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April 17, 1998

For Overnight Delivery

Manning Gasch, Jr., Esq.  
Hunton and Williams  
Riverfront Plaza - East Tower  
951 East Byrd Street  
Richmond, VA 23219-4074

Re: State of New York v. AlliedSignal, Inc., 89-CV-815

Dear Mr. Gasch:

Pursuant to paragraphs 32 and 42 of the Consent Decree for the above-referenced matter, entered on March 16, 1992 and as amended thereafter (and pursuant to paragraph 41 of this decree, assuming solely for argument sake applicability of this provision), enclosed is the State of New York's Determination To Disapprove and Revise the Mercury Modeling Report ("the Determination").

Please take notice that pursuant to the afformentioned provisions of the Consent Decree, the Determination shall be final and binding upon AlliedSignal and AlliedSignal shall be deemed to have accepted and ratified the Determination that revision of the Mercury Modeling Report, including additional work, was appropriate unless within thirty days from the day that the attorney of record for AlliedSignal receives written notice of the Determination, Allied invokes the dispute resolution provisions in paragraph 42.

Very truly yours,

Philip M. Bein

Assistant Attorney General

cc:

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IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF NEW YORK  
BINGHAMTON DIVISION

STATE OF NEW YORK and	)	
THOMAS C. JORLING as Trustee	)	
of the Natural Resources,	)	
	)	
Plaintiffs,	)	CIVIL ACTION NO. 89-CV-815
	)	Judge McAvoy
v.	)	
	)	
ALLIED-SIGNAL INC.,	)	
	)	
Defendant.	)	

STATE OF NEW YORK'S DETERMINATION TO DISAPPROVE  
AND REVISE THE MERCURY MODELING REPORT

As part of the investigation of AlliedSignal's contamination of Onondaga Lake with mercury, and as required by the consent decree governing the Remedial Investigation/Feasibility Study ("RI/FS") of the Onondaga Lake system, AlliedSignal and its consultants constructed a model of mercury behavior based on several models available in the scientific literature, and described and documented the model in a report entitled "Onondaga Lake RI/FS Mercury Modeling Report, June 1997" ("Mercury Modeling Report").

The main purpose of the model was to provide a tool to assist the State and others in understanding, quantitatively (1) the movement of mercury into the Lake (loadings from tributaries, groundwater, atmosphere); (2) its movement within the Lake (water column, sediments and fish); (3) speciation (transformation of mercury into the more toxic methyl mercury), and; (4) its movement out of the Lake (Lake outlet). A second purpose of the model was to serve as a predictive tool such that the State could evaluate, with a reasonable degree of scientific accuracy and reliability, the potential effects that various remedial options could have

on the movement, speciation and fate of mercury in the Lake system with particular concern for the bioaccumulation of mercury in fish. In order to generate a reasonably accurate and reliable model<sup>1</sup>, AlliedSignal was obligated to collect sufficient field data for all significant variables, on a seasonal basis throughout the year, such that any proposed model could be properly calibrated on an annual basis using data-based constraints.

After a thorough review of AlliedSignal's Mercury Modeling Report and the model described therein, the State has concluded that the proposed model is significantly flawed and cannot be used as presented for its intended purposes. The State has reached this conclusion after an exhaustive evaluation of the report, consideration of comments from Onondaga County, and numerous discussions with, and recommendations and requests to, AlliedSignal and its consultant regarding measures which should have been taken by AlliedSignal (but which it failed to take) to resolve problems with the model. The State's evaluation concludes that the field data obtained by AlliedSignal were insufficient, failing to provide the needed constraints to permit an accurate assessment of annual external loads to the Lake and internal "cycling" of mercury. Moreover, the Mercury Modeling Report's interpretation of the data (*e.g.*, the postulation of a theory of "remineralization") is, in significant respects, not supported by the data and scientific literature. As a result of these deficiencies, the model is not reliable as a predictive tool for assessing the impact of various remedial scenarios on mercury in Onondaga Lake. An illustration of the model's serious deficiencies is the fact that it does not effectively simulate the

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<sup>1</sup> Even a reasonably accurate and reliable model, because it endeavors to predict very complex and dynamic conditions, is useful for purposes of remedy selection only in conjunction with other scientific tools and methodologies.

concentrations of mercury in the water column of the Lake. Indeed, the State's analysis of the model, based upon the 1992 RI/FS field investigation database, demonstrates that the model under predicts mercury levels in the Lake by between 33% and 50%.

The Mercury Modeling Report is disapproved by New York State for the reasons summarized herein and described in detail in New York State's Revision of the Onondaga Lake Mercury Modeling Report, attached hereto (and incorporated by reference) as Exhibit A.

### AlliedSignal's Model

The model, through a set of mathematical equations, purports to describe the flow of mercury into and out of the Lake and the behavior of mercury within the Lake, including the exposure of fish and other biota to this hazardous substance. One way that mercury enters the Lake is through the Lake's tributaries, either dissolved in water or attached to particles suspended in water ("suspended solids"). Other sources of mercury to the Lake include precipitation, groundwater flow, the sediments themselves, and discharges from the Metropolitan Syracuse Sewage Treatment Plant. The model includes three major "mass balances": a mercury mass balance and two other mass balances related to the behavior of mercury, a water (or hydrologic) balance and a suspended solids balance. Each mass balance describes quantities flowing into and out of the lake and remaining in the lake. Subparts of the model describe the exposure to, and assimilation of, mercury by fish within the lake.

The model was designed in part to provide assessments of the effect of various remedial options on levels of mercury in water and fish. For example, the model was intended to determine the effects of decreasing or curtailing mercury inputs to the Lake upon levels of mercury found in fish.

## Insufficient Data

The mercury model developed by AlliedSignal contains a large number of parameters and processes which must be estimated with a reasonable degree of scientific accuracy and reliability in order to allow the model to yield useful information. Overall, the model's development and usefulness are severely limited by the lack of data on annual loads to the Lake as well as the lack of data on lake conditions covering a 12 month period. In particular, the absence of data for Lake tributaries during the period of spring runoff, when rains are heavy and accumulated snow melts, undercuts the model's mass balances for suspended solids and mercury and the utility of the model as a whole. Spring runoff typically transports the vast majority of solids to a lake.

Internal cycling of mercury as well as sediment related loads were poorly constrained due to lack of appropriate data and unsuccessful laboratory studies of the sediment processes. Constraint of a parameter or flux means that enough data exists to permit the estimation of the parameter or flux to within a reasonable level of uncertainty independent of the model calculations. A parameter is well constrained if data exists which narrows the range of possible values of that parameter. Conversely, a parameter is poorly constrained if, due to a paucity of data, the parameter can potentially vary over a wide range.

AlliedSignal attempted to fit the model to the available data but was largely unsuccessful in replicating measured lake conditions for total mercury. The model results were better for methyl mercury, another chemical form of mercury, although the discrepancies between model and measured conditions were still not acceptable.

### Inappropriate Interpretation of Data

The Mercury Modeling Report also suffers from deficient interpretation of data associated with the model. One important example of this problem is the report's inappropriate assertion that a process termed "remineralization" is responsible for the summertime buildup of mercury in the lower waters of the Lake. This term, as used in the model and Mercury Modeling Report, is used to describe a process whereby mercury is allegedly released from particles as the particles settle through the water column of the Lake. Despite the State's direction to AlliedSignal to provide support for its remineralization theory, the Mercury Modeling Report and other submissions by AlliedSignal disclosed no evidence that "remineralization" occurs in Onondaga Lake and failed to note data which contradicts the existence of a "remineralization" process.

The Mercury Modeling Report's interpretation of the model's output is also unacceptable. Mass balance calculations prepared by AlliedSignal based on the model are of questionable value due to the failure of the model to accurately predict the measured Lake inventories, such as the amount of total mercury found in the water column of the Lake. Further, the failure of the model to accurately predict this amount and month-to-month variations in mercury levels in the water column result in the model's failure to account for substantial levels of mercury found in the Lake's upper waters.

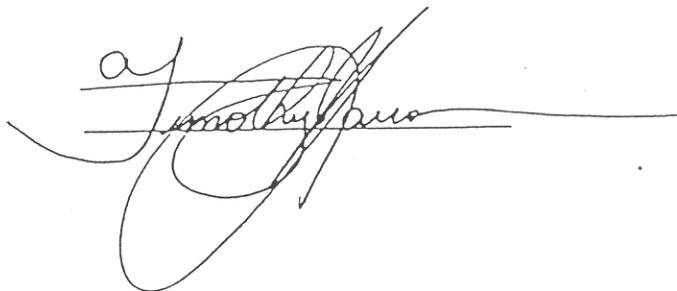
### Conclusion

In conclusion, the lack of data to properly constrain the various model components, along with incorrect data interpretation, render the model and the Mercury Modeling Report incapable of achieving their purposes of understanding mercury behavior in Onondaga Lake and assessing the impact of various remedial scenarios on mercury in the Lake system.

The use of models, such as the mercury model, to assist in the selection of a remedy is not a common practice in an RI/FS. Although AlliedSignal's modeling efforts are being rejected by the State in this determination, reliable and long established tools for selecting a remedy for AlliedSignal's mercury contamination of the Onondaga Lake system remain available. Such tools include analysis of information set forth in the remedial investigation report, the use of ecological and human health risk assessments, and the application of appropriate engineering and scientific principles. In addition, should the State later deem additional mercury modeling efforts necessary or useful, such work can be incorporated into the RI/FS process.

Dated: Albany, New York  
April 16, 1998

TIMOTHY J. LARSON, P.E.  
Project Manager  
New York State Department of  
Environmental Conservation  
Division of Environmental  
Remediation

A handwritten signature in black ink, appearing to read "Timothy J. Larson", is written over a horizontal line. The signature is stylized and cursive.

Dated: New York, New York  
April 17, 1998

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