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Indian Point Independent Safety Evaluation (ISE) Executive Summary





We, the undersigned members of the Indian Point Independent Safety Evaluation Panel, affirm that this report faithfully documents our observations and conclusions regarding operations at the Indian Point Energy Center.

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Executive Summary

On March 20, 2008, Entergy Corporation announced the formation of a special panel to conduct an Independent Safety Evaluation (ISE) of the Indian Point Energy Center (IPEC). The ISE Panel conducted extensive reviews at Indian Point during the spring of 2008 and completed its work in July. This Executive Summary is a synopsis of the ISE objectives, scope, approach and conclusions; the main report covers the entire ISE effort in more detail.

Genesis

The two IPEC operating nuclear reactor units¹ in Buchanan, N.Y., together produce more than 2 million kilowatts of electric power and have supplied a substantial amount of the electricity consumed in the greater New York City area since the mid-1970s. As such, the station plays an important role in the electric reliability and economic health of New York City and surrounding areas.

Indian Point has been the subject of continuing controversy since its early years of operation. The plant itself is located in a highly populated area – nearly 300,000 people live in the 10-mile radius emergency planning zone² (EPZ) around the plant, making it the most densely populated EPZ of any U.S. nuclear plant. And it is about 40 miles from the heart of Manhattan, one of the financial, political and cultural centers of the nation and the world. Not surprisingly, Indian Point has been a visible focal point for anti-nuclear activism.

Contributing to the unease of some in the public regarding the plant's operation has been a history of very visible problems. Leaks from plant systems raise concern about environmental contamination, fines from the U.S. Nuclear Regulatory Commission (NRC) raise obvious questions about plant safety, and the evident difficulty of demonstrating the effectiveness of emergency plans causes many to wonder whether their safety could be protected if there were a major problem at the station. Collectively, these operational upsets, equipment failures and other issues serve to keep Indian Point in the public eye, usually in a negative context.

¹ The currently operating plants are Indian Point Units 2 and 3, which entered commercial service in 1974 and 1976 respectively. The older and smaller Unit 1 was placed in service in 1962 and taken out of service in 1974.

² The emergency planning zone (EPZ) is the area surrounding each licensed commercial nuclear plant in the United States, within which federal regulations prescribe thorough planning, warning and protective actions to safeguard the populace in the event of a significant radiological accident.



The terrorist attack on the World Trade Center on September 11, 2001, elevated to an entirely new level the fundamental issue of acceptability of a nuclear power plant so close to New York City. While these heightened fears have diminished somewhat due to the passing of time and much work to protect the plant from external threats, public acceptance of Indian Point among many is tenuous at best.

Culminating years of public and political debate, U.S. Senator Hillary Clinton and U.S. Congressman John Hall, both of New York, introduced in Congress proposed legislation calling for an independent assessment of the safety of Indian Point. Although Congress took no action on these legislative proposals, Entergy – Indian Point’s owner – chose in early 2008 to commission its own independent evaluation of Indian Point safety, security and emergency preparedness.

The ISE Panel

The Panel of experts engaged to perform the ISE brought extraordinary knowledge, experience and integrity to this task. The Panel co-chairs, selected by Entergy to lead the ISE, are Dr. James Rhodes, former President and Chief Executive Officer (CEO) of the Virginia Electric & Power Company and later Chairman, President and CEO of the Institute of Nuclear Power Operations (INPO), and Dr. Neil Todreas, former Head of the Nuclear Engineering Department at the Massachusetts Institute of Technology (MIT). Both Dr. Rhodes and Dr. Todreas are retired from full-time employment and neither has had any professional ties to Entergy or Indian Point. Together they provided strong leadership and an exceptionally deep and diverse experience base to the ISE.

The other 10 members of the ISE Panel were selected personally by the co-chairs, without constraint from Entergy. Panelists were compensated by Entergy for their participation in the evaluation. In composite, the Panel represented virtually every facet of nuclear plant safety, security and emergency preparedness, from a variety of vantage points, and with full independence. Among the co-chairs and Panelists, five have direct nuclear plant operations experience, seven do not. Further, three have been senior officers in U.S. nuclear utilities; two have held executive positions with the U.S. Nuclear Regulatory Commission (NRC); two have served with INPO and another with the International Atomic Energy Agency (IAEA); three have held senior executive positions in state (New York or Massachusetts) agencies; four were nuclear-trained officers in the U.S. Navy, one a nuclear submarine commanding officer; and one is an internationally known expert in security.



An Independent Panel

Entergy required a technically sound, credible evaluation of the health of the Indian Point plants. To get that, they consciously chose to secure the services of a team with an essential balance – the capability, experience and objectivity to provide a solid assessment and the ethical strength to do so honestly.

The Indian Point ISE Panel is a diverse group, in terms of background, experience and corporate and government relationships. Panel members were selected by the co-chairs, not Entergy. They have impeccable professional credentials for this work. And they have no financial ties³ to Entergy, beyond this ISE.

The ISE Panel members are placing their considerable reputations on the line. Each has signed and stands behind this report – an undeniable measure of independence.

The ISE Panel is structured into four teams, each with an area of primary focus – nuclear safety, security, emergency preparedness and public policy – and all members collaborated in examining the plant as a whole.

ISE Objectives, Scope and Criteria

As summarized in the ISE Charter, approved by the ISE Co-chairs on March 27, 2008:
“The Indian Point independent safety evaluation will be a thorough and objective assessment of the IPEC. The independent panel will examine a range of nuclear safety and plant performance factors, with particular attention to matters of importance to those who live and work near the station, including plant security and emergency management.”

The charter further states:

“The objectives of the independent safety evaluation are:

- 1. To provide internal and external decision-makers with a body of technically sound and reliable information about the safety of the Indian Point Energy Center.*
- 2. To address issues of particular interest to IPEC stakeholders including the public.”*

Based on that directive, the ISE Panel developed a detailed scope of review that included examination of specific aspects of Indian Point nuclear safety, security and emergency preparedness, along with a broader look at the overall plant health in areas germane to the ISE objective, but not limited to one of these three areas of particular attention.

³ Two panelists previously provided limited professional services (approximately 40 hours) at other Entergy plants.



The Panel also placed very high emphasis on examination of matters that have been particularly prominent in the public eye. These public interest issues were identified through review of media reports, transcripts of public meetings, discussions with stakeholders and public officials, and letters or e-mails to the Panel. Many were implicitly included in the Panel's review of nuclear safety, security and emergency preparedness while others required separate investigation. In light of the broad ISE objective above, the Panel considered review of these issues to be a necessary part of its review.

Several issues of high public interest are not within the ISE scope. Among these are:

- **License Renewal:** The ISE Panel was charged with examining the current state of Indian Point, whereas license renewal is a regulatory process that addresses its suitability for extended future operation. Although some information in this report may be pertinent to license renewal, the ISE effort did not explicitly examine Indian Point operations beyond the plants' current operating licenses.
- **Off-site Aspects of Emergency Preparedness (EP):** Off-site evacuation planning and implementation are the responsibility of governmental (primarily county) organizations, with support from the station. On that basis, the ISE did not attempt to assess the details or projected effectiveness of evacuation planning. The ISE did, however, examine the station's effectiveness in discharging its EP responsibilities and its interface with local, county, state and federal emergency management organizations.
- **Off-site Environmental Issues:** The ISE addressed IPEC radioactive materials management, including implications of on-site radiological releases. It did not assess off-site radiological consequences of normal plant operation or other environmental issues (such as thermal effects on Hudson River aquatic life).
- **Macroeconomics:** The ISE addressed IPEC economics/investment, but not regional electricity supply cost/demand issues or impacts.

Evaluation Criteria

The Panelists evaluated Indian Point performance in comparison with their own experience and expectations for high performing nuclear plants and other facilities, such as chemical and manufacturing plants. This criterion was applied to the evaluation of IPEC nuclear safety, security and emergency preparedness, based on the collective professional judgment of the Panel members and taking into account a range of qualitative and quantitative factors. Given the diversity and depth of Panelist experience, this approach made possible an unusually broad composite perspective on the station.

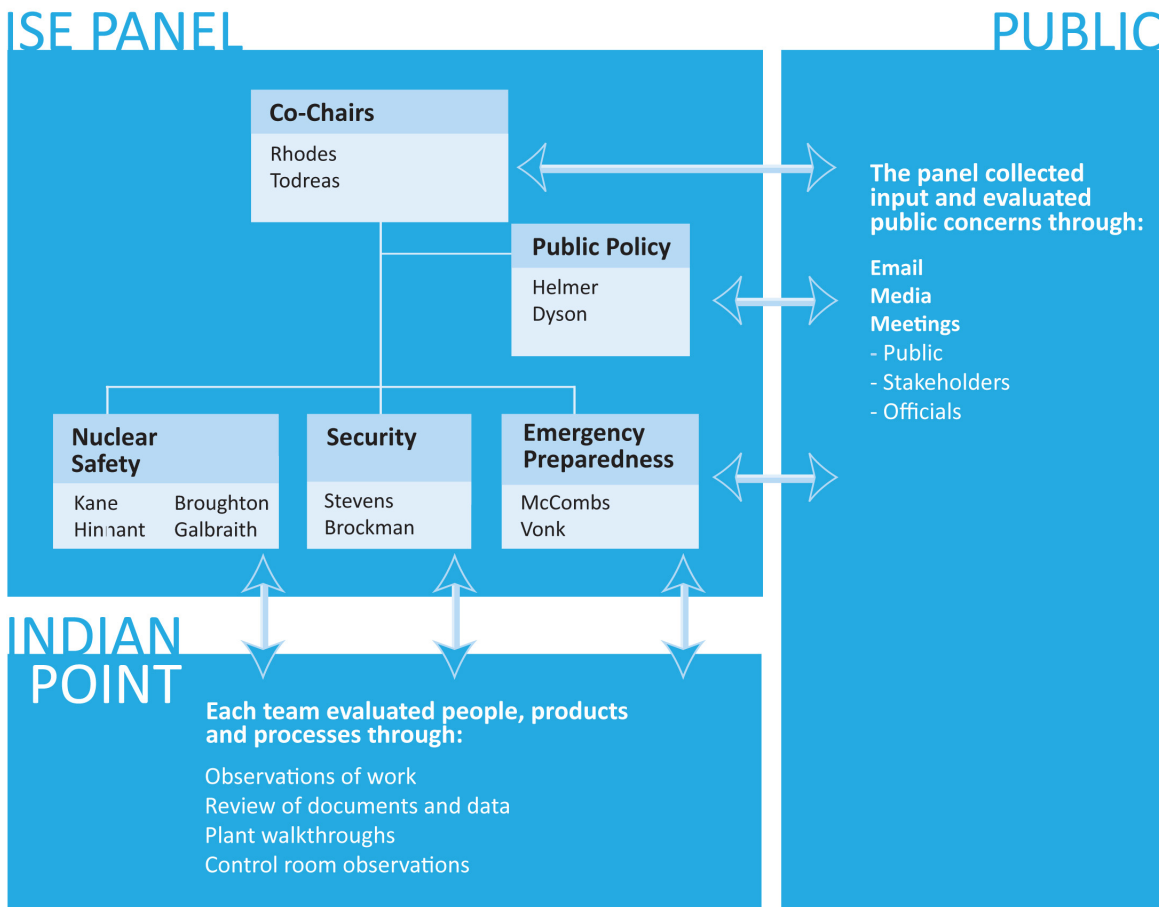


As a separate evaluation factor, the Panel consciously assessed the level of difficulty facing Entergy in correcting the problems identified by the ISE. It was the Panel's view that judgments by others about the viability of the station should take into account not only the current health of the plant but also Entergy's capability, resources and will to correct any serious safety, security or emergency preparedness problems that currently exist.

Process

Four ISE Teams – Nuclear Safety, Security, Emergency Preparedness and Public Policy – conducted pre-planned, structured assessments of the station, including observations of work in progress, meetings, interviews with individuals, discussion sessions with groups of employees, and reviews of plant records, work products and other documents. Each of the teams examined plant aspects germane to its areas of responsibility, and all Panelists collaborated in a review of cross-cutting topics indicative of overall station health.

ISE Interaction with Plant and Public





In parallel with the in-plant reviews, members of the Public Policy and Emergency Preparedness Teams interviewed numerous municipal, county and state officials regarding issues of public interest. The Panel hosted two public meetings on April 28, 2008 as opportunities for direct communication with members of the public on matters of importance to them, and established a dedicated e-mail address as an additional avenue for public comments and questions. From those sources, and from news reports and other communications, the Panel developed a comprehensive list of public issues for consideration as appropriate by individual teams or the Panel as a whole.

In all of their individual and collective assessments, the Panelists formulated judgments about Indian Point performance relative to their experience and expectations of high-performing nuclear plants and other facilities, both in the United States and internationally.



Principal Conclusions

From the entirety of its work – the evaluations by the Nuclear Safety, Security, Emergency Preparedness and Public Policy Teams, and its composite plant assessment – the ISE Panel has reached several principal conclusions. These are summarized here and discussed in much more detail in the main report.

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| <p>The Executive Summary and Section 8 present the ISE Panel’s proposed conclusions and recommendations, in each of the following topics, based on its extensive evaluation.</p> | |
| <p>Overarching Principal Conclusions</p> <ul style="list-style-type: none"> • Nuclear Safety • Relationship with Public and Stakeholders | <p>Overarching Principal Recommendations</p> <ul style="list-style-type: none"> • Investment Commitment • Communication and Outreach |
| <p>Additional Principal Conclusions</p> <ul style="list-style-type: none"> • Emergency Response Facilities and Equipment • Security • Physical Condition in Non-Safety Areas • Leadership Team • Staffing • Work and Project Management • Change Management • Acquisition by Entergy | <p>Additional Principal Recommendations</p> <ul style="list-style-type: none"> • Emergency Response Facilities and Equipment • Staffing • Security • Clean-up and Preservation |
| <p>The ISE Report Sections 2 through 7 provide extensive detail of the ISE evaluation, including numerous conclusions, recommendations and areas for improvement. From these, principal conclusions on the above topics were determined by the Panel to be of highest importance.</p> | |

There are two over-arching principal conclusions:

1. Indian Point is a safe plant.

The Panel found that Indian Point nuclear safety meets the U.S. nuclear industry highest standards in most respects. Indian Point nuclear operations are conducted



competently and professionally, plant safety systems are well-maintained, reliable, and are backed with full resource commitment by the plant owner. Control Room operations – a key indicator of plant nuclear safety culture – were observed frequently by the Nuclear Safety Team and other ISE Panelists and found to be consistently professional and effective. Indian Point management, at all levels, is clearly attentive to nuclear safety.

2. The Indian Point relationship with public and stakeholders on matters of emergency preparedness is not healthy.

Public protection from a sizable radiological release from a nuclear reactor – whether caused by natural disaster, accident or terrorism – is by law a shared responsibility among federal, state and local authorities, with defined support by plant personnel. Effective public protection therefore demands close cooperation and communications, and in turn joint planning, preparation and practice. Most importantly, it must be founded on mutual respect and trust among all participants.

The Panel found numerous indicators that a sufficiently respectful and trusting relationship between Entergy/Indian Point and the public/stakeholders is not in place today.

And the Panel has drawn additional principal conclusions:

3. The Indian Point emergency response facilities and equipment do not meet high industry standards.

Both the Indian Point Emergency Operations Facility (EOF) and the back-up EOF, although compliant with regulatory requirements, are undersized and would be sub-optimal for extended use in a major emergency. Other Indian Point emergency-use facilities and equipment, on- and off-site, are inadequate in some respects. Communications and other equipment used by these facilities is dated and in many cases difficult to use or unreliable.

In an actual emergency, public safety would depend on effective use of these facilities, by Entergy personnel and public officials, under very trying conditions. The ISE Panel's view is that these facilities and equipment should be upgraded to meet top standards.

4. Security at Indian Point is strong in many respects, but has some shortcomings.

The ISE Security Team found the Indian Point security force to be well-trained, proficient and professional. The IPEC Security organization has developed sound strategies for dealing with a range of possible security threats including some scenarios well beyond those that the plant is required to prepare for by regulation.



However, there is inadequate staffing (and resultant excessive overtime work) in some security functions and some security systems and equipment are old and difficult to maintain.

5. The physical condition of the plant in non-safety areas is visibly deficient.

While station personnel pay close attention to the care, maintenance and operation of plant safety systems, the care and maintenance of some other plant systems and structures do not meet the standards of high-performing plants. Also, the external visible condition of the plant is poor in many respects. While these have no direct bearing on safe operation of the plant, it is the Panel's view that the maintenance and preservation of non-critical plant systems, equipment and structures is important, because it communicates to employees and the public alike the owner's and operators' commitment and professionalism.

6. The new leadership team at the station is strong, and morale and attitudes among workers are distinctly positive.

Nuclear power plants are operated by people. The capability, dedication and attitudes of the staff affect every aspect of plant safety and performance. And while these are intangibles and difficult to assess, the ISE Panel was favorably impressed in its extensive interviews and observations of plant personnel.

The station senior management team is experienced, capable, energetic and well respected. This is a relatively new team, and its long-term effectiveness remains to be seen, but it exhibits the strengths central to successful and safe operation. Similarly, the ISE Panelists found Indian Point workers to be well-trained, professional and positive about their jobs. Also noteworthy is the mutually respectful and constructive relationship between union and station management.

It is the Panel's judgment that the caliber of Indian Point staff is very good, consistent with high-performing plants.

7. The station is facing potentially critical staffing shortages.

The Panel found staffing issues, of different kinds, in several areas. The combined effects of several factors – an aging IPEC workforce, high cost of living in the U.S. Northeast, internal corporate changes at Entergy and a very competitive hiring climate in nuclear specialty areas around the country – is already affecting Indian Point hiring and retention and portends even more serious future challenges. Particularly critical needs are foreseen in licensed nuclear operators, technicians and EP personnel. Entergy and IPEC have formulated ambitious plans to deal with this situation, but it is not yet clear that they will be adequately implemented and ultimately successful.



8. Station effectiveness in work management and project management needs improvement.

The processes of work management and project management – the planning, preparation and execution of the myriad of day-to-day tasks and longer term projects necessary to keep the plants running smoothly and safely – is not as effective as at most high-performing plants. Inadequacies in these areas are considered by the Panel to be a contributing factor to many of the observed problem areas at Indian Point – poor execution of the siren system replacement project and the backlog of maintenance work are two key examples – and are an impediment to lasting station improvement. The pace of improvement has been unnecessarily slow.

9. Change management at Indian Point is important and should be improved.

In recent years, the Indian Point workforce has been deluged with change – new ownership of both plants, integration of previously separated Unit 2 and Unit 3 functions, adoption of new Entergy standards and procedures, and significant plant software modifications, as examples. The steps taken to plan for and accommodate these changes, and particularly to prepare and train the workforce, have been inadequate in some respects, with ripple consequences in station performance. Better implementation of change management processes is needed.

10. Acquisition by Entergy has affected Indian Point in many ways – most of them good.

Fleet ownership of nuclear plants has proven to be beneficial to both owners and plants. Successful nuclear operating companies like Entergy offer proven practices and processes, extensive operating experience and timely technical support, a supply stream of seasoned managers, layers of oversight and other sources of strength to their operating plants. At Indian Point, there has been dramatic improvement in the performance of both units since the acquisitions early in this decade. As examples, plant capacity factors and forced outage rates have both improved to levels comparable to high-performing U.S. plants, and in the experience of the Panel, there is strong correlation between a plant's operational stability and its safety. It is very reasonable to conclude that Indian Point is a safer plant now than when initially acquired by Entergy.

On the other hand, there are aspects of Entergy ownership that merit close scrutiny. The recent announcement of the Entergy corporate restructuring, now under review by two state public utility commissions, is a good example. This is a complex change, and while it may prove financially beneficial to the corporation, its effect on Indian Point (if any) is not yet known.



Applying these 10 principal findings to the central ISE evaluation criterion of judging Indian Point relative to high-performing nuclear plants and other facilities, the Panel concludes that the comparison must be drawn separately in each of its primary areas of evaluation, as follows:

- In **nuclear safety**, Indian Point performance is good, and compares favorably to high-performing plants in most aspects of nuclear safety.
- Indian Point **security** compares favorably to high-performing U.S. nuclear plants in a number of areas, but needs upgrading in others. The ISE Panel judges Indian Point security to meet the highest standards of international nuclear facilities and to be superior to most complex non-nuclear U.S. industrial facilities.
- **Emergency preparedness** at Indian Point requires improvement. The relationship and interaction between EP station personnel and local, county and state officials is not healthy, and the emergency response facilities and equipment provided by Entergy, while compliant with regulatory requirements, are inadequate in some respects. Indian Point emergency preparedness clearly does not meet the standards of high-performing U.S. nuclear plants.
- With respect to its **public and stakeholder interactions**, Indian Point is uniquely challenged – compared to all other U.S. nuclear stations – because of its location and political visibility. Entergy/Indian Point management has not been sufficiently proactive in dealing with this unique challenge.

Principal Recommendations

In the course of its examinations, the Panel identified numerous recommendations and areas for improvements. These are presented throughout the report, in each applicable section. From these, the Panel has derived eight principal recommendations, including two over-arching recommendations that relate to the plant as a whole, and six additional major recommended actions, as follows.

Over-arching principal recommendations that affect the viability of the entire station:

1. **Investment commitment as needed to achieve and maintain top levels of safety, security and emergency preparedness at Indian Point**



Entergy must continue its financial commitment to accelerate visible, meaningful and convincing improvement to the station. The Panel acknowledges the progress already made, but given the history of the station, its national visibility, its precarious position in terms of public and political acceptance, its importance to New York's supply of electrical power and its financial value to its owner, Entergy must commit to achieving unequivocal excellence.

2. Aggressive, proactive communication and outreach

Maintaining a strong, mutually respectful and trusting relationship between the company and the community is central to long-term viability of the station. This relationship is not healthy today – it must be rebuilt, and Entergy must take the lead in making that happen. The Panel recommends that Entergy and IPEC executives commit to a structured process of continuing proactive and frequent interactions with the surrounding communities, including both private citizens and local officials. While resource-intensive, such an initiative could be very effective in replacing the distant, faceless owner with a personal and (over time) familiar contact.

Other principal ISE recommended actions include:

3. Comprehensive upgrade of emergency response facilities and equipment

As detailed in Sections 5 and 7, the Panel strongly recommends near-term, significant upgrades to the Entergy-provided emergency response facilities and equipment, including:

- Emergency Operations Facility (both main and back-up) replacement
- Technical Support Center and Operations Support Center upgrades
- Joint Information Center upgrade
- Substantial equipment upgrades, including the Off-site Notification System (RECS), Low Band Radio, satellite phones and the Plant data system.

Additionally, the Panel recommends that Entergy consider and act upon, as appropriate, reasonable requests from the counties for EP financial support. And as part of this action the company should establish a clear and consistent process for dealing with requests for EP resources and support.

4. Aggressive staffing actions

The Panel notes the encouraging plan of action to address immediate and potential longer-term critical staffing shortages at IPEC. However, Entergy's corporate commitment to effective implementation of this comprehensive staffing plan remains to be seen. The Panel urges close management attention to this action plan.



As a related matter, the Panel recommends immediate action to restore the EP staff positions that were eliminated as part of aligning Indian Point with Entergy's corporate structure. These positions support day-to-day off-site interface with county EP organizations and are important to both EP effectiveness and the Entergy relationship with the off-site EP personnel. The reductions in these positions had the unintended consequence of undermining stakeholder trust and confidence in Entergy, just at the time it was most important to strengthen their relationship.

5. Security improvements

The Panel recommends a number of improvements and enhancements in Security equipment, in order to improve reliability, maintainability and effectiveness of these systems. Items needing upgrading include the plant entrance, Central Alarm Station (CAS) and Secondary Alarm Station (SAS), the Access Authorization system and the fence line/barrier.

6. Station cleaning and preservation

A major site-wide campaign is recommended to accelerate cleaning, painting or removal (as appropriate) of deteriorating non-safety exterior features such as the containment ventilation ductwork and plant stack. This work is needed to properly reflect overall station quality and to convey to workers and the public Entergy's commitment to care and protection of their workplace.

Relationship with the Public

On a plane above the specific conclusions and recommendations previously summarized, the ISE Panel is compelled to call attention to the unusually polarized relationship between the Indian Point owner/operator and the larger public. Indian Point seems to inspire strong advocacy among both its ardent supporters and its strident critics. In the Panel's view, such polarization is a major obstacle to achieving progress on the issues that matter to both sides.

Two Sides of the Same Coin...

In their multiple interactions with both Indian Point personnel and off-site stakeholders and public, the ISE Panelists observed sharply different points of view on many of the same issues.

By and large, the people who run Indian Point take their jobs very seriously. They know their plant provides a vital service to the New York area, they are acutely aware of the importance of safe operation, and they see themselves as hardworking, dedicated and very



capable professionals. They are proud of what they do. And they are consequently often dismissive of criticism from media and the public.

On the other hand, some in the public who live near Indian Point fear nuclear power and are suspicious of its owner. They frequently hear rumors (some true) about problems in the plant, and they have no way to separate fact from fiction or to view the facts in perspective. They see the plant as a large, potentially dangerous industrial facility, owned and managed by a huge corporation a thousand miles away. And while they recognize the value of the plant as an electricity provider for the greater New York City area, they believe themselves to be saddled with the lion's share of the risk for a disproportionately small share of the benefit.

Neither point of view is wrong, neither side has a corner on the truth. It is the Panel's view that on most of the lightning-rod issues, there is a fact-based common ground, a place for mutually satisfactory resolution – if both sides are willing to go there.

Several of the findings and recommendations of the ISE Panel address this polarization. The Panel considers it essential that Entergy take an active role in addressing this issue, and the Panel is hopeful that public officials and citizens will be willing to do so as well.

This Executive Summary and the lengthy main report that follows present the results of an extensive and rather unusual evaluation of Indian Point. It was performed by a highly qualified Panel and reflects the Panelists' objective and independent perspectives about the station. It considers the gamut of technical, institutional and public policy issues germane to Indian Point safety, security and emergency preparedness.

The ISE Panel presents this report with the hope that it will guide future actions by Entergy and that it will contribute in a meaningful way to decisions by company and public officials regarding the future of the station.

