STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Case 06-M-1078 - Proceeding on Motion of the Commission to Audit the Performance of Consolidated Edison Company of New York, Inc. In Response to Outage Emergencies.

Case 06-E-1158 - In the Matter of Staff's Investigation of Consolidated Edison Company of New York, Inc.'s Performance During and Following the July and September Electric Utility Outages.

Technical Conference
90 Church Street
New York, New York

October 26, 2006
9:00 a.m.

PRESIDING:

ELEANOR STEIN,
Administrative Law Judge

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JUDGE STEIN: This is case 06-E-0894, the proceeding on motion of the Commission to investigate Con Edison outages in its Long Island City electric network.

It is October 26, 2006 and we are beginning today's technical conference with a brief preliminary attorneys' conference and I would like to place on the record counsels' position on the question of whether or

not people speaking today in the capacity as experts should be sworn.

And I will turn the chair over to Con Edison.

MR. LUBLING: Your Honor, on behalf of Con Edison, I would like to state an objection on the record to your ruling of yesterday. This is the first time we heard that you were even considering having all expert witnesses sworn in.

Obviously Con Edison has no objection to having its experts or its panelists swear to tell the truth. We are concerned with an incorrect and a misleading record that would indicate to parties, especially potential litigants, that this was, this proceeding today was a full evidentiary hearing with all due process.

This is supposed to be a technical conference.

We thought this was supposed to encourage a free flow, an exchange of experts' opinions. I think having engineers swear, having them sworn, will have a chilling effect on a flee flow of information.

They won't hypothesize. They won't give the 99.9 percent opinion. I think it will have the opposite effect of what you really want to achieve today.

Con Edison objects even stronger to having other parties' experts being sworn in. The other parties' experts are here to ask questions. They are not making any presentations. We have not received any presentations. We have no idea what they will be

speaking about.

Are we going to have a technical conference when staff issues its draft report? Are we going to have sworn testimony by staff where we can ask questions on the record? Are we going to have sworn testimony when other parties submit comments on staff's report? Are we going to have a technical conference, an evidentiary hearing with sworn testimony, with cross-examination by one side, with no redirect, no objections?

Your Honor, I really plead with you to retract your ruling insofar as it requires the experts to be sworn in.

JUDGE STEIN: Thank you. Did you want to respond?

MS. HARRIMAN: Yes, Your Honor. Kim Harriman for Department of Public Service staff. We don't have an objection to proceeding with the technical conference without the swearing in of Con Edison's technical panel.

We believe that the record will stand and be transcribed and utilized in whatever fashion parties wish to in the future, depending on the circumstances, and that inconsistencies will stand no matter whether or not the witness took an oath or not.

We do not believe--just going to Mr. Lubling's point regarding other parties providing testimony from their technical experts, that that is the purpose of today's technical conference. We do not intend to have

our technical witnesses offering testimony. They are here to provide questions of a technical nature to the company's panel, and to have that free flowing dialog which I think is the purpose of the technical conference.

We don't think that it would be appropriate for any party's technical witness providing testimony. I think we are here seeking answers to questions that we have come across during the course of staff's

investigation into the events in Long Island City network, in the Queens area in general.

That being said, I also don't believe that it is a due process violation should your Honor choose to swear in the technical panel. This is not a litigation. It's not an adversarial proceeding, although it may have the tenor of such. There has not been a prudence proceeding instituted by the Commission. This is a staff investigation that will culminate in a report and recommendations that we will make to the Commission.

The company will be afforded all due process as far as those recommendations go, and if there are subsequent proceedings more adversarial in nature the company will have available all of its rights to defend itself in that adversarial proceeding.

That's all I have.

JUDGE STEIN: Does anyone else want to speak to this issue?

MR. LUBLING: Your Honor, I just want to comment.

I happen to agree with Ms. Harriman. Other experts are here to ask questions, not to present testimony, and therefore there is purpose whatsoever to have other technical experts be sworn in. Are they going to swear that all the questions we ask will be the truth? They

will ask questions based on the presentation.

I also want to point out that staff keeps saying this is an investigation. This was instituted as an investigation. This is not yet a proceeding that requires a hearing by statute, yet we have other parties who are asking double the amount of interrogatories that staff is asking. We're spending 14 to 16 hours a day on interrogatories. This is more of an inquisition to us than an investigation.

JUDGE STEIN: And is that argument directed at the inappropriateness of swearing witnesses at this point?

MR. LUBLING: Yes.

JUDGE STEIN: When I initially proposed the holding of technical conferences in this case I referred parties to two prior investigations, comparable in some ways, very different in some ways, in which this mechanism was used.

In both of those--one was the renewable portfolio standard proceeding and the other was the Verizon 271 application to enter the long distance market--we held a series of technical conferences designed to elicit a

certain amount of free flow information with the understanding that this was a somewhat hybrid form. At

times it looked like a hearing, an evidentiary hearing. At times it looked like a freeforall. At times it looked like a collaborative meeting.

But in general, I believe the parties involved in those proceedings, including the affected utilities, in the end considered it to have been a worthwhile exercise.

If you did review the proceedings that were used in those prior cases, you will see that all subject matter experts were sworn. And the reason is--although I agree with you, Mr. Lubling, that someone asking questions is not giving evidence and is not appropriately sworn, in the interest of encouraging discourse back and forth we sometimes will have subject matter experts from other parties who are going to be making statements. For example, I visited that office, or I saw that manhole and when I was there looked to me like X.

I read my obligation to the Commission to be to, first and foremost, create a reliable record. And accordingly, I am going to overrule your objection this morning and go ahead with swearing in of all subject matter presenters, whether they are here on behalf of Con Edison or here on behalf of another party.

I will say that I appreciate your concern about the mix of formal and informal process here. I do think it's a concern, and I think that concern will go to the question of the weight of any particular statement or evidence that is given here today.

If in the view of Con Edison or any other party a statement that's made because it was not subjected to the full test of cross-examination should not be given particular weight in this record, then parties will have an opportunity to make that point when they file such in the case.

I am placing that, that's my ruling on that issue for the record. Are there any other issues about the procedure for today? Okay. Seeing none, it's almost 9:30, so, let's proceed with the first presentation.

I will say that if the Con Edison panel wants to reallocate the time that's allocated to it on today's agenda, and use more for the morning panel, or for that matter less, I have no objection and parties don't seem to have an objection.

With that, let's go ahead.

MR. LUBLING: Are you going to take appearances?

JUDGE STEIN: My name is Administrative Law Judge Eleanor Stein. I am presiding over this case. I am

going to take appearances for the record. I would like

to begin with Con Edison and go to department staff. And if you haven't participated in one of these proceedings everyone who is here representing an active party I am asking you to identify yourself for the record and then to give the reporter a business card or some other form of identification so that she can keep straight who's making what point for the record.

Would you like to begin?

MR. LUBLING: Yes. For Consolidated Edison Company of New York, Inc, Chan Lubling, Marc Richter, Mary Krayeske, Martin Heslin, and David Warner.

MR. LANIADO: On behalf of TransGas Energy Systems, Sam Laniado, Read and Laniado, and Ricardo Austria of Pterra, LLP.

MR. WALTERS: For New York State Consumer Protection Board, John Walters.

MS. HARRIMAN: For Department of Public Service staff, Kimberly Harriman, Michael Worden and Nancy Plotkin.

MR. LOUGHNEY: For City of New York, Robert Loughney and Moshe Bonder from Couch White law firm, and Michael Delaney, vice president of New York City Economic Development Corporation.

Your Honor, we have two expert witnesses we had identified as speakers during the meeting and one of the them is Tim Taylor. The other one is sick and in his place would be--that was Richard Peck--will be Ralph Mauro. They will be the two people you will be swearing

in.

JUDGE STEIN: When we are done with appearances I am going to ask everyone here in their capacity as a subject matter expert to stand.

Other appearances for the record.

MS. BURNS: For the Attorney General's Office, Mary Ellen Burns and Charlie Donaldson.

MR. NORLANDER: For the Public Utility Law Project of New York, Gerald Norlander.

MS. BONILLA: Alyssa Bonilla from Western Queens Power for the People Campaign.

JUDGE STEIN: Thank you.

MR. FITZGERALD: For NYSEG and RG&E, the law firm of LeBoeuf, Lamb, Greene & MacRae, by Brian Fitzgerald.

MR. BAKER: Liam Baker, US Power Generating Company.

JUDGE STEIN: Any other appearances for the record? Seeing none--

MR. LUBLING: I would like to place into evidence

the presentation we are making whenever you are ready.

JUDGE STEIN: I am going to do the swearing in first. Will everyone here in their capacity as a subject matter expert please stand.

(Subject matter experts duly sworn or affirmed.)

JUDGE STEIN: Thank you very much. And Mr. Lubling, you had something--you would like to enter into evidence the presentations?

MR. LUBLING: Yes, Your Honor. First, I would like to enter into evidence the company's Comprehensive Report on Power Outages in Northwest Queens in July 2006 dated October 12, 2006. All the parties have a copy and I am prepared to give the reporter both a CD and a hard copy.

JUDGE STEIN: Thank you. We will mark this as Exhibit 1 for today.

(Exhibit 1 marked for identification.)

MR. LUBLING: Second, Your Honor, I would like to have marked as an exhibit a company report dated September 25, 2006 entitled Part 105 Compliance Filing by Consolidated Edison Company of New York, Inc., Event Preparation, Recovery and Communication, Power Outages in Northwest Queens July 2006. I only have a hard copy.

Third, Your Honor, I would like to have marked as

an exhibit this morning's slide presentation. It consists of 77 slides and it's entitled Long Island City Network.

(Exhibits 2 and 3 marked for identification.)

I would like to introduce John Miksad, senior vice president of electric operations, John Mucci, vice president engineering and planning, Ed Rasmussen is here this afternoon, vice president and controller, Matt Ketschke is general manager of Brooklyn-Queens electric operation. David DeSanti, section manager Long Island City recovery team, Joseph Murphy, the department manager Brooklyn-Queens energy services. Mary

McCurtney, here this afternoon, director of public affairs. Richard McKnight, the general manager customer analysis. And the last person is not here I will introduce this afternoon.

JUDGE STEIN: Thank you very much.

MR. MIKSAD: Good morning. I am John Miksad, senior vice president of electric operation for Con Edison. I am going to start today's presentation by giving you an overview of Long Island City network, the events and a little bit about our distribution system.

This is what we plan to cover today per the guidance we received in the proposed agenda. We have an

overview for you, talk a very little bit about summer preparation, talk about the sequence of events that occurred during the Long Island City event, what happened, and why. We're going to talk about operations under multiple contingencies, and the decision whether to maintain the network or shut the network down.

We are going to talk about the customer impact within that network, the restoration and recovery effort, the action plan that's outlined in the report we just submitted. Then this afternoon we will talking about customer service, communications and the accounting and system investment.

This is a simplified one line diagram just to frame what we are talking about here today. Basically, electricity is generated from a generating station at

low voltage, transformed up to high voltage. We call that transmission system. That's represented by this line here and this line here.

We have transmission substations, we have a number of those on the system that act as hubs or collectors that then shift the energy to what we refer to as area substations.

In the case of the North Queens--in the case of the Long Island City event north Queens was the area

substation that supplied the Long Island City network. From there, the power is stepped down in voltage again down in this case, in the case of Brooklyn and Queens, down to 27,000 volts, 27 kv, and we have a number of parallel paths that we call feeders that then supplies an individual network.

This one line is very simplified. It shows only four of them. In the case of the Long Island City event in that network we have 22 individual supply feeders that supply that network. The feeders then are connected to transformers, which are indicated here at these blue boxes which step the voltage down once again down to 120 volts, which is the utilization voltage that we use in outlets and lights and power the equipment like the computer.

That's the network. I want to talk a little bit more about that system but I want to contrast it on this side to what is used in most of the rest of the state, most of the rest of the country, in fact. And that is

this, which shows a distribution feeder with an individual transformer that steps the voltage down similarly down to 120 volts and supplies to customers.

What's most notable about that is there's one half a supply. If anything breaks along the supply path

customers are out of service. That is not the case with the network system. I am going to talk a little bit more about that in the next slide.

This is--just to break it down, we have broken down what we call the primary system or these supply feeders away from the secondary grid, the 120 volt grid. This shows eight feeders rather than four in the previous slide. Still not the 22 that supplied the Long Island City network, but it gives you a better feel of the complexity of the network system.

Once again, it's showing this 27,000 volt feeders that make their way--that distribute out from the area station out to where the customers need power. And then we are showing the transformers connected to them in green.

We have broken away, as I said, the primary system from the secondary system here, but actually these transformers are connected to these--the blue lines. The blue lines represent secondary cables. Once again, very simple. We are showing one line going down what would be a street.

This would be an intersection and cables

proceeding down the block and then connected in three other directions to cables. In actuality, there are

multiple cables that are under the street that are supplying the grid, that are making up this grid.

Then the customers which are going--could be a home or apartment building or commercial establishment, are then supplied by tapping off that grid to supply the electricity.

There are really three distinguishing features of the network design that make it such a reliable supply normally--obviously, we are going to talk about an exception to that today--and that is we designed this system for loss of any two of the supply feeders to the network on the peak summer day. We called it second contingent by N minus two design. We redesign the system with additional redundancy so that any two distribution feeders can be lost on peak summer day without any impact to customers. That's the first feature.

The second feature I have already alluded to, and that is that this entire system is built underground. Generally it's housed in conduit and underground structures, manholes, that house all of the components on the grid. It keeps it--it protects it from hurricane, storms, you know, a lot of the weather type events that affect that overhead type distribution

system that I talked about earlier.

And then the third component of this system is that you can see redundant path on the secondary system also, this 120 volt system, so that if something happens to a cable on this side of the block there is still a supply path for the customers on the other.

So, those are really the three characteristics of the network system that make it--give it such a robust design and such a high level of reliability. We just now overlaid the two systems, and in fact they do, under the streets, those conduit systems are shared between primary and secondary cables.

So, this gives you a little better feel for the complexity, but if you look at the actual systems there are multiple cables and it becomes a lot more cluttered picture, but for simplicity for the slide we wanted to just bring it down to a presentable level.

Now, this gives you sort of a cutaway view of what I have been talking about and I think it brings the--makes it clearer. What we have done is used the same color code on that previous slide and show the primary feeder, the 27,000 volt feeder, in green, and then the secondary cable, which is called the secondary main here, this 120 volt cable, in blue.

You can see that this is representing a conduit,

which is just some material that houses the cables, and then goes into an underground structure where it is spliced together and continue on and cap off the supply, other components.

In this case of the primary feeder this is the 27 kv feeder that then supplies a transformer. This is the box which houses the transformer. And the transformer, all it does is step down the voltage from 27,000 volts on this side down to 120 volts on this side.

And then that grid becomes interconnected, like I showed on the previous slide, and it clears that tap off point to help the customers supplied. That's just by way of overview.

There is a process that we go through. Everything we do, really, is focused toward the summer. Summer is our high demand period. Obviously that's when all the buildings in New York City have their air conditioning on, the electrical load increases significantly from the rest of the year to the summer.

We had about 13,000 megawatts or 13,000 million watts was what we supplied this past summer. All time record for New York City and Westchester county. But the only purpose of this slide is that what we do for

the summer doesn't just happen in the three months of the summer. It happens year round.

And just to give you a feel. The summer experience is where we are actually obviously operating the system, but also capturing all the data from the

system, looking at the peak loads of each station, the peak load of the system, and then based on that experience will then generate a load forecast for the following summer.

That occurs sometime in the September or October time frame. So, now we are looking to say, okay, based on our experience this summer here's what we are anticipating for the following summer. And there is some stations that have--we are seeing higher demand growth, some we are seeing less, and take into account all of that in this period.

At that point we enter into the design phase where all of those--in order to reinforce the system for the following summer, the engineers for the company then do the design process where they are modelling the system, and then telling the construction organizations here's what we need to do.

Here's--we need to reinforce this section of cable. We need to change out this transformer to a

higher capacity in order that in the following summer we will be able to meet the load, plus that redundancy that I have talked about which I referred to as the second contingency design.

So, that reinforcement then occurs from September to June to go to prepare ourselves for the next cycle. And that continues every year. And this is the result.

Just have two quick slides just to put the system

in perspective. This is a slide that reflects the interruption rate, the customer interruption rate for US utilities, for all US utilities, and you can see that it's in the range of about 1000, you see at a high of 1400, 1200, and what that means is the normalized rate, so for every 1000 customers those utilities supply 1000 customers were interrupted.

An interruption rate of 1000 means that every customer experiences one outage a year. You can see where it's above that, that would mean every customer experiences 1.2 outages a year, 1.4 outages a year. Contrast that for a second to Con Edison. This is Con Edison's average, which takes into account the network system that we have talked about, and the overhead system which we have in Westchester, Staten Island and some other load density load places. And it shows an

interruption rate, the same measure, that normalized interruption rate, of about 150 or so per thousand customers. So the average Con Edison customer experiences an interruption of about once every seven years.

Very often in the network system our customers experience an outage during a blackout. What I mean by that is 1965 in the northeast blackout, 1977 in the New York City blackout, and 2003 with the northeast blackout. Many of our customers tell us they don't experience outages other than those large scale events.

If I graphed the network system reliability, Con

Edison's network system reliability on this same graph it would be down in the ten or 15 range down here. As I said, this is a composite of our entire system, the network as well as the overhead system.

This is just the same comparison looking at the rest of New York State utilities, which is better than the rest of the US, and then just that same rate for Con Edison. You can see this is from 1997 to 2005.

We are going to focus in now on Long Island City. This is our New York City service territory with five the boroughs, also supply Westchester county, going to focus in on this area right here, Long Island City.

This is a blow up of that area which is outlined in white to show the areas served by the Long Island City network. The northwest corner of Queens. You can see the boundaries here. This is Newtown Creek on the south, the BQE on the east, the river on the north and on the west. You got the midtown tunnel here, Queensboro bridge and Triboro bridge.

We high lighted in yellow and red here, these were the affected areas during the July 17th through 21st event. This network also supplies Rikers Island shown up above, and it also is one of the two supplies to La Guardia airport, shown over here. There is another network supplied from Jackson Heights.

Just some stats on the Long Island City network. This, again, shows just the diagram. I already

mentioned it is supplied from north Queens substation. It has a peak summer load estimate of 395 megawatts. A megawatt is a million watts, so, that's 395 million watts.

There are 115,000 customers supplied from this network. It is supplied, as I mentioned, 22 distribution feeders, and there are 1200 of those distribution transformers that supply it.

The findings, the major findings, and we are

going to delve into this in more detail, but high level findings of the report were really three-fold. That this was an extraordinary sequence of events that resulted in the outage to 25,000 customers in the network. The decision--our decision to maintain the network minimized the impact for many, many other New Yorkers, not only the 90 other thousand customers in the network, but we will talk about some others that would have been affected. And that we are working to, despite having those sort of the reliability record I showed in the previous slide, we are working to strengthen that performance in our response capabilities.

I am going to turn over now to John Mucci, who is going to talk about the sequence of events, what happened and why.

MR. MUCCI: Thanks, John. Good morning. What happened in this event can be described in this simple diagram. Now, keep in mind although this diagram is simple the complexity of this event is significant and

substantial, but if you think about it, it is initially starting out with three discrete, unrelated, unusual events, very improbable in their confluence in the fact that they all happened together.

Any one of these events, on of these three events

had it happened in another network, or the three events would happen in all different networks, we wouldn't be here today. Not only it is unusual to have some of the events, but it's extremely unusual to have them all.

These events which happened over the period on Monday lead us into Tuesday into a cycle. And the cycle became a self reinforcing cycle. I will explain that a little more.

When feeders fail we know that increases the probability that other feeders may fail, especially feeders next to them. Feeders in the same proximity begin to take up the load and the heat that would have been carried by the feeder is now out of service.

As feeders went out of service we had adjacent feeders go out of service. As adjacent feeders go out of service, transformers and secondary begin to pick up the load that was carried by these primary feeders that are now out of service.

And the secondary system, although it's expansive and 750 miles of underground cable crisscrossed everywhere in the Long Island City network, still became highly loaded, in some cases overloaded, in some cases

failed.

When components on a feeder, like a transformer,

fails the feeder comes out of service. When secondary overheats, you sometimes get damage to the primary cables which run in similar manholes and conduits, and that causes additional feeders to come out of service.

Discrete and unrelated events bring you into this cycle. What gets you out of the cycle is the operator's ability and the ability to restore feeders to service as quickly as possible. And all of our operators have been trained that this is the most effective way to prevent multiple contingencies is to restore primary feeders.

The other way to get out of the cycle, in addition to restoring feeders, is to reduce load by appeals, by talking to our large customers, by asking industrial commercial customers to go on their own generation, to switch suppliers, that sort of thing.

In a nutshell this sort of describes what I am going to describe in a little more detail next. John showed you this slide before. The primary, we have separated the primary from the secondary just for simplicity. This was a simplified version of the network. We have in this particular case showing only eight feeders. The network really has 22.

We are showing the secondary in simplified fashion. This is expansive system of mesh and cables

that covers the entire area of Long Island City, every street, every intersection.

In the first event, in the first unusual event, was a fire in a duct. Between the manholes there is duct work that carries the primary and the secondary cables. This duct work caught fire and the secondary caused the fire and the primary was damaged in two feeders opened in succession 32 minutes apart.

These two feeders are in the same area of the network. If I go back to the cutaway drawing, you can see that some of the primary feeders are carried along in conduits that are adjacent to secondary mains.

And secondary mains, this sort of depicts the type of situation was. Secondary mains travel in a route. Con Ed facilities travel in a lane because there are other facilities, water and sewer and telephone, etc., so Con Ed's facilities carry together and ducts will come closer in a proximity to each other.

In this particular case the secondary duct is right above the primary ducts. And in that run between manholes and service boxes, there was a fire. And that fire is the first event and that fire caused two primary feeders to come out of service. That in itself is not terribly unusual, it's not terribly harmful because we

have a design that can withstand two feeders going out.

Even the two, what we call the two worst feeders, closest feeders, can go out. Our design is such that in that situation, N minus two, the rest of our system is still capable of accepting the load that was carried by the feeders that went out of service.

So in the N minus two situation, or two feeder outage situation, customers will not be affected, customers will not even know typically that there is a problem.

I am going to switch now to the second event and unrelated to the first. In the second event we have to go into the area station. Now, feeding these supply feeders, primary feeders, is a set of transformers, switches, cabinets, that's located in Astoria that is basically where the power is converted from the transmission system, the 138 kv down to the 27, and distributed to the 22 feeders throughout the network.

In that area station we have circuit breakers. This is a simplified version of what existed in the station. Really giving you the idea of what exactly what happened. In the first part of this group of occurrences, one of the feeders became faulty. And I will explain why that feeder became faulty first.

It became faulty because of a connection, a termination connection to a transformer. This is a typical underground 500 kva transformer that's used predominantly in Brooklyn-Queens. Generally, this is the size that is used.

This side of the transformer, which is basically a ten with three coils on one side, three coils on the other side, and oil inside, has bushings. These are the primary bushings, 27 kv coming in, and coming out through a switch is the low voltage side the 208, 120 you use in your home or apartment, whatever.

This is basically the unit that's underground throughout our system. We have literally 25,000 throughout the Con Ed system of these. They are in all areas of our networks. This is the termination connections of the primary, primary cables running from along the feeder route from the area station and goes to the primary connections of the transformer.

This is the bushings of the transformer where the connections are both. In this particular case we had tracking along this insulator to the ground, and that caused the short circuit or an overload on that feeder. That feeder--normally this breaker would open to protect that feeder.

In this particular case this breaker did not operate as we expected, and backed up into the back up breaker so the back up breaker opens. When the back up breaker opens we lose two additional feeders to the one that we had because the back up breakers are usually supplying several feeders. In this case, three feeders. These three feeders are out in this instance.

What happened to that circuit breaker that it did

not operate. When we examined after the fact we see that one of the 54 contacts that are in this cabinet were not making up. Explain a little bit.

This is a cabinet a little bit bigger than the size of large refrigerator. You open the door of the cabinet and the breaker is inside--about 800 pounds, this breaker. You can roll it out and it's on wheels. You can roll it out and you can roll it in. The protection DC current that supplies the coils in this breaker is supplied through fingers, and when you push the breaker in it makes contact with these contacts here.

All 54 make contact. One of those 54 was not making contact and that's why the breaker did not work. This is extremely unusual because--this is a C2 advisory circuit. Our breakers are made such that if a contact

does not make up there is a light on this breaker that goes out.

Some cases there is an alarm in the control room that goes on, but there is usually a light in our installations designed that if the light doesn't light something is wrong with the circuit. This breaker is not going to operate correctly. Operators know that and they will repair that.

In addition, if that light does not light the operator cannot even close the breaker so you cannot put the breaker in service. But, sometime between the time the breaker had operated previously in April, and the

time when it tried to operate in this particular case, there was a contact that was not fully made up, and the design of our circuit was such that the monitoring light for this contact was not designed correctly.

The light was in the circuit and was supervised. The trip coil, everything was fine with the trip coil, but there was a second path and that second path is what supplied the trip coil with DC current. Supplies the breaker to slam open and that trip coil was not being supplied by the protective relays that are designed to sense the overcurrent and open the breaker.

So, we found in this case this contact is open

and this circuit was not telling the operator there was a problem. Operator believed because of its indication that we had no problem.

To go back to our diagram here, at this point we only show four feeders out. There's actually five at this point. We had three feeders, at least three of the five were very close proximity to each other. In fact, they were on the fringe, what we call the fringe of the network, outside of the network, which means that secondary had to be supplied a further distance.

If it was in the middle of the network it wouldn't have been as serious, but at the end of the network it's even more serious. Now, as I said before, operators are trained to restore feeders as quickly as possible to get out of this kind of a situation, and

that's what they did.

And that brings us to the third unusual and unrelated event. And the third event, we tried to restore the feeders that, of course, there was no problem with because remember that the main breaker opened up, some of the circuits were still good, but one circuit could be left off to repair and the other circuits could be restored.

When it attempts to restore one of those circuits

we experienced something that we never experienced before. We experienced a problem with inrush that we never realized we experienced before. Might have experienced before, we're not entirely sure, but inrush occurs when the breaker closes. At a certain point it causes the transformers in the network to magnetize to absorb energy, which it provides a sudden peak of current.

That peak of current was short circuit current in the setting of our protective relays and causing the feeder tube to open up. What happens of course is the feeders stay out of out of service and you are back to where you started.

I am going to show in more technical detail why this is unusual, what happened. When looking at the actual captured wave forms, we do this after the fact, we have very specialized equipment, equipment we developed for this purpose, especially for this purpose. Basically recorded a silograph we use.

This blue line shows the wave form of the inrush current in Long Island City. This particular setting, this particular relay, the overcurrent relay was set at 4,000 amperes, 4,000 amperes was actually below the inrush of the magnetizing current that was needed to

supply these transformers.

Now, since then, of course, we changed our settings and there is some--there is a lot of science to doing everything. I am making it look simple. There is some analysis that needs to be done to do this and understand this, but we changed our settings so that we don't have this reoccurrence in the near future. We have plans to do more modifications later on.

But if you filter this signal of the harmonics of the DC offset or X/R, you would have a significantly lower inrush. Our engineers believed that this difference is primarily due to harmonics and the DC offset. It was not anticipated and not understood until after the event.

That left us in a situation. This is the map of Long Island City, as you remember, and East River, but that left us in a situation where there was fringe areas that had significant numbers of feeders, five feeders, out of service, and areas that were no longer being supplied by the primary feeders, which meant if you lived here you had to be supplied by the green, the feeders that are in service, the green. Feeders that

are out of service is the brown, black.

You had to be supplied by feeders that were in

service from a further distance, meaning the secondary cables, transformers, had to carry more load than we had designed for, anticipated, and they did. They did carry more load, but in some cases that caused us problems.

This brings us in, these three events bring us into the recursive situation. That's where we were at that point. At that point, operators needed to restore feeders as quickly as possible.

And now John Miksad is going to talk a little bit about what the operator decisions were during this period.

MR. MIKSAD: Okay, this is--now John's taken us to essentially Monday evening. All of this was occurring on July 17th. We are talking about 8:00 at night or so at that point. This is it a--it looks complex but it really is not. This is the number of feeders out of service to the Long Island City at any one time.

And this is one feeder out, two, three, four, five, six and so on. And this is day of the week. Monday the 17th, Tuesday the 18th, Wednesday the 19th, to Friday at the end there. What you can see here is that the first, the secondary cable fire that John spoke about Monday afternoon, brought us into the second

contingency, two feeders out. As we talked about, we are designed for that, that's not an issue, no problem.

That second event that John talked about, the substation event, brought us up to fifth contingency. That was Monday evening. The operators then went through that process to restore feeders. And I just want to give you a little feel for that process.

It generally takes us about 12 or 13 hours to restore a feeder to service. What's involved in that, we are talking about, again, 27,000 volts here, so there is an up front piece to protect the equipment and make sure it's isolated and grounded so that the operators, when they go to affect the repair and putting their hands on what could be 27,000 volts, is absolutely positive that it is de-energized and safe to work on.

So, that process takes time. Then the repairs are made by the operator and then feeder is restored to service. That generally in the summer time takes us about 12 or 13 hours to do that. So, that's what's happening here.

So, this looked like sort of a plateau here but my point of bringing that 12-hour period up is that there was a lot of dynamics that was happening. The operators were battling and struggling to maintain the

supply feeders to the network, so there were

restorations occurring and other devices failing and coming off line. So there was a lot of activity. Even though this shows something that looks like a static thing for hours, it is--actually there is a lot of movement with puts and takes happening throughout with feeders being restored and feeders coming out of service.

That occurred, that battle occurred for about 24 hours in bringing us to Tuesday evening. And what we show here is a rapid increase. And we go very quickly from a sixth to a seventh to an eighth to a ninth and then even out at a tenth contingency.

So, at this point you can see a very short period of time, but there were ten feeders out to the grid. Ten of the 22 supply feeders out to the grid. Obviously very serious situation. Operators understand that. And again, struggling to restore feeders as quickly as possible in order to restore the supply.

What is also happening during this period, we are going to talk about this more later, we have superimposed this blue line, the actual demand or load that the network is supplying, and that uses the other Y axis here and it's small. This is 200 megawatt, 250

megawatt, 300, 350, 400.

I already mentioned earlier that the peak load for the network that we estimate was about 400 megawatts for the summer. That's shown--we were around 380 or so I believe up at that point on Monday. What you can see

here--there is obviously a natural load cycle that occurs at night where folks are asleep, businesses are closed, demand comes down, then it comes up again during the day as folks go back to work.

So, what you can see here though reflects the efforts of the operators. And the other key element that John spoke about, talk about two, one is quick feeder restoration time. The other is reduce the load if you can.

That is reflected here. So, there were a number of things that were going on simultaneously. The New York State Independent System Operator had initiated their demand reduction program. We at Con Edison had also initiated demand reduction programs. We have customers that actually sign up for program to voluntarily reduce their demand at any given time.

We also had what we call voltage reduction occurring from Monday evening, and that is where we deliberately reduce the delivery voltage in the station.

That affects all customers. Reduce that by about eight percent.

And so there were a number of measures. Also, customer appeals directly from Con Edison. And at some point, I believe starting on Tuesday, there was a Police Department speaker vans going around actually requesting folks to reduce load in this network.

So there were a number of efforts that were going

on that reflect this. You see the subsequent Tuesday peak is lower, subsequent Wednesday peak is lower, and it flattens out about there. The valleys here though are the night time periods where customers are not using as much electricity.

This battle, as I refer to it, occurred essentially all week. And you can see we hit another tenth contingency here on Wednesday about 11:30 in the morning, and then from there we battle back to restore stability to the network. And that really occurred on Thursday and into Friday.

On Thursday we had down to three feeders out in the network and finally on Friday we got within design criteria back down to two and ultimately all feeders restored.

We showed you this diagram before and we bring it

up again to show you the considerations that the operator looks at when making this decision on whether to maintain the network or shut down the network. There are really five, three direct and two indirect. They are the primary feeder loading.

So, if the primary feeders are showing overloaded what we are concerned about there is the cable actually heating up to a point where it can actually be damaged. And then the supply that supplies that life blood of energy to the network would be damaged and that would result in long, very long, duration outages.

The transformers that we talked about before, if

they show signs of overload on a large scale that would be another indicator. There is not an equation to this that we give the operators, but there is guidance in specification.

And then finally, indication of secondary damage. The secondary cable system we talked about, that grid, that is the third direct factor that the operators are looking at when considering whether to shut down a network or to maintain. The two others, we referred to both of these, is what's happening with the demand, the electrical demand load. Is it rising in the morning, for example, or declining in the evening?

And then finally, feeder restoration. Are there prospects for restoring additional supplies to the network?

I am going to give you a snapshot of what the operators saw on Tuesday evening at that first tenth contingency and Wednesday at the second tenth contingency.

Tuesday evening at 8:38 p.m. was the first tenth contingency. This was the situation the primary feeders, none of the 12 remaining feeders were overloaded at that moment. Transformers, there were ten of the 700 remaining in service transformers where it indicated overloaded.

And with regard to secondary damage, of the 15,000 structures that make up the Long Island City

network, 17 of them we had indication of secondary damage. So, my point here is to say that these, if this is the dashboard that the operators are using, this is not a compelling case to shut down the network.

The other two factors that I mentioned before are the load and the feeder restoration. With regard to the load, the load was declining. You probably don't remember, but we do, at that time. That Tuesday evening, there was a cold front that came through the

area dropping temperatures significantly, which has a load reducing effect. Obviously at night time also I mention that has a load reducing effect. So, the load was on the decline. In addition, our load reduction efforts were in effect.

The second is feeder restoration. There were at this time, there were a prospect of three additional feeders being restored within the hour. And as you saw from that just thin line that went up to the tenth contingency, you saw that we did actually restore three feeders within the hour to get us back down to a seventh contingency.

This sort of is another way to reflect that. We show those numbers that I showed on the previous slide just in terms of percentage. We showed no feeder overload at that point, one percent of the transformers overloaded at that point, the ten I mentioned, and indication of 17 manhole events, which is about point one percent of the total number of structures.

I don't want to beat this point out home, but the second tenth contingency the Wednesday morning, same sort of dynamics there. And this, again, same sort of picture for the Wednesday tenth contingency.

Just, again, to show that we then were successful

in bringing--restoring the network and stabilizing the network really on Thursday and Friday, and then could focus on the task fully, on the customer restoration, but until the network was stabilized that really could not be undertaken.

Just once again pull up the global map slide and show the network again. I had shaded before the 25,000 customers were affected over on the eastern side of the network. Just in the consideration of when we are shutting down a network what would happen, as I mentioned, total of 115,000 customers supplied, so there were 90,000 customers that stayed in service and were unaffected by the event, by the operators of building, to maintain this network through the week and stabilize it again.

In addition, there are seven subway lines. My understanding is all of the Queens subway lines are supplied and pass through the Long Island City network. I don't have the ridership of those, I but would venture to say it's perhaps a million people.

In addition, the two branches of the Long Island Railroad pass through and are supplied from the Long

Island City network. The network had shut down all traffic signals, street lights were also shut down. So,

the consequences of shutting down a network, and the operators understand, are fully are significant and real. In particular, the Long Island City network is a particular transportation hub for New York City.

We are going to talk about customer impact now, which is one of the other big issues. Obviously the network shut down was a major issue. A lot has been written and said about Con Edison didn't know about the number of customers, which is true. I just wanted to see if I could explain that a little bit, and obviously talk more about that.

I brought this slide back to show with the overhead system it is one continuous path from the distribution system right down to the customer. And I mentioned before, if anything breaks along that way everything downstream is out. It's like the breaker in your home or apartment. When that breaker trips all the outlets and lines downstream of that breaker are out of service.

That's the way the majority of the country is supplied from a distribution perspective, but on the network system, we already talked a number of times about multiple feeder paths and multiple secondary paths for energy. So, it's really not evident with this

system, with this complex system, when a customer is out of service.

We don't have any detection from the customer perspective. We have no detection from the actual grid. Although we have monitoring at the area station, we have monitoring on all of the transformers, once you get inside this grid here there is no direct telemetering that tells Con Edison whether a customer is in service or out of service.

When you talked about earlier about reliability, the vast majority of the time the network customers are in service. So, the bottom line is we rely on customer calls to tell us, to inform us, that there is a problem with their electric service.

This is the process that we use to get that information. And it shows an emergency call coming in, a customer picking up the phone and saying, Con Edison, I have a problem. They hear initially a broadcast message. That could say press one for English, two for Spanish. It could say, we have a problem in an area if we know about a general problem in an area. If there are storms up in the overhead supplied areas, we have storms and we have a number of customer outages as a result of that.

A customer then has the ability for two choices.

One is to talk to a customer service representative. The other is to report through self service, through an automated system we use for a number of things. That-- either one of those will generate a trouble report that then goes to one of our control centers and then is dispatched out to an operator for repair. And then that information is disseminated out to the public.

I think I am going to talk about--I will talk about here just sort of what didn't happen that hampered some of this. And I am going to talk a little bit more in the action plan. Initially, there was only one period where calls--where customers were getting busy signals. So, that could be considered we are not getting information. That was on Wednesday for a short period of time. What we have done is added additional phone lines to allow that. We've increased the phone lines by a third.

The broadcast message could be considered by some to be vague or dissuade customers from pursuing it. If we say we know about an outage customers might say, okay, we know about it so we don't need to continue this process. We think many of our customers did that. So, we have clarified that message to say, to encourage

customers to continue on with the process even if we do know of a general outage.

We added capability in this area also, particularly with self service, and streamlined the process. It took three minutes to get through the

process previously. It's down to 90 seconds now, so folks who are impatient will be able to better get through that process.

I'm going to talk about some of the other improvements later on. This is just to show what that process that I just showed on the previous slide generated in terms of trouble reports of customer outages. And it shows on the 17th that process generated a total of 17 customers out, 225 on Tuesday, 1100 on Wednesday, and then 1600 on Thursday. Obviously, vastly underestimating the total that were affected in particular on Wednesday and Thursday, as this event proceeded.

What we did on Thursday was to divide the network. This, again, is the grid, and we divided it up into these smaller grids. And the high lighted areas are the affected areas. And we actually sent folks out and surveyed the area Thursday evening when we got an indication that there was more customers out than we had

been estimating.

We actually drove through every street of the affected area with dozens of people, actually, and then collected that information on Friday morning. And that resulted, after that was all kind of analyzed, that resulted in the 25,000 customer estimate being realized and then shared with the public and the city.

Just one other point, that when networks are

in--I said they are in and usually very reliable. This is just another stat I think that Con Edison gives insight into the operator's mind that we look back 40 years where networks were actually in service and there were customer outages.

In 40 years, there were four other outages that were 1000 customers or more. So, in 40 years time we only had four others that were more than 1000 numbers out in a network with the network in service. Not talking about the 2003 blackout or anything like that. But this, I'm sure, is in the operator's mind that we don't have large outages when the network is in service. The network is up or the network is shut down, like in a blackout.

We are going to talk about restoration right now and Dave Desanti is going to do that.

MR. DESANTI: Again, as John mentioned, the first step really is to stabilize the network, return the feeders and redirect and reconnect the distribution capacity, and restore the customers.

What we did was we mobilized into three zones run by Brooklyn-Queens crews and Bronx-Westchester. We opened up a second workout location in northern Queens to help the logistical support, and not only our own crews but crews coming from elsewhere, and also the bring this down to zones. Helped with the administrative control of all the personnel.

Con Ed did an all hands on effort, brought in

500 company crews, went out to other utilities, out to Washington, Ohio, Boston, other centers that have had underground cable crews. 75 mutual aid crews, 50 underground contractor crews, and excavation contractors to help us.

We also deployed a total of 54 energy generators, particularly during the unstable period in the network that allows you to restore customers, take affirmative action, and deload the network to serve customers faster. We also ran 25 shunts to bypass damaged sections that we couldn't replace quickly, again, to get customers back as quickly as possible.

With regard to the restoration, display shows the customer accounts and restoration progress. You note by midnight Sunday night 80 percent of the customers were restored and by midnight on Tuesday the customers restored in the Long Island City network.

The recovery effort includes about 500 layouts to repair and rebuild secondary that was damaged, installing over 25 miles of secondary cable, installing about nine miles of new conduit and duct system, we're enlarging 160 structures to accommodate those vehicles and replacing more than 25 transformers.

MR. MUCCI: Your Honor, we can hold the action plan for this afternoon. Is that okay?

JUDGE STEIN: Let's do that. We are going to take-- I appreciate your speed at which you accelerated.

Off the record.

(Recess taken.)

JUDGE STEIN: We will go back on the record and I will hand the agenda over to staff counsel.

MS. HARRIMAN: Thank you, Your Honor. The first set of questioning is going to be conducted by Michael Worden and myself and I will let Mike start out.

(Panel consists of John Miksad, John Mucci, Matt Ketschke and David Desanti)

EXAMINATION BY MR. WORDEN:

Q. Good morning. Just a couple clarifications and I will let you guys decide who can clarify best. From the presentation, you mentioned that you had a number of transformers. Can you explain just for everybody's sake when you say a transformer, you had seven transformers overloaded and that was Tuesday night what you mean by overloaded at that point.

A. (Mucci) We determined overloaded transformers by when the hot spot or top oil temperature exceeded the calculated hot spot, the calculated temperature exceeded the design. In some cases 125 centigrade, in some cases 135.

Q. So, some of these transformers, correct me if I am wrong, were possibly above their MVA rating but not above the temperature rating, right?

A. (Mucci) Exactly right. We tested these things. We knew they could go higher than their name plate rating.

Q. Who's the one on the network shut down?
A. (Miksad) I can talk about the network shut down.
Q. Can you elaborate a little more on the discussions that took place Tuesday night, Wednesday morning, when you were above a sixth contingency

regarding whether you should shut the network down or not.
A. (Miksad) Sure. We have two perspectives on the panel here. I was in the distribution command post at the time. That gives the overview perspective. And Matt Ketschke was in the Brooklyn-Queens control center. You will hear both of them I guess.

From my perspective, from the distribution command post, we had--I had conversations with Matt and Tom Newell, the vice president of Brooklyn-Queens, on Tuesday evening when we were in the sixth, seventh, eighth, ninth. Number of conversations throughout the evening. Obviously when we were in a tenth, the most significant.

And we talked about, again, the criteria for shut down. We talked about what the control center was seeing in terms of those measures that I put up on the display. Feeder loading, transformer loading, and any indication of secondary events, which is not a telemetered measure. It is something that we get from field reports, either from our folks, from our employees, or from police and fire department or some

customers.

So, we had a number of discussions, I don't know

how many through that evening. We had a number of discussions that just talked about the criteria and whether the criteria was such, that the contingencies were such that would prompt a shut down of the network.

Q. Can you, before I hear Matt's perspective, tell us what the--I think on the first one you mentioned there were 17 of 15,000 secondary damage conditions. Can you elaborate what 15,000 represents?

A. (Miksad) 15,000 is the total number of structures, manholes, service boxes, vaults, that comprised the Long Island City network. The 17 is a report of damage from one of those groups that I just mentioned, either an employee report, a police or fire report which has a direct line into each control center, or a call from the public indicating one of those problems. In an event is either a manhole fire, a manhole explosion.

Q. The 17 weren't necessarily--were they events or were they possibly just customer outage from a manhole or service box, I mean?

A. (Miksad) No. Those were events.

(Ketschke) That 17 is really cumulative from Monday through Tuesday, so, not all of those 17 were active events at that point in time.

Q. Did you get to--were you going to elaborate, Matt, on what John said about circumstances about shutting down?

A. (Ketschke) My perspective in the Brooklyn-Queens control center at the time, we are looking at the estimated restoration time for feeders, what equipment we expected to restore going through Tuesday evening. We were in a sixth contingency for the majority of the evening with the expectation of restoring feeders throughout.

Anyway, as the evening evolved from sixth contingency, we were looking at what we had for estimated restoration time for equipment, what we were receiving for secondary events, monitoring loads on equipment. As the contingency escalated quickly from a sixth to tenth contingency we continued to focus on those things.

We were receiving additional calls for reports of events in the field, monitoring transformer and feeder coding. The conversations that were going on in the course of the events as engineering staff would bring in the analysis of the current situation really revolved around what to do next, what do we have coming back, and what other means are available to us to get any

additional load off the system. We looked to push load

off for the whole day.

There are a series of conversations about--with going back and forth to the distribution command post, what we had for available equipment, what we were doing about considering shutting down the network. And there was a request made to run cases at the distribution engineering level, if we were to shut down the network what to bring back as a state, how much equipment we had to bring back to restore the network.

Q. I believe your report says you determined you needed 18 feeders to put back. Was that during that evaluation?

A. (Ketschke) That's what the evaluation came out with.

Q. Were you primarily focused at this time on the primary system, the secondary system, both?

A. (Ketschke) At that point--we are talking about the tenth contingency on Tuesday night. At that point all the telemetry came back from the field. It was primarily a feeder driven event. There were outages and there was secondary events, but the majority of the concern was on stabilizing the network, yes.

Q. Your focus was on stabilizing the primary portion

of feeding the network?

A. (Ketschke) Yes. Stabilizing, the primary focus was stabilizing the feeders in the network.

Q. Did you get at any time to a state if X happens we are going to shut the network down? X could be a

number of things, if we lose this feeder, that feeder, something like that.

A. (Miksad) We had a conversation.

(Ketschke) We did have a conversation when we got to the tenth contingency after the next contingency we would consider shutting down the network. There was no--all the information we had at the tenth said we can hold this here. If it continues to escalate you may need to shut down the network.

Because these events evolved quickly, over about a 40-minute period, we didn't fully complete the analysis of this feeder versus this feeder or the next feeder. There were 12 feeders in service in the network. Some of those feeders would be worse than others. As we were running through the analysis we were also trying to restore equipment. We didn't go through all the remaining equipment, loss of this piece of equipment, yes. Loss of this piece of equipment, no.

(Miksad) My understanding of that conversation

was that it was not an automatic if the next event occurred we would be shutting down the network. My understanding was that if the next event occurred we would take--reevaluate and there would be possibilities of a shut down.

Q. You would essentially reevaluate because you had already done an evaluation whether you should shut it down?

A. (Ketschke) We evaluated at that point. At that point we didn't.
Q. Were there any people that were advocating shutting the network down within the company?
A. (Ketschke) The conversations we had, it was all part of the discussions, nobody came to--the meetings I had nobody said we need to shut down the equipment during any discussion I had in the Brooklyn-Queens control center.

Operations staff and the engineering staff at the time in the tenth contingency through the evening both said we can maintain the network in the configuration we have it now.
Q. Again, that's principally looking at the primary faeder loadings, transformer loadings?
A. (Ketschke) Primary feeder loads, transformer

loads, secondary events, and then estimated restoration time for equipment, and the status of where we were in the load cycle.
Q. How about in the distribution command post?
A. (Miksad) In the distribution command post most folks, everyone but one was advocating the maintaining of the network. One Eli Chablis recommended to me that we go to a shut down.

I took that as a point of information. He shares his opinion with me freely and that was one reference point. That goes into the mix with all of the other operating, engineering advice and information that we

get during these events, but there was one.
Q. Was the ultimate damage sustained to the Long Island City network, how would you compare it to the damage to the secondary network in Washington Heights?
A. (Miksad) More significant than Washington Heights, I would categorize it. It is my understanding it amounted total to about four percent of the secondary system that supplied the Long Island City--that makes up the Long Island City network. So, about four percent of the secondary cable sustained damage.
So, although more than Washington Heights, still a relatively small percent of the total number of mains.

And that really is where your questioning is going. That's really what we are looking to attain.
There is extensive damage to the network. If the network grid secondary system burns up or transformers en masse burn, then we are talking about essentially rebuilding the network, which is something that could take us a month, and that really is where the network shut down decision--that's what it revolves around.
(Mucci) Just to add to that. I think in the Washington Heights event the decision point was when the station was experiencing damage. At that point, if you lost a substation you are talking several months rather than, you know, a month.
(Miksad) Right. There was the report of the fire in Sherman Creek, the substation that supplies

Washington Heights network, and essentially as soon as that report was received that's when the Washington Heights network was shut down. That's what triggered the decision to shut down that network.

That was--there was no such substation trouble. The substation was well within its capability. There was no issues in the substation.

Q. One of the city's responses or one of the questions had to do with some of your emergency

procedures when there are a number of feeders out of service. It goes into effect I guess when it's greater than the fifth contingency, maybe something other than the fifth, but I believe it's the fifth.

It specifies when there's a threat of long term damage to a network. How do you define that, I guess is my question? Is Long Island City long term damage or not?

A. (Miksad) No. Long term damage is defined as what I talked about just a second ago where you're essentially overloading and burning large portion of the grid. When that occurs, now you are talking about essentially rebuilding all or a substantial part of the network, which we said couple times now, that's a month, month or months long process.

Q. How long is the Long Island recovery effort going to take?

A. (Miksad) We are expecting to be completed by mid-December.

Q. Including transformers?
A. (Miksad) Including transformers what?
Q. Replacements. I understand they are going to go into the spring.
A. (Miksad) There will be some transformer

replacements that go beyond. There is some transformer replacements going on in all the networks.
Q. I understand, but it's Long Island City. So, the recovery took from July whenever to mid-December, which is a period of months.
A. (Miksad) When I was referring to recovery I wasn't referring to a time where we are going to have the network back to normal. What I am talking about with recovery is customer outages for a month.
Q. So, just to make sure I understand, you are saying that if--unless you are going to have significant customer outages for a period of months it would be your policy to continue operating the network?
A. (Miksad) Long term. Now, six, seven, eight days, four to eight days of outages are long outages, obviously, I am not saying that they are not, but in the scope of things, with regard to the overall network and the remaining 90,000 customers that are supplied from it, it was still not enough to trigger a shut down of the network.
JUDGE STEIN: I am a little confused about the last exchange. Maybe it's just me. And I just want to

for the record make sure it's clear. The question was when would you consider recovery complete and/or

restoration complete.

You said roughly another month, or December, but then were you talking about restoring service to all the customers in Long Island City, or some other definition of recovery? If you could clarify that.

MR. MIKSAD: The event occurred the week of July 17th to 21st. We talked about that restoration time line in the presentation where Dave Desanti talked about that. It showed that all customers that were affected by that event were restored by midnight Tuesday, the 25th.

So, the customer restoration was completed on that Tuesday, July 25th. So, that's what I was referring to in terms of customer outages.

The rebuild and repair of the Long Island City network continued after that, and it continues today. And what I was referring to when I answered Mike's question with regard to the restoration, the restoration is to complete--to get that network fully within our design, within design, and all damage repaired, everything we found as a result of the subsequent inspection program, to make sure that is all up to spec.

When I answered that that will occur through into December, I said--I meant that we have a group that is

dedicated to that. That group is anticipated to complete their work in mid-December. They would then go back to their other regions and back into Manhattan, back into the Bronx, Westchester, and the subsequent work that Mike referred to with the additional transformer replacement will be implemented by the actual normal organization that does that work.

But that we consider ongoing work which, as I said, is occurring all the time, and is shown in the cycle diagram where we are doing that all the time in all the networks, but the intense lifting, the heavy lifting, will be done by mid-December.

JUDGE STEIN: Let me, if I may, just follow up with a question that came up at one of the public statement hearings last night, and that was kind of the definition of what restoring the customer to service means.

And when you use that term you would consider a customer restored to service if they are on a generator or they are on an emergency back up system? That's restored to service? This was raised by several customers at the hearing yesterday, as opposed to being fully back on your network in the usual everyday sense of having electricity.

MR. MIKSAD: Right. We considered on that

Tuesday evening, Tuesday by midnight, the 25th, we said all customers were restored. And that was in one of two ways, either connected to our grid or supplied from a generator. We then, after Tuesday, after that Tuesday, through the next couple of weeks, we then proceeded to transfer all of those customers that were on generation back over to the grid.

JUDGE STEIN: And can you say, do you have a date at which--by which all customers had been restored to the grid?

MR. MIKSAD: There is a date.

JUDGE STEIN: Is it in the past or in the future?

MR. DESANTI: It is in the report. It's the date we had all transformers off.

MR. WORDEN: The generators off, and it is in the record.

MR. DESANTI: The generators, sorry.

BY MR. WORDEN:

Q. One of the things you reported on was the WOLF model wasn't completely operational, and if you address those issues going forward.

A. (Mucci) We are working on that issue. I think that issue needs a little explanation. It's quite

complicated and took us awhile to understand that in our analysis.

We did a significant amount of analysis to try to understand what had occurred with WOLF and those systems related to WOLF. There is three different systems that

use a model to determine activity in the network: Primary, secondary, and loading. Those three are auto WOLF, WOLF and PVL. Actually PVL is the underlying engine under WOLF and auto WOLF. And apparently what--

(Miksad) Just to explain to everyone else who doesn't know what WOLF is, it's essentially a load flow program that can predict what effects the next contingency will have on the network. So, it's essentially a simulator that looks at the next case scenario and then tells the operators what the load will be on all the other remaining components in the network, either the feeder or transformer.

(Mucci) Thanks. As additional explanation, these models are really simulators of our system, and to simulate such a complex system takes hundreds of thousands of inputs. So, it's a fairly sophisticated set of tools that we have for the operators to use.

Having said that, during sometime just prior to the incident, actually July the 12th, our engineers

realized that there was something malfunctioning with auto WOLF. Our people, our technicians worked throughout the weekend to try to correct that problem and later discovered that on a new release of configuration files and loading files this program had been pointing pointers to incorrect or outdated file, and that was providing unreliable information, and we recognized that July the 12th.

On Monday, we began to use manual WOLF, which is basically the same software but operated manually, as we became--as we continued into the increased contingency situation.

Now, in the increased contingency situation, manual WOLF did not function properly after the fifth contingency. That's not unusual because in complicated simulation software when you are not in a situation that's been designed and tested you sometimes will not what we call converge or come together with the correct results.

And that has happened to us in the past and we have done many things over the years to improve the software so it will converge. In fact, there are a number of networks that will converge in the fifth contingency. Unfortunately, in order to set that so it

will converge, you need to have experienced a fifth or greater. You need to have experienced it in that particular network, and we had not experienced since 1999 that serious a contingency in New York City.

So, we did not converge. The reason it doesn't converge is because what happens in high levels of contingency is that the high tension customers would affect the load curve. Particularly in this event it was severe because we had asked our high tension customers to go on generation, and we had a different load curve than we normally would have.

With the industrial, commercial customers

reacting to our appeals, going on their own generation, LaGuardia switching to the other network, Rikers Island on generation, the water plant on its own, the load curve changed radically because you had essentially lesser or greater--significantly less number of industrial commercial customers and greater number of residential customers.

Residential customers peak later in the evening or in the early evening. The industrial customers peak at 3:00 p.m., a little after that. So, radically shifted the load curve.

Because it radically shifted those curves, it

left the operators with results that didn't converge after the fifth. Operators didn't just give up at that point. What they did is they took a PVL engine and used PVL to simulate what they would have gotten from the WOLF product. And although it's less--somewhat less accurate that way because you are entering manual information, they continued to use PVL in through the remainder of the event.

WOLF was corrected, auto WOLF was corrected on Wednesday at noon; however, because WOLF itself was not converging into multiple contingencies and Wednesday we still have extremely high multiple contingencies, we still didn't get reliable results even at that point.

And like our other networks, as we learn this from on the standard multiple contingency operation from

our experiences, we will improve the model further. And that's our intention right now is to work on the model, secondary model, primary model, and WOLF.

Q. You have to be in a fifth to be able to correct the model, to be able to converge after a fifth?

A. (Mucci) That's what we are learning from our experience in the past few years. When we have operated networks of multiple contingencies, this is what our technicians are telling us, that you need fifth and

above in order to understand how the load curve changes, how the high tension load curve changes, and how the customer's load changes in multiple contingencies situation and then you could simulate it more correctly with a simulator.

Q. Wouldn't it matter which feeders were out in the fifth to do that?

A. (Mucci) You are absolutely right. They have--what they do is they use the model to get into a band. It doesn't have to be a perfect simulation of what exactly is going on. What it is is what it has to be in a band in order to provide reasonably reliable results.

Wouldn't want operators making decisions on unreliable results. If not within that band it will not converge. If you get into a multiple contingency and you have that data, the experience--you usually can get close enough to be in that band if it's going to happen again. We have demonstrated this before.

Q. There have been only, my recollection which obviously isn't your recollection, but probably only a handful of networks that been in the fifth since '99?
A. (Mucci) Very few.
Q. That's good. Can you just elaborate, probably as

much for everybody's use as for my own, how not having WOLF available affected what knowledge your people might have in terms of assessing what was going on when you were in a seventh or eighth, ninth, tenth?
A. (Mucci) We use what we call the pi and distribution information system to determine if feeders have overloads. And primary feeders, I am talking about now. Primary feeders, generally what we do is we measure the load on the feeder to determine where the weakest point is. If you exceed that you overload the primary feeder.

The cases of multiple contingencies, you might have areas that act differently than if you had just two feeders out. And what might happen is you might have lanes of a feeder that might not have the same loading as the data we were receiving on the primary feeders, but it came to pass that our analysis after the fact indicated that while there was some primary overloads for very short durations, there was no extended primary overloads because there was no failures of joints and cables because of primary overloads.

And we believe from the model runs afterwards

that the pi data was fairly accurate to determine if primary fields were overloaded.

Q. Where were you getting the loads from? The primary feeders?
A. (Mucci) The primary feeders from the pi data.
(Miksad) SOCCX expansion, but from the station telemetry.
(Ketschke) The only other thing, you asked how it would affect the operators. The work we are able to utilize are more labor intensive and took slightly longer for each in duration than the model if the model had operated. That would be the one big difference, the other big difference.
Q. One of the things in your report I was hoping you could explain to us talks about how the network protectors do not operate or its design when the system contingencies get six feeders and more.
Did you know that going into this? Is that something you knew prior to this? And if so, how does that affect your mindset as to what's going on out there and what you need to do?
A. (Miksad) I think that is referring to the issue of alive on backfeed. That--the network protector is designed. Again, we had--we showed--John showed the picture on the slide of the transformer and had this other device kind of piggy backed onto it, which is the

network protector.

It's basically just a switch that is designed to operate or for reverse power flow, where it's going in the opposite direction, the power is going in the opposite direction than it normally is designed.

So, in other words, we talked about the power supply from the substation, through the distribution feeder, through the transformer, into the secondary grid.

Alive on backfeed means that the power is flowing from the grid, through the transformer, back into the feeder. This comes into play--first of all, the significance of this, by itself it's not a big deal, but the significance of this issue during the Long Island City event was that when a feeder is alive on backfeed it delays the restoration of the feeders in that we have got to make sure--as I mentioned, we had the discussion about processing feeders. We have got to make sure the feeder is deenergized and isolated and protected before an operator can touch it to repair it.

So, if a feeder is alive on backfeed we have got to go about finding what is the source of backfeed and clearing it so that we can go to work. And that's where this issue comes in.

And that we had a number of these things what we

call alive on backfeeds, and the reason that they occurred was because of a realization post event that it was damage to the secondary and there was--although there was a backfeed, it was essentially I would consider it a trickle rather than a full flow, and that trickle didn't trigger the network protector from operating to clear the backfeed.

So, I mean, we understand the mechanics and the physics of it. We had not ever, to my knowledge, I have been doing this for 25 years, experienced it where it had--we experienced it so many times I don't remember the number, but it occurred a number of times during that week, and the net effect was a delay, some delay in feeder restoration time.

Q. I guess part of what I was trying to understand--that was a helpful explanation--what's the significance of six feeders being out? And is it six in Long Island City at this point, six feeders? Is it a different number in a network with 12 feeders? Or is there some--the six kind of struck me. I didn't know what the significance of that was.

A. (Miksad) You say the six, you are quoting the six alive on backfeeds in it. The significance of the six

is that that means that six times during that week a feeder restoration was delayed as a result of this condition we call alive on backfeed. That's the significance.

Q. I think I misinterpreted my own question, so,

apologize for that.

The transformer replacement, I know there were a number out during the event, you replaced them, autopsied them and all that. There have been quite a number replaced since that time in Long Island City.

And I guess my question really is more generic. Is it--I guess I am under the impression a lot of those transformers are being replaced, not being caused by what happened in Long Island City, but just because when you went out and inspected them you found problems with them; is that a fair statement?

A. (DeSanti) As you know, we have been reporting to you each week a list of every transformer that we condemned from the system. And since we began reporting that to you that list has grown to 82 transformers to date.

Now, on that list, which was first delivered in the report on August 4th, the supplemental report, 18 of that 82 were pre-event transformers that were off the

system prior to the event. Nine were banks that failed in service. As you know, ultimately there were 13 that failed in service. Nine were on the list, four had been replaced, 14 were high gas transformers failed DGOA, dissolved gas and oil analysis. Five transformers on that list of 82 were ultimately returned to service because of cable or other reasons. They were returned to service. And seven were bushing leaks. They failed

the pressure test but it wasn't a corrosion issue. When a transformer experiences an overload there is mechanical stresses on it that cause the secondary bushings to leak.

That leaves 30 failing the pressure test for corrosion, 30 transformers. And corrosion is one of the biggest difficulties we have with transformers. The answer to the question is about 30 transformers were taken off.

Q. Would you--I assume you would expect to find corrosion issues similar to that in other networks?

A. (DeSanti) Yes. All around the system in an underground system.

Q. Are you doing anything special or different since Long Island City event took place to address that in the other networks?

A. (DeSanti) We have ongoing programs for corrosion prevention with our transformers. Back in 1990 we amended the coating. We have epoxy coating on the transformer to prevent corrosion.

In '94 we began applying nodes to all transformers that are installed on the system and more than half of the transformers in the Long Island City network have cathectic protection.

Q. I guess what I am asking: Have you done anything corporately to address the transformer issue different since Long Island City?

A. (Desanti) No, we haven't. Again, let's look at

the ones we talked about with corrosion. I got it down to numbers. About 30, I am quoting, based on inspection of 600 transformers, go in and take the vitals of that transformer and that gives you a failure rate about between three and five percent.

And the numbers we quote on our system are about three percent. It is higher, it's something for us to continue to look at, but it's not alarming.

(Mucci) We are still--engineering is still doing the analysis to determine any risk in the transformers in Long Island City, and we will be looking at our programs in general. We have a routine inspection

program that I believe it's once every five years for the transformers, and we have also got programs to provide, through our monitoring systems, additional information coming back from the transformers, and those kinds of things, to give us early warnings to problems and network transformers and we are installing devices to give us more information over the next couple years.

There are programs in place to address some of the concerns that were in Long Island City and had existed before Long Island City.

Q. The overload rating on transformers, the temperature rating 125, 135, that is an emergency, that's your top emergency ratings, correct?

A. (Mucci) Correct.

Q. I assume you operate a number of transformers

approaching that but not--
A. (Mucci) Yeah, not normally.
Q. Did your engineering staff look at the loss of service study analysis on transformers in LIC, or is that not really something that makes sense?
A. (Mucci) I think it makes sense and I think we are--our intention is to do that. When I say risk analysis, that would include age. So, loss of life is something certainly that we definitely should be looking

at and monitoring.
(Miksad) One point on that. I don't know of anyone who has ever done loss of life study on distribution transformers. I think it is done on large power transformers in substations and things like that, but it would be something that I don't think any manufacturer or university or group has ever conducted in the industry, so, it would be a first if we conducted it.
Q. How were you deciding--did you just figure out which of the transformers you needed to cool and which ones were problematic during-- I can think of few ways. I will let you explain which ways you did that.
A. (Ketschke) One of the primary mechanisms, our distribution transformers have remote monitoring on them which provides remote telemetry on load. From that telemetry we have a piece of software that will model based on system conditions the projected top oil temperature of that piece of equipment.

So, we used that projection of temperature to prioritize the piece of equipment that we want to go to to cool. That's the primary mechanism. If that system is not working, and we are not getting telemetry back from the field, and there are associated pieces of

equipment nearby, and we calculated a pick up or shift factor for every transformer so we would know how much load is needed, send a crew to check that piece of equipment.

Q. If I had the transformer with no RMS working, you would be looking for things like manhole events around it, or other transformers around it, combination thereof?

A. (Ketschke) We would look for a combination of particularly other equipment off in associated nearby area. If electrically nearby transformer was off or feeder being out, we would want to check the transformer for several reasons.

One, possibly the transformer has high load and we wanted to get a temperature for field crew. Also a possibility that the switch or network protector could be open and we wanted to verify that device is closed in supplying load.

Q. I think you reported that there were about 20 percent of the RMS units were not operational. I think expected norm is 95 percent. Can you just touch on two things.

One is, what's the basis for 95 percent instead of maybe, say, a hundred percent, and what's the--how do

you get down to 80 percent? How does that happen?
A. (Miksad) Maybe I will--we, back in the late '70s, we took about--undertook the task of actually creating with the manufacturer Hazeltine at the time. We developed this system. It did not exist previously.
And it's sort of--it was unique at the time, first of its kind. Other utilities have adopted it since to some extent.
What it does, it's a power line carrier system. In other words, it sends a high frequency signal from the sensor that we install on the system, it sends it through the transformer, over the feeder, back to substation, and then back to the control center that Matt's folks operate in.
And over the course from 19 early '80s into for about a ten, 12-year period, we took about installing 25,000 of these sensors and their receiving equipment and the communication infrastructure to develop this system.
What happened then is Hazeltine was bought out, the company was bought out by another company, I think it was British Aerospace Engineers, who was primarily a military contractor, and one of the things they grabbed as part of the purchase of Hazeltine was this

proprietary system of remote monitoring.

It had patents, they were in effect until a couple of years ago, that would not allow anyone else to develop the equipment. And they decided--they made a business decision to essentially exit the business.

They would provide some level of maintenance, but they were not developing the units anymore. So, we were sort of caught in between. We couldn't get a hold of the patents until a couple years ago. And they, BAE, British Aerospace Engineering, was not interested in continuing this.

It was not a profitable business for them. We were their main customer and there is not many other folks who do this with the network system.

So, over that time frame, despite our best efforts, the RMS, the reporting rate, diminished down to a level in the 80 percent, 80 to 90 percent level, and in some cases networks down to in the 70s.

So, what has happened, though, as I mentioned, the patents have expired now, and we are now pursuing with two other vendors essentially the new transmitters and new receivers, so it's the new infrastructure that we have in place that could actually work and be maintained going forward. So, that's in place.

I should say also that after Washington Heights,

Washington Heights events in '99, we undertook this program called SUNDAS. And that was another attempt, sort of in parallel, to come up with the next generation, the more modern system, very similar to what we did in the '70s and '80s. And that system proceeded, we actually installed it in the Hunter network.

And what sort of pulled the rug out from under that program were two major communication issues. One is that the communication providers, that initially Verizon and then AT&T, basically discontinued what's called CDPD Communication Technology, and that was the platform which we were building SUNDAS.

In addition, the CHIPS, the power line carrier CHIPS that we were using was also--and, again, we were trying to use essentially cell phone technology for this system. And cell phone providers make their money from turning over and coming up with the next generation of hardware and software, so they have incentive to keep upgrading and changing the technology and generally they don't support previous versions.

That's okay for a cell phone because folks change out cell phones pretty quickly, and like 20 to 40 year life on that doesn't work. So the platform we were

trying to build SUNDAS under was kind of pulled out from under us.

So, long winded answer of saying we made a couple of attempts now. It seems that with the two transmitter vendors and at least one, perhaps two, new receiver

equipment vendors in the market, now we are in a position now to push that reporting race up.

We are also trying sort of the next--we are still pursuing the next generation of RMS, which we are now calling RMSX, and we have an R&D project now to look at ways to come up with the new system, which does everything the old system does with enhancements like additional metering points, not just at the transformer but pushing down into the secondary itself.

So, there are a couple of efforts that are working to drive up that reporting rate.

Q. Based on the breadth of that response would it be fair to say that it's not a real short term solution, it's going to take a number of years for really to have a system out there that's functional for most transformers?

A. (Miksad) To get to the 95 percent level.

Q. Or higher.

A. (Miksad) Or higher. It's going to take us a few

years. That's fair.

Q. Kind of related to that in a way, one of the studies that you had conducted by KEMA talked about one of the large cities that uses AMR as part of their system knowledge type stuff.

Are you guys looking into--let me rephrase the question. Are you familiar with that particular city and what they do? Do they do that on a network? Are

you examining what it is that's out there?
A. (Miksad) We actually have committed in the report that we are investigating AMR. Obviously, there is a couple of versions of AMR. We are using AMR in certain places for meter reading purposes.

But I think what you are referring to is using AMR for outage management. I think that's what the utility, which I believe is Southern California Edison, which announced within the last month that they are going to undertake a program to install the outage management type AMR on I believe the number is five million customer meters.

I don't remember the cost of that program. I think I remember a couple of billion with a B, but we have committed to study AMR or outage management for the Con Edison system.

Q. Do you know if anybody uses it on a network system at all other than Southern California Edison? I don't know what they have for network grid count.
A. (Miksad) My understanding is Southern California Edison has not installed it yet at all. I think they are starting, but I know of no network system currently that has an outage management system type AMR.

JUDGE STEIN: Can I just interject a follow up there. The distinction you are drawing between an outage management and other forms of data, the outage management system would simply be like it's on or it's off, as opposed to more granular data about that meter

or that--roughly?

MR. MIKSAD: The AMR that we have in some parts--we started a program up in Westchester County. The AMR program that is in place for Con Edison and in most other places is a meter reading system.

Instead of--currently most places actually send a meter reader person to go and read the meter and then take down that measurement and it goes into the computer. What this type of AMR does is basically replace the need for going inside a person's home to read the meter.

In our version of it, it is a van with radio

equipment that can drive down the street and pick up the meter reading from each of the homes along that street. So that's the--I would consider that sort of the bare bones type AMR, purely to substitute a meter reader going into a home.

What we are talking about here is a more sophisticated system which requires more than just a van driving down the street in order to know what's happening at the meter. The van is looking at a snapshot. As it's going down the street it's picking the information from that meter, which is purely how much energy was used since the last reading.

What we are talking about here is an infrastructure, communication infrastructure, that is continually communicating with all the meters, all the

customer meters. And that information is being sent back continuously to the utility.

That can be used for meter reading also, but in the case we are talking about here it can be used for outage management in that when the power goes out to that meter there is an--it's designed to sort of send out a last gasp before it dies to say I am out of service.

And that is obviously where Mike I think is going

is with that sort of intelligence that we are no longer relying on the customer to call up and say I am out of service.

BY MR. WORDEN:

Q. Are there problems--you are doing it in Westchester, your deployment, I think I am generally familiar with that. Are there problems in Manhattan doing that because of the density of customers or not necessarily? Do you have plans elsewhere?

A. (Miksad) In Manhattan--the reason we started in Westchester, the best business case is to do it in Westchester because homes are spread out and it's a higher cost to read meters in Westchester than it is Manhattan.

If you are in an apartment building and all the meters are down in the basement the meter reader is down there looking to read off every meter at one time and it's a very quick process.

So, the per unit meter reading cost in Manhattan

is much lower than Westchester. The best business case is to do that in Westchester. Whether there's a plan to install AMR in Manhattan right now, I am not sure.

Q. Your focus was strictly on meters and costs and meter reading?

A. (Miksad) That is correct.

Q. To date anyways?

A. (Miksad) That is correct.

Q. When did you start being concerned that there were more customers out in Long Island City than somewhere between 1500 and 2000 that your reporting system was telling you?

A. (Miksad) I can start. I don't know if anyone else wants to chime in.

We, on Thursday, the 20th, we opened up our corporate emergency response center at our headquarters at Irving Place, and at that time we have periodic conference calls, either video or audio conference calls, with all of the operating organizations.

The first conference call that we had--I am not sure of the exact time, but sometime on Thursday after we opened CERC, our corporate emergency response center.

At our first conference call it was the first time that I heard there was some suspicion that the customer count might be higher than 1600. And the way I heard that was I remember Tom Newell, the vice president of Brooklyn and Queens, saying that he had driven from

the Brooklyn headquarters at Flatbush Avenue over to Astoria, and in that process he had driven around the

neighborhoods.

And I don't remember the quote, but I do remember him saying that, John, it looks like--I just drove through the area and it looks like more than 1500, 2000 customers affected. And that was the first word I had.

He also told me that he had--he knew Matt was following him over there from, again, from Flatbush Avenue over, and he had a conversation with Matt to do a similar drive through the way Tom had done just to get his perspective as a sanity check.

So, sometime on Thursday afternoon was the first time I had heard that there was something that the customer count might be underestimated.

(Mucci) I could add a little to that. I was actually in Astoria on Thursday. We had just opened a remote workout center in Astoria. Matter of fact, that's what I went there to do Thursday morning in order to divide up the restoration work.

At that point we became concerned that the outage was larger than we kept thinking it was. Keep in mind, and what was in my mind at the time was that even the thought of having two or three thousand people out to us in a network system is a huge, huge issue. And so we weren't sparing the focus, but we certainly have systems

that were underestimating the amount of people out.

And I think we realized that from the reports of power out, people as well as what our management people saw, as well as what other reports that were coming in. I think, like John says, late Thursday morning, Thursday afternoon, we were concerned and we decided the only way to really find out is to gather a lot of people and do something we have never done before and drive through the network when the sun goes down, and try to figure out exactly how many people we had, because it was no easy telemetry from the secondary system to tell us that.

Q. What kind of feedback were you getting on customer outages from other entities outside the Con Edison including you said, for example, OEM?

A. (Miksad) OEM had representatives in the distribution command post from Monday through Wednesday, Monday through Thursday. And then when the CERC, the corporate emergency response center, opened on Thursday, OEM had representatives in it.

We also had Con Ed representatives at the OEM headquarters' command post. And I was in the distribution command post for that entire period from Monday through Thursday morning, and then subsequently I

was incident commander in the CERC, and at no point did

OEM give me any indication that there was any concern about the customer count.

(Ketschke) They did feed to our control center, they were feeding both OEM -- we have direct lines to OEM and the fire department. They were feeding individual pieces of information about small areas, but nothing that got pieced together into a larger picture.

So, while we did get calls from fire departments or OEM about this block from here to here, or that we have no traffic signals on this main thoroughfare in this area, there wasn't an integrated picture of the whole network and the impact either fed from us to OEM or OEM back to us.

Q. So--

A. (Mucci) I think some of the confusion comes from the fact that if you drove down the block, which I did Thursday morning in Long Island City and Astoria and Woodside, you saw stop lights working in some areas and you saw stores out of service in some areas.

It was an odd array of how--it wasn't one of these things where the whole area is black and everybody is out, all the lights in the area are out. You might drive down one block and see the stop light working and

you might drive down the next block stores are operating, stop lights are not working.

That comes from the fact that it's a secondary separates, fuses open, those kinds of things. You will have isolated areas but there will be areas in the

isolated areas that mesh.

That leads to the good amount of confusion when we drove through the areas trying to understand what the nature and how widespread it was.

Q. For none of you guys, or for whoever you talked to in your investigation, you didn't come across anything from OEM that said you way underestimated the number of customers out, you need to figure out what's going on, that you are aware of throughout this event?

A. (Miksad) That is correct.

JUDGE STEIN: Can I ask: The pattern of customer calls also was not sufficient to indicate how widespread the outage was?

MR. MIKSAD: No. That really is the crux of the issue. And that's why Mike was asking about the AMR type outage management.

I showed a chart earlier that showed on Thursday the system that relies on the customer call to go through that broadcast announcement, talk to a CSR and

report an outage. That generated the estimate of on Thursday 1600 customers without lights, without power. So, it vastly, by order of magnitude, underestimated the number of customers.

JUDGE STEIN: Is that--to what extent do you attribute that to what you characterized earlier as the perhaps somewhat confusing or maybe misleading opening of your message telling people we know there is an

outage, or to not having sufficient lines or maybe not recording the calls adequately?

MR. MIKSAD: I don't know how many of our customers hung up because of the confusing message.

JUDGE STEIN: Is there any way to know when a call came in and a person hung up?

MR. MIKSAD: We probably have someone who could answer that question.

MR. MCKNIGHT: We do know how many people hung up either hearing the message and those that also hung up that didn't get through because it was busy. Busy signals about 6,000 or so. We also know, based upon data we got from our carrier Sprint, 85 percent of those people called back and got through.

People that hung up hearing messages, we don't know exactly who they are because we don't identify them

at that point in the processing. It's a phone number. We don't who they are yet. We have looked at trying to connect that phone number to an account and we have been able to say that half of those we can match up.

And so that out of 25,000 or so of those calls during the week, that when people heard a message and hung up, half of those people we know what account they were calling about.

JUDGE STEIN: Let me make sure I understand what you are saying. You are saying there was 6,000 callers who--

MR. MCKNIGHT: Got a busy.

JUDGE STEIN: Got a busy. But Sprint verified for you 85 percent of those called back.

MR. MCKNIGHT: And got through.

JUDGE STEIN: And then but 25,000 got through but hung up before they said and gave you any information?

MR. MCKNIGHT: Correct. But half of those, based upon their phone number, we can connect them to an account. The others, we don't know what--it's just a phone number to us and we don't have that number on our record, so we don't know who they are.

JUDGE STEIN: You can call them. It would be time consuming. I guess my question is: If you had

that, is that a piece of data that could have been useful, simply 13,000 people called, we don't know why they called, we never got those calls, but it might be an indication if that were 13,000 accounts that suddenly--

MR. MCKNIGHT: Let me start by we didn't have that information at the time. Post events we got the carrier to provide us information we never received previously, and we analyzed that data and a lot of data churned through. That's how we came to that conclusion.

We didn't have that data currently. We looked at getting it more currently post event through the normal process also.

MR. MUCCI: Just to clarify your point, there was a storm in Westchester at the time so we can't conclude

they were all...

JUDGE STEIN: You can't conclude what?

MR. MUCCI: We can't conclude these callers were from Long Island City.

MR. MCKNIGHT: We actually conclude that most of them were not from Long Island City. 15 percent of those people who we did identify who hung up after hearing a message were from Long Island City.

The remainder of the system, most being

Westchester because there was an outage in Westchester at the same time, on the 18th into the 19th, were from Westchester customers.

JUDGE STEIN: But of the 13,000, did Sprint break those down by area code?

MR. MCKNIGHT: Yeah, but area codes don't always tell you--718 could be Brooklyn, Queens, Staten Island. 914 could be a cell phone, could be someone in Westchester. 917 could be a cell phone anywhere.

JUDGE STEIN: They did break it down?

MR. MCKNIGHT: Yes. We have the numbers.

BY MR. WORDEN:

Q. Are you familiar--I think Matt would probably be best suited, but maybe from people in the organization, the city conducted its own version of the survey Thursday afternoon to identify the number of problems out there? And I guess from the puzzled looks I am getting I guess none of you are familiar with that?

A. (Ketschke) No. I didn't get anything from the

city.
Q. Are you familiar with the city's--they have a program called port to assess customer outages going forward. I don't believe they had it prior to that.
A. (Miksad) My understanding is it wasn't in place

at the time. Since that time I do understand they have that program.
Q. Do you have your own version of something like that, since you don't know how many customers are out in a major event?
A. (Miksad) No. And, again, just going to the uniqueness of this event, is generally when the network is up and running there are a handful, literally a handful, of customers out at any one time. You saw in 40 years we had only four times in our history with more than 1000 customers out with the network up and running.
So, that played into it. This generally did not happen this way. So, going forward we obviously need to have a better way of determining when this sort of event occurs. Hopefully it's a one in 40 year event.
(Mucci) I should point out we did modify our systems. We didn't set up like the city to drive through these, although we could do that, but we modified our systems to provide us with a conservative estimate, an early void of significant numbers of customer outages in the network.
And that modification, I can't talk technical

details, but it does take information from transformer loadings and calls and puts it altogether and provides a

conservative, meaning a high, estimate of how many customers.

Q. That's an algorithm I guess we need to get at outside the framework of this audience, take some time to understand?

A. (Mucci) Yes.

JUDGE STEIN: Off the record.

(Discussion held off the record.)

BY MR. WORDEN:

Q. When you did the follow up review, when was your assessment of when you actually lost 25,000 customers?

A. (Mucci) We looked and it's not an exact science, but we did look at the load that we had--that we didn't have because industrial commercial customers were off. We had the benefit of having all the demand meter information and we estimated how much more that was.

So, we can project without industrial commercial customers what would be the residential load and what would be the projected load, and then the difference being two factors.

One would be customers out of service and two would be the impact to customer appeals. Without knowing the impact to customer appeals, which anecdotally talked about ten percent, but we really

don't know that, we are estimating that after the tenth on Tuesday that there was a separation there at that point, and it possibly was most significant the loss of customers happened Tuesday night and that sort of correlated to the data we looked at and we received.
Q. Starting Tuesday, you escalated up to 25,000 from Tuesday night through Wednesday sometime; is that probably fair?
A. (Mucci) It's probably true, but probably had more rapid escalation late Tuesday evening and then another slight additional escalation Wednesday afternoon, but it looks like Tuesday evening was the majority.
Q. You have, I don't remember the exact number, somewheres on the order of 30 customers, large account customers, 33 that you basically disconnected?
A. (Mucci) Subject to check. I am not sure.
Q. I hope it's not subject to check. On that order, correct?
A. (Mucci) We do have experts that could talk about that.
JUDGE STEIN: Is there someone here? When you said there are experts, is there someone here?
MR. MUCCI: Yeah. Joe Murphy.
MR. MURPHY: Your question again, please.

MR. WORDEN: My question was: There is something

on the order of 30, 35 large account customers that you essentially disconnected, my understanding?

MR. MURPHY: In our database for Long Island City network we identified large and what we call sensitive customers. Approximately about 125 of those, but they represent, I would say, bringing that number down, about 80 customers, because there is a high number of New York City Transit facilities, there is Con Edison facilities, and within that 80 then there is probably around the order of magnitude that you are speaking about that represent customers with fairly large demands, with relatively high demand.

MR. WORDEN: I think a better way of asking the question--maybe I didn't ask the right question. There is 30 to 35, something on that order of magnitude, spot networks? Does that sound right?

MR. MURPHY: I am not quite sure about that specifically. I don't know.

MR. WORDEN: That you were able to disconnect from the system?

MR. KETSCHKE: I think I understand your question. There are probably 30 or 35 large commercial blocks of load that could be separated from the system

and moved off, or to something else. There are probably more than that load that we would classify as spot networks or isolated networks within our terminology.

To answer your question, that's about the number of large users who would make up the majority of the

load that could be moved off the system.

MR. WORDEN: Just trying to get a sense of how much of the load reductions you had specific numbers on. For example, those customers that 30 to 35 would have known pretty much exactly was cut off, the next group probably wouldn't have had as precise an idea, and the other ones you just did estimates?

MR. MUCCI: That is correct.

MR. MURPHY: Even the larger customers, there is actually a relatively small group of those that have interval metering that we were able to make some determinations after the fact of what the actual load reductions were.

There were four customers that were 265, 460 volt isolated networks and we did deal directly with those with respect to reducing loads.

MR. WORDEN: Thank you.

Q. Do you recall when you notified OEM that you thought there were significantly more customers out than

what you were reporting?

A. (Miksal) Well, they were in the room when that report that I received from--I talked about during that conference call occurred. So, if they were paying attention they heard it at that time because everyone in CERC at the time was around the video screen in that conference call.

So, I don't know. I don't know if they heard at

that time, but that's when they had the opportunity to hear it as far as from a CERC perspective. And then obviously, once we said we did our survey Thursday night into Friday morning, once we learned, once we said from that 25,000 customers affected, then we notified OEM and obviously all the other parties, including the media.

Q. Right. Did you at any point plot during the event--I know you plotted customer outages and manhole events or service box events after the event.

Did you at any point during the event plot that information relative to the Long Island City network?

A. (Ketschke) Yes, we did. We began Wednesday early in the morning to plot particularly manhole events and outages together. Not specific to address, but into general geographic areas, knowing the volume of work we had seen and contingency we experienced, this was going

to be a fairly significant restoration effort.

And so we began to plot that--those things together in anticipation of developing work packages that we would use once the network was stabilized.

Q. So, Wednesday morning that plotting was part of the process for deciding that you needed to create this team to go out there for the restoration and to work on that in the three areas and all that stuff?

A. (Ketschke) That's how the three areas that was represented in the slide that showed Manhattan, Brooklyn, Queens.

Q. Even at that point Wednesday morning there was no

indication in anybody's minds from reports you were getting back from people in the field that there were more extensive outages than you were reporting?
A. (Ketschke) Still the same telemetry of information that we had. The number of customer calls, no.
Q. But I mean you had a lot of people, I presume, working on these events. Don't they tell you anything?
A. (Ketschke) The primary focus of the crews working on the field at that point, they were being assigned to areas to work on primary feeder restoration through Wednesday, the network didn't really become stable until

we got into Thursday.
The crews were dispatched primarily to location to address primary feeder outages. That was the main focus, and the communications going back and forth between the call center and field crews really focused on primary feeder restoration.
Q. I want to go back just briefly to clarify on the discussion about the backfeed current. You mentioned in the thing, in your report, that contingencies progressed to six feeders, the network switches didn't have sufficient backfeed current.
That's the question I was trying to get you to explain, why you didn't have sufficient backfeed current. I just didn't ask it properly earlier.
A. (Mucci) Mostly because of the secondary damage.

There was some--keep in mind any one of the 50 or so transformers experiences low voltage on the secondary side could result in that network protector staying closed.

So, if any one of the 50 areas particular feeder goes through has low voltage or lack of enough energy to open the protector, you would remain in a situation where the backfeed remained on. That's what we experienced in certain areas a number of times.

Q. You reported on a number of feeders in your restoration process and you used the cut in open auto, and I think the number of them were blamed on the inrush current issue. I think four of them.

A. (Mucci) Four, exactly four.

Q. How do you--there didn't seem to be much categorization of the remaining cut in open autos. I am wondering what your thoughts are in that regard.

A. (Mucci) You know, number of issues arose during the event. One is that, as I explained before, once we were in multiple contingencies it was seen as urgent to return these feeders as quickly as possible to service.

In some cases we attempted to reclose feeders that had come out of service because we didn't see a relay flag or what is an indication that there was a fault on the feeder.

And in those cases we reclosed--in several of the cases we reclosed--in two of the cases it was--actually three it was successful. One came out a few minutes

later so I wouldn't call it successful. Two cases were actually successful in restoring feeders in that matter, but there was a number of cases where it was not.

The operators in that time made a judgment that that could save us from additional feeders coming out

because the longer the feeder stays out the higher the likelihood the next feeder will come out. Trying to avoid a cascade of feeders.

There was other issues, too. Some of the feeders of course had multiple faults on them. You could have two faults. When you do fault finding our technology only finds--usually only finds one fault.

Sometimes you get reports. If you get reports of a smoking manhole you could find the second one, but that's rare. Usually only find one fault at a time. Then you reclose and find the second fault.

Q. The Long Island City network, as I think you guys know, has a very high level of cut in open auto the last three or four years. The inrush current only can go for so much of that. What are the other reasons for that? What are you trying to do about that going forward to reduce that rate?

A. (Miksad) What really--just the inrush one first. What really allowed us to detect inrush was because we installed, I know you are familiar with the system, that whole power quality node in the substation, which is this high speed data recorder that records voltage and

current at a subcycle level.

That device was only installed--we have been

installing them in all the substations, but we just got the one in north Queens substation, the substation that supplies Long Island City network, installed my understanding I think it was weeks before this event.

So, once that device is in there recording it's able to tell us that the breaker opened, but there is no indication of the voltage and current recordings that there is a fault on the feeder. So, without that device there is really no way for an operator to know that the breaker operated inadvertently.

So, that is the information that we now have that allows us to detect readily that inrush current issue. I don't know, I don't think we have gotten under the hood of all of the other reasons for the cut in open auto, but the only other reason that I could speculate on is that there was another fault, as John indicated, a second fault on the feeder.

There was, and I believe still is, an R&D project that is going to attempt to overcome that limitation of the current fault finding systems. In other words, to allow fault detection for multiple faults on a feeder.

That would certainly be--if that's successful, that would certainly be a way to address the issue because now you are finding and fixing the faults in

parallel rather than fixing one, restoring the feeder, and then finding another and restoring it. That would be something that we are looking to do in order to reduce the occurrence of cut in open auto.

(Mucci) I should add that during the analysis we had concerns about--because there was so much switching in this because there was a number of feeders were restored and came out and restored, that switching surges could be a cause. And we contracted a company to study this.

They did a modelling of the Long Island City events and we were not able to prove that fact. They estimated the voltage which increases on the unfaulted phase did not exceed the capabilities of our cable. In fact, they weren't any worse than any other feeder in the backfeed situation.

So, we did study this quite extensively in order to try to determine why we had multiple faults on some of the feeders that we believe caused cut in open autos.

Q. Did you look back at previous 2005, '4 and '3 that the cut in open auto issue in Long Island City to see if there was anything there to help explain anything what happened this year?

A. (Mucci) One of the biggest issues that John

mentioned is that without the data from the recorders

it's very hard. The other thing I should add is most of these recorders have been in our other networks. We are able to now reduce the amount of time it takes to find the fault with these devices and we believe in the future we can be doing that for Long Island City, too.

Q. What's the--what was the basis for talking about the inrush current feeders with over 32 MVA or higher?

A. (Mucci) We believe that the--that increasing transformer capacity causes higher inrush, and that's pretty sure that this would not affect any feeders under 32 MVA. I am using 32 because even at 35 we are doubtful this will happen. Safety margin of 32.

We identified a hundred and--a little more than 130 feeders that fall into this category, so we can examine the statistical information, number of cut in open autos, to see if this has been a factor in any past events.

And in many of our networks we do have these recorders to indicate the more details about supposed faults we might have had in these networks. We are using that to go back and study what we had and going forward we have got several action items to address that.

Q. You mentioned in your action plan that you put two feeders in prior to next summer in the Long Island City network, but kind of said it was a good idea so we are going to put them in. Can you elaborate on that?

A. (Ketschke) We are going to take two feeders of

the 22 feeders, two of the feeders that have higher load on them within their capability, but they are among the higher loaded feeders in the network.

They both serve the portion of the network most significantly affected by the Long Island City event. 1Q16 and 1Q17. We are going to take those feeders and split those feeders into--each into two portions. Take two feeders, divide those feeders, and make four feeders out of them, serving different geographic areas.

Q. 1Q16 and 1Q17 remain in the--

A. (Ketschke) There's a new conduit system being built for the new portions of the feeders branch off, the 1Q16 and 17 will remain in the duct system that they are in. That's parallel.

Q. How much of that duct system for those two feeders?

A. (Ketschke) For those two feeders, offhand, I don't know. About 12 percent of our total conduit system is with duct.

Q. And in Long Island City or the systemwide?

A. (Ketschke) Systemwide.

Q. How about Long Island City?

A. (Ketschke) I don't know.

(DeSanti) I don't know the percentage, but in Long Island City we estimate 1.23 million feet of wood duct in Long Island City. It's a large amount.

JUDGE STEIN: If there is a question that you

would like an answer to we can keep a running list and revisit it at the end of the technical conference. Do you want to follow up on that?

MR. WORDEN: No. That was fine. I am sorry. I just didn't hear it.

JUDGE STEIN: You are just about at the end of your half hour.

Q. You don't have any specific plans to replace the wooden conduit duct, do you?

A. (Miksad) No proactive program is identified yet.

Q. When you replace a primary section, let's say for example paper lead cable, and you are replacing that, would you automatically replace the duct section that goes with it, or not necessarily?

A. (Miksad) Not necessarily. If the duct or conduit was instructed then it more than likely be replaced at

that point.

Q. Same is true on secondary?

A. (Miksad) Yes.

Q. When you said 12 percent, is that talking about primary, secondary, both?

A. (Mucci) Talking about primary and secondary. It's the asset value percentage.

MR. WORDEN: Counsel says I am done. Thank you.

JUDGE STEIN: We listen to counsel. Thank you. We will move on to the city, give you half an hour, and take our lunch break and reconvene with a new set of time lines.

(Lunch recess taken.)

MR. LOUGHNEY: Ralph Mauro and Tim Taylor will be doing the questioning.

EXAMINATION BY MR. TAYLOR:

Q. My name is Tim Taylor and I am working on behalf of the city, and Ralph Mauro here is also working for the city.

To start off with, we would like to ask a question about the state of the network in terms of at the beginning of the event and in which the report shows that 86 transformers were out of service, which is about 7.2 percent of Long Island City's transformers.

Could you elaborate a little bit on the causes for why transformers are routinely out of service?

A. (Mucci) First of all, there are two ways to see if a transmission is out of service. One is to disconnect from the feeder because at some point in time it failed or was inspected and found to be in the condition that needed replacement.

In addition, there are some times when the transformer is connected to the feeder but the network protector is open. And that could happen quite often, especially in industrial commercial area, because in industrial commercial areas you might have three banks supplying a customer and even at peak load you may only need one or two of those banks, which means one bank's network protector would be open.

That's the normal way it operates and made redundant to allow for second contingency. You could have two feeders fail and still not have a customer go out. And good numbers of those transformers indicated network protectors were open somehow. I believe 25 off the system.

(Ketschke) Approximately 25.

(Miksad) Two other potential ways that might not have been fully discussed. Another is if there is a

portion--a feeder has a fault on it and we do something called alive end cap. We disconnect the damaged portion of the feeder from the feeder, and we energize the remaining portion of the feeder. That would be another reason why transformers could be out of service.

The other one that I am thinking about is if the transformer network protector has a long fuse, that would also essentially disconnect the transformer from the network. I think there is a total of four.

Q. Could you clarify the 25 again. I think I did hear a comment about it's common for customers perhaps with spot networks to have transformers that are energized. Is that the difference between the 25 and the 86 then?

A. (Mucci) No. It also includes fuses open, I forgot that. And that's it.

Q. So, the 25 was--

A. (Mucci) Actual banks out of service disconnected from the feeders awaiting replacement.

Q. And the 86 mentioned in the report is different than that?
A. (Mucci) Banks not supplying energy to the secondary system.
(Miksad) For all four of the reasons that we

recited. So, the 86 is for--as a result of feeder problem, alive end cap. I am not sure if any of those existed in this case. A transformer gets connected from the feeder, blown fuses and open protector because of low load.
(DeSanti) That's 25 out of more than 1200.
Q. Correct, right. Is that 25 out of 1200, would that be a typical percentage that you would see out on any given network on a summer day? I know you don't formally keep statistics on that most likely but...
A. (Ketschke) That would be a reasonable number, yes.
Q. I guess in developing plans, when you are using PVL or other programs and you're utilizing the N minus 2 criteria, is there any assumption made as to the number of individual network transformers that might be out of service while you're doing the planning studies?
A. (Ketschke) No. The PVL planning studies are run with the assumption of all equipment in service available. As we make an operating decision to take equipment out of service, or drop a piece of equipment off temporary to schedule its repair, that individual

pocket is looked at by engineering staff to make sure it would still meet the design criteria and be able to

supply load in the area for the expected period that would be off, and it's assigned a priority based on if it's a high it's more sensitive and less active based on what else is around it.

Q. Shifting gears in a sense, but also bringing up the question of transformer inrush once again, I hate to belabor it and actually many of my questions were answered earlier, but I did want to ask, I just wanted to clarify: The location of the PQ node devices, are they monitoring the bus or the feeders themselves?

A. (Mucci) Monitoring the bus.

Q. Does that present any difficulties in terms of determining how much contribution is coming from the feeder as compared to other load currents that are on the bus?

A. (Mucci) We didn't understand the inrush issue until we put specialized recorders on the individual feeders. So, the devices that are on the bus of the station can tell us what the fault looks like.

And in some cases when we looked at it we said this current is too small to be a fault, that it doesn't have the same characteristics, and that gave us sort of a pointer something is not right here.

And then we added the--I forget the name of the

equipment, but we added specialized equipment that we developed just for this purpose and added it to the feeder and we were clearer on what we saw. And what we saw was inrush causing the relays to stop as if it was an overcurrent.

So, it was a very complicated analysis. The conclusion appears to be sound, that there was definitely four of the open autos, that was four of the cut in open autos that was caused by inrush, by that phenomena, and we have a solution for that.

Q. Did the protection people happen to run fault current studies incorporating possible DC offsets and comparing those simulated wave forms to the wave forms that you got from your PQ nodes during the event?

A. (Mucci) I believe that's what we did, but you are getting into areas where I am just on the edge of understanding.

Q. Okay, I apologize for that. I don't want to get too technical.

JUDGE STEIN: Do you want to pursue it and get an answer to that question?

Q. I just wanted to make a further comment. That was the first time I saw the wave form today and it did strike me as very similar to a wave form that could be

produced by fault current with DC. So I was just asking

to see if the calculations had been made to compare a calculated wave form with your actual wave forms.
A. (Mucci) Okay. We are still studying that whole issue. Your comment is very helpful. I can pass that on to people doing the studies. It is a very, very complicated issue.
Q. Yes, it is. I think you have just answered--my last question was: Are there any plans to do possible simulations of using a model such as EMTP to look at the transformer inrush phenomenon and comparing it to a fault currents with DC offsets?
A. (Mucci) We plan to do some modeling studies and we still got aways to go, but we are in the midst of it now.
MR. TAYLOR: Thank you.
EXAMINATION BY MR. MAURO:
Q. Good afternoon again. I want to just follow up on one question Mike was talking about, about these alive on backfeeds. In the report on page 546 you talk about three different type of network relays that are employed in network protectors, microprocessor relay that can operate with minimum of 13 volts on any one phase, the solid state model that can operate on

50 volts on B phase, and an electromechanical model requires a minimum of 60 volts on all three phases.
Do you have any statistics that show what percentage of each of these relays are installed in Long Island City and in Con Ed's system as a whole?

A. (Mucci) I am sure we have that data. I don't have it here, though.

Q. I would like to follow up on that, please. Going on further, on page 547 of that section, it says RMS telemetry showed voltage as low as 26 volts.

With that information, it would imply that certainly the solid state and the electromechanical would not have operated, yet three phase grounds were applied to the feeder in an attempt to clear backfeed, and that low voltage would indicate that the secondary could not supply sufficient current.

Was that recognized during the event or was it something that came up after the event?

A. (Mucci) We definitely recognized it after we ran the model after the event. We had suspicions during the event, but we did not know this was happening specifically. But we know that in low voltage--we know when there's low energy in the secondary system that you run into backfeeds. Any one of the 50 or so

transformers could be affected by it, this situation.

Q. My question went a little further than the fact that the protector did not operate. My question really was: 26 volts--when you recognized that there was 26 volts, that had to give you some indication that it wasn't sufficient capacity in the secondary to blow a fuse in the protector, yet three phase rounds were applied in the attempt to blow fuses. That's my

question. Was that considered during the event?

I understand that with the low voltage network protector relays would not operate. However, my question really was directed towards the fact that you had read from your systems that some protectors or at least one had voltage as low as 26 volts.

Would that not have been an indication that the secondary was somewhat apart and could not supply sufficient fault current to blow a fuse? And why then were three phase rounds applied in an attempt to blow the fuses?

A. (Ketschke) I don't know if the specific case that you are talking about with a known voltage at a point in the system was recognized by the operators at the time. I do know that we applied three phased rounds when they had backfeed conditions in attempt to clear backfeeds.

That's normal protocol to attempt a clear a backfeed using three phase rounds. It wouldn't have been clear to the operators at the time if that location had 26 volts was the actually backfeeding location. Could have been, it might not have been, it could have been somewhere else where voltage and energy levels were higher and the operation of three phase rounds would have cleared the backfeed.

The telemetry we get back from the system doesn't give us a solid indication of the location of the backfeeding device. In the cases where we had backfeeds, not knowing where that location was exactly,

we would apply a ground. If that round didn't clear the backfeed, then the tech men, the other activities they were engaged in, including cooling transformers and trying to restore primary feeders, and move those resources into trying to hit every location and find the location of backfeed and clear the issue.

An indication of the low voltage at a network at one location wouldn't preclude us from clearing the backfeed.

(Mucci) You have a very good point, but maybe we should consider looking at that kind of data in using our systems to be more predictive in what we expect if

we cause a ground.

Q. You got the point, okay.

A. (Mucci) Definitely something we can look at.

MR. MAURO: I'll move on to another question.

JUDGE STEIN: Before you do, I just want to take a second off the record to talk about follow up questions.

(Discussion held off the record.)

BY MR. MAURO:

Q. In regard to the breaker at north Queens that failed to operate, which puts you into a fifth contingency, a serious event from what you discussed. This is in regard to the breaker which failed to operate in north Queens.

There is a figure on page 4-29 of the

October 12th report which shows a circuit which affects the tripping of this breaker and it shows the installation of a jumper. It says the jumper was installed on 4/17/2006; is that correct?
A. (Mucci) No. That was--we caught that in the presentation. We didn't catch that here, but that's 7/17. I am sorry.
Q. You make me feel a lot better by saying that. Thank you.

Going on with additional questions with regard to the breaker. In the body of the report there was a discussion about three indicating lights and a change being inadvertently made to make it clearer for the operator.

In the circuit that's shown on page 429 there was only one indicating light and in your presentation today you showed two indicating lights, neither one of which do I see that is monitoring the trip of that breaker. Can you elaborate further on that?
A. (Mucci) I think I can explain it. This--the one in the report is a very simplified version of what we wanted to express. Contact had a path to keep the light lit so operators would not understand the situation.

In this presentation, I wanted to be a little more thorough to show--to demonstrate the complexity of the issue, one, and demonstrate, two, why the design error came about. And it was because the two lights--is a light--it's not one light, it's two lights. The other

contact referred to as the SOCCX indication.

So, there is actually three contacts, but if you just think about it as lights in the substation. The designer at the time missed, we believe, and this is conjecture because we are not sure, but we believe the

reason it was on the same circuit was to avoid the conflict that an operator may have if one light was lit and the other light was not.

Obviously, that's an error. If the lights were in conflict it would raise questions. Operators would say something is wrong and we could have discovered this sooner. This is a case in some of these breakers, not all of these breakers, that were installed and redesigned at one point in time. So, that's the explanation for it.

Q. There were two breakers in the station which actually failed to operate, and both of them involved contact number 24 from what I gather.

A. (Mucci) That's right.

Q. Several questions regarding that then. With regard to the one for feeder I believe it was 1Q12, that breaker was inspected and tested in March of 2006, it operated correctly for fault in April of 2006, and then it failed to operate in July of 2006.

What was done to that breaker? What could have been done to that breaker to cause that contact to become misaligned between April of 2006 and July of

2006?

A. (Mucci) We don't know a hundred percent, but I

think I could explain it a little bit. The contacts to the breaker of--24 is the last contact on the row. And the alignment to the contacts was such that top contact appears to be--the cabinet isn't perfectly square.

You know as well as I, the metal they use in the cabinets can't be perfect geometry. So, to make these contacts, curved portion to lean up against the stationary side. In doing that it looks like it cocked so that the top contact was actually further in and the bottom contact was out.

So, it may be the case that--and this is all conjecture--the temperature changes, vibration, whatever, caused this set of contacts to cantilever a little bit and caused the bottom contact to open.

That's probably where the design--where the least pressure is, the bottom contacts, and in 20/20 hindsight it would have been nice if it was the top contact for the relay circuits.

JUDGE STEIN: Let the record reflect the speaker was angling his arm from the bench to show--how would you describe it?

MR. MUCCI: Bending, cocking, tilting to one side.

Q. Going back to this contact 24 which was

misaligned in two breakers, what plans if any do you have to look at the other breakers? And have you contacted the breaker manufacturer to see if he's had any other problems of this type anywhere else?

A. (Mucci) I know they have contacted the manufacturer and I know there's potential for the problem in several breakers in various stations.

Our first effort was--which we could do with the breakers in service--was to fix the supervisory circuits, and we did that. So, that would give us an indication if the contacts were open and service would be open now.

That is sort of an immediate fix, but the actual contact changes or redesign, stiffening of the contacts a different way to support that structure, and that's planned, and we will have that in place before next summer in Long Island City, those breakers in Long Island City.

Q. Do you need to make this temporary jumper fix now for the remaining breakers in Long Island City so this doesn't occur in another case?

A. (Mucci) In some cases where this is--not all breakers have this design, the supervisory design. Where there was we put in jumpers temporarily until we

could redesign the circuit, add a light.

MR. MAURO: That's all I have on the breaker.
BY MR. TAYLOR:
Q. Just one last question on the wiring of the breaker. The report had said it was "inadvertently wired to serve a single function". It sounds as if the wiring was done according to the diagram, it was just that the diagram was not developed correctly, the functionality that was intended?
A. (Mucci) It's hard to understand what exactly happened at that point because we don't have enough information to know if it was inadvertent error in the design. We believe it's in the design, but we don't have the original drawings that the constructor worked for.
Q. Was the work done fairly recently?
A. (Mucci) The work was done in the '90s when we-- well, let me correct that. I am not sure when the work was done. Could have been done later than that.
Started a program in the '90s to remove the fixed breakers and put these removable breakers in, but we didn't complete that program until recently.
Q. So, there is no way of comparing the actual wiring with wiring on the diagrams because the diagrams

really don't exist, as far as you know?
A. (Mucci) As far as I know. We haven't found them yet.
MR. TAYLOR: Thanks.
JUDGE STEIN: You are on your last couple of

minutes before we break.

MR. MAURO: Shift over to another topic, the topic of voltage reduction.

JUDGE STEIN: You have a couple of minutes. Can you finish the topic? Why don't we break.

(Recess taken.)

JUDGE STEIN: Back on the record.

BY MR. MAURO:

Q. Before we left I had mentioned voltage reduction, but I would like to hold that for a second and talk about some of these cut in open autos. On page 413 of the report you list--you make a statement that the four cut in open autos that did not display clear evidence of a fault are--and you go on to list them, yet in each one there is a statement similar to--something like the following: Subsequently, a failed cable was found on the feeder, the failure was on page C. Subsequently a failed cable joint was found on the feeder. The feeder failed a full hi-pot but no fault was found.

How do you reconcile that after no damage was found but yet these four instances at least out of many had damage and faults?

A. (Mucci) That's a good question because it baffled us for a while too. This is after the fact because at the time we didn't know yet.

When we looked at PQ-node, after the fact we realized that there was no apparent fault on the feeder,

and what we deduced from the whole analysis after looking at that and then finding other evidence of CT saturation during the testing later on, we concluded that these faults were caused by the DC hi-pots that we did in order to find the faults.

As you know, Ralph, when you find--when you go to process a feeder and you want to locate where the problem is, you put--you press high voltage DC on it. Sometimes you pulse it. You find where it is and that tells you where to repair.

That process is somewhat destructive sometimes, and we believe these faults were exposed or these incipient failures came out as a failure after we applied the DC current and not before. And the engineers who reviewed this are very sure that there was no fault of the feeder prior to the cut in open auto or

during the cut in open auto.

Q. Even with relay targets and PQ-node information?

A. (Mucci) The relay targets were caused by the--conclusion was from the analysis that relay targets came up, a result of overcurrent was caused by the magnetizing current. This only happens in some cases because as the voltage--as the breaker contacts close at the peak of voltage, you have the highest amount of inrush current. So you could see in the voltage wave. If the breaker causes it at a lower point you won't have that much inrush current.

So, it only occurred--it didn't occur every time,

it only occurred at certain times, and that's one of the reasons why we had not known about this before.

And in looking at this after the fact, we concluded that the inrush magnetizing current was caused by transformers and cable being energized, magnetizing, some cases residual flux in the transformer causing harmonics.

In some cases the saturation of the transformer coils. In some cases--in one case the saturation of a CT coil causing neutral current. It was concluded after all the study by two different people studying the problem that there was--the problem was caused by inrush

of the normal feeder operation.

And that was after much study, after the fact of actually putting devices, these measuring devices and recording devices on specific feeders and seeing the phenomenon occur.

Q. I just want to point out that I used those four as example, but there are many other examples in the report of cut in open auto with no damage reported yet you found faults.

So, again, with timing that we have I can't go into each and every one of them. We will prepare questions on that.

A. (Mucci) When you think about it, when you look at the full current, if the full current is over 10,000 amperes it's definitely not inrush, but some cases full

current was slightly over the relay settings.

If you look at these four--and I think we could respond to discovery questions and clarify that a little better with better experts than I am.

Q. Fine. We will take it that way.

JUDGE STEIN: Before you go on, did you want to give an answer to our previously asked question?

MR. DESANTI: Yes. The question was asked when were the generators removed. And that was on 8/18 the

last generator was removed from Long Island City network.

JUDGE STEIN: Thank you.

BY MR. MAURO:

Q. Now, I would like to touch on the subject of voltage reduction. Voltage reduction went into effect at approximately 18:53 on the 17th, very soon after the bus section ES open auto. What was the purpose of voltage reduction and what was accomplished by voltage reduction?

A. (Mucci) Basically we were in a situation where we are above design. Five contingencies is significant impact on a network, as you know. To mitigate that, we have found historically that voltage reduction and calculated--voltage reduction of eight percent can give you a reduction of 45 percent in load.

And the idea, like I said before, in the situation, in a recursive situation we were in, there was only two ways to get out of it: To restore feeders

quickly and to reduce demand. And the idea was to reduce demand to the network and at the same time we went and appealed to our major large customers on generation to do some of those things.

I think that was very helpful and part of the

reason we were able to keep the network in service through those contingencies.

Q. At the time that you went into voltage reduction, according to the report there were no equipment or facility overloads, so at that particular time what were you trying to accomplish by the voltage reduction? A reduction in load when you weren't overloaded anywhere?

A. (Mucci) It was a preemptive move, basically. We knew we had five out and I guess that was the first record hot day of the year and we were concerned.

Q. On page 447 of the report there's a graph which shows load and voltage, and it shows a decrease in voltage beginning at about 18:53, 18:55, but it takes over two hours to get an eight percent voltage reduction.

Is that what it normally takes to get a voltage reduction? And how do you cope with the situation you have at hand when it takes that long for the voltage reduction to occur?

A. (Mucci) I recall an answer, but I don't want to conjecture. I don't remember clearly the reason, but the automated device they use I think had to be adjusted

manually to reduce at the station, so I am not sure. Let me pass the question. We will find out.

Q. Do you know what it should take to achieve voltage reduction when things are working normally?
A. (Miksad) It should be minutes.
Q. Can you give a very short description of how voltage reduction is accomplished when things are working correctly?
A. (Miksad) Sure. It is usually instituted from our energy control center. An operator essentially presses a button at a console and selects voltage reduction, and it sends a signal to the station for all of the in service transformer tap changers to move down. And that as those tap changers--the tap changer is a device that regulates voltage on a day-to-day basis.

So what we are doing is overriding the normal operation of the tap changer and telling it to reduce the voltage on the substation bus, in this case the 27 kv bus, and when it does that all of the feeders and all of the transformers and the mains all experienced reduced voltage.

Q. One last thing on voltage reduction. Your specification E04095 has a suggestion in there, I don't think it's a must but suggestion that after voltage reduction is implemented the feeder lines are to be sent from system operation to distribution engineering for

analysis.

Was that done? Was an analysis completed and what were the results of it if it was done?

A. (Ketschke) When that specification was written--there have been some changes in technology. Actually I think it says feeder loads, not necessarily logs. You take a snapshot of loading before and after implementation of voltage reduction to determine you had the desired effect.

Since that spec's been written there is some additional software mentioned, pi, that takes snapshots of that information, making it more readily accessible to both operators and engineers who really are no longer required to take that 2P snapshot called for in the spec.

Q. So, if I understand what you said right, you no longer need to do an analysis of what voltage reduction accomplishes for you?

A. (Ketschke) No longer need to do--I thought you were asking of taking and transmitting the data from the operators to the engineers in distribution engineering because the information is more readily accessible through a different information system.

Q. Let me rephrase the question then to make it

clearer. The statement in the specification was the

logs should be sent to distribution engineering for analysis. The operative word there I think in my mind is "analysis".

Was an analysis performed on what effect voltage reduction did--what it did for you and was it the desired effect? Has the analysis been done? If it has been, what are the results? If not, will it be done?

A. (Miksad) Sounds like we don't know. So, we will--

Q. I would suggest that it looks like everything around the megawatts, other things to look at besides megawatts, currents, load power factor, when that analysis is done. I think you want to look at some of those things.

A. (Miksad) Yes.

Q. That's all I have on voltage reduction. Just one very quick question on your EMTP study. In the report you talk about switching surges. Today you talked about looking at transformer inrushes in further studies.

During the inspections of the network protectors there was a finding in five of the network protectors network relays were damaged and they could not function during the inspection. It is not known when they got

damaged. It is suspected that they got damaged during the event due to transience.

Are you intending to look at transience on the secondary to feed this information to the relay manufacturers and improve on the design, if necessary?

A. (Mucci) I think that is a good idea. We hadn't considered that before. I think it's a good idea. Definitely bring that back to people.

MR. MAURO: Thank you.

BY MR. TAYLOR:

Q. A few questions just on the background of some of the larger customers in Long Island City network, particularly Long Island Railroad, MTA, Rikers Island, La Guardia airport.

Could you describe--and you may not know this--but in terms of back up generation that these customers may have, as well as alternate supplies, and I think you said today that La Guardia does have an alternate supply from Jackson Heights.

But for those customers, those four customers, could you describe any back up generation that they might have or alternate supplies, to the best of your knowledge?

A. (Miksad) Joe Murphy could answer that question.

MR. MURPHY: With respect to La Guardia airport, the airport is supplied from two Con Ed substations, one being in north Queens, which is the Long Island City network. The other network is our Jackson Heights network. And the load at La Guardia is approximately 15 megawatts of load.

From the Long Island City network we supply approximately five megawatts of load into what they call

their west substation. From our Jackson Heights network we supply approximately ten megawatts of load into their central substation.

In meeting with the Port Authority, which we did certainly pre-summer on certain issues, clearly they have certain FAA requirements with regard to emergency back up generation for their control tower, for their runways, and for some of their PD facilities on site and their emergency control centers. They have indicated to us that they have emergency back up generation.

The Port Authority doesn't mandate generation facilities be installed in terminals, nor does the FAA. It's up to the individual carriers to determine what level of back up supply they wish to have.

And from the feedback we have gotten from the Port Authority, most of that is targeted towards

emergency ingress and egress issues. It is not necessarily addressed by baggage handling nor HVAC systems.

The opportunity that we have at La Guardia airport, having been in constant contact with them through all of this activity, was on Tuesday morning, although we did have some feeders available to them, they were experiencing problems with closing in their breakers because of low voltage.

After further consideration and discussion they contacted us and asked us whether or not we could support from our Jackson Heights station the transfer of

the five megawatts from their west substation to their central substation, which they were able to do internally, and my understanding was that the limitation of that transfer was really based upon the capacity of the existing cable that they have within their internal distribution system.

So, they were in contact with us Tuesday morning at around 11 is my recollection. They asked us for permission to transfer load. We took a look at that, we did an evaluation, we got back to them and gave them a green light to go, and they began that process that afternoon, concluding I believe around 6:30, 7:00 in the

evening when they were able to move their entire load over to the central substation and theoretically begin normal operations at the airport again.

There are only a handful of other customers who do have generation. I know that Rikers Island certainly has generation available to them. Specific amounts, I do not know. I know we did support them with generation capability during this event.

My recollection is we may have had at least eight or nine generators that we moved to their facility to support them. The DEP at the Bowery Bay water pollution control plant also has significant generation available to them.

During this event we did support them by moving two two-megawatt generators out to them in support of

their own internal efforts.

You had mentioned one or two other customers.

MR. TAYLOR: MTA.

MR. MURPHY: To my knowledge, I don't have a great deal of information about what the MTA might have available as far as generation goes.

MR. TAYLOR: And you may not be able to answer this as well, but in terms of supplying MTA, I think you have to supply maybe numerous converter stations

throughout your network?

MR. MURPHY: Right. There are--I guess just to basically give an understanding, the lines run through obviously various geographical areas of Queens, and as they enter into certain areas, specifically our networks, we then supply their stations. And they generally have two supply facilities where we have two 27 kv volt feeders supplying their rectifier stations. They used that power to obviously move the trains along the route.

They have a series of stations in the network that are supplied by alternating feeders. As the line extends, the subway line extends beyond the boundaries of the network, then the next station that they would have is then supported by the subsequent network in Con Ed.

MR. TAYLOR: Would you happen to know if the two 27 kv supplies to each converter station, are they operated normally closed, like a spot network, or

normally open?

MR. MURPHY: My understanding is that they are usually both closed and underload.

BY MR. TAYLOR:

Q. In terms of reenergizing the LIC network if it

happened to go down, could you briefly expand upon some of the complexities that might exist in trying to reenergize it from I will call it black start?

A. (Mucci) There is a couple. If you consider the fact the number of feeders needed to be repaired, if we had shut down it would have needed to repair specific feeders in order to restore the network. We would look in bands to see if there was enough support to restart and how many feeders we would need to have to restart.

The other complexity, as you know, we had a number of cut in open autos. In hindsight, one of the concerns would have been we would have restarted, feeders would have failed on restart, and maybe had false restart. Those are some of the things we thought about after the fact. We thought about the restart could have been interrupted by the failure of the feeders.

The other issue is high tension. High tension customers would have to be open for us to restart. I don't think that's as big an issue.

Q. Along the lines of cold load pick up, in which the load is significantly higher when customers are

reenergized after being out for a period of time, would that have posed any difficulties in your perspective?

A. (Mucci) First off, when we would reenergize, the network protectors would be in open position. In a network you reenergize you are only dealing with the connected load at the moment and that connected load would be the inrush and the magnetizing current of all the transformers and cable.

However, the customers would not immediately restart and the network protectors would then close and you have sort of a second start. And that could be problematic if you don't have enough feeders and you are starting and, say, a peak hour, and all the compressors of all the air conditioners were turned on five minutes after you restarted, but generally our calculations are that the network could have been restarted in that manner if we had enough feeders.

Q. Just to change subjects. In terms of the weather conditions and peak loading on the network, the load forecast was for 395 megawatts for summer 2006. Was that forecast value based on your weather conditions that you would see at your temperature variable of 86 degrees?

A. (Mucci) That is correct, yes.

Q. From the data that we have gotten through some interrogatories it looks like the temperature variable

was 79.8 degrees on a Sunday, July 16th, and then over the next two days looks like the highest hourly average was--the highest hourly average of the wet dry was 81 degrees.

Do you know approximately how often you would see these types of conditions, these weather conditions, in Queens?

A. (Miksad) I could say the 86-degree temperature variable design criteria is considered a one in three-year event, and that's a standard that I believe is conservative. I think the New York ISO uses one in two-year event design criteria and most other utilities use a one in two-year criteria, but the specific, the numbers you quoted for that day, I am not sure how often they occur.

Q. Okay.

A. (Miksad) And that was apples and oranges. The wet dry is not the temperature variable.

Q. Correct.

A. (Miksad) One is wet dry hourly average and the other is temperature.

Q. But I believe the temperature does consider the wet dry average?

A. (Miksad) Absolutely. Three-day weighted average.

Q. Correct, right.

A. (Miksad) We just did not have that information yet, so that's why I was using that value. In terms of planning for next year, this year's actual peak was 381 megawatts. I know you apply a weather adjustment factor based upon your actual weather conditions that we are seeing that will adjust it to your design variable of 86 degrees, what is the projected forecast for next year for LIC based upon what we are seeing.

(Mucci) I know it's not about 395. Exactly what it is, I don't remember, but slightly below that, slightly below the projected peak for this year, what the adjusted peak was.

(Ketschke) I think that was a slightly different question.

(Miksad) The forecast has been generated. We just don't know what that number is, but we definitely can get it for you.

Q. I was thinking it would be significantly higher than this year since the peak weather conditions did not approach the 86 degrees temperature variable.

A. (Miksad) Generally I know we have experienced about a two percent annual growth in Long Island City. I would expect it to be about two percent higher, but if

you asked--

JUDGE STEIN: Let's wait and get the number on the information request.

Q. Last question. The wording of action 16A was just a little unclear. It has to do with the additional

area substation. I think the intent was to say that the study, that the actual study, would be completed by summer of 2007 and not the construction of a new substation.

A. (Miksad) That is correct.

Q. In considering whether or not a new substation should be accelerated and the development of a new network, which would take some of the load from Long Island City, what are some of the considerations that you look at in deciding whether or not those facilities should be accelerated?

A. (Miksad) Yeah. The criteria that we use currently for when a new substation is required, there is really only one right now and that is the demand, the electric load on that substation.

So, we do each year, when we go through this cycle of the summer we then update our ten-year load forecast for every individual station and every individual network, so we are looking out ten years.

When the load--the substation exceeds its capability, that's where we are always looking to do either reinforcement of the substation, a transfer of the load to balance load, or the creation of a new station prior to the need. And that is the criteria.

Now, what we proposed in this case would be the first time we were actually looking not just on need, because on load need would be out in 2015, so we are

saying let's look at the benefit with regard to reliability benefit, what it would do for reliability performance.

Q. This is my last question I think. When you say reliability, I assume that you are talking about the programs, the risk of feeder outages, because obviously if you build a new substation and have two networks you then have shorter feeders and less on a reduced exposure, reduced feeder failure rate and perhaps CIOAs, was that your thinking?

A. (Miksad) That's absolutely correct.

BY MR. MAURO:

Q. I have just one question. In section three of the report there are quite a few maps which give a very good depiction of what went on during the five or six days.

Are these maps available in real time to the operators in the Brooklyn-Queens control center?

A. (Miksad) Not currently, but they will be. That is part of our plan.

Q. When you look at the maps, that's why I asked the question, as early as 15:18 and 15:14 there are clumps of customer outages. When these maps were plotted by Brooklyn-Queens engineering beginning on the 19th, were those clumps recognized as being there has got to be more out there even though we just got these numbers of calls?

A. (Ketschke) The maps that are represented in the

report integrate information from several sources, including customer outages, equipment out of service. The maps that were plotted or applied by the engineers did not integrate all this information into one package.

We will have that ability. They didn't have the ability at the time. That was not done, integrating all the things you see in the report into one representation real time during the event.

JUDGE STEIN: I think that your time has come to an end, and I thank you very much for all your work. I actually have a question of my own which follows on some of the previous questions. I am going to ask it now,

take a quick break, and run through the dance card for the rest of the afternoon.

I actually want to follow up on the questions about temperature, because the report talks about the heat wave condition that set the stage for the outage, and there's a considerable discussion about preparation for heat events, preparation for summer load forecasting, and so on. I have really two questions that are related.

The first is to what extent did the heat wave conditions and both the heat itself and the resulting load spike contribute to the cascade of events that you have described? And second, as a result if in your view it did contribute significantly, is the company reviewing its measures to manage customer demand in any

kind of global way?

MR. MIKSAD: The heat and the load that result from the kind of temperatures we saw that week are definitely a backdrop to an event like this. A fifth contingency, you know, that occurs at midnight on a Sunday morning on a cool weekend is the load and heat of the system are at a much lower level.

The system is much less stressed and we have survived through those sorts of events historically

without impact to customers. It is a compounding effect. It is definitely a part of this picture, despite the fact we have redundancy built into the system, but we far exceeded that demand time management that's a part of our portfolio right now.

And there are a number of different programs that are currently in place. There is an--I guess there is a couple of categories. Con Edison has demand reduction programs, the New York Independent System Operator has demand reduction programs, and NYSERDA also has demand reduction programs.

And then there are a couple of different subcategories of those programs. There are targeted plans that Con Edison has these--where we see the load in a particular area growing very quickly. What we will do is actually work with, go out to bid with contractors, and we will pay them to go out and retrofit buildings, first market themselves and retrofit buildings.

And retrofit, I mean changing of outlying to high efficiency motors, changing out motors to high efficiency motors and things like that. Actually reduces demand and pushes off investment in the transmission and distribution system. It's targeted to

particularly high growth areas.

Con Edison also had another type of program and the ISO, the Independent System Operator, does as well. These are the programs I referred to during the presentation, and that is where customers actually sign up in advance and volunteer to reduce load on request. And then they are paid for that, actually get reimbursement for that. They are voluntary.

There are some versions of the program that do have penalties associated with that, but still they are voluntary. They don't--they are not guaranteed reductions. So, there is some probability that you will not actually get the reduction when you ask for it, which is a concern, because that is not equivalent to capacity.

When you install capacity you have that there. If you have a voluntary demand side program you don't necessarily have it there. You might have it there.

So, that's another version. So, the difference between those two types I just talked about where vendors, contractors, are actually changing motors, you actually--that's really that's a solid. That's

equivalent to capacity. It's just customers turning off motors or reducing a thermostat. That's something you

don't have a guarantee you are going to get.

So, there are a number of programs in place. It actually adds up to a sizable amount of megawatts. I haven't done the math, but looks like about 500 or 600 megawatts of load reduction in the Con Edison service territory.

Remember we talked about on a basis of 13,000, so about 600 reduction in programs that are at some stage, either signed up or in progress of being signed up. So, it is a part of the picture now and it did help us during the event but...

JUDGE STEIN: Let me just follow up. I am not going to take any more of the parties' time, but I know that there are relatively recently decided and ordered Commission programs, company/Commission programs for demand reduction.

I guess my question is: Is this an area that is under active reconsideration by the company at this time in the context of the backdrop of heat waves and the potential contribution to serious outage events?

MR. MIKSAD: I don't know if demand side management is going to be the solution. Just one example is when the--let's say these programs, we have got 40 megawatts of load reduction in a particular

network. What is done, it has postponed necessary investment, has postponed investment in the T&D system.

It is also obviously environmental benefits, greenhouse gasses and all that. So, taking those aside, we are talking about reliability here, but we would still--the load is 40 megawatts lower, essentially we would reinforce the system to a level that's 40 megawatts lower so it doesn't necessarily increase your cushion or margin on the system.

So, I don't know if that's the be all and end all solution to reliability.

JUDGE STEIN: Thank you.

MR. LUBLING: If I may note the primary vehicle for demand side management in New York State is NYSERDA and all of our customers pay a system benefits charge. It does have several programs for Con Edison as well as NYSERDA.

We also have six or seven tariffs, special demand side management programs, and under our current rate plan the plan is to reduce load by 675 megawatts within the three-year rate period.

JUDGE STEIN: Thank you. Representatives from Power for the People for questioning.

EXAMINATION BY MS. BONILLA:

Q. Hi, everyone. My name is Alyssa Bonilla. I live

in Sunnyside, Queens. I am a part of Western Queens Power for the People Campaign.

First let me say that we strongly object to the continued reference to the outage as an event and to the customers affected and reference to customers affected and not people affected. For those of us who experienced this outage it was not an event, it was a disaster. Using these terms feels to us as minimizing our experience, so it's very important for us to add into this discussion even at the technical level that all these decisions and steps have consequences that affect people. These are not just pieces of metal that we are dealing with. The end is a human being.

Now for my questions, and please forgive me if they are seemingly simple or stated or answered elsewhere.

Regarding the fire that started in Astoria, I recall your summary of the report mentioned it was started by a short circuit in a low voltage cable. Can you let me know how old that cable was.

A. (Mucci) We do have that data. I don't have that data right here right now. We will have to get back to you with that.

Q. How does that happen? How do you get back to us? How does that happen?

MR. LUBLING: You are a party to the proceeding. We provide you and all the parties with an answer to that question.

MS. BONILLA: Thank you.
Q. The component that had the faulty contact, how old was that component?
A. (Mucci) 2002.
Q. When you reference 25,000 customer estimated to have been affected by the outage, how do you define customer affected? Completely zero? No power whatsoever? Or low voltage? Or both?
A. (Miksad) There is actually two parts to that. First of all, a customer to us, as we described in the report and in this discussion today, is a meter, is an account.

In other words, we don't count the number of people who live--number of people in a family or in an apartment or the number of people in a home. We count the account. That's the first thing.

Second of all, the outage numbers we quote are outage, not low voltage.

JUDGE STEIN: So total out?

A. (Miksad) Total out, yes.
Q. In my particular case in my apartment in one room we had a light bulb that was very brown and we could plug in a T.V. and we kept on for information. You are saying we would not have been counted because our meter was technically still running.
A. (Miksad) That is correct.
Q. Wow, okay. Are there plans to do an actual count

ever? Do you have any plans to actually count the number of people affected? Do you have plans to do some sort of poll or counting?

A. (Mucci) We thought about that because I guess one of the issues was that multiple--good number of people affected that are not direct customers; however, we believe it would be an imposition on people's privacy to be asking them to tell us how many people are behind the meter, how many people in any particular apartment, and we didn't see that as being as useful as the estimates we made.

And the estimates could be made off of census data and things like that, but generally to ask people who's living in the apartment or how many people in their building, we didn't see that as a benefit to anybody.

Q. You referred to the network in Long Island City as being a level two contingency network. Are there networks that are greater than level two that have a larger redundancy than two feeders? Does this exist and are there any in New York City if they did?

A. (Miksal) All of our networks are designed to the same design criteria, essentially N minus two.

Q. Do higher levels than that exist? Is it possible?

A. (Mucci) Not by design. It's possible as load doesn't grow in a particular area and grows in other areas that you might have a little margin, but generally

our design is N minus two in New York City.

(Miksad) Nor do I think, by the way, any other utility does anything greater than N minus two.

Q. That's the question. Thank you. As we know, portions of the network failed and portions of the network survived this outage. The remaining cables, the ones that didn't fail that are still in place that haven't been repaired or replaced, are they more vulnerable to future failure due to the stress they incurred?

For example, in certain materials you can have stress without failure, but that is more vulnerable to

stress or failure in the future. Are those components in greater danger now?

A. (Miksad) We are actually--since the event we have been out, you may have seen us doing inspections, diagnostic testing and maintenance replacement or repair of anything that we find to be defective.

Now, I guess to your point, could there be incipient failure that we don't know about, I suppose. The diagnostic tests we use not just for Long Island City but for the entire system are not a hundred percent foolproof.

It's not--I guess you could say it's like an EKG. You could pass an EKG and drop dead of a heart attack in a week, but that's sort of the same thing with the system. We could take a diagnostic. It passes that

diagnostic but we still experience failures on the components that we have done diagnostic tests on to a lesser degree.

And that's why we do the diagnostic tests, but it's not a hundred percent guarantee, but we do have--I think everyone would say we have a high degree of confidence when we are done with the Long Island City network, we will be by next summer, it will be in very good condition.

EXAMINATION BY MR. BARNHART:

Q. My name is Patrick Barnhart also with Power for the People in Western Queens. I am a resident also of Sunnyside, Queens.

My question relates to the previous question. And I am wondering if in terms of the network maybe we can--if you considered a demand side management program like you were discussing earlier, specifically for the Sunnyside or Long Island City network?

A. (Miksad) No additional programs. I mean these programs, some of them are targeted systemwide so some of that may impact and help the Long Island City network, but we haven't taken some additional effort to further reduce load in the Long Island City network.

One of the things in particular in your area, it's difficult when we are talking about two story buildings, mostly residential, small commercial. Most of the demand side management programs that exist today are really targeted toward commercial, large commercial

industrial company, buildings.

And although Long Island City does have some of that in portions of the network, there is a good deal, as you know, of industrial commercial, small residential, which is just tougher for a couple of

reasons.

It's a very small--you have very small amounts of load, so you are reducing, you are making very, very small reductions and got to get a lot of it to add up to something significant.

Also, I would say it's a challenge to attract some of the contractors that we talked about to target residential and small commercial areas because it's a lot of work for them. They have got to go basically door to door in order to get subscribers, as opposed to coming to one large building like this one and having one point of contact and getting a lot of reduction on all of these floors.

Q. Perhaps somewhat related is that at least 50 of the customers that you talk about were large condominium and co-op buildings. When those buildings called to report an outage does it--the super is calling from those buildings, does it count as different customers or one customer? You are talking about 400 people and significant demand load.

A. (Miksal) Right. As I say, we consider a customer to be an account. So, if--let's take the apartment,

your apartment building scenario. There are some apartment buildings that have one meter. We call them

master meters.

If there is one meter we would consider that apartment building with, to use your example, 400 tenants to be a customer. That is not usually the case. We moved away from master metering and we are--most of the apartments are individually metered.

And the reason for that is, again, to have customers see their bill and to be able to adjust their usage accordingly, whereas with a master meter it's sort of you got the middle person in between the customer. So, if there are 400 meters in the apartment building there is 400 customers. If there's one meter it's one customer.

Q. I have a question related to your contingency levels and the lack of field surveys until Thursday.

JUDGE STEIN: I wanted to follow up on the question of the metering because--I am sorry to break into your train of thought, but I think I heard one of you say or read that you use a rough estimate of four people for one account or one customer for a meter. You might estimate roughly four people would be involved?

MR. MUCCI: We don't try to make that estimate because we are not sure how many people live in any particular apartment. That has been estimated by

ourselves.

JUDGE STEIN: Is that just the New York Times? I can't try to defend it, can I?

MR. MIKSAD: No. The print media has come up with that four to one ratio based on an average of four people per family.

JUDGE STEIN: Thank you. So actually we don't know how many people were affected by the outage?

MR. MIKSAD: That's true.

BY MR. BARNHART:

Q. In terms of the field surveys, has there been any consideration to in the future when you reach a certain contingency level and summer time, which obviously is going to be a higher demand for power, to starting a field survey once you reach a certain contingency level?

A. (Miksad) It's something we will definitely consider. What we have done in the short term and alluded to earlier, we have developed this algorithm that doesn't only rely on customer calls, it looks at field contingencies, number of feeders out of service, and secondary damage reports to provide not an estimate of algorithm, give a pi side trigger to alert the operator something is going on in the area that would initiate a survey to say what's going on in this

particular area.

I think that was Mike's point earlier with regard to what the city is doing with the port team. I think it's something that we can do given--until we get real good intelligence directly from the customer, a good interim step.

Q. Finally, I mean in your initial part of the presentation with the power point there was a suggestion that--at least what I took from it was the network was basically saved in order to--or not shut down because of the large customers such as MTA and Long Island Railroad. Is that Con Edison's position that was the main consideration in not shutting down the network?

A. (Miksad) No. The reason we didn't shut down the network was because, first of all, it did not--the criteria that we are looking at, which we talked about earlier to be feeder loading, transformer loading, and indication of secondary damage, as well as what's happening with the demand of the network, whether it's rising or declining, and the feeder stats, whether feeders are scheduled to be returned to service in certain short period of time.

When looking at all of those factors we felt that we could maintain the operation of the network. Now, in

the back of our mind is always the consequence of shutting a network down. It is a big deal.

I understand 25,000, including you two folks, were out of service. And it was a big deal and you described it as a disaster and I understand that. I

don't know if you were out for five days or six days but that is a long time to be without electricity. We do understand that.

One of the reasons we show those reliability slides is we do take great pride in the level of reliability we provide to our customers, but the shutting down of the network with 90,000 other customers affected, again, using our definition of customer, not people, as well as the transportation hubs, is a definite consequence of shutting that network down and is in the back of all of our minds when we are looking to make that decision.

BY MS. BONILLA:

Q. From where I sit in my experience I need to communicate to you that I am perceiving a tremendous gap between what you are asserting was your level of concern, your level of diligence, your level of action to mitigate this what you term unprecedented situation, this tenth level contingency.

In the summary report you do mention it went as high as 13. I kind of wondered what happened to the 13 in the presentation there, but that's an aside. I am perceiving this gap between this sense you were there, you were in the field, you were on top of the situation, and then on the other hand this communication to us that we didn't know how many people were out.

That seems a gap between highly intelligent,

capable people and this vast cloud of unknowing, this vast bit of lack of knowledge, because it seems that--I won't get into the issue about communications and relying on customers to tell you who's out, but if you have 22 feeders and ten have failed and this accounts for 100,000 customers, to think that almost half of your feeders are gone and only 1600 customers went out, seems like there could have been some simple common sense extension from your activity into this is unprecedented event, maybe there are unprecedented consequences and maybe there is an unprecedented number of people affected, and we need to take unprecedented steps to investigate.

So, to, on the one hand, be very busy attending to the repairs and, well, no one's called us so it can't be that bad, we in the community are experiencing as not

an acceptable level of explanation. For us this is unacceptable. And to hear you state to me now I was not even counted because my meter was still running and I had a brown light bulb, that makes these numbers totally inadequate.

So, I am feeling terribly disappointed, and that my needs are not really valued because at low voltage you can't run your air conditioning. It's like leaving a dog parked in the car on a day with your windows up. You know the dog is going to roast really fast. And I am not even one of your 25,000 customers. I don't count at all in your thinking patterns in this planning.

So, I would like to hear of plans. Do you have plans for higher level, more rapid, more dramatic responses when you get to something like ten, ten contingencies?

A. (Miksad) Yes. I just want to clarify the 13 feeders for you first so you understood that. We showed that the maximum number of feeders out at any one time, and that occurred--actually occurred twice, on Tuesday evening and Wednesday morning was ten. What we say in the report about 13 was that 13 of the 22 feeders were the ones that caused all of this trouble.

What we are saying is nine feeders in the network

never failed. They hung in there for the entire duration of the event.

Q. But you had ten simultaneously?

A. (Miksad) Ten simultaneously at two times. That's the first. The second is I hear your concern and I heard you say you heard a disparity between Con Edison has control of the situation and this obvious lack of understanding with regard to customer count.

That's absolutely true. I thought that's what we had said in that, on the one hand, the operators really worked very hard in order to maintain the rest of the network in order to stabilize it and keep it in service. They were very focused on that task, I assure you. A lot of people worked very hard to accomplish that, but it's very obvious we did not have a handle of the

customer count.

I mean 1600 on Thursday versus doing a survey Thursday evening and coming up with 25,000, obviously we need to do something better. We have interim steps we have already implemented, some additional things. We talked about including systems that will help operators visualize these sorts of things and bring multiple system information together for them so they can see feeder stats, transformer stats, manhole event stats,

superimposed on customer reports of outages and low volts, so that's all going to happen short term.

And then ultimately we are going to, as we talked about earlier with staff, what we are going to study is the use of additional metering, this what we call metering or advanced metering, which would be every customer's meter sending a signal to Con Edison saying I am in service, I am out of service, and that would be no more algorithms, no more operator estimates, no more system estimates. This would be factual data sent to an operator to alert us of outages.

Now, that is not without challenges, and Mike had alluded to that earlier that not been done in a network system. Completely underground meters all in basements and communicating signals from below the ground up to some remote point is a challenge.

Just think about cell phone service when you are in some of these places. We have got technical issues to overcome. There is a cost issue. I mean, again, I

don't remember the actual numbers, but for the five million meters I believe that Southern California Edison is planning on installing, I seem to recall the number is about two billion, $2 billion, to do that in that program.

That is something that in my opinion we should be talking about collectively to see if the cost is--to look at the cost and benefits of that kind of system and those kind of dollars, but it is something that we first have to prove is technically feasible for our system.

JUDGE STEIN: You have another few minutes.

Q. Given that the system you just described, the response system and assessment system, very technology based, it seems easily available and affordable to immediately dispatch some guys in a truck or a truck to the field. The decision not to employ that simple tool earlier on seems management failure, from our perspective.

The simple, very cost effective, say some guy was driving and noticed, hey, seems to be more. Given that low voltage, people aren't even--couldn't that immediate field assessment be required to have a real live, real time handle on the situation?

Because we suffered in real time. If you were in my house those first two nights, Wednesday and Thursday or Tuesday and Wednesday, we heard nothing but sirens all night, ambulance and fire engines. While you are

tabulating, we are having medical emergencies. We are having crisis.

So, this is the gap I am speaking of and this is not a technology gap. This sounds very '70s. This is a sensitivity gap between your services that affect living, breathing human beings and your work. You need to--we need to communicate to you that those needs have to be included in your decision making from the beginning. And level ten contingency seems to automatically imply potentially high human consequences.

And this is what we are disappointed with from the outage, and we appeal to you to immediately implement on any level anywhere in the city or anywhere in your jurisdiction because this was not acceptable. This can't be collateral damage. You know? So, that's the end of my questions for now.

A. (Mucci) It's not acceptable to us either that we had that many customers out, and it's not our usual performance. As engineers who pride--before this--pride themselves on performance, it's a disappointment to us too that this happened.

We have got a good number of corrective actions that I think are going to prevent this, reduce the probability of this happening again.

JUDGE STEIN: Let's take a five-minute break.

(Recess taken.)

JUDGE STEIN: We are going to hear from the Attorney General and then the Consumer Protection Board.
EXAMINATION BY MS. BURNS:
Q. Mary Ellen Burns from the Attorney General's Office. Good afternoon. I just have a couple of questions and then Charlie Donaldson from the office will also have a couple of questions.
My first question is: Before 2006 what was the highest number of primary feeder cables that were ever out at the same time in the Long Island City network?
A. (Mucci) We know in 1999 we had seven, and before that we go back quite a number of years. I am not sure when the previous record was before. That seven was in 1999. I remember that.
Q. That was during the same time as the Washington Heights blackout?
A. (Mucci) Within a day. I think it was July 5th, if I remember right.
Q. If you know, has any other network in the Con Ed system ever gone to a tenth contingency during the summer cooling season?
A. (Miksad) I don't know. It would also be relative to the normal number of feeders that normally supply the network. Battery Park City, for example, only has eight

feeders. So, but I don't know off the top of my head.

Q. Would it be fair to say a tenth contingency was a fairly unusual event?
A. (Mucci) Extraordinary events.
Q. Do you have any thoughts or any analysis done on Con Ed why the network went so quickly on the evening from Tuesday the 18th from a sixth to I believe a tenth contingency, I believe by your report, within the space of a half hour in that evening went from six to ten?
A. (Mucci) We do know a couple of things. We do know when you have feeders out and you reach--as the number of feeders out in a network increases the probability that the next feeder will fail increases.

We also know that the probability of the feeders will fail increases with temperature, outside temperature. We also know that probability of feeders will fail increases with pick up of load. And all of these were factors in what we think of as a cascade.

But the primary driver was that the--we got--we found ourselves in a recursive cycle after we had three events that in their confluence was extremely improbable to happen.

The three events did happen, happened in the same network, and put us in a situation where the energy in

the primary system was actually being transmitted into the secondary. In other words, secondary flows increased to a point we know there was going to be some secondary heating and that heating caused cables, secondary cables, to damage primary cables with heat and

fire, and transformers to fail because the load of the transformers went up.

And the other thing is these feeders were in the same general residential areas and in the fringe of the network which added to the whole situation. If you are in the side of the network, the fringe of the network energy is to flow--only can supply from one direction and not from two.

If it had been in the center of the network--all of those were factors in the fast driving, fast acting event. It was an extreme challenge for us and because in that event we had only minutes to do significant amount of analysis and try to understand what was happening and try to predict where we would be.

Q. During that evening when you reached the tenth contingency or before, are there documents that reflect the decision making that went on that you discussed earlier today in your presentation about the factors that go into or went into making decisions about whether

or not to shut down the network at that point?

Do you have documents that reflect that decision making?

A. (Miksad) I think there is a record of status points that we talked about. In other words, there is a record of what the feeder loading was at that time and what the transformer loading was at that time and the indication of secondary damage.

But if you are saying more than that, like some minutes after that a meeting occurred to discuss the issue and express opinions and that sort of thing, that didn't occur. There were numerous--and this was not just--I should say this was not a decision. This was not two decisions on Tuesday evening and Wednesday morning.

This was a series of evaluations that were occurring during this entire period and judgments being made to say can we continue in this way or do we need to shut down.

So, and that was occurring through multiple discussions between distribution command post, the Brooklyn-Queens control center, and our emergency control center. Sort of a three-way discussion.

Q. In the situation as it occurred during the Long

Island City outages, who was the person or persons who make that ultimate decision?

A. (Miksad) By procedure, the decision is left to the regional vice president in charge of that area or his or her delegate, which generally means the general manager of the area.

I should say, though, that we have operators on duty around the clock, you know, 24/7, that if some quickly developing situation arose at midnight on Saturday they are empowered to also make that decision if they had to.

Q. And then finally on my end, we have heard some

discussion and questioning about the large users and particular the large transport users, the Transit Authority, the Long Island City Railroad, and so forth.

I want to probe again. On Tuesday or at any point were you in conversations with each or all of those entities? And what was the nature of the discussions in terms of their needs for power and their concerns, if any, about Con Ed shutting down the network? And to what degree did their requests, if any, that you not do that or other concerns that they might have affect your decision making about shutting down the network?

A. (Miksad) There were discussions with--and there is good documentation I think also in the report about communication that was going on between major customers, both transportation and others.

Q. It mentions communications but it doesn't give the flavor.

A. (Miksad) That's where I was going. Obviously two-way communications. A lot of it was Con Edison folks requesting load reduction obviously from various parties. And you heard about La Guardia airport and Rikers, essentially asking Rikers to go on generation to deload the network.

A conversation with Citicorp building to put on their generation and reduce load. You heard about the Bowery Bay pollution treatment plant also. There were

discussions going on throughout this event to obtain load reduction and to communicate to customers that we have--large customers, that we have a problem.

Q. What about specifically with the Transit Authority, Long Island Railroad, and anybody else at the MTA?

A. (Miksad) There were a number of discussions. I can't say I could find out there were discussions about, hey, listen, this network has a potential for shutting

down, but I do know that prior to that the TA did provide an assist in reducing load.

So, I know there were discussions about trouble in the network and about load reduction requests as a result of that trouble. And they did help us out quite a bit.

(Mucci) I could say I was part of some of the discussions that we had and almost in all cases people were asking how they could help out. The Transit actually reduced the speed of the trains and the number of trains. And unfortunately I guess that hurts the public pretty much, but the point was they were trying to help us in any way they can.

People who had generators when we asked them they went on generators, no question about that. Rikers started generators. Citibank sent people home, closed the building. We had a good number of industrial commercial customers that gave significant amount of response.

Actually when we measured it later on, on appeals alone we got 70 megawatts from commercial programs not--without the programs. With the programs on we were over 90 megawatts reduction.

Q. So, no one at Con Ed got any requests or appeals

from the Transit Authority or the MTA, its parent company, or from the city, that they not shut down the network because of the impact it would have on the Transit system?

A. (Mucci) Not that I am aware of. Joe Murphy could probably comment on more direct conversations because he was in touch minute by minute with these people.

MS. BURNS: I am actually trying to focus on the ground transportation system.

MR. MURPHY: Those contacts were handled through the central command post through our OEM contact. I was not privy to those dialogs with MTA.

Q. Who would have had the conversation?

A. (Miksad) Would have been emergency management vice president or someone from his group, essentially our liaison to OEM.

Q. So, conversations would not be had directly with the Transit Authority or the MTA but through OEM; is that what you are saying?

A. (Miksad) I think that's--if Joe did not have direct conversation with Transit Authority.

MR. MURPHY: There may have been some interim

phone calls to let them know what was going on, but with respect to the specific initiatives that the Transit

Authority took I believe Wednesday, frankly supporting our request, I believe that dialog was had specifically through central command post with our office of emergency management.

(Miksad) One other thing that I am thinking about, actually two other things that occurred. I mentioned earlier that Con Edison sends representatives to the office of emergency management command post. Transit is also in that location, so there is dialogue going on also within that as well as Con Ed to Transit as well as OEM sponsored conference calls.

They have updated conference calls. Every two or four hours they discuss latest stats and each agency briefs the central command on stats and issues.

MS. BURNS: I don't have anything further but I think Charlie Donaldson does.

MR. DONALDSON: Try to keep this as brief as possible.

EXAMINATION BY MR. DONALDSON:

Q. During the power point reference was made to if a feeder goes down it puts stress on a "related" feeder. In that sentence what does the word "related" mean?

A. (Mucci) When a feeder comes off the load, that feeder carries--is now carried by another feeder, and

it's--the largest portion of that load is carried by the feeder that's closest in electrical proximity to we call it companion feeders or feeders near it.

So the feeders that run in the same sort of pathway will pick up more load than feeders further out. And it's more serious for those feeders suddenly picking up more load.

(Miksad) As an example, with 22 feeders in the network, if you lose one, all 21 feeders could pick up some percentage of that lost supply capability but it would not be equally distributed. Feeders in closest electrical proximity to the feeder that is out of service will pick up the lion's share of that loss capacity.

Q. Related meant the same thing as electrical proximity?

A. (Miksad) Yes.

Q. You folks in the study had a dialogue about four cut in open autos that are described on page 413 of the October 12th report, and as written--as referenced to things like cable joint failures and the company's explanation is they were caused by hi-pots or something trying to figure out what the problem was, but it's really inrush that knocked them out. The studies that

say this is really caused by inrush, when were those

finished?

A. (Mucci) We are actually still studying the problem, but made our conclusions probably about mid September.

Q. That's before the report?

A. (Mucci) Oh, yes.

Q. One last thing. There was conversation earlier on the question of what counts as a "customer out of service". You made reference to putting in some new meters that will tell you whether the customer is out or not.

Let's say for sake of argument that the customer's got low voltage, you got a brown out. Is the meter going to pick the condition up or not?

A. (Miksad) I am not sure of the answer, but given the fact that I said that the way I believe they operate is that even on the loss of power they have enough either battery back up or capacity to--back up to send out a signal, I would say it would also give it the ability to do so as low voltage situation.

Q. I was looking at it from the customer's side. Is it going to tell you the customer's got low voltage on the other side of the meter?

A. (Miksad) I don't know. We would like to have that.

Q. One final thing. You have got a customer who has lost a phase, got baseboard power in one room and lights in the next, but not all power everywhere. Are the

meters going to pick that condition up?
A. (Miksad) Again, it would be a function we would like to have. Would have to check on whether it actually delivers that.
MR. DONALDSON: That's all I have.
JUDGE STEIN: Consumer Protection Board.
MR. WALTERS: Yes. I just have a few questions. A lot of the stuff we were going to ask has already been covered.
EXAMINATION BY MR. WALTERS:
Q. I wanted to go back to the AG's questioning. I think you, Mr. Miksal, referenced the individuals that have the ability or the authority to shut down a network system. And you said I think the regional vice president or one of the managers.
I just received this recently, network shut down procedure system operation manual, and it might be in here, might not be, I honestly don't know. Is there anywhere that parties could look to find a definitive

process by which the decisions are made? Is there any place that's spelled out?
A. (Miksad) Yes, it is.
Q. Where would that be?
A. (Miksad) It's specification EO-4095.
Q. We have that?
A. (Miksad) I believe so.
Q. You mentioned also, Mr. Miksal, you mentioned

earlier a number of times the five factors that the company uses in evaluating the system when making a determination whether to shut down the system.

In this instance, July 17th, Long Island City, were there any--did any of those factors bear any more weight than the others or were they all considered equal? Is there one factor you would look at or are they ranked in any order or how does that work?

A. (Miksal) I am just thinking about one factor that stands out above the others. I don't think one stands out. Any of them in a large degree could result in very long term troubles for the network.

Like I was saying earlier, when you burn up--extensively burn up any of those systems, you are talking about very long outages. Now, we consider this eight-day, seven-day outage a very long outage, but what

could happen in this worst case scenario would be significantly worse.

Q. Going back, again, I am not--it was mentioned a number of times, but you mentioned Thursday the company went out and did basically a head count, for lack of a better word.

Has the company ever done that in the past for any outage, or is that unprecedented as far as outages are concerned, for the company?

A. (Mucci) Everybody has said it's unprecedented. My 38 years, I don't remember that happening.

(Miksad) Just so you know, I referred to the one

chart that showed four outages with over 1000 customers out in 40 years in a network that's still in service. So, that is sort of the indication of how it could be unprecedented. This sort of thing does not happen and this outage far exceeded any of those historical outages.

Q. I guess I am trying to--over 1000, the company has never gotten to that level?

A. (Miksad) Never, no.

Q. I believe it was the city that had asked you some questions on the RMS and you mentioned, and I am blanking, I think it was Hazeltine was the original

supplier?

A. (Miksad) That is correct.

Q. And you mentioned British?

A. Aerospace Engineering, BAE.

Q. The design for the system when you were being supplied I guess by Hazeltine was 95 percent, or that's the ultimate design or preferred design, the 95 percent number?

A. (Miksal) I believe that target was created after Washington Heights in '99. I don't think that was established prior to that. When the system first came into effect, as I said in the early '80s, and took us ten years to install on the entire system 25,000 transformers.

So, until the late '80s, early '90s, the system

wasn't fully implemented on our network system.
Q. For explanation purposes, for a lay person like myself, the 80 percent number that was quoted, that was where the system was during the event or in the days leading up to the event?
A. (Mucci) It was 79 I think point something.
Q. So, give or take. Is that an acceptable number for Con Ed?
A. (Desanti) Can I just have a clear picture of

these numbers? The RMS operating at 80 percent, operating at 80 percent allows you to look at eight out of ten transformers in the network and 95 you look at nine. And for operators, we think that's a useful number.
And also you have to remember these networks operated for grids, we had this system and able to operate them effectively.
Q. So the 80 percent number would be general industry practices? I know there is not a lot of these type of systems.
A. (Desanti) You can operate the network at 80 percent.
Q. Can you give attribution to lack of the supplier leaving from going from the 95 number to the 80 number? Would you agree that was the only factor involved?
A. (DeSanti) I wouldn't say it was the only factor. Certainly one of many factors in the 80 percent.
Q. What other factors in the number would be reduced

by that amount?
A. (DeSanti) Other factors would be there was patent rights associated with this. Couldn't bring in other vendors. Recently we went to a new generation of the receivers we are starting to install to hopefully

improve the rate. We installed one now at the substation in north Queens on this network. That should help.
Q. Are you talking about the interlude between Hazeltine and the British company?
A. (Desanti) You mentioned patents, yes, I believe so.
(Miksad) Actually, the patents actually expired after the acquisition. The patents only expired I am thinking two or three years ago to give others access to.
Q. What time period are we talking about here I guess for the transition between Hazeltine and British? Was there a notice given to you guys or they pulled up stake and they left?
I am confused what time period we are talking about and when this transition was made and how that went about.
JUDGE STEIN: You have been very patient. I wonder if we would get a more productive response out of an IR at this level of detail, a written answer, people could go back to the documentation.

MR. WALTERS: That's fine. We were on that line. The city started it.

JUDGE STEIN: I would like to see the answer. It's hard to get it.

MR. WALTERS: No further questions.

JUDGE STEIN: Thank you very much.

MR. AUSTRIA: Ric Austria from Pterra.

EXAMINATION BY MR. AUSTRIA:

Q. Earlier in the question and answer period you talked about the probability of failure of the feeder increase with temperature and with load. With respect to increasing load, do you mean current increasing so that if you have some other factor that increases the current you're probably looking for failure of the feeder in certain cases?

A. (Mucci) We are talking about increases in current and increases in heat. You got concomitant heat with the current.

Q. So, increases in current that result in increases in heat, so if you have, say, low voltage resulting in high currents that result in heat, you have the same somewhat impact on probability of outage?

A. (Miksad) Are you tying this into the voltage reduction? Is that your point?

Q. No. I am coming from a system voltage point of view and trying to understand the probability of the

feeder outages in relation to certain factors.

And I think you discussed temperature with your Honor and you mentioned increasing load and I am trying to clarify whether increasing load means increasing current.

A. (Mucci) Yes. Increasing load means increasing current, but voltage is regulated by the tap changes in the substation, so voltage would remain where it's set at. So, you wouldn't decrease voltage to increase current. Tap changers would change to supply it. Remember that the substation can supply more than the network can use, essentially.

Q. I was leading to that. If you get to a point where your tap changers are under limits due to the increasing demands of the load, your voltage will move down on the low voltage side and your currents will rise.

JUDGE STEIN: Is that a question?

A. (Mucci) That's almost impossible because the tap changers--first of all, we designed the station in this particular case to exceed the capacity of the network. And second, the tap changers will remain--will regulate the voltage in the network and will move up and down to regulate that.

A situation with the tap changer is all the way

up and voltage remains--continues to go low would be something--that would be a stream that we have not experienced. In this particular event this station had more capacity than the network could use, so it's unlikely you ever get to that very improbable.

Q. In terms of capacity, are you referring to reactive capacity or tap changing capacity?

A. (Mucci) I am referring to the capacity of the demand of the network. Capacity of the transformers in the substation are greater than the demand in the network.

(Miksad) We do both actually. We look at both megawatts capability of the station and we design the station to supply the forecasted demand for the following summer. And I mentioned earlier about the ten-year forecast looking at and making sure we do reinforcements to the substation prior to any need.

Whenever we forecast the load or demand capability, we are taking steps or measures to either reduce the load off that station or increase the capability of that station. We also look at voltage and make sure voltage will operate within design criteria within the contingency level.

So, John mentioned we have a number of our sources, obviously, from the--we have capacity to bank VAR support to the network. So, we are monitoring, measuring and supporting the system for both megawatts and megaVAR requirement.

Q. Maybe we can get back to this point because we are answering a slightly different question. Maybe we can approach it in two or three questions.

It was a hot summer day, July 17th. The presumption was there was large amounts of air conditioning load. Could you estimate how much of that load at that time was air conditioning load?

A. (Miksad) I am sure someone in Con Edison could. I don't know if we can, but someone could tell us what they estimate the air conditioning component of the load to be. I am not sure to what degree of accuracy, but it could be estimated.

Q. Was there then a measure of the reactive demand into the Long Island City load pocket?

A. (Miksad) Yes.

Q. Before and during the events?

A. (Miksad) Yes.

Q. Were they within power factor targets for that load pocket or experience VAR factor levels?

A. (Miksad) I guess the actual answer is I don't know for sure, but what I do know is that the voltage at the station was controlled by--under control of the operators, and the only impact to the voltage was what we actually initiated, which was the voltage reduction we referred to which occurred--was triggered on Monday evening, which there was deliberate attempt to reduce the demand of the network, but that was under the

control of the operators and it was not as a result of some lack of VAR support.

Q. We discussed the voltage reduction. I did have a follow up question. Could you clarify when you said an eight percent voltage reduction was significant for the 27 kv voltage to go down by eight percent?

A. (Miksad) Yes.

Q. And taps are allowed to change on the step down to the secondary, or is this taps from the high side, 138 kv?

A. (Miksad) These are taps on the 27 kv side on the power transformers in the substations.

Q. On Monday, July 17th, even before the first feeder outage, there were reports of low voltage. This was stated in the report. To what extent was the low voltage--and this related primarily to secondary, to the

secondary network?

A. (Ketschke) Yes. We did--I forget the exact number. There were a small number of low voltage complaints in the network prior to any of the feeder outages. Those were related to secondary issues, isolated to the individual customers.

It's not uncommon if people add air conditioning load it doesn't--we don't see the low voltage problems until the summer because they essentially oversize the load without filing with us.

The first hot summer day throughout the system it's not uncommon to see low voltage complaints as

people added demand without filing for an upgrade.
Q. Did you--you steadily monitor the voltage to maintain that voltage and customer would report a low voltage because the experience at the secondary side is telling them there is a low voltage. Did they tell you what the low voltage is on the secondary side?
A. (Ketschke) Depends on the source of the call from the customer. If it's an individual homeowner sometimes they are savvy enough to be able to report actual voltage readings. Sometimes they only will report they have indications of low voltage, like dim lights, or if it comes sometimes from electricians or if it's a larger

building.
But these are not--when we go out we will check two points to see if in the street we have low voltage in the area, which is most commonly related to if there is an issue within the secondary system.
The more common cases are it's an issue with either the service cable going to the customer or customer has added load beyond the capability of their service point.
Q. If there is a low voltage in a meshed network then it tends to be spread out rather than in a radial supply you have low voltage at the end of it, does it spread out where if you start an air conditioner several customers already see the low voltage?
A. (Ketschke) Not typically. If you recall some of

the slides, the network system is an intermeshed system, not a radial with each individual load along the system would be drawn down. Unless you have an unusual configuration or some other defect in the system you don't typically have an impact of one customer's load on a neighboring customer unless it's a significantly oversized load.

The system hasn't been adjusted to compensate for most commonly when customers add load and don't tell us

or cable was to fail and we didn't know about it.

Q. If a customer did report a low voltage then the likelihood that neighboring customers are also experiencing the low voltage because of the nature of the network?

A. (Ketschke) Not necessarily. That does happen in some cases. That's usually because a component, usually a cable section of the underground distribution system, has failed, moving those customers from two directions, supply to radial supply. More commonly it's a low voltage at a single customer.

Within the network we do have a monitoring point, a voltage monitoring point, that monitors the voltage for the whole network at the distributed network level to kind of give a snapshot view of the distributed network.

Q. Sorry to belabor this. Just clarifying where the low voltage reports are coming from. There was no outage on the feeders yet at this point but there are

outages on the secondary that would have resulted in the low voltage reports?

A. (Ketschke) There were--I don't recall the exact numbers at the start of this event. It was a small or no individual customer outages. There was a small

number of low voltage complaints and those were attributed, as far as I know, I haven't gone back and read every one of them in detail, those were attributed to issues directly related to customer service or secondary cables immediately adjacent to customer service. Things like secondary connection, poor connection, not to inadequate voltage support or VAR support coming from the area substation.

Q. If there are indications of low voltage would you attribute these to a need for reactive support, large reactive demands, like air conditioners turning on and any other factors you might from experience be familiar with?

A. (Ketschke) My experience has been the majority of low voltage in the distributed network are related to undersized capacity size within the network, not to the components of the load. The power factors are managed fairly clearly from the area substation by switching capacitor banks out of service at the area substation.

So the majority--in the time I have done work with network system, the majority of low voltage complaints are trying to preserve it.

Q. Another way, since we were talking about that, maybe this is where we approach the same point we were

talking about. In beginning you have low voltage because you have large demand?
A. (Ketschke) When we have low voltage complaints mostly they are associated with the distribution systems, to that customer being undersized for some reason. And most common reason that has occurred, in my experience, the customer added demand without telling us. They are underground infrastructure or building a structure and the wire is not big enough when they added additional load.
Q. If the current goes high is that a reason why the voltage will be recorded low on the feeder?
A. (Ketschke) Not on the feeder, on the individual service or secondary system. The voltage issues for low voltage beyond the times when we initiate voltage reduction for system reasons, in my experience I have not seen voltage complaints that come from issues related to the substation or VAR feeder or VAR feeders.
Q. We are talking about secondary low voltage and increasing demand, so increasing current going with that.
A. (Ketschke) Increasing current with increasing demand, particularly when the system has not been reinforced to accept that demand. Most commonly

occurring when people add load and don't tell us. In general, when they add load and tell us we will design the system to support both voltage and current needs.

Q. Mention earlier that you do derive VARS from the transmission system into, for example, the Long Island load pocket. Specifically to Long Island, how did the VARS come into the load pocket? What path do they normally take?

A. (Miksad) They come in--we are talking about the north Queens substation which is attached to the Astoria east transmission station, so they will come in from Astoria east, Con Edison's Astoria east substation, to north Queens. By the way, those substations are located on the same piece of property.

Q. At Astoria, is VARS coming into Astoria as well that gets shipped into Long Island, VARS from the higher voltage network?

A. (Miksad) VARS don't travel well over long distances, so the vast majority of the VAR support occurs fairly locally on the transmission system. As I said earlier, we have also VAR sources within the station, namely either 20 or 30 megaVAR capacitors, and generally each station has either two or three sets of capacitor banks to provide the VAR support necessary.

(Mucci) Also six major power plants in the same

property. Plus I think about 700 or 800 megawatts of gas turbines. We don't own those machines. They are owned by independents.

(Miksad) Point being, those are all sources of VARS that are available locally for north Queens and Long Island City.

Q. And do we know that those power plants at Astoria, the units in Astoria, were available during this week?

A. (Miksad) I don't know the specific stats of all the units that John just outlined, but I do know on a week like this all would be called for to be in operation by the New York ISO.

JUDGE STEIN: Let me interject for a minute. We only have ten minutes until we have to make the phone call. I do want to give you a quick break.

MR. NORLANDER: I am yielding my time.

JUDGE STEIN: We only have five minutes because the stenographer needs a break and we have to make the call.

MR. AUSTRIA: I think there is just a couple of questions.

JUDGE STEIN: Thank you.

BY MR. AUSTRIA:

Q. If the only source--there is a megaVAR source in Astoria that supplies the Queens load pockets, is there absolutely no megaVAR that comes there or you lose megaVARS going to the step down transfer, but there is

megaVARS on the 345 kv that may go through, are they controlled in any way into the load pocket?

A. (Miksad) Into that load pocket, no.

Q. So, megaVARS can flow from the 345 kv, I guess the closest would be the Sprain Brook and Rainey substations?

A. (Miksad) That's not a direct path to Astoria east, but megaVARS can flow from the 345 into the 138 kv system, yes.

MR. AUSTRIA: I have no more questions. Thank you very much.

MR. NORLANDER: One question.

EXAMINATION BY MR. NORLANDER:

Q. We just mentioned the New York ISO and our discovery has shown that you asked the New York ISO to implement a load reduction program on the morning of Tuesday, but Con Edison had lowered the voltage on Monday night.

I was just curious if you could elaborate on your

communications with the ISO and the reasons why you went to voltage reduction first before load shedding, when I would think that--or load reduction--when I would think that from an electrical risk point of view it would be less risky for a customer to get off the system than to reduce voltage.

A. (Miksad) Understood. The sole reason for that is voltage reduction is something that generally is

immediate, has an immediate effect. I talked earlier in response to one of Mike's questions that it generally takes minutes to see the effect of voltage reduction, so back ups went into that fifth contingency, the higher level contingency, to look for something immediately to reduce the demand on the grid in order to reduce the stress on the remaining in service components.

That's why we chose to implement voltage reduction. Generally, the demand reduction programs take time to implement. In many cases some of those programs actually require a day ahead notification to customers and operators and we felt we didn't have the time for that.

JUDGE STEIN: Thank you. That concludes our questioning and our discussion of this morning's panel. Didn't quite finish it by two. So, we can go off the

record.

(Recess taken.)

JUDGE STEIN: Let me begin. Would you like to introduce yourself.

MR. COLONNA: My name is Nick Colonna, I am director of planning and analysis for Con Edison, responsible for the operating and maintenance and capital investment budgets.

(Nicholas Colonna duly sworn or affirmed).

(Mr. Berklee appearing telephonically.)

JUDGE STEIN: Mr. Berklee, would you like to put in an appearance for the record?

MR. BERKLEE: Yes. This is Richard Berklee. I am appearing for Assemblyman Richard Brodsky, Chairman of the Assembly Committee on Corporations, Authorities and Commissions.

JUDGE STEIN: Thank you very much. And we have the other members of the panel here from Con Edison who may respond to your questions. Maybe they will just state their names and you can proceed and they could say who they are as they answer. That might be helpful.

MR. BERKLEE: Thank you.

MR. MIKSAD: John Miksad, senior vice president of electric operations for Con Edison.

MR. MUCCI: John Mucci, vice president of planning and engineering for Con Ed.

MR. RASMUSSEN: Andrew Rasmussen, vice president and controller for Con Edison.

JUDGE STEIN: Thank you very much. Why don't you proceed, Mr. Berklee?

MR. BERKLEE: Thank you.

EXAMINATION BY MR. BERKLEE:

Q. The October 12th report states that between 2000 and 2005 Con Edison spent roughly $800 million on the Brooklyn-Queens distribution system. And the Assemblyman wanted to know how much of those capital expenditures were spent solely on the Long Island City network.

A. (Colonna) As stated in the report, that for the

same period approximately $50 million was invested in the Long Island City network.

Q. Thank you. How much--over the same time period, 2000-2005, how much O&M money was spent solely on the Long Island City network?

A. (Colonna) During that same period we spent approximately $52 million in maintenance in the borough of Queens. Approximately 21 percent of that $52 million is in the Long Island City network.

Q. Thank you. How much of the capital expenditure money spent on the Long Island City network for that time period are attributable to growth and demand?

A. (Colonna) It wasn't categorized that way, but in the report we talk about the amount of work we did during that time period to upgrade the primary, secondary system transformers, replace secondary cable, primary cable, elimination of what we call the paper and lead cable and heat sensitive joints.

Also, during that time, there was something that was related to demand growth with new construction, major new business development, and reconstruction of public highways and roads in the borough, in the area where we had to relocate and upgrade our facilities, but I don't have the exact breakdown of the dollars in those broad categories.

Q. Con Edison's investment in T&D rose roughly 30 percent from 2004 to 2005, and the 2005 number is roughly double the 2000 number, and roughly triple the

1995 number of investment in T&D.

Just starting with the 2004 to 2005, why did Con Ed's investment in T&D rise so sharply?

A. (Miksad) If I had--I will give you just a general answer. I don't know if anyone on the panel wants to

follow up with more specifics, but there are two major categories for the capital investment increase.

One is in the area that you alluded to earlier, Richard, the demand growth, and in particular the addition of the construction of substations and the transmission to support those--transmission feeders to support those substations, and then the distribution outlet system for those substations. That is a large component of that.

The other big factor in that '04 to '05 investment level is we initiated a number of reliability/public safety programs in the wake of the Jody Lane fatality down on 11th Street where we, for the first time, initiated a secondary system program to proactively changeout the network secondary cables, whereas previously it was essentially a replacement upon failure mechanism.

So, if I had to say in broad categories, it was the demand growth and the addition of some public safety/reliability programs. I don't know if anyone has anything else to add.

(Colonna) We give more specific examples of those

broad categories, but those were the two primary drivers. We started projects related to the new

substation that are going into service next summer.

And also, as John alluded to, several reliability/public safety programs replacing the new style manhole covers, and then as part of our inspection program replacing the secondary cable where necessary.

Q. How much money on an annual basis since 2000 has Con Ed invested in emergency response preparation?

A. (Miksad) I don't have a number, a dollar number, for that. I could talk about some of the tasks, some of the activities that occur on an annual basis, but I can't--I don't have, nor do I think we break down, sort of the cumulative dollar value of those activities.

Q. I would like to hear a description, but if you could tell me where those numbers would be in your general report on finances that would be useful, too.

A. (Miksad) As I said, I don't think we break them out that way, if I understand your question correctly. It's sort of under the hood of other general categories.

But in terms of activities, there are a number. I guess I will start with--are you interested in particularly for network system events or in general for overhead system as well as network system?

Q. Both.

A. (Miksad) I will start with the overhead system

and I would start with our storm planning and training. And we develop a plan each year. We update the plan every year for storm preparation and planning. And we actually submit that to Public Service Commission staff each April 1st that outlines that plan.

And that--parts of that plan include individual training for participants, emergency response participants, as well as at least one annual drill to test the plan.

This year in particular we have had a number of actual storms that have drilled our emergency response folks, so we got a lot of practice this year. And so that's on the storm side.

We have also, over the last year or two, have started working on a coastal flood preparedness and plan, namely hurricane. In the wake of Katrina and the other hurricanes that hit the Gulf Coast, we have undertaken, as have others, including New York City, have undertaken developing plans for if a Category 3 hurricane hit our service territory.

It would have different effects for different parts of our service territory. So, there is an overhead portion of that which is very similar to our existing storm plan, only a greater magnitude,

obviously. And then there is also a coastal flood plan

which is in particular importance to the network system being an underground system.

So, we have the--we are putting the finishing touches on that plan right now. Actually, there is a meeting today to disseminate the final version of that. We have met with the city OEM on that plan and communicated to them the plan, and a number of the issues that we face if we were hit with a hurricane of that magnitude.

So, those two plans are in place. The hurricane plan, as I said, just putting the finishing touches on that, and we would then look to establish the number of people required to support that plan, make sure they are all identified, trained, and drilled. And that will be our--the next focus once we enter into that next stage.

We also have a plan for heat events, heat waves, like we experienced this week in July, and that again in August, which trains and drills the operators to make sure that they are of a level of sufficiency to understand the information systems and the data that they provide and the procedures associated with that.

We have established, actually, since Washington Heights event in 1999, goals for feeder restoration

time, so that everyone in the organization is focused on restoring feeders as quickly as possible, as was alluded to earlier in the day.

And we have significantly reduced the feeder processing time from an average of about 34 hours back

in 1999 down to, as I mentioned, 12 or 13 hours this past summer, having a significant impact on reliability and the number of times we get into multiple contingencies.

Those are the three major emergency preparedness plans that come to mind. I don't know if I am leaving anything out, but those are the three major ones that come to mind.

Q. How often does Con Edison drill on the emergency plans?

A. (Miksad) At least once a year. We are planning to drill more often in 2007, which would include testing parts of the plan as well as the overall plan. That would include either table top drills or full blown simulation of storm events.

Q. If you can't break out on an annual basis how much is spent on emergency response preparation, can you answer whether Con Edison's expenditures on this category have stayed the same or increased since 2000?

A. (Miksad) I would venture to say, and I don't know this, but I would venture to say that it has increased as we have added additional aspects to emergency preparedness, hurricane being the most significant one. But we also--the one I did leave out, we have also done extensive work on preparedness for things like Avian flu.

We participate with the city on some of the

drills that they do for biological weapons and for radioactive weapons, and we actually have a team of folks who are equipped to be suited up and enter into an area that might be exposed by either of those two events.

So, I would venture to say we have, over the course of these five years, we have increased significantly the amount of storm--of emergency preparedness we have done.

Q. What has Con Edison expended on its call center annually from 2000 to 2005?

A. (Miksad) Have to get back to you on that.

JUDGE STEIN: If you would like to put in an information request we are doing that for follow up.

MR. BERKLEE: I will be doing that for some of these questions.

JUDGE STEIN: The people who are here have been answering a very wide range of questions, but don't necessarily have all the information at their fingertips. And after initially trying to figure out a way to do follow up we decided to just put it over into the information request realm because so much information is passing that way.

So, the burden is kind of on the questioner here to--if there is something you want and it's not in the report and you can't get it today, by all means put in an IR.

MR. BERKLEE: I will be doing that.

Following in that vein then, I would like to make a request here on the record for capital expenditures and O&M for Con Ed's entire system for 1995 to the present as a whole, and then broken down separately for Westchester, and separately for the city borough by borough or, I'm sorry, the organizational units. And I will follow up with a paper information request for that, too.

JUDGE STEIN: I think we are taking e-mails. E-mail is fine.

MR. BERKLEE: Okay. In that case, that's all I have for now.

JUDGE STEIN: Thank you very much.

MR. BERKLEE: Thank you. Much appreciate it.

JUDGE STEIN: Thank you. Off the record.

(Discussion held off the record.)

JUDGE STEIN: We're going to pick up with a second Con Edison panel in an abbreviated version. Is that going to be on both customer service and communications and accounting and investments?

MR. MIKSAD: Just accounting and investment.

And relatively straightforward slides that we prepared for the presentation. Obviously we will answer questions to the extent we can in more detail, but the first slide just attempts to show the level which actually Assemblyman Brodsky's counsel was referring to.

The level of capital investment on Con Edison's

transmission and distribution infrastructure over the period from 2003 through--actual through 2005 and projected for 2006. And you can see the numbers are there. 654 million in 2003 and rising this year to an anticipated almost $1.3 billion capital investment.

Next slide just breaks those numbers down into three large buckets. Reliability and public safety in yellow; demand growth in blue, and then regulatory and environmental compliance, which includes EPA rules and

OSHA rules and all of those sorts of things, in pink up on top.

And just to give you a sense for how those dollars break out. Just shifting over, the next slide, to the maintenance side of the house. You can see, again, same period of time, 2003 through 2006, projected--I believe projected, right? Yes. And just broken into two buckets. Reliability and public safety is one large bucket and then that same regulatory and environmental compliance in yellow, ranging from $456 million in 2003 up to $617 million in 2006 anticipated.

And that is the end of the presentation.

JUDGE STEIN: Do parties have questions on this presentation or this data? If so, do they want to pose the questions this evening? If so, how many minutes worth of questions do they have?

MR. WORDEN: Probably ten to 15 minutes for staff.

JUDGE STEIN: Anyone else? I suggest that what

we do is complete this portion of the agenda and we will pick up tomorrow morning with the panel on customer service and communications and questions on that. And we will begin at 9:30.

Please proceed.

EXAMINATION BY MR. WORDEN:

Q. The company, from our understanding, primarily keeps your records by operating areas, right, of which there are four?

A. (Colonna) Yes. Four operating areas.

Q. And have you ever considered keeping those kind of records on a network by network basis?

A. (Colonna) We have looked at that recently, and we have talked about that over the years. We have been actually looking at how much we have done in the network over the past year and a half, specifically in Long Island City, but also across the networks.

So, we have been trying to quantify how much investment we have been making, first, by looking at how much work volumes we have completed or replaced, numbers of primary cable, secondary cable, and transformers, by network.

And it's working off engineering layouts and property accounting records to tell us the quantities of work and a cost per section of cable replaced in order to come up with approximate cost for each network.

From there we have to then evaluate how much

infrastructure in our accounting system would be required to do this on a more automatic basis, but we

have been trying to get a sense of the investments we made in each network in terms of work volumes first.

(Miksad) One other point. I would--we don't want to make this an accounting nightmare in particular for our crews, the work crews. You can make this overly complicated. And if they have a particular account number for this network versus across the street at another network, it could bog them down, too.

We have--it's going to take a lot to get folks to make sure that they are putting the right account number and right work number in, that sort of thing. We don't want to make it an accounting maze in particular for the work group.

Q. So, I think what I heard you say was that you kind of backed into the 50 million by doing the best guess of how many primary feeders--how much primary feeder work was done in the Long Island City network and secondaries?

A. (Colonna) In that case I wouldn't say we backtracked by guessing how many--amount of work we did in the networks. We went through a meticulous--we went through for the last two years how much work we--how many sections of cable, how many transformers we actually replaced in Long Island City network.

It wasn't--that was not the back into number. We went layout by layout, project by project, and accumulated those work volumes. And then to use--we estimated the dollars based on an average cost per section replaced by that operating area. So, it wasn't an exact cost, but we were very comfortable with the amount of work we did, particularly in Long Island City over that recent time period.

Q. Could you do a similar estimated cost for all networks?

A. (Colonna) It would take time, but we could.

Q. I am trying to get a sense of what we are talking about here.

A. (Colonna) It took about two weeks to gather all the work we did in Long Island City. That was covering the period 2005 through the first six months of 2006, and we would have to go through 57 networks. I am not saying it's 57 times two weeks but...

JUDGE STEIN: I would like to hear you finish that sentence.

A. (Colonna) It's a fair amount of time, but I know it's--may be talking a couple months to gather all the information on all the networks depending on how far back we want to go in time.

Q. But I mean whenever--speaking of crews, whenever

they work on feeders don't they record the feeder number as part of their work ticket, or is that not necessarily a part of it?

A. (Miksad) Not necessarily on the work ticket. The accounting system, they don't need to do that. There is a whole other system for signing on a feeder number in order to make sure it's safe that is recorded there, but feeder log, feeder processing system, but not necessarily on the actual work units.

Q. Those two systems aren't linked together?

A. (Colonna) To follow up on John Miksal's last comment, it was going through those various logs in order to accumulate the amount of work that was completed in the Long Island City network.

That's what took the amount--that's what took the extensive amount of time, but the systems that capture cost and the various systems that report to feeder numbers are not integrated.

Q. Have you looked at doing it from a system standpoint since--in the last couple years?

A. (Colonna) We are still looking at that. It's, as John said, it would be fairly cumbersome in order to try to set up a system to cost segregate work done by

individual networks. You are talking in our case integrating many systems. We are still evaluating that.

Q. Have you looked at the costs of any other networks or is Long Island City the only one you have really done this kind of analysis on?

A. (Colonna) Right now we have looked at Long Island City and we were in the process of accumulating similar activity, how much work we have done in all the other networks to approximate--come up with a similar cost per network.
Q. So you are going through a one time process of estimating that so you can decide what to do going forward?
A. (Colonna) We are going through a one time process now to evaluate what--where all the information is, how much we have actually spent on these networks, and then evaluate what would it take to automate some of those processes going forward.
Q. When do you expect to have that done?
A. (Colonna) I don't have any specific time period yet, but we were trying to see if we can get something in place for tracking next year's work.
Q. Before your next budget cycle?
A. (Colonna) We are in that budget cycle now but

certainly before the next budget cycle.
Q. I meant the next one after that.
A. (Colonna) Okay.
JUDGE STEIN: Can somebody say a year associated with the next budget cycle year? Talking about the budget cycle for what year?
MR. COLONNA: This would be preparation in 2007 for the 2008 budget.

JUDGE STEIN: Thank you very much. Just to clarify the record.

Q. And you are compiling information from the 2005 through mid-2006 time period?

A. (Colonna) Same time period, so we can compare all the networks for the same time period.

Q. Do you plan on doing a correlation between expenditures and network performance after you compile this data?

A. (Colonna) My initial mission is to correlate expenditures and volumes of work and then to sit with the engineering folks to evaluate costs spent, work completed, and system performance, as a way of helping us to prioritize work for next year going forward.

(Miksal) So the answer is yes.

Q. In the company's press release associated with

the October 12th report you indicated you're investing $58 million in the Long Island City network. Can you give us a breakdown of how that capital recovery, putting customers back in service, how that breaks down?

A. (Colonna) Of the $58 million we reported, $42 million of that was expense, O&M, maintenance, the restoration of customers and of the system, and about 17 million was capital investments.

Q. And that's through what time period?

A. (Colonna) That was through the period ending September.

Q. Do you have--

A. (Colonna) That doesn't include any of the money that we reimbursed, the company has reimbursed to customers already.
Q. Exclusive of claims?
A. (Colonna) That excludes the claims.
Q. Do you have a total estimate for what the $58 million is going to be?
A. (Colonna) In addition to the maintenance and capital work that I just quantified as another $14 million in claims through September reimbursed.
JUDGE STEIN: Just to clarify the record, we are talking about September 2006?

A. (Colonna) Yes. Through September 2006.
Q. I guess the question is: Have you projected what the total cost is going to be when that's done?
JUDGE STEIN: The total cost of?
Q. How the 58 million and 14 million are going to go. Right now it's 72 million.
A. (Colonna) For maintenance, we are estimating about $54 million by the end of the year, through the end of this year, 2006. And capital, we are estimating approximately $30 million in 2006.
(Rasmussen) As far as the claims are concerned, the $14 million would expect to grow maybe another half a million dollars.
Q. You are talking roughly a hundred million?
A. (Rasmussen) Including the capital, right.

Q. Right. I am not an accountant. Round them off a little bit. How--can you break those different components down and talk about how each of those would be recovered and how it fit into rate structure and how that works?

JUDGE STEIN: Before we go ahead, I am a little confused by your last--I am not sure what was the question and what was the statement. You said we are talking about around a hundred million dollars. And you

said?

MR. RASMUSSEN: I agreed with his roughly $100 million.

A. (Rasmussen) On the rate side as to how those would be handled is any cost--as you know, we are in the middle of a three-year rate agreement. Rates were set through 2008. Any costs incurred between that period, unless we defer and ask for special recovery, would not be recovered in rates.

And these type costs which occurred during that rate plan and do not plan to recover and seek recovery for wouldn't have any special rate treatment.

As far as the claims are concerned, the same would be true on the claims. Would be approximately 500,000 insurance claims we would expect to be recovering from the insurance company.

Q. So the O&M, I think you mentioned that was going to be a little over 50 million, so, essentially is that going to come out of your budget for this year from

other O&M--
A. (Rasmussen) No. We will be substantially over budget in this year.
Q. If you look at the table where you outline the capital expenditures for electric distribution from 2000

to 2005, the last two years, 2003 to '4, goes up 100 million and then 2004 to '5 goes up 150 million.
Can you touch on the reasons for those particular increases and the electric distribution, specifically budget?
A. (Miksad) Capital, right?
Q. Yes.
A. (Miksad) The '4 to '5, when we were on the conference call we talked about that shift, which is increased demand, increased reinforcement for demand, which includes the distribution work associated with the new substations that are coming on line. And as well as the--what I described as public safety reliability programs, which include programs that you are familiar with, Mike, the vented cover program and the secondary reliability program. I think that's--that's I think the majority of it.
Q. Has there been also a substantial increase in burnouts over those two years?
A. (Miksad) Burnouts we have to quantify. Burnout is a budget category in Con Edison's budget. It covers a lot of different things.

I think the name in some respects is a misnomer. It implies something failed or whatever, and there is

some of that in that bucket, but there are also a number of other things that are in that, which include main replacement or transformer replacement.

There is a conduit--there is a conduit line item in there also. So, there's some things that are not necessarily changing things that failed in that bucket.

So, I think what you are seeing is an increase in the category, but that is not equated to an increased number of failures on--either in terms of open automatics on the feeder side or transformer failures or secondary cable failures.

Q. Looking at the capital investments that you cut out of Long Island City--I am going to put some numbers together. I am not an accountant. Hopefully Nick can keep me in line here.

You said there was approximately 50 million spent in Long Island City between 2000-2005?

A. (Colonna) Correct.

Q. In capital total, right?

A. (Colonna) Total capital.

Q. And ten million total O&M over that period? I made that one up. You actually had a bigger number and you said it was 52 million in Queens, 21 percent in Long Island City?

A. (Miksad) Correct.
Q. So, that's on the order of ten million?
A. (Colonna) Correct.
Q. And to date and since the Long Island City event you spent 58 million, and you are projecting that to be about 100 million?
A. (Colonna) Capital and O&M, yes.
Q. I am talking 60 million over five or six-year period.
MR. HESLIN: Claims too.
Q. 60 million from 2000 to 2005, that's six years, 85 million in capital and O&M since this event. So, from a financial budgeting perspective I guess I would be curious what your perspective on this outage and occurrence has been.
How you would compare the outage in terms of significance?
MS. KRAYESKE: Maybe you could try and rephrase the question. I am not really sure I understood it, and they kind of all look like they didn't understand it.
Q. I think we had some discussion about shutting down the network and the recovery period, how much work was done on Long Island City to put it back together. And I am trying to use a financial analysis to see

whether, from a financial perspective, whether you

considered this to be a significant event or not, or outage. Extraordinary, if you want to call it that, unprecedented.

A. (Colonna) From a financial perspective it is a significant event in terms of the--particularly with the maintenance money, how much we have spent to date and how much we project to spend this year.

Q. And you wouldn't normally try to do things to end up in this kind of situation, obviously?

A. (Colonna) Sorry, I didn't understand the question.

Q. From a budgeting perspective, that's not how you would plan to plan your O&M activities, right?

A. (Colonna) Right. That is correct. We wouldn't budget for something this extraordinary.

Q. We have to seek a couple clarifications that I guess we are not sure we heard quite right on the recovery aspect. The O&M I think we are straight on. You have an O&M budget over the three-year period, somehow comes from that one way or the other?

A. (Rasmussen) Doesn't come from the budget. We are running over the budget.

Q. I understand that. I guess the question is:

Would you possibly seek recovery of anything over the budget?

A. (Rasmussen) As I stated before, we are not deferring these costs to seek recovery.

Q. What about capital?

A. (Rasmussen) Capital we are treating somewhat also as normal capital. We are not seeking recovery of that capital while rates are in effect. Under our new rate plan we would assume this is additional capital. At that point we would include it in capital as any other dollars we invested over the years.

Q. So, in the capital agreement we have in place there is a provision for I guess the simplistic point of view like a true up provision. This capital dollars would go into that money in terms of truing up?

A. (Rasmussen) That is correct.

Q. What about claims, how will they be dealt with?

A. (Rasmussen) The claims that are not covered through our insurance, and we expect that to be--we are spending about 14 and a half million on claims, expect to get five million back in insurance.

The balance of nine and a half million would be similar to the O&M dollars I mentioned. We would incur them and not seek recovery of them in the future.

MR. WORDEN: I think we are all okay now. We are all set. Thank you.

JUDGE STEIN: I think that concludes our questions for today and concludes our panel for today. So, let's go off the record for a second.

(Discussion held off the record.)

JUDGE STEIN: First of all, I would like to thank all the participants today. I think this was a very

full day, a productive day, and these were difficult issues for everyone involved.

And I would like to thank the parties, the speakers from Con Edison for their patience and forbearance. We are going to pick up tomorrow morning, Friday, October 27th, at 9:30 in the morning.

We will begin by finishing up follow up questions for no more than one hour total. Today staff, New York City, and Power for the People have asked for time for follow up questions. And then at 10:30, allowing time for a break, we will have the third and final Con Edison panel, which will be on the subject of customer service and communications.

We will take approximately 20 minutes for that panel, and we will then hear questions for no more than one hour from all parties collectively on the issues

raised in that panel, and we will adjourn tomorrow no later than noon.

That said, I now adjourn the technical conference that was held today for the evening and I will see you tomorrow morning.

(Conference adjourned.)