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June 13, 2006

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In Reply Refer to:
P-10482-NY, P-10481-NY,
P-9690-NY

Mongaup River System
Inflow Design Flood
Supplemental Studies

Mr. Kevin McLeod
Plant Manager
Mirant NY-GEN, LLC
140 Samsondale Avenue
West Haverstraw, New York 10993

Dear Mr. McLeod:

By letter dated March 8, 2006, you were directed to conduct a supplemental hydrologic and hydraulic (H&H) analysis to confirm the Inflow Design Flood (IDF) for the Mongaup Projects and determine the risk to life due to the incremental damages that may result from a dam failure.

The supplemental H&H Study was submitted by your letter dated March 31, 2006, with additional information and analyses submitted by your letter dated May 4, 2006, and your e-mails dated May 17, 2006, May 31, 2006 and June 5, 2006. The supplemental H&H Study was conducted by DTA Engineers of New York and reviewed by Mead and Hunt, Inc. Mead and Hunt concurred with your conclusions.

Your conclusion based on the supplemental H&H Study for the Mongaup River projects, Rio, Mongaup, Swinging Bridge, Toronto and Cliff Lake is that the current spillway capacity for all project dams is sufficient to pass the IDF for each dam in accordance with the Engineering Guidelines. The spillway capacity, the PMF, the IDF and the percentage of the PMF that each dam can safely pass is summarized in the

- 2 -

following table. We generally concur with the conclusions of the supplemental H&H Study.

The following table contains the results of the study for a few select locations.

Table 1.

Dam	Spillway Capacity (cfs)	PMF ¹		Peak Inflow for Pool at Dam Crest	Percentage of the PMF Inflow ² For IDF	IDF Outflow Thru Spillway (cfs)
		Inflow	Outflow			
Rio	56,700	105,100	104,500	57,800	55%	56,700
Mongaup Falls	34,000	87,400	87,200	36,300	42%	34,000
Swinging Bridge	32,000	77,800	70,100	42,800	55%	32,000
Toronto	8,900	30,600	21,500	21,000	68%	8,900
Cliff Lake	12,800	27,200	26,800	14,300	53%	13,000

Your May 17, 2006 additional information submittal provided the results of a dam breach analysis that compared the downstream flooding impacts in Port Jervis, New York, with the flows on the Delaware River from a PMF event on the Mongaup River with and without a failure of Swinging Bridge dam. The inundation map shows an increase in the water level elevation of 8.5 feet above the natural flood rise of 23 feet. If Swinging Bridge dam failed during the PMF there would not be significant additional inundated areas or developments affected and would not constitute a threat to downstream life or property.

In addition to the limited extent of the additional areas inundated by a dam failure under extreme floods, this finding above is based on the extensive flooding already occurring in Port Jervis from the natural flood. The Emergency Action plan (EAP) will include additional requirements that will insure that all affected development will be safely evacuated prior to any possible Swinging Bridge dam failure.

Further, as explained in your Supplemental H&H Study there are several additional risk mitigation considerations that support your conclusions.

¹ PMF values from Mongaup River Hydro System Probable Maximum Flood Study by DTA Engineers of New York, Inc. dated October 2005, and revised June 5, 2006.

² Percentage of PMF values from Mongaup River Hydro System Supporting Document for Supplemental H&H Study by DTA Engineers of New York, Inc. dated April 2006, and revised June 5, 2006.

- 3 -

- In all of the flooding scenarios, it was assumed that a flow equivalent to the 100-year flood was already present on the Delaware River. Since Swinging Bridge Dam is the highest dam with the largest reservoir in the Mongaup River system, failure of Swinging Bridge Dam represents the worst failure case for downstream flooding
- Structures located in Port Jervis begin to be impacted at elevation 420 feet. The flood stage in Port Jervis as defined by the USGS is elevation 433.35 feet. The maximum flood level on record is elevation 442.35 feet that occurred on February 12, 1981 as the result of a downstream ice jam. The greatest natural flood of record was from Hurricane Diane, which occurred on August 19, 1955. Water levels in Port Jervis reached elevation 439.25 feet. The table below shows flooding of the Port Jervis area occurs with or without the failure of the Swinging Bridge Dam. The incremental difference between the impacts due to dam failure between the full PMF case and the Spillway Capacity Flood is one foot. The additional increment of one foot is not significant when the magnitude of the flood flow and the extent of inundation for these events are considered.

Table 2.

Mongaup River Projects						
Incremental Analysis for PMF Condition						
Location	PMF			Spillway Capacity Flood		
	PMF Peak Elevation without Dam Failure (ft)	PMF Peak Elevation with Dam Failure (ft)	Increment Between Breach and Non-Breach Case (ft)	Peak Elevation without Dam Failure (ft)	Peak Elevation with Dam Failure (ft)	Increment Between Breach and Non-Breach Case (ft)
Failure of Swinging Bridge Dam						
Port Jervis	442.6	451.1	8.5	440.0	450.1	10.1
Failure of Rio Dam						
Port Jervis	443.0	447.7	4.7	440.7	446.3	5.7

- Site-specific PMP studies performed for hydro projects in New York and Maine have realized reductions of about 25% in PMF analyses when compared to the studies performed using HMR-51. Although a reduction of this magnitude of the Swinging Bridge PMF would lessen the potentially adverse impacts, it would not eliminate them. A conservative estimate of a 15% reduction in the PMF would increase the percentage of the PMF the spillway could pass.
- Each spillway (except for Mongaup Falls) is capable of passing a flood flow with a frequency of occurrence of about 1,700 years or greater and at least 50% of the PMF. The resulting impacts in Port Jervis due to dam failure at Mongaup Falls are less than the impacts from dam failure at Swinging Bridge or Rio due to

- 4 -

substantially less reservoir volumes. In addition, the downstream impacts due to dam failure do not vary significantly between the spillway capacity flood and flood flows up to the PMF.

The acceptance of IDF values listed in Table 1 above will require revisions to your existing EAP. You have proposed a method for enhancing the time available for evacuation as part of your EAP. Conditions B and C of the EAP propose notification protocols based on reservoir elevations and spillway flows. Condition C would be implemented when project flows are equivalent to the 50-year flood. Condition B is proposed to be implemented when project flows are equivalent to the 100-year flood. This level of implementation is considered too frequent and should be raised to a level closer to the spillway capacity to limit premature evacuation. Furthermore, since the impacts from dam failure are primarily on the Delaware River, especially in Port Jervis and Matamoras, flooding criteria to be used to activate Condition B or A should be tied to the stage and flow on both rivers.

These notification procedures must be implemented in a timely manner when these flood conditions occur. The following conditions and assurances are required:

1. Proof that the flashboards will fail at the reservoir elevations prescribed under Condition C for all dams. Based on the tables in the draft EAP, the flashboards must be designed to fail with one-foot of overtopping.
2. Provide assurance that operational personnel will be available and have reliable means of communication at all dams and that the gates at Swinging Bridge Spillway will be opened as required.
3. The Condition A and B notifications must be revised to realistic warnings that will maximize the evacuation time. Coordination with the local Emergency Management Agencies (EMA) is necessary to determine the evacuation time needed and Condition A should be back calculated considering rate of reservoir rise, time to fail, and travel time to populated areas.
4. A public education program must be developed and implemented before reservoir refilling in coordination with the EMAs. The public education program should contain graphical displays that show pre-breach and post-breach water levels. The graphical displays should use actual photographs of area buildings and bridges with flood levels superimposed. The pre-breach and post-breach water levels should be based on the activation levels for Condition A described in item 3 above.
5. A Tabletop and Functional Exercise of the EAP must be conducted within sixty days after the public education program is implemented to obtain comments from the Emergency Management Agencies on the workability of

- 5 -

this new notification and evacuation plan. This must be coordinated to make certain that the EMAs that are most affected during a potential emergency are appropriately communicated with to determine their specific requirements for notification, their understanding of potential evacuation routes, and their understanding that their evacuation plans are adequate.

As required with all established IDFs for high hazard potential dams which are less than the PMF, it is your continuing responsibility to periodically review and monitor downstream development to ensure that new development does not change the determination that failure of any of the project dams would not constitute a hazard to downstream life and property. In the event that additional downstream development is identified that would be impacted by failure of a project dam at flows above the current IDF, remedial measures may be required. A report on your review and monitoring of the downstream reach is due annually, with the first report due July 2007.

A plan and schedule to respond to these items must be submitted by June 23, 2006. Your cooperation in these matters is appreciated.

Sincerely,



Constantine G. Tjoumas, P.E.

Director, Division of Dam Safety &
Inspections

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