BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF WATER TO WATER RIGHT NOS. 36-02551 AND 36-07694	)	**CM-DC-2011-004**
	)	
	)	**FINAL ORDER REGARDING RANGEN, INC.'S PETITION FOR DELIVERY CALL; CURTAILING GROUND WATER RIGHTS JUNIOR TO JULY 13, 1962**
(RANGEN, INC.)	)	
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	)	
	)	

The Director ("Director") of the Idaho Department of Water Resources ("Department") finds, concludes, and orders as follows:

FINDINGS OF FACT

I. Procedural Background

1. On December 13, 2011, Rangen, Inc. ("Rangen") filed a *Petition for Delivery Call* ("Petition") with the Department alleging that it is not receiving all of the water it is entitled to pursuant to water right nos. 36-02551 and 36-07694, and is being materially injured by junior-priority ground water pumping in the areas encompassed by the Enhanced Snake Plain Aquifer Model Version 2.0 ("ESPAM 2.0"). *Petition* at 3-4. The Petition requested the Director administer and distribute water in the areas encompassed by ESPAM 2.0 in accordance with the prior appropriation doctrine and to curtail junior-priority ground water pumping as necessary to deliver Rangen's water. *Id.* at 7.

2. In response to the Petition, the Department assigned the contested case proceeding docket number CM-DC-2011-004.

3. On January 4, 2012, the Idaho Ground Water Appropriators, Inc. ("IGWA") petitioned to be designated as a respondent or alternatively to intervene in the proceeding. IGWA represents ground water districts whose members consist of irrigators, municipalities, and commercial and industrial entities with ground water rights. Many of the ground water districts' member's water rights are junior to Rangen's water rights and could be curtailed if Rangen is successful in its delivery call. The Director granted IGWA's petition to intervene on January 13, 2012.

4. On May 21, 2012, the City of Pocatello ("Pocatello") petitioned to be designated as a respondent or alternatively to intervene in the proceeding. Pocatello is a municipality with ground water rights junior to Rangen's water rights and could be curtailed if Rangen is successful in its delivery call. The Director granted Pocatello's petition to be designated as a respondent on May 29, 2012.

5. On July 24, 2012, A&B Irrigation District, American Falls Reservoir District #2, Burley Irrigation District, Milner Irrigation District, Minidoka Irrigation District, North Side Canal Company and Twin Falls Canal Company (collectively, the "Surface Water Coalition" or "SWC") petitioned for limited intervention in the proceeding for the purpose of addressing the application of ESPAM 2.0 in the Rangen delivery call. The water delivery entities comprising the SWC hold senior surface water rights on the Snake River and filed a separate delivery call against junior ground water users. The Department employed a previous version of ESPAM to determine the effects of ground water pumping on the SWC's senior priority water rights. The Director granted the SWC's petition for limited intervention on August 14, 2012.

6. On August 14, 2012, Buckeye Farms, Inc. ("Buckeye") petitioned for limited intervention in the Rangen proceeding for the purpose of addressing the application of ESPAM 2.0. Buckeye argued that it has several surface water rights downstream from Rangen and should be allowed to participate in the proceeding because "[f]uture conjunctive administration involving Buckeye's senior surface water rights will involve ESPAM 2.0." *Buckeye Farms, Inc Petition for Limited Intervention* at 3. On August 21, 2012, both IGWA and Pocatello filed responses in opposition to Buckeye's petition. The Director denied Buckeye's petition on September 11, 2012, stating Buckeye's petition was untimely and that Buckeye's limited interests are adequately represented by existing parties. *Order Denying Buckeye Farms, Inc.'s Petition for Limited Intervention* at 2-3.

7. On August 21, 2012, Fremont-Madison Irrigation District ("Fremont-Madison") petitioned to be designated as a respondent or alternatively to intervene in the proceeding. The Director granted Fremont-Madison's petition to be designated as a respondent on September 11, 2012, concluding Fremont-Madison meets the definition of a respondent according to the Department's rules of procedure because Fremont-Madison is an irrigation district that diverts ground water from the Eastern Snake Plain Aquifer ("ESPA") and could be curtailed if Rangen is successful in its delivery call. *Order Designating Freemont-Madison a Respondent* at 1.

8. Several dispositive motions were filed prior to the hearing. Rangen filed a *Motion for Partial Summary Judgment Re: Material Injury* on January 9, 2013. The motion was disposed of by an *Order Denying Rangen, Inc.'s Motion for Partial Summary Judgment Re: Material Injury* issued April 24, 2013.

9. Rangen filed a *Motion for Partial Summary Judgment Re: Source* on March 8, 2013, which was disposed of by an *Order Granting In Part and Denying in Part Rangen, Inc's Motion for Partial Summary Judgment Re: Source* issued on April 22, 2013.

10. Pocatello filed a *Motion for Declaratory Order Regarding Rangen's Legal Obligation to Interconnect* on March 8, 2013. The motion was disposed of by an *Order Denying*

City of Pocatello's Motion for Declaratory Order Re: Rangen's Legal Obligation to Interconnect issued on April 23, 2013.

11. The hearing on Rangen's delivery call commenced on May 1, 2013, at the Department's State Office in Boise, Idaho. The hearing concluded on May 16, 2013. The hearing was bifurcated. The first part of the hearing focused on issues of material injury and beneficial use and the second part of the hearing focused on issues related to ESPAM 2.1.[1]

II. History of the Rangen Facility

12. Rangen started business in 1925. Courtney, Vol. I, p. 53. The company was formally incorporated in 1935 and has been in business for over 88 years. *Id.* Aquaculture is one of the company's business enterprises. *Id.*

13. Rangen owns and operates a fish research and propagation facility ("Rangen Facility") in the Thousands Springs area near Hagerman, Idaho. Courtney, Vol. I, p. 55. Rangen Exhibit 1005[2] is a schematic diagram of the Rangen Facility and is attached as Attachment A. The Rangen Facility is situated below a canyon rim at the headwaters of Billingsley Creek. *Id.* Torlief Rangen began construction of the Rangen Facility in 1962. *Id.* at 62.

14. The Rangen Facility was developed in stages. Courtney, Vol. I, p. 61. The facility started with a series of concrete channels for fish rearing, now commonly referred to as the "small raceways" and the "large raceways," and a hatch house for incubation of fish eggs. Rangen Ex. 1014; Courtney, Vol. I, pp. 60, 66. Rangen also constructed some earthen ponds for fish rearing and holding. The facility was expanded in 1976, when additional raceways, now referred to as the "CTR raceways," were constructed. Courtney, Vol. I, p. 61. In approximately 1992, the greenhouse was added to the back of the hatch house to expand Rangen's hatching and research capabilities. *Id.* Other buildings were added over time, but their addition is not relevant to this proceeding.

15. Rangen first filed a delivery call in September of 2003, seeking to curtail junior-priority ground water users. In February of 2004, a previous Director of the Department, Karl Dreher, ordered curtailment of all ground water rights in Water District 130 with priority dates junior to July 13, 1962 (the priority date of Rangen's water right no. 36-02551). *Order* at 26 (Feb. 25, 2004). However, ESPAM model version 1.0 was released shortly thereafter. Based on the curtailment predictions of ESPAM 1.0, Director Dreher withdrew his curtailment order, concluding instead that the Rangen delivery call was futile. *Second Amended Order* at 28 (May 19, 2005).

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[1] As described later in this order, ESPAM 2.0 was updated shortly before the hearing commenced. The latest version is referred to as ESPAM 2.1.

[2] All references to "Exhibit" or "Ex." in this order refer to exhibits from the administrative hearing in this matter.

III. Source of Water and Diversions

16. Immediately east of the Rangen Facility, water emanates from numerous springs on the talus slopes just below the canyon rim. Water also emanates from what is called the "Martin-Curren Tunnel" or "Curren Tunnel." The tunnel is a large, excavated conduit constructed high on the canyon rim and extends approximately 300 feet into the canyon wall. Tate, Vol. IV, p. 911. The first 50 feet of the tunnel is supported by a corrugated metal pipe approximately 6 feet in diameter. Brendecke, Vol. IX, p. 2039. The remaining 250 feet of the excavation is an open tunnel unsupported by any structure. *Id.* The main tunnel bifurcates into two tunnels approximately 150-200 feet into the tunnel from its mouth. *Id.*; IGWA Ex. 2328. The record does not clearly establish when the tunnel was built, but the tunnel predates the construction of the Rangen Facility.

17. A concrete collection box located near the mouth of the Curren Tunnel collects water for delivery to Rangen and holders of early priority irrigation water rights via pipelines. Pocatello Ex. 3651. The concrete box is commonly referred to as the "Farmers' Box." Since 2002, the water historically diverted by the senior-priority irrigation water right holders has been replaced with surface water delivered by the Sandy Pipeline. Sullivan, Vol. VI, p. 1345; Brendecke, Vol. IX, p. 2081. Currently, only Rangen diverts from the Farmers' Box, but senior priority irrigation water right holders may call for delivery of water from Curren Tunnel in the future.

18. Further down the talus slope is a second concrete water collection box with an open top, commonly referred to as the "Rangen Box." Rangen rediverts the water from the Farmers' box through two plastic pipes down to the Rangen Box. Sullivan, Vol. VII, p. 1661. Water is then delivered from the Rangen Box via a 12-inch diameter steel pipe to the small raceways. *Id.* The water diverted by Rangen can then be routed from the small raceways down through the large and CTR raceways. *Id.* Rangen Exhibit 1292, a picture showing the two collection boxes and the distribution piping, is attached as Attachment B. Water can also be spilled out the side of the Rangen Box and returned to the talus slope.

19. In the early 1980's, Rangen built a 6-inch white PVC pipeline to divert water from inside the Curren Tunnel and deliver the water to the hatch house and greenhouse buildings. The water is used in the hatch house and/or greenhouse and then can be discharged either back into Billingsley Creek or discharged directly into the small raceways and used in the large and CTR raceways. Sullivan, Vol. VI, p. 1336.

20. The main diversion for the large raceways is located downstream from the talus slope, where the defined channel for Billingsley Creek begins. Sullivan, Vol. VI, p. 1336. This Rangen diversion is commonly referred to as the "Large Raceway Diversion" or "Bridge Diversion." The Bridge Diversion collects and diverts the spring flows that arise on the talus slope below the Curren Tunnel and water spilled from the Rangen Box. *Id.*

IV. Rangen Water Rights

21. Rangen holds five water rights for the Rangen Facility. The five water rights have been decreed through the Snake River Basin Adjudication ("SRBA"). Rangen's decreed water rights are summarized as follows:

ELEMENTS OF RANGEN, INC.'S WATER RIGHTS					
WATER RIGHT NO.:	36-00134B	36-00135A	36-15501	36-02551	36-07694
PRIORITY DATE:	Oct. 9, 1884	Apr. 1, 1908	July 1, 1957	July 13, 1962	Apr. 12, 1977
SOURCE:	Martin-Curren Tunnel Tributary: Billingsley Creek	Martin-Curren Tunnel Tributary: Billingsley Creek	Martin-Curren Tunnel Tributary: Billingsley Creek	Martin-Curren Tunnel Tributary: Billingsley Creek	Martin-Curren Tunnel Tributary: Billingsley Creek
QUANTITY:	0.09 cfs[3]	0.05 cfs	1.46 cfs	48.54 cfs	26.0 cfs
DIVERSION POINT:	T07S R14E S32 SESWNW	T07S R14E S32 SESWNW	T07S R14E S32 SESWNW	T07S R14E S32 SESWNW	T07S R14E S32 SESWNW
PURPOSE AND PERIOD OF USE:	Domestic (0.07 cfs) 01-01 to 12-31 Irrigation (0.09 cfs) 03-15 to 11-15	Domestic (0.05 cfs) 01-01 to 12-31 Irrigation (0.05 cfs) 03-15 to 11-15	Fish Propagation (1.46 cfs) 01-01 to 12-31	Domestic (0.10 cfs) 01-01 to 12-31 Fish Propagation (48.54 cfs) 01-01 to 12-31	Fish Propagation (26.0 cfs) 01-01 to 12-31
PLACE OF USE:	Domestic T07S R14E S31 SENE S32 SWNW Irrigation T07S R14E S31 SWNE 2 SENE 4 S32 SWNW1 (7 acres total)	Domestic T07S R14E S31 SENE S32 SWNW Irrigation T07S R14E S31 SWNE 2 SENE 4 S32 SWNW 1	Fish Propagation T07S R14 E S31 SENE S32 SWNW	Domestic T07S R14E S31 SENE S32 SWNW Fish Propagation T07S R14E S31 SENE S32 SWNW	Fish Propagation T07S R14E S31 SENE S32 SWNW

[3] Cubic feet per second.

22. Water right nos. 36-00134B and 36-00135A are for irrigation and domestic purposes. They are not for fish propagation.

23. Water right nos. 36-15501, 36-02551, and 36-07694 authorize a total, cumulative diversion of 76.0 cfs for fish propagation. The priority dates associated with the three fish propagation water rights are July 1, 1957, July 13, 1962 and April 12, 1977, respectively.

24. Rangen alleges that it "is not receiving all of the water to which it is entitled pursuant to decreed water rights nos. 36-02551 and 36-07694." *Petition* at 3. Rangen does not allege injury to water right nos. 36-00134B, 36-00135A, and 36-15501. *Id.*

25. The source for water right nos. 36-02551 and 36-07694 is the Martin-Curren Tunnel, which is commonly referred to as the Curren Tunnel. Rangen Ex. 1026; Rangen Ex. 1028. The point of diversion for both water rights is described as the 10 acre tract: SESWNW T07S R14E S32. *Id.*

26. On March 8, 2013, Rangen filed a *Motion* and *Brief in Support of Motion for Partial Summary Judgment Re: Source* ("Source Brief"). Rangen sought a ruling that it is entitled to judgment as a matter of law as follows: (1) the source for water rights 36-02551, 36-07694, and 36-15501 is surface water, not ground water; and (2) its delivery call "is not limited only to water from the mouth of the Martin-Curren Tunnel itself." *Source Brief* at 2. Rangen stated that IGWA and Pocatello "contend that Rangen's water rights at issue are ground water rights (as opposed to surface water) and that Rangen can only call for water discharging from the mouth of the Martin-Curren Tunnel itself and not the entire spring complex that supplies Rangen's Research Hatchery." *Id.* at 2-3.

27. On the issue of source, the Director reviewed the SRBA decrees and concluded the decrees were not ambiguous:

> Water right nos. 36-2551, 36-7694, and 36-15501 were decreed in the SRBA with the following Source element: Martin-Curren Tunnel, tributary to Billingsley Creek. ... The fact that the source and tributary are named demonstrate that the rights were decreed from a surface water source. *See* [IDAPA 37.03.01.060] ("For surface water sources, the source of water shall be identified . . . . The first named downstream water source to which the source is tributary shall also be listed. For ground water sources, the source shall be listed as 'ground water.'"). Consistent with [IDAPA 37.03.01.060], listing a source and tributary for surface water rights, and only "ground water" for ground water rights, was the custom and practice in the SRBA. In 1997, Rangen's Martin-Curren Tunnel water rights were partially decreed. The partial decrees were entered pursuant to Idaho Rule of Civil Procedure 54(b). No appeal has ever been taken. The plain language of Rangen's partial decrees from the SRBA show that Martin-Curren Tunnel is unambiguously surface water.

Order Granting in Part and Denying in Part Rangen, Inc.'s Motion For Partial Summary Judgment Re: Source ("Order on Summary Judgment") at 4 (April 22, 2013).

28. The Director also concluded that previous Idaho Supreme Court decisions already decided that the source of the Martin-Curren Tunnel is surface water. *Order on Summary Judgment* at 4. The Idaho Supreme Court case *Musser v. Higginson*, 125 Idaho 392, 871 P.2d 809 (1994), involved a delivery call by water users other than Rangen with water rights from the Martin-Curren Tunnel. The Court in *Musser* specifically described the source as "springs." *Musser* at 394, 871 P.2d at 811. Spring water users are considered surface water users, not ground water users. *Clear Springs Foods, Inc. v. Spackman*, 150 Idaho 790, 804, 252 P.3d 71, 85 (2011) ("The Spring Users are not appropriators of ground water . . . [t]hey are appropriators of surface water flowing from springs."). The Court in *A&B Irr. Dist. v. Idaho Dept. of Water Res.*, had cause to discuss the *Musser* Court's characterization of the source and recognized that the Martin-Curren Tunnel is considered surface water. *A&B Irr. Dist. v. Idaho Dept. of Water Res.*, 153 Idaho 500, 509, 284 P.3d 225, 234 (2012)(Concluding that the Court in *Musser* could not have opined on the application of the Ground Water Act because the call was "between senior spring users and junior ground water users.")

29. Based on the above conclusions, the Director granted summary judgment to Rangen on the issue of source. *Order on Summary Judgment* at 7.

30. On the second issue, the Director again started with the SRBA decrees:

> The point of diversion element decreed by the SRBA district court unambiguously limits diversion to T07S R14E S32 SESWNW. Therefore, by the unambiguous terms of its SRBA partial decrees, Rangen is not authorized to divert water from sources outside T07S R14E S32 SESWNW. Without a water right that authorizes diversion outside T07S R14E S32 SESWNW, Rangen cannot call for delivery of water from sources located outside its decreed point of diversion. IDAPA 37.03.11.001 ("rules prescribe procedures for responding to a delivery call made by the holder of a senior-priority surface or ground water right) (emphasis added); 37.03.11.010.25 (defining "water right" to mean "[t]he legal right to divert and use . . . the public waters of the state of Idaho where such right is evidenced by a decree . . . .").

Order on Summary Judgment at 6 (emphasis in original).

31. However, summary judgment was not granted to any party on the issue of the point of diversion because questions of material fact remained related to how water is diverted by Rangen from the Curren Tunnel. *Id.* 6-7.

V. Water Measurements

32. Rangen has measured the flows through the Rangen Facility since 1966. Ramsey, Vol. III, p. 617; Rangen Ex. 1075. Since 1995, Rangen has been required by the Department to measure the flows through the Rangen Facility and report the measurements annually to the watermaster. IDWR Staff Memorandum, Ex. 3203, p. 13.

33. The water that flows through the Rangen Facility is measured at two different locations, the CTR raceways and the lodge pond dam.[4] Maxwell, Vol. I, p. 269; Rangen Ex. 1074. Rangen's measurements at the CTR raceways and the lodge pond dam, summed together, quantify all inflow that is tributary to Billingsley Creek upstream from those measurement locations, except for diversions to the senior irrigation rights from the Farmers' Box. Courtney, Vol. I, p. 142. Irrigation return flows sporadically discharge into Billingsley Creek above the lodge dam measurement point. Rangen is not able to beneficially use these irrigation return flows, but the irrigation return flows are included in Rangen's measurements. *Id.*, pp. 142-143. Rangen measures the flows weekly. *Id.*, p. 270. The weekly measurements from the CTR raceways and the lodge pond dam are summed for reporting purposes. Maxwell, Vol. I. p. 281; Rangen Ex. 1094. Rangen also measures flows weekly at the large raceways, but the large raceways measurement data are not reported to the watermaster. Maxwell, Vol. I., p. 278.

34. To determine the flow of water in the CTR raceways, Rangen employees measure the depth of water (head) flowing over wooden check board dams in each raceway using a ruler placed on top of the board. Maxwell, Vol. I, pp. 270-273. This method of measuring head with a ruler on top of the board is commonly referred to as "sticking the weir." Sullivan, Vol. XI, p. 1387. Rangen employees clean the upper board in each multi-board dam prior to measuring the head to prevent error from moss accumulation. Erwin, Vol. I, p. 249. Rangen also inspects the upper dam board to ensure that the board is centered and flush. Maxwell, Vol. I, pp. 273-274. Rangen uses the same procedure to measure head at the lodge pond dam.

35. Frank Erwin, who has been watermaster for Water District 36 for more than 16 years, observed Rangen employee Dan Maxwell measuring water three or four times. Erwin, Vol. I, p. 249. Erwin stated Maxwell did "a good job" and that Maxwell "probably does a little better job at it than I would be able to do." *Id.*, p. 245. He stated that Rangen sends him annual reports of their water measurements and that he has never had an issue with any of Rangen's measurements. *Id.*

36. Wooden check board dams are considered nonstandard measurement devices and are not listed as an acceptable measuring device in the Department's *Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices*. Yenter, Vol. III, p. 557; IDWR Staff Memorandum, Ex. 3203, p. 59; Luke, Vol. V, pp. 1134-1135. Roughness, rounding, and sagging in wooden check boards can cause measurement error. Sullivan, Vol. VI, pp. 1408-1409.

37. Although wooden check board dams are considered nonstandard measuring devices, the Department historically accepted measurements using these structures because the Department's standards allow an accuracy of +/- 10% for open channel measuring devices when compared to measurements using standard portable measuring devices. The Department's experience is that flows rates derived by treating wooden check board dams as weirs generally

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[4] The Department has measured the flow from the mouth of Curren Tunnel since 1993. The Curren Tunnel flow data are not used by the watermaster to determine the overall flows through the Rangen Facility, as most water that emanates from the Curren Tunnel is counted either at the measurement in the CTR raceways or at the lodge pond dam.

provide an accuracy of +/- 10%. Yenter, Vol. III, p. 567; IDWR Staff Memorandum, Ex. 3203, p. 13; Luke, Vol. V, pp. 1139,1140, 1168.

38. Two questions were raised related to Rangen's measurements. The first question is whether Rangen historically under-measured its flows because Rangen was using an incorrect rating table. The second question is whether United States Geological Survey ("USGS") flow measurements downstream from the Rangen Facility are a more accurate representation of historic flows through the Rangen Facility and should be relied upon in this proceeding.

39. The Francis equation for a standard suppressed rectangular weir with full bottom contraction is $Q=CLH^{3/2}$ where the weir coefficient "C" is 3.33, and:

Q=flow rate in cubic feet per second
L=length of the weir crest in feet
H=head of water over the weir crest in feet

40. Each weir type has a unique weir coefficient and relates the measurement of the head on the weir to the flow rate over the weir. Brockway, Vol. IV, p. 935. A wooden check board dam employed by Rangen is considered a suppressed weir with a nonstandard weir blade. *Id.*

41. After measuring the head over the wooden check board dams, Rangen employees consult a rating table and identify the flow value corresponding to the measured head for each raceway. By referring to a rating table, a water user can determine flow rates based solely upon the head of water over the weir without calculating the flow with a weir equation. The values in a rating table should be derived either from a weir equation or from direct measurements of discharge and head at numerous flow rates.

42. Historically, Rangen has used at least two different rating tables. It is not clear how Rangen's rating tables were derived. The accuracy of Rangen's original and revised rating tables was an issue discussed extensively at the hearing. The parties, including Rangen, agree that there are problems with the original and the revised rating tables.

43. If compared to the Francis equation, the weir coefficient implicit in Rangen's original rating table varied with the depth of water over the weir crest. Pocatello Ex. 3345, p. 18. Prior to December 1998, Rangen's rating table implied a weir coefficient that averaged between 3.27 and 3.40. *Id.*

44. Sometime between December 1998 and July 2003, Rangen revised its rating table. Pocatello Ex. 3345, p. 18. Between December 1998 and July 2003, there are no measured head data available with which to determine the implicit average weir coefficient. *Id.* Starting in July 2003 through the present, the available measurement data suggest that the revised table had an equivalent weir coefficient in the range of 3.05 to 3.09. *Id.*

45. When the head over a wooden dam board exceeds approximately two times the width of the board crest, the nappe, or the sheet of water flowing over the top of the dam board, begins to "spring" from the front edge of the dam board, and simulates the physical "springing"

of water across a sharp crested weir blade. Brockway, Vol. IV, pp. 955-958. The width of Rangen's dam boards is 1 and 5/8 inches. Two times 1 and 5/8 inches is 3 and ¼ inches. The vast majority of Rangen's head measurements exceeded 3 and ¼ inches, more than two times the dam board width. *Id.*, p. 959. Rangen's wooden dam boards act like a standard suppressed sharp-crested weir. *Id.*, p. 959. Without actually calibrating the measurement of flows over the nonstandard dam boards, the best approximation of a correct flow computation for measurements of head at Rangen's wooden check board dams, would be to use the Francis formula with the standard suppressed sharp-crested weir coefficient of 3.33. Brockway, Vol. IV, pp. 959, 962.[5]

46. In 2003, the Department evaluated Rangen's measurements in connection with Rangen's previous delivery call. Department employees measured flows at the large and CTR raceways and the lodge pond dam by "sticking the weir." Department employees measured a combined total discharge of 18.69 cfs for the CTR raceways and the lodge pond dam. Rangen Ex. 1129, p. 3. The day prior to the Department's measurement, Rangen employees measured a combined total discharge of 17.52 cfs for the CTR raceways and the lodge pond dam, a difference of 1.17 cfs, or a difference of approximately -6%. *Id.*, p. 12.

47. The employment of a nonstandard measuring device and the under-reporting of flow rate values due to the uncalibrated rating table is cause to review other available flow rate measurement values. The USGS periodically measures Billingsley Creek flows at a site just downstream of the Rangen Facility. Sullivan, Vol. VI, pp. 1414-1415. The USGS derives flow values by measuring velocities across the creek's flow profile and by multiplying each measured velocity by a cross sectional area to compute the flow rate in each individual cross sectional area using a current meter. The flow rates for each area are summed, resulting in a total flow rate. The method described above is considered a standard method of water measurement, is listed as an acceptable measuring method in the Department's *Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices,* and is employed to calibrate the accuracy of weirs and other measuring devices. USGS flow measurements are widely accepted as accurate and objective measurements.

48. When a USGS hydrographer measures flow rates, the hydrographer assigns a quality rating to the measurement. Sullivan, Vol. VI, p. 1423. This is a quasi-quantitative rating of the quality of the measurement. Various factors are considered in rating the measurement. The USGS quantifies the standard error[6] associated with each rating. The highest rating assigned to measurements in Billingsley Creek below the Rangen Facility is "good," abbreviated by the letter "G." When a measurement is rated "G," the estimated standard error is plus or minus 5%. A lesser rating of "fair" is abbreviated by the letter "F." When a measurement is rated "F," the estimated standard error of the measurement is plus or minus 8%. *Id.* at 1424. The lowest rating is "poor," abbreviated by the letter "P." When a measurement is rated "P," the estimated standard error of the measurement is greater than 8%. *Id.* The abbreviation "U" means the measurement was unrated and means that, for some reason, the hydrographer didn't assign a

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[5] Brockway derived a weir coefficient for measuring flows discharging over splash board dams at another fish propagation facility. The other facility's weir coefficient was 3.68. Brockway distinguished the other facility's weir coefficient from the standard 3.33 value by observing that the head measurements over the dam board at the other facility were near or below two times the width of the dam board, resulting in a larger coefficient.

[6] A standard error of 5% means there is a 68% probability that the true measurement is within plus or minus 5% of the true value. Sullivan, Vol. VI, p. 1423.

rating. *Id.* Most of the USGS measurements in Billingsley Creek below the Rangen Facility are rated as "good" or "fair" measurements. The rating of measurement conditions may be "fair" because, as discussed in the IDWR staff memorandum, flow and/or cross-sectional conditions are less than ideal. IDWR Staff Memorandum, Ex. 3203, p. 65.

49. Rangen presented evidence that there is a small drain that discharges into Billingsley Creek between where Rangen measures flows from the Rangen Facility and where the USGS measures flow in Billingsley Creek. This drain sometimes carries irrigation return flows to the creek. Sullivan, Vol. VI, p. 1419. However, the record does not support a finding that these return flows affected the USGS measurements because the USGS generally measures the flow in Billingsley Creek during the non-irrigation season. *Id.*

50. Pocatello compared the USGS measurements taken downstream from Rangen with Rangen's reported flows closest to the date of the USGS measurement. Pocatello's expert, Greg Sullivan, testified that comparison of Rangen's reported flows with flows measured by the USGS below the Rangen Facility show a systematic under-measurement of Rangen's flows, especially since 1980. Sullivan estimated the measurement error to be 15.9% based on the comparison of 45 measurements by the USGS between 1980 and 2012. Sullivan, Vol. VI, pp. 1428-1429; Pocatello Ex., p. 3349.

51. In addition, Sullivan derived a weir coefficient for the Rangen Facility by solving the standard weir equation for the weir coefficient using 14 of the USGS flow measurements and Rangen head measurements made nearest in time. Sullivan derived an average weir coefficient of 3.62. Sullivan, Vol. VI., pp. 1438-1439.

52. The Director finds, based upon clear and convincing evidence, that Rangen's use of a nonstandard measuring device with an inaccurate rating curve has resulted in under-reporting of flows at the CTR raceways and Rangen's lodge pond dam.

VI. Historical Spring Flows

53. Notwithstanding Rangen's use of inaccurate rating tables and under-reporting of its flows, it is clear that spring flows in the area of the Curren Tunnel have declined significantly. IDWR Staff Memorandum, Ex. 3203, p. 2. In 1966, Rangen's reported hatchery flows averaged 50.7 cfs. Rangen Ex. 1075. In 2012, spring complex flows averaged just 14.6 cfs. *Id.* If one redetermines Rangen's reported flows using Pocatello's estimated measurement error of 15.9% since 1980, the declines in flow rate from the Rangen springs have been dramatic. Even if the 15.9% correction is applied to the 2012 spring complex discharge, flows declined by over 33 cfs between 1966 and 2012.

54. Discharge from the mouth of Curren Tunnel has been measured by the Department since 1993. Pocatello, Ex. 3650, p. 5. The measured discharge does not include flow in the 6-inch PVC pipe. The sum of the tunnel discharge and flow in the 6-inch PVC pipe represents the flow available from the Curren Tunnel source. Rangen began submitting flow data for the 6-inch PVC pipe to the Department in 1996. Sullivan used data available from1996 through 2011 to extrapolate Curren Tunnel flows prior to 1996. *Id.* Sullivan estimated the

average annual tunnel flow in 1966 was 32.1 cfs.[7] Pocatello, Ex. 3650, Table A-5. By 2011, the average annual tunnel flow had declined to 4.4 cfs. *Id.*, Table A-1.

55. There is no single reason for the decline in flow. Several anthropogenic activities on the Eastern Snake Plain caused reductions in spring flows near Rangen and throughout the Thousand Springs complex. These activities included diversion of ground water from wells, reduction in incidental recharge because of increased delivery and application efficiencies for surface water irrigation, and reductions in incidental recharge because of an overall reduction in surface water delivered for irrigation of the Eastern Snake Plain. Reduction in natural recharge derived from precipitation has also contributed to declines in spring flow. Because the Rangen spring complex is hydraulically connected to the ESPA, it is clear that ground water pumping has contributed to the decrease in discharge, but other activities have also contributed.

VII. Effects of Declining Flows on Rangen

56. Rangen argues that its ability to conduct research has been hindered because of reduced spring flows. Ramsey, Vol. III, p. 691; Kinyon, Vol. II, pp. 452,460; Rangen Ex. 1161. An important aspect of the Rangen Facility is its research. Rangen conducts experiments at its facility to: (a) improve its commercial fish food, (b) treat or prevent disease, and (c) improve its fish rearing (husbandry) techniques. Because of lower flows, Rangen is not able to conduct all the desired experiments. Ramsey, Vol. III, pp. 692-693. Rangen would conduct more research if the flows were higher. Kinyon, Vol. V, p. 1183.

57. Pocatello argues that, historically, most of Rangen's experiments have been conducted inside the hatchhouse and greenhouse, not outside in the raceways, and that outside experiments in production ponds do not generate reliable data. Woodling, Vol. VI, pp. 1239-1240. Pocatello references a Rangen analysis suggesting that more reliable data could be generated from studies in the greenhouse as opposed to the outside raceways. Woodling, Vol. VI, p. 1246. Rangen's response to this argument is that its clients want experiments in outdoor raceways in a production-type setting, not a laboratory setting, and that Rangen would conduct experiments in the outdoor raceways if more water were available. Ramsey, Vol. III, pp. 697-698. For example, Rangen testified it would experiment with fishmeal replacements. Kinyon, Vol. V, p. 1185; Ramsey, Vol. V, p. 1197. Rangen testified to numerous other studies it would undertake. Kinyon, Vol. V, pp. 1184-1186; Ramsey, Vol. V, pp. 1198-1199.

58. Pocatello also argues that if Rangen wants to undertake outside studies, it should modify the way it conducts raceway studies and initiate fish tagging studies instead. Woodling, Vol. VI, pp. 1249-1250. Pocatello suggests Rangen would then need only two raceways and would gather better data. Pocatello recognizes that its suggested alternative study method would require much more manpower to complete, but suggests Rangen can find volunteers with the Idaho State Fish and Game or Idaho Power Company ("Idaho Power").

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[7] Pocatello's Ex. 3650, Table A-5 is based on Rangen's reported values for flow in the CTR raceways and lodge pond dam. The values in Table A-5 do not incorporate Pocatello's correction of Rangen's reported values based on comparison with the USGS data.

59. Rangen also argues that its ability to raise more fish has been hindered because of the reduced flows. Tate, Vol. IV, pp. 867-868. There currently is sufficient water available to the hatchery and the greenhouse to raise more fish should Rangen desire to do so. Tate, Vol. IV, p. 894. The bottleneck for raising more fish is the outside raceways. Rangen has sufficient water to operate the small raceways during some parts of the year but not others. *Id.*, p. 895. Rangen could open up the other raceways and add more fish if it had more water. Tate, Vol. IV, pp. 868, 905-906. Furthermore, while the water may be sufficient to satisfy its existing contractual obligations, Rangen would raise more eggs in the hatchhouse than are currently being raised if it had more water in other parts of the facility to put those fish, when the fish are grown out. Ramsey, Vol. III, p. 719.

60. Rangen argues that it employs many fewer people now than it once did. Kinyon, Vol. II, p. 452. There may be multiple reasons for a reduction in employees, including a slump in the fish hatchery industry. Church, Vol. VIII, pp. 1965, 1974.

VIII. Rangen's Use of Water

61. Rangen currently raises fish for commercial processing, research, and for public sale to fish pond operators and others. Kinyon, Vol. II, p. 474. Since 2004, Rangen has also contracted with Idaho Power to raise trout. Rangen Ex. 1141. Idaho Power stocks the fish in the Middle Snake River and American Falls Reservoir. Kinyon, Vol. II, p. 422. Raising fish for restocking is commonly referred to as raising fish for conservation purposes, and the fish are commonly referred to as conservation fish. The timing and the way Rangen raises the fish for Idaho Power is dictated primarily by the contract with Idaho Power. Kinyon, Vol. II, p. 478; Maxwell, Vol. II, p. 316; Tate, Vol. IV, p. 860.

62. Because the fish for Idaho Power are being raised for conservation purposes (as opposed to being raised for processing), Rangen is contractually required to satisfy specific flow and density indexes when raising the fish. Kinyon, Vol. II, p. 482. A flow index is a measurement of the relationship between the number and size of fish and the flow rate of water in a rearing space. The density index is a measurement of the relationship between the number and size of fish and the available rearing volume of water. Ramsey, Vol. III, p. 721; Smith, Vol. IV, p. 812. The Idaho Power's contract requires that Rangen employ a specific flow index so that the ratio of flow to fish is higher than the ratio of flow to fish when raising fish for processing purposes. Similarly, the Idaho Power contract requires that Rangen employ a specific density index so that the ratio of volume of water to fish is higher than the ratio of volume of water to fish than might be used when raising fish for processing purposes. Requiring higher flow and density indexes is a standard industry practice when raising conservation fish because the goal is to produce fish that are better able to survive in the wild and are more physically attractive to anglers. Kinyon, Vol. II, pp. 482-483. Since contracting with Idaho Power, raising fish for Idaho Power has been the main focus of Rangen's fish production efforts. The Idaho Power contract governs the timing of Rangen's purchases of its fish eggs and Rangen's movement of fish from one rearing location to another through the facility. Rangen raises some extra fish beyond those required by the Idaho Power contract. Rangen sells these extra fish for processing and other purposes.

63. IGWA and Pocatello argue Rangen's use of water is unreasonable. First, they argue Rangen is not efficiently using its water, is not efficiently raising fish at the facility, and could be raising more fish if they would take advantage of peak spring flows. They assert Rangen could be raising more fish for the Idaho Power contract, even under the density index imposed through the Idaho Power contract, Rangen could be raising more fish. Rogers, Vol. VIII, p. 1829. They argue the lack of records related to dissolved oxygen suggests Rangen is not trying to maximize fish production. *Id.*, p. 1839. They suggest that Rangen's failure to maximize the number of fish it raises is unreasonable and constitutes waste. *Id.*, p. 1849. Furthermore, they argue Rangen could be taking steps to further aerate its water, so it could raise even more fish. *Id.*, p. 1840.

64. IGWA and Pocatello also argue that Rangen's use of the water is unreasonable because Rangen is not recycling the water it has already beneficially used to raise more fish. Rogers, Vol. VIII, pp. 1843, 1866. Recycling water would require a pump-back system or reconfiguring the present system for water delivery. *Id.* Prior to filing its delivery call, Rangen considered constructing a pump-back system but ultimately rejected the idea. Courtney, Vol. I, p. 113; Courtney, Vol. II, pp. 400-404; Rangen Ex. 1203. Raceways require continuous replenishment with fresh water. Courtney, Vol. II, p. 401. Interruption of this flow would result in the loss of fish and likely a significant monetary loss. *Id.* A pump-back system would require redundant power sources and pumps to ensure that a loss of power or a pump failure would not deprive fish of water, thereby killing the fish. Courtney, Vol. I, p. 112; Courtney, Vol. II, p. 401. The cost of building the pump-back system, without the redundant power sources and pumps, was estimated to be $116,000. Courtney, Vol. II, p. 403. The annual costs of operating the system run between $22,000 and $46,000. *Id.* Because of the significant costs to build the project, and other concerns about the issues of water quality and water temperature associated with a pump-back system, Rangen ultimately rejected the idea of a pump-back system. Courtney, Vol. I, p. 113. The cost of building redundant systems along with annual operating costs makes a pump-back system cost prohibitive.

65. Water must contain dissolved oxygen for fish to extract the oxygen through their gills. The minimum level of dissolved oxygen in water for rearing fish is approximately 5 to 5.5 parts per million. Smith, Vol. IV, p. 840; Rogers, Vol. VIII, p. 1828. Rangen maintains a dissolved oxygen level of approximately seven parts per million in the CTR raceways, which is at the bottom of its system. Maxwell, Vol. II, p. 320. The solubility of dissolved oxygen in the water varies because of water temperature and other factors, but a typical oxygen saturation level for water at the Rangen springs is nine parts per million. Rogers, Vol. VIII, p. 1828. IGWA and Pocatello suggest, because Rangen does not regularly measure the oxygen levels in its raceways, Rangen is not efficient in its operation. Rogers, Vol. VIII, pp. 1839-1843. They argue, if Rangen wanted to maximize its production, Rangen could further aerate its water as part of a pump-back system. *Id.*

66. Water depleted of dissolved oxygen can be aerated to restore the level of dissolved oxygen. Water can be aerated mechanically by injecting oxygen or by creating a head drop where water is exposed to oxygen in the atmosphere. Rangen does not mechanically inject oxygen. Smith, Vol. IV, p. 840. There are slight vertical drops within the Rangen Facility that provide some aeration. *Id.*

IX. Diversion Works

67. In 2004, Rangen hired SPF Water Engineering, LLC ("SPF") to evaluate a number of projects with the intent of improving Rangen's water supply. IGWA Ex. 2040. The evaluations were supportive technical information for grant funding applications from the Idaho Department of Commerce and Labor. *Id.*

68. SPF evaluated the possible construction of a new vertical ground water well near the upstream end of the Rangen raceways. IGWA Ex. 2040, p. 7. Ground water in a new well would have to be lifted more than 100 feet. *Id.* There were three concerns with this approach. The first concern was the pumping costs associated with lifting the water from the wells to raceways. *Id.*, pp. 7-8. The second concern was that this would require redundant systems to protect against a loss of water from failure of power or pumps. *Id.*, p. 8. The third concern was that, because of the ESPA moratorium on new appropriations, Rangen would not be able to obtain a new water right absent mitigation. *Id.*

69. A second option studied was the construction of a horizontal well at a lower elevation than the Curren Tunnel. IGWA Ex. 2040, p. 8. While SPF believed a horizontal well would increase flow to the Rangen Facility, it also believed that a horizontal well would likely decrease current discharge to the Curren Tunnel, to other springs in the vicinity of the Curren Tunnel and possibly to wells located on the rim above the Curren Tunnel. *Id.*

X. Eastern Snake Plain Aquifer

70. The ESPA is defined as the aquifer underlying an area of the Eastern Snake Plain that is about 170 miles long and 60 miles wide, excluding areas lying both south of the Snake River and west of the line separating sections 34 and 35, Township 10 South, Range 20 East, Boise Meridian. The ESPA is defined as an area having a common ground water supply. IDAPA 37.03.11.050.

71. The ESPA is highly productive and is composed predominately of fractured Quaternary basalt having an aggregate thickness that may, at some locations, exceed several thousand feet and generally decreases in thickness along the margins of the aquifer. The fractured Quaternary basalt is generally characterized by high hydraulic conductivity. The presence of interbedded sediments, a volcanic rift zone, and less permeable basalts result in lower hydraulic conductivity in some areas of the aquifer. Notable areas of lower hydraulic conductivity are in the vicinity of Mud Lake and in the Great Rift zone, which extends north to south across the plain from the Craters of the Moon to just west of American Falls Reservoir. These zones of lower hydraulic conductivity impede the transmission of water through the aquifer.

72. The ground water in the ESPA is hydraulically connected to the Snake River and tributary springs at various places and to varying degrees. One of the locations at which a direct hydraulic connection exists between the ESPA and springs tributary to the Snake River is in the Thousand Springs area. The amount of water that discharges from the aquifer to hydraulically

connected surface water sources is largely dependent on ground water elevations and hydraulic conductance.

73. Based on averages for the time period from October of 1980 through September of 2008[8], the ESPA receives approximately 7.7 million acre feet of recharge on an average annual basis from the following sources: incidental recharge associated with surface water irrigation on the plain (5.3 million acre feet), infiltration of precipitation on non-irrigated lands (0.7 million acre feet), underflow from tributary drainage basins (1.1 million acre feet), and seepage losses from rivers and streams (0.6 million acre feet). Rangen Ex. 1273A, Figure 8.

74. Based on averages for the time period from October of 1980 through September of 2008, the ESPA discharges approximately 8.0 million acre feet on an average annual basis through the Snake River and tributary springs (5.4 million acre feet), evapotranspiration in wetlands (0.1 acre feet), and ground water withdrawals (2.5 million acre feet). *Id.*

75. For the time period from October of 1980 through September of 2008, average annual discharge from the ESPA exceeded annual average recharge by approximately 270,000 acre feet, resulting in declining aquifer water levels and declining discharge to hydraulically connected reaches of the Snake River and tributary springs. *Id.*

XI. History of ESPA Model

76. The Enhanced Snake Plain Aquifer Model ("ESPAM") is a calibrated regional ground water model representing the ESPA. ESPAM version 1.0 ("ESPAM 1.0") was developed by the Department working in collaboration with the Eastern Snake Hydrologic Modeling Committee ("ESHMC"), a technical committee comprised of representatives of water user groups and government agencies. ESPAM 1.0 simulated the effects of ground water pumping from the ESPA on the Snake River and tributary springs.

77. In determining a previous Rangen delivery call to be a futile call using ESPAM 1.0, former Director Dreher determined that curtailment of water rights junior to July 13, 1962 would not result in a meaningful increase in the quantity of water discharging from springs in the vicinity of the Rangen Facility. *Second Amended Order*, p. 28 (May 19, 2005).

78. Following the previous Rangen delivery call, ESPAM 1.0 was superseded by a revised and recalibrated model version 1.1 ("ESPAM 1.1"). In *Clear Springs Foods, Inc. v. Spackman*, a delivery call proceeding instituted by Clear Springs Foods, ESPAM 1.1 was used to estimate the effects of ground water pumping on the springs in the Thousand Springs area, the name for the general geographic location where Rangen diverts water. The Idaho Supreme Court upheld the Director's application of ESPAM 1.1. *Clear Springs Foods, Inc. v. Spackman*, 150 Idaho 790, 814, 252 P.3d 71, 95 (2011).

79. In the Clear Springs Foods delivery call, a trim line was used to limit the area of curtailment simulated with ESPAM 1.1. The trim line was defined by model cells in which 10%

[8] Volumes were calculated from the ESPAM 2.1 water budget, which extended from 1980 to 2008. Rangen Ex. 1273A.

or greater of the curtailed use would result in benefits to the Buhl to Thousand Springs reach (the reach within which Clear Springs Foods diverted water) at steady state. Because much of the benefit to the Buhl to Thousand Springs reach would occur at locations other than Clear Springs Foods' point of diversion, the Department subsequently estimated that Clear Springs Foods would receive 6.9% of the benefit accruing to the Buhl to Thousand Springs reach. Therefore, the trim line applied in Clear Springs Foods limited curtailment to areas where Clear Springs Foods was predicted to receive at least 0.69% (6.9% of 10%) of the total benefits of curtailment at steady state.

80. In the Blue Lakes delivery call, a trim line was used to limit the area of curtailment simulated with ESPAM 1.0. The trim line was defined by model cells in which 10% or greater of the curtailed use would result in benefits to the Devil's Washbowl to Buhl reach (the reach within which Blue Lakes diverted water) at steady state. Because much of the benefit to the Devil's Washbowl to Buhl reach would occur at locations other than Blue Lakes Trout Farms' point of diversion, the Department subsequently estimated that Blue Lakes Trout Farms would receive 20% of the benefit accruing to the reach. Therefore, the trim line applied in the Blue Lakes delivery call limited curtailment to areas where Blue Lakes Trout Farm was predicted to receive at least 2% (20% of 10%) of the total benefits of curtailment at steady state.

81. In 2005, the ESHMC and the Department started working on updates to ESPAM 1.1. The revision to ESPAM 1.1 was referred to as ESPAM 2.0. The model was refined and re-calibrated with additional data. In particular, the model was calibrated using monthly water levels and flow targets, including measured spring discharges within 14 specific model grid cells. The springs captured and used by Rangen were measured throughout the model calibration period, and the monthly average spring discharge in the model cell where spring flows are captured by Rangen was a target for model calibration. The revision of the ESPAM was in progress when Rangen filed its Petition in December of 2011. The parties to this proceeding agreed to wait until the work on the updated model by the ESHMC was complete before going to hearing.

82. "During development of ESPAM 2.0, IDWR discovered that values from Covington and Weaver (1990) that were used to estimate discharge for Thousand Springs and springs in the Thousand Springs to Malad spring reach for calibration of ESPAM1.1 were inaccurate. These values were corrected in the calibration targets for ESPAM2.0. These corrections resulted in a significant decrease in the spring discharge target at Thousand Springs and a significant increase in spring discharge targets in the Billingsley Creek area." IDWR Staff Memorandum, Ex. 3203, p. 32. Because of these adjustments, Rangen challenged the previous determination of a futile call. The update to ESPAM 2.0 was the basis for Rangen's renewed delivery call.

83. The Director concluded that Rangen's request to apply ESPAM 2.0 to the delivery call was premature because the ESHMC had not yet completed its work on the revisions. *Prehearing Conference* (Jan. 19, 2011) (audio recording). The Director explained the remaining steps needed before ESPAM 2.0 would be ready to be applied in the proceeding. *Id.* The Director and the parties agreed to hold regular status conferences to receive reports on the status of ESPAM 2.0. *Order Continuing Prehearing Conference* at 1 (Feb. 1, 2012).

84. In July of 2012, the ESHMC determined that the calibration of ESPAM 2.0 was complete and recommended that the Department begin using ESPAM 2.0 rather than ESPAM 1.1 for ground water modeling. Email from Rick Raymondi to Gary Spackman, *ESPAM Version 2.0* (July 16, 2012). In response, an order was issued adopting ESPAM 2.0 for use in the Rangen delivery call. *Order Re: Eastern Snake Plain Aquifer Model and the Rangen, Inc. Delivery Call* at 1 (July 27, 2012). However, during the preparation of the final project report, data calculation mistakes were discovered in the model input data used for calibration. Email from Rick Raymondi to ESHMC members, *ESPAM Version 2* (Oct. 4, 2012). The model was re-calibrated in November 2012, resulting in the release of ESPAM 2.1. In January of 2013, the ESHMC endorsed the use of ESPAM 2.1 in place of ESPAM 2.0. Email from Rick Raymondi to Gary Spackman, *ESPAM2.1* (Jan. 16, 2013). ESPAM 2.1 was subsequently used by the Department and the parties in this proceeding to simulate the effects of ground water withdrawals on flows available to the Rangen Facility.

XII. ESPAM 2.1 is the Best Available Science

85. "ESPAM 2.1 is a numerical groundwater model that was developed for the purpose of determining the effects of groundwater pumping on discharge to spring and river reaches, such as the Rangen spring cell." IDWR Staff Memorandum, Ex. 3203, p. 2. "Numerical models are . . . the most robust approach for predicting the effects of groundwater pumping on surface-water discharge." *Id.* "ESPAM 2.1 is a regional groundwater model and is suitable to predict the effects of junior groundwater pumping on discharge at the Rangen spring cell because the spring discharge responds to regional aquifer stresses, and junior groundwater pumping is a dispersed, regional aquifer stress." *Id.* "ESPAM 2.1 . . . is an imperfect approximation of a complex physical system, but it is the best available scientific tool for predicting the effects of groundwater pumping on discharge at the Rangen spring cell and other spring and river reaches." *Id.*

86. ESPAM 2.1 was developed in an open, collaborative environment, with guidance from the ESHMC. During development of ESPAM 2.1, decisions regarding the conceptual model, modeling methods, and modeling data were presented to the ESHMC with opportunity for committee members to provide comments and suggest alternative approaches. *Id.*, p. 3. By developing the model in collaboration with the ESHMC, the Department benefitted from the input of a number of individuals with expertise in hydrology, geology, and ground water modeling.

87. The ESHMC is comprised of professionals working on eastern Snake Plain water issues. Regular members include agency representatives (Idaho Department of Water Resources, U.S. Bureau of Reclamation (USBR), U.S. Fish and Wildlife Service, U.S. Geological Survey (USGS)), industry representatives (Idaho Power), researchers (University of Idaho, Idaho Water Resources Research Institute), and private consultants (AMEC; Brockway Engineering, PLLC; HDR, Inc.; Leonard Rice Engineers, Inc.; Principia Mathematica, Inc.; Rocky Mountain Environmental Associates, Inc.; Spronk Water Engineers, Inc.; and others) representing water users on the eastern Snake Plain. Rangen Ex. 1273A, p. 2.

88. ESPAM 2.1 incorporates the spatial distribution of recharge and groundwater pumping, a large number of water level and aquifer discharge observations, regional-scale hydrogeology, and the transient response of aquifer discharge to spatially and temporally distributed recharge and pumping. *Id.*, p. 5.

89. ESPAM 2.1 answers the following questions relevant to the Rangen water call:

a. What is the effect of junior groundwater pumping within the ESPA on discharge at the Rangen spring cell?
b. What portion of curtailed groundwater use will accrue to the Rangen spring cell?
c. What portion of curtailed groundwater use will accrue to other spring cells?

90. During development of ESPAM2.1, model uncertainty was reduced through collaboration with the ESHMC and the use of model calibration tools. The ESHMC provided input on decisions about the conceptual model, calibration targets, and water budget input data. Id, p. 3, Exhibit 1273A.

91. The Department evaluated the predictive uncertainty of ESPAM 2.1 by repeatedly recalibrating the model and comparing predicted impacts from ground water pumping at eight different locations in the Eastern Snake Plain. Impacts were evaluated for two targets: Clear Lakes spring and the near Blackfoot to Minidoka reach of the Snake River. Exhibit 1277, p.5. The predictive uncertainty for Clear Lakes spring was not significant for each of the eight analyses. The largest predictive uncertainty with respect to Clear Lakes spring was noted for ground water pumping in the Big Lost River area. With alternative calibrations of the model, the predicted impact of ground water pumping in the Big Lost River area on spring discharge at Clear Lakes ranged from 3% of the pumping rate to less than 1% of the pumping rate. Id, p. 9. The predictive uncertainty for the near Blackfoot to Minidoka reach was not significant for pumping locations evaluated on the western side of the plain, but higher uncertainty in the near Blackfoot to Minidoka reach was noted for some pumping locations evaluated on the eastern side of the plain. Id, p. 12. Lack of water level data in the Craters of the Moon area and noise in the calibration target for the near Blackfoot to Minidoka reach may contribute to higher predictive uncertainty for pumping locations evaluated on the eastern side of the plain. *Id.* There is lower uncertainty on the western side of the Great Rift. There is generally higher uncertainty on the eastern side of the Great Rift, however impacts from several pumping locations evaluated on the eastern side of the Great Rift had negligible impacts on Clear Lakes.

92. Expert witnesses employed by Rangen testified that the ESPAM 2.1 development process resulted in a very robust model with good calibration results. Colvin, Vol. X, pp. 2403-2404; Brockway, Vol. X, pp. 2296 - 2327.

93. Expert witnesses employed by junior ground water users offered criticisms of using ESPAM 2.1 for administration of water rights. The following is a summary of the criticisms offered.

a. The time-constant transmissivity model does not adequately represent conditions in the ESPA aquifer, which is an unconfined aquifer where transmissivity may vary with time.

b. ESPAM 2.1 does not adequately represent detailed geologic features and groundwater flow direction in the immediate vicinity of the Rangen Facility.

c. Uncertainty in the water budget, particularly uncertainty in the spatial distribution of canal seepage within the North Side Canal Company service area, contributes to uncertainty in model predictions of impacts to spring flows in the Rangen model cell.

d. Interpretation of calibration results indicates that ESPAM 2.1 is biased toward over-predicting impacts to spring flows in the Rangen model cell.

e. It is not appropriate for the Department to use a regional model as a tool for the administration of water rights.

94. The experts criticizing use of ESPAM 2.1 did not offer reasonable alternatives to using ESPAM 2.1. IGWA's experts argued that "any application of ESPAM 2.1 must acknowledge and accept that there is an inherent and unquantifiable level of uncertainty in the predictions generated by the model." Brendecke, Vol. XI, p. 2741. IGWA's experts further argued that uncertainty could be acknowledged by discounting the prediction generated by the model, or by applying a zone of exclusion or trim line. Hinckley, Vol. X, pp. 2489-2498, Brendecke, Vol. XI, 2741-2743. However, IGWA's experts acknowledged that model uncertainty does not provide a definitive location for a trim line. Hinckley, Vol. XI, p. 2551.

95. Department staff and Rangen's expert witnesses responded to the above criticisms in the staff memorandum and testimony. The following is a summary of the responses offered.

a. ESPAM 2.1 uses time-constant transmissivity to approximate conditions in the unconfined ESPA aquifer. Time-constant transmissivity models of unconfined systems are common in practice, because calibrating models with variable transmissivity is generally not feasible with state of the art calibration tools. IDWR Staff Memorandum, Ex. 3203, p. 29. Employment of time-constant transmissivity is an accepted scientific practice for modeling aquifers where drawdown is generally expected to be less than 10% of the total saturated thickness. *Id.*, p. 5.

b. Although ESPAM 2.1 is a regional model that accounts for variation in geologic features within the constraints of a one-square-mile grid cell, ESPAM 2.1 was calibrated to observed monthly spring discharge in the Rangen model cell. These discharge data reflect local and regional geologic controls on hydrologic responses to ground water pumping and other aquifer stresses. IDWR Staff Memorandum, Ex. 3203, pp. 4, 28. Further, Dr. Brendecke explored the effects of changing the model to better represent local geologic detail and ground

water flow direction as discussed by Mr. Hinckley. Dr. Brendecke presented three alternative conceptual models (AMEC Model 1, AMEC Model 2, and the "composite model") that he asserted resulted in a "more realistic representation of the local hydrogeology" near the Rangen Facility. IGWA Ex. 2401, p. 42. The impacts of junior groundwater pumping on the model cell containing the Rangen spring predicted by AMEC Model 1 and AMEC Model 2 were very similar to the impacts predicted by ESPAM 2.1, and do not contradict the Department staff conclusion that ESPAM 2.1 is the best available tool for predicting the impacts of groundwater pumping on the Rangen spring cell. IDWR Staff Memorandum, Ex. 3203, p. 38; Wylie, Vol. XII, p. 2925; Colvin, Vol. X, p. 2412. The calibration method used in AMEC's "composite model" did not follow proper procedures. Wylie, Vol. XII, p. 2923. The quality of the calibration of the composite model was compromised. Colvin, Vol. X, pp. 2418-2419.

c. The ESPAM 2.1 calibration procedure allowed adjustment of several components of the water budget (including evapotranspiration, tributary underflow, recharge on non-irrigated lands, canal seepage, and non-Snake River seepage) within ranges of uncertainty determined by the ESHMC. The IDWR predictive uncertainty analysis incorporated the impact of uncertainty associated with these components of the water budget. IDWR Staff Memorandum, Ex. 3203, p. 10. Not all sources of uncertainty significantly impact every prediction. This is illustrated by the IDWR predictive uncertainty analysis, which incorporated the uncertainty associated with many of the components of the water budget and indicated that predictive uncertainty is low with respect to the response at the Clear Lakes spring cell. *Id.* Regarding the water budget in the North Side Canal Company service area, the ESPAM 2.1 water budget did simulate a reduction in incidental recharge over the calibration period, because the sum of incidental recharge and canal seepage in the North Side Canal Company service area is equal to recorded diversions less crop irrigation requirement and return flows. Canal seepage losses varied with time, because diversions varied with time. *Id.*, p. 33. Information to refine the spatial distribution of the canal seepage was not available to the Department during development of ESPAM 2.1.

d. Department staff disagree with the conclusion that calibration results indicate ESPAM 2.1 is biased to over-predict impacts to spring flows in the Rangen model cell. IDWR Staff Memorandum, Ex. 3203, pp. 39, 57. Mr. Hinckley's and Dr. Brendecke's arguments that the model is biased to over-predict impacts are based largely on comparison of model results with well and spring discharge data collected only after the year 2000. Ignoring data collected before 2000 compromises their interpretation. It is important to consider both older and more recent data to obtain the best representation of the physical system. IDWR staff memorandum, p. 37. The difference between recent low flow values and older historic values is the spring's response to changes in the aquifer water budget and is critical to the prediction of the impacts of ground water pumping. *Id.*, p. 57. Contrary to IGWA's arguments, evaluation of ESPAM2.1's calibration results, which under-predict the difference between

flows in the 1980s and the 2000s, suggests that the model would be more likely to under-predict the impacts of ground water pumping on spring flows in the Rangen cell. *Id.* IGWA's arguments are further contradicted by the results obtained from Dr. Brendecke's alternative model (AMEC Model 2), which he states "*appears to resolve the overprediction problem noted for ESPAM 2.1 in recent years.*" IGWA Ex. 2401, p. 45. AMEC Model 2 predicts a response of 18.0 cfs in response to curtailment within the model domain, which is slightly higher than the ESPAM 2.1-predicted response of 17.9 cfs. IDWR Staff Memorandum, Ex. 3203, p. 57.

e. It is appropriate for the Department to use a regional model as a tool for conjunctive administration of water rights, because the effect of junior ground water pumping within the Eastern Snake Plain, an approximately 11,000 square mile area, on spring discharge and river reaches is a regional-scale question that cannot be addressed with a small-scale, local model. IDWR Staff Memorandum, Ex. 3203, p. 4. ESPAM 2.1 was developed specifically to predict the effect of regional aquifer stresses such as ground water pumping on river reaches and springs, including the model cell containing the Rangen spring. *Id.*, p. 2. ESPAM 2.1 incorporates much more information about the aquifer than can be considered in other predictive methods available to the Department, and incorporates data that specifically reflect how spring discharge in the Rangen cell has responded to regional aquifer stresses in the past. *Id.*, p. 4. This is the reason that numerical models are recognized by the USGS as the most robust approach for predicting the effects of groundwater pumping on surface-water discharge. *Id.*, p. 2.

96. The criticisms raised in Finding of Fact 93 fail to persuade the Director that ESPAM 2.1 should not be used in this proceeding. The Director finds, based upon clear and convincing evidence, that ESPAM 2.1 is the best technical scientific tool currently available to predict the effect of ground water pumping on flows from springs located in the Rangen cell. The Director acknowledges that there is uncertainty in the model predictions, but disagrees with IGWA's conclusion that ESPAM 2.1 is biased toward over-predicting impacts to flows at the Rangen model cell.

XIII. Prediction of Impacts of Ground Water Pumping on Curren Tunnel Flow

97. ESPAM 2.1 predicts the effect of ground water pumping on the aggregate flows from springs located within the Rangen model cell, including but not limited to the Curren Tunnel. ESPAM 2.1 cannot distinguish the water flowing from the Curren Tunnel from water discharging from other springs within the model cell. Because Rangen's water rights only authorize diversion of water from the Curren Tunnel source, the historical relationship between Curren Tunnel discharge and total spring complex discharge must be used to predict the portion of the modeled effects that will accrue to the Curren Tunnel.

98. The Department has measured discharge from the mouth of Curren Tunnel since 1993. Pocatello, Ex. 3650, p. 5. The measured discharge does not include flow in the 6-inch PVC pipe. Rangen submitted flow data for the 6-inch PVC pipe to the Department beginning in

1996. *Id.* The sum of the measured tunnel discharge and flow in the 6-inch PVC pipe represents the flow available from the Curren Tunnel source.

99. Historically, the total spring complex discharge is the sum of the flow in Rangen's CTR raceways, Rangen's lodge pond dam, and irrigation diversions from the Farmers' Box. As described in Section V above, Rangen's use of a nonstandard measuring device with an inadequate rating curve has resulted in under-reporting of flows at the CTR raceways and Rangen's lodge pond dam.

100. In Pocatello Exhibit 3650, Figure 1, Pocatello's expert witness Greg Sullivan plotted data for measured Curren Tunnel flow rates on the "y" axis and data for measured total spring flows on the "x" axis, and performed a linear regression of the data. The resulting regression line represents the historic relationship between Curren Tunnel flow and total flow in the spring complex. The slope of the regression line in Exhibit 3650, Figure 1 is the coefficient 0.7488 associated with the "x" variable and represents the change in flow at Curren Tunnel corresponding to a 1 cfs change in total spring complex flow. The increase in flow at Curren Tunnel resulting from curtailment can be computed by multiplying the predicted increase in total spring flow from ESPAM 2.1 by 0.7488. *Id.*, p. 7. This analysis used flow data reported by Rangen, and predicts that approximately 75% of curtailment benefits accruing to the model cell would accrue to Curren Tunnel. Because this analysis used Rangen's under-reported flow data, the Director finds, based upon clear and convincing evidence, that the slope of the regression line is too high.

101. Sullivan plotted another regression line using adjusted data. Pocatello Ex. 3654, Fig. 1. Data values that were under-reported were "corrected for the historical 15.9% under-measurement of flows by Rangen by multiplying the reported flows by a factor of 1.189 (computed as 1/[1-0.159])." *Id.*, Fn. 2. The slope of Sullivan's alternative regression line is 0.6337, which is the coefficient associated with the "x" variable. This analysis predicts that approximately 63% of curtailment benefits accruing to the model cell would accrue to Curren Tunnel. Because there is uncertainty about the accuracy of the USGS measurements used by Sullivan to adjust the under-reported data, the slope of this regression line may be too low or too high.

102. There are two reasons why the Director should apply the 63% proportion to determine the increase in Curren Tunnel flow from the total simulated increase in flow to the Rangen model cell. First, all parties agree that the data used to calculate the 75% proportion were under-reported. The alternative regression line plotted by Sullivan is a credible method to correct the under-reported data. Second, applying a 75% proportion to determine the increase in the Curren Tunnel flow may result in Rangen benefiting from its own under-reporting of flows if mitigation by direct flow to Rangen is provided in lieu of curtailment.

103. Using ESPAM 2.1, Department staff simulated curtailment of ground water rights for irrigation within the model boundaries bearing priority dates later than July 13, 1962, the priority date of Rangen's water right no. 36-02551. The simulated increase in discharge to the Rangen model cell at steady state is 17.9 cfs. IDWR Staff Memorandum, Ex. 3203, p. 6.

104. Department staff eliminated points of diversion inside the model boundary but outside the boundary of common ground water supply as described in Rule 50 of the Department's Conjunctive Management Rules. After the removal of these points of diversion from the simulation, the model predicted a total of 16.9 cfs of reach gains to the Rangen cell attributable to modeled curtailment of junior ground water diversions within the area of common ground water supply at steady state.

105. In model simulations of curtailment for each model cell, Department staff determined the percentage of water that would ultimately accrue to the Rangen cell and the percentage that would ultimately accrue to other spring cells or river reaches. These percentages will be referred to hereafter as a "depletion percentage" of ground water pumping on the Rangen model cell. For example, if 10 cfs of ground water pumping is modeled within a given model cell and the modeled decrease in discharge at the Rangen cell is 0.1 cfs, the depletion percentage for points of diversion within that model cell is 1%. In this example, the simulated decrease in discharge and depletion percentage for all other springs and river reaches are 9.9 cfs and 99%, respectively. A map of the ESPA showing the depletion percentage for each model cell with respect to spring discharge in the Rangen cell is provided in Figure 1. IDWR Staff Memorandum, Ex. 3203, p. 9.

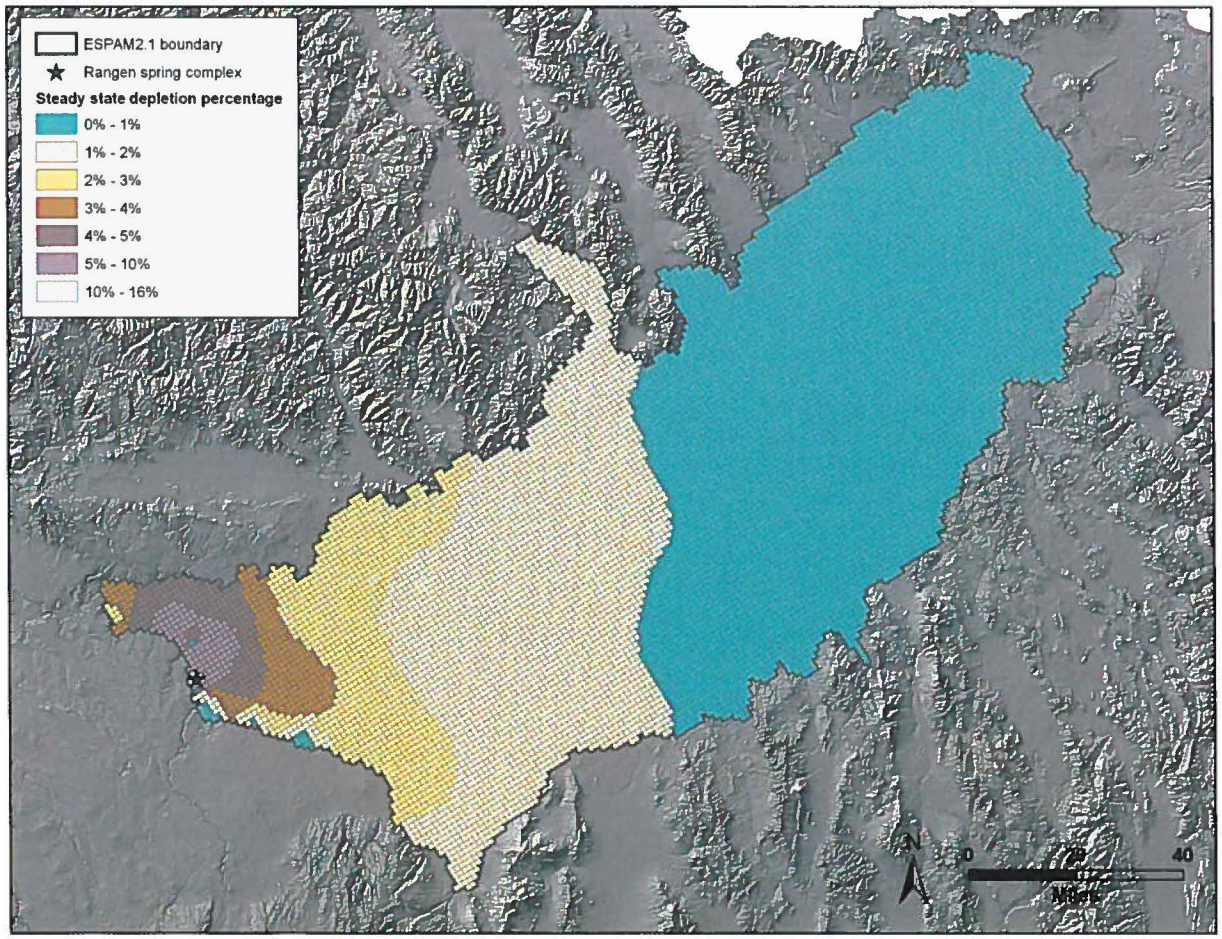

Figure 1. Depletion percentages indicating the portion of curtailed ground water use predicted to accrue to the Rangen model cell.

106. Department staff used ESPAM 2.1 to predict the benefit to discharge in the Rangen model cell resulting from curtailment within areas bounded by various depletion percentages. See Figure 2 below, taken from IDWR Staff Memorandum, Ex. 3203, p. 51. For each depletion percentage, the predicted increase in discharge in the Rangen model cell was plotted against the number of curtailed acres.

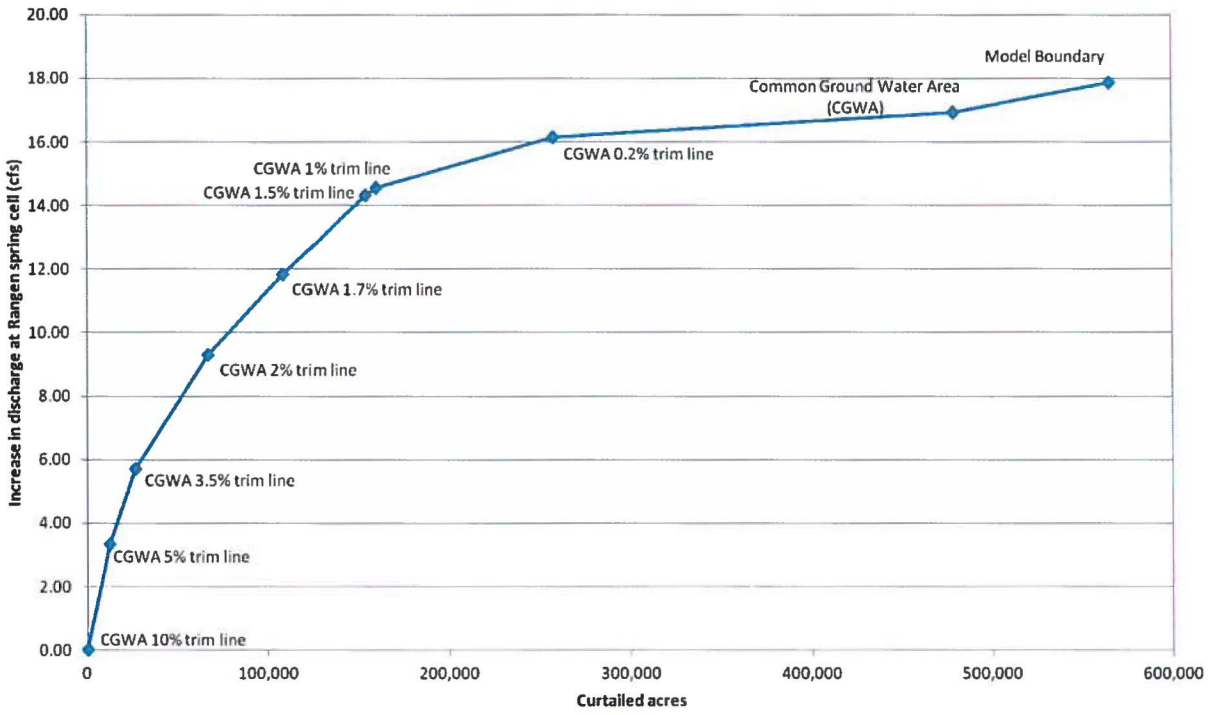

Figure 2. Acres of ground water irrigation curtailed and simulated increase in spring discharge in the model cell.

This chart illustrates that the benefit of curtailment with respect to the number of acres curtailed diminishes significantly where the depletion percentage approaches 1.0 to 1.5% and the benefit approaches approximately 14.3 to 14.6 cfs.

107. Because Rangen is only entitled to the portion of the benefit that is predicted to accrue to Curren Tunnel, a revised chart was prepared (Figure 3). This chart also illustrates that the benefit of curtailment with respect to the number of acres curtailed diminishes significantly where the depletion percentage for the Rangen model cell approaches 1.0 to 1.5% and the corresponding benefit to Curren Tunnel approaches approximately 9.0 to 9.2 cfs.

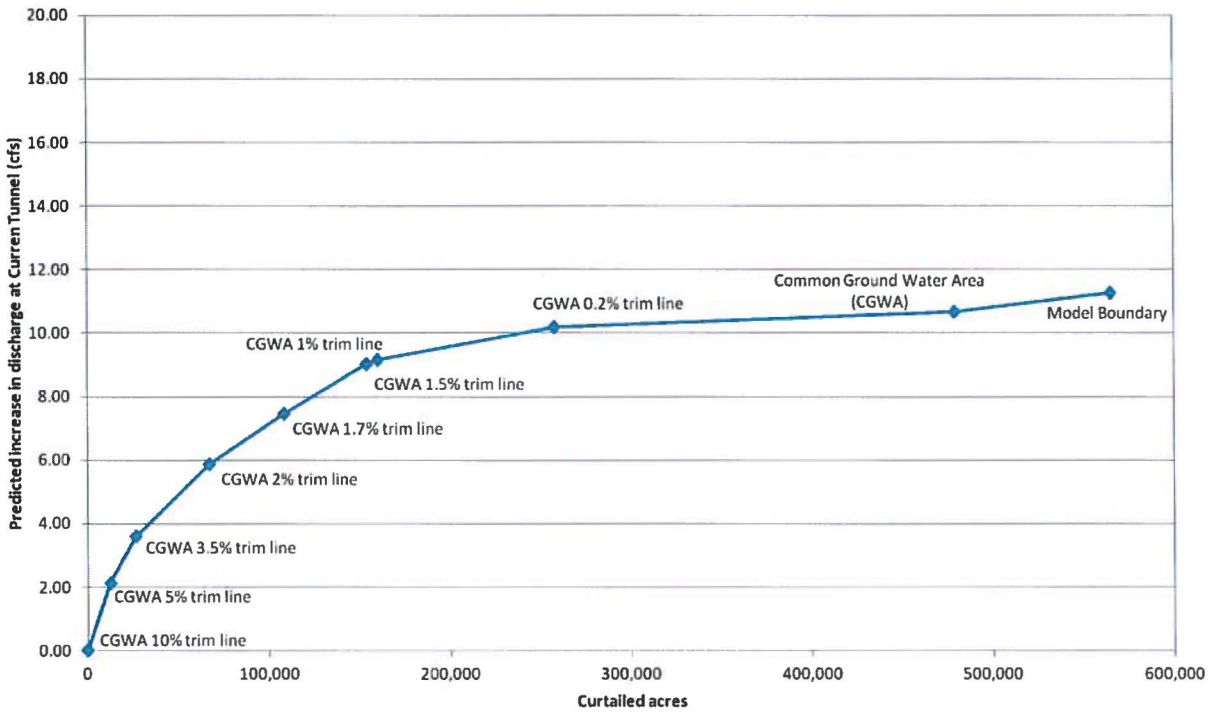

Figure 3. Acres of ground water irrigation curtailed and predicted increase in spring discharge from Curren Tunnel.

108. The diminishing benefits correspond with the location of the Great Rift (Figure 4), where low transmissivity impedes the transmission of water through the aquifer. IDWR Staff Memorandum, Ex. 3203, p. 8.

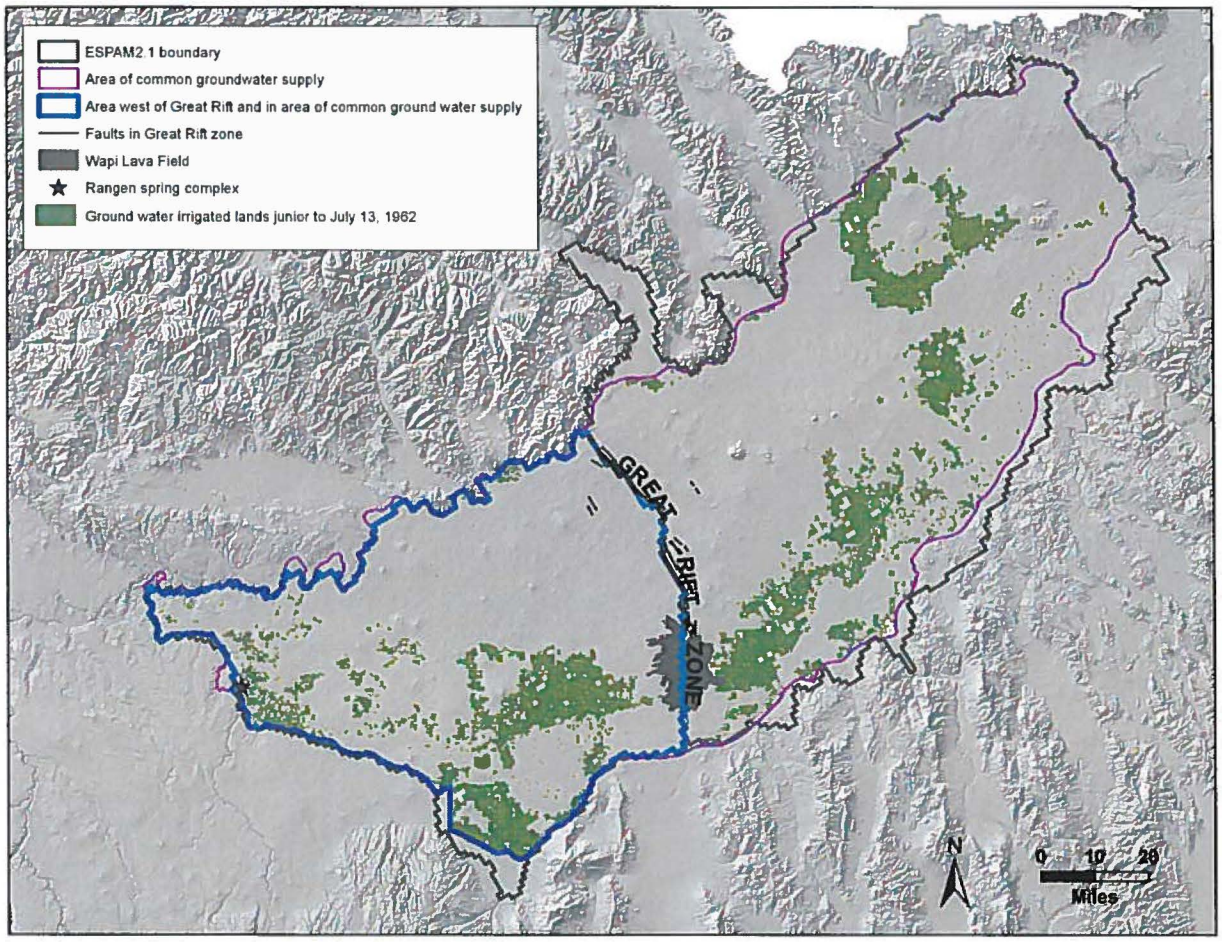

Figure 4. Delineation of area west of the Great Rift.

109. If ground water points of diversion located east of the Great Rift are eliminated from the simulation (Figure 5), ESPAM 2.1 predicts the curtailment of the remaining junior wells in the area of common ground water supply would accrue 14.4 cfs of benefit to the Rangen model cell at steady state. The predicted increase in discharge to Curren Tunnel is 9.1 cfs (63% of 14.4 cfs).

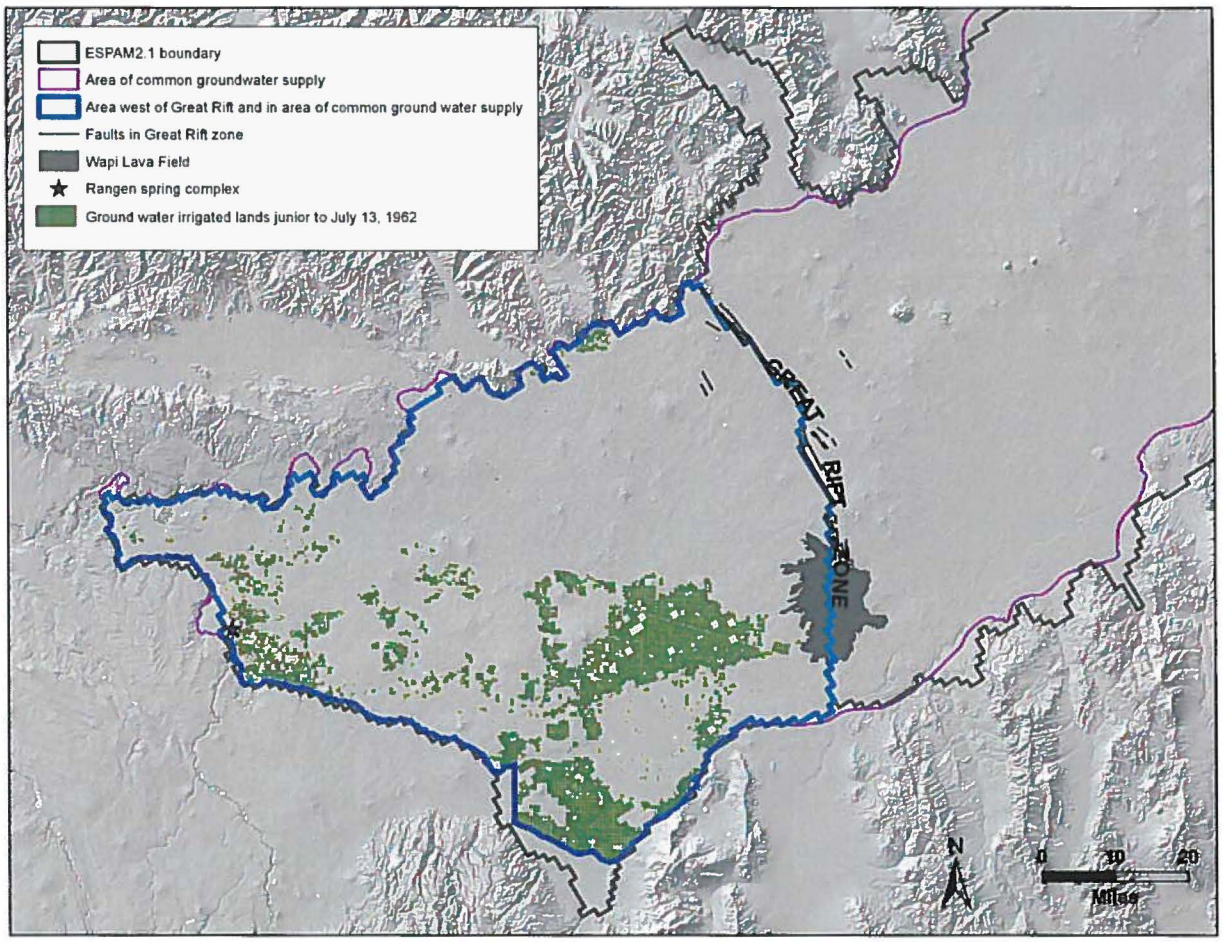

Figure 5. Junior ground water irrigated lands within area of common ground water and west of the Great Rift.

110. Curtailment of junior ground water irrigation west of the Great Rift would curtail irrigation of approximately 157,000 acres, resulting in curtailment of irrigation of approximately 17,000 acres per cfs of predicted benefit to the Curren Tunnel. Curtailment of junior ground water irrigation east of the Great Rift would curtail irrigation of approximately 322,000 additional acres, resulting in curtailment of irrigation of approximately 204,000 acres per cfs of predicted benefit to the Curren Tunnel.

111. While Curren Tunnel discharge will continue to vary with climate and surface water irrigation practices, historic values can be used to evaluate the range of flow rates that can be expected to be available from Curren Tunnel if junior ground water use is curtailed. From the

time the Department began measuring Curren Tunnel discharge in 1993, the maximum annual average discharge measured at the mouth of the tunnel was 18.2 cfs in 1997. Pocatello Ex. 3650, Table A-1. Including the discharge from the 6-inch PVC pipe, the annual average flow available from Curren Tunnel in 1997 was 19.1 cfs. *Id.* The lowest average annual flow available from Curren Tunnel was 3.1 cfs in 2005. *Id.* The average annual flow has not exceeded 7 cfs since 2002. *Id.* Because the predicted increase in Curren Tunnel flow from curtailing ground water rights junior to July 13, 1962 within the area of common ground water supply and west of the Great Rift is 9.1 cfs, the average annual discharge from Curren Tunnel after several years of curtailment within the model boundary is expected to be less than 17 cfs.

CONCLUSIONS OF LAW

I. Idaho Law Applicable to the Distribution of Water Under the Prior Appropriation Doctrine

1. Idaho Code § 42-602, addressing the authority of the Director over the supervision of water distribution within water districts, provides:

> The director of the department of water resources shall have direction and control of the distribution of water from all natural water sources within a water district to the canals, ditches, pumps and other facilities diverting therefrom. Distribution of water within water districts created pursuant to section 42-604, Idaho Code, shall be accomplished by watermasters as provided in this chapter and supervised by the director. The director of the department of water resources shall distribute water in water districts in accordance with the prior appropriation doctrine. The provisions of chapter 6, title 42, Idaho Code, shall apply only to distribution of water within a water district.

2. Idaho's Constitution provides that "[p]riority of appropriation shall give the better right as between those using the water" of the State. Idaho Const. Art. XV, § 3. "As between appropriators, the first in time is first in right." Idaho Code § 42-106.

3. Beneficial use plays an equally important role in the prior appropriation doctrine: "The prior appropriation doctrine is comprised of two bedrock principles—that the first appropriator in time is the first in right and that water must be placed to a beneficial use." *In Matter of Distribution of Water to Various Water Rights Held By or For The Benefit of A & B Irrigation Dist.*, Docket Nos. 38191, 38192, 38193, slip op. at 14 (Idaho Dec. 17, 2013). "A prior appropriator is only entitled to the water to the extent that he has use for it when economically and reasonably used. It is the policy of the law of this state to require the highest and greatest possible duty from the waters of the state in the interest of agriculture and for useful and beneficial purposes." *Washington State Sugar Co. v. Goodrich*, 27 Idaho 26, 44, 147 P. 1073, 1079 (1915).

4. Idaho Code § 42-603, which grants the Director authority to adopt rules governing water distribution, provides as follows:

> The director of the department of water resources is authorized to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of the rights of the users thereof. Promulgation of rules and regulations shall be in accordance with the procedures of chapter 52, title 67, Idaho Code.

In addition, Idaho Code § 42-1805(8) provides the Director with authority to "promulgate, adopt, modify, repeal and enforce rules implementing or effectuating the powers and duties of the department."

5. It is the duty of a watermaster, acting under the supervision of the Director, to distribute water from the public water supplies within a water district among those holding rights to the use of the water in accordance with the respective priority of the rights subject to applicable Idaho law, including applicable rules promulgated pursuant to the Idaho Administrative Procedure Act. *See* Idaho Code §§ 42-602 and 607.

II. Conjunctive Management Rules

6. In accordance with chapter 52, title 65, Idaho Code, rules regarding the conjunctive management of surface and ground water were adopted by the Department, effective October 7, 1994. IDAPA 37.03.11. The Conjunctive Management Rules ("CM Rules") prescribe procedures for responding to a delivery call made by the holder of a senior priority surface or ground water right against junior priority ground water rights in an area having a common ground water supply. IDAPA 37.03.11.001.

7. The CM Rules "give the Director the tools by which to determine 'how the various ground and surface water sources are interconnected, and how, when, where and to what extent the diversion and use of water from one source impacts [others].'" *American Falls Reservoir Dist. No. 2 v. Idaho Dept. of Water Resources,* 143 Idaho 862, 878, 154 P.3d 433, 449 (2007) (citations omitted).

8. Generally, junior-priority ground water users are entitled to a hearing prior to curtailment. *Clear Springs Foods, Inc. v. Spackman*, 150 Idaho 790, 815, 252 P.3d 71, 96 (2011). Any hearing will determine whether the senior-priority water right holder is suffering material injury and whether both the senior-priority and junior-priority water right holders are diverting and using water efficiently without waste. IDAPA 37.03.11.040.03.

9. The burden is not on the senior-priority water right holder to re-prove an adjudicated water right. *American Falls*, 143 Idaho at 878, 154 P.3d at 449. In a delivery call, the Director must give a decree proper legal effect by establishing a presumption that the senior is entitled to his decreed quantity. *Id.* However, there may be some post-adjudication factors which are relevant to the determination of how much water is actually needed by the senior. *Id.* A determination in a delivery call proceeding that less than the decreed amount is needed must

be supported by clear and convincing evidence. *A&B Irr. Dist. v. Idaho Dept. of Water Resources*, 153 Idaho 500, 524, 284 P.3d 225, 249 (2012).

10. Once the initial determination is made that material injury is occurring or will occur, the junior then bears the burden of proving that the call would be futile or to challenge, in some other constitutionally permissible way, the senior's call. *American Falls*, 143 Idaho at 878, 154 P.3d at 449. Any defense raised, such as waste or futile call, must be proven by clear and convincing evidence. *A&B Irr. Dist.*, 153 Idaho at 517, 284 P.3d at 242.

11. Beneficial use acts as a measure and limit upon the extent of a water right. *In Matter of Distribution of Water to Various Water Rights Held By or For The Benefit of A & B Irrigation Dist.*, Docket Nos. 38191, 38192, 38193, slip op. at 14 (Idaho Dec. 17, 2013). A person claiming a right under a decree is not entitled to the use of more water than can be beneficially used. *Id.* The wasting of water is both contrary to Idaho law and is a recognized defense to a delivery call. "Neither the Idaho Constitution, nor statutes, permit...water right holders to waste water or unnecessarily hoard it without putting it to some beneficial use." *American Falls*, 143 Idaho at 880, 154 P.3d at 451. "Simply put, a water user has no right to waste water. If more water is being diverted than can be put to beneficial use, the result is waste. Consequently, Idaho law prohibits a senior from calling for the regulation of juniors for more water than can be put to beneficial use." *In the Matter of the Petition for Delivery Call of A&B Irrigation District for the Delivery of Ground Water and for the Creation of a Ground Water Management Area*, Memorandum Decision and Order on Petition for Judicial Review, Minidoka Dist. Court Case No. 2009-000647 at 31-32 (May 4, 2010) (Hon. E. Wildman).

12. The agency's experience, technical competence, and specialized knowledge may be utilized in the evaluation of the evidence. Idaho Code § 67-5251(5); IDAPA 37.01.01.600. "Somewhere between the absolute right to use a decreed water right and an obligation not to waste it and to protect the public's interest in this valuable commodity, lies an area for the exercise of discretion by the Director." *American Falls*, 143 Idaho at 880, 154 P.3d at 451. This discretion is not unfettered, nor is it to be exercised without judicial oversight. *Id.* The courts determine whether the exercise of discretion is being properly carried out. *Id.*

III. Material Injury

13. In considering a petition for delivery call, the Director must first determine whether the holder of a senior water right is suffering material injury and using water efficiently and without waste. Material injury is defined by the Conjunctive Management Rules as "[h]indrance to or impact upon *the exercise of a water right* caused by the use of water by another person as determined in accordance with Idaho Law, as set forth in Rule 42." IDAPA 37.03.11.010.14 (emphasis added). Material injury requires impact upon the exercise of a water right. *Clear Springs Foods*, 150 Idaho at 811, 252 P.3d at 92.

14. CM Rule 42 lists the factors the Director may consider in determining whether Rangen is suffering material injury and using water efficiently and without waste. Factors listed in Rule 42 solely relevant to other beneficial uses, such as irrigation, should not be considered in this delivery call. The factors relevant in this proceeding, using CM Rule 42's lettering

identifiers, include: (a) the amount of water available to Rangen from its decreed source; (b) the effort or expense of Rangen to divert water from the source; (c) whether the junior ground water rights affect the quantity and timing of when water is available; . . . (e) the amount of water being diverted and used compared to the water rights; (f) the existence of water measuring devices; (g) [i]whether Rangen's needs could be satisfied with the user's existing facilities and water supplies and [ii] the reasonableness of Rangen's diversions and activities; and (h) whether the senior water right could be met using alternate reasonable means of diversion or alternate points of diversion.

i. Amount of Water from the Source

15. The source for water right nos. 36-02551 and 36-07694 is the Curren Tunnel. The point of diversion for both water rights is described to the 10 acre tract: SESWNW Sec. 32, T7S, R14E. While Rangen has historically diverted water from Billingsley Creek at the Bridge Diversion located in the SWSWNW Sec. 32, T7S, R14E, Rangen's SRBA decrees do not identify Billingsley Creek as a source of water and do not include a point of diversion in the SWSWNW Sec. 32, T7S, R14E. A decree entered in a general adjudication such as the SRBA is conclusive as to the nature and extent of the water right. Idaho Code § 42-1420. Administration must comport with the unambiguous terms of the SRBA decrees. Because the SRBA decrees identify the source of the water as the Curren Tunnel, Rangen is limited to only that water discharging from the Curren Tunnel. Because the SRBA decrees list the point of diversion as SESWNW Sec. 32, T7S, R14E, Rangen is restricted to diverting water that emits from the Curren Tunnel in that 10-acre tract.

16. Dr. Charles Brockway ("Dr. Brockway") testified that Rangen is entitled to divert water at the Bridge Diversion (which is located outside the SESWNW) because Rangen is legally entitled to all the water that emanates from springs in the talus slope in the SESWNW. Brockway, Vol. V, p. 1074-1075. When questioned about how Rangen can legally divert water at a point not listed as a point of diversion in its SRBA decree, Dr. Brockway stated that springs arising in the SESWNW constitute a legal point of diversion. *Id.* p. 1075-1076. In other words, Dr. Brockway argues that a physical diversion structure at the springs is not necessary to declare the spring water appropriated, and that a spring itself, without any sort of diversion structure, constitutes a diversion of water.

17. First, Dr. Brockway's argument ignores the fact that the source listed on the water rights is the Curren Tunnel. Setting aside that impediment for discussion purposes, Dr. Brockway's suggestion that a spring itself constitutes a point of diversion is contrary to Idaho water law. Idaho water law generally requires an actual physical diversion and beneficial use for the existence of a valid water right. *State v. United States*, 134 Idaho 106, 111, 996 P.2d 806, 811 (2000). The only recognized exception to this rule is for instream beneficial uses of water. *Id.* Taken to its logical conclusion, Dr. Brockway's argument means that any water user could claim as his point of diversion the highest headwater of the state and then argue for protection up to the water source. This troublesome outcome underscores the problem of Dr. Brockway's argument and diminishes the credibility of his testimony.

18. Because Rangen's decreed source and point of diversion limit Rangen to only water discharging from the Curren Tunnel and diverted in the 10 acre tract, the evaluation of material injury must consider this limitation. The Director must determine whether Rangen's ability to divert water that discharges from the Curren Tunnel and is diverted in the 10-acre tract has diminished sufficiently that Rangen has been materially injured.

ii. The Existence of Water Measuring Devices

19. Although Rangen has historically measured water at the bottom of the raceways and not at the Curren Tunnel, the Department has measured the discharge of Curren Tunnel since 1993. Experts testifying on behalf of junior ground water users have established a relationship between the total spring complex discharge and the discharge of the Curren Tunnel.

20. Rangen currently measures the flows through the facility at two different locations, the CTR raceways and the lodge pond dam. While the detailed methods of measuring at these locations are considered a nonstandard measurement method, the Department has historically accepted the measurements and associated flow rates. For purposes of this decision, the Director accepts the use of the dam boards as a substitute for a standard weir, given the measurement conditions of flow over the dam boards.

21. Because Rangen used incorrect rating tables for determining flow rates, Rangen's reported historic flows were lower than actual flows. Sullivan used USGS data to determine the magnitude of error in Rangen's reported flow rates. He concluded the measurement error to be 15.9% based on the comparison of 45 measurements by the USGS between 1980 and 2012. Finding of Fact 50. Sullivan also plotted a regression line to determine the relationship between Curren Tunnel discharge and the corrected historic measurement of total spring complex discharge. Finding of Fact 101. The slope of the regression indicates that the change in discharge of Curren Tunnel is 63% of the corresponding change in total spring complex discharge. If curtailment of ground water pumping results in an increase in the total flow of the spring complex, 63% of that benefit would be realized at the Curren Tunnel. The other 37% of the benefit from curtailment would accrue to the talus slope springs below the Curren Tunnel and would not be available to water rights 36-02551 and 36-07694.

22. Because of Rangen's measurement error, the Director adopts Sullivan's corrected calculation of the proportion of the benefit to total spring flows in the Rangen model cell that would accrue to the Curren Tunnel. The Director concludes, based upon clear and convincing evidence, that a percentage of 63% should be used to compute the quantity of water the ground water users may be required to provide as mitigation to avoid curtailment.

iii. Amount of Water Diverted Compared to the Water Right

23. It is clear that spring flows have declined significantly. One of IGWA's own experts, who first visited the Rangen property back in 1976, described the declines as significant. Rogers, Vol. VIII, pp. 1899-1900. Rangen's reported hatchery flows in 1966 averaged 50.7 cfs. Finding of Fact 53. In 2012, spring complex flows averaged just 14.6 cfs. *Id.* Notwithstanding Rangen's estimated measurement error of 15.9% since 1980, the declines have been dramatic.

Even if the 15.9% correction is applied to the 2012 spring complex discharge, flows declined by over 33 cfs between 1966 and 2012. Based on the relationship between Curren Tunnel flow and total spring complex flow, the corresponding decline in Curren Tunnel discharge between 1966 and 2012 would have been approximately 21 cfs. This decline in flow is substantial, resulting in Rangen diverting significantly less than allowed under its water rights.

24. Rangen is authorized to divert up to 76 cfs pursuant to water rights 36-15501, 36-02551, and 36-07694. Rangen asserts it is not receiving the quantity of water authorized for diversion by water rights 36-02551 and 36-07694. Water rights 36-02551 and 36-07694 authorize a total diversion of 74.54 cfs.

25. An issue was raised at the hearing regarding Rangen's junior fish propagation water right, water right no. 36-07694, and the extent of its beneficial use at the time of licensing. The predicted increase in discharge to the Curren Tunnel from curtailing ground water rights junior to July 13, 1962 (the priority date for water right no. 36-02551) within the ESPAM 2.1 model boundaries, within the area of common ground water supply, and west of the Great Rift is 9.1 cfs. Finding of Fact 109. The average annual discharge from Curren Tunnel after several years of curtailment within the model boundary is expected to be less than 17 cfs. Finding of Fact 111. Because Rangen's two senior fish propagation rights, water right nos. 36-15501 and 36-02551, authorize diversion of a total of 50 cfs from Curren Tunnel, it is not expected that curtailment will ever result in more water than the two additional senior water rights are authorized to divert. Thus, the issue of extent of beneficial use for water right no. 36-07694 is never likely to arise and is moot.

iv. Existing Facilities, Water Supplies, and Needs of Rangen for Water Use

26. As a result of declining spring flows, Rangen has been hindered in its ability to exercise its water rights from the Curren Tunnel. A number of Rangen staff testified regarding the impact of the declining flows and Rangen's ability to raise more fish if Rangen had more water. Finding of Fact 59. The Director finds the testimony of Rangen's staff on this point credible. The reduction in flows from the Curren Tunnel have caused a reduction in the number of fish that Rangen could raise at the Rangen Facility and impeded Rangen's full beneficial use of water that could have been diverted pursuant to its water rights.

27. Rangen's ability to conduct the type of research it would like to conduct also has been hindered. Findings of Fact 56. The Director finds the testimony of Rangen's staff credible and concludes that the reduced flows at the Curren Tunnel have hindered the way Rangen would conduct its research.

28. Pocatello argues that if Rangen wants to undertake outside research studies, it should modify the way it conducts raceway studies and initiate fish tagging studies instead. Finding of Fact 58. Fish tagging studies require less water but requires more manpower to complete. *Id.* Pocatello suggests Rangen can get the required manpower by finding volunteers with the Idaho State Fish and Game or Idaho Power Company. *Id.* The Director finds that Pocatello's suggestion of modification of Rangen's fish study processes, while interesting, is not

required of Rangen. The Director will not dictate in detail how Rangen must conduct its studies. The Director concludes Rangen's plans for research are reasonable.

29. The ground water users argue that Rangen could be producing more fish if Rangen would rotate more fish through the Rangen Facility and if Rangen would take advantage of peak spring flows. Findings of Fact 63. The ground water users also argue Rangen has not maximized the number of fish it raises because it does not oxygenate its water, has not maximized the number of eggs it orders, and has not maximized the number of cycles of fish moving through the facility because of its Idaho Power contract.

30. While beneficial use acts as a measure and limit upon the extent of a water right, *In Matter of Distribution of Water to Various Water Rights Held By or For The Benefit of A & B Irrigation Dist.*, Docket Nos. 38191, 38192, 38193, slip op. at 14 (Idaho Dec. 17, 2013), this does not mean that a water user must maximize his beneficial use, or otherwise risk his water use be deemed inadequate or unreasonable. There could be a circumstance where a water use might be deemed no longer beneficial. "What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time." *State, Dep't of Parks v. Idaho Dep't of Water Admin.*, 96 Idaho 440, 448, 530 P.2d 924, 932 (1974) (Justice Bakes concurring specially) (citations omitted). This is not such a case. In this case, Rangen is beneficially using water by raising fish to satisfy its contract with Idaho Power and to sell fish on the open market. IGWA and Pocatello have failed to show, by clear and convincing evidence, that Rangen's water use is unreasonable. *A&B Irr. Dist. v. Idaho Dept. of Water Resources*, 153 Idaho 500, 524, 284 P.3d 225, 2249 (2012). The Director concludes Rangen's water use is reasonable.

v. Whether Ground Water Rights Affect the Quantity and Timing of When Water is Available

31. The total average annual discharge of the spring complex in the vicinity of the Rangen Facility declined over 33 cfs between 1966 and 2012 in response to changes in the ESPA water budget. Finding of Fact 53. Decreased incidental recharge associated with surface water irrigation, decreased recharge derived from precipitation, and increased ground water pumping have all contributed to declines in discharge from the spring complex in the vicinity of the Rangen Facility and from Curren Tunnel. Finding of Fact 55. While it is clear that junior-priority ground water pumping is a significant component of the ESPA water budget, quantifying the portion of the declines that is attributable to ground water pumping is complex. ESPAM 2.1 is a numerical ground water model that was developed for the purpose of determining the effects of ground water pumping on discharge to spring and river reaches. ESPAM 2.1 simulations establish that junior-priority ground water pumping is a substantial component of the decline in spring complex discharge. ESPAM 2.1 simulations predict that approximately 14 cfs of the decline to the spring complex can be attributed to junior-priority ground water pumping west of the Great Rift and in the area of common groundwater supply. The relationship between Curren Tunnel flow and total spring complex discharge indicates that approximately 9 cfs of the decline in flow from Curren Tunnel can be attributed to junior-priority ground water pumping west of the Great Rift and in the area of common groundwater supply. Finding of Fact 109.

32. As previously discussed, as a result of declining spring flows, Rangen has been hindered in its ability to exercise its water rights from the Curren Tunnel. The reduction of flows affects the number of fish Rangen raises and the research it is able to undertake. Ground water diversions have reduced the quantity of water available to Rangen for beneficial use of water pursuant to its water rights.

vi. Alternate Reasonable Means of Diversion or Alternate Points of Diversion

33. IGWA and Pocatello argue that Rangen's water needs could be met using alternate means of diversion. Specifically, they point to the report prepared by SPF in 2004 to evaluate a number of projects with the intent of improving Rangen's water supply. IGWA and Pocatello suggest that Rangen should be required to explore and implement these alternative means of diversion prior to making a delivery call. The two proposals they focus on from the SPF report are the proposals to construct a vertical well and a horizontal well at the Rangen Facility.

34. Both proposals were considered and rejected by Rangen. With the vertical well, the three concerns highlighted were: the pumping costs associated with lifting the water from the wells to raceways, the redundant power and pumping systems necessary to protect against a loss of power or pumps, and that Rangen would not be able to obtain a new water right absent mitigation because of the ESPA moratorium on new appropriations. The concern regarding the horizontal well was that such a well would likely decrease current discharge to the Curren Tunnel, decrease discharge of other springs in the vicinity of the Curren Tunnel, and possibly reduce ground water levels in wells located on the rim above the Curren Tunnel. Wayne Courtney, executive vice president for Rangen testified about the concerns with the well proposals. He explained that Rangen did not implement the proposal for alternate points of diversion because Rangen "felt that the risk was too great for any possible outcome." Courtney, Vol. I, p. 111-112. Rangen was concerned that new wells might damage the geohydrology of the area and would actually injure the existing springs and injure water users that rely on the springs for their water. *Id.* at 112. The Director concludes that Rangen's reasons for rejecting the proposals are reasonable. IGWA and Pocatello have failed to show, by clear and convincing evidence, that Rangen's means of diversion is unreasonable. The Director concludes that Rangen employs "reasonable diversion and conveyance efficiency and conservation practices" in diverting water from the Curren Tunnel.

vii. Effort or Expense to Divert Water from the Source

35. Because the method of diversion is reasonable, the effort and expense by Rangen to divert water from the source is also reasonable.

IV. Conclusion Regarding Material Injury

36. The Director concludes that pumping by junior ground water users has materially injured Rangen.

V. ESPAM 2.1 Results and Area of Common Ground Water

37. ESPAM 2.1 is a technical improvement to ESPAM 1.1 in part because ESPAM 2.1 was calibrated to monthly observations of spring discharge within individual model cells and is capable of simulating the impacts of depletions from or accretions to the aquifer on spring discharge within those model cells. ESPAM 1.1 was calibrated to significantly fewer spring discharge data. ESPAM 1.1 was only capable of simulating depletions from or accretions to a group of springs that, in total, contribute water to larger segmented reaches of the Snake River. In ESPAM 2.1, spring discharge in the model cell where Rangen's water is derived was a target used for calibration of the model. The outflow of water in the vicinity of the Rangen Facility was identified as a model calibration target because flows from the Rangen Facility had been measured over a sufficiently long period of time and with enough frequency.

38. Idaho courts previously held that ESPAM 1.1 was the best scientific tool for estimating the impact of pumping on spring flows. Recognizing that every model is an approximation of physical reality, ESPAM 2.1 is a technical improvement to ESPAM 1.1 and is the best available science for simulating the impacts of ground water pumping. There is no other technical instrument as reliable as ESPAM 2.1 that can be used to determine the effects of ground water pumping on the ESPA and hydraulically-connected reaches of the Snake River and its tributaries. Accordingly, the outputs from ESPAM 2.1 simulations will be used to determine impacts to total flow in the Rangen spring complex.

39. ESPAM 2.1 simulations determined that curtailment of ground water diversions authorized by priority dates earlier than July 13, 1962 would result in a total increase in flow in the Rangen model cell of 17.9 cfs.

40. Rule 50 of the CM Rules delineates the boundaries of the ESPA area of common ground water supply. The delineated area is the area within which the Director is currently authorized to administer junior priority ground water rights to satisfy senior priority surface water rights. Any curtailment of junior ground water rights in this matter will be limited to water rights with points of diversion within the delineated area of common ground water supply.

41. IDWR is only authorized to curtail diversions within the area of common ground water supply described by Rule 50 of the CM Rules. Removing water right points of diversion outside of the area of common ground water supply reduces the total simulated increase in flows in the Rangen model cell to 16.9 cfs.

VI. Trim Line

42. The applicability of a trim-line was previously litigated in the Clear Springs delivery call. *Clear Springs*, 150 Idaho 790, 812, 252 P.3d 71, 93 (2011). In *Clear Springs,* the Department used ESPAM 1.1 to determine effects of ground water pumping, just as ESPAM 2.1 is being applied in this proceeding. *Clear Springs*, 150 Idaho at 814, 252 P.3d at 95. With ESPAM 1.1, former Director Dreher found that "the degree of uncertainty associated with application of the [Aquifer] ground water model is 10 percent" and based on that level of

possible uncertainty, he limited the number of junior water right curtailed. *Clear Springs*, 150 Idaho at 812-13, 252 P.3d at 93-94 (bracketed language in original).

43. In the Clear Springs delivery call, the 10% trim line was applied based on accrual of the benefits of curtailment to the Buhl to Thousand Springs reach, which contained multiple ESPAM model cells and several other springs not diverted by the calling party. The calling party was estimated to receive 6.9% of the benefits accruing to the Buhl to Thousand Springs reach. In the Clear Springs delivery call, the trim line limited curtailment to areas where the calling party would receive at least 0.69% (6.9% of 10%) of the benefits of curtailment.

44. Because the 10% trim line applied in Clear Springs delivery call was based on model predictions of impacts to a multi-cell reach containing several springs, applying a 10% trim line based on model predictions of impacts to a single model cell, as proposed by IGWA, would result in a significantly different standard than was applied in the Clear Springs delivery call.

45. Similarly, in the Blue Lakes delivery call, the 10% trim line was applied based on accrual of the benefits of curtailment to the Devil's Washbowl to Buhl reach, which contained multiple ESPAM model cells and several other springs not diverted by the calling party. The calling party was estimated to receive 20% of the benefits accruing to the Devil's Washbowl to Buhl reach. In the Blue Lakes delivery call, the trim line limited curtailment to areas where the calling party would receive at least 2% (20% of 10%) of the benefits of curtailment.

46. The district court in the Clear Springs delivery call affirmed the application of a trim line on appeal: "The evidence also supports the position that the model *must* have a factor for uncertainty as it is only a simulation or prediction of reality… ." *Clear Springs*, 150 Idaho at 816, 252 P.3d at 97 (emphasis added). Because the model is just a "simulation or prediction of reality", the district court held that "it would be inappropriate to apply the [model] results independent of the assigned margin of error." *Id.* The district court concluded "the use of a trim-line for excluding juniors within the margin of error is acceptable simply based on the function and application of a model…the Director did not abuse discretion by apply the 10% margin of error 'trim line.'" *Id.* The Idaho Supreme Court affirmed the Director's application of the trim line, finding that the Director properly exercised discretion in making the trim line determination: "The Director perceived the issue as discretionary, he acted within the outer limits of his discretion and consistently with the legal standards applicable to the available choices, and reached his decision through an exercise of reason. The district court did not err in upholding the Director's decision in this regard." *Id.* at 817, 252 P.3d at 98.

47. Substantial testimony was presented about the approximations and possible inaccuracies of using a regional model to simulate the depletions to Rangen spring complex discharge caused by ground water diversions from the ESPA. Ground water users diverting from the ESPA argued that any application of the model should acknowledge that there is an unquantifiable level of uncertainty in the predictions generated by the model by either discounting the prediction or applying a trim line. Rangen and the SWC argue that regardless of inaccuracies in the model, it is the best estimate of the impacts of junior ground water pumping on flows in the Rangen cell, therefore no trim line should be applied.

48. Because numerical models are approximations of complex physical systems, aquifer modeling is a dynamic process. ESPAM 2.1 is the result of improvements to previous versions of the model, and it will likely be improved upon through future efforts of the Department and the ESHMC. Some of the criticisms of the model have merit, and may be addressed in future versions of the model as data availability and improvements in computing technology allow. While there is the potential to improve the model given additional time and resources, ESPAM 2.1 is currently the best available scientific tool. Imperfections in the model should not preclude the Department from using the model as an administrative tool, and should not be the basis for using other predictive methods that have less scientific basis. The Director concludes that ESPAM 2.1 predicted responses to curtailment are the best available predictions.

49. Because of the complexity of the model, the margin of error associated with model predictions cannot be quantified. The lack of a quantifiable margin of error associated with the model does not mean that the model should be abandoned, but simply that its use should be tempered with the fact that it is a "simulation or prediction of reality." The Director concludes that there is uncertainty in the predicted increase in spring flow resulting from curtailment and that the actual response may be lower or higher than predicted. This variance should be taken into consideration when considering a trim line.

50. The Curren Tunnel and the Rangen spring complex are located west of the Great Rift, a low transmissivity feature that impedes the transmission of water through the aquifer Finding of Fact 108, Figure 4. While there is some predicted depletion of Curren Tunnel discharge attributable to points of diversion east of the Great Rift, the contribution is small. ESPAM 2.1 establishes, by clear and convincing evidence, that the portion of benefits of curtailed ground water use east of the Great Rift that would accrue to the Rangen spring complex is generally less than 1%. Finding of Fact 105, Figure 1. The benefit of curtailment with respect to the number of acres curtailed diminishes significantly if areas east of the Great Rift are included in the curtailment. Finding of Fact 107, Figure 3. The argument that no trim line is appropriate was considered and rejected in *Clear Springs*. The effect of the Great Rift on propagation of impacts to Curren Tunnel should be taken into consideration when deciding on a trim line.

51. Delineating a trim line using the Great Rift will limit curtailment to an area where the Rangen spring cell is predicted to receive at least 1% of the benefits of curtailment, and the calling party is predicted to receive at least 0.63% of the benefits of curtailment. This is similar to the trim lines applied to ESPAM 1.1 in the Clear Springs delivery call and the Blue Lakes delivery call, where the calling parties were predicted to receive 0.69% and 2% of the curtailed benefits, respectively.

52. The Idaho Supreme Court stated, "Given the nature of the decisions which must be made in determining how to respond to a delivery call, there must be some exercise of discretion by the Director." *American Falls*, 143 Idaho at 875, 154 P. 3d at 446. The Director perceives this issue of a trim line as one of limited discretion and applies the legal standards established by Idaho courts. *Clear Springs,* 150 Idaho at 813, 252 P.3d at 94.

53. The Director must consider the diminishing benefits of curtailment beyond the Great Rift. An appropriator is not entitled to command the entirety of large volumes of water in a surface or ground water source to support his appropriation contrary to the public policy of reasonable use of water. CM Rule 20. Demand should be viewed in light of reasonableness and optimum development of water resources in the public interest. CM Rules 20 and 42; *American Falls,* 143 Idaho at 876-80, 154 P.3d at 447-51; *Clear Springs*, 150 Idaho at 807-10; 252 P.3d at 88-91; *In Matter of Distribution of Water to Various Water Rights Held By or For The Benefit of A & B Irrigation Dist.*, *supra*, slip op. at 13-17.

54. "The policy of the law of this State is to secure the maximum use and benefit, and least wasteful use, of its water resources." *Clear Springs*, 150 Idaho at 808, 252 P.3d at 89 (quoting *Poole v. Olaveson*, 82 Idaho 496, 502, 356 P.2d 61, 65 (1960)). The Idaho Constitution enunciates a policy of promoting optimum development of water resources in the public interest. *Baker v. Ore-Ida Foods, Inc.,* 95 Idaho 575, 584, 513 P.2d 627, 636 (1973); Idaho Const. Art. XV, § 7. "There is no difference between securing the maximum use and benefit, and least wasteful use, of this State's water resources and the optimum development of water resources in the public interest. Likewise, there is no material difference between 'full economic development' and the 'optimum development of water resources in the public interest.' They are two sides of the same coin. Full economic development is the result of the optimum development of water resources in the public interest." *Clear Springs*, 150 Idaho at 809, 252 P.3d at 90. "The policy of securing the maximum use and benefit, and least wasteful use, of the State's water resources applies to both surface and ground waters, and it requires that they be managed conjunctively." *Clear Springs*, 150 Idaho at 809, 252 P.3d at 90.

55. Low transmissivity impedes the transmission of water through the aquifer at the Great Rift. Finding of Fact 108. This low transmissivity causes the benefit of curtailment compared to the number of acres curtailed to diminish significantly. As provided in Findings of Fact 105 through 108, generally less than 1% of the benefits of curtailment of water users east of the Great Rift will accrue to the Rangen spring cell. Even less will be expected to accrue to the Curren Tunnel. Curtailment of junior ground water irrigation west of the Great Rift would dry up approximately 157,000 acres, resulting in curtailment of irrigation of approximately 17,000 acres per cfs of predicted benefit to the Curren Tunnel. Finding of Fact 110. Curtailment of junior ground water irrigation east of the Great Rift would dry up approximately 322,000 additional acres, resulting in curtailment of irrigation of approximately 204,000 acres per cfs of predicted benefit to the Curren Tunnel. *Id.* In addition, there is uncertainty in the model. There is lower predictive uncertainty on the western side of the Great Rift. Finding of Fact 91. There is generally higher predictive uncertainty on the eastern side of the Great Rift, however impacts from several pumping locations evaluated on the eastern side of the Great Rift had negligible impacts on the spring cell evaluated in the Department's predictive uncertainty analysis. *Id.* Uncertainty in the model justifies use of a trim line. *Clear Springs*, 150 Idaho at 816, 252 P.3d at 97. The Director concludes curtailment of ground water diversions on the east side of the Great Rift is not justified. To curtail junior ground water users east of the Great Rift would be counter to the optimum development of Idaho's water resources in the public interest and the policy of securing the maximum use and benefit, and least wasteful use, of the State's water resources. This conclusion is consistent with previous conclusions regarding trim lines applied in Clear Springs delivery call and the Blue Lakes delivery call.

56. Eliminating water rights with points of diversion east of the Great Rift results in a simulated curtailment benefit to the Rangen model cell of 14.4 cfs at steady state.

57. The predicted curtailment benefit to the Curren Tunnel, computed as 63% of the simulated curtailment benefit to the Rangen model cell, is 9.1 cfs.[9]

VII. Rule 40 Call Determination

58. Rule 40 of the CM Rules provides in relevant part that upon a determination of material injury:

> [T]he Director, through the watermaster, shall:
>
> ...
>
> Regulate the diversion and use of water in accordance with the priorities of rights of the...ground water users whose rights are included within the district, provided, that regulation of junior-priority ground water diversion and use where the material injury is delayed or long range may, by order of the Director, be phased-in over not more than a five-year (5) period to lessen the economic impact of immediate and complete curtailment; or [a]llow out-of-priority diversion of water by junior-priority ground water users pursuant to a mitigation plan that has been approved by the Director.
>
> ...
>
> [T]he Director shall consider whether the petitioner making the delivery call is suffering material injury to a senior-priority water right and is diverting and using water efficiently and without waste, and in a manner consistent with the goal of reasonable use of surface and ground waters as described in Rule 42. The Director will also consider whether the respondent junior-priority water right holder is using water efficiently and without waste.

IDAPA 37.03.11.40.

59. In the material injury analysis above, the Director considered whether Rangen is diverting and using water efficiently, without waste, and in a matter consistent with the goal of reasonable use. The Director concludes Rangen is diverting and using water efficiently, without waste and in a matter consistent with the goal of reasonable use. Testimony was presented at hearing regarding respondent junior-priority water right holders' use of water. The Director concludes the junior-priority water right holders are using water efficiently and without waste.

60. Because Rangen has suffered material injury, the Director will curtail ground water rights bearing dates of priority earlier than July 13, 1962, with points of diversion located both within the area of common ground water supply and west of the Great Rift as delineated in Figure 5, Finding of Fact 109.

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[9] Rangen may not be entitled to all of the predicted increase in discharge of the Curren Tunnel if senior water right holders call for delivery of water from the Curren Tunnel.

ORDER

IT IS HEREBY ORDERED that, at 12:01 a.m. on or before March 14, 2014, users of ground water holding consumptive water rights bearing priority dates junior to July 13, 1962, listed in Attachment C to this order, within the area of common ground water, located west of the Great Rift, and within a water district that regulates ground water, shall curtail/refrain from diversion and use of ground water pursuant to those water rights unless notified by the Department that the order of curtailment has been modified or rescinded as to their water rights. This order shall apply to all consumptive ground water rights, including agricultural, commercial, industrial, and municipal uses, but excluding ground water rights used for *de minimis* domestic purposes where such domestic use is within the limits of the definition set forth in Idaho Code § 42-111 and ground water rights used for *de minimis* stock watering where such stock watering use is within the limits of the definitions set forth in Idaho Code § 42-1401A(11), pursuant to IDAPA 37.03.11.020.11.

IT IS FURTHER ORDERED that the watermasters for the water districts within the area of common ground water, located west of the Great Rift, and who regulate ground water, are directed to issue written notices to the holders of the consumptive ground water rights listed in Attachment C to this order. The water rights on the list bear priority dates junior to July 13, 1962. The written notices are to advise the holders of the identified ground water rights that their rights are subject to curtailment in accordance with the terms of this order.

IT IS FURTHER ORDERED that holders of ground water rights affected by this Order may participate in a mitigation plan through a Ground Water District or Irrigation District if a plan is proposed by a Ground Water District or Irrigation District. The mitigation plan must provide simulated steady state benefits of 9.1 cfs to Curren Tunnel or direct flow of 9.1 cfs to Rangen. If mitigation is provided by direct flow to Rangen, the mitigation may be phased-in over not more than a five-year period pursuant to CM Rule 40 as follows: 3.4 cfs the first year, 5.2 cfs the second year, 6.0 cfs the third year, 6.6 cfs the fourth year, and 9.1 cfs the fifth year. Holders of ground water rights that are not members of a ground water district may be deemed a nonmember participant for mitigation purposes pursuant to H.B. No. 737 (*Act Relating to the Administration of Ground Water Rights within the Eastern Snake River Plain*, ch. 356, 2006 *Idaho Sess. Laws* 1089) and Idaho Code § 42-5259. If a mitigation plan is approved and the holder of such a junior priority ground water right elects not to join a ground water district, the Director will require curtailment.

Dated this 29th day of January, 2014.

GARY SPACKMAN
Director

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 29th day of January, 2014, the above and foregoing document was served on the following by providing a copy in the manner selected:

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