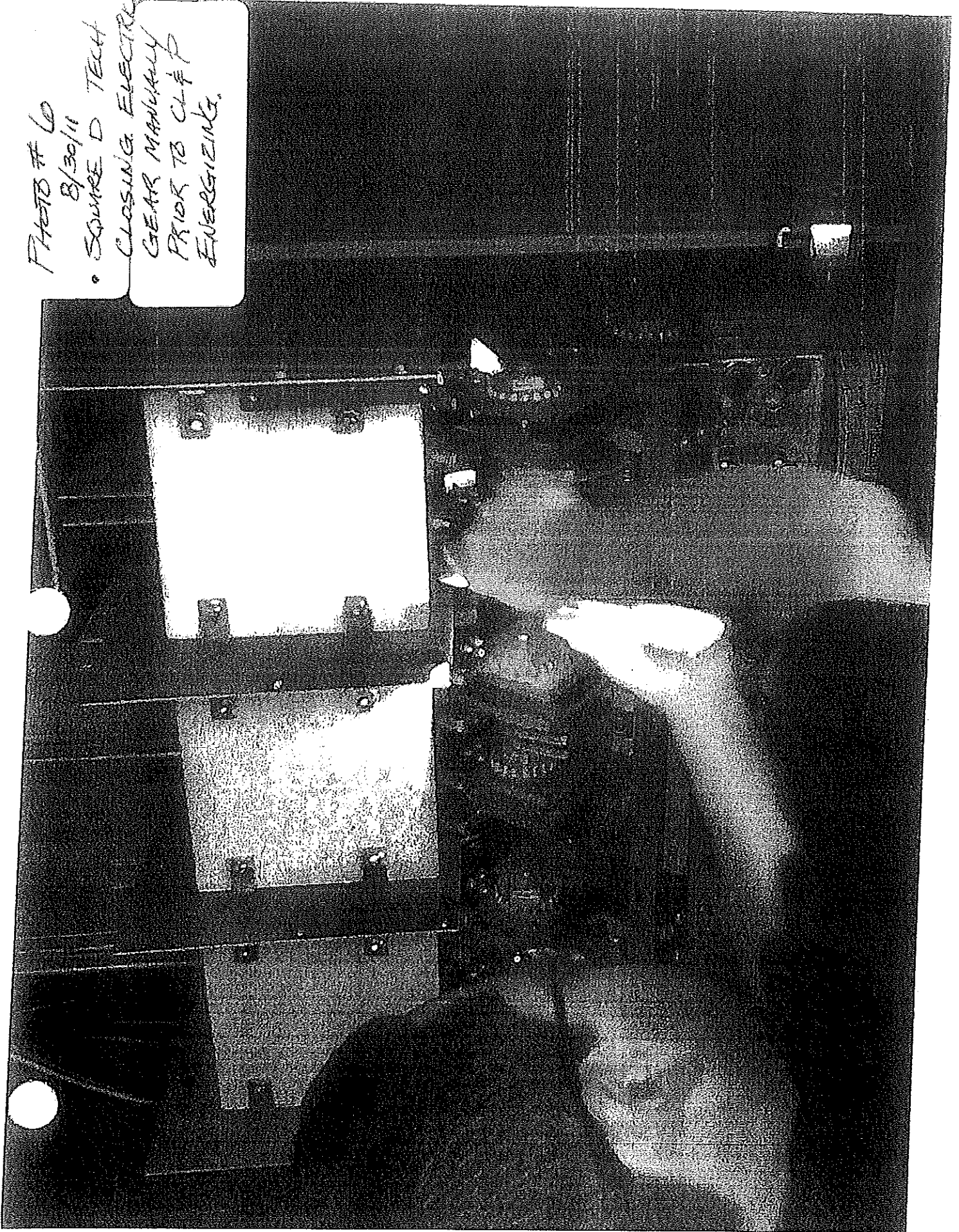
Photo #5

PHOTO # 6

8/30/11

• SOURCE D TECH

CLOSING ELECTRICAL  
GEAR MANUALLY  
PRIOR TO CL&P  
ENERGIZING.



ATTACHMENT 'A'

Speed Message

To RON WILKIE  
EAST HARTFORD BO OF EDUCATION

From KEVIN DUGUAY  
VENTANA CORPORATION

Subject COGEN "STANDBY RUN" PROCEDURE

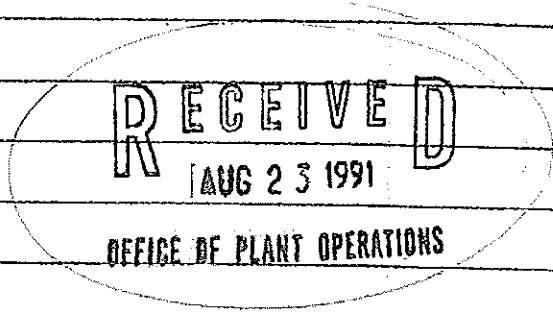
Date \_\_\_\_\_ 19\_\_\_\_

RON,

HERE'S A COPY OF THE EMERGENCY RUN PROCEDURE  
FOR COGENERATING UNIT. SOME NOTES HAVE BEEN ADDED  
TO THE PROCEDURE.

IF YOU HAVE ANY QUESTIONS LET ME KNOW.

*File  
EHS*



Signed \_\_\_\_\_

*Kevin Duguay*

SUPPLYING EMERGENCY POWER  
TO  
EAST HARTFORD HIGH SCHOOL  
FROM  
THE COGENERATION UNIT

In the event East Hartford High School loses it's normal electrical supply from Northeast Utilities, the cogenerator can be used as an emergency source of power to selected areas of the school by following this procedure.

Procedure for supplying power from the cogenerator

1. Verify NU power not available by observing NU power available lights above boiler room door in hallway to loading dock. (lights should be out)
2. In the switchgear room, open the schools main disconnect switch (bottom center of the breaker panel) and remove the round key from the handle. THIS BREAKER MUST BE OPENED TO RUN THE COGENERATOR AS THE SOLE SOURCE OF ELECTRICAL POWER.
3. Open all circuit breakers on Main Switchgear Panel as follows
  1. PP-10
  2. NLA-1
  3. NLB-2
  4. NLA-4
  5. NLA-4A
  6. NLB-3
  7. NKLD
  8. NMD
  9. PP-12
  10. NLB
  11. NLB-1
  12. NKED
  13. BRPP
  14. NLC
  15. SWIMMING POOL
  16. NLS-2
  17. BRPPE
  18. NLD
  19. NBRP
  20. LPIB
  21. SA

4. Start the cogenerator as follows
  - a) Insert key (removed in step 2) in lock mounted on generator control panel, turn to manual position.  
\*\*\* REMOVING THIS KEY WHILE GENERATOR IS ON LINE WILL TRIP THE GENERATOR CIRCUIT BREAKER.
  - b) Place mode selector switch on face of generator control panel in manual position. (This will trip the generator circuit breaker if it is in the closed position.)
  - c) Press the start pad on the generator control panel.
  - d) Allow the cogenerator to warmup until oil temp. is 150°F or 10 minutes, whichever comes first. Check voltage at 480 volts and frequency at 60 Hz.
  - e) Now the cogenerator circuit breaker may be closed by operating the breaker control switch located below the display on the generator control panel.
5. Restore power to the Boiler Room by closing circuit breakers 13 (BRPP), 17 (BRPPE), and 19 (NBRP).
6. To supply power to the Kitchen/Cafeteria area close breakers 7 (NKLD), 8 (NMD), and 18 (NLD). If kitchen is not to be used leave 7 (NKLD) open.
7. If Gymnasiums are to be used close breakers 14 (NLC) and 1 (PP-10).
8. Panel NKED supplies the kitchen freezers and refrigerators from its own 5 KW emergency generator.

## RETURNING SERVICE TO NORTHEAST UTILITIES

1. Open all circuit breakers in breaker room.  
(#13 BRPP, #17 BRPPE, #19 NBRP, #7 NKLD, #8 NMD, #18 NLD,  
#14 NLC and #1 PP-10)
2. Trip the cogenerator breaker by placing the breaker control switch in the open position. The cogenerator display should now show 480 V, 0 KW and 0 Amperes.
3. Place the mode selector switch (on cogenerator control panel) in the OFF position. Cogenerator now begins its 5 minute shutdown sequence.
4. Remove the key located on the cogenerator control panel. This key is needed to unlock the school's main disconnect switch in the switchgear room. Once the key is installed in the main disconnect panel the main disconnect may be shut.
5. After shutting the main disconnect, all the circuit breakers on the Main Switchgear Panel may be closed. After all 21 breakers are closed, the school is being supplied by Northeast Utilities.
6. Place the cogenerator control switch on the cogenerator control panel in automatic. The cogenerator may begin its start sequence as part of its normal duty. Lock the cogenerator booth and switchgear room.

E N D



## **EAST HARTFORD HIGH SCHOOL - SEQUENCE OF OPERATION GRID CONNECT OPERATION TO STANDALONE OPERATION CHANGEOVER**

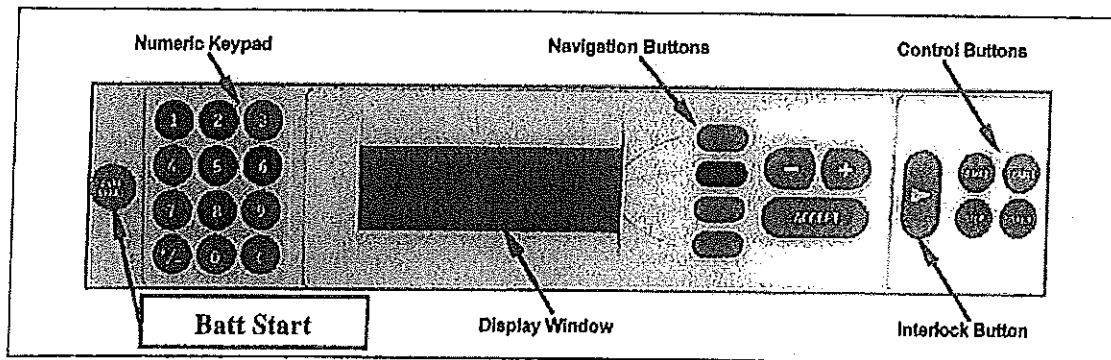
### **TO ENTER STAND ALONE OPERATION**

#### **IN THE SWITCH GEAR ROOM:**

1. Shut off all of the site breakers, including the chiller breaker.
2. Opened the site's Grid Isolation switch.
3. Turn and remove the Kirk-key.

#### **AT THE MICROTURBINES:**

4. Insert the Kirk-key in the microturbine master's mode selector switch and turn it. This will take the system out of "Grid Connect" and put it into "stand-alone".
5. Press the "BATT START" button on the Master (# 1) microturbine to start the system. This may take a minute or two.



6. When the microturbines enter the LOAD state they are ready to deliver power to the site.
7. Enter the Chiller Building and re-set the shunt-trip breaker.

#### **IN THE SWITCH GEAR ROOM:**

8. Re-apply the site load by turning on the site breakers up to the approved load. Use the kW meter (Shark meter) to determine amount of load applied.  
(SEE OTHER SIDE OF SHEET FOR SHARK METER DESCRIPTION AND APPROVED LOAD SCHEDULE)

### **TO GO FROM STAND ALONE BACK TO THE GRID**

#### **AT THE MICROTURBINES:**

1. Once the Grid has returned turn the KIRK Key to "Grid Connect" and remove it.
2. The turbines will enter a recharge mode for the batteries to recharge up to at 80% charge.

#### **IN THE SWITCH GEAR ROOM:**

3. CLOSE all of the site breakers.
4. Replace the Kirk-key and close the site's Grid Isolation switch.
5. Enter the Chiller Building and re-set the shunt-trip breaker.
6. After the microturbines complete the auto-recharge the units will go to Cooldown, stop and then re-start in Grid Connect.

**TOWN COUNCIL OFFICE**

**DATE:** December 5, 2011  
**TO:** Al Costa, Facilities Director, Board of Education  
**FROM:** Eric Thompson, Minority Leader  
**RE:** Storm Alfred Response

Thank you for answering the Council's questions at the November 22<sup>nd</sup> meeting. Below is a list of questions that I have on the High School's Co-Gen Generator. I would appreciate as much detailed information as you can provide at your earliest convenience.

Questions regarding the Co-Gen Generator for East Hartford High School

1. What is broken? The main shut off or the Kirk Key? \*Kirk Key is the safety key to prevent back feed from Generator
2. When did it break?
3. Who are the employees that work on or run this equipment?
4. Are they all licensed or trained to run this equipment?
5. Would they be available to answer questions regarding the Co-Gen Generator?
6. Who trained them?
7. Did you have anyone monitoring the equipment while it was running? If yes whom?
8. Do you have a written record of testing and maintenance?
9. How many times a year do you run on generator power or test it?
10. Do you have a written action plan in case of an emergency?
11. Who is making the repairs presently?
12. Should this have gone out to bid? (\$50,000 expenditure)
13. Have you pulled any permits from town for repairs?

C: Mayor Leclerc  
Town Councillors  
Board of Education Members