

# **EXHIBIT “A”**



The State of New Hampshire  
**DEPARTMENT OF ENVIRONMENTAL SERVICES**



Thomas S. Burack, Commissioner

December 17, 2009

Ms. Joan A. McKibben  
Chair  
Litchfield Conservation Commission  
Two Liberty Way, Suite 1  
Litchfield, New Hampshire 03052-2345

**Subject: EPA ID 1201010-Hudson Water Department  
Dame and Ducharme Wells**

Dear Ms. McKibben

Thank you for your letters dated October 8, 2009 and December 7, 2009 regarding the operation of the Dame and Ducharme Wells in Litchfield.

The New Hampshire Department of Environmental Services has only concurred with the allowance of an increase from 0.79 million gallons per day (MGD) to 0.89 MGD at above average precipitation conditions based on the 2002 safe-yield study followed by three years of water level monitoring. Considering the available information, we believe that the current withdrawal limitations (0.79 MGD during average or below average precipitation conditions and 0.89 MGD when above average precipitation exist) are reasonably protective of Darrah Pond. Prior to the completion of that that safe yield study, the Dame and Ducharme Wells sometimes extracted up to 1.16 MGD which is substantially more than 0.89 MGD.

Copies of the scope of work for the safe yield study and the results of the study itself were provided to the Town of Litchfield in 2001 and 2002. In 2002, as part of our review of the safe yield study, and prior to approval, the Department received and considered recommendations from Litchfield and its consultant, Dr. Thomas Ballestero. The Department also provided copies of its findings on the safe yield study and recommendations to Litchfield, Hudson, and Pennichuck Water Works for the future management of water resources in this aquifer (see Attachment 1). Additionally, the Department attended a meeting in Litchfield on June 4, 2003 to discuss its findings regarding the future operation of the Dame and Ducharme Wells.

Attachment 2 provides a detailed summary of efforts that have been employed by all parties to protect the water level in Darrah Pond. These efforts, coupled with above average precipitation trends, have resulted in the water level in Darrah Pond being near or above its full elevation level since 2003. Attachment 2 also summarizes measures that the Town of Litchfield, Town of Hudson, and Pennichuck Water Works should take to

DES Web site: [www.des.nh.gov](http://www.des.nh.gov)

P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire 03302-0095

Telephone: (603) 271-2513 • Fax: (603) 271 5171 • TDD Access: Relay NH 1-800-735-2964


Ms. Joan McKibben  
Dame and Ducharme Wells  
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continue to protect the pond. Attachment 3 contains responses to the specific questions raised in your letters dated October 8, 2009 and December 7, 2009.

Attachment 2 also explains the Department's limited regulatory authority to proactively regulate withdrawal rates from the Dame and Ducharme wells unless the Department can demonstrate that a violation of surface water quality standards is occurring. The Dame and Ducharme wells were developed prior to August 1998 and therefore the provisions in RSA 485-C relative to the permitting requirements for new large groundwater withdrawals are not applicable to these wells. In 2002, Hudson proposed a plan to voluntarily limit the volume of water extracted from the Dame and Ducharme Wells to protect Darrah Pond in response to complaints. If these efforts fail to protect Darrah Pond in the future, the Department could, upon demonstration of a violation of surface water quality standards, pursue enforcement actions to consider regulatory limitations on the use of these wells.

Please contact me at 271-0660 or [Brandon.Kernen@des.nh.gov](mailto:Brandon.Kernen@des.nh.gov) with any questions.

Sincerely,

  
Brandon Kernen  
Hydrologist  
Drinking Water and Groundwater Bureau

cc: Roger Cantu, Hudson Board of Selectmen  
Frank Byron, Litchfield Board of Selectmen  
Chris Countie, Pennichuck Water Works  
Gary Webster, Town of Hudson  
Jeff McClure, Weston and Sampson  
Sarah Pillsbury, NHDES  
Harry T. Stewart, NHDES  
Thomas S. Burack, NHDES  
Kate Peters, Office of the Governor



State of New Hampshire  
DEPARTMENT OF ENVIRONMENTAL SERVICES

6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095  
(603) 271-3503 FAX (603) 271-5171



ATTACHMENT 1

Date: June 21, 2002

To: Paul Sharon, Town of Hudson  
Rob Desmarais, Town of Hudson  
Frank Byron, Town of Litchfield  
Joseph Stapleton, Town of Litchfield  
Steve Densberger, Pennichuck Water Works  
Don Ware, Pennichuck Water Works  
Andrew Singelakis, Nashua Regional Planning Commission  
John Boisvert, Weston and Sampson  
Thomas Ballestero, Consultant to Litchfield  
Carl Paulson, New Hampshire River's Council

From: Brandon Kernen, <sup>bc</sup> New Hampshire Department of Environmental Services

Re: Safe Yield Study for the Darrah Pond Aquifer

The Department of Environmental Services (DES) has been working with the Town of Hudson (Hudson), Town of Litchfield (Litchfield), and Pennichuck Water Works (PWW) to investigate the cause and identify a remedy for the re-occurrence of low water levels in Darrah Pond in 1999, 2000, 2001, and 2002. These efforts have mostly focused on modifying the operation of the Dame and Ducharme wells which are located approximately 1500 feet from Darrah Pond. These efforts have been coordinated through numerous communications via-mail, telephone conversations, meetings, and the following written correspondences:

- 1) Letter from DES to PWW dated June 14, 2000 commenting on a proposed operation and monitoring program for the Dame and Ducharme wells;
- 2) Letter from DES to Hudson dated August 15, 2000 in which DES describes a need for a hydrogeologic study of the Darrah Pond Aquifer;
- 3) Letter from DES to Hudson dated October 30, 2000, again describing the need for a safe yield study for the Darrah Pond Aquifer;
- 4) Letter from DES to Litchfield dated October 30, 2000 describing Litchfield's need to limit water use at Campbell High School. The letter also asked Litchfield to educate the residents about the importance of conserving water, as well as encouraged Litchfield to participate in a Beach Water Quality Sampling Program for Darrah Pond;

- 5) Letter from DES to Weston and Sampson (consultant to Hudson) dated September 20, 2001 which DES provided technical comments on the proposed scope of work for the Safe Yield Study;
- 6) Letter from DES to Hudson dated March 21, 2002 in which DES requested that Hudson submit the results of the Safe Yield Study within 30 days; and
- 7) Letter from DES to Weston and Sampson (consultant to Hudson) dated April 16, 2002 in which DES provided a preliminary technical assessment of the report titled "*Final Report – Dame and Ducharme Well Safe Yield Study*" and dated March 14, 2002.

Applicable project background and history is documented in the written correspondences.

DES agrees with the recommendation put forth by Hudson in the March 14, 2002 report titled "*Final Report – Dame and Ducharme Well Safe Yield Study*". The recommendation states that withdrawals from the Dame and Ducharme wells be lowered to an annual average daily production rate of 0.79 million gallons per day (MGD) with a provision to increase withdrawals to 0.89 MGD for periods with above average precipitation. This reduction results in a 25%-35% reduction in the extraction rates from the aquifer when compared to the extraction rates of the wells in 1998 and 1999 (the use of the wells was voluntarily restricted by the Town of Hudson and Pennichuck Water Works in 2000). DES believes that implementing these reductions will restore and maintain the water level of the pond, except under drought conditions, when the water levels in many surface water bodies state-wide are below normal levels. The rationale for DES's concurrence with the recommendation proposed by Hudson was described in a letter dated April 16, 2002. DES also agrees with the water level monitoring and reporting program proposed by Hudson in a letter dated May 22, 2002. By April 30, 2003, DES will review the comprehensive set of water level data collected in 2000, 2001, 2002 and 2003 and assess if the further action is required to maintain the water level in Darrah Pond. However, DES will not expect future efforts to maintain the water level in Darrah Pond to only include actions on the part of Hudson, but also the Town of Litchfield (including Campbell High School) and PWW.

DES encourages all stakeholders to pursue additional conservation/management activities immediately, and should future mitigation measures be necessary to maintain the water level of the pond, it is expected that each stakeholder will contribute in this effort by implementing the activities described below:

**Hudson/Litchfield/PWW:** 1) Begin addressing the issue of water demand for all water users in Litchfield and Hudson - This can be accomplished through educating its residents, as well as working with PWW to enforce outdoor water use restrictions. Litchfield and Hudson can also be proactive by coordinating with developers and builders to design housing developments that are more water efficient than homes that currently exist; 2) Begin identifying alternative sources of water - Irregardless of the extraction rate for the Dame and Ducharme wells, it is clear that Litchfield and Hudson will require additional water sources in the future as both towns complete their build out. These alternative water sources may include new wells, increased purchases from PWW's Nashua system, or an interconnection with Manchester Water Works which has water mains approximately one mile from water mains located in Litchfield. PWW has a water supply contract in place with Manchester Water Works and may be able to utilize this to facilitate an interconnection. By identifying and developing

alternative sources of water, all parties will not only solve the problems of future water needs, but also reduce the stresses currently placed on existing sources of water.

**Litchfield:** 1) Reduce water use at Campbell High School, which withdraws approximately 57,000 gallons a day from new wells approximately 1000 feet from Darrah Pond for the purpose of maintaining turf at its facility; and 2) Reduce water use at the recreation field adjacent to Darrah Pond.

**PWW:** As the operator of the water system in Litchfield, Hudson, and surrounding towns, use its authority under the regulations of the Public Utilities Commission to implement and effectively enforce water use restrictions for customers provided water from the Hudson-Litchfield system.

**Hudson:** Re-evaluate the effectiveness of the operational changes of the Dame and Ducharme wells based upon the results of the water level monitoring program, and if necessary, implement additional measures to ensure the water level of the pond is maintained.

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DES discussed the results of the Safe Yield Study with representatives of Litchfield, Hudson, and PWW in meetings on April 30, 2002, and May 13, 2002. A number of comments were provided at these meetings or in correspondences after the meeting, and below are DES's response to these comments.

**Comment:** Comments were made that were critical to the approach to work for the safe-yield study.

*Response: All stakeholders were provided an opportunity to review the scope of work for the safe yield study prior to initiating the study. Critical comments regarding the scope of work could have been directly addressed at that time.*

**Comment:** Stakeholders have indicated that it is their desire to have the extraction rate of the Dame and Ducharme wells tied to pre-established triggers for water levels measured in Darrah Pond and a nearby monitoring well. A trigger level of 180 ft-msl in August of this year for the water level at Darrah Pond has been specifically recommended. A trigger level of 173.5 ft-msl in August of this year has also been proposed for MW5.

*Response: While DES agrees that having pre-established quantitative triggers in which to base the operation of the Dame and Ducharme wells upon would be ideal, we do not believe there is sufficient data to fairly establish quantitative triggers that can incorporate seasonal and varying precipitation trends at this time. DES does not agree with trigger level proposed for the pond or monitoring well. The elevation of the old wood dock in the pond is 180.02 feet, meaning that the proposed trigger August water level for Darrah Pond is the same elevation of the dock. Therefore it is DES's opinion that this trigger level is not attainable. On June 27, 2001, personnel from DES's Watershed Bureau conducted a lake survey at Darrah Pond, and indicated on the field data sheets that the pond appeared to be at a full level. The water level of Darrah Pond was measured on June 21, 2001 at 178.94 ft-MSL and on July 5, 2001 at 178.63 ft-MSL. The measured water level in MW5 on June 28, 2001 (when Darrah Pond was at full level) was 169.28 ft-MSL which is four feet lower than the proposed trigger level for August.*

*As stated previously, it is DES's intention to review the comprehensive set of water level data collected in 2000, 2001, 2002, and 2003 in April 2003. If un-natural stresses in the aquifer continue to impact the water level of Darrah Pond, further mitigation measures will be pursued as described in this letter. Some stakeholders believe that this approach is open ended, and could result the failure to implement appropriate or timely mitigation measures. However, DES believes that this approach is the fairest and most technically correct way to consider the numerous variables involved with maintaining the water level of the pond. An open ended approach to addressing the water level problem in the pond has already resulted in a significant reduction in withdrawals from the Dame and Ducharme wells, and the implementation of a water level monitoring and reporting program.*

Comment: Stakeholders have indicated verbally and in writing that it is unfair for DES to pressure Hudson to reduce withdrawals from the Dame and Ducharme wells because there are thousands of other water users in the area. It has been stated that under drains associated with roads or homes are draining the aquifer and that there are thousands of other water users in the recharge area of the Dame and Ducharme wells.

*Response: Hudson determined in the course of completing its safe-yield study that it is necessary for it to reduce the withdrawal volume in order to maintain and preserve a sustainable supply of water. DES agrees with Hudson's assessment, and believes that Hudson's approach to operating the wells will result in maintaining a reliable source of water from the wells, in addition to maintaining the water level of Darrah Pond.*

*On August 30, 2000, Department personnel visited the locations of several storm water catch basins in the Darrah Pond aquifer with a resident of Litchfield and employee of PWW who had previously reported that the drains had running water in them during periods when no precipitation occurred. Prior to August 30, 2000, it had not rained for at least four days. At the time of the site visit, all of the storm water catch basins visited were observed to be dry. It should be noted that the site visit did not constitute a comprehensive evaluation of the stormwater drainage network in Litchfield, but only an evaluation of those specific areas reported to DES as having running water during dry times. DES has also asked the town Road Agent and Health Officer, Mr. Roland Bergeron, if he is aware of any under drains installed under road surfaces. Mr. Bergeron stated that there were no under drains installed as part of road construction projects.*

*A list of all wells located within the recharge area of the Dame and Ducharme wells is attached as Table 1. The list indicates that there are approximately seventy (70) private well located within the recharge area of the aquifer. Although water use from these well certainly contributes to the decline in water levels at Darrah Pond, the Dame and Ducharme wells accounts for 80%-90% of all water use in the Darrah Pond aquifer. Nevertheless, if maintaining the water level of the pond continues to be problematic during periods of average precipitation, future mitigation measures involving all water users in the aquifer will have to be implemented as described previously in this correspondence.*

Should you have any questions, please contact me at 271-0660 or [bkernen@des.state.nh.us](mailto:bkernen@des.state.nh.us).

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	LN#	LNNAME	ST#	ROAD	TOWN	MAP	PARCEL	DCOMP	USE	REASON	TYFE	TOTD	BDKD	CASING	YTM	YTD	YTO	SWL	DMEAS	OB	NOTE
1		LITCHFIELD HIGH SCHOOL		ALBUQUERQUE	LITCHFIELD			17-Sep-99	6	1	2	70	62	1	2	40	35	15-Sep-99	12-1-1		
2		LITCHFIELD HIGH SCHOOL		ALBUQUERQUE ROAD	LITCHFIELD			28-Jun-00	6	1	2	90	82	3	3	40	34	29-Jun-00	1-2-3-1-12	SN	
3		SMITH	1	BAYBERRY LANE	LITCHFIELD			20-Jul-98	6	1	6	38	33	2	10	8	22	21-Jul-99	3-1-2-1	YL SN	
4		NEGARITY	2	BAYBERRY LANE	LITCHFIELD			6-May-99	6	1	5	37	30	2	8	15	19	6-May-99	4-1-4-1-4	SN	
5		BONNETT	4	BAYBERRY LN	LITCHFIELD			29-Jul-97	6	1	2	44	41	2	8	25	12	29-Jul-97	1-1	SN DL	
6		G FRANCOUER INC		BIRCH ST	LITCHFIELD			26-Jul-84	1	1	1	145	10	20	3	1	25	5	26-Jul-84	12	SN
7		G FRANCOUER NC		BIRCH ST	LITCHFIELD			29-Aug-84	1	1	1	305	15	20	3	1	2	5	30-Aug-84	1	YL
8		G FRANCOUER INC		BIRCH ST	LITCHFIELD			9-Oct-84	1	1	1	125	17	23	3	1	40	5	9-Oct-84	1-2	YL
9		NORRIS	1	BONISA AVE	LITCHFIELD	20	74	13-Feb-88	1	2	6	75			2	3	12	60	13-Feb-88	1	YL
10		SEMPL	14	BRANDY CIR	LITCHFIELD		14-9	25-May-97	6	1	2	25			22	2	10	40	6	25-May-97	4-1-1
11		ANTHONY DIONNE		BRANDY CIR	LITCHFIELD			1-Aug-97	1	1	1	500	34	43	3	1	10	11-Aug-97	1	SN	
12		SEMPL	14	BRANDY CIRCLE	LITCHFIELD			25-May-97	6	1	2	25			22	2	10	30	6	25-May-97	4-1
13		HARDY	6	BRIARWOOD	LITCHFIELD			25-Jun-97	6	1	2	24			22	2	10	40	3	25-Jun-97	1-1-4
14		BRANCO	3	BRIARWOOD LANE	LITCHFIELD			21-May-99	6	1	6	44			41	2	8	20	15	21-May-99	2-1-1
15		DUROCHER	3	BRIARWOOD LN	LITCHFIELD			6-Dec-97	6	1	2	38			35	2	10	25	16	6-Dec-97	1
16		TIBERT	2	BRIARWOOD LN	LITCHFIELD			1-Apr-98	6	1	2	40			37	2	10	15	18	1-Apr-98	1
17		HOVEY	3	CAMPBELL DR	LITCHFIELD	7	49	20-Apr-93	1	2	1	205	95	105	3	2	5	0	20-Apr-93	1-4	SN
18		DOYLE	11	CAMPBELL DR	LITCHFIELD	7	53	29-Mar-95	1	1	1	100	80	97	3	0.83	100			1	
19		RICE	14	COUNTRY LN	LITCHFIELD			8-May-96	6	1	6	45			40	8	25	20	8-May-96	4-1	SN
20		GAUTHIER ENT	1	JOSIAH DR	LITCHFIELD	9	100	14-Nov-91	1	1	1	242	50	60	3	0.8	5			3	
21		GARTHER ENT BLDG CONTR	9-Jul	JOSIAH DR	LITCHFIELD	6	77	19-Dec-93	1	1	1	165	50	60	3	0.5	35	6	19-Dec-93	124	
22		KANE	3	JOSIAH DR	LITCHFIELD	9	99	13-Dec-93	1	1	1	125	35	50	3	0.5	45	3	13-Dec-93	1	
23		RAND	4	JOSIAH DR	LITCHFIELD	9	97	15-Dec-93	1	1	1	120	68	80	3	0.5	15	6	15-Dec-93	124	
24		HAL-GOR REALTY TRUST	5	JOSIAH DR	LITCHFIELD	9	106	19-Jul-95	1	1	1	185	48	60	2	8	12	8	20-Jul-95	1	
25		CIVITERES	13	KOKOKEHES DRIVE	LITCHFIELD			23-Apr-00	6	1	6	53			50	2	10	10	33	23-Apr-00	1-4-1
26		CHARBONNEAU	5	LAUREL ST	LITCHFIELD			23-Oct-97	1	2	1	260	12	30	3	1	7.5	20	25-Jul-97	12	SN
27		DIONNE	6	LEARY DRIVE	LITCHFIELD			26-Jul-99	1	1	1	620	18	35	3	0.3	4	15	29-Jul-99	1	
28		BRIGGS	7	MULBERRY	LITCHFIELD			12-Jul-96	6	1	6	40			36	10	15	25	12-Jul-96	4-1	YL
29		LEPROHON	2	MULBERRY LN	LITCHFIELD			1-May-97	6	1	2	40			35	2	10	12	17	1-May-97	1-1-4
30		CONTINENTAL PAVING CO		OFF WOODHAWK RD	LITCHFIELD			25-Mar-97	8	5	1	300	65	86.5	3	1	0.5			12-4	SN
31		SCHOFIELD	6	PARKER CIRCLE	LITCHFIELD	10	146	17-Jan-91	1	1	1	505	50	60	3	1	4	25	17-Jan-91	4	
32		MARTIN	4	SATA WAY RD	LITCHFIELD	11	74	9-Nov-87	1	2	1	265	80	90	3	2	7	20	10-Nov-87	1	YL
33		MORIN	2	SPARROW COURT	LITCHFIELD	007	0076	25-Jun-99	1	2	1	240	76	90	3	1	30			1-2-3	YL
34		WILSON	5	SPARROW CT	LITCHFIELD			7-Apr-97	1	1	2	30			27	2	10			2	
35		LATSHA	128	TALENT	LITCHFIELD			9-Apr-98	6	1	2	40			35	2	10	15	8-Apr-98	1	SN CM:POINT WELL
36		BOUCHARD		TALENT RD	LITCHFIELD			15-Mar-84	1	1	1	165	10	22	3	1	5	15	16-Mar-84	2	SN
37		OLSON	61	TALENT RD	LITCHFIELD	7	32	20-Sep-84	1	2	1	305	49	60	3	1	1	21	20-Sep-84	1	
38		ESPANA BLDG & DEVEL INC		TALENT RD	LITCHFIELD		LOT 106-1	12-Dec-88	1	1	1	185	8	20		1	40	10	12-Dec-88	4	
39		HOMES BY PARADISE	55	TALENT RD	LITCHFIELD	7	29	14-Jan-94	1	1	1	160	25	40	3	0.5	7	20	17-Jan-94	1-4	YL
40		LAMBERT	15	TALENT RD	LITCHFIELD	3	45	15-Jul-94	1	1	1	400	18	40	3		15			12	
41		ESSEGIAN	119	TALENT RD	LITCHFIELD			22-Jul-97	6	1	2	60			60	3	1.5	60		2	
42		SCAFIDI	123	TALENT RD	LITCHFIELD			9-Sep-97	6	1	2	102			102	3	1	20		2	
43		DICEY	126	TALENT RD	LITCHFIELD			26-Jul-97	6	1	2	50			47	2	8	20	8	26-Jul-97	1-1-4
44		HUNT	124	TALENT RD	LITCHFIELD			8-Jun-98	6	1	5	37			33	2	1.5	7	18	8-Jun-98	3-12
45		LYNCH	131	TALENT RD	LITCHFIELD			24-Apr-98	6	1	2	33			30	2	10	20	18	24-Apr-98	1
46		SHANER	140	TALENT RD	LITCHFIELD			27-Aug-97	1	1	2	30			27	2	0.5	8		2	SN CM:POINT WELL
47		JEFFREYS	138	TALENT RD	LITCHFIELD			25-Sep-97	6	1	2	29			27	2	8	20	18	25-Sep-97	1-1-4
48		HINKLEY	121	TALENT RD	LITCHFIELD			20-Sep-97	6	1	2	22			20.5	2	8	15	16	20-Sep-97	1-1-4
49		KING	109	TALENT RD	LITCHFIELD			31-May-97	6	1	2	50			47	2	8	20	7	31-May-97	1-1-4
50		FERLAN	122	TALENT RD	LITCHFIELD			31-May-97	6	1	2	40			35	2	8	16	31-May-97	1-1-4	SN
51		RUSSELL	137	TALENT RD	LITCHFIELD	8	324	4-Nov-97	1	2	1	500	90	100	3	1	80	10	5-Nov-97	1	YL
52		MCNEILL	113	TALENT RD	LITCHFIELD			24-Apr-98	6	1	5	29			26	2	1.5	10	15	24-Apr-98	12-12
53		MOLINARI	122	TALENT RD	LITCHFIELD			13-May-98	1	1	1	250	81	100	3	2.5	4	19	14-May-98	1	SN
54		VIOLA	28	TALENT RD	LITCHFIELD			8-Sep-97	1	1	1	405	95	95	3	0.5	8			4	
55		LAW	29	TALENT RD	LITCHFIELD			1-Feb-94	1	1	1	420	22	40	3	0.5	2	15	5-Feb-94	3	YL
56		LEARY	55	TALENT RD	LITCHFIELD	4	40-1	26-Sep-94	1	1	1	250	38	53	3		30			12	
57		HOMES BY PARADISE	29	TALENT RD	LITCHFIELD	7		14-Jan-94	1	1	1	140	20	30	3	0.5	10	20	17-Jan-94	1-4	YL
58		SHUMSKY	62	TALENT RD	LITCHFIELD	7		5-Jul-91	1	1	1	225	28	40	3	1	4	30	5-Jul-91	1	
59		DEMANCHE	97	TALENT ROAD	LITCHFIELD		31	14-Apr-87	1	2	1	505	30	40	3	3	1.25	25	15-Apr-87	1	YL
60		DAMPHOUSSE	117	TALENT ROAD	LITCHFIELD			11-Aug-99	6	1	6	60			55	2	10	9	28	11-Aug-99	1-4-1
61		KANHAI-SINGH		WOODHAWK WAY	LITCHFIELD	8	165	26-Jun-98	6	1	6	49			45	2	10	30	7	25-Jun-98	1-4-1-4
62		CONSUMERS WC-DUCHARM		WOODHAWK WAY	LITCHFIELD	8	124	24-Jun-85	3	1	2	90			70	2	48	650	15.8	22-Jun-85	1-12-1
63		DUTTON	9	WOODHAWK WAY	LITCHFIELD			15-Apr-87	1	1	1	100	91	98	3	2	10	35	15-Apr-87	1	SN
64		VARRIEUR	21	WOODHAWK WAY	LITCHFIELD			28-May-98	6	1	2	54			52	2	10	10	35	28-May-98	4-1
65		MAKI		WRENN ST	LITCHFIELD			15-Oct-98	6	1	5	53			49	2	5	15	25	15-Oct-98	1
66		IARROBINO	32	WRENN ST	LITCHFIELD			17-Jun-96	6	1	2	111			110	3	1.5	20	40	17-Jun-96	1-14-12
67		LANDRY	19	WRENN ST	LITCHFIELD			9-May-97	1	1	2	95			95	3	2	100			
68		MILLER	37	WRENN STREET	LITCHFIELD			20-May-98	6	1	6	62			57.75	2	10	30	11	20-May-98	3-4-1
69		MATHIEU	33	WRENN STREET	LITCHFIELD			18-Jun-00	6	1	0	50			47	2	10	10	22	18-Jun-00	1-1-1
70		BLAKADAR	38	WRENN STREET	LITCHFIELD			1-Apr-00	6	1	6	50			41	2	10	10	25	1-Apr-00	4-1

ATTACHMENT 2  
DARRAH POND AQUIFER STUDY SUMMARY  
December 17, 2009

Darrah Pond is located in approximately the center of a sand and gravel aquifer which is called the Darrah Pond Aquifer. The pond is categorized as a "kettle hole" pond because there are no surface water bodies that flow into or out of the pond. This means that the amount of water in the pond is directly related to: 1) the water level of the underlying aquifer; 2) the interconnection of the aquifer with the pond; 3) amount of direct precipitation received; and 4) the amount of water lost to evaporation or direct water withdrawals. The perimeter of the pond is surrounded by homes, ball fields, a play ground, and a horse farm. Some of the shoreline of the pond is very shallow, meaning that 10-20 feet of shoreline can be exposed for every vertical foot decline in water level. There is a very limited amount of natural habitat surrounding the pond.

There are two large community water supply wells located within the Darrah Pond Aquifer. Both supply wells are located approximately 1800 feet downgradient (south) of the pond. These wells were installed between 1983 and 1985 and have been in use since that time. This means that these withdrawals are not subject to the current large groundwater withdrawal permitting process established by RSA 485-C, RSA 485:3, and associated administrative rules. These laws and rules only apply to groundwater withdrawals constructed after July 1998. The two wells, the pond, and the aquifer are all located within the political boundaries of the Town of Litchfield. There is also third community water supply well in Litchfield, but this well is not located within the Darrah Pond Aquifer.

The three community water supply wells in Litchfield were originally installed by Consumer's Water Company and the Southern New Hampshire Water Company and were used to provide water to the Towns of Hudson and Litchfield. Hudson purchased the wells and associated infrastructure (water mains, pumping stations and storage facilities) from the Southern New Hampshire Water Company. Currently, Hudson owns the three wells, associated facilities, and major water transmission mains. Pennichuck Water Works, Inc. (PWW) owns much of the distribution system within Litchfield. PWW also owns two small interconnected systems in Pelham and Windham. PWW is under contract to Hudson to operate and maintain the three wells and the distribution system in Hudson. The overall water system has a connection to PWW's Nashua system at Taylor Falls, and therefore has a fourth source of water via PWW's surface water treatment facility. The cost of water obtained from the surface water source, however, is significantly higher than that of the water obtained from the three groundwater wells.

In the fall of 1999, representatives of the New Hampshire Department of Environmental Services (NHDES) received complaints from a pond resident regarding the low water levels in Darrah Pond. Prior to 1999, NHDES does not have any record of receiving reports about low water levels. NHDES visited Darrah Pond in 1999, and observed the low water levels. NHDES also visited other ponds in the area, and noted that the water levels in these ponds appeared to be at normal levels despite the summer drought. At the time of the site visit, it was speculated that the groundwater influenced pond was affected by both the drought of the previous summer and, possibly, the two wells described above. NHDES advised the residents to observe any changes in the pond to determine whether the water level recovered after the winter season.

Attachment 2 (continued)  
Darrah Pond Aquifer Study Summary  
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On March 8, 2000, NHDES received a phone call from a pond resident who again complained of low water levels despite the recent heavy rains and snowmelt from that winter. A representative of NHDES visited the site again on April 10, 2000 and noted that the pond water level appeared to be low for the time of year based on: 1) an evaluation of the exposed shoreline and beach area of the pond; 2) an assessment of the elevation of docks relative to the elevation of the water level in the pond; 3) by analyzing water marks on a pillar and boat docks in the pond; and 4) by speaking with the Litchfield Conservation Commission and residents in Litchfield that are historically familiar with the pond. NHDES then reviewed the withdrawal history of the two wells in the Darrah Pond Aquifer. It was noted that withdrawal volumes from the wells from 1989 to 1994 averaged approximately 0.77 million gallons a day, and that from 1995 to 1999 withdrawal volumes averaged 1.02 million gallons per day (see Figure 1). This means that withdrawals from the wells increased by 25% or almost 100 million gallons per year.

On May 11, 2000, NHDES met with representatives from PWW and Mr. Paul Sharon, Hudson's Town Administrator. The purpose of the meeting was to initiate a discussion regarding the hydrologic relationship between the withdrawal of water from the two wells and the potential impacts of these withdrawals on the water levels in Darrah Pond. At this meeting, PWW proposed, and subsequently implemented an interim study to assess the relationship between extraction volumes of the two wells and the water level in Darrah Pond and the underlying aquifer. From July 13 through October 5, 2000, PWW collected pond and aquifer water level elevation data as it operated the two wells at three different extraction rates over a set period of time.

Upon receiving the initial results of the interim study, NHDES, the Town of Hudson, and PWW attended a Selectmen's meeting in the Town of Litchfield to update the town on efforts that were being implemented to assess the impacts of the withdrawals on the water level in Darrah Pond. After receiving all of the results of the interim study, NHDES determined that the pumping of the wells was significantly stressing the resources of the aquifer. During this time, NHDES also learned that the Town of Litchfield installed two new wells at a new high school located 1200 feet south of Darrah Pond, and that these wells were extracting approximately 57,000 gallons per day to irrigate the high school grounds. NHDES also learned during this process that the town operated an intake on Darrah Pond that was used to irrigate a recreational field.

NHDES requested that the Town of Hudson complete a thorough hydrogeologic assessment to determine the withdrawal volume that the Darrah Pond Aquifer could sustain, such that withdrawals from wells do not cause a violation of the surface water quality standards as defined by NH Admin. Rules Env-Ws 1700. The surface water quality rules include provisions to protect the designated use of surface water bodies including uses associated with recreation and ecological functions from any activity. NHDES provided Hudson a source water protection grant of \$15,000 that funded approximately 20% of this study. Hudson agreed to conduct the study and fund the remaining balance. NHDES also requested that the Town of Litchfield minimize water use at the high school and support PWW in promoting and enforcing outdoor water use restrictions to minimize demand from the two wells.

In March 2001, Hudson submitted a scope of work for the hydrogeologic analysis. A copy

Attachment 2 (continued)  
Darrah Pond Aquifer Study Summary  
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of the scope of work was provided to a representative on the Litchfield Conservation Commission. NHDES agreed with the scope of work and Hudson implemented the study. In March 2002, Hudson submitted the results of the safe-yield analysis. The report recommended capping withdrawals from the two wells at 0.79 million gallons per day, with a provision to withdraw up to 0.89 million gallons per day for periods of above average precipitation. This recommendation represented a 25%-35% (100-150 million gallons a year) reduction in extraction rates from the wells when compared to withdrawal volumes from the wells in 1998 and 1999 (see Figure 1). The proposed withdrawal limitations were also consistent with how the wells were operated in the early 1990s, when NHDES received no complaints about low water levels in the pond. Hudson also proposed implementing a water level monitoring program to measure how the aquifer and pond water levels responded to the reduction in withdrawal volumes.

The Town of Litchfield hired a consultant to review the recommendations of the report. Litchfield's consultant did not agree with the approach to completing the safe-yield study and the recommendations of the report. NHDES fully considered Litchfield's comments, but found that Hudson's proposed withdrawal restrictions were appropriate with the condition that the withdrawal volumes of the wells be evaluated annually after assessing the aquifer and pond water level monitoring. In making its final decision, NHDES also encouraged all stakeholders to pursue additional conservation/management activities immediately, and indicated that should future mitigation measures be necessary to maintain the water level of the pond, that each stakeholder would be expected to contribute in this effort by implementing the activities described below:

**Hudson/Litchfield/PWW**

- Begin addressing the issue of water demand for all water users in Litchfield and Hudson by educating its residents, as well as working with PWW to enforce outdoor water use restrictions. Also, both towns were encouraged to coordinate with developers and builders to design housing developments that are more water efficient than homes that currently exist.
- Begin identifying alternative sources of water; it was explained that regardless of extraction rates for the two wells, it is clear that Litchfield and Hudson will require additional water sources in the future as both towns complete their build out. It was noted that these alternative water sources could include new wells, increased purchases from PWW's Nashua system, and/or an interconnection with Manchester Water Works.

**Litchfield**

- Reduce water use at the high school, which withdraws approximately 57,000 gallons a day from new wells approximately 1200 feet from Darrah Pond for the purpose of maintaining turf at its facility.
- Reduce water use at the recreation field adjacent to Darrah Pond.

Attachment 2 (continued)  
Darrah Pond Aquifer Study Summary  
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**PWW**

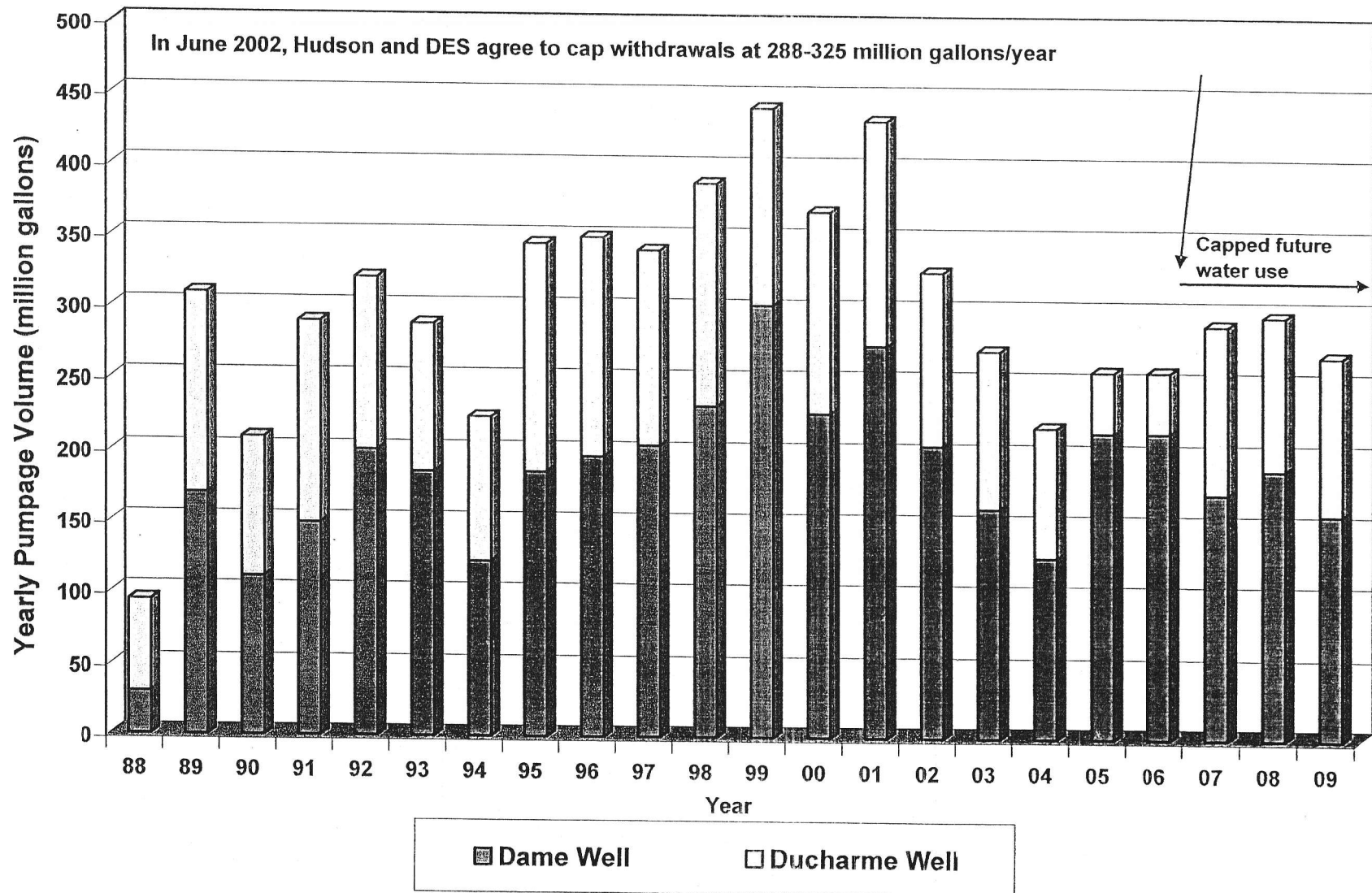
- As the operator of the water system in Litchfield, Hudson, and surrounding towns, use its authority under the regulations of the Public Utilities Commission to implement and effectively enforce water use restrictions for customers provided water from the Hudson-Litchfield system.

**Hudson**

- Reevaluate the effectiveness of the operational changes of the two wells based upon the results of the water level monitoring program, and if necessary, implement additional measures to ensure that the water level of the pond is maintained.

As for NHDES's regulatory authority in this matter, the current surface water quality rules (Env-Ws 1700) do contain criteria that protect the water level of the pond, but these rules do not define a specific process in which impacts are addressed. However, in the case of the low water level in Darrah Pond, Hudson voluntarily elected to establish a process with NHDES to assess and address impacts associated with the withdrawals. Hudson and PWW have worked in partnership with NHDES and Litchfield to address the occurrence of low water levels in the pond. Hudson has expended significant funds to study the problem, and then agreed to limit withdrawals from its wells which will ultimately lead to additional costs associated with developing new water supplies or purchasing water from adjacent water systems. PWW has also voluntarily supported this process and in doing so incurred many additional costs by manually modifying the operation of the wells to accommodate the hydrogeologic studies, and by making its water system operators available to collect water use and water level data. Except during times of drought, it is not anticipated that Darrah Pond will continue to experience low water levels. New Hampshire has experienced droughts in 1999, 2001, and 2002. In 2002, many surface water bodies reported record low water levels, even in areas where there are no water withdrawals. However, if water levels in the pond continue to be a problem, NHDES will request that all stakeholders (Hudson, PWW, and Litchfield) contribute to the solution. A collective approach to mitigating the problem would be required because there are so many interrelated factors that cumulatively impact the water level in the pond (water use from private and public wells, impervious surfaces associated with rapid development, increased water demand from rapid development in Litchfield and Hudson, and inefficient water use).

**FIGURE 1: HISTORIC PUMPING VOLUMES FROM THE DARRAH POND AQUIFER BY HUDSON**



Source: NH Department of Environmental Services

Attachment 3 - Response to Specific Questions Raised by Litchfield in a Letter Dated  
October 8, 2009 and December 7, 2009

**Comment 1)** *"The Town should be copied on all correspondence involved in any request or decision involving the consumption of Darrah Pond and must be a participant in the decision making process."*

**Response:** The Department has copied Litchfield on all of its correspondences pertaining to this project. The Department has also provided Litchfield a copy of a letter from Hudson regarding changes in the extraction rates from the Dame and Ducharme Wells. Litchfield was involved in the review and decision making process associated with the Darrah Pond safe-yield study in 2002. The results of this study imposed limitations on the use of the Dame and Ducharme Wells that are still in effect at this time. If these limitations are re-evaluated at a future date in response to water level measurements, Litchfield will have an opportunity to participate in this process.

**Comment 2)** *"The Town of Hudson's request for an increase in consumption is based on "above average precipitation", providing back-up in the form of a table which supposedly shows the "historical 45-year average rainfall at the Nashua Airport for the months of June, July, and August". Darrah Pond is not located in Nashua and rainfall varies from town to town. Data from the Nashua Airport may have no bearing on actual rainfall in the Town of Litchfield. The provided data itself, recognizes that there was below average precipitation this past August (and probably for September). Whatever rainfall may have occurred months ago in Nashua has no rationale bearing on current rainfall in Litchfield."*

**Response:** The Nashua Airport is located approximately five miles from Darrah Pond. Although the weather station is not located in Litchfield, its proximity to Darrah Pond is sufficient for a reasonable estimate of long-term precipitation trends. Environmental professionals routinely rely on metrological data from the nearby weather station(s) when completing these sorts of assessments. This is standard practice and is, in our judgment, a reasonable approach.

**Comment 3)** *No guidelines are provided as to how a determination of "above average precipitation" is to be made: i.e, the time frame to be used, where the precipitation is to be measured and the amount that is considered "above average" etc.*

**Response:** In response to Hudson's request to increase withdrawal rates from 0.79 MGD to 0.89 MGD in its letter dated September 9, 2009, the Department clearly specified in its response that the determination of above or below average must be based on the amount of precipitation that occurred the prior three months as compared to historical precipitation values for the same time period.

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Dame and Ducharme Wells  
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**Comment 4)** *"Moreover, while it is understood that some "trigger" must be used for monitoring consumption, the "precipitation barometer" is not an appropriate sole determinant as discussed below." "Perhaps the greatest concern to the Town of Litchfield and the Litchfield Conservation Commission is the primary reliance of "approved daily consumption levels" and "precipitation" as determinants of appropriate Darrah Pond consumption rather than the level of the pond itself. In theory, if the Town of Hudson abides by the "approved daily consumption levels," whether 0.79 or 0.89 million gallons per day, Darrah Pond could be drained dry-or to a completely unsafe level for the ecosystem in the pond-without abatement. In theory, if there is "above average precipitation" although the precipitation increase may have no real relationship to the level of the pond: Darrah Pond may not, necessarily, rise proportionately to an increase in precipitation-may not the amount of precipitation, at different times and/or with different underground influences on the pond, have different influences on the actual level of the pond?"*

**Response:** The Department described its rationale for approving the current production volumes for the Dame and Ducharme Wells in its letter dated June 21, 2002 (Attachment 1) which approved the Safe Yield Study conducted by the Town of Hudson. This letter also describes the fact that there are many stresses affecting the water level of the pond. For this reason, the letter describes the additional measures that Hudson, Litchfield and Pennichuck will each need to take if the elevation of the water level in the pond during a non drought period became unacceptable in the future.

**Comment 5)** *"The letter closes by suggesting that increased consumption is safe because the Town of Hudson "is also committed to continuing to monitor well data based on collection requirements set forth by the DES" Where are these wells that the Town of Hudson is monitoring? Has the DES approved these wells as being reasonably located? Should not a neutral party from the DES be conducting the well monitoring and/or the Town of Litchfield at least be allowed to participate in the process? The Town of Litchfield should be provided a map of the well sites that are used (and otherwise available) for monitoring and, if not handled by the DES, Litchfield should be involved in the monitoring process going forward."*

**Response:** Please refer to the document titled "Final Report - Dame and Ducharme Well Safe Yield Study" dated March 14, 2002, which contains the detailed information regarding the location of the wells. The Department will inspect water level monitoring or conduct the measurements itself if: 1) It determines additional data is necessary to assess impacts to the pond; or 2) There is reason to believe that measurements collected by others are inaccurate or otherwise warrant verification. By copy of this letter, the Department

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Dame and Ducharme Wells  
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requests that Hudson contact Litchfield to accompany them when water level measurements are being completed if desired.

**Comment 6)** *"The 2002 DES Safe Yield Study, and underlying analyses of that study, also recognized the importance of grounding proper Darrah Pond consumption in the actual water level of the pond. Yet, in the recent exchange of correspondence between the Town of Hudson and DES, no information was offered concerning the actual pond level and the actual pond level was not even discussed. How could the determination of proper consumption, and the Town of Hudson's request for increased consumption, even be considered without regard to this information?"*

**Response:** The actual pond level and the effect of pumping on the pond was considered and continue to be. The Department's letter dated June 21, 2002 describes the rationale for establishing appropriate extraction volumes from the Dame and Ducharme Wells on a long-term average basis. This approach was determined during the safe-yield study and verified through monitoring in 2003. Water level data collected from wells and surface water on June 12th and August 28th were transmitted by Hudson to the Department on August 28, 2009. This data demonstrated that the water level elevations in the aquifer and the pond exceeded average conditions.

**Comment 7)** *The town requested an opinion from DES regarding the applicability of RSA 482-A:21 relative to displacing water from Darrah Pond.*

**Response:** It is the opinion of the Department, that RSA 482-A:21 regulates the dredging or filling of lands underlying public water bodies below their natural mean high water level. It does not apply to the withdrawal of water from a water body or to fluctuations in water level caused by groundwater withdrawals.

**Comment 8)** *The town requested precipitation data and water level monitoring collected over the past three months.*

**Response:** The Town of Hudson did not complete the water level monitoring it voluntarily offered to complete in its letter dated September 9, 2009. The Department required intense water level monitoring from 2001-2003 as part of its concurrence with the safe yield study. Hudson has stated that it will collect a round of water level measurements in December 2009. The Department could coordinate with Litchfield to collect additional water level measurements in the future in order to ensure water level data continues to be collected and to directly address Litchfield's concerns.

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The Town of Hudson has been monitoring precipitation trends. On November 3, 2009, Hudson reduced average daily withdrawal rate from the Dame and Ducharme Wells back to 0.79 MGD as the amount of precipitation that occurred over the prior three months was below rolling historic three month precipitation average. Because the demand of the water system decreases in the winter months, the average withdrawal rate from the Dame and Ducharme Wells will not exceed 0.79 MGD even if above average precipitation occur.

# **EXHIBIT “B”**



State of New Hampshire  
DEPARTMENT OF ENVIRONMENTAL SERVICES

6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095  
(603) 271-3503 FAX (603) 271-5171



August 4, 2003

Thomas J. Sommers, P.E.  
Town of Hudson  
12 School Street  
Hudson, New Hampshire 03051

**Subject: Sustainable Yield Study – Weinstein Well**

Dear Mr. Sommers:

As requested by you in a letter dated March 21, 2003, the New Hampshire Department of Environmental Services (DES) has reviewed the report titled "Final Report – Weinstein Well Sustainability Yield Study" dated February 28, 2003 and has the following comments:

1. *Sustainable Yield/Adverse Impacts:* The report concludes that the Weinstein Well and aquifer are capable of a sustainable yield of approximately 1.1 million gallons per day and indicates that the withdrawal could be increased so long as it does not exceed 400 million gallons per year. However, the report indicates a significantly lower historic withdrawal rate averaging only 238 million gallons per year or 0.65 million gallons per day over the past 10 years of operation. Existing data supports the continued operation of the Weinstein Well at its current extraction volume. However, DES is concerned that the report's recommendation of increasing extraction volumes from the Weinstein Well by 70% (from 0.65-0.70 million gallons per day (mgd) to 1.1 mgd) may result in adverse impacts to existing water users and water resources. While it may be possible to extract more water from the Weinstein Well on a continuous basis, an increase of this magnitude may contribute to the partial and/or periodic dewatering of wetlands, streams, and private wells.

Current large groundwater withdrawal regulations, which require that the impacts associated with new withdrawals be identified and mitigated apply to withdrawals from wells established after July 1998, and therefore does not apply to the Weinstein Well. However, if an increase in the extraction volume of the well causes adverse impacts to water resources, this would trigger a violation of surface water quality standards (Env-Ws 1700) which are applicable to any activity affecting surface waters. DES recommends that any significant increase in the withdrawal amount occur only after a thorough study of impacts to water resources and existing water users is completed. This study should incorporate the impacts associated with other competing water users in the aquifer. Existing large groundwater regulations, although not applicable to the Weinstein Well, provide a methodology the Town can follow to evaluate impacts associated with increasing the extraction rate. An alternative

Thomas J. Sommers, P.E.  
Weinstein Well  
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approach for evaluating the impact of increasing withdrawal volumes would be to establish an environmental monitoring program that measures the response of representative water users and resources over time to changes in the extraction rate of the well. Through this analysis, the Town can determine the volume of water that may be extracted that does not adversely impact existing water users or resources. This type of analysis could also confirm the estimated sustainable capacity of the well which has been estimated in the report based on limited measurements made during well re-development. The Town would likely need to replace the background monitoring well 6 which was reportedly damaged to complete such an assessment. The installation of additional monitoring reports may also be necessary to measure the response of groundwater and surface water levels to increases in the withdrawal rate in areas where representative water resources exist.

2. *Estimate of Transmissivity*: The equation used on page 7 to estimate transmissivity applied the well pumping rate used during well development. It is recommended that the average well pumping rate for the month of October 2002 be utilized instead because it was this pumping rate that caused the change in drawdown used in this equation. It is not anticipated that this change, however, would substantially alter the recharge area delineated in the report.
3. *Boring Logs*: Please submit copies of the boring logs associated with the boreholes advanced for the monitoring wells.

Should you have any questions, please do not hesitate to contact me at 271-0660 or [bkernen@des.state.nh.us](mailto:bkernen@des.state.nh.us).

Sincerely,



Brandon Kernen, PG  
Hydrologist  
Water Supply Engineering Bureau

cc: J. Boisvert, Weston and Sampson  
F. Byron, Town of Litchfield  
A. Singelakis, Nashua Regional Planning Commission  
S. Densberger, Pennichuck Water Works  
J. Boisvert, Weston and Sampson  
R. Mann, DES

# **EXHIBIT “C”**

Text

[illegible]

1. Wheeling rate charged to Hudson for water wheeled through PEU system to northern Hudson by PEU is the same wheeling rate charged to PEU by Hudson.