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BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

COLUMBIA, SOUTH CAROLINA

HEARING #15-11488 JULY 21, 2015 10:35 A.M.

DOCKET NO. 2015-103-E:

SOUTH CAROLINA ELECTRIC & GAS COMPANY – *Petition of South Carolina Electric & Gas Company for Updates and Revisions to the Capital Cost Schedule and Schedules Related to the Construction of a Nuclear Base Load Generation Facility at Jenkinsville, South Carolina*

TRANSCRIPT OF TESTIMONY AND PROCEEDINGS **VOLUME 1 OF 3**

HEARING BEFORE: Nikiya M. 'Nikki' HALL, *Chairman;* Swain E. WHITFIELD, *Vice Chairman;* and COMMISSIONERS John E. 'Butch' HOWARD, Elliott F. ELAM, JR., Comer H. 'Randy' RANDALL, Elizabeth B. 'Lib' FLEMING, and G. O'Neal HAMILTON

ADVISOR TO COMMISSION: F. David Butler, Esq.
Senior Counsel

STAFF: Joseph Melchers, General Counsel; James Spearman, Ph.D., Executive Assistant to Commissioners; David W. Stark, III, Esq., Legal Staff; Philip Riley, Doug Pratt, Lynn Ballentine, and Tom Ellison, Advisory Staff; Jo Elizabeth M. Wheat, CVR-CM/M-GNSC, Court Reporter; and William O. Richardson and Colanthia Alvarez, Hearing Room Assistants

APPEARANCES:

K. CHAD BURGESS, ESQUIRE, MATTHEW W. GISSENDANNER, ESQUIRE, MITCHELL WILLOUGHBY, ESQUIRE, and BELTON T. ZEIGLER, ESQUIRE, representing SOUTH CAROLINA ELECTRIC & GAS COMPANY, **PETITIONER**

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APPEARANCES (Cont'g):

SCOTT ELLIOTT, ESQUIRE, representing SOUTH CAROLINA ENERGY USERS COMMITTEE, **INTERVENOR**

ROBERT GUILD, ESQUIRE, representing SIERRA CLUB, **INTERVENOR**

JEFFREY M. NELSON, ESQUIRE, and SHANNON BOWYER HUDSON, ESQUIRE, representing the **SOUTH CAROLINA OFFICE OF REGULATORY STAFF**

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Mr. Guild, do you have any recross?

MR. GUILD: I don't. Thank you, very much.

CHAIRMAN HALL: All right. Thank you, Mr. Marsh. You may step down.

[WHEREUPON, the witness stood aside.]

All right, and we'll take a short break before we call your panel.

MR. ZEIGLER: Nope, we have one more witness.

CHAIRMAN HALL: Okay. So let's talk about this. We have our night hearing starting at 6 o'clock, so we will probably break about 4:45 to give you some time to relax and maybe get something to eat before that. So we'll see how far we go with Mr. Byrne.

MR. ZEIGLER: Perfect. Thank you.

[WHEREUPON, a recess was taken from 3:45 to 4:05 p.m.]

CHAIRMAN HALL: Thank you. Be seated.

All right. Mr. Burgess, whenever you're ready, sir.

MR. ZEIGLER: Madam Chairman —

CHAIRMAN HALL: Oh, Mr. Zeigler.

MR. ZEIGLER: Yes, ma'am. — SCE&G would call Mr. Byrne to the stand.

[Witness affirmed]

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THEREUPON came,

S T E P H E N A . B Y R N E ,

called as a witness on behalf of the Petitioner, South Carolina Electric & Gas Company, who, having been first duly affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. ZEIGLER:

Q Would you please state your name for the record.

A My name is Steve Byrne.

Q By whom are you employed and in what capacity?

A I'm employed by SCE&G. I'm the president of Generation and Transmission?

Q Mr. Byrne, have you prepared or caused to be prepared under your supervision certain written testimony of 47 pages that's been prefiled in the record of this proceeding?

A I have.

Q Are there any changes to that testimony?

A One change, and that is we put some slides in with — that form an annual update to the Commission on the progress of the nuclear construction site. We have updated those slides.

Q All right, sir, so that would be your Exhibit -1, I believe, and we'll get to that in just a second. But as to the testimony itself, are there any changes to the

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1 text of that testimony?
2 **A** There are not.
3 **Q** All right, sir. If I were to ask you the questions
4 contained in those 47 pages today, would your answers
5 from the stand be the same?
6 **A** They would.
7 **MR. ZEIGLER**: Madam Chairman, we'd move Mr.
8 Byrne's prefiled direct testimony into the record
9 at this time, as if given orally from the stand.
10 **CHAIRMAN HALL**: All right. Mr. Byrne's
11 testimony will be entered into the record as if
12 given orally.
13 *[See pgs 237-283]*
14 **BY MR. ZEIGLER:**
15 **Q** And, Mr. Byrne, you, I believe, have two exhibits
16 attached to that testimony; is that correct?
17 **A** I do.
18 **Q** And one of those is the set of slides, which you've
19 updated with some more complete and current slides; is
20 that correct?
21 **A** That's correct.
22 **MR. ZEIGLER**: And I've already, Madam
23 Chairman, provided a copy of that to the other
24 parties and to the court reporter, and would move
25 at this point for those two exhibits to be entered

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1 into the record.
2 **CHAIRMAN HALL**: All right. Mr. Byrne's
3 exhibits will be entered into the record as Hearing
4 Exhibit No. 4.
5 [WHEREUPON, Hearing Exhibit No. 4 was
6 marked and received in evidence.]
7 **BY MR. ZEIGLER:**
8 **Q** Mr. Byrne, have you prepared a summary of your
9 testimony?
10 **A** I have.
11 **Q** Would you please provide that to the Commissioners and
12 the parties present here in the hearing room?
13 **A** Certainly.
14 Good afternoon, Chairman Hall and members of the
15 Commission. As it approaches its seventh year, the
16 construction project for the new nuclear units is
17 passing through a transition point. Initially, most of
18 the risks related to first-of-a-kind nuclear design,
19 licensing, supply chain, staffing, and construction
20 activities, which is understandable for one of the first
21 new nuclear projects in the United States since the
22 1970s. Today, many of the uncertainties related to
23 first-of-a-kind activities have been resolved or
24 mitigated. Unanticipated problems are always possible.
25 The challenge of completing the units is now shifting to

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construction, fabrication, and acceptance testing. These risks are, in many ways, similar to those encountered in other major generation projects.

Since 2008, we have received, effectively, all of the permits or certifications that we identified as being required for the project. These include two of the first four combined operating licenses issued under the new NRC licensing scheme for new nuclear construction. We have successfully recruited a pool of qualified, licensed reactor-operator candidates and trainees for other technical positions, to staff the units. Our constructor and subcontractors have successfully fielded an on-site labor force that numbers approximately 3500 workers, over half of which are South Carolina residents.

Most nuclear supply chain issues have been resolved. At present, all but three of 13 major pieces of equipment for Unit 2 are on site, as is more than a third of the major equipment for Unit 3. To date, there have been no disruptions or losses due to shipping of ultralarge and ultraheavy components from Europe, Asia, and around the United States. Design finalization for the nuclear island is approaching completion, which marks another substantial reduction of risk for the projects.

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Site conditions are fully known. All the required transmission facilities have been sited and many have been built.

The Fukushima disaster has not derailed the project, as we initially believed that such an event might. Construction of the first AP1000 reactor at the Sanmen site in China is largely complete, and this unit is undergoing testing.

Looking forward, we face the challenge of enforcing the EPC contract while maintaining an effective working relationship with the consortium of Westinghouse and Chicago Bridge & Iron, and this is an important challenge. It is taking the consortium too much time and too much labor expense for the scopes of work required to complete the project. For the current schedules to be achieved, the consortium must improve the productivity factors of their workforce. Unfavorable productivity factors have been the matter of frank discussions between the parties, and the consortium's senior leadership recognizes the need to improve in this area.

Another challenge will be the successful completion of inspections, tests, analysis, and acceptance criteria — or ITAAC — required to demonstrate the units' conformity with the design documents. This ITAAC process

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is new to the nuclear industry. Over 1700 ITAACs must be completed for the project. Initial results are good, but we are in the early stages of this process.

Successfully licensing and retaining reactor operators and senior reactor operators is another major challenge. A full complement of licensed operators must be ready for the initial fuel load to take place. Our operators will likely be the first licensed on the AP1000 design. Delays in certification of the plant's reference simulator for operator testing have complicated this effort for the initial class of operator candidates.

In our initial BLRA filing in 2008, SCE&G identified uncertainties around the use of modular construction for nuclear units as a potential source of delay. This is a new technique for commercial nuclear builds. Much of the current delay in the substantial completion dates of the units has been caused by delays in fabrication and delivery of submodules for the units.

Beginning in 2010, SCE&G began raising concerns about delays in submodule fabrication. SCE&G worked diligently to convince the consortium to address these issues. SCE&G challenged the consortium's construction plan and schedule, which the consortium ultimately agreed to thoroughly review. In 2014, the consortium

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provided SCE&G with a revised, fully integrated construction schedule, along with related costs. This schedule reflecting new substantial completion dates for the units of June 19, 2019, for Unit 2, and June 16, 2020, for Unit 3. SCE&G's team of engineering, accounting, and construction experts carefully analyzed this new information. We began negotiations with the consortium over the costs and the approaches to accelerate the work.

In March of 2015, SCE&G determined that the updated costs and construction schedules from the consortium were, in fact, accurate schedules for completion of the project as envisioned by the BLRA. SCE&G therefore submitted the updated BLRA milestone schedule of the consortium for approval in this proceeding, along with the updated capital cost schedule.

Going forward, SCE&G will monitor the revised construction schedule and costs carefully. We will challenge invoices from the consortium when there are grounds to do so. The company has not accepted responsibility for the costs related to the delay in the project and the costs resulting from the consortium's failure otherwise to meet its responsibilities under the contract. At present, the company is challenging several cost categories, including increased costs due

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to project delay and the consortium not meeting initial productivity factors. Where we dispute invoice costs, the EPC contract dictates that we pay 90 percent of these costs while the dispute is resolved. These are the costs that we believe to be — there are costs that we believe to be deficient, and we return those invoices unpaid and we are not seeking review of those in this proceeding.

The costs and construction schedules submitted here are well reviewed, well documented, and reflect reasonable and accurate schedules for the project based on information to date. They are not the result of imprudence by SCE&G in any way. As with any complex project, however, these schedules are likely to change; but based on the current information, they are appropriate for approval as the new BLRA schedules for this project.

This proceeding also serves as our annual construction update. I have a set of slides that I will use to present that update.

MR. ZEIGLER: Madam Chairman, Mr. Byrne may wish to approach the large monitor there, as we go through this process.

WITNESS: It might be a little easier to point things out. If you prefer, I'll stay here, but it

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might be a little quicker if I'm able to point things out.

CHAIRMAN HALL: That's fine. Let's get you a Lavalier mic, so you can move, please.

WITNESS: [Indicating.]

CHAIRMAN HALL: Oh, you've got it. Okay. And, Mr. Byrne, I don't know if you remember, but if you touch it, it'll advance, so — well, Ms. Wheat claims it won't, but I don't know. Good luck to you.

[Reference: Hearing Exhibit 4/SAB-1 Page 1]

WITNESS: Can you hear me? Okay, good. All right. What we have here is an overview of the site from May 2014, so it's a little bit dated. But what you can get is a sense for the layout of the site. In the center you can see the large heavy-lift derrick, the world's largest crane. Unit 2 is towards the bottom of the screen, and Unit 3 is toward the top of the screen.

See, I touched it and it didn't advance.

[Laughter]

What you can see here is — I know this was May 2014 because that's when we set the CA20 module, and you can see the rigging is still attached to that CA20 module. So this large rectangle here

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1 [indicating], which forms a large portion of the
2 auxiliary building, is module CA20.
3 We talk a lot about structural modules on this
4 project. There are six big structural modules.
5 CA20 is one of those. The others are CA01 through
6 -05, and we'll look at those a little bit later.
7 So, CA20 is here, outside of the containment
8 vessel, and it forms most of the auxiliary
9 building. And the circle you can see in the center
10 here [indicating], that is the lower bowl of the
11 containment vessel. The containment vessel is a
12 big steel can; it's about 1¾-inch steel, and all
13 the nuclear components go inside of that
14 containment vessel. So the rest of the structural
15 modules we talk about go inside of that containment
16 vessel.
17 The turbine building for Unit 2 is here
18 [indicating]. This is — we call this module here
19 CR10. This is CR10 [indicating]; it's just a
20 cradle for the lower bowl, so the lower bowl sits
21 in that. The area where we're fabricating the
22 containment vessel, in modular format, is the area
23 that's up here [indicating], and what you see here
24 are a number of ring sections and the lower bowl
25 which will form Unit 3. That's this one here

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[indicating].

So this is what we would call the tabletop for the units. That's where most of the work activities are taking place. The construction site overall is much, much bigger than this.

[Reference: Hearing Exhibit 4/SAB-1 Page 2]

Let me get my clicker [indicating]. Fast-forward to March of 2015 — we don't take aerial pictures all that often, but we have to take them when we can get them — we can see evident here are the cooling towers. What you see are three of the four cooling towers here [indicating]. Two of them here are structurally complete. The third one here [indicating] is actually now structurally complete, and we're probably 25 percent complete with the one that's just a base in the ground in this picture.

The module assembly building, where we do the fabrication of the modules when we get submodules in from Lake Charles and other places, is labled here [indicating] as MAB. And you can see that in the Unit 3 excavation, we've now placed the lower bowl [indicating] — we've now placed the lower bowl for the containment vessel.

And if you go over to the Unit 2 side, we've placed the first ring section on top of the lower

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bowl there that's next to CA20. And we've actually moved the second ring section adjacent to the excavation. It's ready to go, but I need to set a very large module called CA01 inside the containment vessel, because the crane — big as it is — doesn't have the clearance to lift over two ring sections of a module that's almost 100 feet tall. So we're waiting on that one. You can see that the other ring sections up here, CB&I Services is completing those. They're essentially complete with the ring sections, and they've actually started on the top dome section for that.

The heavy-lift derrick is labeled in the middle, and you can just see the switchyard. That's the Unit 2/3 switchyard, completely separate and independent from the Unit 1 switchyard, evident up here in the top [indicating]. You just see the turbine building for Unit 2 and some modules that are being assembled for the turbine building superstructure for Unit 3.

[Reference: Hearing Exhibit 4/SAB-1 Page 3]

This is just to show you that we're having some struggles with parking facilities. We've had to run new parking lots. As you get more and more employees — we've got about 3500 contract employees

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1 working here. In addition to that, we've got
2 probably 560 to 580 SCE&G employees — all of whom,
3 by definition, are South Carolina residents — who
4 are also working on the project: some of them down
5 here [indicating] on the tabletop, and some of them
6 [indicating] up in our administration building.
7 And you can see some shield building panels —
8 and we'll talk about the shield building later.
9 We're just staging them at the corner of this
10 parking lot [indicating].
11 [Reference: Hearing Exhibit 4/SAB-1 Page 4]
12 These are the big six structural modules,
13 absent CA20, so these are the structural modules
14 that go inside of the containment vessel. So these
15 are CA01 through CA05, and you can see in the
16 center basically how they fit together inside of
17 that containment vessel.
18 [Reference: Hearing Exhibit 4/SAB-1 Page 5]
19 Because of some problems we've had with the
20 Lake Charles facility, the contractor — the
21 consortium — has agreed to descope that facility,
22 and they've moved the fabrication of some of these
23 submodules to other places. This is just a
24 representation of where they're moving from Lake
25 Charles. Some went to a facility called SMCI in

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1 Orlando; some are at Newport News Industrial in
2 Newport News, Virginia; some to Oregon Iron Works,
3 in Oregon; and some to Toshiba and IHI in Japan.
4 So the submodules are moving out to other places.
5 [Reference: Hearing Exhibit 4/SAB-1 Page 6]
6 This is an example of the first submodule.
7 The top is just the rigging; the submodule is
8 actually down here [indicating]. This is one of
9 the submodules for CA01 for the trailing unit, Unit
10 3, that was built at the Toshiba facility, and this
11 is at the port in Yokohama, coming over here. This
12 is actually on site now.
13 [Reference: Hearing Exhibit 4/SAB-1 Page 7]
14 This is another of those modules. This is
15 module CA05. It is inside of the containment
16 vessel now, so this has been set. You can see the
17 containment vessel walls up here [indicating], with
18 penetrations going through. Those holes are
19 penetrations for piping and conduit that would go
20 through the containment vessel.
21 [Reference: Hearing Exhibit 4/SAB-1 Page 8]
22 This is module CA02. CA02 forms a tank of
23 water and containment along with -03, and it has a
24 couple of openings for a passive residual heat-
25 remover heat exchanger to go through, so that's

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what those holes or openings are. This is inside the module assembly building. Behind it is CA01, but we'll take a closer look at that in just a second.

[Reference: Hearing Exhibit 4/SAB-1 Page 9]

This is the CA01 module. You can see that we have to take the end off the module assembly building to get it out. We did the same thing for the CA20 module when we removed it. You can see this is about 90 foot wide, 95 foot deep, and almost 100 foot tall. It sits on a platform we call a platen. When we take it out, we'll move transporters underneath; we'll jack it up. We'll bring the platform and the module outside, and when we left it with the heavy-lift derrick, the platform will stay in place. We'll take the platform back in and start on the second unit. So this is the wall coming off, and you can see some of the structural steel is still attached to the wall.

[Reference: Hearing Exhibit 4/SAB-1 Page 10]

This is the postcard photograph with all the steel off, the ends off the module assembly building. And the module that's in here is CA01, and CA01 is really all of this [indicating] ready

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to come out.

[Reference: Hearing Exhibit 4/SAB-1 Page 11]

This is it coming out. You see two of the six transporters used underneath. You can see the platform, which is raised off the ground now.

[Reference: Hearing Exhibit 4/SAB-1 Page 12]

And now we've made a turn with those transporters and we're going down alongside the module assembly building towards the crane that will eventually pick up this supermodule.

[Reference: Hearing Exhibit 4/SAB-1 Page 13]

This is the nuclear island for Unit 2. What you notice here is we have a lot of work going on on CA20, which is the big rectangle in the middle. The auxiliary building walls are starting to come up around that CA20 module, and we're waterproofing and then backfilling as we go. And you can see the containment vessel, the first ring section, behind it. The big openings there are for either personnel or equipment, so we've got two equipment hatches and two personnel hatches.

[Reference: Hearing Exhibit 4/SAB-1 Page 14]

This is just a view from the top of the turbine buildings where we're working on top there. I'll show you some more of that in just a second.

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[Reference: Hearing Exhibit 4/SAB-1 Page 15]

This is the turbine building. You can see in the front there, there's a lot of structural steel. We actually have GPS locators on all of that structural steel, so that we don't have to go searching for things; we know where they are.

And if we zoom in a little bit on the turbine building [indicating], what you can see are some feedwater heaters that have already been installed inside the condensers. The turbine building is coming along pretty well.

[Reference: Hearing Exhibit 4/SAB-1 Page 16]

Before we set the actual turbine and generator itself — we'll put those on a pedestal — we have to pour that pedestal. It's about 10-foot-thick concrete, and this is the area where the pedestal will be poured.

[Reference: Hearing Exhibit 4/SAB-1 Page 17]

To get power out of the units, we need transformers to step the power up to 230,000 volts. So instead of a single three-phase transformer, we're going to use three single-phase transformers, and that's these transformers up at the top, plus a spare. We'll have an installed spare.

And the bottom is an on-site, we call it a

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1 switchyard. It's where all the transformers are
2 going to go, and they go on pads and they're
3 separated by thick concrete walls such that, if you
4 have a failure on one, it doesn't impact the next
5 one. All of these main transformer components will
6 go there, plus some auxiliary transformers for the
7 units. There are about eight bays there.
8 [Reference: Hearing Exhibit 4/SAB-1 Page 18]
9 Shield building. The shield building is
10 protection for the containment vessel and all the
11 components inside. It accounts for aircraft
12 impact. It is steel, concrete, steel; it's a
13 composite. It's made at Newport News Industries.
14 Originally it was going to be made at CB&I/Lake
15 Charles, but now made at Newport News Industrial,
16 in Virginia. It comes in panels. Panels will be
17 stacked, welded, and eventually filled with
18 concrete once they're in place around the
19 containment vessel. So you have the containment
20 vessel, about a four-foot annular gap, and then
21 this shield building.
22 The first section of rings is short; it's
23 about three foot tall. And that's what you can see
24 here [indicating], and they're actually testing the
25 fit-up. You can see we've probably got about six

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1 or seven rings to get — six or seven panels here,
2 to start to form a ring section on a pad, that
3 we're just fitting up.
4 [Reference: Hearing Exhibit 4/SAB-1 Page 19]
5 Left-hand side again, here, is the
6 transitional section, the short pieces, and you can
7 see there's a lot of supports that go in between
8 there. And then these panels here [indicating] are
9 taller ones. The other panels, the ones that stack
10 on top, are either eight foot or ten foot tall, and
11 we have 167 of those per unit.
12 [Reference: Hearing Exhibit 4/SAB-1 Page 20]
13 This is from about a week ago. We are lifting
14 the first of those transition sections, so the one
15 on the left, this is the transition section in the
16 air here [indicating], and we've actually placed it
17 on its concrete pedestal next to the containment
18 vessel there [indicating]. So we are starting to
19 place the shield building structure. We placed six
20 of these last week.
21 [Reference: Hearing Exhibit 4/SAB-1 Page 21]
22 This is the containment vessel, just so you
23 get just a reminder. I think you've probably seen
24 this picture before. But it's built in modular
25 format, so there's a bottom head, which has been

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placed for both units, three ring sections, and then a top closure head. And this [indicating] is that top closure head for Unit 2 being assembled at the site.

[Reference: Hearing Exhibit 4/SAB-1 Page 23]

CA04, that's — the reactor actually will go inside of CA04, so this is placing CA04 inside the containment vessel lower bowl, for Unit 3

[Reference: Hearing Exhibit 4/SAB-1 Page 24]

The Unit 3 turbine building. On the top we see the basemat being poured. We've completed pouring this basemat for the turbine building.

On the right-hand side, the structural steel, you see here there's actually three pieces of structural steel here [indicating]. Those are erected in modular format outside the excavation; they get lifted with the heavy-lift derrick and placed on the turbine building basemat.

We make steam to turn the turbine; when you want to condense that steam back to water, you need a condenser. We have three condenser sections that are on the bottom left-hand side. So these are the top portions of the condensers, again being built as modules and will be placed eventually later.

[Reference: Hearing Exhibit 4/SAB-1 Page 25]

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Not everything is a structural module. We do have some mechanical modules. This is an example of one of those. This work was actually supposed to be done at a site in Texas, I believe it is. We moved it to the site to finish it. So we're doing it in a tent on site, and this is an ion exchange module that has now been placed in the auxiliary building already.

[Reference: Hearing Exhibit 4/SAB-1 Page 26]

Major components, I said that most of them are on site. This is just a representation. The blue is Unit 2; green is Unit 3. You can see that we've already received the majority of the components for Unit 2, and a good many of the components for Unit 3. We're nearing completion on these. So one of the concerns we had was manufacturing happening all over the world, and that has not worked out to be as big a problem as the modules have been.

[Reference: Hearing Exhibit 4/SAB-1 Page 27]

This is an example of one of those components. This is a steam generator from Doosan, in South Korea. This is at the Port of Charleston.

[Reference: Hearing Exhibit 4/SAB-1 Page 28]

This is the steam generator that was railed to the site, and it is being offloaded from the rail

car using the heavy-lift derrick.

[Reference: Hearing Exhibit 4/SAB-1 Page 29]

This is the reactor vessel for Unit 3. You'll note the Ravenel Bridge in the background, so this is the Port of Charleston again. And it was railed to the site and is stored at the site now.

[Reference: Hearing Exhibit 4/SAB-1 Page 30]

Some other components that have been coming in from all over the place: We've got the stator for the generator, top left; low-pressure turbine rotors, top right. The sets of tanks on the bottom of this slide are all associated with the passive containment cooling systems, and those tanks came from Mangiarotti, in Italy.

[Reference: Hearing Exhibit 4/SAB-1 Page 31]

Other components — some secondary site components like auxiliary boiler feed pumps, condensate polishers, and then the integrated head package really makes the head — the reactor vessel head — sort of a quick disconnect, so we can lift all the components off together as opposed to disassembling them.

[Reference: Hearing Exhibit 4/SAB-1 Page 32]

This is a pressurizer, and this is stored on site in a tent. So tents are another area we have

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a disagreement with the consortium over who needs to pay for them. This is an example of them staging something inside a tent on site.

[Reference: Hearing Exhibit 4/SAB-1 Page 33]

And our most difficult logistical transport was the deaerator. We have one of these per unit. This is difficult because it's about 140 feet long, so too long to ship by rail. About 300 tons. So we had to ship it on a specially designed trailer; it had a pushing truck, a pulling truck, and a spare truck. This is it going through Camden. It was a photographer's dream. We had a lot of people that came out, and it was almost like a parade

[Reference: Hearing Exhibit 4/SAB-1 Page 34]

Simulator. We have two simulators for the units, one for Unit 2 and one for Unit 3. Those simulators have been up and running for about a year. They're running scenarios on the simulators; we are training operators on the simulators.

[Reference: Hearing Exhibit 4/SAB-1 Page 35]

Transmission. We're not asking for any updates on transmission during this hearing. The transmission is going very well.

[Reference: Hearing Exhibit 4/SAB-1 Page 36]

Water treatment facility. We will supply all

three units, eventually, with one water treatment facility. This is on our property on Lake Monticello, so we're going to take water and purify it from Lake Monticello and provide drinking water and demineralized water for the units.

[Reference: Hearing Exhibit 4/SAB-1 Page 37]

We mentioned Sanmen earlier. This is the Sanmen site. Unit 1 is in the foreground, Unit 2 in the background. You can see that this plant is — physically looks complete, so it is truly nearing completion. They're doing hydrostatic testing and primary and secondary system flushes now. We anticipate that this unit will be on-line somewhere near the end of 2016. So they are and have been about two and a half years ahead of us

And that concludes the update.

[PURSUANT TO PREVIOUS INSTRUCTION, THE PREFILED DIRECT TESTIMONY OF STEPHEN A. BYRNE FOLLOWS AT PGS 237-283]

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DIRECT TESTIMONY OF

STEPHEN A. BYRNE

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

DOCKET NO. 2015-103-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION.

A. My name is Stephen A. Byrne and my business address is 220 Operation Way, Cayce, South Carolina. I am President for Generation and Transmission of South Carolina Electric & Gas Company ("SCE&G" or the "Company").

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE.

A. I have a Chemical Engineering degree from Wayne State University. After graduation, I started my nuclear career working for the Toledo Edison Company at the Davis-Besse Nuclear Plant. I was granted a Senior Reactor Operator License by the Nuclear Regulatory Commission ("NRC") in 1987. From 1984 to 1995, I held the positions of Shift Technical Advisor, Control Room Supervisor, Shift Manager, Electrical Maintenance Superintendent, Instrument and Controls Maintenance Superintendent, and Operations Manager. I began working for SCE&G in 1995 as the Plant Manager at the V.C. Summer plant. Thereafter, I was promoted to Vice President and

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Chief Nuclear Officer. In 2004, I was promoted to the position of Senior Vice President for Generation, Nuclear and Fossil Hydro. I was promoted to the position of Executive Vice President for Generation in 2008 and to Executive Vice President for Generation and Transmission in early 2011. I was promoted to President for Generation and Transmission and Chief Operating Officer of SCE&G in 2012.

Q. WHAT ARE YOUR DUTIES WITH SCE&G?

A. As President of Generation and Transmission and Chief Operating Officer for SCE&G, I am in charge of overseeing the generation and transmission of electricity for the Company. I also oversee all nuclear operations. Included in my area of responsibility is the New Nuclear Deployment ("NND") project in which Westinghouse Electric Company, LLC ("WEC") and Chicago Bridge & Iron ("CB&I") (collectively "WEC/CB&I") are constructing two Westinghouse AP1000 nuclear generating units in Jenkinsville, South Carolina, (the "Units") that are jointly owned by SCE&G and South Carolina Public Service Authority ("Santee Cooper").

Q. HAVE YOU EVER TESTIFIED BEFORE THIS COMMISSION?

A. Yes. I have testified before the Public Service Commission of South Carolina (the "Commission") in several past proceedings.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

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A. The purpose of my testimony is to discuss the current status of construction of the new nuclear Units; the new construction schedule proposed here which is based on the revised, fully-integrated construction schedule provided to SCE&G by WEC/CB&I in the third quarter of 2014 (the "Revised, Fully-Integrated Construction Schedule"); the changes in commercial operations dates for the Units; the updates in cost forecasts; and the operational, contractual and other matters related to the updates to the cost and construction schedules proposed in this proceeding. This testimony is also submitted in satisfaction of the requirement imposed by the Commission in Order 2009-104(A) that the Company provides annual status reports concerning its progress in constructing the Units.

PROJECT UPDATE

Q. PLEASE PROVIDE AN OVERVIEW OF THE PROJECT STATUS.

A. Concerning current status, the project is passing through an important time of transition related to the risks and challenges that will define our efforts going forward. When we began the project, the most important risks were related to first-of-a-kind nuclear construction activities. This project is one of two new nuclear construction projects to be initiated in the United States since the 1970s. It is being licensed by the NRC under an entirely new regulatory framework contained in 10 C.F.R. Part 52. In the early stages of the project, you would have expected risks to reflect that first-of-a-kind nature of the undertaking.

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Today, we still face substantial risks and challenges in completing the project. But many of the uncertainties related to first-of-a-kind activities have been resolved or substantially mitigated. While unanticipated problems are always possible, the challenge of completing the Units is now shifting away from first-of-a-kind activities where major new design, performance, fabrication or regulatory challenges predominate. Today, execution risks related to construction, fabrication and acceptance testing are at the forefront. These tasks pose important challenges, and the challenges are commensurate in scale and complexity with the scale and complexity of this project. But qualitatively, these challenges are not that different from the challenges encountered in other major generation projects. It is a sign of the progression of the project that execution risks related to construction, fabrication and testing risks increasingly define the project rather than the first-of-a-kind nuclear project risks. Reaching this point represents an important milestone in our progress toward completion.

Q. COULD YOU PLEASE ELABORATE ON THE PROJECT'S RISKS AND CHALLENGES AS THEY CURRENTLY STAND?

A. Much of the change in the risk profile of the project has to do with the major risk factors that are being wholly or partially mitigated. For example, in the 2008 BLRA Combined Application, we identified 19 major permits, certifications or categories of permits that were required to construct the Units. *See* Combined Application in Docket No. 2008-196-E

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at Exhibit J, Chart B. Eighteen of the 19 have now been issued and one was determined not to be needed. Receipt of these permits represents the successful resolution of a major risk factor for this project.

Q. COULD YOU OUTLINE SOME OF THE KEY LICENSES, PERMITS AND CERTIFICATIONS THAT THE PROJECT HAS RECEIVED TO DATE?

A. Yes. We have now received:

1. The Combined Operating Licenses ("COLs") for the two Units that were issued by the NRC under 10 C.F.R. Part 52;

2. Amendments to the Design Control Documents ("DCDs") for the AP1000 Units through DCD Revision 19 that were approved by the NRC to incorporate design enhancements to the Units;

3. A Clean Water Act Section 404 permit that was issued by the Army Corps of Engineers related to work in on-site wetlands;

4. Several permits associated with use of Lake Monticello as a source of cooling water and potable water for the project that were issued by the Federal Energy Regulatory Commission ("FERC");

5. A Clean Water Act Section 401 Water Quality Certification and an Environmental Impact Statement issued under the National Environmental Policy Act ("NEPA") for the project, including associated transmission projects, to support other federal permits;

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6. Multiple construction and storm-water permits that were issued by the South Carolina Department of Health and Environmental Control ("DHEC");

7. Several National Pollutant Discharge Elimination System ("NPDES") permits associated with the on-site waste water treatment plant and discharge of blow-down water from the Units' cooling system that were issued by DHEC; and

8. Certificates under the Utility Facility Siting and Environmental Protection Act that were issued by this Commission for the construction of 305 circuit miles of new or reconfigured 230 kV transmission lines to deliver power from the project to our customers.

Q. WHAT OTHER RISK FACTORS HAVE BEEN REDUCED OR AMELIORATED?

A. Let me review where we stand on several of the key risk factors including those that were identified when we came before the Commission in 2008 in the first BLRA proceeding.

1. **Financial Risk.** In 2008, we identified a key risk factor for the project to be uncertainties as to whether financial markets would support SCE&G in raising the capital needed to support construction**.** As Mr. Marsh's testimony demonstrates, SCE&G has successfully met this challenge thus far. The financial markets have developed confidence in the BLRA largely because ORS and the Commission have applied that statute

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in a fair and consistent way. Because of that confidence, to date markets have been comfortable providing capital to the project on reasonable terms, even in times of generally unfavorable market conditions. However, as Kevin Marsh indicates, our May 2015 bond issuance indicates that markets appear to be more concerned about regulatory risk than they have been in the past. Nonetheless, we believe that if regulatory conditions remain stable and consistent, financial markets will continue to support the project through to completion.

2. **Major Equipment**. The design and fabrication of major equipment for the AP1000 Units was an important risk factor for the project when we began. As we stated in 2008:

> Quality controls and manufacturing standards for components for nuclear plants are very stringent and the processes involved may place unique demands on component manufacturers. It is possible that manufacturers of unique components (*e.g.*, steam generators and pump assemblies or other large components or modules used in the Units) and manufacturers of other sensitive components may encounter problems with their manufacturing processes or in meeting quality control standards. Many of the very largest components and forging used in the Units can only be produced at a limited number of foundries or other facilities worldwide. Any difficulties that these foundries or other facilities encounter in meeting fabrication schedules or quality standards may cause schedule or price issues for the Units.

Combined Application in Docket No. 2008-196-E at Exhibit J, page 7.

The first-of-a-kind risks associated with major equipment fabrication have now largely been mitigated. All of the major equipment for an AP1000 unit has been fabricated at least once and in some cases two or

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more times. More than a third of the major equipment for Unit 3, or five out of the thirteen components, have arrived on site. All of the major equipment for Unit 2 has been received on site except three of the thirteen components. In this regard,

a. The Passive Residual Heat Removal Heat Exchanger ("PRHR") while fabricated has been returned to Italy for installation of a Supplemental Restraint Bar to improve its performance and durability.

b. As of May 2015, the Reactor Coolant Pumps ("RCPs") for the AP1000 were successfully undergoing engineering and endurance testing with redesigned bearings. Previous endurance tests indicated a potential problem with the performance of the RCPs' bearings.

c. Squib Valves are important parts of the passive safety features of the AP1000 Units. Prior performance testing of the Squib Valves had shown problems with certain seals. Those seals have been redesigned and as of May 2015 the redesigned valves were undergoing testing and performing satisfactorily.

3. Shipping. The construction of the Units is supported by a global supply chain. Several ultra-large and ultra-heavy components of the Units are fabricated in Asia and Europe. In 2008, we identified important risks related to shipping these components safely and without delay to the

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site. To date, there have been no disruptions or losses due to shipping. The Deaerators, which were approximately 148 feet in length and weighed in excess of 300 tons, have been successfully delivered to the site. Delivery of this equipment was the project's most difficult and complex shipping challenge and was met without loss or delay, or any disruption to the construction plan. The Deaerators were shipped by sea to the Port of Charleston and then by barge to a Santee Cooper dock facility on Lake Marion. From there they were taken on special trailers to the site.

4. **Design Finalization.** Design finalization has been an important risk factor for the project since its inception. As we stated in 2008,

> Under the current NRC licensing approach, there is engineering work related to the Units that will not be completed until after the COL is issued. Any engineering or design changes that arise out of that work, or the engineering or design changes required to address problems that arise once construction is underway, are potential risks which could impact cost schedules and construction schedules for the Units.

Combined Application in Docket No. 2008-196-E at Exhibit J, page 6.

The most challenging aspect of design finalization of the AP1000 Units is finalization of the Nuclear Island ("NI"). The NI includes the Shield Building and containment vessel which house the reactor, steam-generators, refueling equipment and passive safety components of the Units, and the Auxiliary Building, which houses other nuclear components of the plant. Design delay and design changes related to the NI have been a

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major source of delay in the project to date and have contributed to delay in submodule production. As of May 2015, design finalization for the NI was approaching completion, indicating that risks associated with this aspect of the project are being mitigated.

A related development that has reduced risks due to design finalization has been the NRC's successful implementation of the Preliminary Amendment Request ("PAR") process. The License Amendment Request ("LAR") process, which has been in place for some time, allows SCE&G to obtain license amendments when needed to address changes in design documents. These changes arise from finalization of design, constructability issues identified in the field, and similar matters. Processing a certain number of LARs is a necessary and expected part of a construction project involving an NRC licensed facility.

The PAR process was developed less than five years ago to support new nuclear construction. A PAR requires the NRC staff to issue a "notice of no objection" and allows construction work to proceed at the applicant's risk pending issuance of a LAR. We have used the PAR process in several cases to mitigate potential delay in the project. The NRC's successful implementation of the PAR process has been very helpful in mitigating design finalization risk.

5. **Hiring, Training and Retention of Operating Staff.** Another very important risk factor that has been highlighted since the

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beginning of the project was the possible "[i]nability [of SCE&G] to hire sufficient qualified people to operate the plants." *See* Combined Application, Docket No. 2008-196-E, at Exhibit J, Chart A. Without a sufficient team of licensed operators and other staff to operate the Units, initial fuel load would be prohibited and the project would come to a halt. To support initial fuel load, the team must be large enough to staff all necessary positions at the Units around the clock seven days a week with provisions for training and development time and personal and sick leave. Each Unit requires no less than three Senior Reactor Operators ("SROs") and two Reactor Operators ("ROs") to be on duty at all times. Training as a licensed reactor operator takes between 3-7 years depending on the level of nuclear experience that the candidate brings to the job. Because the AP1000 is a new design, there is no pool of trained and licensed AP1000 reactor operators and other personnel potentially available to fill gaps in SCE&G's ranks.

As the Commission is aware from past proceedings, SCE&G's concerns about this staffing issue grew as the project progressed and concerns about the difficulty in finding qualified candidates for training as reactor operators and other skilled positions came into focus. With support from the Commission and ORS, SCE&G redoubled its efforts and expanded its hiring targets to allow for greater rates of attrition. *See* Order 2012-884 at pp. 47-48. We currently have a group of 60 well-qualified

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licensed reactor operator candidates in training and a similarly sufficient number of candidates in training for other technical positions. Training is proceeding well and to date retention has been good. As things stand today, the risk factor related to hiring the staff for the Units when constructed has largely been mitigated. As described below, risk factors remain related to completing the licensing of our staff and maintaining our current retention rates.

6. **Hiring, Training and Retention of Construction Labor.** Another significant risk factor which was recognized when the project began is that WEC/CB&I might potentially be unable to recruit, train and retain a sufficient work force to support construction activities on-site. As we reported to the Commission in 2008, "staffing risks for the Units include both the possible shortage of required workers, which could impact both schedule and cost, and the risk that bidding for the available work force will raise labor costs to levels higher than anticipated." Combined Application in Docket No. 2008-196-E at Exhibit J, page 9. A construction work force of approximately 3,500 WEC/CB&I and subcontractor personnel have been recruited, hired and trained and is working on site. To date, the contractors have been able to staff the project, but we continue to monitor the effect of an improving economy, and increasing labor demand on their ability to do so.

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7. **Site Conditions.** Every construction site has the potential to conceal soil, rock, hydrological or other conditions that can impede or halt construction. Discovering and dealing with those conditions is an important part of the initial stage of any construction project. The construction project for the Units is now past this site discovery stage. Excavation, grading, mapping of subsurface rock, and other site preparation work are complete for the nuclear Units. The most significant issue that came to light in this work was related to a depression in the bedrock underlying Unit 2. It was resolved with the installation of concrete fill. As we stand today, site discovery risk has largely been resolved.

8. **Transmission.** The design, routing and permitting of transmission facilities was another important risk factor in the early stages of the project. As the Commission is aware, the siting plan and schedule for constructing the transmission assets required to support the Units was disrupted when the Corps of Engineers, at the insistence of the Environmental Protection Agency, decided to change its position related to the acceptability of assessing potential transmission-related environmental impacts based on a macro-corridor approach. *See* Order No. 2012-884 at 40-41.

In response to this challenge, SCE&G accelerated the siting of transmission by placing all but approximately 6 miles of transmission lines in or adjacent to existing rights of way. As of May 2015, all necessary

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transmission lines and off-site substations have now been sited and either are completed or are under construction. In addition, the new Unit 2 & 3 switchyard located on the site has been completed and energized. At present, transmission related risk factors are largely resolved.

9. **Fukushima** – In 2008, SCE&G disclosed that

> events that are hypothetical and difficult to predict could result in a change in the current level of political, legislative, regulatory and public support for nuclear generation in particular or for the Units specifically. Such a change could in turn result in additional costs, delays, and difficulty in receiving permits, licenses or approvals for the Units and could possibly place the cost and schedules of the Units in jeopardy. While such events are difficult to predict or envision, any event that casts doubt on the continued safety and reliability of nuclear power . . . could result in such a reversal.

Combined Application, Docket No. 2008-196-E, at Exhibit J, pp.5-6.

On March 11, 2011, a 9.0 magnitude earthquake occurred off the eastern coast of Japan. The epicenter of the earthquake was 112 miles from Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station. The earthquake was the largest Japan has ever experienced and caused all of the operating units at the Fukushima Daiichi Nuclear Power Station (Fukushima Units 1, 2, and 3) to automatically scram on seismic reactor protection system trips.

After the earthquake, the first of a series of seven tsunamis arrived at the site. The maximum tsunami height that impacted the site was estimated

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to be 46 to 49 feet. This exceeded the design basis tsunami height and inundated the area surrounding Fukushima Units 1-4 to a depth of 13 to 16 feet above grade, causing extensive damage to site buildings and flooding of the turbine and reactor buildings. Despite their best efforts, the operators lost the ability to cool the Fukushima Units resulting in damage to the nuclear fuel shortly after the loss of cooling capabilities.

The Fukushima event was the realization of the sort of major disaster risk that was disclosed in 2008. Fukushima could easily have soured public support for nuclear power, delaying and complicating SCE&G's ability to complete the Units.

However, the feared reaction did not occur. President Obama quickly went to the public. He committed his administration, through the NRC, to conduct a comprehensive review of the safety of U.S. nuclear units in light of the disaster. He promised that lessons learned would be identified and applied. Through President Obama's leadership the United States avoided a "knee-jerk" reaction to halt nuclear construction or to close nuclear plants as some proposed.

The location and seismic profile of the Jenkinsville site and the more modern design standards and passive safety features of the AP1000 unit make a disaster on the scale of Fukushima extremely remote for SCE&G's project. Nonetheless, the NRC's review of the Fukushima event has resulted in important improvements in the resources, procedures and safety

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plans for U.S. nuclear reactors. Some of the increased costs experienced in this project since 2011 are a direct result of the application of lessons learned through Fukushima. However, the feared result from such an event, a wholesale loss of public, political and regulatory support for nuclear power, never materialized. This risk factor was triggered but overcome.

10. **Summary.** Risks will remain as to all of these items. They will not disappear until construction of the Units or the applicable components of them are complete and they have been inspected, tested and placed into service. Nonetheless, the nature and extent of risks associated with these items has been greatly mitigated by the progress made on the project to date.

In this regard, one important fact reducing risks is that construction of the first AP1000 reactor at the Sanmen site in China is largely complete physically. That reactor is undergoing flushing and purging in preparation for hydrostatic testing. SCE&G continues to benefit from lessons learned in the Chinese construction project. In fact, Westinghouse personnel participating in the startup of the Chinese reactors are scheduled to participate in the start-up of our Units. The risk profile of our project has changed significantly since the project began. Startup of the Chinese unit will provide an important opportunity to identify any yet undisclosed risks.

In the United States, TVA is also approaching the completion of the

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Watts Bar 2 nuclear plant in Tennessee. Construction on Watts Bar Units 1 and 2 began in 1973. Construction on Unit 2 was suspended in 1988 when it was approximately 80% complete, but was resumed in 2007. Watts Bar Unit 2 will be the last of the pre-AP1000 Westinghouse units to be completed. Through cooperation with TVA we have gained valuable information about the practical issues involved in system turnovers and pre-operational testing. Several of our start-up engineers plan to assist in TVA's start-up activities at Watts Bar to gain information in this area.

Q. WHAT DO YOU CONSIDER TO BE THE MOST IMPORTANT CHALLENGES THAT THE PROJECT FACES GOING FORWARD?

A. As I indicated earlier, the project seems to be moving past first-of-a-kind activities and major design, performance or fabrication challenges to the challenge of executing construction, fabrication and acceptance testing tasks. I do not mean in any way to minimize the importance of these remaining challenges. The project continues to be highly complex with thousands of interdependent tasks and multiple opportunities for problems and delay, even where contractors and subcontractors use great skill and care. In my opinion, the major challenges appear today to be as follows:

1. **Enforcing the EPC Contract while Maintaining a Working Relationship with WEC/CB&I.** It is a critical necessity for the

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project that we effectively enforce the EPC Contract for the benefit of the customers of SCE&G and Santee Cooper. But effectively managing a project of this scope and complexity also requires a close working relationship between the owners and the contractor. This leads to an important challenge, that of maintaining an effective working relationship with WEC/CB&I in spite of mounting commercial disputes over the rights of the parties under the EPC Contract. Striking the proper balance between these two potentially conflicting requirements is a challenge now and will be an increasing challenge going forward. Failure in either direction could be a risk to the project. This effort is complicated by the high level of turnover in WEC/CB&I project management. The senior on-site project managers have resigned, or have been replaced several times since the project began. This turnover has made establishing and maintaining effective working relationships a challenge.

2. **Maintaining Financial Community Support Through a Predictable Regulatory Environment for the Project.** As discussed above, the financial community has demonstrated its willingness to fund the project even in adverse market conditions. However, this willingness depends on the continuation of predictable regulatory environment for the project such as ORS and this Commission have established to date. If the financial community were to lose its confidence in the predictability of regulatory treatment for this project, the Company could lose the ability to

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raise the funds needed to complete it on reasonable terms, if at all. This is a very important risk factor for the project going forward.

3. **Modules and Submodules.** The use of modular construction for nuclear units was new to the commercial nuclear industry in the United States with these projects. In 2008, SCE&G identified risks associated with this production technique as an important risk factor for the project. *See* Combined Application in Docket No. 2008-196-E at Exhibit J, p.7.

> [T]he construction of the Units will employ standardized designs and advanced modular construction processes. The project schedules are based on efficiency anticipated from the use of these techniques. . . . Standardized design and advanced modular construction has not been used to build a nuclear unit in the United States to date. The construction process and schedule is subject to the risk that the benefits from standardized designs and advanced modular construction may not prove to be as great as expected.

See Combined Application in Docket No. 2008-196-E at Exhibit J, p.8.

Experience has shown that to be the case. Delay in production of modules, submodules and Shield Building panels has been a major source of delay for the project. This remains a key focus area for concern going forward.

However, there are indications that problems in this area are lessening. Three of the six major structural modules for Unit 2 (CA04, CA05, and CA20) have now been fabricated and set in place. The fabrication of a fourth (CA01) is physically complete. All submodules for a fifth (CA02) are on site. Submodules for the sixth module (CA03) are being

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received. There are one hundred and sixty-seven (167) Shield Building cylinder panels for each Unit. As of May 2015, more than sixty-eight (68) Unit 2 and six (6) Unit 3 Shield Building cylinder panels had been received on site and initial welding of the first ring of them had begun. However, module and submodule production remains a major challenge for the project.

4. **Shield Building Air Inlet and Tension Ring.** Among the last items of the NI design to be finalized is the design for the Shield Building Air Inlet and Tension Ring. These are design features at the top of the vertical walls of the Shield Building and are the most complicated sets of Shield Building panels to be fabricated.

Delay in design finalization for these items has resulted in delay in finalizing their procurement. WEC/CB&I assures SCE&G that these panels can be fabricated and delivered to site on schedule. Nonetheless, Shield Building construction is currently a critical path item for the project. This means that a delay in fabricating the Shield Building Air Inlet or Tension Ring panels could delay completion of the project. SCE&G is monitoring this area closely.

5. **Productivity Factors.** Construction companies like WEC/CB&I base their construction plans on data they compile indicating the expected amount of labor required to complete specific construction tasks. One measure of productivity is the ratio between the amount of labor

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actually required to perform a particular task, and the amount of labor anticipated to be required, the so called productivity factor, or PF. Higher PFs indicate more labor hours were required than expected.

In compiling a construction plan and budget, the design and engineering documents are reviewed to determine the amount or volume of commodities that need to be installed. The appropriate expected productivity labor factor is applied to each item. Doing so determines the amount of labor required for each scope of work. The amount of labor which is calculated in this way determines both the cost of construction and the schedule for construction.

For various reasons, to date WEC/CB&I has not met the overall PF on which its original cost estimates were based. In preparing the Revised, Fully-Integrated Construction Schedule, WEC/CB&I forecasted an increase its PF across the board. (The higher the rate indicates more hours required for a task). SCE&G has not accepted responsibility to pay for this increased labor. Unfavorable productivity factors have been a matter of frank and direct discussion between the parties, and WEC/CB&I's senior leadership has recognized the need to improve in this area. In justifying their confidence in the revised rate on which the current construction schedule is based, WEC/CB&I points to things like reduced delay in submodule production, increasing levels of design finalization, and lessons learned from construction of the first AP1000 unit in China. They also

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point to the increasing adaptation by the project's work-force to the requirements of nuclear construction. They further reference the assumption that productivity for Unit 3 will improve due to the experience gained in completing similar scopes of work on Unit 2.

SCE&G fully supports WEC/CB&I in its efforts to improve labor productivity and will continue to monitor WEC/CB&I's performance and demand improvement. But the possibility that WEC/CB&I will fail to meet current productivity assumptions for the project represents an important risk to both the cost forecasts and the construction schedule for the project

6. **Testing and Start Up.** In 2008, the NRC's implementation of its new regulatory approach to licensing nuclear units was seen as a major risk factor for the projects. Previously, the NRC issued a permit to begin nuclear construction at the beginning of a project. It only issued a license to operate the unit after construction was complete and comprehensive post-construction testing was done. Under the new approach, which is contained in 10 C.F.R. Part 52, the NRC now issues a single license to build and operate a new nuclear unit. This happens at the start of the construction process. Construction takes place under an active nuclear operating license with all of the regulatory oversight that this entails.

As construction proceeds, and before a new unit is placed in commercial service, the licensee is required to complete a specified

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regimen of Inspections, Tests, Analyses and Acceptance Criteria ("ITAACs"). Successfully completing those ITAACs to the satisfaction of the NRC demonstrates that a new unit has been built in conformity with the design documents and the COL and will perform as designed. This ITAAC process is entirely new to the industry as of the current projects. There are 873 ITAACs that must be completed for each Unit, or 1,746 for the project.

Uncertainties about how ITAACs would be administered was an important risk factor that SCE&G identified in 2008: "[T]he NRC is still developing the process for approving the results of ITAAC tests once they are completed and for resolving disputes or other issues related to the results of those tests." Combined Application, Docket No. 2008-196-E, at Exhibit J, page 4. The NRC has now issued regulatory guidance resolving some of the outstanding issues concerning the review of ITAAC Closure Notification ("ICN") packages. *See* Guidance for ITAAC Closure, 80 Fed. Reg. 265 (January 2, 2015). However, there are still important issues to be resolved, such as how a hearing will be conducted if ITAAC results are challenged. Furthermore, the sheer number of ITAACs to be completed poses a challenge to the schedule for the substantial completion of the Units.

As of late May 2015, SCE&G has successfully completed 22 ITAAC packages and has submitted 20 ICN packages to the NRC. While the ITAAC process seems to be working satisfactorily at present,

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completing the required ITAAC program on schedule remains an important risk factor for the project.

7. **Failure to Obtain NRC Certification of the Full Scope Simulator.** Plant simulators are computer systems designed to model the response of a generating plant to changing operating conditions and operator inputs. They are used for operator training and testing and to support plant operations. Certification of a simulator by the NRC as a Plant Reference Simulator ("PRS") allows that simulator to be used to support an operating nuclear unit and for all training purposes. Successful Integrated Systems Validation ("ISV") testing is necessary for the NRC to approve a plant simulator to serve as a PRS.

During the first quarter of 2015, WEC conducted the required ISV testing on the Unit 2 and 3 plant simulators. As of May 2015, SCE&G and WEC are evaluating the results. If the NRC accepts ISV testing as sufficient, the documentation supporting certification of the simulators as PRS could be completed by the end of 2015.

This approval schedule will not permit certification of the Unit 2 and 3 PRSs in time for them to be used in conducting the integrated operator simulator exams for the first class of candidates seeking licensing as Reactor Operators ("ROs") and Senior Reactor Operators ("SROs"). That exam was scheduled to be offered in May 2015. The schedule also may not

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support testing for the second class of candidates. Their exams are scheduled for November 2015.

In response, WEC and SCE&G have requested the NRC to approve the simulators as Commission-Approved Simulators ("CASs") under the process specified in 10 C.F.R. 55.46(b). However, it is not clear that the NRC will grant CAS approval. The NRC has also indicated that approval of the simulator as a PRS could be delayed until Instrumentation and Control ("I&C") systems for the Units are installed and ITAAC testing is completed. If the NRC takes this position, and denies CAS certification for the simulator, the training and licensing schedule for ROs and SROs candidates might not support initial fuel load for the Units.

8. **Retaining Operating Staff in the Face of Delay.** Delay in completing the Units can cause morale problems among the SROs, ROs and other operating staff that are being trained to operate the Units. These individuals' opportunities for advancement and job satisfaction are often related to operating experience. Delaying the start of the Units postpones the time when operating experience becomes available. A risk factor for the project at present is that morale problems due to delay could increase attrition in these areas.

9. **Instrumentation and Controls Acceptance Testing**. While several existing nuclear units have been retrofitted with digital Instrumentation and Control ("I&C") systems, the AP1000 is the first United

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States reactor to be designed with a site-wide integrated digital I&C system as original equipment. To address testing and commissioning of the new integrated I&C system, WEC has developed a Digital Test Strategy ("DTS") to demonstrate the AP1000 integrated I&C system compliance with design requirements and regulatory commitments. While informal feedback from the NRC has generally been positive, formal acceptance of the DTS by the NRC has not been received. If the NRC does not concur with the DTS and requires that hardware and software testing be delayed until installation is complete, that testing could result in a delay in the scheduled completion of the Units.

CURRENT CONSTRUCTION STATUS

Q. DO YOU HAVE PHOTOGRAPHS OR SLIDES THAT ILLUSTRATE THE STATUS OF CONSTRUCTION AND FABRICATION ACTIVITIES RELATED TO THE UNITS?

A. Yes. Those slides are attached to my testimony as Exhibit No. __ (SAB-1). Let me now review those slides with the Commission and the parties.

Q. HOW MANY PEOPLE ARE CURRENTLY EMPLOYED AT THE JENKINSVILLE SITE?

A. As of March of 2015, of the approximately 3,500 construction personnel working at the site, 57% were South Carolina residents. An

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additional approximately 560 SCANA, SCE&G and Santee Cooper employees are working full time on the project.

Q. WHAT IS THE PROJECT SAFETY RECORD?

A. SCE&G and WEC/CB&I are very proud of the current safety record at the site. As of May 2015, the project has logged over 25 million man hours on the site with only a minimal number of lost time accidents. This is remarkable testimony to the care and professionalism with which all parties are approaching work on these Units with respect to safety.

<u>COST CATEGORIES FOR THE PROJECT</u>

Q. PLEASE DESCRIBE HOW THE VARIOUS COSTS ASSOCIATED WITH THE UNITS ARE CATEGORIZED.

A. In Order No. 2009-104(A), the Commission reviewed and approved SCE&G's estimate of forecasted costs for the Units as shown in nine cost categories. Seven of these cost categories reflected costs agreed to in the EPC Contract. Four of those seven involve categories of fixed cost, which do not change, or firm costs which change only based on specified inflation indices ("Fixed/Firm Costs"). Two of the seven EPC categories involve costs where WEC/CB&I operates under established budgetary targets and SCE&G pays actual costs as incurred ("Target Costs"). The seventh is Time and Materials ("T&M") which are costs for allowances requiring pre-approval by SCE&G for things like start-up support, scaffolding, and licensing support. The final two cost categories are Transmission costs and

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Owner's cost. These are activities that SCE&G undertakes directly and are outside of the scope of work of the EPC Contract with WEC/CB&I.

- Transmission cost includes the cost of the transmission facilities that SCE&G will build to integrate the Units into its transmission grid. It does not include the on-site switchyard which is part of the EPC Contract scope.
- Owner's cost include the costs of the NND teams and associated labor costs, and involve such things as site-specific licensing and permitting of the Units and their construction; regulatory costs such as NRC fees; insurance, including workers compensation insurance for all workers on site, builder's risk insurance and transportation risk insurance; construction oversight and contract administration costs; the costs of recruiting and training of operating personnel for the Units; the costs of overseeing the final acceptance testing of the Units and providing for interim maintenance of components of the Units as completed; the cost of NND facilities, information technology systems and equipment to support the project and the permanent staff of the Units; sales taxes, and other incidental costs for the site.

<u>OWNER'S COST AND THE NND PROJECT</u>

Q. WHAT IS THE COMPANY'S PHILOSOPHY CONCERNING THE NND PROJECT?

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A. As I have mentioned in past testimony, apart from ensuring the safety of our public and the people, the Company has no greater priority than getting the deployment of the new nuclear Units right. Senior leadership, including our CEO Mr. Marsh, is directly involved in the management of this project and of escalation of issues to WEC/CB&I on a regular basis.

On the day to day operations level, the Company has put in place a team of people that are capable of interfacing with the NRC, overseeing the work of thousands of on-site contractors and subcontractors, a worldwide supply chain for highly specialized components and equipment, and the transportation and logistics required to bring those components and equipment safely together in Jenkinsville. All this must be done while recruiting and training a permanent staff that can operate and maintain the Units safely and efficiently when they go into service, and that can successfully conduct the acceptance testing that the NRC requires before the Units are put into commercial operation. This effort also requires SCE&G to keep in place a team of people who can ensure that the contractual aspects of the project are prudently managed, that the terms of the EPC Contract are enforced, and that we do all in our power to ensure that costs are controlled.

Q. DO YOU TAKE COST CONTROL SERIOUSLY?

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A. We take cost control very seriously. Senior leadership for the project takes an active role in reviewing budgets, setting up systems, and engaging staff appropriately to ensure that only reasonable, necessary and prudent costs are included in the cost forecasts. As Company Witness Walker testifies in detail, our cost and staffing reviews are thorough and demanding. We will not jeopardize the safety or quality of the project, but by the same token, we will not tolerate unnecessary spending.

Q. UNDER THE EPC CONTRACT, WHAT ROLE DOES SCE&G PLAY IN THE LICENSING AND PERMITTING OF THE UNITS?

A. Apart from the Design Control Document for the AP1000, which WEC as owner of the technology was responsible to obtain, SCE&G is responsible for obtaining the major licenses and permits that are required to construct and operate the Units. SCE&G is responsible for procuring all LARs required by the project. Also, during construction and testing of the Units, SCE&G must ensure that it and its contractors comply with all terms and conditions of these licenses and permits.

Q. HOW DOES THE NRC SEE SCE&G'S CURRENT RESPONSIBILITIES AS OWNER AND LICENSE HOLDER?

A. Since March 30, 2012, SCE&G has been managing the project under active NRC nuclear construction and operation licenses, i.e., COLs, issued in SCE&G's and Santee Cooper's names. As the NRC is quick to remind us, the Company is now directly responsible to the NRC for the safety of

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the Units as constructed and for QA/QC both on-site and in the shops and factories where components are being fabricated worldwide.

Q. WHAT IS SCE&G'S PHILOSOPHY ABOUT DEPLOYING THE RESOURCES REQUIRED TO MEET THESE CHALLENGES?

A. These Units will serve as a critical component of our generation portfolio for decades. They are expected to serve the needs of our customers for 60 years or more. With those facts in mind, SCE&G is committed to continuously monitoring the needs of the project and to adjust its staffing, training and resource plans whenever it concludes that doing so is necessary to protect the interests of the Company and its customers in this project.

Q. WHAT GROUP WITHIN SCE&G IS RESPONSIBLE FOR CARRYING OUT THE TASKS YOU HAVE DESCRIBED?

A. The NND teams have direct responsibility for the project. They are supported by resources from throughout SCE&G and SCANA. But the primary responsibility for the success of the project rests with the NND teams.

Q. HOW HAS SCE&G STRUCTURED THE NND TEAMS?

A. The NND teams are comprised of eight groups which include Nuclear Licensing, Design Engineering, Organizational Development and Performance ("OD&P"), Quality Systems, Construction, Business and Finance, Operational Readiness and Training. Other groups that share

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resources with Unit 1 are Health Physics, Emergency Planning, Chemistry, and Security Services. In all cases, where resources are shared between units, there are strict accounting rules in place to ensure that each unit bears its full share of cost that benefit it.

In March 2015, the staffing of the NND teams was approximately 560 SCANA, SCE&G and Santee Cooper employees. The permanent staffing for the two Units is expected to be approximately 761 individuals (excluding security contractors). Many of the members of the NND teams will transition to permanent operating staff of the Units, although there will be some retirements and other attrition. The structure of the NND teams and the responsibilities of the eight areas that comprise them are discussed in Mr. Jones' testimony and exhibits.

Q. WHAT IS THE EXPERIENCE LEVEL OF THE LEADERS OF THESE TEAMS?

A. The members of the senior leadership team for the NND effort have an average of more than 35 years of experience in nuclear and major generating plant construction. All told, the seven senior leaders for the NND project represent 252 years of nuclear and major construction experience.

Q. WHAT PART OF THE COSTS INCLUDED IN THESE UPDATES ARE OWNER'S COSTS?

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A. As Ms. Walker testifies, updates in Owner's cost forecasts represent $245 million[1] of the $698 million that we are presenting here for BLRA approval. These costs are the reasonable and prudent costs of fulfilling our responsibilities as the owner of this project.

Q. WHAT IS DRIVING THESE OWNER'S COST INCREASES?

A. As Mr. Jones and Ms. Walker testify in more detail, the majority of these Owner's cost increases are a result of the delay in the substantial completion dates of the Units. This delay will require SCE&G to support the project and the NND teams for 27 additional months as to Unit 2 and 25 additional months as to Unit 3. These delay related costs represent $214 million, or approximately 87% of the increase in Owner's costs. The other $31 million represents increases in personnel costs, facilities costs, software and systems costs and other expenses that must be incurred for SCE&G to meet its obligations as Owner and COL licensee in a reasonable and prudent way.

Q. DO YOU HAVE AN OPINION CONCERNING THE REASONABLENESS AND PRUDENCE OF THE ADJUSTMENTS TO THE STAFFING LEVELS AND COST SCHEDULES FOR THE NND PROJECT THAT THE COMPANY IS PRESENTING HERE?

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[1] Unless otherwise specified, all cost figures in this testimony are stated in 2007 dollars and reflect SCE&G's share of the cost of the Units.

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A. For the reasons set forth in this testimony, as well as those set forth in Mr. Jones' testimony and Ms. Walker's testimony, it is my opinion that the adjustments in the forecasts of Owner's cost for the NND project are reasonable and prudent costs of the Units. These costs reflect a prudent and valuable investment that the Company is making to protect the interest of its customers in these long-lived assets, as well as those of our partner Santee Cooper, in the project.

<u>THE REVISED PROJECT SCHEDULE AND COST SCHEDULE</u>

Q. PLEASE PROVIDE THE BACKGROUND FOR THE REVISED PROJECT SCHEDULE THAT IS PRESENTED IN THIS PROCEEDING.

A. Beginning in 2010, and consistently thereafter, SCE&G publicized its concerns about the inability of the module fabrication facility in Lake Charles, Louisiana, to produce submodules for the project in a timely-way. Initially, that Lake Charles facility was operated by Shaw Modular Solutions ("SMS"), a subsidiary of the Shaw Group, which was WEC's original partner in the construction consortium. As the Company has testified in past proceedings, and has been reported to ORS and the Commission regularly over this period, the Company, along with Southern Company, the other AP1000 owner, worked diligently to convince WEC and Shaw to make required changes.

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In March 2012, SCE&G placed a permanent on-site inspector at the SMS facility. An inspector has been on site since. On multiple occasions during the period 2009-2012, at SCE&G's direction, SMS re-baselined its initial module fabrication and delivery schedule to account for its rate of production. But SMS was never able to prepare a schedule that reasonably reflected the effect of on-going delay.

In July 2012, CB&I announced its intention to acquire the Shaw Group. After that sale closed, in February 2013, SCE&G requested that WEC/CB&I produce a revised construction schedule that included a realistic and achievable production for submodules from the Lake Charles facility (now known as CB&I-LC), and a plan for completing the project in light of the submodule production delay. During this time, SCE&G urged WEC/CB&I to resolve its submodule production issues, and specifically to relieve the congestion issues that were impeding progress at its Lake Charles facility. In response, WEC/CB&I asked SCE&G for space to relocate certain aspects of submodule production from Lake Charles to designated work areas at the Jenkinsville site. This relieved some of the congestion at the Lake Charles facility and allows work crews to be hired in South Carolina to supplement those on site in Louisiana. CB&I also proposed to diversify it supply chain by outsourcing production of certain submodules to other fabricators. As a result, important aspects of the

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submodule fabrication for Units 2 and 3 were assigned to other fabricators, including Oregon Iron Works in Oregon and IHI/Toshiba in Japan.

In late May 2013, SCE&G received a revised construction schedule from WEC/CB&I that sought to take into account the effects of production delay at the Lake Charles facility. SCE&G challenged important aspects of this schedule. WEC/CB&I agreed to conduct a thorough review of the schedule in light of delay to date, and to include is a full review of the engineering, procurement and construction resources necessary to support the plan.

In the third quarter of 2014, SCE&G received what WEC/CB&I termed a Revised, Fully-Integrated, Construction Schedule. Accompanying the construction schedule data was information related to the revised cost estimates for completing the project, the Estimated at Completion ("EAC") costs. SCE&G spent a number of months reviewing the schedule and cost information with WEC/CB&I and in negotiations with WEC/CB&I concerning costs and schedule mitigation to accelerate the substantial completion dates of the Units.

Based on those reviews and negotiations, SCE&G determined in March of 2015 that the cost and construction schedules as updated by WEC/CB&I through that time were in fact the anticipated schedules for completion of the project as envisioned by the BLRA. As Mr. Marsh testifies, Senior leadership approved those schedules, with updates as to

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Owner's costs and other cost items, as the basis for the filings presently before the Commission.

The Revised, Fully-Integrated Construction Schedule, is the mitigated construction schedule for the Units as it was revised and finalized during the review process.

Q. WHAT DO YOU MEAN BY A MITIGATED CONSTRUCTION SCHEDULE?

A. There a number of ways to mitigate a construction schedule. One of the more common is to add additional shifts of labor. Another is to reallocate fabrication activities to multiple vendors, as we have done with sub-modules going forward. Another is to change the method or sequence of construction activities so that delayed components do not hold up other specific tasks. For example, if delivery of a module is delayed, concrete forms can be used to allow concrete to be placed that would otherwise have been poured directly against the module wall. In many cases, schedule mitigation means additional expense, and that additional expense can become a matter of negotiation between the owner and contractor.

Q. PLEASE DESCRIBE EXHIBIT NO. _ (SAB 2).

A. Exhibit No. _ (SAB-2) is the Milestone Construction schedule based on the Revised, Fully-Integrated Construction Schedule, which we proposed for Commission approval as the current anticipated construction schedule for the Units as envisioned by the BLRA.

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Q. ARE THE SCHEDULES PRESENTED HERE REASONABLE AND PRUDENT SCHEDULES FOR COMPLETION OF THE PROJECT?

A. The schedules that SCE&G has presented here are the current anticipated schedules for completing the Units as envisioned by the BLRA and are reasonable and prudent schedules for completing the project. They should be approved as the new BLRA schedules for the Units.

These schedules represent the best current forecasts of the anticipated costs and the anticipated construction schedules to complete the project. They are based on the cost projections and construction schedule data that WEC/CB&I has provided to SCE&G and which SCE&G has carefully studied and reviewed consistent with its duties as Owner. The construction schedule is based on a comprehensive identification and sequencing of the tens of thousands of construction activities that must be accomplished for the project to be completed. The cost schedule is based on identifying labor and other costs that must be incurred to complete the scopes of work listed on those schedules.

SCE&G's construction experts have reviewed the schedules presented here. We find that their scope and sequencing is logical and appropriate. As to both timing and cost, the schedules are based on productivity factors that WEC/CB&I represents can be met given the current status of the project. Meeting these productivity factors will pose a challenge to WEC/CB&I. But doing so will benefit the project both in

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terms of cost and schedule. For that reason, as owner SCE&G has no basis or interest in insisting that WEC/CB&I should use less challenging assumptions. However, SCE&G does recognize that WEC/CB&I has set itself a significant challenge as to future productivity.

The schedules presented here are the schedules that WEC/CB&I has represented to SCE&G that it is prepared to meet and that SCE&G has carefully reviewed with WEC/CB&I. For those reasons, I can affirm that these schedules represent the best and most definitive forecast of the anticipated costs and construction schedule required to complete this project that is available as of the date of this filing of the testimony. These updated costs are not in any way the result of imprudent management of the project by SCE&G. Further, these costs do not include speculative or un-itemized costs, such as owner's contingencies. *S.C. Energy Users Comm. v. S.C. Pub. Serv. Comm'n*, 388 S.C. 486, 697 S.E.2d 587 (2010). While additional costs may be incurred after the date of this filing of the petition in this proceeding, those costs are not known at present and so cannot be included here.

Q. COULD THESE SCHEDULES CHANGE?

A. These schedules can and almost certainly will change. That is because the construction schedule for any project as complex as this one will be dynamic. It can be expected to vary from month to month during the construction period as conditions change. The construction and cost

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forecasts will be subject to ongoing change and revision, as any forecast would be.

OVERVIEW OF INCREASE IN FORECASTED EPC CONTRACT COSTS

Q. PLEASE PROVIDE AN OVERVIEW OF THE INCREASE IN THE EPC CONTRACT COST FORECASTS SCE&G IS PRESENTING IN THIS PROCEEDING.

A. This total increase of $698 million is made up of (1) changes in the Estimated at Completion ("EAC") cost under the EPC Contract, (2) ten additional change orders to the EPC Contract, (3) reallocation of certain on-site transmission costs between SCE&G and Santee Cooper, and (4) changes in Owner's cost. Company witnesses Mr. Jones and Mrs. Walker will address these items in detail in their pre-filed direct testimony in this matter. I am familiar with the matters they discuss and can confirm the accuracy of their testimony. I also affirm that cost and construction schedules presented here accurately reflect the anticipated cost and schedule for completion of the Units and in no way are the result of any imprudence on the part of SCE&G.

DISPUTED COSTS

Q. YOU MENTIONED EARLIER THAT SCE&G IS NOT RELEASING OR WAIVING ANY CLAIMS AGAINST WEC/CB&I. PLEASE EXPLAIN WHAT COSTS YOU ARE CHALLENGING.

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A. At present, SCE&G is challenging several categories of costs being billed to it by WEC/CB&I. Those challenges include:

1. Costs invoiced by WEC/CB&I where the costs are increased costs related to fixed or firm items where SCE&G has entered into an agreement with WEC/CB&I to resolve claims for a fixed amount of compensation. For example, WEC/CB&I has attempted to bill SCE&G for module rework. Modules are a fixed cost item. SCE&G has returned the invoices for such charges as improper since additional costs associated with these items are a WEC/CB&I responsibility.
2. Cost invoiced by WEC/CB&I which are related to general project delay. SCE&G takes the position that these delay costs are WEC/CB&I payment responsibility for reasons including WEC/CB&I failure to meet its responsibilities under the EPC Contract to effectively manage the project.
3. Cost invoiced by WEC/CB&I which are the result of WEC/CB&I not meeting productivity factors. SCE&G believes that WEC/CB&I is under a contractual obligation to efficiently conduct its construction activities, and some or all of any labor costs based on failure to meet productivity factors is WEC/CB&I's payment responsibility.

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As to invoices for costs which are 100% unjustified, SCE&G believes it is contractually entitled to return the invoices as improperly issued and pay nothing. This is permissible under provisions of the EPC Contract that only require SCE&G to pay for properly invoiced items.

As to invoiced costs where only part of any given invoiced amount would be subject to dispute, SCE&G will withhold part of the payment. Under the EPC Contract, SCE&G is required to pay at least 90% of the disputed amount pending resolution of its dispute. Other provisions of the EPC Contract permit WEC/CB&I to cease work and treat the project as if it had been suspended at SCE&G's request if 90% payments are contractually required but are not made after proper invoicing. WEC/CB&I has reserved its rights under these provisions to cease work on the site if required payments are not made.

As to delay costs, the revised cost forecast associated with the Revised, Fully-Integrated Construction Schedule shows the amount by which overall project costs have increased due to delay through the end of the project. A percentage of increased cost due to delay has been computed for each cost category under the EPC Contract where delay has increased costs. Since May 5, 2015, SCE&G has applied that percentage to the charges in each invoice and only paid 90% of the disputed amount as the EPC Contract provides.

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As to productivity factors costs, SCE&G will determine on a case by case basis the amount of additional charges that is due to inefficiency and from this amount, SCE&G will withhold 10%.

Q. WHY ARE DISPUTED AMOUNTS PROPERLY INCLUDED IN THE COST SCHEDULES PRESENTED HERE?

A. The BLRA requires SCE&G to present the anticipated cost to complete the project. SCE&G in no way disputes the fact that the project will incur the amount presented here to complete the Units. The question is who is required to absorb these additional and disputed costs. SCE&G intends to pursue its dispute of these certain costs, and going forward will pay only 90% of those costs pending resolution of those disputes. When SCE&G pays those 90% amounts, they will become paid capital costs of the project and will be reflected in CWIP for the project. For that reason, these 90% payments are properly included in the cost projections for the Units.

At present, the outcome of the disputes with WEC/CB&I is not known. Therefore, SCE&G does not have any basis to forecast any additional costs or cost reductions beyond the 90% payments it knows it must make. We have only included in this filing non-speculative, itemized costs which are costs that SCE&G fully anticipates paying. Revised rates only reflect costs actually paid. If for any reason, certain costs are not paid,

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they will not be booked as capital costs of the Units, and will not be used for calculating revised rates or for any other ratemaking purposes. Any future reductions in the anticipated cost presented here due to resolution of claims against WEC/CB&I or other reasons are also not known, are unquantifiable, and therefore are not properly included in the current BLRA cost projections for the project.

Q. HOW WILL THESE DISPUTES BE RESOLVED?

A. SCE&G is committed to resolving these disputes by negotiation if possible. However, litigation may occur. The venue specified in the EPC Contract is the Southern District of New York. If litigation occurs, there is no way to determine how long it would take to resolve the disputes. While the amounts in dispute are important, SCE&G and its customers have a primary interest in seeing the Units completed in a timely, safe and efficient manner. This is particularly important since if Unit 3 is not placed in service before January 1, 2021, SCE&G and its customers could lose the value of federal Production Tax Credits associated with that Unit. The value of those credits, grossed up for tax, could equal approximately $1.1 billion. That is one important reason to maintain focus on the goal of the project and not let disputes interfere with completing the project in a timely way. The overarching goal is to ensure that the project is completed in a safe and timely fashion.

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Q. HOW DO YOU RESPOND TO THE CLAIM THAT INCLUDING THE 90% PAYMENTS IN BLRA COSTS TAKES AWAY SCE&G'S INCENTIVE TO REACH A FAIR SETTLEMENT OF CLAIMS AGAINST WEC/CB&I?

A. There are multiple reasons that this is not the case.

1. SCE&G seeks to include the 90% payments in its BLRA cost schedule because they will in fact be part of the capital outlays for this project. SCE&G hopes that it will recover all or part of those payments from the WEC/CB&I. But this recovery is not guaranteed. As a result, we are in no different position than in cases where we complete a plant or project, and once it is closed to rate base, we pursue warranty or contractual claims against suppliers. Those claims, if successful, lower the cost of the plant or project after the fact. This happens in the ordinary course of our business.

2. Further, to withhold these payments from the capital costs recognized under the BLRA would do the opposite of what the question implies. Rather than creating an incentive for SCE&G to aggressively and doggedly pursue the claims against WEC/CB&I, it would create an incentive for SCE&G to settle claims quickly so that the settlement amounts could be included in BLRA filings. Mr. Marsh has testified that it is critical to our financial plan that we generate cash returns through revised rates filing on the capital we spend on this project. If the only way to

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include disputed costs in revised rates is to settle the underlying dispute, then SCE&G will be put under financial pressure to settle as quickly as possible. That fact would not be lost on WEC/CB&I and would likely change their bargaining position in settlement negotiations.

Q. WHAT WILL HAPPEN IF SCE&G DOES RECOVER PART OF THE DISPUTED AMOUNTS THAT IT HAS PAID?

A. If through negotiation or litigation, SCE&G recovers any past payments to WEC/CB&I or reduces any current payments, those amounts will be reflected as reductions to the accounts where the capital cost of the project are recorded. This will reduce the financing costs to be charged to customers and the reduction will be reflected in lower revised rates in subsequent revised rates proceedings going forward.

CONCLUSION

Q. ARE THE UPDATES REQUESTED IN THIS PROCEEDING REASONABLE AND PRUDENT?

A. Yes they are. As President for Generation and Transmission, I am involved on an on-going basis with all major aspects of the construction project and am directly involved in the negotiations with WEC/CB&I over the issues discussed here. The adjustments requested in this proceeding include adjustments to the construction schedule as well as to EPC costs and Owner's cost. They are adjustments that I know to represent reasonable and prudent changes in the cost and construction schedules for

the Units. Making these adjustments is necessary to create the anticipated cost and construction schedules for the Units as required by the BLRA. Based on my knowledge of the project, and in my professional opinion, the adjustments are in no way the result of any lack of responsible and prudent management of the project by the Company or of imprudence by the Company in any respect. I ask the Commission to approve these adjustments as presented in the exhibits to Mrs. Walker's testimony.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

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MR. ZEIGLER: Madam Chairman, Mr. Byrne is available for questions from Mr. Guild or the Commissioners.

CHAIRMAN HALL: Thank you, Mr. Zeigler. Mr. Guild.

MR. GUILD: Thank you, Madam Chairman.

CROSS EXAMINATION

BY MR. GUILD:

Q Good afternoon, Mr. Byrne.

A Good afternoon.

Q I heard Mr. Marsh drawing a distinction between what I understood to be the company's level of satisfaction with the work that was taking place on the site — I don't know whether you would characterize this an installation, but in any event — to distinguish that from the fabrication work that's being done of the modules and submodules. Is that a fair distinction that you agree with?

A The distinction you're making, again, is what?

Q You want me to say it over again?

A Yes, please.

Q Okay. So the distinction I heard Mr. Marsh saying was, he was satisfied with the on-site work at the facility, at the location, the, I'll call it, installation — I'm not sure that's his word — as distinct from the

fabrication of the submodules by the subcontractors to whom you attribute the delay. Is that a fair distinction?

A Yeah, I would say that the work on site is going better than the work at the module fabricator, and that we have taken some of the modules from the module fabricator and we have completed them on site. To say that we're completely satisfied with the contractor's level of performance on the site would be a bit of a stretch.

Q Okay. So there are some problems there, too, that are associated with the delay? On-site work?

A There are some problems on site with regard to on-site efficiencies that we are trying to address with the contractor.

Q You just mentioned doing some of the work on site. Look at your Slide 25, if we could put that back up, if that's possible.

A [Indicating.]

[Reference: Hearing Exhibit 4/SAB-1 Page 25]

Q Now, is that — 25, you describe that as a mechanical module, and I think it's the charcoal filter/ion exchange module?

A That's correct.

Q All right. And does that represent an example of a module that was intended to be fabricated at a

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subcontractor off site, that you brought back to the site to work on?

A It does.

Q And tell us how that happened. Why did you not rely on a sub off site to complete that submodule?

A The sub off site did start the submodules. Even for these mechanical modules, there was a sub in Texas that was fabricating. They are fabricating some modules completely at their site. We took a look at the most schedule-averse modules, the ones that would put the schedule at risk, and we decided that we would free up some space and offload this from those facilities, take them on site and we could complete them better at the site.

Q All right. So, free up space at the subcontractor? Or at your site?

A At the subcontractor. This is being done at our site.

Q All right. So, free up some space at the subcontractor, so they could make better progress on their remaining work?

A Yes.

Q Okay. And you brought it back and had your people doing the work on site to finish the submodule?

A The contractor had the folks who were on site at our site finishing the work, but it's the consortium that's

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1 doing the work, physically.
2 **Q** Well, I mean, I guess what I'm asking is, did you bring
3 the subcontractor folks from Texas up to South Carolina
4 to have them finish the work that you — where you freed
5 up the space back in Texas?
6 **A** The short answer is yes and no. There are some folks
7 from the subcontractor's that would accompany these,
8 particularly folks that would be closing out things like
9 paperwork and documentation. But most of the physical
10 work was being done by folks who were not from the Texas
11 facility.
12 **Q** What's the name of the Texas facility?
13 **A** Is a CB&I facility, and I can't remember — it'll be the
14 name of the town where it's located.
15 **Q** Okay.
16 **A** I can't remember what the name is.
17 **Q** But it's CB&I?
18 **A** It's a CB&I —
19 **Q** Chicago Bridge & Iron?
20 **A** That's correct.
21 **Q** All right. Now were there delay and capital cost
22 increases associated with having made that choice — just
23 as an example — to have not had the CB&I Texas utility
24 do the work as intended, but instead to bring it up to
25 the site to finish it there?

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1 **A** Your question is were there delays in making this
2 decision?
3 **Q** No, sir.
4 **A** No.
5 **Q** Were there delays in the project and/or capital cost
6 increases associated with the change in approach that is
7 represented by that example, bringing that module from
8 Texas instead of letting it be finished there, finishing
9 it at the site?
10 **A** The decision to bring this module and others, including
11 structural modules, to the site to complete them, was
12 done in order to expedite the schedule. And the cost
13 should be borne by the contractor, not us, in these
14 cases.
15 **Q** Okay, that's helpful. So there is additional cost
16 associated with it, in exchange for which you hope to
17 appreciate some schedule advantages?
18 **A** That's correct.
19 **Q** All right. And where does that additional cost appear?
20 **A** That additional cost is not billed to me. I don't
21 receive an invoice for it. So, the cost is borne by the
22 consortium.
23 **Q** All right. So that's one that indisputably has been
24 accepted as an added cost that the consortium has agreed
25 to bear?

A Yeah, this was in the fixed or firm portions of the work, not in the target portion of the work.

Q And does that general observation extend completely to all the rest of the submodules and modules that were brought back to the site for completion?

A Yeah, all of the modules that were originally intended to be done at one of the subcontractor's — either the contractor's or subcontractor's facilities that were finished on site to try to expedite some of that work, there should be no change to the capital cost schedule to SCE&G from that move.

Q All right. Whatever additional costs are being borne by the consortium, correct?

A That's correct.

Q I'm looking for one of your slides. Let's go back to Slide 18, your transition ring fit-up.

A [Indicating.]

[Reference: Hearing Exhibit 4/SAB-1 Page 18]

Q Now, I think you explained this, but just to be clear, where you see that shield building section there, that's not its final location; that's a fit-up location on a pad, correct?

A That's correct.

Q And was the original project design to do just that, to do a fit-up at that location?

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A I don't have that level of detail on the original schedule. They would be expected to do some level of fit-up. But, you know, if you're asking whether we had intended to do this on this pad or with these panels, I don't — the schedule was not that detailed.

Q All right. Well, isn't it the fact, Mr. Byrne, that with these shield building transition ring panels, there were tolerance problems associated with the work of the fabricator and, because of the tolerance problems, you had to add this fit-up exercise at the site to review those issues. Isn't that right?

A I will say that, because of concerns that the constructor had over the fit-up and the tolerances, they decided that it would be a smart idea to try the fit-up before we actually tried it in its final location.

Q Right. But that wasn't a part of the original plan, because you assumed the tolerance problem wasn't going to be there. The tolerance problem occurred and, therefore, you had to do this trial fit-up on the site.

A Yeah, I think I said a few minutes ago, I didn't know that to that level of detail, whether it was in the original plan or not.

Q Okay. And what was the tolerance problem that you encountered?

A It was with the specifications for how much out of

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1 tolerance one panel could be, relative to the next
2 panel.
3 **Q** Okay. So I'm looking at your slide again. I think it's
4 18, and I'm looking at between those two skids or I-
5 beams, I guess, I see what looks to be a joint and
6 appears to be — is it a bolted connection?
7 **A** If you are referencing the section that I'm putting the
8 green pointer on [indicating] —
9 **Q** Yes, sir, exactly.
10 **A** — that is the connection between two sections or two
11 panels. And what you see here are dowel pins.
12 **Q** Okay. And is that where the tolerance problems
13 occurred?
14 **A** It was certainly at these locations, and they also had
15 some support members that were close. The concern was
16 that, as you weld those members, these panels, together,
17 that these crossmembers or the support pieces were
18 actually starting to buckle.
19 **Q** That's not good. All right. The support members you're
20 talking about, are those inside where the concrete is to
21 be poured?
22 **A** That's correct.
23 **Q** So you've got two layers of — if I've got this right,
24 this description — two layers of steel, looking at the
25 outer layer; there's an inner layer between the two.

You're eventually, once it's in place, going to pour concrete?

A That's correct.

Q And you were finding that there were some buckling issues because of the way the contractor fabricated these braces or —

A I don't know that it was a problem with the way the contractor fabricated the braces. But when they were going through some of the original fit-ups and trying to do the welding — I don't even know if it was at our site, because we do things in conjunction with Southern Company. But at one of our two sites, and I believe it may have been at the Vogtle site, and when the original fit-up was tried, some of these crossmembers were buckling.

Q So it might not have been a fabrication problem; it might've been a design problem?

A It certainly could've been.

Q Now, if I can find the slide here — [indicating]. Slide 5, please.

A [Indicating.] This one?

[Reference: Hearing Exhibit 4/SAB-1 Page 5]

Q Yes, sir. All right. Change of venue. That's one of those lawyer terms, but actually what it means, I guess, is you decided to ship this stuff hither and yon from

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where you originally planned to do it. It was going to be in Lake Charles, Louisiana; that's CBI-LC. Correct?

A Yeah, CBI-LC is CB&I in Lake Charles, Louisiana.

Q And it used to be Shaw — whatever, Shaw something-or-other?

A Shaw Modular Solutions.

Q Shaw Modular Solutions. And I think one of the Commissioners charitably said there was a reorganization or something, but they aren't around anymore and it's now Chicago Bridge & Iron/Lake Charles, or CB&I/Lake Charles.

A Chicago Bridge & Iron acquired the Shaw Group in its entirety, in, I think it was February of 2013.

Q Okay. In any event, Lake Charles has been where a lot of these submodular fabrication problems have occurred. And this change of venue, so to speak, is a remedial measure to try to remedy those problems, right?

A Yeah, and I can assure you that no lawyers were consulted when I used the word "venue."

Q Okay. Glad to hear it.

[Laughter]

So, anyway, it turned out that neither Shaw nor Lake Charles could do the job that you assumed they'd be able to do as part of this innovative modular construction approach, and so you had to find a bunch of

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other people or entities to do the work. How did you go about figuring out that there was an Oregon Iron Works that was going to do some of this stuff? Where did they come from?

A They stemmed from some experience that CB&I had with the MOX facility. So they had utilized Oregon Iron Works, and they started an inquiry as to whether or not they would be able to fabricate modules.

Q Okay. So what kind of modules are they doing in Oregon?

A The Oregon Iron Works is doing some of the modules for CA20.

Q So it's — they were doing MOX work, so presumably they were familiar with NRC quality-assurance requirements?

A I would make that assumption, since the MOX facility falls under NRC requirements.

Q I mean, that's part of the reason why they're qualified, I presume, that they knew how to do that stuff, right?

A They were not doing modular construction at MOX.

Q Right. Right, but they had a workforce that was familiar with the NRC requirements, I take it?

A At least after a fashion.

Q Well, did they? I mean, I'm presuming. Did the Oregon people that you sent this to, did they have experience with nuclear construction?

A They have some experience with the MOX facility. We

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1 sent our inspectors to the facility. We sent other
2 members of our staff and management team to the facility
3 to verify that they knew what they were doing.
4 **Q** Right.
5 **A** So they are qualified to do what they're doing.
6 **Q** So you start out with Lake Charles, and at that point,
7 the Lake Charles people were specifically hiring,
8 training, and assembling a facility and a staff who, by
9 definition, were going to be performing nuclear quality-
10 assurance-standard work, correct?
11 **A** Yes.
12 **Q** All right. You lost the Lake Charles facility, or at
13 least you needed to displace them with these other
14 change-of-venue operations, and then you had to go out
15 and find people who had that same qualification or could
16 achieve it, right?
17 **A** I wouldn't say — characterize it as the same
18 qualification. We look for vendors who had nuclear
19 experience, and even when it was Shaw Modular Solutions,
20 Shaw has nuclear experience.
21 **Q** Right.
22 **A** So, Shaw does nuclear work. So, you know, to preclude
23 that facility, we would have had to have had a rationale
24 or reason to preclude that facility at that point in
25 time.

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1 **Q** I'm sorry, "preclude," meaning what?
2 **A** Meaning that they wouldn't use that facility.
3 **Q** I see. But, I mean, there are only two AP1000s being
4 built in this country. The Vogtle people were facing
5 the same issues with Lake Charles that you were, right?
6 **A** Yeah, Vogtle was having the same issues with Lake
7 Charles.
8 **Q** So, together, you guys had to go out and find some
9 replacement that had nuclear-qualified, skilled crafts
10 to do these submodules, when there wasn't any other
11 nuclear work out there. I mean, MOX is an exception to
12 that. But, really, there's no AP1000s or other nuclear
13 plants being built in the US at the time, right?
14 **A** Watts Bar is being finished by the Tennessee Valley
15 Authority.
16 **Q** Yeah, and that's a 1980s or '70s version?
17 **A** It's a nuclear facility, that's correct.
18 **Q** But I mean, it's an old design, right?
19 **A** Yeah, it's not an AP1000, sir.
20 **Q** So, the point being, you had to go out and find people
21 from scratch to replace the Lake Charles folks, and
22 those people had to either have existing nuclear
23 training — which was unlikely, because there's nobody
24 else doing it — or you had to bring them up to speed.
25 **A** Are you saying that we had to find people that had

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1 nuclear training, and that was unlikely? Is that what I
2 heard you say?
3 **Q** Yeah. I'm saying there's nobody out there, except Lake
4 Charles, who's building new nuclear plants, because
5 there aren't any other new nuclear plants. That's a
6 given, right?
7 **A** Well, new nuclear plants in the United States, I would
8 say that's an accurate statement. There are a lot of
9 vendors that do nuclear work. And Toshiba/IHI is one of
10 the vendors that we did remove some of these things from
11 Lake Charles and send to those facilities, and they do
12 nuclear work, albeit not necessarily in this country.
13 **Q** Right, exactly. Okay, that's a good point. So, let's
14 take Toshiba. I don't speak Japanese, so "Toshiba" is
15 the way I always said it, because that's who made
16 whatever electronics I used to use. But anyway, there
17 in Japan there are a lot of nuclear plants in Japan;
18 presumably, they're building stuff for Asian nuclear
19 plants. They had some nuclear-qualified folks, and you
20 went to them to do some of this work formerly assigned
21 to Lake Charles, correct?
22 **A** That's correct.
23 **Q** Okay. How about the SMCI folks in Florida? Who are
24 they?
25 **A** That is a fabricator of metal components that Shaw

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evidently – or Shaw and maybe CB&I – has had some experience with.

Q And did they have folks that were actively engaged in nuclear construction work at the time?

A They have done nuclear construction, albeit not modules.

Q What kind of work do they do?

A Fabrication. They make plates, supports, tanks, those kind of things.

Q Is that what they've been doing for you?

A Embedment plates. They do some of that for us, too, yes.

Q What are they doing for you?

A Right now, they're making modules.

Q In Newport News, I remember they built ships, didn't they?

A They have experience in shipbuilding, that's correct?

Q All right. And did they build nuclear power plants?

A Do they, or did they?

Q Did they, when you went to them?

A Yeah, nuclear power from the respect of Navy nuclear power propulsion, they have experience there. I don't know if they've built nuclear components for commercial nuclear plants.

Q Okay. Were there additional schedule and cost implications from the change of venue for the modules,

Mr. Byrne?

A Yeah, the answer I would give for the structural modules is the same answer I give you for the mechanical modules. We descoped the facility at Lake Charles in order to preserve the schedule, not retard the schedule. And the costs associated with moving those components to those facilities is borne by the consortium.

Q So in every respect, having failed to meet the productivity rates and producing the submodules on time at Lake Charles, and changing venues as far away as Japan, bringing facilities up to speed with staffing who met the qualifications, none of the cost impacts of that are being borne by SCE&G and its ratepayers?

A None of the costs of the direct costs of those is being borne by SCE&G or its ratepayers. Where there may be indirect costs, for example, if we make the decision that we want some oversight in those facilities, we do have increased oversight as a part of this proceeding.

Q Yeah, I guess the plane ticket to Japan is a little pricier than the plane ticket to Louisiana, if that's among the costs you have to bear, right?

A The plane ticket to Japan is more expensive than the plane ticket to Louisiana.

Q So that's an additional cost, and who bears that cost?

A It's our decision to put those inspectors in. We think

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1 that is the right thing to do, so we're asking that
2 those costs be passed along.
3 **Q** To ratepayers.
4 **A** Yes.
5 **Q** And, similarly, the cost of sending inspectors not to
6 Louisiana but to Oregon — I love Oregon — that's being
7 borne by ratepayers, as well.
8 **A** We have one inspector in the Oregon Iron Works, and
9 they're also covering another mechanical module
10 facility, an erector called Greenberry. So the one
11 inspector is splitting time between two facilities.
12 **Q** Can't beat being in Oregon, now. So what's Granberry
13 doing?
14 **A** They are doing mechanical module sections, similar to
15 some of the ones you saw on the screen.
16 **Q** And would you say the same thing about Newport News, you
17 have to send somebody up there and that's a cost we're
18 bearing?
19 **A** We've recently sent somebody up to Newport News.
20 **Q** Now, is it just a matter of freeing up space at Lake
21 Charles by this change of venue, so that Lake Charles
22 will have some more room in their shop to do this work?
23 Or was it really a question also of having other
24 competent, qualified crafts to perform the submodule
25 work at the other venues?

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1 **A** I would say yes to both.
2 **Q** Okay. In both instances, the consortium is bearing the
3 cost for the additional inspection which you talked
4 about?
5 **A** Yeah, the cost to descope that facility is being borne
6 by the consortium.
7 **Q** All right. And to the extent that it's not just to make
8 room at Lake Charles to get their productivity up, are
9 there schedule impacts — adverse schedule impacts — of
10 the change of venue?
11 **A** I would say that the most significant adverse schedule
12 impact would have been to leave everything at the Lake
13 Charles facility. So, moving things from the Lake
14 Charles facility actually has mitigated some schedule
15 delays. Absent us doing that, I believe that the
16 schedule delays would've been worse.
17 **Q** All right. In all respects? For all critical path
18 items?
19 **A** Yeah, I believe so.
20 **CHAIRMAN HALL**: Mr. Guild, I'm sorry to
21 interrupt you, but I did promise that we would
22 break before our 6 o'clock hearing. So we'll break
23 now. We will resume at 10 o'clock in the morning
24 for whoever isn't coming to the night hearing.
25 [WHEREUPON, the witness stood aside.]

[WHEREUPON, at 4:55, the hearing in the above-entitled matter was adjourned, to reconvene at 6:00 p.m. on the same date.]

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C E R T I F I C A T E

I, Jo Elizabeth M. Wheat, CVR-CM-GNSC, Notary Public in and for the State of South Carolina, do hereby certify that the foregoing is, to the best of my skill and ability, a true and correct transcript of proceedings had and testimony adduced in a hearing held in the above-captioned matter before the PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA;

That the witnesses appearing during said hearing were sworn or affirmed by me to state the truth, the whole truth, and nothing but the truth;

IN WITNESS WHEREOF, I have hereunto set my hand and seal, on this the 31st day of July, 2015.

Jo Elizabeth M. Wheat, CVR-CM/M-GNSC
Hearings Reporter, PSC/SC
My Commission Expires: January 27, 2021.