

United States Nuclear Regulatory Commission Official Hearing Exhibit	
In the Matter of:	Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3)
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Attachment 15

January 24, 2011 Report of Dr. Stephen C. Sheppard in connection with Contention 17B

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January 24, 2011

Susan L. Taylor
Assistant Attorney General
Office of the Attorney General
Environmental Protection Bureau
The Capitol
Albany, NY 12224

Dear Ms. Taylor:

In light of new information concerning the timing of power plant decommissioning at the Indian Point Energy Center (IPEC) and NRC findings on the permissible times during which spent fuel and other radioactive wastes can remain on site after the end of nuclear reactor operations, you have asked me to prepare a declaration on the potential economic impacts related to property value diminution in communities surrounding the IPEC. My report is attached below.

Sincerely,



Stephen Sheppard
Professor of Economics

Summary of finding

I consider four different scenarios involving potential delay in removal of waste and reclamation of the IPEC site and the potential renewal of the operating license for the nuclear reactors at the plant. I compare these scenarios to a baseline scenario of “no action” (non-renewal of the reactor operating license) and relatively rapid waste removal and site reclamation. Compared with the baseline scenario, license renewal combined with the potential delay in waste removal and site reclamation imposes a severe burden on surrounding communities. This burden is equivalent to a present decrease in wealth in the communities of between \$169 million and \$237 million.

Introduction

In my initial report submitted on November 29, 2007 I provided a preliminary estimate of the impact of continued presence of the Indian Point Nuclear Power Plant on the combined value of nearby property. Based on evaluation of census data and results established in peer-reviewed publications I provide a preliminary estimate of this impact and find it to be at least \$576,026,601. This should be regarded as a preliminary estimate subject to revision upon completion of a more extensive analysis of local property markets. In my subsequent declarations I discussed the scientific basis for evaluating the impacts of facilities such as IPEC on property values, and also the potential effects of delay in site reclamation.

In this declaration I provide a more complete analysis of the potential economic impacts on the value of nearby property that specifically considers the dynamic scenarios in site reclamation that may arise in light of the revised NRC findings concerning the generic environmental impacts of storage of spent fuel at reactor sites after expiration of reactor operating licenses¹. The analysis I present is based on my preliminary estimate of the total impact on nearby property values. As such, this should be regarded as a preliminary analysis that is designed to provide a general idea of the scope of economic impacts that can be expected to arise in connection with property value diminution in light of the several possible scenarios regarding the timing of site reclamation and making specific comparisons of scenarios that arise with and without renewal of reactor operating licenses at IPEC.

¹ *Federal Register*, Vol: 75, No. 246, December 23, 2010, p. 81032.

Analysis

The essential facts that are the basis of my analysis are:

1. The presence and operation of the Indian Point Nuclear Power Plant causes a diminution in the value of nearby residential and commercial real property². When the plant has closed and the site has been reclaimed and made available for alternative use, new sources of economic activity and employment can be expected to develop and the values of nearby properties can be expected to increase.
2. The increase in the values of nearby properties will, without any change in the property tax rate, provide (assuming reassessment to reflect market value of property) some increase in property tax revenues for local communities.
3. While the plant continues in operation, Entergy pays property taxes and/or payments in lieu of taxes to local communities³. These payments will cease once the plant has ceased operation or some time shortly thereafter.

Whether or not the IP2 or IP3 reactor operating licenses are renewed to permit operation at the site beyond 2015, eventually IPEC will close and the site will be reclaimed and made available for alternative use. From an economic perspective, the sequence of important events is expected to be:

- 1st – end of reactor operations
- 2nd – reclamation of IPEC site including removal of all spent fuel, hazardous materials, buildings and equipment
- 3rd – recovery of surrounding property values because of site reclamation
- 4th – recovery of property tax payments on surrounding properties

All scenarios involve this sequence of events, but differ between them in when exactly each event occurs. This difference in timing arises either because of regulatory and legal decisions (such as relicensing IP2 and IP3 for twenty years of continued operations) or because of physical and technical

² For further details, including the methodology for estimation, see November 29, 2007 Declaration of Stephen C. Sheppard with accompanying report *Potential Impacts of Indian Point Relicensing on Property Values* and March 18, 2010 Supplemental Declaration of Stephen C. Sheppard and accompanying report *Determinants of Property Values*.

³ A report prepared in 2004 by the nuclear industry lobbying group Nuclear Energy Institute, *Economic Benefits of Indian Point Energy Center* indicated that annual property tax and payments in lieu of taxes by Entergy to local communities was \$25.3 million.

considerations (such as the greater time required to remove spent fuel from the site after operations cease if relicensing occurs).

Recent revisions and clarifications of NRC findings concerning storage of spent fuel and hazardous waste on site imply that there are several possible options available to Entergy concerning the timing of waste removal and site reclamation. There are limits to how quickly this can occur because of the time required to remove the spent nuclear fuel and other wastes from the site. I base my analysis on the potential schedule of plant decommissioning that is presented and discussed in Preliminary Decommissioning Cost Analysis report prepared by TLG Services, Inc.⁴

The Preliminary Decommissioning Cost Analysis report indicates that waste removal at the Indian Point Power Plant could begin 2 years after ending reactor operations. With the amount of waste that has been generated at the site during the operating period ending in 2015, removal of the waste was expected to require a 2 year preparation period followed by 30 years of work at removal, based on a rate of 3000 metric tons of uranium per year.

If the operating license is renewed the plant would be permitted to run for an additional 20 years. This could be expected to generate a 50% increase in total waste since it represents a 50% increase in the time of operation. For scenarios that consider plant relicensing, I will assume that the waste removal process, whenever it begins, will take 40 years after an initial 2 year preparation time. This assumes modest economies of scale in spent fuel and radioactive waste removal, and reflects the 2 years preparation time, the 30 years required time to remove the wastes that would be present without license renewal plus an additional ten years that reflects the time required to remove the additional wastes generated during the added 20 years of reactor operation.

I evaluate a baseline scenario for comparison with other possible outcomes involving IPEC reactor relicensing or delays in site reclamation. The baseline scenario assumes the most rapid practicable process of site reclamation, and assumes the “no action” alternative in which IP2 and IP3 operating

⁴ Document E11-1583-006, *Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 3*, prepared by TLG Services, Inc., December 2010, see page 9 of 40.

licenses are not renewed so that reactor operations end in 2015 and waste removal and site reclamation will be completed by the end of 2047.

The first alternative scenario will examine the costs associated with delay of site reclamation. This considers the “no action” alternative with end of reactor operations in 2015 but delays completion of the removal of wastes, plant and equipment from the site to 2077.

The second alternative scenario considers the impact of renewal of operating licenses for IP2 and IP3 so that reactor operations continue at IPEC until 2035. The most rapid practicable site reclamation would then require a period of 42 years so that the site is available for alternative use in 2077.

The third alternative scenario assumes renewal of operating licenses for IP2 and IP3 so that reactor operations continue at IPEC until 2035. The process of cleanup and site reclamation is assumed to be delayed by 30 years so that the site is available for alternative use in 2107.

The fourth alternative scenario assumes renewal of operating licenses for IP2 and IP3 so that reactor operations continue at IPEC until 2035. The process of cleanup and site reclamation is assumed to be delayed by 60 years so that the site is available for alternative use in 2137.

As noted above, IPEC generates property tax payments or payments in lieu of property taxes of approximately \$25.5 million dollars per year for communities surrounding the plant. These can be expected to continue during the period of plant operation and perhaps for some time afterwards, but once the plant has ceased operations and a process of site reclamation has been set upon (even if not fully commenced) Entergy is likely to argue that the value of its plant and equipment is essentially zero. Without detailed information on the payments in lieu or other agreements with communities, I assume that Entergy continues these payments through 2035 in all scenarios. This covers the extended time period of operation if the operating license is renewed. If Entergy is granted reduced tax liability prior to this the effect would be to increase the burden on surrounding communities.

There is some variation between communities in the area in the property tax rate applied to residential real estate. After reviewing the actual tax rates imposed on selected residential properties in the area, I

assume a rate in the lower part of the observed range of tax rates: 2.36% of actual market value. Thus a \$200,000 house generates \$4719 in annual property tax revenues for the community in which it is located. If removing Indian Point Nuclear Power Plant increases its value by 5% then property tax revenues could potentially rise by \$236 per year. The loss of this \$236 is part of the burden on the communities of having the power plant remain. An alternative (and equivalent) way to think of this is to note that once IPEC is closed and the site is reclaimed, surrounding property values can be expected to recover and generate (after reassessment) higher property tax payments every year. The present value of this stream of higher tax payments is part of the benefit to the community of site reclamation.

The economic impacts of the different scenarios arise from delays in the timing of property value recovery and delays in the time during which property taxes receipts on nearby properties are decreased because of the presence of IPEC. Economic comparison of these scenarios requires computing the “discounted present value” of the future flows and receipts. Such computation requires use of some interest rate or “discount rate” and it is usual in such cases to use a rate that approximates the effective cost of capital for those parties affected. Since I am primarily concerned to calculate the impact on community residents whose property values will be affected, it seems most appropriate to use something close to the real mortgage interest rate. My calculations use a discount rate of 4% which is approximately equal to the current mortgage interest rate less the current rate of inflation – that is the current real mortgage interest rate.

The most essential fact that separates the alternative scenarios is when the site becomes available for alternative use. The first alternative scenario imposes a cost on the surrounding communities whose present value is \$169,429,649. This cost (and the costs associated with other scenarios) arises because of the delay in recovery of property tax receipts on surrounding property and delay in recovery of property values and wealth of the community.

The second alternative scenario considers license renewal but rapid site reclamation so that the site is available for other uses in the same year (2077) as the 1st scenario. Consequently the cost associated with the second alternative is the same as the 1st scenario: \$169,429,649.

The third alternative scenario considers the impact of license renewal with moderate delay in site reclamation so that the site is available for alternative uses in 2107. This scenario imposes a cost on surrounding communities of \$221,667,973 relative to the baseline.

Finally, the fourth alternative scenario considers the impact of license renewal with extended delay in site reclamation making the site available for alternative uses in 2137. This scenario imposes a cost on surrounding communities of \$237,774,023 relative to the baseline. This cost is comprised of approximately \$147 million cost attributable to delay in recovery of property values, and \$90 million in costs associated with delay in recovery of property tax receipts on property surrounding the plant.

Conclusion

My calculations show clearly that both license renewal and a delay in site reclamation imposes a real economic cost on the surrounding communities. License renewal with delayed removal of waste and site reclamation imposes a burden on the communities that is equivalent to an immediate charge of between \$169 million and \$237 million. For these communities with limited resources, this can be considered a severe burden that would have consequences for the well-being of the community and the pattern of economic development and land use.