From: Jack Cushing
To: John Kauffman
Date: 9/29/05 8:41AM
Subject: Re: Entrainment numbers

John

I appreciate you, Gary and John for meeting with us last week. Thank you for getting back to us on the entrainment and imingement calculations. Our biologist, Mike Masnik, is out this week, but if he has any questions I will have give you a call.

Jack Cushing
Senior Project Manager
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
USNRC
Phone 301-415-1424
Fax: 301-415-2002
E-mail: JXC9@NRC.GOV

>>> "John Kauffman" <John.Kauffman@dgif.virginia.gov> 09/29/05 7:48 AM >>>
Attached is a sheet with the entrainment numbers. In reviewing the earlier calculations I discovered a mistake which makes the numbers and potential impact worse. Analysis of Dominion's earlier entrainment data for size structure would be needed for a more accurate estimate of the impacts. In addition any Lake Anna larval fish tow studies they conducted would be necessary to evaluate habitat utilization by larval fish.

CC: Gary Martel; John Odenkirk

Mail Envelope Properties (433BE0FD.D3D : 22 : 2450)

Subject:	Re: Entrainment numbers
Creation Date:	9/29/05 8:41AM
From:	Jack Cushing
Created By:	JXC9@nrc.gov

Recipients	**Action**	**Date & Time**
dgif.virginia.gov	Transferred	09/29/05 8:41 AM
Gary.Martel CC (Gary Martel)		
John.Kauffman (John Kauffman)		
John.Odenkirk CC (John Odenkirk)		

Post Office	**Delivered**	**Route**
		dgif.virginia.gov

Files	**Size**	**Date & Time**
MESSAGE	1832	09/29/05 08:41AM

Options

Auto Delete:	No
Expiration Date:	None
Notify Recipients:	Yes
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard
To Be Delivered:	Immediate
Status Tracking:	Delivered & Opened

From: "John Kauffman" <John.Kauffman@dgif.virginia.gov>
To: <JXC9@NRC.gov>
Date: 9/29/05 7:53AM
Subject: Entrainment numbers

Attached is a sheet with the entrainment numbers. In reviewing the earlier calculations I discovered a mistake which makes the numbers and potential impact worse. Analysis of Dominion's earlier entrainment data for size structure would be needed for a more accurate estimate of the impacts. In addition any Lake Anna larval fish tow studies they conducted would be necessary to evaluate habitat utilization by larval fish.

CC: "Gary Martel" <Gary.Martel@dgif.virginia.gov>, "John Odenkirk" <John.Odenkirk@dgif.virginia.gov>

Mail Envelope Properties (433BD592.D51 : 1 : 60753)

Subject:	Entrainment numbers
Creation Date:	9/29/05 7:48AM
From:	"John Kauffman" <John.Kauffman@dgif.virginia.gov>
Created By:	John.Kauffman@dgif.virginia.gov

Recipients

nrc.gov
owf4_po.OWFN_DO
JXC9 (Jack Cushing)

dgif.virginia.gov
John.Odenkirk CC (John Odenkirk)
Gary.Martel CC (Gary Martel)

Post Office	**Route**
owf4_po.OWFN_DO	nrc.gov
	dgif.virginia.gov

Files	**Size**	**Date & Time**
MESSAGE	431	09/29/05 07:48AM
Determination of total impingement.doc	26112	
Mime.822	37849	

Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

Determination of total impingement/entrainment loss

Page 3-5-26 of September 2003 document quotes .38% of gizzard shad numbers are impinged and 3.1% of black crappie.

Standing crop is estimated by dividing the number of impinged fish by the above percentages. Standing crop estimates were determined by August cove rotenone samples conducted and a minimum average size fish 25 mm or larger were collected in the samples.

Gizzard shad 113,857/.0038 =29,962,368 standing crop

Black crappie 27,939/.031= 901,258

Entrainment/impingement
Addition of unit three to total E/I

	Entrained	Impinged	Total
Gizzard shad	188,582,835	266,203	188,849,038
Black crappie	3,555,427	62,475	3,617,902

With a screen size of 9.5 mm any black crappie or gizzard shad over 50 mm would likely be entrained instead of impinged. The draft EIS estimates no black crappie would be entrained in July. This may reflect a habitat selection change by the juvenile crappie and lower susceptibility to the intake location.

From the above numbers more fish were entrained than the standing crop estimate. What is unknown is the contribution the entrained fish would have made to the lake standing crop if they had survived. To develop an estimated loss to the standing crop, entrainment loss would have to be converted using size of fish entrained and expected survival rates from entrainment date to the August time period. Fish small enough to be entrained usually have a size dependent survival rate with higher survival for larger juvenile fish. In addition, fish 25 mm or larger entrained near the end of July would have to be considered as part of the standing crop losses.

As provided in the Jan 2005 letter a trophic gradient within the lake has been observed with higher biomass above Rt 208. The existing plant could be having a significant impact on the lower lake and an unknown impact on the entire lake biomass.