

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BRIEFING ON TURKEY POINT
LESSONS LEARNED

- - - -

PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Tuesday, May 18, 1993

The Commission met in open session,
pursuant to notice, at 1:30 p.m., Ivan Selin,
Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
JAMES R. CURTISS, Commissioner
FORREST J. REMICK, Commissioner
E. GAIL de PLANQUE, Commissioner

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STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

JOE SCINTO, Deputy General Counsel for Hearings,
Enforcement, and Administration

EDWARD L. JORDAN, Director, AEOD

HUGH THOMPSON, DEDO

FREDERICK HEBDON, Director, Directorate II-4, NRR

THOMAS PLUNKETT, Vice President, Turkey Point Nuclear
Power Plant

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P-R-O-C-E-E-D-I-N-G-S

1:30 p.m.

CHAIRMAN SELIN: Good afternoon, ladies and gentlemen.

The Commission is meeting this time to receive a briefing on the effects of Hurricane Andrew on the Turkey Point Station. We know it caused widespread devastation around the station.

Following the hurricane there was a joint team of NRC and INPO personnel who reviewed the effect of the hurricane on the facility. We look forward to hearing from the NRC Team Leader and we also have with us Mr. Thomas Plunkett, Vice President for Florida Power & Light, who was at the site during the hurricane, who can give us both a personal and professional account of the hurricane and its aftermath.

I understand that copies of the viewgraphs are available.

Any comments?

Mr. Thompson, please.

MR. THOMPSON: Thank you, Mr. Chairman, Commissioners.

As you know, on August 24th Hurricane Andrew struck the Turkey Point Nuclear Power Plant

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1 with sustained winds of 145 miles an hour. Although
2 Hurricane Andrew was one of the most severe hurricanes
3 on record, the effects on the safety of the Turkey
4 Point Nuclear Plant were limited by the design of
5 safety-related equipment and by the preparations made
6 by Florida Power & Light in advance of the storm.

7 Details of the damage and the measures
8 taken by Florida Power & Light to maintain an
9 effective work force in the aftermath of the storm are
10 important to NRC and to the industry in preparing for
11 future hurricane seasons. This event provides insight
12 about planning for external events, since this was the
13 most severe hurricane or external event that any of
14 the nuclear power plants in the U.S. has faced and
15 maybe any nuclear plant in the world. Based on the
16 significance of this, in early September Jim Taylor
17 and Zack Pate of INPO authorized a special joint
18 NRC/INPO review effort to report on the event and
19 extract appropriate lessons learned.

20 I'd like to turn to Mr. Jordan now, who is
21 the Director of AEOD, to provide additional remarks
22 and introduce today's speakers.

23 MR. JORDAN: An eight person team was led
24 by Mike Haydin, who is the Department Manager, Human
25 Performance Department at INPO, and Mr. Fred Hebdon,

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1 who is the Director of Project Directorate II in NRR.
2 Due to a schedule conflict, Mr. Haydin was unable to
3 participate in this presentation. Mr. Hebdon will be
4 providing the team findings today.

5 In addition, Florida Power & Light
6 conducted their own review that Mr. Tom Plunkett will
7 share with you.

8 A report of the joint review has been
9 prepared and initial distribution of black and white
10 copies has been made pending printing of color copies.
11 INPO will transmit the report to utilities and NRC
12 will distribute copies to the service list, including
13 other federal agencies, states and our international
14 counterparts. I believe that it is important to use
15 every opportunity to disseminate this experience. The
16 ACRS has been briefed during their April meeting and
17 a presentation was given during a breakout session at
18 the Regulatory Information Conference in April.

19 The order of presentation today will be a
20 discussion of the team findings by Fred Hebdon,
21 followed by discussion by Tom Plunkett of the effects
22 of the storm and the efforts employed by Florida Power
23 & Light to maintain a viable work force at the plant.
24 Finally, Mr. Plunkett and Mr. Hebdon will jointly
25 discuss the lessons learned.

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1 Fred, would you like to begin?

2 MR. HEBDON: Thank you.

3 (Slide) Could I have the first slide,
4 please and then the next slide, please?

5 What I would like to do is start off with
6 a brief description of the plant and description of
7 the storm itself and then spend some time talking
8 about the preparations that Florida Power & Light
9 undertook before the storm and then provide a summary
10 of the damage that did occur to the plant as a result
11 of the storm. Then I'd like to let Tom spend a few
12 moments discussing the utility perspective. He was at
13 Turkey Point, of course, and spent the time in the
14 control room during the passage of the storm. He can
15 provide a perspective from that viewpoint. Then we'd
16 like to go back and discuss the lessons that we feel
17 we've learned from the effort that we undertook on the
18 team.

19 (Slide) The next slide, please.

20 As Ed mentioned, the team was made up of
21 representatives from both INPO and from the NRC, from
22 both the NRC Headquarters and the region. We also had
23 a representative on the team from Florida Power &
24 Light. So, there was a fairly broad representation on
25 the team.

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1 (Slide) Next slide, please.

2 The plant description, Turkey Point is a
3 four unit generating station. There are two fossil
4 units on the site, Units 1 and 2, and there are also
5 two nuclear units on the site, Units 3 and 4. The
6 plant is located in Dade County, Florida, near the
7 city of Homestead, which is about 30 miles south of
8 Miami on the coast.

9 (Slide) Can I have the next slide,
10 please.

11 This is an overhead photograph of the
12 Turkey Point site. Some of the features, as you can
13 see of course, near the center of the photograph are
14 the two containments for Units 3 and 4, the two
15 nuclear units. To the right of that you can see the
16 two fossil units and you can see that they are located
17 quite close to the nuclear units. You can also see
18 just below the fossil units the two large smokestacks.
19 They're about 400 feet high and are quite imposing
20 structures and we'll spend some time talking about
21 those a little later.

22 In the small rectangular area surrounded
23 on three sides by water, lower down in the photograph,
24 there's an area where there's a large water tank and
25 we'll be talking about that in some detail, so just to

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1 give you a general idea of the orientation of the
2 site. And then off to the left in that photograph are
3 a number of administrative buildings, the training
4 center, warehouses and other buildings and we'll be
5 talking about them in some detail also.

6 (Slide) Can I have the next slide,
7 please?

8 Tom will discuss this also in some detail,
9 but the point we wanted to make was that prior to the
10 storm, because of the fact that this storm did follow
11 a fairly straight path, Florida Power & Light was able
12 to undertake considerable preparations. They had a
13 procedure that they had developed that was quite
14 detailed and, as a result, for a period of about 48 to
15 72 hours, they were taking various levels of
16 precautions to try and prepare the site for the
17 approach of the storm. There were sandbags placed in
18 areas. There were also portable pumps available
19 because the largest threat actually from a hurricane
20 is from the storm surge, more so than from the winds
21 themselves. The Turkey Point site is designed for a
22 storm surge of about 20 feet and that's a considerable
23 height for a hurricane, but still, this was known to
24 be a very intense storm. I'll provide some details on
25 that in a few minutes.

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1 They also checked to ensure that the
2 diesels were ready because it was, of course,
3 anticipated that they'd lose off-site power to the
4 site, and to assure that they had as much diesel fuel
5 on site as possible, again because of the fact that
6 they were concerned that it would take some time to
7 provide additional fuel.

8 Another thing that took a considerable
9 amount of time was removal of equipment and trying to
10 secure equipment on the site. As luck would have it,
11 the plant was ready to go into an outage on Unit 3.
12 In fact, the outage was scheduled to start that night.
13 There was a considerable amount of material that had
14 to be removed and had to be stored in a safe location
15 so it would not become missiles.

16 In addition, they trained the operators on
17 the simulator to ensure that they were familiar with
18 the procedures that they might have to go through that
19 night and tried to go through all the different
20 scenarios that they might encounter as the storm
21 passed over.

22 COMMISSIONER REMICK: Was that matter on
23 their procedures or is that an ad hoc

24 MR. HEBDON: The simulator training was an
25 additional thing that they thought of. Most of the

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1 other things were in the procedure and the procedure
2 was quite detailed, but that was one thing that they
3 thought of as they were preparing for the storm.

4 COMMISSIONER REMICK: Good judgment.

5 MR. HEBDON: Yes. As it turned out, it
6 was a very good decision.

7 (Slide) Can I have the next slide,
8 please?

9 Another thing that they needed to do was
10 to station operators. Turkey Point has a number of
11 buildings, particularly the two diesel buildings, that
12 can't be reached from the plant itself. So, they
13 stationed operators in those buildings in case there
14 was a problem. They knew they would not be able to
15 get operators out there from the main class one
16 structures, so they had people stationed there ahead
17 of time. They also provided life lines so that they
18 could get people out and around the site as quickly as
19 possible after the hurricane and have them be able to
20 move around safely after the storm.

21 They also invoked 50.54(x), which allows
22 them to take precautions that are appropriate and they
23 use that to make sure that they had all their people
24 in safe locations. For example, the security force
25 that would normally be out in various structures out

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1 around the site, they were all brought into the class
2 one structures to make sure that they were in safe
3 locations. Again, that proved to be a very wise
4 decision, as you'll see from some of the photographs
5 that I'll show later.

6 COMMISSIONER REMICK: In the case of TMI,
7 there was some question about -- not about invoking
8 the 50.54(x), but whether it had been done properly.
9 Was there any question in this case?

10 MR. HEBDON: No, there were no questions.
11 In the situations where they used it, I think they
12 were good decisions.

13 The other thing that they decided to do
14 was they decided to shut down both of the nuclear
15 units. So, they had a step or a part in their
16 procedure that called for them to be in hot shutdown
17 two hours before the hurricane. So, in anticipation
18 of the hurricane arriving in the early morning hours
19 of the 24th, they began the shutdown the night before.
20 So, as a result, they were able to do an orderly
21 shutdown of both units and both units were, in fact,
22 shutdown and on RHR when the hurricane hit and when
23 they lost off-site power.

24 (Slide) Can I have the next slide,
25 please?

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1 I'd like to spend a few moments describing
2 the storm itself. Hurricane Andrew passed over the
3 Turkey Point site starting at about 4:00 a.m. on
4 August 24th. The hurricane had sustained winds of 145
5 miles an hour with estimated gusts to 175 miles an
6 hour. This makes it the third most intense hurricane
7 to strike the continental United States since they've
8 been keeping records. So, it was an extremely intense
9 hurricane. It was not, however, a particularly large
10 hurricane. Its spacial area was not all that large
11 considering its intensity, but it was extremely
12 intense. The eye of the storm passed over the site at
13 4:45 a.m. and, in fact, the plant went through the eye
14 and spent a period of time when it was actually in the
15 eye of the hurricane.

16 There was also a storm surge created by
17 the hurricane. As it was explained to me, the center
18 of a hurricane is a low pressure area. So, what
19 happens is the hurricane tends to draw the water up
20 into the center, much like someone would suck water up
21 into a straw. When that hurricane then gets to land,
22 all that water is released and that produces what's
23 referred to as the storm surge. In most cases, the
24 greatest loss of life from a hurricane is from the
25 flooding that results from the storm surge.

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1 In this particular case, the highest storm
2 surge measured was 16.9 feet, which is a considerable
3 height. You can imagine in an area like South Florida
4 that's a fairly flat area to suddenly have a body of
5 water 16 feet above the normal sea level is
6 considerable. The storm surge at the site, however,
7 was only on the order of about seven feet. So,
8 really, as it turned out, didn't produce that much of
9 a threat to the site.

10 (Slide) Can I have the next slide,
11 please?

12 This is an indication of the track of the
13 storm. One feature of this particular storm that is
14 somewhat unusual is the fact that it traveled on such
15 a straight line. I've looked at the data that they
16 tracked from the National Hurricane Center and almost
17 48 hours before the storm hit the site, it turned onto
18 the latitude that Turkey Point is on and didn't waver
19 from that latitude by more than about five or six
20 miles for almost 48 hours, which was really rather
21 unique. There are tracks of other hurricanes that
22 have done 270 degree turns and pirouettes and various
23 types of changes in direction. This one, fortunately,
24 turned out to be very predictable and traveled along
25 a very straight path for a rather extended period of

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1 time.

2 COMMISSIONER REMICK: What was the
3 barometric pressure in the eye?

4 MR. HEBDON: 922 millibars and that's what
5 determines the intensity. The wind speed measurement
6 was not available because there are few anemometers
7 that can measure wind at that high a speed. So, the
8 way they measure the intensity is by the barometric
9 pressure. In this particular case it was 922
10 millibars.

11 (Slide) Can I have the next slide,
12 please?

13 This is a picture of the site after the
14 hurricane had passed over and I wanted to try and give
15 you some feel for some of the major damage that
16 occurred on the site. You can see the two large
17 smokestacks from the fossil unit and I'll talk about
18 those in a moment. As you can see, right between them
19 there are two large storage tanks, one of which you
20 can see the side is very blackened. Those are day
21 tanks for the fossil units which are oil-fired plants.
22 A missile hit one of those day tanks and cut it about
23 25 feet from the top of the tank. As a result, a
24 considerable amount of bunker C oil was spread around
25 the site by the wind. That ended up doing quite a bit

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1 of damage, particularly in the fossil fuel part of the
2 plant. Tom will provide some additional insights on
3 that.

4 In the lower area you can see a structure
5 that is lying out into the intake canal. That was
6 actually the shell of a large water tank. There was
7 a very high water tank. It's 175 foot high water
8 tower that was used as part of the raw water system.
9 It was hit -- one of the legs was hit by a missile and
10 it caused the leg to collapse and as a result the
11 entire tank collapsed. When it did fall, it landed on
12 the two raw water storage tanks. It destroyed one of
13 them and damaged the other one to the point where it
14 lost the water that was in it. More severe, however,
15 was that it landed on the fire protection system and
16 it did a considerable amount of damage to the fire
17 protection system as a result of this very large
18 structure. It's 100,000 gallon tank dropping from a
19 height of 175 feet.

20 (Slide) Can I have the next slide,
21 please?

22 I'd like to give a brief summary of the
23 damage that did result. First of all, I'd like to
24 mention that there was a remarkably low death toll as
25 a result of this hurricane, due largely to the fact

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1 that there was a considerable evacuation and the
2 evacuation and the evacuation was very successful and
3 as a result the death toll from a storm of this
4 intensity was remarkably low. It was fewer than 100
5 people.

6 The class one structures were essentially
7 undamaged. There's no indications of damage to any
8 extent to any of the class one structures. So, they
9 survived as expected and really turned out to be not
10 a major factor in the damage. There was a loss of
11 off-site power that lasted for about five days and in
12 addition the off-site power proved to be unreliable
13 for a period of about two days after it was initially
14 restored. So, they were basically without off-site
15 power for about a week.

16 As I mentioned, the high water tower
17 collapsed and damaged the fire protection system and
18 there was also a loss of all off-site communications,
19 initially for a period of about four hours and then
20 the communications remained quite unreliable for a
21 period of about 24 hours. They were able to have some
22 intermittent communications, but it was fairly
23 unreliable.

24 (Slide) Can I have the next slide,
25 please?

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1 This is a photograph of the water tower
2 that has collapsed. The blue structures are part of
3 the water tower. The one red pipe that you can see
4 going through there is part of the fire protection
5 system. As you can see, the damage was pretty
6 extensive.

7 (Slide) Next slide, please.

8 This again is a picture of the fire
9 protection system and this damage was the result again
10 of the water tower falling.

11 (Slide) Next slide, please.

12 Again, more damage to the fire protection
13 system. As you can see, this is just structural
14 damage from the falling water tower.

15 (Slide) Next slide, please.

16 And again, another photograph of some of
17 the damage to the pipe. As you can see, the damage to
18 the fire protection system was very extensive.

19 (Slide) Next slide, please.

20 Next slide, please.

21 Okay. To continue with a summary of the
22 damage, there were numerous outlying buildings, non-
23 class one buildings that were damaged, warehouses,
24 office buildings. As a result, the infrastructure
25 around the site was fairly severely damaged. A number

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1 of class three structures were damaged, a number of
2 structures associated with the security system were
3 also damaged. One problem that caused a considerable
4 amount of difficulty was that the site access road was
5 blocked. There were a number of trees along the site
6 access road which is about six miles long and those
7 trees were all knocked over by the hurricane. Despite
8 the fact that Florida Power & Light had anticipated
9 this problem and had equipment available, it took
10 about 48 hours to clear that road. Now, they were
11 able to get access to the site by helicopter later on
12 Monday, which is the day following the hurricane. So,
13 they did have access, but they did not have access by
14 road for a period of about 48 hours.

15 The employees that were on site at the
16 time, of course, left their vehicles in the parking
17 lot of the site. Unfortunately, as a result, they
18 were very severely damaged. A number of the vehicles
19 were overturned, they were smashed into each other and
20 a number of them were damaged by various missiles that
21 hit the -- rocks that were picked up and larger
22 objects.

23 One of the things that fascinated me in
24 the discussions I had with some of the people down
25 there were the size of some of the objects that were

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1 moved around by the hurricane. One gentleman was
2 telling me a story of a riding lawnmower that he found
3 in his front yard. He's still trying to find out
4 where it came from. He's gone out to a range of about
5 a quarter of a mile and still can't find anybody that
6 will claim it. So, there were some fairly large
7 objects moving around at rather high velocities and
8 caused quite a bit of damage.

9 (Slide) Can I have the next slide,
10 please?

11 This is an overhead shot of a very large
12 warehouse on the site. As you can see, the roof was
13 torn off and, of course, there was considerable damage
14 to the contents of the warehouse as a result of the
15 hurricane.

16 (Slide) Next slide, please.

17 This is a picture of the area around the
18 entrance and you can see trees broken off, light
19 towers bent, a lot of the light towers were broken,
20 and damage to a number of the buildings, particularly
21 the buildings that were not of a concrete-type
22 construction.

23 (Slide) Next slide.

24 This is a picture inside the security --
25 the entrance portal building. You can see the kind of

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1 damage that occurred as the windows were blown out of
2 just about every structure as a minimum. Then, of
3 course, the winds and the rain then did quite a bit of
4 damage to the inside of the buildings.

5 (Slide) Next slide,

6 This is the access road. You can see the
7 kind of problem they were faced with with the trees.
8 This is after a path had been cleared down the road
9 and you can see the path going down the center of the
10 road.

11 (Slide) Next slide.

12 This is one of the vehicles that belonged
13 to one of the people that stayed at the site. As you
14 can see, this particular vehicle was rolled over by
15 the intensity of the storm.

16 (Slide) Next slide.

17 Another vehicle again that was damaged by
18 the storm. It gives you some feel for the intensity
19 and the forces that were involved. It just had to be
20 absolutely incredible to take vehicles and basically
21 roll them over and slide them down the parking lot.

22 (Slide) Next slide, please.

23 This is a picture of one of the structures
24 that was up around the turbine area. Again, these are
25 more secondary type structures that were damaged as a

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1 result of the wind force and again as a result of the
2 missiles that were generated. But there was quite a
3 bit of this kind of debris and just general debris
4 around the site and, of course, all over the area
5 around the entire site.

6 (Slide) Next slide, please.

7 This is another picture of another
8 structure on the site that was damaged.

9 (Slide) Next slide.

10 (Slide) Next slide, please.

11 Okay. Just continuing with a summary of
12 the damage, the security system was extensively
13 damaged and as a result a lot of the fences were torn
14 up, light standards were either blown over or at least
15 severely damaged. Another thing that caused a
16 considerable amount of concern, if you'll recall the
17 two large smokestacks associated with the fossil
18 units. One of those stacks had a preexisting crack
19 that had run up the length of the stack. Well, the
20 intensity of the storm severely aggravated that crack
21 and as a result the stack was not structurally sound
22 and eventually had to be knocked down with explosives
23 and it did cause quite a bit of concern for a period
24 of time until it could be removed because of just the
25 mass of material and the fact that it was quite

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1 unstable.

2 As I mentioned, the one day tank on one of
3 the fossil units was cut by a missile and a
4 considerable amount of bunker C oil was blown around.
5 There were five what are called black star diesels
6 which are diesels that were on the site primarily for
7 use by the fossil units. At one point there was --

8 CHAIRMAN SELIN: Small diesels.

9 MR. HEBDON: Moderate size diesels.
10 They're used for starting out from the fossil units,
11 from something analogous to a station blackout type of
12 situation. They were used by the nuclear plant until
13 the two additional diesels were added two years ago.
14 Those diesels, those black star diesels were quite
15 damaged by the oil that was blown around and blown
16 through some of the switch gear associated with them.

17 The other thing, and this is something
18 that Tom will talk about in considerable detail, is
19 that the local infrastructure was very severely
20 damaged. Almost everything that you can rely on was
21 destroyed. People were really in an extremely
22 difficult situation and over a very wide area. I
23 think we've all seen pictures of the area, but the
24 thing that you don't realize is the extent of it.
25 We've all seen pictures of tornadoes that have gone

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1 through areas, but a tornado cuts a path that's maybe
2 from a few hundred to a quarter of a mile wide. You
3 can imagine a tornado that cut a path 30 miles wide
4 and that's the extent of the damage. It was that
5 level of severity but over a much greater area.

6 (Slide) Can I have the next slide,
7 please?

8 This is a picture of one of the security
9 buildings. As you can see, the decision to bring the
10 security people into the class one structures was
11 obviously a good decision.

12 (Slide) Next slide, please.

13 This is a picture of the stack and you can
14 see the crack that developed up the backside of the
15 one smokestack. It was a very severe problem and it
16 did cause quite a bit of concern and that stack was
17 eventually demolished using explosives.

18 (Slide) Can I have the next slide,
19 please?

20 Okay. That completes the initial part of
21 the discussion. At this point I'd like to turn it
22 over to Tom Plunkett to talk about Hurricane Andrew
23 from his perspective, having been at the site during
24 the storm.

25 Can we switch slide trays at this point?

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1 COMMISSIONER REMICK: While we're waiting
2 for that --

3 MR. HEBDON: Are there any questions?

4 COMMISSIONER REMICK: Yes. While we're
5 waiting for that, on the security side, the report
6 indicates that the computer-controlled access to vital
7 areas was lost. I assume that meant that people's
8 cards could not be used to enter. Is that what the
9 meaning of those words are? And therefore was access
10 to vital areas lost at any time?

11 MR. HEBDON: Well, they still had the
12 emergency access. The access was lost, as you said,
13 because the computer was damaged. You can see the
14 security building was very badly damaged and the
15 diesel that would normally have provided backup power
16 to the security computer failed to start. So, the
17 security system computer that drives it was lost, but
18 the actual security system within the plant, within
19 the class one structures, of course, that wasn't
20 damaged by the hurricane, but wasn't available because
21 of the loss of the computer.

22 COMMISSIONER REMICK: I'm not quite sure
23 what you're telling me. You said emergency access was
24 still available. What is emergency access?

25 MR. HEBDON: There are procedures at the

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1 plant to bypass the card readers in the event of a
2 failure of the computer.

3 COMMISSIONER REMICK: By key?

4 MR. HEBDON: By key, yes.

5 COMMISSIONER REMICK: I assume with guards
6 or did operating staff have keys?

7 MR. PLUNKETT: Operating staff had keys
8 and the security force had the keys both.

9 COMMISSIONER REMICK: Okay.

10 MR. HEBDON: And the security force, of
11 course, was all brought into the plant. So, they were
12 inside the plant at the time and they were stationed
13 at various locations.

14 COMMISSIONER REMICK: So, if operators had
15 wanted to get the vital area, they could have gotten
16 there without having to call upon the guards to let
17 them into the vital areas?

18 MR. PLUNKETT: Absolutely, and we did do
19 that.

20 MR. HEBDON: Now, understand, of course,
21 that this is a plant where some of the equipment, for
22 example the auxiliary feedwater system, is located
23 outside. So, there are some areas that they would not
24 have been able to gain access to during the worst part
25 of the storm, simply because they're located outdoors.

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1 They're inside a missile barrier, but they're not in
2 a place where a person can go safely.

3 MR. PLUNKETT: (Slide) Okay. If you're
4 ready, next slide, please.

5 Okay. I have some pictures here that may
6 disrupt your flow on your handout there. So, we'll
7 talk from the slides.

8 I believe most of you have been out at
9 Turkey Point or have visited it, at least in my
10 duration there the last two and a half years. So,
11 you're familiar with this. But you can see, we're
12 obviously right on Biscayne Bay and there's nothing
13 between us and any hurricane that comes in there.

14 (Slide) Next slide.

15 I believe Fred already covered this. The
16 only point I wanted to make here is that these are old
17 plants and old plants means cable vaults that are very
18 tight and small and all that. The only reason I
19 mention that is that we had to move into the cable
20 vault. That became our technical support center as
21 part of our emergency plan during the storm. Very
22 interesting. The Navy people there liked it. They
23 felt at home. I thought it was awful myself.

24 (Slide) Next slide, please.

25 I need to mention this, I think, just to

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1 let you know or give you some perspective on what the
2 situation would have been if we hadn't installed two
3 additional emergency diesel generators there in the
4 1990-'91 time frame. We shut down both units for
5 about 11 months essentially in response to station
6 blackout rule and we added two more emergency diesel
7 generators, which gave us four, and we separated the
8 electrical power systems for the units. Before it was
9 the old way of doing business with the shared
10 electrical power systems. That turned out to be a
11 tremendous boon to us when the hurricane hit.

12 The security system, we were only meeting
13 your requirements by compensatory posts. So, we add
14 a very nice security system there and I only mention
15 that because you'll see what the storm did to that.

16 (Slide) Next slide, please.

17 This is what Turkey Point looked like at
18 5:00 p.m. The eye was directly over the plant. I
19 went out in the eye so if I ever have grandchildren
20 I'll be able to tell them about it. It's not a very
21 smart move and I wouldn't recommend it.

22 (Slide) Next slide, please.

23 After the eye passed over, we could see
24 very little damage out there. I had flashlights, but
25 I couldn't see very much, but I knew it looked bad.

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1 This is what it looked like as we got out of the
2 control room about 7:30, 8:00 in the morning.

3 (Slide) Next slide, please. Next slide,
4 please. Okay. Next slide, please.

5 Okay. This is the track of Hurricane
6 Andrew. The hurricanes, as you all are well aware,
7 start forming over the west coast of Africa. The
8 minute there's any kind of a report of a depression in
9 that area, we start preparations at Turkey Point. In
10 many respects we start preparations a week before a
11 storm gets anywhere near us. I'll use this slide a
12 little later to show you how the reports on the time
13 that the hurricane was supposed to hit Turkey Point
14 turned out to be erroneous. I've got the dates on
15 there. They're a little hard to see. You'll see 19,
16 20, 21, 22, 23. 24 is Monday morning at 4:00 a.m.
17 when it hit. You can see between 23 and 24 the storm
18 covered a lot of distance in a short period of time
19 compared to the two days before. That caused a lot of
20 surprise to the South Florida area.

21 (Slide) Next slide, please. Next slide.

22 We have a very -- I won't go into this,
23 but we have a very detailed procedure and I believe
24 it's going to be attached to this joint NRC-INPO
25 report, which I was glad to hear because any of the

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1 plants that are vulnerable to the hurricane situation
2 on the Gulf or the Atlantic need to get a copy of that
3 and go through it because it really is complete and it
4 really will help them. I won't go through all the
5 details of all the things we did to prepare for the
6 storm, but these preparations were going on like
7 Thursday, Friday, Saturday time frame and we were in
8 contact daily with the emergency planning people in
9 Dade County starting back as early as Tuesday.

10 (Slide) Next slide, please.

11 I believe Fred covered it all. Emergency
12 power, it was obvious to us if a hurricane of what
13 appeared to be a pretty good magnitude back then on
14 Friday and Saturday hit us, that we'd lose off-site
15 power. So, we did all the things that you would
16 expect to make sure that we were in good shape there.

17 (Slide) Next slide, please.

18 One thing we did we felt that because of
19 that entrance road, which some of you may remember is
20 loaded with these Australian pines, they're called,
21 they're trees that are not native to South Florida.
22 They were brought in and they went wild and they're a
23 nuisance tree, but if they're growing, we're not
24 allowed to cut them down. Everybody at that site knew
25 that those trees should not be along that road, but

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1 there wasn't anything from an environmental standpoint
2 we could do about it. The only thing I might add now,
3 there will never be another one of these poke its
4 little head up along that road.

5 But as a result, we made sure that we had
6 emergency supplies available because we were pretty
7 sure that we were going to be locked into that plant
8 for two or three days just in case the storm did hit.

9 We also made communications checks and I
10 can remember on Saturday discussions with Region II,
11 absolutely assuring them that we would not lose
12 communications. I hope they didn't tape that. I
13 never expected what happened to our various
14 communications systems there and I don't think anybody
15 did. But we did have supplies and that turned out to
16 be good. The problem was because we had such a large
17 crew out there on Sunday, that they ate up a lot of
18 the supplies and when it came to Monday, after the
19 storm when we had no way to get in or out, our
20 supplies were severely limited. I'll discuss what we
21 did for that.

22 We also have a relationship or had a
23 relationship with the Air Force. The survival school
24 for their pilots is right behind the plant. So, we
25 made sure they were all set and all tied down and they

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1 were. We also staged pumps essentially for flooding.
2 We had pumps all over that plant tied down. It turned
3 out that what they really became valuable for was for
4 fire protection because once we lost -- that water
5 tank dropped on our fire protection supply system, we
6 were able to take these pumps and just get a suction
7 line into one of our canals out there and able to feed
8 the fire protection header. So, we weren't without
9 fire protection for very long. But that turned out to
10 be a secondary asset of having these pumps everywhere,
11 which we did not realize at the time.

12 COMMISSIONER REMICK: Just a matter of
13 curiosity. Would the IPEEE program have caught that
14 vulnerability?

15 MR. PLUNKETT: I don't think so. I don't
16 think so. Every water tower survived except ours in
17 the area. Ours is the only one that dropped and they
18 suspect it was a missile through the air hit one of
19 the struts. I don't think it would have picked it up.
20 Just gut feel.

21 (Slide) Next slide, please.

22 Okay. Now we're through the watch. The
23 watch came on Saturday and the warning came at 7:00
24 a.m. on Sunday morning. The evacuation of the Florida
25 Keys -- you've got to remember, we sit just north of

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1 Key Largo and it's essentially a one lane highway of
2 about 100 miles or a little more than that down to Key
3 West. Of course, it's of very much concern to try and
4 get the evacuation of the whole Florida Key area
5 going. So, that started officially Saturday morning.
6 So, all the people from the Florida Keys were coming
7 up this one lane road into the area by our plant and
8 in the area surrounding the plant. This was going on
9 all day Saturday and Sunday morning when the warning
10 came out at 7:00 a.m. The bad part about that is that
11 they essentially evacuated right into the storm
12 because the storm missed Key Largo by about two or
13 three miles. So, they would have been perfectly safe.
14 But in reality, you can't make a call like that. They
15 made the right call to get them out of there, but it
16 was just unfortunate that the storm hit where it did.

17 (Slide) Next slide, please.

18 Okay. Now we're talking -- it's hard to
19 read that a little bit, but it will be the 23 time
20 frame. At that stage -- this would be Sunday morning
21 now. At that stage the storm was still moving very
22 slowly and it was predicted to hit sometime late
23 morning or around noon on Monday. About 11:00 Sunday
24 morning we made a decision based on that feedback that
25 we were getting from Coral Gables where the hurricane

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1 center is or was, it's not there anymore, it got blown
2 away. But based on what they were telling us, we made
3 a decision to shut down one of the units at 6:00 p.m.
4 Sunday night, four hours, nice easy shutdown, and then
5 at 10:00 at night shut down the other unit. That
6 turned out to be just barely enough time, quite
7 frankly, for us to shut them down and to get into mode
8 4, or get on RHR. We wanted to make sure we were on
9 RHR.

10 So, that storm, as you can see from the 23
11 to the 24 accelerated very fast and came at us very
12 fast and caught everyone by surprise.

13 (Slide) Next slide, please.

14 With the warning, Sunday morning it became
15 pretty obvious. That thing had been on a straight
16 line at us now for almost two days. Even if it
17 deviated a little bit, we were pretty sure we were
18 going to get smashed pretty hard. So, what we decided
19 to do is we asked for volunteers. We had more
20 volunteers than we needed. We came up with 235
21 people, 35 security officers and 200 of the Florida
22 Power & Light staff would stay out there that night
23 and ride out the storm. We had two shifts of
24 operators, two for each -- it's a common control room.
25 We had two shifts for each unit. So, essentially four

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1 crews of operators out there.

2 At that time, we realized that we were
3 going to have to -- we would not be able to use our
4 technical support center or our operation support
5 centers and those types of things, so we made plans to
6 move those in to the actual class one buildings
7 themselves.

8 (Slide) Next slide, please.

9 Once again, our whole effort out there was
10 based on storm surge. We were expecting a large surge
11 from the storm to hit the site. In reality, the surge
12 hit about 25 miles north. There's a brand new
13 headquarters of Burger King, beautiful facility and
14 that's where the surge hit of almost 17 feet. That
15 got wiped out pretty good. My home, which is about
16 three miles further south of that saw 11 foot surge
17 and then Turkey Point saw an eight foot surge. So,
18 the surge came like this to Turkey Point and then
19 there are reports of it rising again down in the
20 Florida Keys.

21 Installing the life lines between the
22 various locations on that site turned out to be a real
23 good item also because we had no way at all to get
24 around that site and if we would have had to go out --
25 and we did have to use the life lines right as the

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1 storm was leaving to get out.

2 (Slide) Next slide, please.

3 Probably if I had to name one or two
4 things that we did that I thought was the best was to
5 get these operating crews Sunday night. You've got to
6 remember, we've been working out there heavy for three
7 days now getting everything tied down, we thought, and
8 getting ready for this. Sunday night there was an
9 actual lull. So, we took the operating crews over to
10 the simulator and anything we could think of -- I was
11 worried about instrument error. The plant manager was
12 worried about intake cooling water, any of the things
13 we could think of. We just continually ran these
14 scenarios over with the operators and I wish we would
15 have had a video of how they performed during the
16 storm when all this hit and we started losing all
17 these things. Absolutely a great performance.

18 So, this really was a plus thing to do.
19 Then, of course, putting the people in the other
20 facilities, the class one facilities, allowed us to
21 have radio contact with them. So we could get some
22 idea of what the heck was going on because there was
23 no way you could look out and see.

24 (Slide) Next slide. Okay. Next slide.

25 I'm going to run you through a quick

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1 scenario here of what happened the first three or four
2 days. At 11:00 Sunday morning, I said we made our
3 decision on when we were going to shut down. Wind
4 speeds were at 135 steady at that time and as I said
5 it was directly coming right at us, predicted for mid-
6 morning Monday.

7 (Slide) Next slide, please.

8 We've covered this one. This was to show
9 the acceleration.

10 (Slide) Next slide, please.

11 Sunday night, after we completed the work
12 in the simulator, we started putting people into the
13 TSC, which happened to be that very small cable vault
14 area and shortly after 1:00 a.m. on Monday morning, we
15 had everybody in there. Then at 2:00 we had security
16 make a sweep of the site just to make sure. Now, at
17 this stage, there was one TV channel in Miami, Channel
18 4, that was staying on-line. So, I stayed in my
19 office and we put everybody else over in the plant and
20 the plant manager was in the control room and I had
21 contact with him. I was watching the TV the whole
22 time and that was our intelligence on where the storm
23 was and that's where we were picking up the
24 acceleration of it and the intensifying of it, which
25 was starting to make us, quite frankly, pretty damn

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1 nervous.

2 (Slide) Next slide, please.

3 As was indicated by Fred, we had planned
4 ahead to use 50.54(x). We refreshed our memories with
5 it, became familiar with it again. We weren't sure
6 where all we'd have to use it, but the senior resident
7 was in the control room with us through the whole
8 thing and a very steady guy. So, this was all talked
9 out ahead of time with him and I think it worked out
10 very well.

11 COMMISSIONER REMICK: In the report it
12 mentions that there was adequate flexibility. The
13 only reason I asked this question, going back a few
14 years ago there was at least one member of ACRS that
15 was critical of 50.54(x) as not being as complete or
16 as robust as what FAA provides. Do you agree that
17 it's adequate for your needs?

18 MR. PLUNKETT: It worked fine for this
19 situation for us. I see nothing that would have to be
20 changed or added. We had no problem using it.

21 COMMISSIONER REMICK: Good.

22 MR. PLUNKETT: And we didn't over use it
23 obviously either. That would be a concern.

24 At 3:00 we made a final sweep for all
25 personnel again. About ten minutes after 3:00, I was

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1 watching the television. I was still in my office and
2 it said the storm was hitting Elliot Key. Well,
3 Elliot Key is a little island about eight nautical
4 miles that everyday I can see out my window. It
5 surprised me because it seemed dead calm around there
6 and I couldn't understand that that storm could just
7 be eight miles off. So, I thought it was time. So,
8 I headed to the control room at that time, probably
9 one of the smarter moves. That thing came racing in
10 on us. Unbelievable how that storm was accelerating.

11 (Slide) Next slide, please.

12 By 4:00 a.m., that storm had been roaring
13 for a good half hour. It sounded like a freight train
14 or a jet engine. We could hear stuff, metal, and you
15 could hear noises outside, but you couldn't go out and
16 look. Nobody in the other buildings could see
17 anything at that time. It was still dark, early
18 morning. The bad thing is, about a half hour into
19 the storm, we started losing communications. As you
20 can see on the slide there, it just continued. About
21 maybe an hour and 20 minutes after, about 5:20 or so,
22 we had lost every form of communications we had. We
23 lost off-site power, as you can see on the first unit,
24 about 4:40 and that went smooth as could be. We had
25 one unit on RHR and one unit on RHR and off-site

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1 power. Right after the eye passed over at 5:22, we
2 lost off-site power to the other unit and everything
3 worked. The diesels came up, all the equipment
4 started.

5 (Slide) Next slide, please.

6 This is what it looked like at 5:00 a.m.
7 Turkey Point is essentially in the center of the eye.
8 My home was right at the top of the eye and the Burger
9 King facility is a little bit above that. So, the top
10 half of the storm, right around the eye, is where it's
11 the most severe. Wind velocities, nobody knows.
12 There was just another study published down there in
13 the last couple days that's been making a lot of TV
14 stories. They think there were gusts over 200 miles
15 an hour. Air Force base -- Homestead Air Force Base
16 measured 189 on one of theirs, but Coral Gables, where
17 the Hurricane Center is, most of their instruments
18 left in the 140 mile an hour range. So, nobody really
19 knows. But it was not good.

20 (Slide) Next slide, please.

21 COMMISSIONER REMICK: Tom, you indicated
22 that the diesels came up when you lost off-site power.
23 What are the pros and cons of actually having the
24 diesels running when you anticipate off-site --

25 MR. PLUNKETT: I've had that question

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1 before and we've thought about it. I think -- well,
2 we don't even agree out there on site what we should
3 do, if you want to know the truth. My gut tells me
4 that I'd like to see us cold before it hits. The
5 plant manager feels he wants to have steam for aux.
6 feedwater, and there's pluses and minuses to both of
7 those. I would say it would -- at least have them
8 running. I wouldn't be connected into them, but have
9 them running. But we had just run them the day
10 before. We were pretty confident in them.

11 COMMISSIONER REMICK: Okay.

12 MR. PLUNKETT: Anyway, by 5:30, 5:45, we
13 had lost all communications. I've got to tell you
14 that was a very, very difficult time. We knew we were
15 all right. We knew nobody was hurt at that time and
16 we knew that all the safety systems were working, but
17 you didn't know and we knew that our general office,
18 our headquarters didn't know. Just you not having
19 that knowledge is very bad, quite frankly.

20 So, anyway, that's the situation we were
21 in. Then the storm, we could hear it letting up about
22 7:00 a.m., 7:15 or so. So, at that point we made a
23 decision that -- normally you'd send out a rad team
24 just to look around and make sure there wasn't
25 anything on-site or any contamination anywhere. We

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1 decided against that. We felt it was much more
2 important to get a message out than it was anything
3 else. So, that was the first team we sent out.

4 (Slide) Next slide, please.

5 About 7:30, four of us left the control
6 room and we got to the roof of the security building.
7 We had a little hand-held radio and with that hand-
8 held radio we got one message to our general office up
9 in Miami. Now, our general office is about at the
10 same latitude as the airport, so to speak, and that
11 received damage, but not severe damage. So, we had
12 people there and we got one message out that the plant
13 was all right, all the systems were working and that
14 the people were all right. We never really got
15 another message out from that site radio-wise for
16 maybe three or four hours after that.

17 Then we sent the rad teams out. We were
18 pretty sure there wasn't anything to be found. Number
19 one, there wasn't anything on site. We had pretty
20 well cleaned off the site a couple months before, but
21 we were pretty sure there wasn't anything around. But
22 we had to do it and went out and did not find any
23 radiation in the environment.

24 (Slide) Next slide, please.

25 COMMISSIONER CURTISS: Could I ask you on

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1 that point because one of the lessons learned here is
2 that later on in the overviews that the radioactive
3 waste that you did have stored on-site there was
4 adequately secured? When I had visited the site a
5 couple of months ago I guess I left with the
6 impression that you had had some low-level waste
7 stored on-site that sometime before the hurricane, a
8 couple of months, a couple of weeks, I don't recall
9 what, had been just fortuitously shipped for disposal.
10 But had that been at the site where it was at the time
11 of the hurricane would that conclusion still be true?

12 MR. PLUNKETT: No. That's a good point.

13 Turkey Point has been going through a
14 recovery and one of the recoveries is to make that
15 site look really nice again and we work very hard at
16 that. In January of this year we made a decision, and
17 it really turned out to be an economic decision, to
18 get all that rad waste shipped off. We set a six
19 month goal to do that and we did. By June it was
20 essentially almost all gone. It was economic because
21 they were raising the rates at the burial ground, so
22 that turned out to be a very wise move. I think if we
23 hadn't done that there would have been other problems.

24 Basically what we do now is we build up
25 until we can get one truck load and then, boom, it's

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1 gone, and I would highly recommend that. But that's
2 a good point you raise.

3 When we got out of the control room what
4 we saw was -- we'd heard during the eye, one of the
5 operators over in our diesel building had sort of
6 yelled over the radio that he thought the water tower
7 had fallen and he thought the stack was cracked. Well
8 we couldn't hardly believe either one of those, but
9 when we walked down to the control room, lo and
10 behold, I took a look around to the right.

11 I couldn't see the water tower, so I knew
12 it had come down. I could see the stack and I
13 couldn't believe what I was seeing there. So then
14 instead of going over in that direction, I was headed
15 over to the security building so I walked down the
16 turbine deck.

17 (Slide) Next slide, please.

18 That's the stack. You've seen that.

19 (Slide) Next slide, please.

20 Well, let me just talk because this slide
21 here shows that that thing was being held together up
22 there -- this is about halfway up, but the crack went
23 the whole distance -- by the rebar really around it.
24 But that stack was waving back and forth, but it was
25 also breathing. You could see it from the ground, so

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1 it was not a -- I don't think anybody in that site
2 kept one eye off that thing for the next week until we
3 dropped it. I didn't think it would do any damage to
4 us, but I was worried it was going to hit the fossil
5 or could hit the number two stack.

6 (Slide) Next slide, please.

7 Coming down the turbine deck there was a
8 lot of damage, but my gut told me that it really
9 wasn't bad damage. It was a lot of the lighter weight
10 stuff, stuff that we pull -- this is an open air
11 plant, so to speak, and it's stuff that we move over,
12 say a turbine when we work on it, to keep the rain
13 out. Even though it looked really bad, I just didn't
14 think it was that bad and it turned out that way
15 fortunately. The thing that was bad was the damage to
16 the security system.

17 (Slide) Next slide, please.

18 Well, there you go, the parking lot. As
19 I was coming down the turbine deck to head to the
20 security building I looked over and -- this wasn't my
21 car. I have an Oldsmobile and I had moved it to a
22 location I thought was really a good location and it
23 was actually on top of a mustang. What was really bad
24 was what we saw in the parking lot everywhere.

25 (Slide) Next slide, please.

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1 I only show this one over again because
2 this one didn't get exactly tipped over. This one was
3 parked in a number of vehicles and it just kind of
4 lifted up and went over and flipped and we to this day
5 cannot figure out or have any idea how that van was
6 able to be lifted up. It doesn't look like an airfoil
7 and I can't figure out how it got over there, but it
8 just amazed me.

9 (Slide) Next slide, please.

10 Here's the security, what's left. The
11 parts for the security system were everywhere. Debris
12 was just -- the security debris was all over and I was
13 sure that this was going to be critical path to get
14 that unit back on line again. It turned out not to
15 be, but it really, really looked bad that first time
16 down the turbine deck.

17 (Slide) Next slide, please.

18 And then the Bunker C oil was a real mess
19 from the fossil units. It was everywhere. It even
20 got in relay boxes, filters, everything.

21 (Slide) Next slide, please.

22 Just about everywhere you looked in the
23 plant site in the back there was Bunker C oil and
24 debris everywhere.

25 (Slide) Next slide.

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1 Anywhere we had any kind of a warehouse
2 with a roll-up door or anything like that, the roll-up
3 doors were either damaged or missing. This is pretty
4 typical of what the back of the site looked like.

5 (Slide) Next slide, please.

6 This building here, you can't get a
7 perspective here but this was a main warehouse that we
8 had about \$70 million to \$80 million worth of spare
9 parts in this building. We couldn't go in the
10 building for a long time. It was too dangerous
11 because the structure was just hanging there and we
12 had to get in cranes to hold the structure up to get
13 people in.

14 This was probably our largest expense, not
15 expense to Florida Power & Light because it's covered
16 by insurance, but the overall largest claim. Trying
17 to recover the parts, refurbish them, whatever, it's
18 just like starting all over again.

19 (Slide) Next slide, please.

20 These were parts that we had staged for
21 our-- remember we were going to start an outage at
22 midnight Sunday and the storm hit at 4:00 a.m. Monday.
23 These were parts that we had staged for that outage
24 and it just was -- it was awful. They were
25 everywhere.

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1 (Slide) Next slide, please.

2 This was my office.

3 (Slide) Next slide.

4 This was the road going out and those are
5 those Australian pines. It took us almost until
6 Tuesday, late Tuesday evening, early Wednesday morning
7 to get this road open. We weren't worried about
8 getting fuel oil in. We had more than enough fuel oil
9 for the diesels. We were more worried about getting
10 water or food, ice cubes, that type of thing in.

11 (Slide) Next slide, please.

12 Monday morning about noon -- remember we'd
13 been on the diesels since 4:00 a.m. and we had
14 grounds, as you can imagine, the whole plant was just
15 literally with all that salt water spraying we had
16 grounds everywhere. In trying to clear grounds we
17 tripped one of the diesels off-line for three minutes.
18 That was the only time we lost any of the four diesels
19 until, I believe, Thursday.

20 At around 2:00, I was able to get a
21 helicopter down because it was obvious that we were in
22 trouble food-wise. Because we'd eaten up so much of
23 the food on Sunday, we didn't have enough food for
24 Monday night. So I got a helicopter, came down and I
25 went up to our general office and I got a hold of my

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1 counterpart from St. Lucie and he took over from
2 there. Helicopters started coming in, essentially
3 cleaned out a supermarket literally, and some of the
4 stuff they came with I don't even want to know where
5 or how they got it.

6 (Slide) Next slide, please.

7 On that little helicopter ride, I took off
8 and went over the Homestead Air Force Base. It looked
9 real bad and when I saw that I asked the pilot to
10 swing around over some of the residential areas and
11 that's when it really hit. This happens to be a
12 place-- it's hard to tell from that slide, but this
13 happens to be a place where a lot of our employees
14 live and I didn't see any homes standing and I think
15 then is when I really started to realize the terrible
16 situation we were going to be in from a people
17 standpoint.

18 (Slide) Next slide, please.

19 This is probably more appropriate for
20 South Florida. Almost everybody down there except me
21 owns a boat. I never will own one. These are
22 \$100,000.00, \$200,000.00, \$300,000.00 boats that were
23 just tossed all over the place.

24 (Slide) Next slide, please.

25 Once I got a hold of St. Lucie they sprung

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1 into action. The good thing about this is that
2 because we happen to be the same company we happen to
3 use the same paperwork for parts and everything else,
4 so they could buy parts and procure them for us and
5 just ship them down to us once we got the roads open.
6 Whether you have that ability or not with a plant
7 within your company, you sure better have a sister
8 plant somewhere around that can help you out because
9 that's the only way we survived is due to St. Lucie
10 taking care of us.

11 (Slide) Next slide, please.

12 The NRC deserved tremendous kudos for
13 getting the satellite communication system down there.
14 The fellow showed up on the last helicopter Monday
15 night about 10:30. I didn't even know who he was or
16 where he was from, but he had this satellite
17 communication system and he spent the night and the
18 morning installing that and that really made a
19 difference.

20 Now let me back up a little bit here.
21 When I saw how bad the situation was from the
22 helicopter we got everybody together Monday night
23 about 11:00 that night. I told them what the
24 situation was, that we didn't have a way out of the
25 plant yet although it looked like we were going to

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1 have access out a little road over a levy early
2 Tuesday morning, and that if they wanted to go home
3 and take a look, fine, go ahead. If they wanted to
4 stay, fine, go ahead, so most people took advantage of
5 that and started -- with four-wheel drive vehicles
6 that survived the storm -- started going out, taking
7 a look at their home, but they immediately came back
8 to the plant because there was nothing there for them.

9 I went out about 10:00 Tuesday morning.
10 The way you went out -- this is weird. There were so
11 many lines everywhere. Everything was laying on the
12 road and you had to -- you'd come up to a set of
13 lines, you'd throw a chain over it to see if it would
14 spark. If it didn't spark, you drove over it and
15 that's how you made your way. The only thing that
16 bothered me about that is that, you know, the guy I
17 was with was about five levels below me on the org.
18 chart and he was driving and I was the guy throwing
19 the chain and something didn't seem right about that.

20 But my house looked real bad and I felt
21 bad. I looked at it about five minutes and I said,
22 "Let's go look at your house." He happened to be
23 about five or six miles inland. It took us about
24 three hours to get over there and I kept reassuring
25 him that he would be all right, but in reality his

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1 house was flattened. There was nothing left of his
2 house, so it was just a real bad situation.

3 We got access to the site then late that
4 night on one lane through that road with the trees and
5 the first thing we wanted in was water. St. Lucie had
6 a tanker of water. As you come to Turkey Point you
7 come down to the end of the turnpike and you make a
8 left turn. It's very simple. Well, the Florida City
9 Police were sitting there at the turnpike and they
10 took that water and diverted it to Florida City. Then
11 they did that again and that was the end of that.

12 We got a hold of Florida Highway Patrol
13 and we told the St. Lucie people what was going on and
14 nobody stopped for anybody. Those trucks came off and
15 just made a left turn, and that's the way it was for
16 a good three or four days there. You really had to
17 look out for yourselves.

18 (Slide) Next slide, please.

19 This was where the surge was. Whoops,
20 back up a bit. This was where the surge was the
21 highest, by that Burger King building, and this huge
22 tanker somehow got -- I still don't know how that
23 happened -- got floated way up on shore and this
24 turned out to be the tourist site. You came there,
25 you had your picture taken, they had hot dog stands

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1 all over. This was just a couple miles from the house
2 and I still can't imagine that storm doing something
3 like that. That's a huge vessel.

4 (Slide) Next slide, please.

5 This is the sad part. As we were driving
6 over to this other fellow's house, the one I went out
7 with on Tuesday morning, everywhere you went there
8 were long lines. This was a line and you can't even
9 see the end of it, but a water company had come in
10 with two truck loads of bottled water, just the quart,
11 not the gallon, and these people were all standing in
12 line for just one quart of water.

13 As you go down this road where the zoo is,
14 that was all demolished. There were animals
15 everywhere. Farm animals were everywhere. It was
16 just unbelievable the human misery right now. This is
17 Tuesday morning after the storm.

18 (Slide) Next slide, please.

19 Wednesday, I'll go through this real fast.
20 Wednesday we got off-site communications back, fiber
21 optics, that made us feel a lot better. Thursday we
22 had our only significant loss of a diesel generator.
23 We lost one for a little over two hours and we were
24 unable to figure out why, but up until then everything
25 had been just absolutely reliable as heck and we

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1 really weren't concerned, worried about the plant at
2 all. Everything was working so well from a safeguard
3 standpoint.

4 (Slide) Next slide, please.

5 Fred showed this picture, but I just want
6 to emphasize it. This is where we slept and this is
7 where we ate, on the grass out there on the plant.
8 You slept out there at night, because when the sun
9 went down there wasn't any lighting or power and it
10 got dark fast.

11 That building you see with the four tanks,
12 those are 55 gallon drums on top of it there. What we
13 did is design a MASH-like, MASH TV-like shower. I'll
14 tell you, we got that, I took a shower. I think it
15 was like early Thursday morning. I've never -- you
16 know, just a gravity-fed -- boy, was that nice. And
17 that turned out to be -- that and ice cubes turned out
18 to be the best thing that happened to us on Thursday.

19 (Slide) Next slide, please.

20 On Friday we had enough communications
21 back. On Friday we got our first off-site line back.
22 The problem was, I've been through two other losses of
23 off-site power in my career and both times your goal
24 was to quick get off the diesels and get back on off-
25 site power. That's just the opposite here.

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1 We felt that there was no reliability on
2 the off-site power. We did not want to shut the
3 diesels off. We just didn't believe that those lines,
4 just having one line in would work, and sure enough
5 about a few hours later that line relayed out and that
6 would have caused -- if we had gone on it, that would
7 have caused another blackout and the diesels up and
8 running and all that, so we actually stayed on it for
9 quite a while.

10 (Slide) Next slide, please.

11 It wasn't until Sunday afternoon actually
12 before we finally switched off of off-site power and
13 then I still was nervous, quite frankly, because we
14 still only had one line, but the second line came in
15 on Monday and then things relaxed a little bit.

16 (Slide) Next slide, please.

17 This was that stack you saw.

18 CHAIRMAN SELIN: Why did you switch to
19 off-site power when you only had one line? Were you
20 running out --

21 MR. PLUNKETT: It was stable. It had
22 stayed in place for almost a day and a half and hadn't
23 relayed out, so it looked like it was stable and our
24 relay people said that it was stable by then.

25 CHAIRMAN SELIN: From a diesel point of

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1 view, could you have continued with on-site power?

2 MR. PLUNKETT: Oh, yes.

3 CHAIRMAN SELIN: So it was purely a
4 judgment --

5 MR. PLUNKETT: Judgment call, yes.
6 Essentially we delayed two days before we went on off-
7 site power to make sure we had a stable system.

8 COMMISSIONER REMICK: Did you have
9 sufficient steam during that whole time for the
10 auxiliary feedwater pumps?

11 MR. PLUNKETT: No. We were cooling down
12 in RHR. We wouldn't have -- no.

13 We dropped the stack -- we didn't, a
14 contractor did, on Monday and it fell right where he
15 said fortunately.

16 (Slide) Next slide, please.

17 There's lots of lessons learned, there's
18 big lessons and little lessons. There's one big
19 lesson and that big lesson is people. There's a lot
20 of little lessons which we have to take care of and
21 Fred and I will be talking them a little bit. You
22 know, the communications and all that stuff. But the
23 real key is the people.

24 (Slide) Next slide, please.

25 We provided emergency shelter for our

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1 employees by Thursday. This is Thursday of the week
2 of the storm. People had nowhere to live, no food, no
3 water. They were coming out to Turkey Point, our
4 employees, and pretty soon our training building was
5 filled to the hilt with families. Then we ended up
6 with a child care center there and everywhere there
7 was any square footage, somebody was living in it.
8 Then we were cooking meals for -- on Thursday night we
9 had over 500 people and it became obvious that we just
10 couldn't continue this. St. Lucie was supplying us
11 supplies as far as we could, but when you start
12 cooking for 500 people, that's a lot of people, over
13 grills, which was all we had.

14 So, that became pretty -- people did not
15 have money. We had to get money helicoptered in
16 because ATM machines don't work, nothing works. In
17 fact, that turned out to be a real critical thing.

18 We did everything we could to start
19 helping our people because it was obvious that that
20 was the number one priority. The units were stable.
21 There was no need to worry about getting them back on-
22 line or anything. We had to take care of the people.

23 (Slide) Next slide, please. Next slide,
24 please.

25 You can't see this, but basically what

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1 this is is the former QA manager at Turkey Point came
2 down and set up a working organization out in our
3 parking lot. Our parking lot turned into the
4 equivalent of what we call Home Depots down there. I
5 don't know if you have them up here, but plywood, the
6 roofing paper, the tire, all the supplies you need to
7 try and protect what's left of your house, we were
8 getting. I don't know how this fellow got them. We
9 also had all kinds of trucks show up we were using to
10 move people around and this fellow is a hero in our
11 book down there at Turkey Point. For a QA manager, I
12 think that's pretty good. That's darn good.

13 We had over -- at one time on Labor Day
14 Weekend, we had close to 300 people outside of the
15 Turkey Point organization down there helping us,
16 trying to stabilize people's homes. They'd go out in
17 crews and try and patch up. In many respects half the
18 home or a third of the home would be still all right,
19 try and patch that up so they could live in it in some
20 way or fashion.

21 (Slide) Next slide, please.

22 COMMISSIONER REMICK: How many people did
23 the QA manager have keeping records?

24 MR. PLUNKETT: None. This is a very
25 practical QA manager.

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1 What we did too, we set up phone banks
2 when we got communications because it became obvious
3 that apartments, houses, everything were going to be
4 at a premium. So, we set up phone banks and grabbed
5 everything we could grab. We just took it over the
6 phone. We provided gasoline to our employees for two
7 months at the site because there wasn't any way to get
8 gasoline. The pumps weren't working and we wanted our
9 people to come to work. We had tire repair service
10 out there for two months because you were getting
11 flats almost everyday.

12 But psychological counseling became a very
13 big factor because here were people, many of them --
14 Turkey Point is an old plant. Many of these people
15 had been there 20, 25 years. Their lives, their
16 families, everything they've owned is there and it got
17 wiped out. In fact, I think we're going to be doing
18 psychological counseling for a couple of years.

19 We also provided insurance counseling,
20 which turned out to be a real benefit because the best
21 I'll say at this forum is don't believe any of those
22 commercials. As you probably heard, Allstate is
23 canceling around 300,000 policies down there as we
24 speak.

25 COMMISSIONER CURTISS: With respect to the

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1 situation with your employees, I recall that right
2 after the accident for some time because of the stress
3 that your employees were under and this kind of
4 problem, that you saw an increase in the attention to
5 detail, personal error type problems.

6 MR. PLUNKETT: Right.

7 COMMISSIONER CURTISS: Has that pretty
8 much gone back to pre-hurricane levels now?

9 MR. PLUNKETT: Yes. What happened is we
10 saw -- this is something you track at a plant, is
11 personal errors and types of personal errors and all
12 that. It almost went up by a factor of three after
13 the storm and stayed that way all September until
14 about mid-October. When we got the one unit back on-
15 line again, it seemed to be a real plus for these
16 people because I think they felt they could grab onto
17 something again. You know, a plant was running.

18 There was a major fear, like I said when
19 I met with the employees that Monday night of the
20 storm, the single major fear they had was that Florida
21 Power & Light was going to walk away from Turkey Point
22 and shut it down and never go back again. They were
23 worried about their livelihoods and their jobs. So,
24 for some reason, it carried out until mid-October.
25 Then we went back down to normal.

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1 COMMISSIONER CURTISS: You're essentially
2 where you were before the hurricane?

3 MR. PLUNKETT: Right. That's correct.

4 COMMISSIONER CURTISS: Good.

5 MR. PLUNKETT: (Slide) Next slide,
6 please.

7 We're trying to do everything we can to
8 maintain our employees and our staff out there. We've
9 got a permanent child care facility on site. We're
10 only licensed for 50 kids right now. We have a big
11 backlog and last week I was at the zoning commission
12 hearings and we got it through there. So, we can
13 build a permanent facility. It will be able to take
14 care of permanent child care for over 100 children.

15 We're building a K through 2 school on
16 site as a satellite school of the Metro Dade System,
17 which is a very popular item because it will be our
18 school, we select the teachers and we run it and it
19 will be a very good school, as you imagine.

20 Then we've done a number of things to
21 retain the operators and retain key employees on site,
22 retention plans, whatever.

23 (Slide) Next slide, please.

24 But this is our number one problem, right
25 here on this slide. It represents the number of

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1 people who have left Turkey Point since the storm. It
2 only runs out to February. That was six months. I
3 can give you some numbers. The bottom curve, the
4 green curve, represents Florida Power & Light. The
5 top curve represents Florida Power & Light and our
6 security employees because even though they're
7 contractor, I like to feel they're really part of our
8 organization out there. We've lost about 84 Florida
9 Power & Light employees, which is about ten percent,
10 a little over ten percent of the staff in eight
11 months. We have a normal attrition rate of about two
12 to three percent without the storm, to give you some
13 idea what's going on here.

14 So, at least from my standpoint, we've
15 finally got a team out there that has a very good
16 facility and we've got to keep them out there.

17 (Slide) Next slide, please.

18 The reason I mention this is that --
19 keeping team out there, is that things have not
20 improved from an infrastructure standpoint at all.
21 This is a picture of the street that I live on taken
22 about six weeks ago. In reality, it looks worse than
23 that now because not the first home on the corner but
24 the next two homes have been totally bulldozed down
25 now and things are just getting started there.

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1 There's a supermarket open and gas stations open and
2 row of pharmacy, but that's all there is in this whole
3 area. We're looking at years here, quite frankly, not
4 months to get things back to normal down there. So,
5 I think our people situation is going to continue for
6 awhile.

7 (Slide) Next slide, please.

8 That's it. That's the story of the
9 hurricane.

10 MR. HEBDON: Tom, if you could answer a
11 few questions.

12 If we could switch back to the first slide
13 tray, the last four or five slides.

14 Were there any questions for Tom?

15 CHAIRMAN SELIN: I had a set of questions
16 that had more to do with things like emergency
17 planning and emergency power and interactions with the
18 state and the county rather than on the one hand the
19 equipment questions. Not just emergency planning, per
20 se, but what happened when you had to deal with people
21 and functions off-site, both the emergency
22 communication systems and the state and the county
23 systems, et cetera. I don't know who's the right
24 person to put these to.

25 MR. HEBDON: Well, the charter of the

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1 group that we had to look into the lessons learned, we
2 only carried out to the point where they restored off-
3 site power. So, most of the emergency planning
4 activity was after that.

5 MR. PLUNKETT: I think I can address a
6 little bit --

7 MR. HEBDON: Tom may be able to address
8 that.

9 CHAIRMAN SELIN: I was thinking during
10 that time. Not the period afterwards, but during that
11 period, what happened to the communication system?
12 How did you try to replace that communication system
13 along the way? I'm talking about the sirens and the
14 emergency communications, not the other ones. There
15 were some problems with that, weren't there?

16 MR. PLUNKETT: Yes. I think I can address
17 some of that, at least I'll try anyway.

18 When I went to my house on Tuesday
19 morning, I didn't see a single siren standing. Coming
20 back, I made a longer route back and still didn't see
21 a single siren standing. So, when I got back, I got
22 a hold of a crew at our general office and they
23 started right on that, reinstalling the sirens again.
24 So, it got top -- Florida Power & Light gave us top
25 priority. I never had any trouble getting that type

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1 of work and effort going. So, that came together
2 pretty quick.

3 As far as dealing with the -- well, a very
4 good lady named Kate Hale for Dade County, she was
5 glad that we weren't a burden to her, quite frankly.
6 She had so many other problems. We had been dealing
7 with her before the storm and telling her what we're
8 doing and when we got the word to her that everything
9 was all right after the storm, we really didn't not
10 become an impact or a factor on all the emergency
11 preparedness and planning and actions that the Dade
12 County people had to take.

13 What we did is the military -- I don't
14 want to make this sound too depressing, but looting
15 was going on, wholesale looting was going on that
16 first week. My family got down there on Thursday and
17 it was not good. Looters were everywhere. Military
18 showed up on Friday and they saved us. They came in
19 all the subdivisions and just took over and ran all
20 those looters out.

21 What we did, when we saw the military get
22 there, we got a hold of the commander, told him the
23 situation. There really wasn't anybody living in the
24 two or five mile radius by then. There was just
25 nothing there. But there were other areas outside of

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1 that. So, we told him where we thought those areas
2 were and we made arrangements with him to communicate
3 if anything happened out at the plant. That was the
4 initial week and trying to handle it the first week
5 and the second week. I don't know what else your --

6 CHAIRMAN SELIN: No. Were you also
7 concerned about if there had been further problems how
8 you'd have gotten people off-site? Were you
9 knowledgeable about what roads were open?

10 MR. PLUNKETT: Oh, yes. Yes, absolutely.
11 There weren't that many roads left open. The turnpike
12 was open and that would have been our normal way out.
13 But there really weren't any people to get out, so to
14 speak, because they were all evacuated or after the
15 storm, if they tried to ride it out, there was nothing
16 left. So, they were gone. So, the military had
17 flooded the whole area, thank God.

18 COMMISSIONER ROGERS: I was just curious
19 about that fiber optics telephone link. How was that
20 done? Did the telephone company have a supply of
21 fiber optic cable handy that they could just bring in?
22 Fiber optics is a little fragile.

23 MR. PLUNKETT: It's fragile and we had it
24 above ground before the storm and they came in and put
25 it underground right after. I don't know how they had

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1 it available.

2 COMMISSIONER ROGERS: But they got that
3 in?

4 MR. PLUNKETT: Oh, yes. They did a good
5 job, very good job.

6 COMMISSIONER de PLANQUE: If you had to
7 pin down the major cause for the turnover, is it more
8 the personal housing situation or is it just
9 everything?

10 MR. PLUNKETT: I don't know. I've lived
11 a number of places in the country. I like it down
12 there. It's a nice place. I think the people that
13 have lived down there like it. But Dade County
14 doesn't have the best reputation in the world. I
15 would suspect that it would be no different than my
16 family. The spouses, I don't think, like it as much
17 as the people that work at the plant. When you've
18 lost everything, what happens is the insurance
19 company -- if you were totally wiped out, the
20 insurance companies came in and they gave you all the
21 money for your home at a price that was more than the
22 home was worth. They gave you all the money for your
23 contents and lo and behold you're sitting with
24 \$200,000.00, \$300,000.00 in the credit union.

25 CHAIRMAN SELIN: And they canceled your

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1 policies at the same time.

2 MR. PLUNKETT: Yes, but when you move to
3 Tennessee, it doesn't make any difference. I think
4 that was a lot of it. All of a sudden people had
5 cashed out of everything and it was a very depressing
6 time.

7 COMMISSIONER de PLANQUE: Yes.

8 MR. PLUNKETT: Very depressing time. I
9 think they just moved.

10 MR. HEBDON: I think there's a concern too
11 about whether or not the area would recover. If
12 someone lives in a subdivision of 50 or 60 homes and
13 they're all destroyed, you don't want to be the only
14 one that rebuilds. Or even if three-quarters of the
15 homes are rebuilt, you still are in a subdivision
16 where some number of homes are basically derelicts
17 that have been abandoned by their owners because they
18 turned them over to the insurance company. Of course,
19 now especially with the announcements recently that
20 they're not going to try to rebuild Homestead Air
21 Force Base, I'm sure that will have a fairly strong
22 negative impact as well.

23 MR. JORDAN: Do you have any other of the
24 lessons learned?

25 MR. HEBDON: (Slide) If I could go

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1 through the lessons learned, could I have the first
2 slide, please? Could you back up just one? There we
3 go.

4 The first one is a question about the
5 shutdown of the unit. Turkey Point had a commitment
6 that had derived from the station blackout rule to
7 commence a shutdown within two hours of the expected
8 onset of hurricane-force winds. As it turns out, they
9 had in their procedures a requirement to actually be
10 shut down. So, their requirement said that they
11 should be in mode 4 at least two hours before the
12 onset of hurricane-force winds. So, as a result, they
13 commenced their shutdown the night before. They
14 started about 6:00 at night and the hurricane struck
15 at 4:00 in the morning. As a result, they were in a
16 shutdown condition. They were on residual heat
17 removal and I think that greatly simplified the
18 situation. If they had taken the literal words of the
19 station blackout commitment and it commenced the
20 shutdown shortly before the onset of the winds, about
21 two hours before the storm, the plant would have been
22 in a condition of trying to do a two unit shutdown at
23 the point where off-site power was lost. I think that
24 could have presented more of a challenge for them.

25 So, I think one of the lessons was that

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1 their decision to shut down early, I think, was a very
2 prudent decision and the guidance in the station
3 blackout to commence the shutdown might have left them
4 in a vulnerable position.

5 The humanitarian aid, of course we talked
6 about. One thing to keep in mind, of course, is that
7 hurricanes are predictable. You can see them coming,
8 you can evacuate people out of the way of them, and
9 particularly you can evacuate families. There are
10 other natural disasters, for example a large
11 earthquake, that would have been much worse. It could
12 have produced comparable levels of damage, but without
13 the ability to have evacuated the families ahead of
14 time. And, of course, that would have presented a
15 considerably greater stress on the crew if they had
16 also been faced with the possibility that their
17 families were dispersed around the area and had been
18 injured in an external event that has this kind of
19 damage involved with it. Of course, an earthquake
20 would be an example.

21 (Slide) Can I have the next slide,
22 please?

23 Tom, of course, has talked about the
24 considerable amount of effort that was expended trying
25 to maintain a viable staff. It was almost -- it's

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1 difficult to imagine all the things they had to do.
2 They basically had to create an entire infrastructure,
3 everything from replacing tires to running a small
4 bank to running a child care center. That's the kind
5 of thing that a plant needs to try and do some
6 advanced planning, as much as they can, to understand
7 how they're going to deal with that so that they can
8 maintain a viable staff on the site.

9 The use of the simulator was, I think,
10 something that helped considerably. The operators had
11 just run through most of the procedures that they saw
12 on the simulator the night before, so they were
13 familiar with it. In the very high stress environment
14 that they were placed in, I think that training was
15 very much a good decision and proved to be very
16 valuable.

17 The procedure that Florida Power & Light
18 had put together, Procedure 01-06 was an excellent
19 procedure. It's about 50, 60 pages long and shows a
20 considerable amount of thought and has a considerable
21 amount of detail in it. We have provided a copy of
22 that procedure as an appendix to the report that we
23 prepared and I hope that all the utilities as they
24 received the report will take a look at that procedure
25 and if they are in a situation where they're

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1 threatened by hurricanes, that they consider
2 establishing a procedure like that.

3 One of the things that was striking to me
4 when I talked to the people at the National Hurricane
5 Center was the fact that hurricanes, large hurricanes
6 were considered to be category 3 hurricanes, which is
7 winds in excess of 110 miles an hour, are not
8 particularly rare events. They hit the United States
9 on the average of about once every two to three years.
10 For reasons that are just a statistical anomaly, it's
11 been very quiet for the last 20 or so years.

12 In fact, from Hurricane Hugo in 1989, all
13 the way back to Hurricane Camille in 1969, there's a
14 gap of almost 20 years when a large hurricane had not
15 hit the United States. The people at the Hurricane
16 Center are very concerned that people have become
17 complacent. There are not a lot of people around in
18 some of these areas that are on plant staffs that work
19 in the areas around the plant that are familiar with
20 what it's like to go through a hurricane like this.
21 The message that they were trying to put out is that
22 although Andrew was a little bit extreme, being the
23 third most severe, it's not that unusual that large
24 hurricanes, hurricanes with winds in excess of 110,
25 120 miles an hour, it's not that unusual that they'll

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1 hit the United States. In fact, it does happen with
2 some degree of regularity.

3 (Slide) Next slide, please.

4 We talked about the communications.
5 There, I think, are some additional things that might
6 have been done, with the benefit of hindsight, to make
7 it easier to restore the communications after they
8 were lost. Things like spare antennas that are
9 located in places that people could find them to get
10 the antennas back up.

11 Of course, the satellite communications
12 that the NRC was able to provide, there would be a
13 great advantage if that could be prepositioned and if
14 we could get those satellite dishes to the sites ahead
15 of time. As I understand it, in fact, as Andrew
16 proceeded across the Gulf and approached Waterford,
17 that they were able to get the satellite communication
18 equipment to Waterford ahead of the storm and so it
19 would have been there and they could have set it up
20 immediately after the storm, if it had, in fact, hit
21 Waterford.

22 COMMISSIONER REMICK: Will that be our
23 intent in the future then?

24 MR. JORDAN: That is our procedure now,
25 yes, sir.

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1 MR. PLUNKETT: We have ours now.

2 MR. HEBDON: Well, as I understand it,
3 Turkey Point also has their own satellite as well.

4 MR. PLUNKETT: That's for sure.

5 MR. HEBDON: So, we have that one covered
6 from two directions.

7 The diesel powered pumps proved to be very
8 valuable, although as Tom mentioned they really were
9 not intended to be there for fire fighting
10 capabilities. They did prove to be very useful when
11 the fire fighting system was destroyed.

12 (Slide) Next slide, please.

13 One thing that I think was interesting was
14 the amount of time after the restoration of off-site
15 power until it was reliable. They restored off-site
16 power after about five days and, of course, that was
17 a very high priority. But it remained unreliable for
18 a period of time and as a result Florida Power & Light
19 chose to stay on the diesels for another two days
20 after the off-site power was restored to the site.

21 The ability to have a sister plant, I
22 think, is essential. Not only for events like a
23 hurricane, but also for events like an earthquake
24 where you may need supplies, you may need people to be
25 available that you could take to a site that had been

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1 subjected to an event like this, either a hurricane or
2 a large earthquake, and that these people would be
3 available to provide material and in some cases maybe
4 even to provide people to go to the site to relieve
5 the crews that might be there, that might find
6 themselves in a very difficult situation.

7 We mentioned about the radioactive waste.
8 Fortunately, Florida Power & Light had a relatively
9 small inventory of radioactive waste at the site and
10 they were able to secure that material so that it was
11 not damaged and spread around the local area, which of
12 course would have considerably complicated the
13 recovery effort if there had been large quantities
14 even of low-level waste that had been spread around
15 the area by the storm. It would have made a difficult
16 situation even more difficult.

17 COMMISSIONER REMICK: The waste that was
18 on site, was it in solidified form?

19 MR. PLUNKETT: No. It would be like dry
20 active waste, so to speak, in 55 gallon drums in a
21 concrete block building kind of thing.

22 COMMISSIONER REMICK: Resins? Would you
23 have resins?

24 MR. PLUNKETT: Yes, there were some resins
25 there, but they were in a cask. They were protected.

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1 MR. HEBDON: It's probably the low-level
2 material that would be the worst because those are the
3 kind of containers that could get ripped open and all
4 of a sudden you have yellow plastic bags all over the
5 area. You can imagine what a problem that would be to
6 try to recover.

7 (Slide) Next slide, please.

8 There was a small problem with getting
9 diesel fuel on-site. There was a requirement to do
10 some analysis of the diesel fuel and as a result the
11 trucks had to stay on-site for a long period of time.
12 The drivers, as you can imagine, were not willing to
13 do that or not very anxious to do that because there
14 were substantial needs for diesel fuel in other areas
15 and they wanted to make as many runs as they could.
16 So Florida Power & Light was able to develop a
17 procedure where they sampled the tank at the source
18 and then sealed that tank and made sure that that was
19 the only fuel delivered to the site and eliminated the
20 need to hold up the trucks on-site for a period of
21 several hours.

22 And finally, the major radiological
23 release path was damaged substantially. There was
24 duct work that was destroyed and there were monitors
25 that were damaged as a result of some movement of the

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1 stack that would be used for the normal radiological
2 release path and, as a result, if an additional
3 release had been necessary, they would not have had
4 the capability to monitor that release and it would
5 not have been through the normal release pathway up
6 through the stack that would provide the normal
7 release.

8 Those are all the observations that I
9 have, if there are any additional questions.

10 CHAIRMAN SELIN: How did you feel about
11 the adequacy of diesel with the four generators? Was
12 this plenty to spare or just about right?

13 MR. PLUNKETT: Oh, probably four was more
14 than enough. You've got to remember that place was
15 designed for two. I think three would have been
16 adequate. Four was more than enough.

17 CHAIRMAN SELIN: Hypothetically, if you'd
18 had to run much longer, are these diesels maintained
19 such that they can run indefinitely the way diesels
20 originally are built?

21 MR. PLUNKETT: Yes.

22 CHAIRMAN SELIN: So you wouldn't have been
23 faced with a problem of taking them down for
24 maintenance on a regular basis or anything like that?

25 MR. PLUNKETT: No.

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1 MR. HEBDON: And the diesels do have quite
2 a bit of cross-connect capability, both in the fuel
3 supplies and in the way they can power the units, so--

4 CHAIRMAN SELIN: I should explain. The
5 reason I asked you the question before about emergency
6 communications was not that you would get a hurricane,
7 which is still a rather unusual event, and then
8 another independent event, but that in the case that
9 the hurricane itself had led to a fire or a highly
10 correlated radiological threat. That was what was
11 behind the question, plus the fact that I've been
12 asked it several times by some of your neighbors that
13 live down there.

14 Other questions, Commissioners?

15 COMMISSIONER ROGERS: Did you do your IPE
16 for external events before the storm?

17 MR. PLUNKETT: Yes.

18 COMMISSIONER ROGERS: How did your
19 vulnerabilities compare to actuality?

20 MR. PLUNKETT: Well, it's kind of
21 interesting. We had just finished this type of thing.
22 Pretty close except for that water tower. We never
23 saw that. Pretty close.

24 CHAIRMAN SELIN: Is the staff going to
25 issue a generic letter on water towers?

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1 Forrest?

2 COMMISSIONER REMICK: I'd asked the
3 question about the barometric pressure in the eye and
4 you gave me 922 millibars. Is that the eye or is that
5 the --

6 MR. PLUNKETT: That's the eye.

7 COMMISSIONER REMICK: That is the eye?

8 MR. HEBDON: That is the eye. That's the
9 lowest reading. Of course, the problem they have is
10 damage in the area. The anemometers were all
11 destroyed, so there's really not much in the way of
12 reliable wind speed indication. The barometric
13 pressure was a little more --

14 COMMISSIONER REMICK: I thought it would
15 have been lower.

16 MR. HEBDON: There's only been two lower.

17 COMMISSIONER REMICK: Where are you
18 getting the 16 foot surge, then?

19 MR. HEBDON: That was measured up around
20 the --

21 COMMISSIONER REMICK: I know, but how are
22 you getting the 16 foot surge then? You're saying
23 it's due to the pressure depression.

24 MR. PLUNKETT: Well, it's two things. The
25 pressure depression causes part of it, but the wind

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1 itself amasses water.

2 COMMISSIONER REMICK: Yes, okay. That I
3 can understand.

4 MR. HEBDON: But most of the surge is --

5 COMMISSIONER REMICK: The statement was
6 made it was due to the depression.

7 MR. HEBDON: -- is due to the low pressure
8 in the center, in the eye. As it was explained to me,
9 it acts just like a straw and it just pulls water up
10 into the eye of the storm. So if you were to measure
11 the sea level at the eye it's fairly high and then
12 when the storm gets to land and that mass of water
13 comes up onto the shore it's just released
14 essentially.

15 COMMISSIONER REMICK: I understand that,
16 but you made the analogy of a straw and to me 16 feet
17 is half an atmosphere.

18 MR. HEBDON: That's right. It's also the
19 wind. I mean, there are other factors involved, yes.

20 MR. JORDAN: On the other side of the
21 hurricane you actually have a drop, a severe drop, and
22 that's another problem with plants that need an intake
23 and you end up with a very low level and a problem
24 with having enough water to draw.

25 COMMISSIONER REMICK: Okay.

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1 You talk about the distribution of the
2 report and say "we're going to issue it to our
3 international counterparts," which are generally
4 regulatory bodies and I think they in all cases aren't
5 necessarily good at distributing those to the plants.
6 Is INPO going to through WANO see that these are
7 distributed to utilities?

8 MR. JORDAN: We have discussed that. We
9 are going to go for a large distribution.

10 COMMISSIONER REMICK: Good. I think
11 that's extremely important.

12 MR. JORDAN: And the Europeans are very
13 interested in the storm.

14 COMMISSIONER REMICK: Yes. Others too
15 where they have typhoons and so forth.

16 MR. JORDAN: Definitely.

17 CHAIRMAN SELIN: People who live on
18 islands.

19 COMMISSIONER CURTISS: No further
20 questions.

21 COMMISSIONER de PLANQUE: No further
22 questions.

23 CHAIRMAN SELIN: Thank you. That was a
24 fascinating review. It was very interesting.

25 Had you guys done your study -- how much

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1 communication was there between the FPL study and our
2 study during the time period? They seem to interleave
3 very well when you were presenting them. Was there a
4 lot of communication between the two while you were
5 doing your own?

6 MR. HEBDON: Well, a lot of the input we
7 had to our study, of course, was from interviews with
8 people at Florida Power & Light and so a lot of the
9 insights we gained were from talking with people that
10 had been there.

11 CHAIRMAN SELIN: But you were conducting
12 your own lessons learned more or less simultaneously,
13 weren't you? Did the study groups have a lot of
14 interaction?

15 MR. PLUNKETT: Well, I think it was the
16 fact that we put a senior manager -- that a senior
17 manager was allowed to be on this team I think had a
18 lot to --

19 MR. HEBDON: Yes.

20 MR. PLUNKETT: -- allow the information
21 sharing.

22 MR. HEBDON: We had a representative from
23 Florida Power & Light on our team.

24 CHAIRMAN SELIN: I see.

25 MR. HEBDON: And of course, he provided a

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1 lot of input from some of the things that they had
2 been looking at. We didn't actually go to the site
3 until a number of months after the hurricane, because
4 of just the need to allow them time to stabilize the
5 situation, so it was around late October before we
6 actually started our efforts.

7 CHAIRMAN SELIN: The strict radiological
8 safety-related lessons learned seem rather mild. I
9 don't get the sense that you're foreseeing any change
10 in how we deal with plants that are in high hurricane
11 zones compared to overall plants. Is that --

12 MR. HEBDON: No, the class 1 structures in
13 that part of the plant was relatively unaffected by
14 the storm. There was very little impact in that area.

15 COMMISSIONER REMICK: If I may, I'll ask
16 another question. I assume if there had been a
17 turbine building, that it would have been damaged?

18 MR. PLUNKETT: It would have been gone.

19 MR. HEBDON: Oh, it would have been.

20 MR. PLUNKETT: It wouldn't have survived.

21 CHAIRMAN SELIN: Well, thank you very much
22 for the report.

23 MR. PLUNKETT: You're welcome.

24 (Whereupon, at 3:07 p.m., the above-
25 entitled matter was adjourned.)

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PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: MAY 18, 1993

were transcribed by me. I further certify that said transcription
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**Report on the Effect of Hurricane Andrew on
the Turkey Point Nuclear Generating Station
from
August 20 - 30, 1992**

And

Utility Perspectives by Tom Plunkett, Vice President FP&L

Discussion

- **Plant Description**
- **Storm Description**
- **Preparations**
- **Summary of Damage**
- **Utility Presentation**
- **Lessons Reinforced and Lessons Learned**

Team Composition

- **Team Co-leaders**
 - Mike Haydin - INPO
 - Fred Hebdon - U. S. NRC
- **Team Members**
 - Henry Bailey - U. S. NRC
 - Jack Crlenjak - U. S. NRC, Region II
 - Roger Kenneally - U. S. NRC
 - George Northcutt - INPO
 - David Powell - Florida Power & Light Company
 - Harvey Wyckoff - EPRI

Plant Description

- **4 unit generating station**
- **Units 1 & 2, 430 MW(e) Fossil Fueled**
- **Units 3 & 4, 760 MW(e) Nuclear Fueled**
- **Located in Dade County, Florida
near city of Homestead**

Preparations for Storm

- **Placed sand bags**
- **Staged portable pumps**
- **Verified emergency diesels ready**
- **Topped off diesel fuel tanks**
- **Secured or removed materials and equipment**
- **Trained operators using simulator**

Preparations for Storm (continued)

- **Stationed operators in Class I buildings**
- **Installed “life lines”**
- **Invoked 10 CFR 50.54(x) and moved personnel inside Class I structures**
- **Shutdown both nuclear units and began normal shutdown cooling**

Storm Description

- **Passed directly over Turkey Point about 4:00 a.m. August 24, 1992**
- **Sustained wind speeds - 145 mph**
- **Wind gusts (at least) - 175 mph**
- **Eye of hurricane - 4:45 a.m.
(45 minutes of relative calm)**

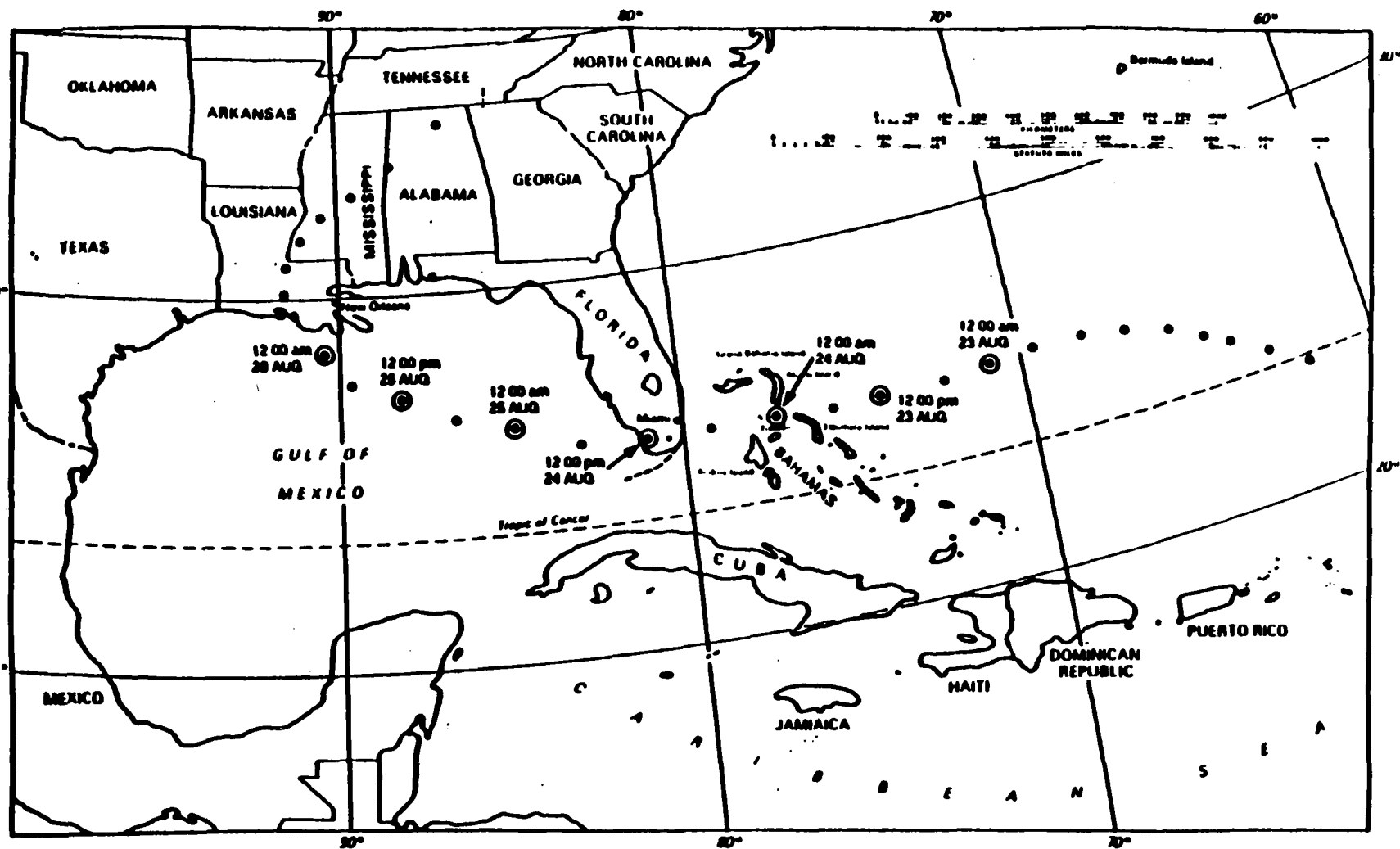


Figure 3.1 Track of Hurricane Andrew.

Summary of Damage

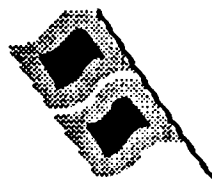
- **Class I structures undamaged**
- **Lost off-site power for five days**
- **High water tower collapsed - damaged fire protection system and water supply**
- **All off-site communications lost for four hours**

Summary of Damage (continued)

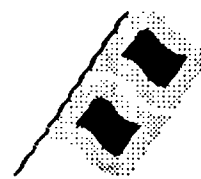
- Numerous outlying facilities and equipment damaged
- Class III structures damaged
- Site access road blocked
- Some employees' vehicles unusable
- Debris (glass, twisted metal, broken material) throughout the nonclass I buildings and outside areas

Summary of Damage (continued)

- **Security system damaged**
- **Fossil plant stack severely cracked**
- **Bunker C fuel oil blown around nuclear plant and in service water intake water supply**



HURRICANE ANDREW



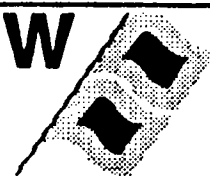
VS

TURKEY POINT

MEDIA DESIGN GROUP (305) 663-3327



HURRICANE ANDREW OVERVIEW



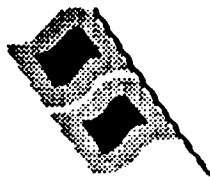
- Hurricane Watch 1700 - 8/22/92 (Saturday)
- Hurricane Warning 0714 - 8/23/92 Unusual Event
- Unit 3 Shutdown (Mode 4 @ 0312 - 8/24/92)
- Unit 4 Shutdown (Mode 4 @ 0405 - 8/24/92)
- Loss of Offsite Power Unit 3 0440 - 8/24/92



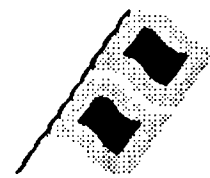
HURRICANE ANDREW OVERVIEW



- **Loss of Offsite Power Unit 4 0522 - 8/24/92**
- **Loss of Fire Protection/Suppression 0916 - 8/24/92 - Alert**
- **Return of Offsite Power Unit 3 1427 - 8/30/92 (Sunday)**
- **Return of Offsite Power Unit 4 1844 - 8/30/92**
- **Downgrade from Alert to Unusual Event 2308 - 8/30/92**

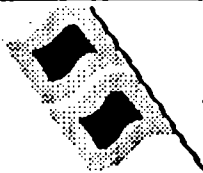


HURRICANE ANDREW

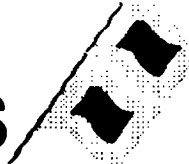


WATCH PREPARATIONS

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WATCH PREPARATIONS



SATURDAY 8/22/92 AND SUNDAY 8/23/92

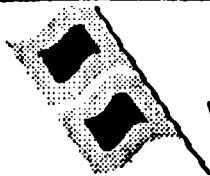
Hurricane Watch Issued 1700 - 8/22/92

● **Implemented 0-0NOP-103.3, Severe Weather Preparations-
Category V Preps**

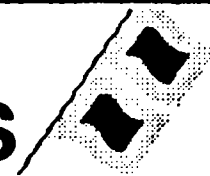
● **Rad-Protection Preparations**

- **Ensured All Rad-Material Containers Were Secured**
- **Pulled Loose Information Postings Down**
- **Distributed Instruments in Different Locations**
- **Removed Trash and Debris, Secured Loose Items**
- **Frisking Stations Established for Sanitary Facilities
in Aux-Building**

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WATCH PREPARATIONS



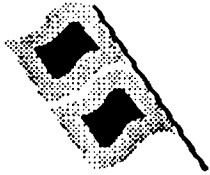
SATURDAY 8/22/92 AND SUNDAY 8/23/92

Hurricane Watch Issued 1700 - 8/22/92

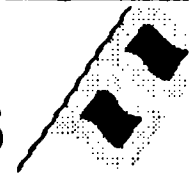
● Emergency Power Preparations

- Test Ran All Emergency Diesel Generators**
- Test Ran DC Driven Auxiliaries**
- Test Ran Electric and Diesel Fire Pumps**
- Topped Off Diesel Oil Storage and Arrange Deliveries**

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WATCH PREPARATIONS



SATURDAY 8/22/92 AND SUNDAY 8/23/92

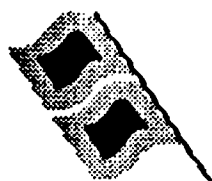
☛ Emergency Planning Preparations

- Frequent Contacts Made With Dade and Monroe County Emergency Managers
- Ensured Emergency Supplies Available (Food, etc.)
- Communications System Checks (NAWAS, ENS Radio Equipment, etc.)

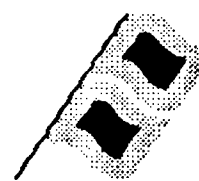
☛ Other Preparations

- Plant Instrument Air Supply Checked
- Ensure Air Force Survival School Was Secured - Contact USAF Base
- Staged Pumps for Fire Protection and Flooding
- Implemented EPIP-20106, Natural Emergencies

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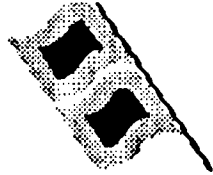


HURRICANE ANDREW

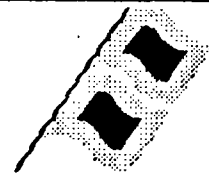


WARNING PREPARATIONS

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WARNING PREPARATIONS

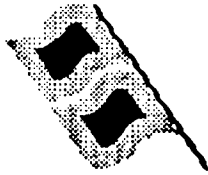


SUNDAY 8/23/92 AND MONDAY 8/24/92

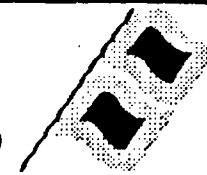
Hurricane Warning Unusual Event 0711 - 8/23/92

- **Implemented EPIP-20106, Natural Emergencies**
- **Initiated 0-OSP-104.1, Record of Meteorological Forecasts (Log Forecasts)**
- **Operations and Rad-Protection Preparations**
 - **Focused All Work on Hurricane Preparations**
 - **Determined Need for Additional Staff (Early 8/23)**
 - **Issued Dosimetry to all Personnel in Advance of Storm**
 - **Considered Need to Relocate TSC, RCA and/or OSC to Cable Spreading Room**
 - **Relocated Some Emergency Response Personnel to the Control Room**
 - **Performed Frequent Walkdowns to Inspect for and Reduce Potential Missiles**
 - **Performed Further Communication Checks as During Watch**

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HURRICANE ANDREW WARNING PREPARATIONS

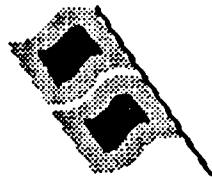


SUNDAY 8/23/92 AND MONDAY 8/24/92

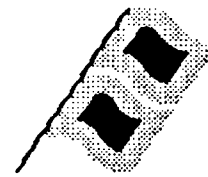
EPIP-20106 (Cont.)

● Operations and Rad-Protection Preparations (Cont.)

- Performed Operability Check of Black Start Diesels 8/23**
- Verified Operability of Battery Chargers and Station Vital Batteries**
- Test Ran Security Diesel 8/23**
- Stopped Various Vent Fans to Lock Dampers and Installed Covers**
- Isolated Miami Dade Water Supply**

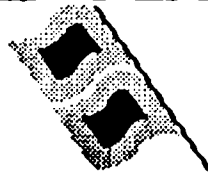


HURRICANE ANDREW

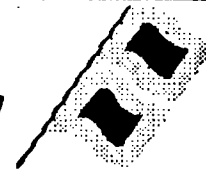


"THE EVENT"

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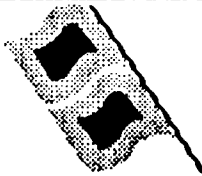


HURRICANE ANDREW

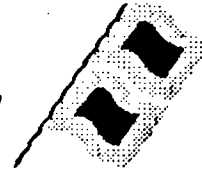


Sunday - 8/23/92

- ☛ 1100 - Andrew Cat. 4 Windspeed = 135 mph
 - Almost Same Latitude as PTN Heading Directly West
 - Storm Predicted to Arrive Early to Mid Monday Morning
- ☛ "Shutdown / Cooldown Both Units to at Least Mode 4 Within Two Hours Prior to the Projected Onset of Sustained Hurricane Force Winds at the Site." EPIP-20106
- ☛ 1800 - Unit 3 Began Shutdown
- ☛ 2005 - Unit 4 Began Shutdown



HURRICANE ANDREW

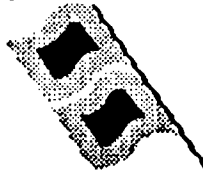


Sunday - 8/23/92 (Cont.)

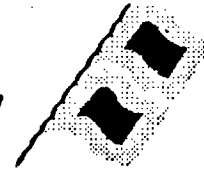
- 2200 - TSC Staffing Began in Cable Spreading Room
- 2322 - TSC Declared Operational

Monday - 8/24/92

- 0115 - Decision Made to Suspend Work and Muster in Cable Spreading Room
- 0200 - Security Accounted for All Personnel in Protected Area

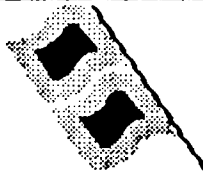


HURRICANE ANDREW

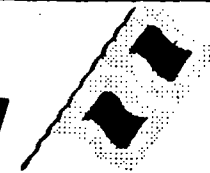


Monday - 8/24/92 (Cont.)

- 0245 - Suspended Safeguards per Security Plan -
Discontinued Fire Watches per 50.54(x)
- 0300 - Final Sweep of Site for Personnel
- 0312 - Unit 3 Reached Mode 4
- 0355 - NRC Notified of Sustained 50 mph Winds
(Storm Arriving Early)



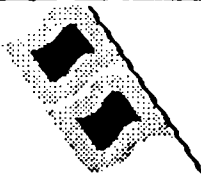
HURRICANE ANDREW



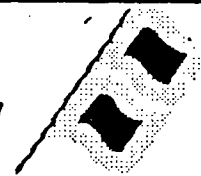
Monday - 8/24/92 (Cont.)

- 0405 - Unit 4 Reached Mode 4
- 0415 - FTS-2000 Communications Lost (NRC Direct Line)
- 0435 - NAWAS Communications Lost (State/Local Direct Line)
- 0440 - Lost Offsite Power to Unit 3 - 3A and 3B EDGs Start and Load
- 0522 - Lost Offsite Power to Unit 4 - 4A and 4B EDGs Start and Load

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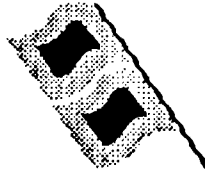


HURRICANE ANDREW

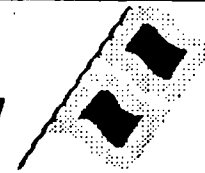


Monday - 8/24/92 (Cont.)

- 0545 - All Offsite Communications Lost
- 0550 - National Hurricane Center in Coral Gables Recorded a One Minute Average Wind Speed of 140 mph
- 0640 - Notified NRC Onsite That With Both Startup Transformers, Deenergized the Plants Must be in Cold Shutdown Within 30 Hours
- 0705 - First Damage Assessment Completed by Turbine Operator

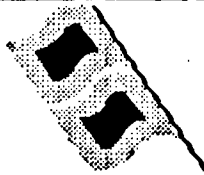


HURRICANE ANDREW

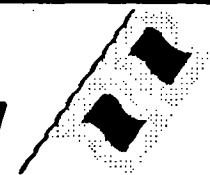


Monday - 8/24/92 (Cont.)

- 0730 - VP, Sec. Comm, and 2 Electricians Try Communications From Top of Security Building
- 0750 - Radio Contact Made With G.O. - Relay to EOF and NRC - Plant OK; People OK
- 0801 - Damage and Radiological Assessment Teams Sent Out (w/Micro R Meters)
- 0900 - Normal RCA Access Control Established



HURRICANE ANDREW



Monday - 8/24/92 (Cont.)

- **0916 - Alert Declared Due to Loss of Fire Protection/Suppression**
- **1157 - 4A EDG Output Breaker Opened During Ground Isolation Attempt**
- **1200 - Restored Power to 4A Buss and Restarted RHR**
- **1400 - VP Helicopters to GO for Assistance**



HURRICANE ANDREW



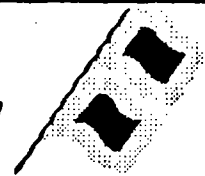
Monday - 8/24/92 (Cont.)

- 1400 - First Cellular Phone Contact Made With EOF From Turkey Point
- 1430 - VP Contacts St. Lucie From EOF for Assistance
- 1536 - Established Intermittent Communications With NRC and State via Cellular Phones
- 1950 - Updated NRC With Plant Status via St. Lucie
- 2315 - NRC Updated From EOF in Central Miami

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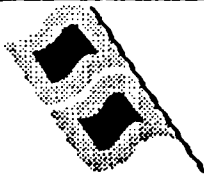


HURRICANE ANDREW

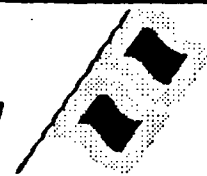


Tuesday 8/25/92

- ☛ **0010 - NRC Starts Installation of Satellite Communications System**
- ☛ **0505 - Some Access to the Site Restored via the Levee Road**
- ☛ **1705 - Unit 3 in Mode 5 - Entered Without Surveillance on Overpressure Mitigation System per 50.54(x)**
- ☛ **1800 - Access to Site via Palm Drive Was Restored**
- ☛ **1845 - NRC Notified That All Offsite Warning Siren Capability Lost**



HURRICANE ANDREW



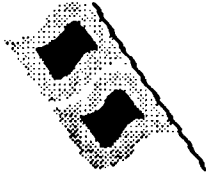
Wednesday 8/26/92

- ☛ 0200 - Restored Offsite Communications via Fiber Optics
- ☛ 1015 - Unit 4 in Mode 5 - Entered Without Surveillance on OMS per 50.54(x)
- ☛ 1143 - All FPL Employees Allowed Access to Site

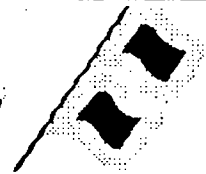
Thursday 8/27/92

- ☛ 0705 - 3A EDG Lost Due to Lockout
- ☛ 0943 - 3A EDG Started 3A Bus Restored

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HURRICANE ANDREW

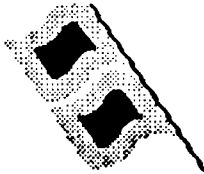


Friday 8/28/92

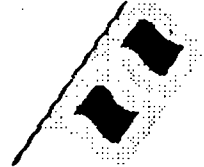
- ☛ 1300 - All Major Phone Communications Restored Including FTS-2000
- ☛ 1345 - Davis #1 240 kv Line Energized to Turkey Point
- ☛ 1800 - Notified NRC of Asbestos Release to the Environment
- ☛ 2020 - Lost Davis #1 Line

Saturday 8/29/92

- ☛ 0010 - Davis #1 Line Returned to Service



HURRICANE ANDREW



Sunday 8/30/92

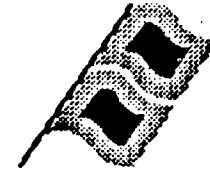
- 1427 - 3A Safeguards Bus Energized From Offsite Power
- 1844 - 4A Safeguards Bus Energized From Offsite Power
- 2308 - Alert Terminated - Fire Protection/Supression Functional (Pressurized Header and Components and Ran Test)

Monday 8/31/92

- 1855 - 60 Meter Meteorological Tower Returned to Service
- 2336 - Second 240 kv Line Restored (Flagami #2)



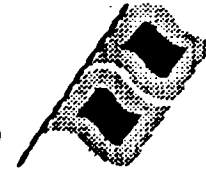
LESSONS LEARNED



- **The Need to Be Prepared**
- **Ability to Communicate After a Category Five Hurricane**
- **Off-site Relief and Supplies**
- **Importance of Reliable Emergency Power Sources and Backup Fire Suppression Methods**
- **Providing for Employees**



PROVIDING FOR EMPLOYEES

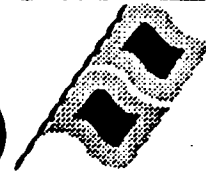


- **Emergency Shelter of Our Employees
and Their Families**
- **Emergency Repairs to Employees Homes**
- **Providing Temporary Transportation and
Moving/Storage of Personnel Possessions**
- **Assisting With Temporary Transportation**
- **Providing Supplemental Financial
Assistance to Replace Personnel Vehicles**
- **Organized Child and Infant Care**

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PROVIDING FOR EMPLOYEES (Cont'd)



- **Developed Temporary Housing Alternatives**
- **Provided Emergency Gasoline**
- **Provided Employees With Psychological Counseling**
- **Provided Employees With Financial and Insurance Counseling**
- **Long Term Actions**



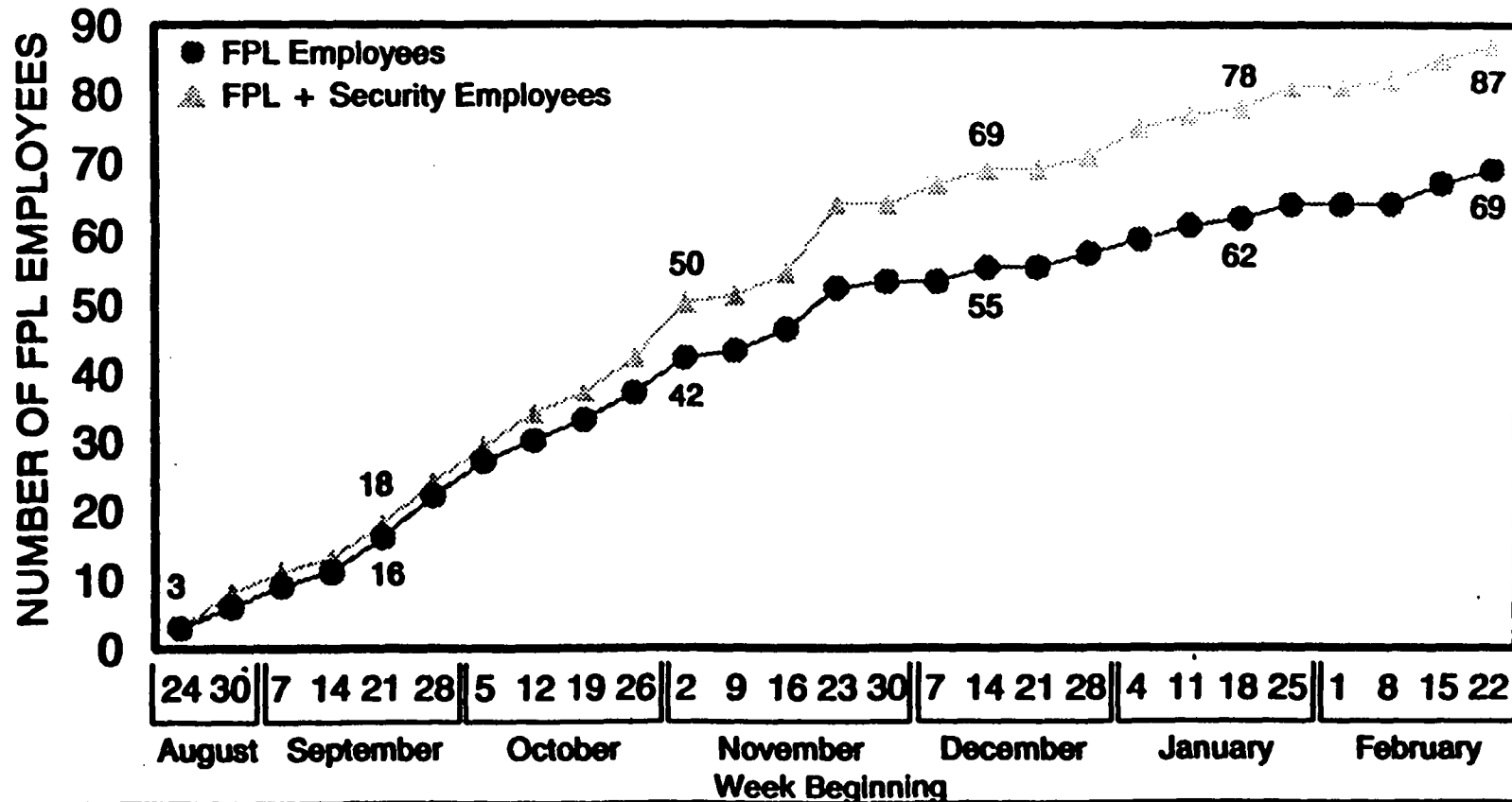
PEOPLE ACTIONS LONG TERM



- Permanent Child Care Facility
On Site
- K-2 School On Site
- Key Employee Retention
Plans

TURKEY POINT TURNOVER

SINCE 08/24/92 (6 MONTHS)



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Lessons Reinforced and Lessons Learned

- **Plant procedures required shutdown (mode 4) two hours before hurricane winds**
- **Plant shutdown on residual heat removal simplified riding out the storm**
- **Humanitarian aid for plant staff included housing, feeding, transporting families for several days**

Lessons Reinforced and Lessons Learned (continued)

- **Significant effort expended in meeting physical and emotional needs of plant staff and families**
- **Use of control room simulator before storm enabled operators to be more alert to likely transients**
- **Extensive preplanning and implementation of emergency procedure 20106 was important in mitigating storm effects**

Lessons Reinforced and Lessons Learned (continued)

- **Additional planning for restoration of communications would have speeded recovery**
- **Temporary satellite communications provided by U. S. NRC aided recovery - would have been better if on site before storm**
- **Diesel-powered pumps (staged for draining flooded areas) were used to rapidly restore fire fighting capability when the high water tank collapsed and destroyed part of the fire protection system**

Lessons Reinforced and Lessons Learned (continued)

- **Offsite power was unreliable after it was initially restored**
- **The materials and resources supplied by St. Lucie were helpful during the recovery**
- **The radioactive waste stored on site was adequately protected from the elements - This prevented spread of low level waste.**

Lessons Reinforced and Lessons Learned (continued)

- **The development of a procedure to analyze diesel fuel before it was sent to site permitted better use of trucks that were critical to the surrounding communities**
- **The major radiological release path could not be monitored because of damage to the plant stack, ductwork, and associated monitoring equipment**