

Declaratory Judgment Action Expense Reserving

by Lee R. Steeneck

In this paper's context, Declaratory Judgment Actions generally mean judges resolve coverage grant conflicts between the insurer and insured. They are most noticeable in the last decade in the context of whether *old* general liability insurance contractual language was meant to include latent-injury, environmental gradual or sudden & accidental pollution liability or direct first party property damage for cleanup expenses. Significant DJA activity also surrounds asbestos-related injuries and damages.

The NAIC "Codification of Statutory Accounting" project has highlighted the need to bring current (widely divergent) DJA *expense* practice into logical uniformity. This paper identifies various issues (especially relating to recognition, measurement, and disclosure timing/standards) and provides a case study application of DJA expense reserving using a simplified **Report year count (inventory model) and amount** methodology.

The article ends with some thoughts about how to analogize the Environmental DJA expenses of the recent past into the **Y2K exposure** that insurers imminently face. Coverage disputes will indisputably occur and *best practices* for accounting and reserving should be addressed.

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Declaratory Judgment Action Expense Reserving

Introduction

When parties to a contract are in conflict as to the meaning of the contract's content, either party can seek clarification from a judge through a Declaratory Judgment Action (DJA). In insurance (or reinsurance) coverage scope disputes, this can relate to: "Was the underage adolescent, borrowing the family car without permission insured for the subsequent accident?", "Is the commercial hazardous waste producer/hauler covered by CGL insurance for *intentional* gradual pollution from hazardous materials (HazMat) at an EPA identified polluted dumpsite?" Are these insured events or do they fall outside the coverage grant of a specific policy form, so as to be properly denied claims?

While DJAs have a long history, their amounts and consequential insurance company *reserves* have been modest and not oftentimes identified clearly. Owing to the latency associated with claims: (1) for asbestos-related injuries and death and (2) for damages associated with HazMat pollution liability, older insurance policies in the USA are often silent-to-ambiguous as to coverage grant, especially in understanding the interpretation of "occurrence during the policy period". With tens of millions dollars of indemnity (loss) and allocated loss adjustment expense (ALAE) in contention between insured and insurer (\$billions aggregated), DJAs have taken on all the expense and importance of the actual defense of the insured against the claimant in court. Further, with such mass torts being somewhat similar, initial cases in state and federal court have precedential value for future coverage dispute cases.

This paper will examine various accounting and actuarial considerations for recognizing, measuring, and disclosing balance sheet liabilities for DJA expenses. Company data, drawn primarily from environmental litigation from 1980-1998 will be used to illustrate one methodology and assumptions as a case study. This may guide the Appointed Actuary who must opine on material amounts of alleged asbestos, environmental, or other mass tort insured liability (and don't have DJA expense history so identified in their data) or introduce the Appointed Actuary to considerations necessary to establish reserves for the so-called **Y2K** or "millennium bug" problem which may surface during 1999 and continue for years.

A.M. Best has estimated¹ that Y2K insured liabilities (including coverage disputes) are more immediate a concern than the \$26 billion it estimates that P&C insurance companies in the US are underreserved. They include \$6-8 billion of Y2K compliance costs.

¹ Review Preview, A Special Supplement to Best's Review and BestWeek, "Living on the Edge", January 1999.

NAIC Statutory Accounting

During the March, 1998 meeting of the NAIC it approved a recommendation from the Casualty Actuarial (Technical) Task Force to clarify or standardize definitions for allocated and unallocated loss adjustment expense obligations. A “Blanks” proposal will likely be forthcoming soon. SSAP # 55, establishes statutory accounting principles for recording unpaid claims and claim adjustment expenses for insurance contracts.

It should be noted that **new terminology** has been created to help migrate from old L.A.E. definitions to new (the relationship is not one-to-one). Terminology and definition shifts from ALAE to **Defense** and **Cost Containment (DCO)** and Unallocated LAE to **Adjusting** and **Other (AO)**. The following chart identifies which adjustment expenses fall into each category for statutory reporting purposes. It is particularly noteworthy that DJA expenses have been expressly identified as AO.

| Defense and Cost Containment | Adjusting and Other |
|--|--|
| <i>defense, litigation, and medical cost containment expenses, internal or external</i> | <i>LAE other than those assigned as DCO</i> |
| Surveillance expenses | |
| Fixed amounts for medical cost containment | |
| Litigation management expenses | Fees and expenses of adjusters and settling agents |
| LAE for in/voluntary pools (A/Y reporters) | LAE for pools reporting on a Cal/Y basis |
| Fees/salaries for appraisers, investigators, rehab nurses, working on defense of a claim | Fees/salaries for appraisers, investigators, if working in the capacity of an adjuster |
| Attorney fees incurred owing to a duty to defend | Attorney fees incurred in the determination of coverage, including litigation between insurer and policyholder |
| Cost of engaging experts | |

The NAIC will either change or clarify statutory accounting treatment for DJA expenses in this directive.

DJA Expenses in the 2nd Millennium

In the past, if the language of an insurance contract wasn't clear, the insuring parties usually resolved the conflict by way of compromise, in order to preserve a mutually desirable business relationship. Insurance still relies on “utmost good faith” between the insuring parties. Unlike defense provided contractually to the insured against claimants, DJAs involve insurers litigating a coverage issue with its insured or amongst themselves. These DJAs oftentimes relate to total denial of coverage for a claim presented to an insurer. But especially in latent injury cases, with multiple occurrence date possibilities, there is substantial litigation as to the allocation of claims between insurers.

There is very little case law *on point* as to whether these expenses relate solely to the formation and interpretation of insurance contracts, which precede any transfer of risk to the insurer, or whether they are adjusting expenses.

Until recently, insurers were given wide discretion in (statistical) reporting and accounting for DJA expenses. Suppose an insurer was using an attorney employed in its Legal Department or outside law firm to monitor and instruct local counsel in litigating a DJA issue relating to one of its policyholders. It would be possible to report either or both of these expenses to a statistical bureau, NAIC, or other regulatory body as: (1) overhead - pay-as-you-go without reserve accruals, (2) ALAE, or (3) ULAE. The NAIC has now clarified the treatment. The home office coordinating counsel is DCO and the litigating attorney is AO.

This is one interpretation, that home office coordinating counsel expense is a litigation management expense and not a direct attorney fee for coverage determination (including litigation).

According to the NAIC definitions, the line of demarcation distinguishing claim expense payments between DCO and AO classifications, is that once the insurer has determined its coverage position (clearly DCO) then subsequent expenses on duty to defend remain DCO, but extra contractual expenses for DJA litigation are AO.

Perhaps as corroborating evidence that this is appropriate, would it be public policy to:

1. Erode aggregate (expense within) limits for litigation expenses that insurers incur while denying policyholders' coverage?
2. Include the litigation expenses incurred while denying policyholders' coverage within retrospectively rated premium adjustments as though they were ALAE?
3. Deny agents contingent commissions on the basis of DJA expenses?

It is clear that insurers need to research their historical accounting treatment of DJA expenses to ensure that any need to change procedures to properly classify such expenses is implemented consistently, properly monitored, and that any history of DJA expenses can be extracted for actuarial forecasting purposes (of both DCO and AO classifications).

Larger DJA expenses are incurred in connection with disputes as to which coverages and years may have been triggered (almost exclusively related to "occurrence" policy wording, not "claims made") or whether certain exclusions (e.g whether either sudden & accidental and/or gradual pollution are covered perils) should prevail. Attached in Appendix 1 is a state coverage trigger map, showing how state courts have opined on asbestos and environmental incurred claims' triggers. Assuming the finding of coverage, the most popular triggers are Continuous (all policies in effect at the time of exposure, manifestation of claim and all the time in between), Injury-in-fact (only policies in effect when damages occur are triggered - need not manifest themselves during the current policy period as long as its existence during the period can be proven in retrospect),

Exposure (those policies in effect when the claimant or property was exposed to the injurious conditions), and Manifestation (only those policies in effect when the injury or damage manifested itself are triggered).

Accounting for Declaratory Judgment Action Expenses

There are 3 key reporting features which require careful consideration:

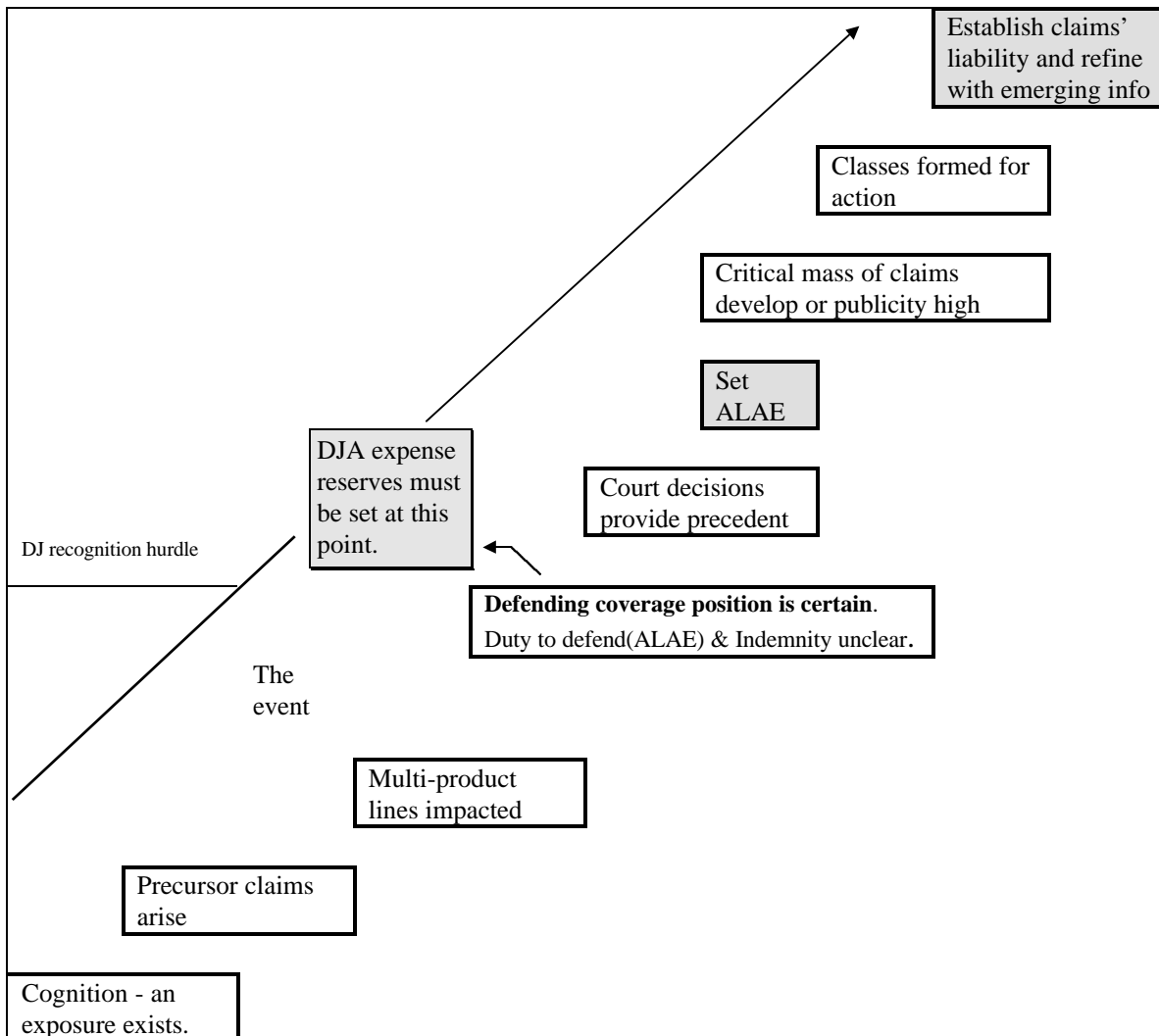
- Recognition - when does an entity acknowledge existence of a DJA expense exposure?
- How does an entity measure its exposure to DJAs?
- How can a company clearly disclose its exposure in financial statements?

Recognition should follow accounting pronouncements SFAS #5, *Accounting for Contingencies* and SFAS #60, *Accounting and Reporting by Insurance Enterprises*. The “cause” for liability has to have taken place before the statement date, information at statement date must demonstrate that it is probable that liability has been incurred, and the amount can be reasonably estimated. In relation to asbestos and environmental litigation, recognizing material amounts of mass tort exposure or liability may exist follow by way of an analysis of the various stages prior claims have emerged. DJA expense reserving has a lower recognition hurdle than either ALAE reserving or claims reserving.

The following chart displays the likely sequential emergence of claims which could be subject to declaratory judgment action.

A single claim (demand for coverage) or a small number of claims, may not alert the entity of the possibility of mass tort coverage dispute litigation. But as anecdotal evidence accumulates - from claims adjusters, underwriters, even media reporting, the entity’s awareness heightens. As the *event* becomes recognizable, in the policy period, unless the possibility of coverage disputes is remote, recognition of declaratory judgment action expenses should be forthcoming.

Initial recognition may be verbal, a disclosure that an unmeasurable DJA expense exposure is present, related to demands for coverage for an emerging mass tort.



Measurement of DJA expense reserves is the focal point actuarial exercise of this discourse. Standard expense extrapolation methods, wholly dependent on credible historical payment experience are neither available, nor reliable for setting reserves. Data sets are small and volatile. The lag between occurrence, report, and timing to closure amongst DJAs are not stable, and in fact can be dependent on each other.

In a mass tort's early stage, when disputes are few in number, one might rely on the Claim Department to estimate future litigation expenses on a reported case basis (and disclose that no IBNR forecast is possible at this time). It could be best practice to build the entity's DJA expense reserve by examination of each *action*, and to apply judgment as to the aggregation of the expense reserves. It is also necessary to forecast IBNR DJ *Actions* by number, but with "mitigation". As precedents are set, future similar contentiousness is possibly reduced and it is possible that reported annual counts and amount will decrease.

If one proceeds by examining insurance policies by insured classification, line of business and coverage state, it may be possible to model (and sensitivity test) DJA accumulations. This may take the form of: (1) development forecasts on reported DJAs in progress, plus (2) a forecast of future DJA emerging counts and associated forecasted payment amounts as they age to closure. As more data becomes available, more reserving models may be created and tested, probably increasing reserve accuracy or reliability.

As an extreme value for the latency of costs in DJAs, we are aware of one case, reported in 1982, that went to (Phase 1) trial in 1991 over the issues of policy authentication and proof of the existence of lost contracts. Later that year (Phase 2) litigation surrounded whether the insured “expected or intended” contamination, number of occurrences, and the issue of late notice to insurers (delaying their opportunity to a fair, timely investigation). In early 1992 a jury found in favor of the insurer; it had no duty to indemnify the insured for cleanup costs. Phase 3 dealing with damages and allocation of costs between defense and indemnity was also concluded by jury verdict in 1992. Late 1993 the insured filed with the Court of Appeals, challenging results of all 3 phases. All phases were finally adjudicated to conclusion in 1997 and final expenditures made.

Establishing an industry reserve estimate after analyzing insurer-specific policy data is oftentimes called a *bottom-up* analysis. The reserve forecasts are entity specific, but it takes longer to generate sufficient applicable experience on which to develop credible entity estimates.. Industry results are the sum of the entities’ results. Individual company data are likely to be quite sparse and volatile, but at least germane to the subject book of business. When many individual companies disclose their emerging experience, financial analysts, amongst others, create what are sometimes called *top-side* industry aggregate estimates (by extrapolating the *few* to the *many*, probably using some stratified sampling method and market shares). While it is certainly much less reliable, companies can calculate an estimate of their emerging liabilities by applying their market shares to industry aggregate estimates. In the early 1990’s, once certain public agencies made their aggregate asbestos & environmental liability forecasts known, they employed a top-down *distribution* to spread forecasted losses/expenses (on a market share of premium basis) to the operating entities during the previous decade(s).

The entity’s estimate will likely fall within a plausible range of amounts. Low and high boundaries are not likely to be absolute, only that extreme values are more likely remote possibilities. All outcomes within the range are therefore reasonable. The actuary may recommend a best estimate within the range (the statistical concept of mean value) or may not be able to identify one estimate which is better than any other, in which case the median, or middle of the uniform distribution range can be endorsed. But FAS #5, interpretation #14, only requires that the minimum of a range of equally likely outcomes be incurred (recognized).

Disclosures in notes to financial statements often follow AICPA SOP 94-5, *Disclosures of Certain Matters in the Financial Statements of Insurance Enterprises*. These disclosures explain management’s policies and methodologies for estimating unpaid claims and LAE.

It is also advisable to give the rationale for selecting those policies and methods and to provide the major assumptions underlying the selected method. If the estimate is changing between reporting cycles, an explanation of cause is desirable. Entities should also consider SOP 94-6 *Disclosure of Certain Significant Risks and Uncertainties* for items subject to near term change.

The liability charged to income and posted into the balance sheet should provide for the estimated ultimate cost of settling the DJ Actions relating to those allegedly insured events occurring before the statement date. A reconciliation should clearly identify:

| | |
|-------|---|
| | <u>Prior period ending DJA expense reserves</u> |
| (+) | DJA expenses incurred during the current period (noting the split between current year - if any, and prior) |
| (-) | <u>DJA payments made during the current period (on current, prior)</u> |
| (=) | Current period ending DJA expense reserves |

Figures provided should be gross and net of reinsurance.

Entities may not take credit for the time value of money principle through discounting its reserves. Entities must consider inflation in future costs but may not consider changes in technology which may mitigate expenditures. This clearly was meant to apply in cases of HazMat cleanup. One cannot hypothecate a future lowering of cleanup standards or that science will dramatically or incrementally find cheaper “cures”. But this does not preclude taking into account that as more environmental contractors compete for cleanup projects, bidding may become intensive, implying future cost savings. Nor does it preclude an analysis that shows that the expensive cleanups occurred initially with the largest, most egregiously polluted sites, and that smaller sites require less technological, simpler cleanup of fewer contaminants by weight.

In the case of DJA expenses, the prime cost determinants are:

- issues of the case,
- complexity of the case,
- precedential values,
- (closely aligned with) venue,
- indemnity at risk,
- cost of attorneys,
- opposing side resources to continue litigating.

While attorney hourly fees are subject to change (inflation), total cost is also impacted by amount of work delegated to para-legals, prior precedents or analogous claims leading to findings, etc. which over time will reduce DJA ongoing expenses.

Reinsurance²

Data are probably coded before the application of any possible reinsurance recoverable or recoveries. DJA expenses are mostly incurred on a Direct basis between insurer and insured. But clearly, DJA expenses can be incurred in the disposition of reinsurance contracts, giving rise to Assumed and Ceded incurred liabilities.

To reiterate but in the case of *Reinsurance*, it is the contract which establishes the intentions of the signatories. There is no historical record of customs and practices which courts have found precedential as to whether DJA expenses of insurers are reinsured. History tends to point to the extra contractual nature of possible settlements. “Follow the fortune” clauses are of little use, since reinsurer and insurer are oftentimes disproportionately affected by the issue litigated.

There is only one modern court case, but the finding was very fact oriented (providing little precedential value). In *Affiliated FM Ins. Corp. v. Constitution Reins. Co.* a certificate of facultative reinsurance on an umbrella liability policy, became subject to litigation regarding expenses claimed by the insured, Campbell Soup Company in defending itself against a certain EEOC discrimination action. Since the insurance policy and the facultative certificate were found to be unambiguous and coverage was not granted in the umbrella, Constitution Re did not have to reimburse Affiliated FM Ins. for any DJA expenses it incurred in denying coverage on behalf of Campbell. But on appeal, the Massachusetts Supreme Court did find the policy language ambiguous and remanded the case - forcing the parties to consider evidence of industry custom and practice and the “probable intention of the parties”. In 1998 a Massachusetts jury concluded that the facultative certificate did in fact grant DJA coverage and that the 1976 insuring parties had this common understanding.

Contract drafting should eliminate ambiguities. The common practice amongst reinsurance underwriters isn’t usually to contemplate taking on underwriting risk for DJA expenses (contracts are said to be loss and ALAE based), but underwriters may provide *relief to the insurer* by its payment of a ceding commission, to offset overhead and ULAE contained within the insurers gross price. The ceding company is not reinsuring an exposure since it is not part of the insuring agreement with the original policyholder.

Of course reinsurance contract coverage grants can be drafted to provide a wide definition called **Ultimate Net Loss (UNL)** to include Loss + ALAE + ULAE from an occurrence, as the subject of reinsurance *claim*. Even so, the contract should be specific as to how DJA expenses are being reinsured. In proportional reinsurance, insurer ULAE expenses are considered within the ceding commission and loss/ALAE losses are reinsured at the stated proportion. In non-proportional or excess reinsurance (in the absence of UNL), loss/ALAE expenses only are subject to the retention. Ceding commissions recognize

² While reinsurance is probably as old as insurance itself, the first recorded reinsurance contract dates back to 1370 and was made by an underwriter who, having insured a ship for a voyage between Genoa and Sluys, reinsured the part of the voyage between Cardiz and Sluys which was deemed most hazardous.

DJA and other ULAE expense relief. UNL pricing would differ, dependent on how the DJA expense forecast would fall upon insurer and reinsurer in the reinsurance structure.

There is some suggestion that since the insurance coverage grant does not cover DJA expenses, then the insurer is actually seeking an *insurance* of its direct exposure with a reinsurer. In this case, the reinsurer may be issuing an insurance contract and would be subject to rate, form and market conduct regulation, just as though it issued a D&O policy in favor of the insurance enterprise. Alternately, insurers have litigation risks that are not related to its insurance policies (e.g. wrongful termination or discrimination suits brought by its employees, patent infringement, etc.) which it (may) self insures, but in fact are insurable. In some states punitive damages are insurable. But in some states, it is against public policy to relieve the insured of the financial consequences of those egregious acts by passing on the loss to the insurer. Similarly, wrongful acts committed by insurers may not be passed along to reinsurers. One could create a legal expense insurance product to insure DJA expenses incurred by an insurer.

DJA Expense Analysis (largely HazMat litigation between Insured and Insurer)

Through 31 December 1998 the company has been engaged in 287 DJAs, of which, 72 remain open and 215 are closed-with-payment. The following is a summary of the Report Year DJA count (Total DJAs by Report Year are in the far right column, the actual closures - upper left of “triangle”, and the forecasted closures - bottom right in *italics*).

| R/Y | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Forecast to close | Actual open | Total R/Y |
|------|---|----------|----|----|----|----|----|----------|----------|----------|----------|----------|-------------------|-------------|-----------|
| 1987 | 0 | 0 | 3 | 3 | 3 | 4 | 6 | 6 | 6 | 6 | 7 | 8 | 0 | 0 | 8 |
| 1988 | 0 | 0 | 0 | 2 | 5 | 9 | 15 | 17 | 20 | 20 | 22 | <i>1</i> | 1 | 1 | 23 |
| 1989 | 0 | 3 | 6 | 6 | 9 | 12 | 14 | 16 | 17 | 17 | <i>1</i> | 0 | 1 | 2 | 19 |
| 1990 | 1 | 4 | 7 | 7 | 9 | 12 | 14 | 15 | 16 | <i>1</i> | 0 | 0 | 1 | 3 | 19 |
| 1991 | 2 | 9 | 11 | 13 | 18 | 22 | 25 | 27 | <i>1</i> | 1 | 1 | 1 | 4 | 5 | 32 |
| 1992 | 3 | 6 | 8 | 15 | 16 | 18 | 18 | <i>1</i> | 1 | 0 | 1 | 0 | 3 | 3 | 21 |
| 1993 | 1 | 6 | 16 | 22 | 27 | 31 | 2 | 2 | 1 | 1 | 1 | 1 | 8 | 4 | 35 |
| 1994 | 3 | 9 | 19 | 26 | 27 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 10 | 8 | 35 |
| 1995 | 3 | 8 | 11 | 17 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 8 | 8 | 25 |
| 1996 | 1 | 8 | 11 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 8 | 11 | 22 |
| 1997 | 0 | 7 | 3 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 10 | 10 | 17 |
| 1998 | 1 | <i>7</i> | 2 | 3 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 17 | 17 | 18 |
| | | | | | | | | | | | | | 72 | 72 | 274 + |

There is a marked acceleration in closing DJAs beginning in 1993 and continuing into 1994

13
prior R/Y

18.42 2.46 1.75 1.46 1.35 1.27 1.19 1.14 1.09 1.06 1.04 1.03 interval closing factors

Interval closing factors are *adjusted link ratios* from the historic closure data (adjusting for the 1993/94 acceleration). We forecast 72 eventual closures on 72 open DJAs.

1999 closure expectations are noted by shading. We experience and forecast almost a 33% closure rate per year³.

To determine the appropriate 31 December 1998 reserve based on **A REPORT YEAR counts and payment history METHOD**, it is necessary to: (1) forecast remaining payments on the open cases, (2) forecast the number of IBNR cases⁴, and (3) forecast the expected payments on the IBNR DJAs. Considerations and conclusions will be drawn in the text, while spreadsheet analyses will be relegated to Appendices.

The DJA expense amounts escalated from immaterial to significant between 1980-1990 as noted in Appendix 2. **Values have been scaled in this case study to preserve confidentiality.** Starting in 1989, the company employed a national law firm to act as coordinating counsel, ensuring the consistency of our coverage positions between clients, monitoring each client's consistency of approach across jurisdictions, and co-managing (with the company) individual DJA strategy/expenses. This led to significant savings, starting in 1992. A drop in average expenses was again seen in 1995, as a comprehensive approach was adopted to analyzing the exposure (decision tree analysis). This often resulted in a decision to explore settlement on the indemnity and compare it to the costs for DJA expense and possible ALAE in defense of the insured. Average paid claim cost trend has been negligible since 1995.

The effect is not singular. There are many confounding effects: (1) most notable environmental DJAs in the 1980s had such indemnity-at-risk exposures that extremely expensive, complicated actions resulted, (2) little precedent existed, so every possible item was litigated (few stipulations), (3) attorneys were *speeding up the learning curve* at insurer expense, and (4) **now**, latter report year DJAs have tended to be for less polluted sites or where cleanup standards have been relaxed, so the indemnity-at-risk is smaller. The mix of payments from report year statistics are certainly not from a stationary population⁵, exhibiting identifiable trends in properly categorized formats. There is subjectivity here as well, due to lack of credibility associated with claim count and individual timing and amount. This case study requires (illustrates the need for) intense understanding of company operational, socio-economic and political changes affecting the consistency of the historic data as a basis for forecasting.

Travel time from report to closure is noted in Appendix 3. It is very clear that DJAs which are easier to resolve, do so quickly and less expensively, by age 6. The more complex, time consuming cases close later at additional cost. We also notice the "outlier" 1982 DJA (outlined on page 5) which closed in 1998. Of course, the 72 in progress are not included in this exhibit.

³ We will see in Appendix 7, column 8 that 0.333 may be a limiting value for the closure time series.

⁴ DJAs are booked to the accident year in which the contentious claim occurs. Reported DJA must be forecasted into future Report Years, but with 1998 & prior "accident dates".

⁵ A population of claims is stationary when sufficient "breadth" of time, etc. exists so that entrants and closures, on a level exposure base, are equal. "Inventory level" is stationary.

The average DJA closed amounts by report and closure year are noted, in grid format, in Appendix 4. While the data are volatile, after inspection of the highlighted yearly grand totals, one could opine that DJA expenses have a current favorable plateau of perhaps \$250,000-275,000. Forecasts depend on how one treats *Extreme Values* - a mathematical/statistical subject unto itself. DJA cost is perhaps bracketed by [**\$250,000, 275,000**]. These are more probable forecasts based on historical data, but clearly outside-of-range values are possible. If it is the actuary's judgment that cost trend is negligible, that future cases will be simpler, etc. the actuary may establish reserves based on the *lower estimate*, rather than a mid-point or mean value.

Paid on open DJAs average **\$175,000** (highlighted) which is consistent with closing values. The difference between average paid DJA at closure and paid-to-date will become the *unpaid on open cases' reserve*. This concludes our analysis of the 1st of 3 features needed for establishing a DJA expense reserve.

There does not appear to be significant savings associated with precedential value of previous cases (each being a fact-centric finding) or any judicial streamlining associated with well-informed attorneys/judges according to this data.

The 2nd required feature, a forecast of IBNR DJAs, is developed in Appendices 5 and 6. We hypothecate that reported DJAs follow a single *Wave* pattern - where we were building on the front side of the wave in the 1980's, the crest of the wave in the 1990's, and are experiencing the back side of the wave currently. We have chosen to extrapolate two single-modal distributions to illustrate possible future emergence⁶. Both a Normal (symmetric) and Lognormal (skew) fit of report year opening counts are fit to the time series 1980-1998. The adjusted R is moderately better for the Lognormal, so the forecast of 80 DJAs to come is somewhat more probable than the symmetric analytic result of 30. One can speculate that EPA regulators implementing laws since 1980 have increased their oversight and likely skewed the confrontational process between insured and insurer and reinsurer. The author has seen many more instances of a long, thin *tail* than a symmetric distribution of runoff.

While it is possible that more than 80 DJAs remain, it is less likely than under 30 remain. The distribution of reasonably probable outcomes is bracketed by [**30,80**] and some judgmental mean value may be estimated nearer to 60. Seasoned actuarial judgment and analogy from other experience datasets help limit the most probable range of outcomes. We don't *know* that the volatile, sparse emerging data follows either statistical distribution by inclination or design. Future year income statements will be impacted by adjustments to the actuarial model or parameters used, as incremental history replaces actuarial forecast.

Appendices 7 and 8 combine the 3 required features into Inventory Models. Historical data and summary statistics are shown for all prior report years. The inventory (column 6)

⁶ The longer after the inflexion point 1993/94 we get, the greater the likelihood that extrapolations will form a tighter range of possible outcomes.

is a function of prior inventory plus forecasted new reports (column 2) of DJAs minus closures by calendar year (column 4).

Future closure rates are estimated from a simple historical analysis of annual and 3-year average closure rates (columns 7 and 8). Similarly, average ultimate DJA cost per action is estimated from a simple historical analysis of annual and 3-year average closed DJA expenses (columns 9 and 10).

The forecasted closing calendar year values on the inventory of DJAs is given in column 11 as the product of columns 4 and 10. This format was chosen to highlight expected DJA total payments at closure year and to facilitate the imposition and illustration of inflation, if appropriate, in calendar year costs. Trends are anticipated to impact on an incremental basis by calendar year.

From the forecast of ultimate expenses on the unclosed actions, we lastly subtract the payment to date. The effect is to forecast the *development* on the inventory at valuation date with the *incurred but not reported* liability for future DJAs (related to prior year occurrences - a closed item block).

The composite range or domain of the reasonably probable reserve indications are:

| | | Claims Count IBNR | |
|-------------|-----------|-------------------|------------|
| | | 30 | 80 |
| Average DJA | \$250,000 | 12,587,623 | 24,837,623 |
| Amount | 275,000 | 15,112,623 | 28,587,623 |

Cash flow (paid expense) testing of reserves can also be established for ongoing feedback into the reserving structure.

The Year 2000⁷ Analogy

Y2K exposures, possible DJA expenses and indemnity/ALAE *may* somewhat track the emergence of the asbestos and environmental liability litigation (since 1980) in the US. Y2K has a broad(er) spectrum of insureds' subject to a *mass tort*, with issues including: is the peril insured, if so, what number of occurrences, how does the coverage trigger apply, and how do we allocate loss and expense amongst the relevant insurers. But unlike asbestos and environmental claim emergence, there is likely no long-latency between initial exposure and manifestation, since little damage appears to have been done to insureds prior to January 1, 2000⁸. Losses aren't likely to be as separated in time. It is also likely

⁷ Date fields may be "confounded" in 2000 since only the last 2 digits of the year 19xx were captured on computer systems for storage cost-savings purposes. In 1963 it cost approx. \$1,620 to store a megabyte of information for a year; by 1983 it was \$22, and now it is 25 cents.

⁸ March, 1999 attorneys instituted a class action lawsuit against Lucent Technologies and AT&T (telecommunications companies) alleging violations of consumer protection laws and breach of warranties.

that the manifestation of claims and reports will be measured in *months* rather than *years*. And the amount of human suffering and damages to air, water, and biota from environmental claims may be multiples of economic and other damages claimed against the Y2K-bug.

Proprietary market research polls tell us that 70% of Americans believe that insurers and banks should assume the burden of paying for Y2K. But we know insurers will use the following legal defenses when denying claims:

This is an ordinary business expense, not an insured damage,
Fortuity - chips were state-of-the-art with a limited life-span, not a chance loss,
Mitigation - insured should have replaced the chips or taken other mitigating steps
Property Damage - if claimed, doesn't *relate* if there is no physical damage,
Exclusions - expected & intended, specific Y2K exclusions, no physical loss, etc.
Utmost good faith - the insured should have disclosed this exposure on his application, especially if computer remediation efforts were not expected to be completed before 2000,
Warranties - come from manufacturer/installer - not the subject of this insurance,
Statutes of limitation - for older chips (depends on when the statute's clock starts).

Y2K may aggravate normal losses (possibly expenses) and increase the frequency of many types of claims. It should be expected that lawsuits will be based on *Breach of Contract (notably warranty) and Breach of Duty (based on tort- misrepresentation, fraud, negligence, strict product liability)*. From an insurance viewpoint, the insured bears the burden of proving that a particular claim falls within the scope of the insuring agreement. The insurer can appropriately deny claims if the reasons noted above apply.

Unlike asbestos and environmental DJAs, much of the Y2K disruption will fall on first party coverages. The courts will also have to decide whether data is tangible property, capable of physical damage, thus triggering an insured loss.

In order of probable appearance, here is what an insurer may see as 1999, 2000, and beyond unfolds.

1. 1999 - end users, claiming damages, seek computer upgrades or other remediation from sellers/producers. Like the Lucent Technologies/AT&T class action alleges.
2. January 2000 - increased frequency and severity of certain property 1st party claims. Possibly related to automated maintenance system failures or B&M breakdowns. Intensively increased accident rates for the first/several days of January (automobile, etc.) getting promptly reported to the insurer.

They claim damages and seek repair or replacement with systems that do not have the defect. Similar actions involving non-compliant Y2K software have been dismissed because the class hadn't spent any money on repairs (do damages to systems still operating as expected).

3. Notifications of possible business interruption claims due to shutdowns or slowdowns of businesses follow. Particularly exposed industries include: energy companies, security system firms, utilities, transportation companies, health care providers, financial services companies, and government⁹.
4. Followed by (or overlapping with) Liability claims reported under:
 - a) E&O policies, on professionals for services rendered. Particularly exposed professionals include software designers, computer professionals, management consultants, accountants and lawyers.
 - b) D&O policies, covering wrongful acts and security law violations. Exposure is heightened by any abrupt decline in stock price for a publicly held corporation.
5. Commercial General Liability policies, for 3rd party property damage liability or bodily injury liability - Premises-Operations or Products Liability sublines. Will be spread temporally- over months. Particularly exposed industries include: computer or peripheral equipment manufacturers, drug stores, financial services companies, consulting service companies, ticket agencies, agriculture.

Some claims will naturally fall within the scope of the coverage grant and the insurer will adjust these claims in the normal course of its business practice. Other claims will be denied by the insurer and may force a DJA, should the insured wish to litigate the issue.

As the Third Millennium begins, we may find an initial growing inventory of DJAs in progress by March 31, besides the aggravated, but accepted claims (e.g. fire damage is more severe when a sprinkler system fails to deploy because of a computer chip malfunction). Whether a reliable accounting entry can be made for balance sheet reserving at 12/31/99 depends on the speed of claims' identification and emergence. It may only be necessary to consider a premium deficiency reserve [in the context that the gross unearned premium reserve is inadequate to cover net claims, net present value, at 12/31/99, -- GAAP only, not Statutory Accounting (until 2001 "Codification" effective date)]. It will be necessary to consider DJA expense forecasts on reported DJAs, accepted claims and ALAE in the course of adjustment, and possible IBNR DJAs/Losses/ALAE.

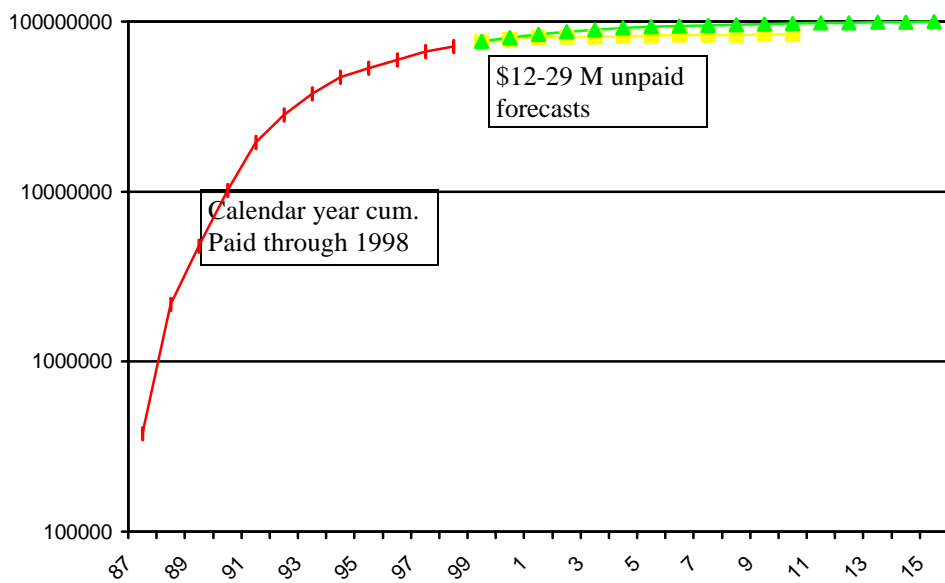
As the year 2000 proceeds (an odyssey into 2001⁺) the accumulating Y2K raw data (insurer specific data, technology consultant's global reports, newspaper accounts) will likely permit data organization and possible forecast (measurement) with some reliability. Some persons have forecast that Y2K claims will continue to be first reported for years into the 3rd millennium (e.g. scheduled maintenance chips *tripping* over infrequently applied maintenance dates). DJAs may be litigated for 5⁺ years. There may be almost a decade before authoritative insurance literature can document this historical event financial consequences.

⁹ The author is indebted to numerous sources for "likely exposed industries" - such as "Y2K A Regulatory Response" (Texas Department) authored by Montemayor, Patterson, Gwynn, 2/99.

At this point we can only speculate about the frequency and average cost associated with insurer / insured declaratory judgment actions for Y2K. But we have some statistical evidence of DJA expenses for asbestos and environmental damage litigation.

It may be possible to condense the environmental/mass tort DJA expense history/forecast below (1986 + 30 years) into an accelerated reserving protocol for Y2K DJAs. One could analogize our case study in years, compressed into months (90 months following 1-1-2000). Although at the “extremities” it probably cannot hold that 1 year of environmental DJA payments/counts = 1 quarter-year of Y2K.

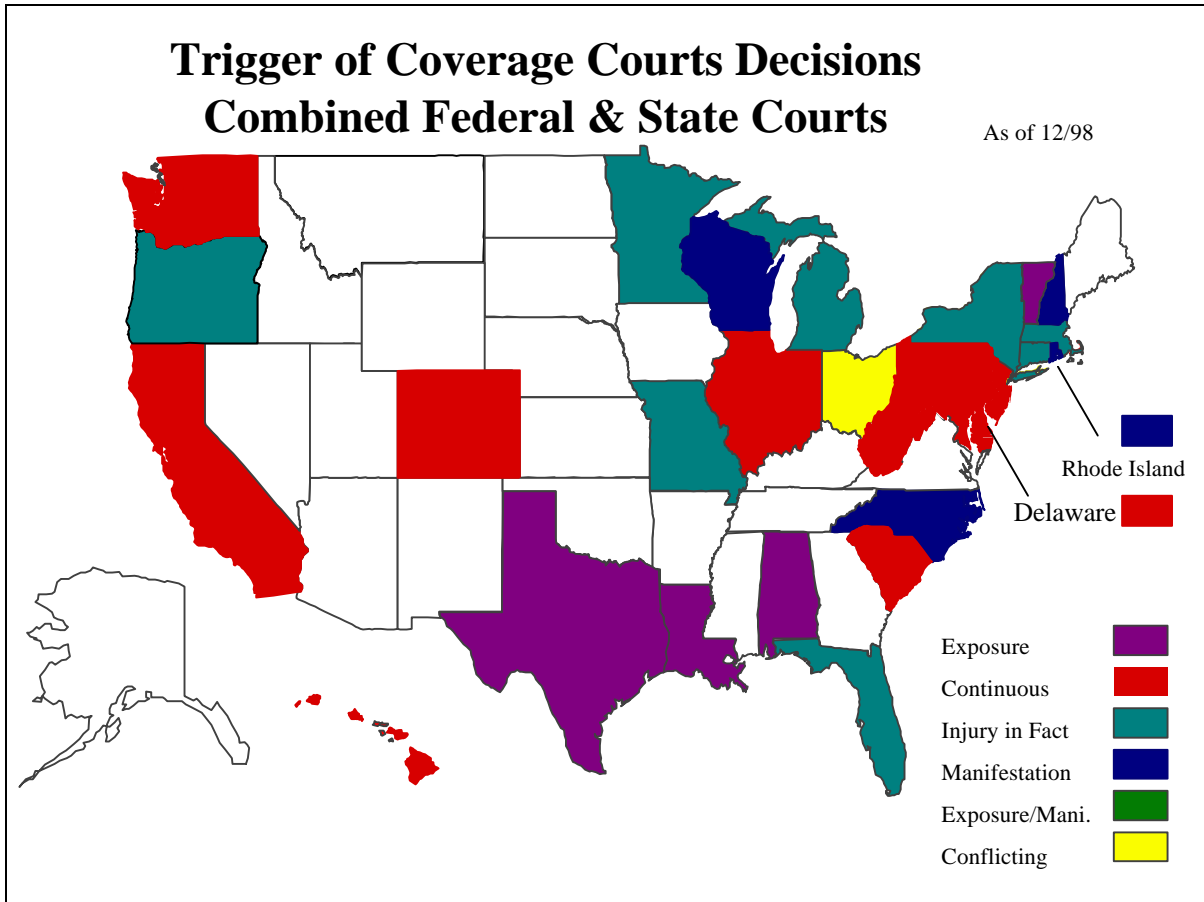
Logarithmic and “scaled values” - unitizing at \$100,000,000 for environmental DJA expenses..



Conclusion

Recognition, measurement, and disclose of Declaratory Judgment Action expenses has only recently received very specific guidance. This should limit current practice and bring much uniformity into financial, statistical and statutory reporting. Conforming data needs to be coded into accounting systems for retrieval, specifically to permit analysis for actuarial projections. This paper places context around a Report Year counts (inventory model) and amounts methodology, using primarily environmental liability DJAs of one affected company. There is the suggestion that Y2K exposures may be analyzed similarly should claims arise. The stages of recognition and measurement may serve as useful *benchmarks*. And some transformation of the case study amounts may also apply to Y2K DJA expenses.

APPENDIX I



| | |
|-----------------------|---|
| Exposure | Only those policies in effect when the claimant or property was exposed to "pollutants" are triggered - Ala, La, Tex, Vt |
| Trigger | |
| Manifestation | Only those policies in effect when the injury or damage manifested are triggered - Miss, NH, NC, RI |
| Injury-in-Fact | Only those policies in effect when damage occurred are triggered - Ct, Fl, Md, Mass, Mich, Mn, Mo, NY, Ore |
| Continuous | All policies in effect at the time of exposure, manifestation and all the time in between are triggered - Ca, Co, De, Hi, Ill, Ind, Pa, NJ, Wa, WV |
| Conflicting | Ohio |
| | Accuracy of the interpretation of the "most likely" trigger by state cannot be assured. |

AVERAGE EXPENSE

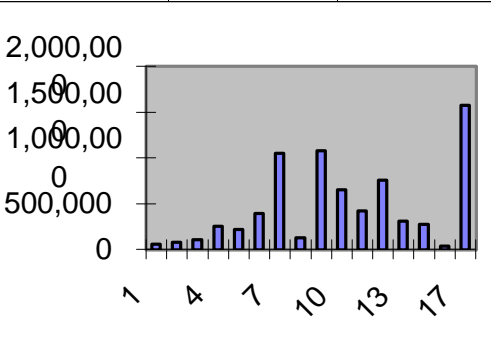
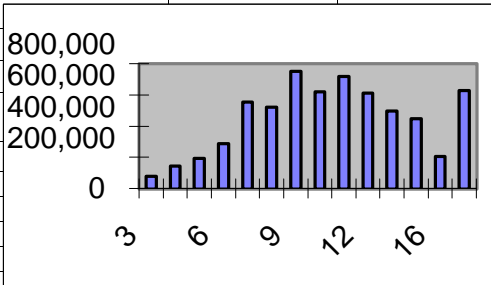
APPENDIX 2

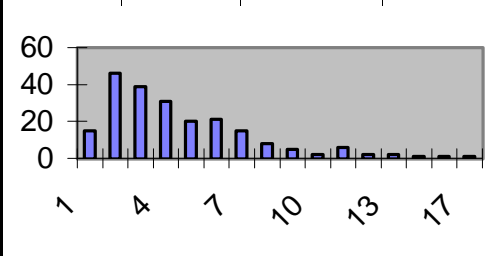
| DJA EXPENSE AT 12/98 | | | | | | | | | | | | | |
|-------------------------------|---------------|---------|---------|---------|---------|-----------------------|---------|---------|---|--------|---------|------------------------|-----------|
| AVERAGE EXPENSE PAID | | | | | | | | | | | | | |
| REPORT | CALENDAR YEAR | | | | | | | | | | | | |
| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
| 1980 | | | | 686 | | 6,069 | 1,451 | 6,204 | 10,321 | 4,050 | 3,304 | | |
| 1981 | | 986 | 9,618 | 51,616 | 210,769 | | | | | | | | |
| 1982 | 3,695 | 77,625 | 102,840 | 31,657 | 474,738 | 801,137 | 179,789 | 8,264 | 9,755 | 5,310 | 10,132 | 8,839 | (138,960) |
| 1983 | | 39,817 | 14,075 | 14,923 | 4,641 | 6,357 | 16,366 | 11,329 | 8,422 | 4,640 | 1,403 | 78 | |
| 1984 | 25,279 | 114,104 | 129,602 | 206,336 | 81,661 | 11,506 | 19,891 | 8,099 | 5,525 | 8,244 | | | |
| 1985 | | | 11,244 | 9,289 | 5,772 | 3,893 | 20,429 | 1,386 | 6,291 | 25,502 | | | |
| 1986 | 1,662 | 64,679 | 109,711 | 13,286 | 22,867 | 135,091 | 139,214 | 374,363 | 131,220 | 31,655 | 34,051 | 267,071 | 64,665 |
| 1987 | | 15,198 | 180,201 | 65,666 | 126,554 | 309,929 | 190,854 | 55,483 | 52,136 | 49,355 | 106,310 | 32,334 | 129,262 |
| 1988 | | | 36,572 | 57,134 | 111,058 | 177,019 | 142,688 | 190,162 | 128,635 | 33,171 | 58,071 | 8,186 | 2,017 |
| 1989 | | | | 132,932 | 116,710 | 94,674 | 40,733 | 65,565 | 42,195 | 17,884 | 13,978 | 8,813 | 8,739 |
| 1990 | | | | | 79,834 | 96,359 | 68,313 | 80,766 | 94,062 | 68,156 | 45,590 | 31,112 | 6,352 |
| 1991 | | | | | | 41,483 | 54,808 | 59,779 | 67,649 | 33,002 | 89,556 | 97,371 | 74,622 |
| 1992 | | | | | | | 25,006 | 52,697 | 67,333 | 38,573 | 36,358 | 83,651 | 70,711 |
| 1993 | | | | | | | | 27,815 | 60,393 | 44,575 | 38,524 | 44,692 | 42,452 |
| 1994 | | | | | | | | | 21,894 | 58,671 | 46,097 | 31,191 | 48,327 |
| 1995 | | | | | | | | | | 14,599 | 50,231 | 59,295 | 55,231 |
| 1996 | | | | | | | | | | | 14,568 | 27,414 | 40,854 |
| 1997 | | | | | | | | | | | | 15,058 | 37,451 |
| 1998 | | | | | | | | | | | | | 33,368 |
| Grand Total | 6,244 | 28,077 | 59,672 | 62,992 | 106,289 | 111,586 | 73,773 | 72,255 | 60,536 | 39,081 | 43,731 | 41,048 | 42,135 |
| 3 YR AVE | | | 31,331 | 50,247 | 76,318 | 93,622 | 97,216 | 85,871 | 68,855 | 57,290 | 47,783 | 41,287 | 42,305 |
| LOGNORMAL FIT | | | 25,763 | 55,641 | 79,394 | 90,750 | 91,026 | 84,125 | 73,699 | 62,288 | 51,369 | 41,655 | 33,390 |
| SS | | | 31,006 | 29,090 | 9,462 | 8,249 | 38,314 | 3,049 | 23,466 | 24,972 | 12,858 | 136 | 79,475 |
| INFLATION YEAR O | | 350% | 113% | 6% | 69% | 5% | -34% | -2% | -16% | -35% | 12% | -6% | 3% |
| AVERAGE PAID IN CALENDAR YEAR | | | | | | 3 YEAR MOVING AVERAGE | | | FIRST SERIES = ACTUAL | | | SECOND SERIES = FITTED | |
| | | | | | | | | | LOGNORMAL PARAMETERS MU 2.11 SIGMA 0.49 YAXIS 327,394.41 XAXIS 1,985.00 SS 260,075 | | | | |

TRAVEL TIME

APPENDIX 3

| DJA EXPENSE AT 12/98 | | | |
|--------------------------|-------|-----------|----------|
| AVERAGE PAID BY DURATION | | | |
| Average of ITD_PD_EXP | | | 3 PERIOD |
| TIME | COUNT | TOTAL | AVERAGE |
| 1 | 15 | 57,744 | |
| 2 | 46 | 77,898 | |
| 3 | 39 | 101,944 | 79,195 |
| 4 | 31 | 254,301 | 144,714 |
| 5 | 20 | 218,826 | 191,691 |
| 6 | 21 | 393,223 | 288,784 |
| 7 | 15 | 1,047,617 | 553,222 |
| 8 | 8 | 123,828 | 521,556 |
| 9 | 5 | 1,077,056 | 749,500 |
| 10 | 2 | 653,345 | 618,076 |
| 11 | 6 | 421,212 | 717,204 |
| 12 | 2 | 757,919 | 610,825 |
| 13 | 2 | 308,029 | 495,720 |
| 14 | 1 | 274,967 | 446,972 |
| 16 | 1 | 32,091 | 205,029 |
| 17 | 1 | 1,575,037 | 627,365 |
| Grand Total | | 273,865 | |

| AVERAGE OF CLOSED CLAIMS BY DURATION | |
|--|--|
|  | |
| MOVING AVERAGE | |
|  | |

| COUNTS BY DURATION | |
|---|--|
|  | |

AVERAGE PAID BY CLAIM STATUS

APPENDIX 4

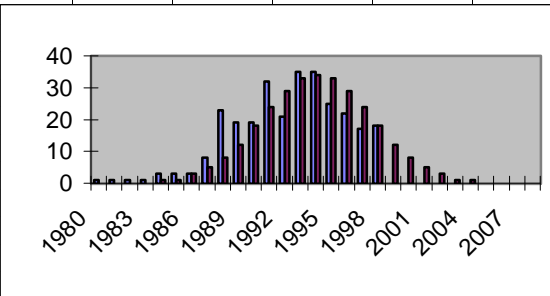
| PAID DJA EXPENSE AT 12/1998 | | | | | | | | | | | | | | | |
|----------------------------------|---------|--------|---------|---------|---------|-----------|-----------|-----------|-----------|---------|-----------|---------|-----------------------|-----------|--|
| AVERAGE PAID | | | | | | | | | | | | | | | |
| YEAR CLOSED | | | | | | | | | | | | PAID ON | Grand Total | | |
| REPORT | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | OPEN | | | |
| 1980 | --- | --- | --- | --- | --- | --- | --- | 32,091 | --- | --- | --- | --- | --- | 32,091 | |
| 1981 | --- | --- | --- | --- | --- | --- | 274,967 | --- | --- | --- | --- | --- | --- | 274,967 | |
| 1982 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1,575,037 | --- | --- | 1,575,037 | |
| 1983 | --- | --- | --- | --- | --- | --- | --- | 121,752 | --- | --- | --- | --- | --- | 121,752 | |
| 1984 | --- | --- | --- | --- | --- | 0 | 944,650 | 128,760 | --- | --- | --- | --- | --- | 357,803 | |
| 1985 | 266,383 | --- | --- | --- | 64,944 | --- | --- | 62,897 | --- | --- | --- | --- | --- | 131,408 | |
| 1986 | --- | --- | --- | --- | --- | --- | --- | 1,306,690 | 42,881 | --- | 494,306 | --- | --- | 614,626 | |
| 1987 | --- | 17,359 | --- | --- | 14,731 | 1,425,469 | --- | --- | --- | 809,955 | 1,387,078 | --- | --- | 639,347 | |
| 1988 | --- | --- | --- | 929,195 | 138,405 | 400,831 | 1,419,660 | 163,972 | 1,602,119 | --- | 333,445 | 470,557 | --- | 811,593 | |
| 1989 | --- | --- | 177,444 | 154,935 | --- | 95,628 | 472,225 | 203,101 | 148,679 | 144,876 | --- | 120,588 | --- | 199,490 | |
| 1990 | --- | --- | 301,461 | 284,563 | 103,194 | --- | 37,103 | 674,871 | 615,782 | 31,711 | 434,045 | 723,472 | --- | 391,120 | |
| 1991 | --- | --- | --- | 154,954 | 81,179 | 306,043 | 44,748 | 374,452 | 141,799 | 902,529 | 134,332 | 442,191 | --- | 287,700 | |
| 1992 | --- | --- | --- | --- | 5,589 | 47,379 | 101,602 | 178,079 | 174,230 | 583,221 | --- | 454,222 | --- | 205,333 | |
| 1993 | --- | --- | --- | --- | --- | 20,481 | 33,946 | 83,195 | 202,547 | 275,599 | 366,176 | 248,870 | --- | 173,589 | |
| 1994 | --- | --- | --- | --- | --- | --- | 14,085 | 120,405 | 106,132 | 261,944 | 175,738 | 211,603 | --- | 157,948 | |
| 1995 | --- | --- | --- | --- | --- | --- | --- | 46,217 | 18,730 | 73,474 | 228,939 | 183,640 | --- | 131,819 | |
| 1996 | --- | --- | --- | --- | --- | --- | --- | --- | 34,641 | 35,527 | 73,460 | 91,938 | --- | 68,865 | |
| 1997 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 36,054 | 57,272 | --- | 48,535 | |
| 1998 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1,999 | 27,362 | --- | 25,953 | |
| Grand Total | 266,383 | 17,359 | 208,448 | 348,679 | 77,194 | 344,741 | 469,326 | 214,484 | 272,128 | 284,709 | 277,162 | 175,866 | --- | 249,280 | |
| THREE YEAR MOVING AVERAGE | | | 164,063 | 191,495 | 211,440 | 256,871 | 297,087 | 342,850 | 318,646 | 257,107 | 278,000 | | | | |
| AVERAGE PAID IBY YEAR OF CLOSURE | | | | | | | | | | | | | 3 YEAR MOVING AVERAGE | | |

| Year | Average Paid |
|------|--------------|
| 1988 | 266,383 |
| 1989 | 17,359 |
| 1990 | 208,448 |
| 1991 | 348,679 |
| 1992 | 77,194 |
| 1993 | 344,741 |
| 1994 | 469,326 |
| 1995 | 214,484 |
| 1996 | 272,128 |
| 1997 | 284,709 |
| 1998 | 277,162 |

| Year | 3 Year Moving Average |
|------|-----------------------|
| 1990 | 164,063 |
| 1991 | 191,495 |
| 1992 | 211,440 |
| 1993 | 256,871 |
| 1994 | 297,087 |
| 1995 | 342,850 |
| 1996 | 318,646 |
| 1997 | 257,107 |
| 1998 | 278,000 |

OPENED SYMMETRIC

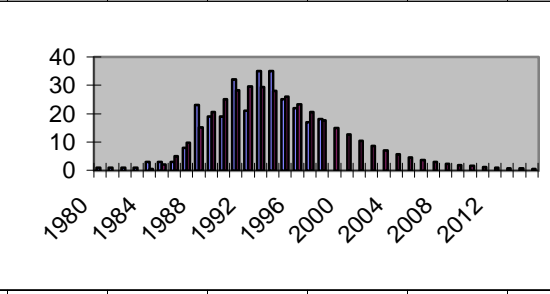
| DJA EXPENSES AT 12/1998 | | | | | |
|-------------------------|------------|----------------|-----------|---------|-----|
| DJA OPENS | | | | | |
| REPORT | OPEN COUNT | CUM TOTAL | FIT | CUM FIT | SS |
| 1980 | 1 | 1 | 0 | 0 | 1 |
| 1981 | 1 | 2 | 0 | 0 | 1 |
| 1982 | 1 | 3 | 0 | 0 | 1 |
| 1983 | 1 | 4 | 0 | 0 | 1 |
| 1984 | 3 | 7 | 1 | 1 | 4 |
| 1985 | 3 | 10 | 1 | 2 | 4 |
| 1986 | 3 | 13 | 3 | 5 | 0 |
| 1987 | 8 | 21 | 5 | 10 | 9 |
| 1988 | 23 | 44 | 8 | 18 | 225 |
| 1989 | 19 | 63 | 12 | 30 | 49 |
| 1990 | 19 | 82 | 18 | 48 | 1 |
| 1991 | 32 | 114 | 24 | 72 | 64 |
| 1992 | 21 | 135 | 29 | 101 | 64 |
| 1993 | 35 | 170 | 33 | 134 | 4 |
| 1994 | 35 | 205 | 34 | 168 | 1 |
| 1995 | 25 | 230 | 33 | 201 | 64 |
| 1996 | 22 | 252 | 29 | 230 | 49 |
| 1997 | 17 | 269 | 24 | 254 | 49 |
| 1998 | 18 | 287 | 18 | 272 | 0 |
| 1999 | | | 12 | 284 | |
| 2000 | | | 8 | 292 | |
| 2001 | | | 5 | 297 | |
| 2002 | | | 3 | 300 | |
| 2003 | | | 1 | 301 | |
| 2004 | | | 1 | 302 | |
| 2005 | | | 0 | 302 | |
| 2006 | | | 0 | 302 | |
| 2007 | | | 0 | 302 | |
| 2008 | | | 0 | 302 | |
| Grand Total | 287 | | 302 | | 591 |
| | | IBNR CT | 30 | | |
| NORMAL FIT | | | | | |
| MU | ##### | | | | |
| SIGMA | 3.50 | | | | |
| YAXIS | 120.00 | | | | |
| SS | 591 | | | | |
| ADJ R | 0.76 | | | | |



OPENED SKEW FIT

| DJA EXPENSES AT 12/1998 | | | | | |
|-------------------------|------------|----------------|-----------|---------|-----|
| DJA OPENS | | | | | |
| REPORT | OPEN COUNT | CUM TOTAL | FIT | CUM FIT | SS |
| 1980 | 1 | 1 | 0 | 0 | 1 |
| 1981 | 1 | 2 | 0 | 0 | 1 |
| 1982 | 1 | 3 | 0 | 0 | 1 |
| 1983 | 1 | 4 | 0 | 0 | 1 |
| 1984 | 3 | 7 | 0 | 1 | 6 |
| 1985 | 3 | 10 | 2 | 2 | 1 |
| 1986 | 3 | 13 | 5 | 7 | 4 |
| 1987 | 8 | 21 | 10 | 17 | 3 |
| 1988 | 23 | 44 | 15 | 32 | 61 |
| 1989 | 19 | 63 | 21 | 53 | 3 |
| 1990 | 19 | 82 | 25 | 78 | 38 |
| 1991 | 32 | 114 | 28 | 106 | 14 |
| 1992 | 21 | 135 | 30 | 136 | 73 |
| 1993 | 35 | 170 | 29 | 165 | 31 |
| 1994 | 35 | 205 | 28 | 193 | 48 |
| 1995 | 25 | 230 | 26 | 219 | 1 |
| 1996 | 22 | 252 | 23 | 243 | 2 |
| 1997 | 17 | 269 | 20 | 263 | 12 |
| 1998 | 18 | 287 | 18 | 281 | 0 |
| 1999 | | | 15 | 296 | |
| 2000 | | | 13 | 308 | |
| 2001 | | | 10 | 319 | |
| 2002 | | | 9 | 327 | |
| 2003 | | | 7 | 334 | |
| 2004 | | | 6 | 340 | |
| 2005 | | | 5 | 345 | |
| 2006 | | | 4 | 348 | |
| 2007 | | | 3 | 351 | |
| 2008 | | | 2 | 354 | |
| 2009 | | | 2 | 355 | |
| 2010 | | | 1 | 357 | |
| 2011 | | | 1 | 358 | |
| 2012 | | | 1 | 359 | |
| 2013 | | | 1 | 360 | |
| 2014 | | | 1 | 360 | |
| 2015 | | | 0 | 361 | |
| Grand Total | 287 | | 361 | | 301 |
| | | IBNR CT | 80 | | |

| LOGNORMAL FIT TO OPEN COUNT BY REPORT YEAR | |
|--|--------|
| MU | 2.71 |
| SIGMA | 0.34 |
| YAXIS | 144.66 |
| XAXIS | 1979 |
| SS | 301 |
| ADJ R | 0.87 |



INVENTORY-SYMMETRIC

APPENDIX 7

| DJA EXPENSES AT 12/1998 | | | | | | | | | | |
|---------------------------|-------------------------------|-----|-------|-----|-----------|-----------|-------|--------------------|---------|------------|
| INVENTORY STRUCTURE MODEL | | | | | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| | | | | | | CLOSED | 3 YR | AVE | 3YR | CLOSED |
| | | | | | | ON PREV. | AVE | CLOSED | AVE | X |
| REPORT | OPEN | CUM | CLOSE | CUM | INVENTORY | INVENTORY | RATE | IN YR | \$ | AVE \$ |
| 1980 | 1 | 1 | 0 | 0 | 1 | | | | | |
| 1981 | 1 | 2 | 0 | 0 | 2 | 0.000 | | | | |
| 1982 | 1 | 3 | 0 | 0 | 3 | 0.000 | | | | |
| 1983 | 1 | 4 | 0 | 0 | 4 | 0.000 | 0.000 | | | |
| 1984 | 3 | 7 | 0 | 0 | 7 | 0.000 | 0.000 | | | |
| 1985 | 3 | 10 | 0 | 0 | 10 | 0.000 | 0.000 | | | |
| 1986 | 3 | 13 | 0 | 0 | 13 | 0.000 | 0.000 | | | |
| 1987 | 8 | 21 | 0 | 0 | 21 | 0.000 | 0.000 | | | |
| 1988 | 23 | 44 | 1 | 1 | 43 | 0.048 | 0.016 | 266,383 | | |
| 1989 | 19 | 63 | 3 | 4 | 59 | 0.070 | 0.039 | 17,359 | 141,871 | |
| 1990 | 19 | 82 | 4 | 8 | 74 | 0.068 | 0.062 | 208,448 | 164,063 | |
| 1991 | 32 | 114 | 10 | 18 | 96 | 0.135 | 0.091 | 348,679 | 191,495 | |
| 1992 | 21 | 135 | 18 | 36 | 99 | 0.188 | 0.130 | 77,194 | 211,440 | |
| 1993 | 35 | 170 | 16 | 52 | 118 | 0.162 | 0.161 | 344,741 | 256,871 | |
| 1994 | 35 | 205 | 25 | 77 | 128 | 0.212 | 0.187 | 469,326 | 297,087 | |
| 1995 | 25 | 230 | 43 | 120 | 110 | 0.336 | 0.236 | 214,484 | 342,850 | |
| 1996 | 22 | 252 | 35 | 155 | 97 | 0.318 | 0.289 | 272,128 | 318,646 | |
| 1997 | 17 | 269 | 30 | 185 | 84 | 0.309 | 0.321 | 284,709 | 257,107 | |
| 1998 | 18 | 287 | 30 | 215 | 72 | 0.357 | 0.328 | 277,162 | 278,000 | |
| 1999 | 12 | 299 | 24 | 239 | 60 | | 0.333 | | 250,000 | 6,000,000 |
| 2000 | 8 | 307 | 20 | 259 | 48 | | 0.333 | | 250,000 | 5,000,000 |
| 2001 | 5 | 312 | 16 | 275 | 37 | | 0.333 | | 250,000 | 4,000,000 |
| 2002 | 3 | 315 | 12 | 287 | 28 | | 0.333 | | 250,000 | 3,000,000 |
| 2003 | 1 | 316 | 9 | 296 | 20 | | 0.333 | | 250,000 | 2,250,000 |
| 2004 | 1 | 317 | 7 | 303 | 14 | | 0.333 | | 250,000 | 1,750,000 |
| 2005 | 0 | 317 | 5 | 308 | 9 | | 0.333 | | 250,000 | 1,250,000 |
| 2006 | 0 | 317 | 3 | 311 | 6 | | 0.333 | | 250,000 | 750,000 |
| 2007 | 0 | 317 | 2 | 313 | 4 | | 0.333 | | 250,000 | 500,000 |
| 2008 | 0 | 317 | 1 | 314 | 3 | | 0.333 | | 250,000 | 250,000 |
| 2009 | 0 | 317 | 1 | 315 | 2 | | 0.333 | | 250,000 | 250,000 |
| 2010 | 0 | 317 | 1 | 316 | 1 | | 0.333 | | 250,000 | 250,000 |
| | BASED ON BELL SHAPED OPEN FIT | | | | | | | TOTAL | | 25,250,000 |
| | IBNR COUNT 30 | | | | | | | PAID ON 1998 OPENS | | 12,662,377 |
| | | | | | | | | RESERVES | | 12,587,623 |

INVENTORY-SKEW

| DJA EXPENSES AT 12/1998 | | | | | | | | | | |
|---------------------------------------|------|-----|-------|-----|-----------|-----------|--------------------|---------|---------|------------|
| INVENTORY STRUCTURE MODEL | | | | | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| | | | | | | CLOSED | 3 YR | AVE | 3YR | CLOSED |
| | | | | | | ON PREV. | AVE | CLOSED | AVE | X |
| REPORT | OPEN | CUM | CLOSE | CUM | INVENTORY | INVENTORY | RATE | IN YR | \$ | AVE \$ |
| 1980 | 1 | 1 | 0 | 0 | 1 | | | | | |
| 1981 | 1 | 2 | 0 | 0 | 2 | 0.000 | | | | |
| 1982 | 1 | 3 | 0 | 0 | 3 | 0.000 | | | | |
| 1983 | 1 | 4 | 0 | 0 | 4 | 0.000 | 0.000 | | | |
| 1984 | 3 | 7 | 0 | 0 | 7 | 0.000 | 0.000 | | | |
| 1985 | 3 | 10 | 0 | 0 | 10 | 0.000 | 0.000 | | | |
| 1986 | 3 | 13 | 0 | 0 | 13 | 0.000 | 0.000 | | | |
| 1987 | 8 | 21 | 0 | 0 | 21 | 0.000 | 0.000 | 266,383 | | |
| 1988 | 23 | 44 | 1 | 1 | 43 | 0.048 | 0.016 | 17,359 | | |
| 1989 | 19 | 63 | 3 | 4 | 59 | 0.070 | 0.039 | 208,448 | 164,063 | |
| 1990 | 19 | 82 | 4 | 8 | 74 | 0.068 | 0.062 | 348,679 | 191,495 | |
| 1991 | 32 | 114 | 10 | 18 | 96 | 0.135 | 0.091 | 77,194 | 211,440 | |
| 1992 | 21 | 135 | 18 | 36 | 99 | 0.188 | 0.130 | 344,741 | 256,871 | |
| 1993 | 35 | 170 | 16 | 52 | 118 | 0.162 | 0.161 | 469,326 | 297,087 | |
| 1994 | 35 | 205 | 25 | 77 | 128 | 0.212 | 0.187 | 214,484 | 342,850 | |
| 1995 | 25 | 230 | 43 | 120 | 110 | 0.336 | 0.236 | 272,128 | 318,646 | |
| 1996 | 22 | 252 | 35 | 155 | 97 | 0.318 | 0.289 | 284,709 | 257,107 | |
| 1997 | 17 | 269 | 30 | 185 | 84 | 0.309 | 0.321 | 277,162 | 278,000 | |
| 1998 | 18 | 287 | 30 | 215 | 72 | 0.357 | 0.328 | 175,261 | 245,711 | |
| 1999 | 15 | 302 | 24 | 239 | 63 | | 0.333 | | 250,000 | 6,000,000 |
| 2000 | 13 | 315 | 21 | 260 | 55 | | 0.333 | | 250,000 | 5,250,000 |
| 2001 | 10 | 325 | 18 | 278 | 47 | | 0.333 | | 250,000 | 4,500,000 |
| 2002 | 9 | 334 | 16 | 294 | 40 | | 0.333 | | 250,000 | 4,000,000 |
| 2003 | 7 | 341 | 13 | 307 | 34 | | 0.333 | | 250,000 | 3,250,000 |
| 2004 | 6 | 347 | 11 | 318 | 29 | | 0.333 | | 250,000 | 2,750,000 |
| 2005 | 5 | 352 | 10 | 328 | 24 | | 0.333 | | 250,000 | 2,500,000 |
| 2006 | 4 | 356 | 8 | 336 | 20 | | 0.333 | | 250,000 | 2,000,000 |
| 2007 | 3 | 359 | 7 | 343 | 16 | | 0.333 | | 250,000 | 1,750,000 |
| 2008 | 2 | 361 | 5 | 348 | 13 | | 0.333 | | 250,000 | 1,250,000 |
| 2009 | 2 | 363 | 4 | 352 | 11 | | 0.333 | | 250,000 | 1,000,000 |
| 2010 | 1 | 364 | 4 | 356 | 8 | | 0.333 | | 250,000 | 1,000,000 |
| 2011 | 1 | 365 | 3 | 359 | 6 | | 0.333 | | 250,000 | 750,000 |
| 2012 | 1 | 366 | 2 | 361 | 5 | | 0.333 | | 250,000 | 500,000 |
| 2013 | 1 | 367 | 2 | 363 | 4 | | 0.333 | | 250,000 | 500,000 |
| 2014 | 1 | 368 | 1 | 364 | 4 | | 0.333 | | 250,000 | 250,000 |
| 2015 | 0 | 368 | 1 | 365 | 3 | | 0.333 | | 250,000 | 250,000 |
| BASED ON SKEWED CURVE TO OPEN DATAFIT | | | | | | | TOTAL | | | 37,500,000 |
| IBNR COUNT 80 | | | | | | | PAID ON 1998 OPENS | | | 12,662,377 |
| | | | | | | | RESERVES | | | 24,837,623 |