

RAS 12489

**From:** "Richard Webster" <rwebster@kinoy.rutgers.edu>  
**To:** <dek@nrc.gov>, <dja@nrc.gov>, <fpg@nrc.gov>, <hga@nrc.gov>, <lar@nrc.gov>, <SECY@nrc.gov>  
**Date:** Tue, Nov 7, 2006 10:18 AM  
**Subject:** Urgent - concern regarding current safety at Oyster Creek Nuclear Power Plant

Mr. Reyes:

Please find attached a letter that we believe raises urgent concerns about safety at the Oyster Creek Nuclear Power Plant. We therefore respectfully request an urgent response. Thank you for your consideration.

Yours sincerely,

Richard Webster

Richard Webster  
 Staff Attorney  
 Rutgers Environmental Law Clinic  
 123 Washington Street  
 Newark, NJ 07102  
 Phone: 973-353-5695  
 Fax: 973-353-5537

DOCKETED  
 USNRC

November 7, 2006 (10:18am)

OFFICE OF SECRETARY  
 RULEMAKINGS AND  
 ADJUDICATIONS STAFF

Docket No. 50-219-LR

**CONFIDENTIAL LEGAL COMMUNICATION/WORK PRODUCT**

This e-mail may contain privileged and confidential attorney-client communications and/or attorney work product. If you receive this e-mail

inadvertently, please reply to the sender and delete all versions on your system.  
 Thank you.

**CC:** <Psturmfels@aol.com>, <psturmfels@cleanwater.org>, <gbur1@comcast.net>, <JTauro@comcast.net>, <Wmdecamp@cs.com>, "Lisa Jackson" <Lisa.Jackson@dep.state.nj.us>, <john.covino@dol.lps.state.nj.us>, <valerie.gray@dol.lps.state.nj.us>, <bradley.fewell@exeloncorp.com>, "Debbie Mans" <Debbie.Mans@gov.state.nj.us>, <Daniel\_Rosenberg@lautenberg.senate.gov>, <Caley.Gray@mail.house.gov>, <Dana.Richter@mail.house.gov>, <Eric.Gordon@mail.house.gov>, <Joan.Zielinski@mail.house.gov>, <Kathryn.Doherty@mail.house.gov>, <Lisa.Smith@mail.house.gov>, <Orly.Amir@mail.house.gov>, <mdonato@micheledonatoesq.com>, <apolonsky@morganlewis.com>, <dsilverman@morganlewis.com>, <ksutton@morganlewis.com>, <pgunter@nirs.org>, <agarber@njpirg.org>, <sleta@njpirg.org>, <Crystal.Snedden@njsierra.org>, <ajb5@nrc.gov>, "Debra Wolf" <daw1@nrc.gov>, <ERH@nrc.gov>, <HearingDocket@nrc.gov>, <MAY@nrc.gov>, <OCAAmail@nrc.gov>, <OGCMailCenter@nrc.gov>, <pba@nrc.gov>, <jeffbrownnj@verizon.net>, <paulagotsch@verizon.net>, <Deadlinedon@yahoo.com>

Template=SECY-043

SECY-02

**Mail Envelope Properties** (4550A3D2.DD5 : 13 : 24021)

**Subject:** Urgent - concern regarding current safety at Oyster Creek Nuclear Power Plant  
**Creation Date** Tue, Nov 7, 2006 10:18 AM  
**From:** "Richard Webster" <[rwebster@kinoy.rutgers.edu](mailto:rwebster@kinoy.rutgers.edu)>  
**Created By:** [rwebster@kinoy.rutgers.edu](mailto:rwebster@kinoy.rutgers.edu)

**Recipients**

nrc.gov

OWGWPO01.HQGWDO01  
AJB5 CC (Anthony Baratta)  
HGA (Hansraj Ashar)  
PBA CC (Paul Abramson)

nrc.gov

TWGWPO04.HQGWDO01  
daw1 CC (Debra Wolf)  
MAY CC (Mitzi Young)  
OCAAMAIL CC

nrc.gov

ch\_po.CH\_DO  
DEK (Daniel Kimble)

nrc.gov

OWGWPO04.HQGWDO01  
ERH CC (E Roy Hawkens)

nrc.gov

OWGWPO02.HQGWDO01  
FPG (Frank Gillespie)  
HearingDocket CC (HearingDocket)

nrc.gov

ARL\_PO.ARL\_DO  
LAR (Lenora Reyna)

nrc.gov

OWGWPO03.HQGWDO01  
OGCMailCenter CC

nrc.gov

TWGWPO02.HQGWDO01  
SECY (SECY)

yahoo.com  
Deadlinedon CC

verizon.net  
paulagotsch CC  
jeffbrownnj CC

njsierra.org  
Crystal.Snedden CC

njpirg.org  
sleta CC  
agarber CC

nirs.org  
pgunter CC

morganlewis.com  
ksutton CC  
dsilverman CC  
apolonsky CC

micheledonatoesq.com  
mdonato CC

mail.house.gov  
Orly.Amir CC  
Lisa.Smith CC  
Kathryn.Doherty CC  
Joan.Zielinski CC  
Eric.Gordon CC  
Dana.Richter CC  
Caley.Gray CC

lautenberg.senate.gov  
Daniel\_Rosenberg CC

gov.state.nj.us  
Debbie.Mans CC (Debbie Mans)

exeloncorp.com  
bradley.fewell CC

dol.lps.state.nj.us  
 valerie.gray CC  
 john.covino CC

dep.state.nj.us  
 Lisa.Jackson CC (Lisa Jackson)

cs.com  
 Wmdecamp CC

comcast.net  
 JTauro CC  
 gbur1 CC

cleanwater.org  
 psturmfels CC

aol.com  
 Psturmfels CC

nrc.gov  
 NRGWIA01.NRGWDO01  
 "[dja@nrc.gov](mailto:dja@nrc.gov)"

#### **Post Office**

OWGWPO01.HQGWDO01  
 TWGWPO04.HQGWDO01  
 ch\_po.CH\_DO  
 OWGWPO04.HQGWDO01  
 OWGWPO02.HQGWDO01  
 ARL\_PO.ARL\_DO  
 OWGWPO03.HQGWDO01  
 TWGWPO02.HQGWDO01

#### **Route**

nrc.gov  
 nrc.gov  
 nrc.gov  
 nrc.gov  
 nrc.gov  
 nrc.gov  
 nrc.gov  
 nrc.gov  
 yahoo.com  
 verizon.net  
 njsierra.org  
 njpirg.org  
 nirs.org  
 morganlewis.com

micheledonatoesq.com

mail.house.gov  
 lautenberg.senate.gov  
 gov.state.nj.us

exeloncorp.com  
dol.lps.state.nj.us  
dep.state.nj.us  
cs.com  
comcast.net  
cleanwater.org  
aol.com  
nrc.gov

NRGWIA01.NRGWDO01

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	688	Tuesday, November 7, 2006 10:18 AM
20061107 Letter to NRC re current safety.pdf		469633
Mime.822	646005	

#### **Options**

**Expiration Date:** None  
**Priority:** Standard  
**ReplyRequested:** No  
**Return Notification:** None

**Concealed Subject:** No  
**Security:** Standard

#### **Junk Mail Handling Evaluation Results**

Message is eligible for Junk Mail handling  
This message was not classified as Junk Mail

#### **Junk Mail settings when this message was delivered**

Junk Mail handling disabled by User  
Junk Mail handling disabled by Administrator  
Junk List is not enabled  
Junk Mail using personal address books is not enabled  
Block List is not enabled

# RUTGERS ENVIRONMENTAL LAW CLINIC

123 Washington Street  
Newark, NJ 07102-3094  
Phone: (973) 353-5695

Rutgers, The State University of New Jersey  
School of Law - Newark  
Fax: (973) 353-5537

November 7, 2006

## VIA E-MAIL AND US-MAIL

Luis A. Reyes  
Executive Director for Operations  
United States Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Mr. Reyes:

I am writing on behalf of STROC, the citizen's coalition including Nuclear Information and Resource Service (NIRS), Jersey Shore Nuclear Watch, Inc., Grandmothers, Mothers and More for Energy Safety, New Jersey Sierra Club, New Jersey Environmental Federation (NJEF) and New Jersey Public Interest Research Group (NJPIRG). We are concerned that the NRC does not have reasonable assurance that the Oyster Creek Nuclear Power Plant (the "Plant") meets safety requirements. In particular, the containment system at the Plant is severely corroded and it appears that it did not even meet code requirements in 1992. According to the Atomic Energy Act, NRC is charged with protecting the health and safety of the public. 42 U.S.C. 2102. Thus, unless the NRC has reasonable assurance that the Plant meets safety requirements, it should not allow the Plant to operate.

As is clear, this letter concerns the current safety of the Plant, not relicensing. We therefore believe that it should be addressed by the Commission. However, because the Commission's letter of October 16, 2006 did not respond to Congressional enquiries regarding current safety, and your letter of October 30, 2006 did respond to those concerns, we are writing to you.

One major concern is that the severely corroded areas of the drywell shell appear to have been larger than is allowable since 1992. Recently, the reactor operator, AmerGen, stated in an e-mail to NRC Staff dated April 5, 2006 at 10 (ML060960563) that areas corroded to less than 0.736 inches in thickness "could be contiguous, *provided their total area did not exceed one square foot*" and their average thickness was greater than 0.536 inches. This statement is based on modeling conducted by General Electric ("GE") which showed that a shell with a general uniform thickness of 0.736 inches, but with a one square foot area that was 0.536 inches thick in each bay would meet code requirements. GPU Calculation No. C-1302-187-5320-024 at 9.

However, statements by NRC staff and contractors regarding the safety of the drywell

Carter H. Strickland, Jr., Esq.+  
Acting Director  
cstrickland@kinoy.rutgers.edu

Julia L. Huff, Esq.\*+  
Staff Attorney  
jhuff@kinoy.rutgers.edu

Kathleen J. Shreckgast, Esq.#  
Staff Attorney  
kshreckgast@kinoy.rutgers.edu

Richard Webster, Esq.+  
Staff Attorney  
rwebster@kinoy.rutgers.edu

\* Admitted in New Jersey Pursuant to 1:21-3(c)

+ Also admitted in New York

# Also admitted in Pennsylvania

## **RUTGERS ENVIRONMENTAL LAW CLINIC**

shell at the October 3, 2006 meeting of the Advisory Committee on Reactor Safeguards License Renewal Subcommittee ("ACRS") indicated that the shell may not meet the stated requirement. Both Hans Asher and Frank Gillespie asserted that two of the 10 bays had areas of *4 square feet* that were severely corroded. Transcript of October 3, 2006 ACRS Meeting ("T.") at 153:22-24, 159:11-15, 179:9-10. Although neither staff member indicated what was meant by severe corrosion, and neither responded to enquiry made on October 5, 2006 regarding this issue, the staff's handout at the ACRS meeting indicated that the modeled thickness was 0.618 inches in Bay 13 and 0.705 inches in Bay 1. In addition, Mr. Asher stated that the inputs were based on measurements taken in 1992. T. 173:12-20. Thus, it appears that NRC Staff now believe that the thin areas of the shell in 1992 were already four times bigger than the GE modeling showed was acceptable.

When asked to respond to the concerns of six Congressmen about current safety you suggested that preliminary results from a more recent NRC study of the drywell shell indicated that the shell met code requirements. Letter from Reyes to Saxton dated October 30, 2006. If you are referring to a recent study conducted by Sandia Laboratories, this statement is highly misleading. At the ACRS meeting, one of the authors of the Sandia analysis stated that "we didn't have enough information to do the rigorous level of analysis that GE had done" and the study was *not* a look at the absolute values of the margin of safety. T. at 169:1-8. In addition, Mr. Gillespie indicated that the NRC study was "confirming their number. We're not trying to independently calculate something that's totally ours." T. 180:3-5. Moreover, the analysis presented indicated that the shell was only just above the required margin, and ACRS members indicated that they were concerned that if the location of the degraded areas moved, the safety factor would be reduced. E.g. T. 173:9-11; 163:25-164:3. Finally, even though one of the ACRS members stated "you have to be pretty thorough with your sensitivity analysis," T. 173:4-6, NRC staff failed to present any analysis of sensitivity to changes in model inputs or estimate of uncertainty of the prediction.

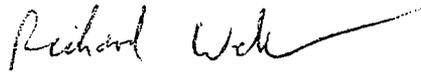
Thus, the NRC cannot rely on the highly uncertain preliminary results of an incomplete study that was not designed to evaluate absolute safety factors to show that the Plant meets safety requirements. Indeed, if the NRC now estimates that the areas thinner than 0.736 inches in any one bay are larger than one square foot, as staff stated to the ACRS, the NRC must not allow the Plant to restart from the current outage. Furthermore, because the Plant was at best extremely close to its required margin of safety in 1992 and we know that water has been in contact with the exterior of the shell since then, the Plant should not reopen until the measurements now being taken have been thoroughly analyzed and reviewed by NRC staff and the ACRS. Finally, even if the current results show no further deterioration since 1992 and the areas thinner than 0.736 inches are less than one square foot in each bay, further analysis is required to provide a reasonable assurance of safety because of flaws in the GE analysis pointed out by Stress Consulting, Inc. Specifically, Stress found that the GE model could have missed a critical failure mode, namely anti-symmetric buckling, and that more accurate methods are now available to calculate the current margins of safety. For ease of reference, this opinion is attached. Thus, until the structural modeling is redone in a rigorous manner taking full account of uncertainty in the inputs and is reviewed by the NRC Staff and the ACRS, the NRC cannot have any reasonable assurance that the plant meets safety requirements and should not allow the Plant to operate.

# RUTGERS ENVIRONMENTAL LAW CLINIC

---

We trust you will understand that this matter is of the utmost importance for those who live close to the plant and in the region. We therefore respectfully request a written response to this letter before the plant reopens, either stating why the NRC believes that there is a reasonable assurance of safety at the Plant, or ordering AmerGen to keep the Plant off-line pending further analysis of the available data and review by the ACRS. Thank you for your consideration and we look forward to hearing from you shortly.

Yours sincerely,



Richard Webster

c.c. Chairman Dale E. Klein  
Congressman Christopher H. Smith  
Congressman Jim Saxton  
Congressman Robert E. Andrews  
Congressman Rush Holt  
Congressman Frank Pallone, Jr.  
Congressman Bill Pascrell, Jr.  
Governor Jon Corzine  
Commissioner Lisa Jackson, New Jersey DEP  
ASLB Service List



# STRESS ENGINEERING SERVICES INC.

13800 Westfair East Drive, Houston, Texas 77041-1101  
Phone: (281) 955-2900 Fax: (281) 955-2638 Website: www.stress.com  
HOUSTON • CINCINNATI • NEW ORLEANS • CHICAGO

## SENIOR PRINCIPALS

*President*  
Joe R. Fowler, Ph.D., P.E.  
*Senior Vice President*  
W. Thomas Asbill, P.E.  
*Vice Presidents*  
Ronald D. Young, Ph.D., P.E.  
Clinton A. Haynes  
Jack E. Miller, P.E.  
J. Randy Long, P.E.

## PRINCIPALS

James W. Albert, P.E.  
Claudio Allevala, Corp. LIII  
Kenneth Bhalla, Ph.D.  
Mark A. Bennett, P.E.  
Richard S. Boswell, P.E.  
Heion Chan, C.P.A.  
John F. Chappell, P.E.  
S. Allen Fox, P.E.  
Andreas Katsounas  
Paul J. Kovach, P.E.  
Terry M. Lechinger  
Douglas L. Marriot, Ph.D.  
Christopher Malice, Ph.D., P.E.  
Charles A. Miller, P.E.  
George Ross, Ph.D.  
Teri Shackelford  
David A. Tokamp, P.E.  
Kurt D. Vandervort, Ph.D., P.E.  
Kenneth R. Waerber, P.E.  
Robert E. Wink, P.E.

## SENIOR ASSOCIATES/ STAFF CONSULTANTS

Christopher Aloxander  
Glen A. Auzon, P.E.  
Richard C. Biel, P.E.  
Michael J. Effenberger, P.E.  
Kimberly O. Flesher, P.E.  
Greg Ganic, P.E.  
David L. Garrett, Ph.D.  
Robert B. Gordon, Ph.D., P.E.  
David P. Huoy, P.E.  
Kenneth R. Riggs, Ph.D., P.E.  
Bobby W. Wright, P.E.

## SENIOR ASSOCIATES

Rafik Boubenider, Ph.D.  
Donnie Curington  
Steven A. Garcia  
Mark Hamilton  
William A. Miller  
John M. Moore  
Ronald A. Morrison, P.E.  
Thomas L. Power, Ph.D.  
Brian S. Royer  
Mahmoud Samman, Ph.D., P.E.  
Ramón J. San Pedro, P.E.  
Daniel A. Pitts, P.E.  
Matthew J. Siehl, D.Eng., P.E.  
Lana E. Wilson

## STAFF CONSULTANTS

Ray R. Ayers, Ph.D., P.E.  
J. Kirk Brownlee, P.E.  
Clinton H. (Clint) Brill, P.E.  
Yusong Cso, Ph.D.  
Joe Frey, P.E.  
Mike W. Guillot, Ph.D., P.E.  
Lori C. Hesselbring, Ph.D., P.E.  
Daniel Krzywicki, P.E., CSP  
Charles Ribardo, Jr., Ph.D.  
Jackie E. Smith, P.E.

## ASSOCIATES

Lyle E. Breaux, P.E.  
P. James Buchanan  
Roger D. Cordes, Ph.D.  
Nirpendu Dutta, Ph.D., P.E.  
Kenny T. Farrow, Ph.D.  
Brett A. Hornberg  
Stuart J. Herbert, Ph.D.  
David Renzi  
Chad Searcy, Ph.D.  
Obaidullah Syed, P.E.  
Leo Vega  
Kevin Wang, Ph.D.

## SENIOR ANALYSTS

Irfan Daig, Ph.D.  
Lixin Gong, Ph.D.  
Ollip Manjar, Ph.D.  
Bo Yang, Ph.D.

## ANALYSTS

Julian Bedoya  
Rhett Ditson  
Napoleon F. Douglas, Jr.  
David Ekwood  
Michael L. Co  
Karon Lucio

July 15, 2006

Mr. Richard Webster  
Staff Attorney  
Rutgers Environmental Law Clinic  
123 Washington Street  
Newark, NJ 07102  
Tel: 973 353-5695  
[rwebster@kinoy.rutgers.com](mailto:rwebster@kinoy.rutgers.com)

SES Project No.: 131377

**Subject:** Cursory Check of Structural Analyses, Oyster Creek Drywell Vessel

Dear Mr. Webster:

Recently, you requested that Stress Engineering Services, Inc. consider several documents that you provided and others that were made available to us through internet link references from the U. S. Nuclear Regulatory Commission. These documents concern the license renewal of the Oyster Creek Nuclear Generating Station.

One issue of contention in the license renewal at hand is whether the corroded drywell shell retains adequate strength for continued service. Your specific instructions were to review the structural analyses and comment on the approach used to assess their adequacy. Thus, we did not address any issues related to either the preexisting corrosion damage or potential ongoing corrosion of the vessel, unless it was salient to our review of the structural analysis work.

This report contains two sections. The first section addresses the general structural analysis methods and results. The second section addresses the ASME Code provisions. In both sections, it is important to note that our comments and opinions are based on a severely limited review that only touches the highlights of the respective subjects. A more detailed review is needed to address these subjects with the depth of study necessary to uncover the fundamental differences between the work that was done in support of the license and the state-of-the-art in structural analysis.

### Structural Analyses

At issue is the structural adequacy of the drywell shell, which has the shape of an inverted light bulb. The primary structural concern is the drywell shell's ability to resist buckling with an adequate margin for continued safe operation.

The structural analysis results offered by AmerGen were obtained using typical techniques for the period of time in which the analyses were performed. Due to the limited computational power that was readily available at the time, the computer-aided analysis performed by General Electric (GE) utilized relatively small slices of

the vessel, idealized geometries (perfect spheres, cylinders, etc.), and required computationally efficient calculation techniques. Calculated buckling load behaviors for the idealized geometries were subsequently adjusted using assumptions or "capacity reduction factors" for surface irregularities, plasticity, and local buckling; and the resulting adjusted values were taken as representative of the actual buckling load. GE compared the calculated buckling loads with the imposed loads, and safety margins were determined for comparison to ASME Code minimum requirements. Primarily because of these computational limitations, the finite element analysis performed by GE on the drywall vessel may not be adequate to capture its global behavior, which may be some combination of symmetrical and anti-symmetrical buckling.

The state-of-the-art has progressed far beyond the methods available to structural analysts in the early 1990s. Today, when reconstructing or reverse engineering existing structures, it is routine to use laser devices to generate "point clouds" that fully define the surfaces of pressure vessels, including any irregularities. The point clouds are digitalized, and the digitized information is converted into a mathematical representation of the actual surface shape, which is subsequently utilized for full three-dimensional modeling. Since the resulting models account for actual surface waviness, unevenness, bulges, facets, and other potentially deleterious geometric surface conditions, there is no longer any need to resort to the use of "capacity reduction factors" to determine buckling loads, as the GE analysts were forced to do.

The digitized surface is converted into a form suitable for meshing and further processing using finite element analysis (FEA). The mesh areas are then assigned the corroded thicknesses at the specific areas where they actually occur, and any future corrosion allowance is subtracted from the thickness at this time. The FEA mesh density would then be generated as fine as needed to capture the stiffness that resists buckling. The simulated loads are then applied and the buckling load and shape are directly calculated without needing imposed perturbations or anything except the measured geometry and thicknesses.

Utilization of point cloud surface mapping techniques along with measurements that represent the actual wall thickness is thought to give the most accurate structural analysis results possible, with the fewest assumptions, using current technology. Three-dimensional thin shell analyses can be done today with few assumptions concerning stiffness and in a way that complies with Case N-284-1-1320.

### **ASME Code<sup>1</sup> Provisions**

At issue is whether the Code is the best tool available for determining the drywell's fitness for continued service.

In general, the Code establishes rules of safety relating only to pressure integrity and governing the construction<sup>2</sup> of boilers, pressure vessels, transport tanks, and nuclear components. Its

---

<sup>1</sup> ASME Boiler and Pressure Vessel Code, Section III, *Nuclear Components*, and Section VIII, *Rules for Construction of Pressure Vessels*, American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016

<sup>2</sup> *Construction*, as used in the Code, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and pressure relief.

wording allows for some latitude in design and analysis methods, anticipates that deterioration of pressure vessels will occur, requires the use of engineering judgment, and recognizes the inevitability of technological progress in design and analysis methods. The following statements, which we excerpted from the FOREWORD of the current edition of the ASME Boiler and Pressure Vessel Code, support this contention.

*"The Committee's function is to establish rules of safety, relating only to pressure integrity, governing the construction of boilers, pressure vessels, transport tanks and nuclear components, and inservice inspection for pressure integrity of nuclear components and transport tanks, and to interpret these rules when questions arise regarding their intent... With few exceptions, these rules do not, of practical necessity, reflect the likelihood and consequences of deterioration in service relating to specific service fluids or external operating environments. Recognizing this, the Committee has approved a wide variety of construction rules in this Section to allow the user or his designee to select those which will provide a pressure vessel having a margin for deterioration in service so as to give a reasonably long, safe period of usefulness. Accordingly, it is not intended that this Section be used as a design handbook; rather, engineering judgment must be employed in the selection of those sets of Code rules suitable to any specific service or need... The Committee recognizes that tools and techniques used for design and analysis change as technology progresses and expects engineers to use good judgment in the application of these tools."*

Clearly, the authors of the Code never intended that its rules be used as the only arbiter of pressure vessel structural integrity. Neither did the authors intend the rules be used to extend, possibly unreasonably, the useful life a significantly corroded nuclear pressure vessel such as the drywell. Nonetheless, some continue to rely on Code construction rules for these purposes. They continue to do so despite the existence of tools such as three-dimensional thin shell analysis that have proven to be more than adequate for nuclear applications when applied in the presence of seasoned engineering judgment.

Respectfully Submitted,



Richard C. Biel, P. E.  
Staff Consultant  
Stress Engineering Services, Inc.



J. Kirk Brownlee, P. E.  
Staff Consultant  
Stress Engineering Services, Inc.