

Indiana Public Retirement System

State Excise Police, Gaming Agent, Gaming Control Officer, and Conservation Enforcement Officers' Retirement Plan

***Replication of the Actuarial Valuation
June 30, 2016***

March 7, 2017

***The Board of Trustees
Indiana Public Retirement System
Indianapolis, IN***

Dear Board Members:

An actuarial valuation is prepared annually by PricewaterhouseCoopers LLP (Fund Actuary) for the State Excise Police, Gaming Agent, Gaming Control Officer, and Conservation Enforcement Officers' Retirement Plan (EG&C Fund) of the Indiana Public Retirement System. Submitted in this report are the results of the replication and review of the June 30, 2016 actuarial valuation. This report has been prepared for use by the Indiana Public Retirement System (INPRS).

Census Data and Asset Information

The member census data and the asset information for this replication were furnished by the Fund Actuary. The Fund Actuary received the asset information and member data from INPRS. The Fund Actuary performed certain checks for reasonableness, but did not audit the data. Nyhart did not audit the information provided, and did not review it thoroughly for reasonableness or compare it with the prior year's submission for consistency. The accuracy of the results presented in this report is dependent on the accuracy and completeness of the information provided.

Benefit Provisions

The benefit provisions reflected in the replication of results are those in effect as of June 30, 2016 and summarized in the Fund Actuary's valuation report. Nyhart did not audit the benefit provisions compared to Indiana Code, but did review them for reasonableness and consistency with Nyhart's understanding of the Fund. An audit of the benefit provisions summarized in the valuation report has been performed by INPRS legal staff and they have concluded the benefit provisions are substantially accurate and provided minor clarification and commentary.

Assumptions and Methods

The selection of actuarial assumptions and methods are the responsibility of the Board and the Fund Actuary. The assumptions and methods used in this replication are those described in the Actuarial Assumptions and Methods section of the Fund Actuary's valuation report. Nyhart relied on the description found in the valuation report and did not review the assumptions for reasonableness. Nyhart performed a cursory review of the actuarial assumptions and methods as they pertained to the relevant replication computations.

The majority of the actuarial assumptions used in the June 30, 2016 valuation were adopted by the Board pursuant to the Experience Study completed in April 2015, which reflects the experience period from July 1, 2010 to June 30, 2014. These assumptions and methods have been used to develop the Actuarially Determined Contribution and are consistent with the accounting requirements detailed in GASB Statements No. 67 and No. 68.

Benefit obligations in the June 30, 2016 valuation are determined using June 30, 2015 census data and rolled-forward to the June 30, 2016 measurement date at the valuation interest rate, using actual distributions during that period, and for any other material events that would require additional adjustments to the benefit obligations.

Certification

To the best of our knowledge, this report is complete and accurate and has been prepared in accordance with generally accepted actuarial principles and the Actuarial Standards of Practice as described by the American Academy of Actuaries. In addition, information has been prepared in accordance with applicable government standards of financial reporting for defined benefit pension funds.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following:

- Fund experience differing from that anticipated by the economic or demographic assumptions;
- changes in economic or demographic assumptions;
- increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the Fund's Funded status); and
- changes in Fund provisions or applicable law.

We did not perform an analysis of the potential range of future measurements due to the limited scope of our engagement.

In the Fund Actuary's opinion, the actuarial assumptions and methods are individually reasonable and in combination represent their best estimate of anticipated experience of the Fund. Nyhart did not review the actuarial assumptions and methods.

Neither Nyhart nor any of its employees have any relationship with the Fund or its sponsor which could impair or appear to impair the objectivity of this report. While Nyhart has collaborated on INPRS projects with PricewaterhouseCoopers LLP (Fund Actuary), Nyhart does not have any relationship with the Fund Actuary that would impair the objectivity of this report.

The undersigned are compliant with the continuing education requirements of the Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States.

Respectfully submitted,



Michael Zurek, EA, MAAA



Danielle Winegardner, ASA, EA, MAAA



Tayt V. Odom, FSA, EA, MAAA

Executive Summary

Purpose and Scope of the Actuarial Peer Review and Replication

INPRS engaged Nyhart to perform an actuarial peer review and replication of the June 30, 2016 actuarial valuation of the EG&C Plan in order to provide INPRS with an actuarial opinion as to the completeness, accuracy, and compliance with Actuarial Standards of Practice (“ASOPs”) of the results and report prepared by PwC, the Fund Actuary.

We performed our review and replication of the valuation results in a manner consistent with the process we would follow to perform the full actuarial valuation of the fund as if we were the newly retained Fund Actuary. We initially prepared a replication of the June 30, 2016 valuation results based on the underlying census, assumptions, methods, and provisions data provided to us, but independent of any knowledge of specific valuation coding or mathematical techniques applied by the Fund Actuary. We then conducted a review of selected individual sample life valuations in order to identify any differences in coding or mathematical techniques that resulted in differences between our valuation results and those of the Fund Actuary.

Our review and replication procedures were not audit procedures performed in accordance with auditing standards prescribed by the American Institute of Certified Public Accountants. Therefore, the results presented in this report should not be construed as an audit opinion, but rather an actuarial statement of opinion.

In particular, the scope of our review and replication procedures included the following steps:

- Request information from the Fund Actuary, including a copy of the June 30, 2016 actuarial valuation report, a copy of the most recent experience study completed in April 2015, the member census data and assets used in the actuarial valuation, and detailed output for individual “sample life” valuations for selected members.
- Review and validate the member census data and market value of asset data provided by the Fund Actuary by replicating various statistics shown in the Fund Actuary’s actuarial valuation report.
- Review the assumption recommendations contained in the Fund Actuary’s 2015 experience study report for consistency with the historical experience and future expectations summarized in the report and for consistency with the assumption development guidance in ASOP 27 and ASOP 35. We note that the study was primarily based on member experience during the period from June 30, 2010 to June 30, 2014.
- Confirm that the recommended actuarial assumptions presented in the Fund Actuary’s experience study report and subsequently adopted by the Board were properly reflected in the June 30, 2016 actuarial valuation and disclosed in the actuarial valuation report.
- Independently value the June 30, 2015 benefit liabilities, in particular the actuarial accrued liability and normal cost based on the member census data provided and the actuarial assumptions, methods, and plan provisions summarized in the actuarial valuation report.
- Review and replicate the roll forward of benefit liabilities from June 30, 2015, the date of the underlying member census data, to June 30, 2016, including application of the interest rate to reflect the time value of money, the benefit distributions reflected, and other adjustments for known activity during the roll forward period.
- Review sample life output for certain selected individuals provided by the Fund’s Actuary to identify any differences in programming or mathematical technique in the Fund Actuary’s valuation and our independent valuation of the benefit liabilities.
- Review the calculation of the actuarial value of assets based on the investment gain/losses for each of the past five years disclosed in the Fund Actuary’s actuarial valuation report and our understanding of the five-year smoothing method selected by the Board as part of its funding policy.

Executive Summary

- Review the calculation of the actuarially determined contributions based on outstanding liability gains/losses disclosed in the Fund Actuary's actuarial valuation report and our understanding of the unfunded actuarial accrued liability amortization method selected by the Board as part of its funding policy.
- Review the June 30, 2016 actuarial valuation report for compliance with ASOP 41, Actuarial Communications, and other applicable ASOPs.
- Confirm the credentials of the actuaries who signed the June 30, 2016 actuarial valuation report and their ability to certify the results and render the opinions contained in their report.
- Identify recommendations and considerations for INPRS and the Fund Actuary for improving future valuations and reports.

Note that scope of our review and replication did not include the following:

- Audit of the member census and asset data, or otherwise review the data for reasonableness. We relied on the member census and asset data provided by the Fund Actuary as is. It is our understanding that the member census and asset data utilized by the Fund Actuary are audited by the independent accounting firm retained by INPRS.
- Independent replication of the experience study analysis supporting the assumptions selected by the Board for the June 30, 2016 valuation. Rather, we relied on the analysis completed by the Fund Actuary and summarized in their experience study report for validating the assumptions selected by the Board and used in the June 30, 2016 actuarial valuation.
- Verification of the benefit provisions summarized in the actuarial valuation report to the applicable sections of the Indiana Code. A comparison of the benefit provisions summarized in the report to the Indiana Code was performed by INPRS legal staff and they confirmed to us that the significant benefit provisions summarized in the report are consistent with Indiana Code. The noted exceptions were that the retirement benefit could not exceed 75% of final average salary and that average annual salary is based on the highest 5 non-consecutive years of annual salary in the 10 years preceding the member's retirement date.
- Replication of information prepared by the Fund Actuary in accordance with GASB 67 and GASB 68 for financial reporting. It is our understanding that financial reporting information prepared by the Fund Actuary is audited by the independent accounting firm retained by INPRS. We replicated the valuation of benefit liabilities and calculation of the actuarial determined contributions on a funding basis only. However, we note that the "total pension liability" valuation for financial reporting purposes is based on the same underlying member census data, actuarial assumptions, actuarial methods, benefit provisions, and valuation date as the valuation performed for funding purposes, resulting in the total pension liability being equal to the "actuarial accrued liability" for funding purposes.

Conclusions

Our replication of the actuarial valuation results and funding policy calculations matched those of the Fund Actuary to within a small margin, generally less than 1%. We did not identify any significant errors or omissions on the part of the Fund Actuary. We also found the actuarial valuation and report prepared by the Fund Actuary to be generally in compliance with applicable ASOPs.

Executive Summary

Specifically:

- We were able to match the summary of member census data without any significant differences.
- The actuarial assumptions selected by the Board pursuant to the results of the 2015 experience study completed by the Fund Actuary do not appear unreasonable based on the underlying experience and future expectations summarized in the study. The analysis summarized in the experience study report appears consistent with the assumption development guidance in ASOP 27 and ASOP 35.
- The actuarial assumptions used in the June 30, 2016 actuarial valuation and disclosed in the actuarial valuation report match the Fund Actuary's recommendations contained in the 2015 experience study report.
- We were able to replicate the actuarial accrued liability and normal cost in aggregate, and for the individual sample lives provided, to within a small margin. Generally less than 1%.
- The calculations performed for the liability roll-forward from June 30, 2015 to June 30, 2016, the actuarial value of assets, and the actuarially determined contributions are consistent with customary actuarial practices and appear to be consistent with the Board funding policy.
- The actuarial valuation report prepared by the Fund Actuary generally complies with ASOP 41.
- The signing actuaries have the actuarial credentials that we generally consider appropriate for purposes of preparing pension actuarial valuations. We have also verified that the signing actuaries, as applicable, have satisfied the continuing education requirements of the Society of Actuaries for the period ended December 31, 2015, based on documentation on the Society of Actuaries website (www.soa.org).

The remainder of this report is divided into the following sections that align with the steps taken during our review and replication.

- Member Census Data
- Actuarial Assumptions and Methods
- Valuation Replication
- Actuarial Value of Assets
- Actuarially Determined Contributions
- Actuarial Report

Additional detailed conclusions are presented at the end of each section of the report and identify a number of recommendations and considerations for INPRS and the Fund Actuary for improving future valuations. However, we note that the individual and cumulative impact of the various recommendations and considerations presented in this report would have only a minor impact on the valuation of the benefit liabilities and funding policy calculations.

Member Data

The table below summarizes the member data used in the valuation. The June 30, 2016 valuation is based on June 30, 2015 census data, with liabilities rolled-forward to the June 30, 2016 measurement date. The data summarized in this section is as of the June 30, 2015 census collection date.

	Nyhart	Fund Actuary
	June 30, 2015	June 30, 2015
Number of Actives	421	421
Average Age	42.2	42.2
Average Service	11.0	11.0
Number of Inactive Vesteds	7	7
Average Age	47.9	47.9
Average Service	20.0	20.0
Number of Inactive Nonvesteds	121	121
Number of Retirees and Beneficiaries	220	220
Average Age	68.5	68.5
Annual Benefits Payable	\$5,661,184	\$5,661,184
Total Number of Members	769	769

Conclusions:

We note the following conclusions with respect to our review and analysis of the member census data provided to us by the Fund Actuary:

- Our summary statistics of the member census data provided by the Fund Actuary are consistent with the same statistics presented in the Fund Actuary's valuation reports with no significant differences noted. This provided assurance that the data provided to us is the same data used in the June 30, 2016 valuation.

As a result of our review and analysis, we offer the following recommended revisions to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- None.

As a result of our review and analysis, we offer the following additional considerations to INPRS and the Fund Actuary for implementation in future actuarial valuations of the EG&C Fund:

- None.

Actuarial Assumptions and Methods

The selection of actuarial assumptions and methods are the responsibility of the Board and the Fund Actuary. The assumptions and methods used in this replication are those described in the Actuarial Assumptions and Methods section of the Fund Actuary's valuation report. Nyhart relied on the description found in the valuation report and did not review the assumptions for reasonableness.

Nyhart did review the results of the 2015 experience study performed by the Fund Actuary and for consistency with the assumptions used in the valuation. Nyhart also reviewed the actuarial methods and funding policies disclosed in the Fund Actuary's valuation report for consistency with Nyhart's understanding of INPRS policies.

Actuarial Methods used by the Fund Actuary:

Actuarial Cost Method:	Entry Age Normal Cost Method
Actuarial Asset Valuation Method:	5-year smoothing of investment gains and losses, with a 20% corridor
Calculated Contribution Rate:	Normal cost plus 20-year (30-year prior to 2016) closed level dollar amortization of the unfunded accrued liability

Conclusions:

- Actuarial Standard of Practice (ASOP) No. 27 provides recommendations for economic assumptions and ASOP No. 35 provides guidance for the selection of demographic and other noneconomic assumptions. ASOP 27 and 35 recognize the uncertain nature in which assumptions are selected and that a range of assumptions may be reasonable. Under both standards, a reasonable assumption should have the following characteristics.
 - Appropriate for the purpose of the measurement
 - Reflects the actuary's professional judgement
 - Reflects historical and current (economic or non-economic) data as of the measurement date
 - Reflects estimates of future experience
 - Should be unbiased
- Nyhart did not review the assumptions for reasonableness. Nyhart performed a cursory review of the actuarial assumptions and methods as they pertained to the relevant replication computations.
- The assumptions developed by the Fund Actuary based on the 2015 experience study for the Fund are reasonable representations of plan experience over the period. This conclusion is based on a review of the assumption study report presented by the Fund Actuary, and the data and conclusions contained in the report. Replication of the results of the experience study is outside of the scope of this review.
- The assumptions developed in the 2015 experience study were generally used in the June 30, 2016 valuation by the Fund Actuary.
- The actuarial cost method, asset valuation method, and funding policies used in the June 30, 2016 valuation by the Fund Actuary are consistent with Nyhart's understanding of the actuarial policies established by INPRS.

As a result of our review, we offer the following recommended revisions to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- The base rates used in the mortality table have some incorrect values. While the impact on valuation results will be de minimis, the rates should be corrected in future valuations.

Actuarial Assumptions and Methods

As a result of our review, we offer the following additional considerations to INPRS and the Fund Actuary for implementation in future actuarial valuation of the EG&C Fund:

- A significant portion of the eligible population choose to enter the DROP, but no assumption is made regarding future DROP elections. Consider adding an explicit assumption for future valuations.
- No mortality table specific to disabled lives is being applied, nor was it explicitly discussed in the Experience Study report. Consider whether partial credibility and the definition of disability under the Fund would justify the use of disabled mortality table.

Actuarial Accrued Liability and Normal Cost

The following analysis was performed by Nyhart to review the Actuarial Accrued Liability and Normal Cost of the Fund as determined by the Fund Actuary:

- Calculate the Actuarial Accrued Liability and Normal Cost for the Fund in total based on the census data provided and the assumptions and Fund provisions described in the Fund Actuary's Actuarial Valuation Report.
- Confirm that the roll-forward methodology used by the Fund Actuary to estimate benefit obligations on the June 30, 2016 measurement date from the June 30, 2015 census data and liability valuation date is consistent with standard practices.
- Review the individual liability of sample lives requested by Nyhart and provided by the Fund Actuary.

To provide some context on the replication results below, we generally expect to be within a smaller range on the calculation of the present value of future benefits (PVFB) (within 1%-2%) and within a wider range on the calculation of the actuarial accrued liability and normal cost (within 5%). The wider range on the latter items is because there tends to be more variability in the methodologies used to allocate the total liability (PVFB) to past and future years of service. Nevertheless, we analyzed both measures in our review of individual sample life liabilities and kept a continued focus on the Entry Age Normal measurements actually used to compute the ultimate Fund cost.

Total Fund Liability Replication:

	Nyhart	Fund Actuary
	June 30, 2015	June 30, 2015
Entry Age Normal Accrued Liability:		
Retiree/Beneficiary/Disabled	\$ 68,044,287	\$ 68,050,870
Active and Inactive	\$ 63,060,515	\$ 64,852,398
Total Accrued Liability	\$ 131,104,802	\$ 132,903,268
<i>Difference (\$)</i>	<i>\$ (1,798,466)</i>	
<i>Difference (%)</i>	<i>(1.35%)</i>	
 Entry Age Normal Cost		
	\$ 3,485,966	\$ 3,343,206
<i>Difference (\$)</i>	<i>\$ 142,760</i>	
<i>Difference (%)</i>	<i>4.27%</i>	

Actuarial Accrued Liability and Normal Cost

Replication of Liability Roll-Forward:

The June 30, 2016 valuation is based on census data as of June 30, 2015 and a valuation of benefit obligations on the census collection date. The resulting obligations are then rolled forward to June 30, 2016 at the valuation interest rate and using actual distributions during the period, and further adjusted for any material events during the period.

The table below shows Nyhart's replication of the liability roll-forward. Results of the review of the liability roll-forward are summarized under conclusions on the following pages.

Liability, Normal Cost and Payroll Roll-Forward

	Nyhart June 30, 2015 to June 30, 2016	Fund Actuary June 30, 2015 to June 30, 2016
1. Total Accrued Liability, beginning of year	\$ 131,104,802	\$ 132,903,268
2. ASA Account balance, beginning of year	N/A	N/A
3. Accrued Liability, Net of ASA Account	131,104,802	132,903,268
Balance, Beginning of year [(1) – (2)]		
4. Normal Cost	3,485,966	3,343,206
5. Actual Benefit Payments ¹	6,266,565	6,266,565
6. Actual Transfers	0	0
7. Actual ASA Annuitizations	N/A	N/A
8. Expected Interest [0.0675 * ((3) + (4) - 0.5*(5) + 0.5*(6) + 0.5*(7))]	8,873,380	8,985,140
9. Total Accrued Liability, Net of ASA Account Balance, end of year [(3) + (4) - (5) + (6) + (7) + (8)]	134,716,070	138,965,050
10. ASA Account Balance, end of year	N/A	N/A
11. Total Accrued Liability, end of year	134,716,070	138,965,050
<i>Difference (\$)</i>	<i>\$ (4,248,980)</i>	
<i>Difference (%)</i>	<i>(3.06%)</i>	
12. Normal Cost for Fiscal 2017	\$ 3,536,836	\$ 3,550,386
<i>Difference (\$)</i>	<i>\$ (13,550)</i>	
<i>Difference (%)</i>	<i>(0.38%)</i>	
13. Payroll for Fiscal 2017	\$ 26,163,688	\$ 26,163,688
<i>Difference (\$)</i>	<i>\$ 0</i>	
<i>Difference (%)</i>	<i>0.00%</i>	

¹ Includes refunds of accumulated member contributions and net interfund transfers, as provided by the Fund Actuary.

Actuarial Accrued Liability and Normal Cost

Review of Sample Lives:

Sample lives produced from the Fund Actuary's valuation system were requested and reviewed.

A successful replication of liabilities for the Fund in total does not necessarily provide enough information to conclude that the Fund provisions and assumptions disclosed in the valuation report are accurately used in the valuation of benefit obligations. For example, an error or omission that inflates liabilities by 5% can be offset by a separate error or omission that results in a 5% liability reduction. The net result of the two errors can produce a reasonable match.

Sample lives provide details on the benefits and liabilities calculated at each age for every benefit offered under the Fund. Review of the sample valuation output and replication of individual results can provide the details that might get missed when only reviewing the Fund in total. Six samples representing a thorough cross-section of participants of varying age, gender, years of service, and status were reviewed in detail. The following sample lives were chosen for review:

No.	Fund	PID	Description
1	EG&C	484736	Active member, married, in DROP
2	EG&C	507877	Active member, female, single, nonvested, not in DROP
3	EG&C	575794	Active member, male, married, vested, early retirement eligible
4	EG&C	449774	Terminated vested member, married, early retirement eligible
5	EG&C	517789	Retired member, single, 60% joint and survivor form of payment, multiple beneficiaries
6	EG&C	439077	Survivor, female

We reviewed the valuation output for the sample lives above provided by the Fund Actuary. We compared the assumptions used and the benefits calculated against those summarized in the valuation report. We also ran the same individuals through our valuation software used to match total Fund results and compared individual liability results for consistency. Results of the review showed consistency between the Fund Actuary and our individual liabilities. We achieved a very close match on the computation of the present value of future benefits, and were consistently close on the Entry Age Normal liabilities and normal cost.

Results of our individual member valuations were consistent with Fund Actuary, as shown in the tables below:

As of June 30, 2015								
No.	Present Value of Future Benefits				Entry Age Normal - Actuarial Accrued Liability			
	Nyhart	Fund Actuary	Diff. (\$)	Diff. (%)	Nyhart	Fund Actuary	Diff. (\$)	Diff. (%)
1	\$708,511	\$708,667	(\$156)	0.0%	\$708,511	\$708,667	(\$156)	0.0%
2	164,229	163,982	247	0.2%	70,266	69,598	668	1.0%
3	364,935	364,128	807	0.2%	301,174	299,825	1,349	0.4%
4	237,460	237,110	350	0.1%	237,460	237,110	350	0.1%
5	182,098	182,246	(148)	(0.1%)	182,098	182,246	(148)	(0.1%)
6	146,109	146,109	0	0.0%	146,109	146,109	0	0.0%
Tot.	\$1,803,342	\$1,802,242	\$1,100	0.1%	\$1,645,618	\$1,643,555	\$2,063	1.3%

Actuarial Accrued Liability and Normal Cost

As of June 30, 2015				
No.	Entry Age Normal - Normal Cost Active Participants Only			
	Nyhart	Fund Actuary	Diff. (\$)	Diff. (%)
1	\$0	\$0	\$0	0.0%
2	6,995	7,029	(34)	(0.5%)
3	7,671	7,746	(75)	(1.0%)
Tot.	\$14,666	\$14,775	(\$109)	(0.7%)

Conclusions:

- The total Fund liability replication is well within a reasonable expectation for matching liability results and well within the actuarial standards generally used as a guideline for that purpose. Replication of accrued liability and normal cost within 5% are generally considered to be an acceptable match. Our match produced an accrued liability that is 1.35% lower than the Fund Actuary, and a Normal Cost that is 4.27% higher than the Fund Actuary.
- The total Fund replication was performed based on Nyhart's independent coding of the Fund provisions and assumptions summarized in the Fund Actuary's valuation report. We used the sample lives provided by the Fund Actuary to help interpret how to use the data provided and for general guidance, but we did not attempt to replicate or rely on the coding used to produce the sample lives in our match.
- We have replicated the roll-forward of liabilities from the June 30, 2015 valuation date to June 30, 2016 performed by the Fund Actuary and confirm that the interest adjustments and other adjustments used are consistent with our methodology and standard actuarial practices.
- Our review of the sample lives confirm that the assumptions and provisions summarized in the Fund Actuary's report were generally used in the liability calculations. After accounting for the salary scale assumption, we matched the liabilities and normal costs of all sample lives within a reasonable percentage.
- The total Fund replication did not attempt to match the Fund Actuary's results by status code (e.g. retired, disabled, beneficiary) or by active decrement source (e.g. retirement, death, disability, termination) since liabilities at that level of detail were not contained in the Fund Actuary's report. We do not believe that disclosure of liabilities at that level of detail are necessary in the valuation report.

As a result of our review, we offer the following recommended revisions to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- A review of sample lives revealed a 3.25% salary scale was used in the valuation, and not the 2.50% salary scale disclosed in the valuation report. We understand this issue was brought to the attention of INPRS by the Fund Actuary. The change should be made for future valuations.
- Final Average Pay is computed using the highest 5 consecutive years of compensation in the last 10, while we believe it should be defined as the highest 5 non-consecutive years of compensation in the last 10. We expect this will have little if any effect on the valuation.

Actuarial Accrued Liability and Normal Cost

As a result of our review, we offer the following additional considerations to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- The IRC Section 415 maximum benefit limitation was not being applied to some benefits, which affects the Entry Age Normal liabilities.
- The death benefit for vested participants is assumed to be payable to everyone, yet only 90% of participants are assumed to be married or have a minor beneficiary. Consider applying the married percentage to the death benefit.
- All participants are assumed to elect a 50% Joint and Survivor annuity at retirement, even if currently known to be single. Consider instead using actual marital status for each member or applying the marital assumption to value optional forms of benefit.

Development of the Actuarial Value of Assets

	Nyhart	Fund Actuary
	June 30, 2015	June 30, 2015
	Thru	Thru
	June 30, 2016	June 30, 2016
1. Market Value of Assets, beginning of year	\$ 110,037,215	\$ 110,037,215
2. Market Value of Assets, end of year	\$ 111,329,476	\$ 111,329,476
3. Expected Earnings		
a. Expected Earnings on Market Value	\$ 7,427,512	\$ 7,427,512
b. Receipts with Expected Earnings	6,597,855	6,597,855
c. Disbursements with Expected Earnings	<u>(6,478,062)</u>	<u>(6,478,062)</u>
d. Total [(a) + (b) + (c)]	\$ 7,547,305	\$ 7,547,305
4. Expected Market Value of Assets, end of year, [(1) + (3d)]	\$ 117,584,520	\$ 117,584,520
5. Current Year Market Value Gain/(Loss) [(2) – (4)]	\$ (6,255,044)	\$ (6,255,044)
6. Deferred Recognition of Investment Gain/(Loss)		
a. Current Fiscal Year (80% of (5))	\$ (5,004,035)	\$ (5,004,035)
b. Prior Fiscal Year - 1 (60%)	(4,611,455)	(4,611,455)
c. Prior Fiscal Year - 2 (40%)	2,653,933	2,653,933
d. Prior Fiscal Year - 3 (20%)	<u>(224,659)</u>	<u>(224,659)</u>
e. Total [(a) + (b) + (c) + (d)]	\$ (7,186,216)	\$ (7,186,216)
7. Preliminary Actuarial Value, end of year [(2) – (6e)]	\$ 118,515,692	\$ 118,515,692
a. 80% of Market Value, end of year	89,063,581	89,063,581
b. 120% of Market Value, end of year	133,595,371	133,595,371
8. Actuarial Value of Assets, end of year	\$ 118,515,692	\$ 118,515,692
9. Actuarial Value of Assets as a % of Market Value	106.5%	106.5%
10. Actuarial Value Net Rate of Return	5.0%	5.0%

Development of the Actuarial Value of Assets

Conclusions:

- The Actuarial Standard of Practice (ASOP) No. 44 governs the selection and use of asset valuation methods for pension valuations. ASOP 44 recommends the asset smoothing method satisfies each of the following conditions. The asset smoothing methodology utilized by the Fund Actuary meets these recommendations.
 - The actuarial value of assets method should produce smoothed values sometimes greater than and sometimes less than the market value of assets
 - The actuarial value of assets should fall within a reasonable range around market value
 - The differences between actuarial value of assets and market value of assets are recognized within a reasonable period of time

We believe the 5-year asset smoothing method with 20% corridor adopted by INPRS satisfies the criteria under ASOP 44.

- The actuarial value of assets developed by the Fund Actuary is consistent with the 5-year smoothing period and 20% corridor method disclosed in the Fund Actuary's Valuation Report.
- The market value of assets on June 30, 2016, and the contributions, distributions, and expenses during fiscal 2016 used to develop the actuarial value of assets were consistent with the amounts reported in the INPRS financial statements.
- The expected return assumption of 6.75% is disclosed as net of administrative expenses in the assumption section of the report. The Fund Actuary includes administrative expenses in the disbursements category when developing the actuarial value of assets. This is consistent with the net return as disclosed.

As a result of our review, we offer the following recommended revisions to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the Fund Actuary for implementation in future actuarial valuations of the EG&C Fund:

- Consider separating the disbursements shown in the report into benefit payments and administrative expenses in order to provide more transparency that the return is net of administrative expenses.

Calculated Employer Contribution Rate

This section of the report replicates the calculation of the employer contribution rate based on the funding policy as disclosed in the Fund Actuary's report. Please note that the liabilities and normal cost used in the replication are those determined by the Fund Actuary.

	Nyhart	Fund Actuary	
	June 30, 2016	June 30, 2016	
Normal Cost	\$ 3,550,386	\$ 3,550,386	
Percent of Projected Payroll for Fiscal 2017	13.57%	13.57%	
Amortization of Unfunded Accrued Liability			
Unfunded Accrued Liability (UAL)	\$ 20,449,358	\$ 20,449,358	
Unamortized UAL from Prior Years	19,667,344	19,667,344	
Net Unamortized UAL	\$ 782,014	782,014	
Amortization Factor (20-years, level dollar)	11.5322	11.5322	
Current Year Amortization Payment	\$ 67,811	\$ 67,811	
Payments Established in Prior Years	1,606,821	1,606,821	
Total Amortization Payments	\$ 1,674,632	\$ 1,674,632	
Percent of Projected Payroll for Fiscal 2017	6.40%	6.40%	
Total Calculated Employer Contribution Rate	19.97%	19.97%	
Fiscal 2017 Projected Payroll	\$ 26,163,688	\$ 26,163,688	
Amortization Schedule of Unfunded Accrued Liability (Fund Actuary):			
Year	Remaining Amount	Remaining Period	Amortization Amount
6/30/2009	\$ 10,811,408	21	\$ 915,986
6/30/2010	3,537,113	24	282,586
6/30/2011	945,190	25	74,276
6/30/2012	4,790,385	26	370,750
6/30/2013	(1,588,453)	27	(121,221)
6/30/2014	(3,069,749)	28	(231,239)
6/30/2015	4,241,450	29	315,683
6/30/2016	<u>782,014</u>	20	<u>67,811</u>
	\$ 20,449,358		\$ 1,674,632

Calculated Employer Contribution Rate

Conclusions:

- As part of its funding policy, the Board has adopted the methods used for determining the actuarially determined contributions of the Fund. The methods include the Entry Age Normal Level Percent of Pay actuarial cost method for computing the actuarial accrued liability, a five-year smoothing method for computing the actuarial value of assets, and level-dollar closed amortization methods for including payment towards the unfunded actuarial accrued liability.

Actuarial Standards of Practice (ASOP) No. 4 provides guidance on measuring pension obligations. The standard addresses actuarial cost methods and contribution allocation procedures. Under the standard, the actuary should select an actuarial cost method that meets the following criteria:

- The period over which normal costs are allocated for a participant should begin no earlier than the date of employment and should not extend beyond the last assumed retirement age. The period may be applied to each individual participant or to groups of participants on an aggregate basis.
- The attribution of normal costs should bear a reasonable relationship to some element of the plan's benefit formula or the participant's compensation or service. The attribution basis may be applied on an individual or group basis.
- Expenses should be considered when assigning periodic costs or actuarially determined contributions to time periods.
- The sum of the actuarial accrued liability and the actuarial present value of future normal costs should equal the actuarial present value of projected benefits and expenses, to the extent expenses are included in the actuarial accrued liability and normal cost.

Additionally, under ASOP 4, when selecting a cost allocation procedure or contribution allocation procedure, the actuary should consider factors such as the timing and duration of expected benefit payments and the nature and frequency of plan amendments. In addition, the actuary should consider relevant input received from the principal, such as a desire for stable or predictable periodic costs or actuarially determined contributions, or a desire to achieve a target funding level within a specified time frame. When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

The Entry Age Normal cost method and contribution allocation procedure used by the Fund are in line with the recommendations of ASOP 4.

- The amortization payments for the individual years included in the amortization schedules are consistent with the disclosed unamortized unfunded liabilities, the remaining amortization periods, a 6.75% interest rate assumption, and the level dollar closed amortization policy adopted by INPRS.
- The remaining amortization years as disclosed in the amortization schedules are consistent with the INPRS policy of 30-year amortizations prior to 2016 (without restatement) and 20 years prospectively after 2015.
- The calculated contribution rate developed by the Fund's Actuary is consistent with the methods described in the assumption section of the report and with Nyhart's understanding of the Funding policies developed by INPRS.

Calculated Employer Contribution Rate

As a result of our review, we offer the following recommended revisions to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the Fund Actuary for implementation in future actuarial valuations of the EG&C Fund:

- None.

Actuarial Valuation Report

The actuarial report of the Fund Actuary has been reviewed for completeness and adherence to the Actuarial Standards for presenting actuarial results.

Conclusions:

- The report presented by the Fund Actuary is in compliance with Actuarial Standards. Actuarial Standards of Practice (ASOP) No. 41 provides guidance to actuaries with respect to actuarial communication. The actuarial report should state the actuarial findings and identify the methods, procedures, assumptions and data used with sufficient clarity. The following are additional requirements for actuarial communications as recommended by ASOP 41.
 - Principal and Scope of Engagement – actuary should identify the client or employer and make clear the scope of the assignment and limitations or constraints of results
 - Form and Content – actuary should ensure the communication is appropriate to the particular circumstances
 - Clarity – actuarial communication should be clear and use appropriate language, taking into account the intended users
 - Timing of Communication – results should be presented within a reasonable time period
 - Identification of Responsible Actuary – report should clearly identify the actuary responsible for the results and identify the party responsible for each material assumption and method
 - Additional Disclosures – report should include cautions regarding possible uncertainty or risk, any conflicts of interest, reliance on other sources for data or information, and any relevant subsequent events after findings have been communicated
- The summary of Fund provisions and assumptions and methods used in the valuation is concise, yet thorough.
- Cindy Fraterrigo, Brandon Robertson, and Antonio DeSario of PwC signed the actuarial valuation reports. Ms. Cindy Fraterrigo and Mr. Antonio Desario are both a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries. Mr. Brandon Robertson is an Associate of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries. We verified their credentials on the Society of Actuary's website. The actuaries meet the "Qualification Standards of Actuaries Issuing Statements of Actuarial Opinion in the United States" relating to pension plans. As such, the actuaries qualify as specialists upon whose work we would normally rely on.

As a result of our review, we offer the following recommended revisions to INPRS and the Fund Actuary for implementation in the next actuarial valuation of the EG&C Fund:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the Fund Actuary for implementation in future actuarial valuations of the EG&C Fund:

- In the report, Final Average Pay may be defined as the highest 5 *non-consecutive* years of compensation in the last 10.