ATTACHMENT 1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
SOUTHERN CALIFORNIA EDISON COMPANY, ET AL.	)	Docket Nos. 50-361 OL 50-362 OL
	)	
(San Onofre Nuclear Generating Station, Units 2 and 3)	)	

AFFIDAVIT OF JOHN A. PATTERSON CONCERNING
INTERVENOR CONTENTION 9 AND URANIUM PRICES

JOHN A. PATTERSON, being first duly sworn, deposes and says that if called as a witness herein, he is qualified to testify as follows:

1. I am currently Director, Division of Resource Assessment Operations of the Office of Uranium Resources and Enrichment of the U.S. Department of Energy (DOE). In my position, I am responsible for DOE programs for assessing uranium resources, supply, and economics. This activity includes estimation of U.S. uranium reserves and resources, projection of future uranium production capability, and surveying of uranium market activity, including prices.

2. I have been employed by DOE and its predecessor agencies, the Atomic Energy Commission (AEC) and the Energy Research and Development Administration (ERDA) since 1952. During that time I have been concerned with evaluation of uranium resources and supply, both domestic and

foreign. I joined the AEC at Grand Junction, Colorado, where I was Chief, Ore Reserves Branch. In 1967 I was transferred to Washington, D.C. as Assistant to the Director of the Division of Raw Materials. In 1972 I was made Chief of the Supply Evaluation Branch. In January 1979 I was made Director, Division of Resource Assessment Operations.

3. I have the degree of Bachelor of Metallurgical Engineering from Rensselaer Polytechnic Institute (1947) and an M.S. in Mining Engineering from the University of Utah (1949). I am the author of a number of papers on uranium resources, supply, and marketing. I have appeared as an expert on uranium supply matters at several NRC and state hearings and have provided information for Draft Environmental Statements on uranium availability, including the San Onofre Units 2 & 3 DES.

4. For its cost/benefit studies, Southern California Edison Company (SCE) assumed a base spot price of $42 in 1977 and escalated for future prices at the rate of 7 percent per annum. In my opinion, in light of historical developments in uranium prices and the future outlook for uranium supply and prices, the SCE approach was conservative, producing price projections on the high side of what is likely to actually occur.

5. Uranium prices have historically been reasonably stable, though experiencing some increases and decreases. U.S. uranium prices paid by the Atomic Energy Commission increased from $7.14 per pound U_3O_8 in 1948 to

$12.35 in 1953; then steadily declined to less than $6.00 in 1970. The initial commercial price, in the late 60's, was in the range of $5 to $6 per pound. These prices increased slowly. In 1973, the first year in which AEC surveyed commercial prices, the average delivery price was $7.10 per pound. In 1974 and 1975 prices increased more rapidly, reflecting a general economic condition of increasing costs and inflation for most commodities. Average delivery prices in 1974 and 1975 were $7.90 and $10.50, respectively. Spot prices in 1976 reached $41 to $42 per pound of U_3O_8. From mid-1976 to early 1980 spot prices remained in the low $40's. In the spring of 1980 prices dropped below $40/lb and declined to the low $30's in May. In summary, except for a two year period, uranium prices have been quite stable, marked by periods of slow increase or decline.[1/]

6. In terms of constant dollars, setting aside inflationary factors, the highest price level was in the late 1976, early 1977 period, the first time the price in the low $40's was attained. Prices since that time have actually been decreasing in constant dollar terms, corrected for inflation.[2/]

7. The stabilization of prices in the 1977-79 period and the subsequent reduction is a reflection of the improving U.S. and world uranium supply situation as well as a declining projection of future uranium needs. The improved supply-demand situation is expected to continue for some time and is only likely to be significantly modified if there

is a subtantial increase in new orders for nuclear reactors. At the present time, there is ample uranium in reserves and probable potential resources to fuel all the 166 reactors now operating, under construction or on order.[3/]

8. While forecasting of specific prices is difficult, the historical record for uranium and other raw material commodities indicates that a constant rate of price increase of 7 percent over a long-term period is a conservative approach, likely to produce higher prices than will actually occur. While there may be periods of 7 percent or higher increases, there are also likely to be periods of lower increases, or declines as has been the recent trend.[4/] The reasonableness of the use of this escalation method is borne out by the fact that SCE's 1977 projection of $51.45 per pound price for 1980 is substantially above the current market price which is the low $30's.

9. In procurement of uranium and estimation of prices to be paid, it is not appropriate to simply assume that spot market prices will be paid for all procurement. There are a number of alternative procurement approaches which can provide lower prices than spot market procurement. One such approach is to participate in uranium exploration and production, which practice SCE is known to be well involved in.

10. To the extent that SCE has already made fuel supply arrangements, through purchase contracts or participation in production, they are insulated from possible spot market price increases, and, therefore, their procurement price would not be related to a specific constantly escalating value.

11. For the reasons listed above, SCE's use of a base price assumption of $42 per pound with an allowance for inflation of 7% per year is a conservative estimate of actual purchase price requirements for uranium.

12. The uranium cost escalation analyses used in the Carstens article furnished as part of the Intervenors' July 28, 1978 discovery material reflects the rapid increase in spot prices experienced in the 1973-1976 period. To extrapolate future prices on the basis of the 1973-1976 price increase would be erroneous in that uranium prices decreased 9 percent in real terms during 1977. Thus, it is inappropriate to consider a price escalation which is not even valid for a 5-year period of the uranium market for a cost/benefit analysis which covers the 30-year lifetime of a reactor. It would be just as inappropriate to extrapolate the recent 9 percent decrease in uranium prices for use in the analysis.

Many factors must be carefully investigated to estimate future uranium prices, and simplistic methods can't be justified.

John A. Patterson
I hereby certify that the information listed above is true and accurate to the best of my personal knowledge.

Personally appeared before me this 21st day of July, 1980, was John A. Patterson who swore that on his personal knowledge the information above is true and accurate.

Notary Public
My Commission Expires November 30, 1983

REFERENCES OF JOHN A. PATTERSON

FOOTNOTE
NO.

1. U.S. DOE GJO(79) "Statistical Data of the Uranium Industry," Surveys of U.S. Uranium Marketing Activity USAEC, ERDA, and DOE; Reports of Nuclear Exchange Corporation.

2. U.S. ERDA Survey of U.S. Uranium Marketing Activity, May 1977; Reports of Nuclear Exchange Corporation.

3. U.S. DOE GJO(79) Uranium Industry Seminar Proceedings; OECD-NEA "Uranium Resources, Production, and Demand," December 1979.

   IAEA - Fuel and Heavy Water Availability Report of INFCE Working Group 1, 1980.

4. U. Peterson and R. S. Maxwell, "Historical Mineral Production and Price Trends," Mining Engineering, January 1979.