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Geothermal Technical Partners Inc.

Transmission Interconnection Feasibility Study
"McGee Mountain"
Northern Nevada

Prepared by ZGlobal Inc.

June 2010

"Confidential"

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Executive Summary

Geothermal Technical Partners Inc. "McGee Mountain" project, proposed in northwestern Nevada, has limited interconnection alternatives. The project is within the service area of Harney Electric Cooperative. Harney Electric (HE) is a relatively small cooperative with limited resources and processes to support generation interconnections. In the course of this analysis, several discussion were held with HE staff to establish and confirm the current system conditions, expected use of their system by other generation, and system limitations.

The HEC electric system consists of a single 115 kV circuit that has interconnections to Nevada Energy via Winnemucca NV in the south and to Bonneville Power Administration via Redmond, OR in the north. The HEC system is split electrically into a North and South system, each offering a potential point of interconnection for the proposed project. These are the Quinn River and Fields 115 kV substations, both of which are roughly 26 miles from the proposed project site.

However, both were found to require significant upgrades due to other proposed generation projects in the area. Fields 115 kV, located on the northern HE system, can essentially be eliminated from consideration due to an overwhelming number of projects (as much as 1400 MW per HE staff) being proposed. This level of generation development will require the development of long distance high voltage (345 or 500 kV) lines to interconnect with neighboring system bulk transmission.

Quinn River 115 kV, located in the southern HS system, has fewer projects proposed and was found to be a newer and higher capacity system. There are approximately 230 MW of wind projects proposed for interconnection in addition to McGee Mt. Three scenarios were considered; 1) assume only McGee Mt. (30 MW) is interconnected and evaluated during the impact study, 2) assume all 230 MW proposed as well as 30 MW additional are interconnected, and 3) if the total interconnections exceed a total of roughly 310 MW.

For the first scenario, it was found that as much as 80 MW can be added to the Quinn River substation with few if any upgrades assuming no other projects are considered. For scenario 2, two variations were considered, one with McGee Mt at 30 MW and one at 80MW. It was found that upgrades costs will likely be roughly $6.5Million and 14.5 Million respectively. On a $/MW basis this equates to $215,400/MW and $180,600/MW respectively. The third assumed an upgrade in voltage class to 230 kV would be required. Assuming Geothermal Tech proposed a 100 MW project instead of just 80 MW, the likely upgrades costs assigned to the McGee Mt. project will increase to a total of $48.5 Million, or $485,000/ MW pro-rata.

The prospect for interconnection of a 30 to 80 MW facility is promising. The existing transmission system can support as much as 80 MW with few if any network upgrades. The possibility exists for increased projects size, but will require network upgrades and coordination with HE and other projects proposed in the area.

Overview

Geothermal Technical Partners Inc. has contracted with ZGlobal to perform a high level interconnection feasibility study for proposed geothermal power project. The objective of this scope of work is as follows:

- Identify viable interconnection solution.
- Identify capacity limitations and transmission system reinforcements that may be required by the host utility to support the interconnected generation project.
- Provide engineering cost estimates for expected system reinforcements.

The study will consider pre and post line loading, including N-1 contingency analysis, and will identify where transmission system upgrades may be required.

The proposed project is a geothermal generation facility located in northwestern Nevada. The project is within the service area of Harney Electric Cooperative. Harney Electric (HE) is a relatively small cooperative serving a large rural area (20,000 sq. miles) in southeastern Oregon and northwestern Nevada. The HE electric system consists of a single 115 kV circuit that has interconnections to Nevada Energy Power via Winnemucca NV, and Redmond, OR. To manage inadvertent power flow through the HE system, the 115 kV circuit has a normally open switch[1] at the Orovada substation. The system also has multiple distribution substations serving load via radial 25kV distribution circuits. See Attachment A for an electrical diagram and service area maps of the Harney Electric System.

Figure 1 – General Location of Project Site

[1] Normally open switch is a device on a transmission line, i.e. a switch that is normally operated "open" such that no power can flow past that point on the transmission line. Switches are most often operated closed and used only for maintenance or emergency operations.

Project Site and Interconnection Locations

GPS Coordinates of Proposed Location= (41.81, -118.86)

Quinn River 115kV Substation is approximately 26 miles SE from the proposed site location. GPS Coordinates of Quinn River 115kV Substation: (41.622, -118.420)

Fields 115 kV Substation is approximately 27 miles N of the proposed site location. GPS Coordinates of Quinn River 115kV Substation: (41.622, -118.420)

Interconnection Alternatives

The region presents limited options for interconnection. However, as discussed above, the HE 115kV transmission line is open at Orovada substation, which effectively provides two exit points from the system, one to the north into Oregon, and the other to the South into Nevada. The project site is located such that the distance to reach either section is approximately 27 miles, "as the crow flies". This is the distance to reach existing 115 kV Quinn River and 115 kV Fields substations respectively[2]. See Figures 2 and 3 below.

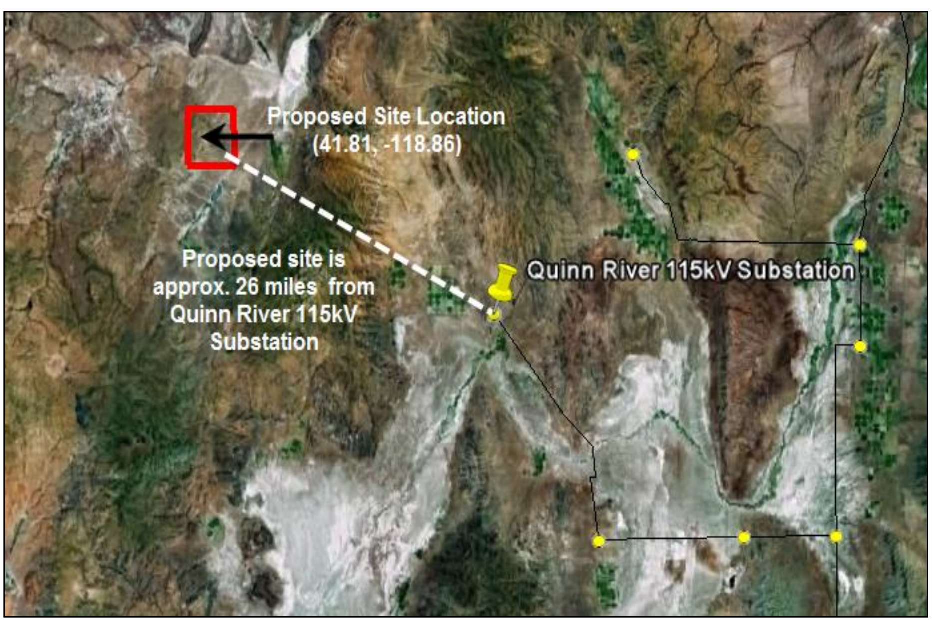

Figure 2: Project Site Location from Quinn River 115kV Substation

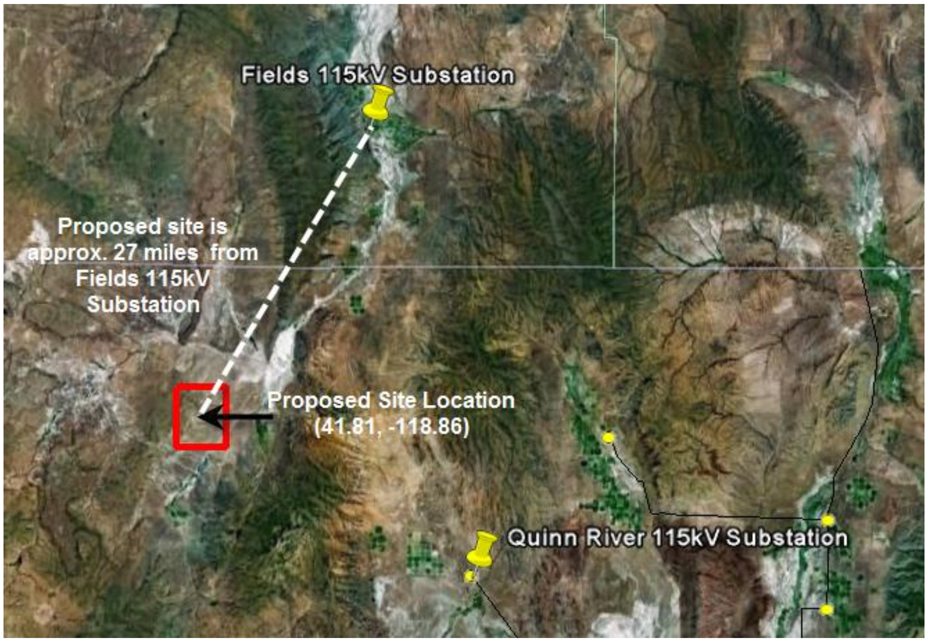

Figure 3: Project Site Location from Fields 115kV Substation

As seen in the single line diagram of the Harney Electric system (See Attachment A) there are also several 25 kV distribution circuits in the area. However, these circuits are not suitable for interconnection, but may be available for routing of generation tie line (i.e. access to existing right of way).

Generation "Tie Line" Option

As noted above, the primary points for interconnection are some distance from the project site. At a minimum, the distance is roughly 27 miles assuming a straight line between the project site and HE substations. However, based on the best available information[3], it appears that a 25 kV distribution circuit, and associated ROW, runs north-south between Fields and Quinn River substations and along Nevada State Highway 140, 3 to 6 miles north of the project site. Following these existing ROW's it

[3] Detailed information Harney Electric ROW's and specific location of their 25 kV distribution system was not available at the time of report drafting. This is very typical of most utilities and will require discussion with HE staff to verify actual locations. Information from Google Earth (Street View) and Platt's transmission line data was used to estimate most probable 25 kV line locations.

is estimated that a total distance of 40 to 45 miles[4] separates the project site from Quinn River substation. For generation tie line discussion, Quinn River will be used as the point of interconnection. As will be shown in the subsequent sections, this station is found to be the better alternative.

The proposed project size (30 MW) and overall distance from Quinn River rules out the use of 25 kV for the generation tie line. The transmission voltage at Quinn River substation is 115 kV, which is a little on the large size for 30 MW. However, a gen tie at 115 kV will require only one (1) 115 kV transformer at the project site and no additional transformation at Quinn River. Assuming that a significant portion of the 25 kV ROW can be used, a new 115 kV generation tie line is estimated at approximately $400,000 per mile[5]. Assuming a total distance of 45 miles, the estimated cost for the generation tie is $18 Million.

Study Assumptions and Input Information

The electric system (115 kV and above) in the region of the project site is included in the 2012 WECC power flow model. This is a heavy summer full loop[6] representation of the WECC including all major transmission lines and substation. To confirm the loading in the model, contact was initiated with Harney Electric to discuss, in general terms, the prospect of interconnection to their system. Following is a summary of the discussion.

<u>Discussion of Quinn River</u>

HE does not publish their Interconnection Queue as most of the larger utilities typically do. However, HE engineering staff provided the following information: Currently, there are two interconnection customers in the HE Interconnection Queue proposed for interconnection at Quinn River Substation.

Queue Position	Interconnection Customer	Project Capacity (MW)	Technology	Interconnection Facility	Status
1	Horizon Energy	150	Wind	Quinn River 115kV Substation	Feasibility Study

[4] Discussion with HE is needed to verify circuit distance.
[5] Note that the costs $400,000/mile is significantly below the estimated $700,000/mile given network upgrade costs. The difference in costs are attribute to larger conductor size, larger support structures, insulators, etc.
[6] "Heavy summer full loop" refers to the conditions modeled. "Heavy Summer" refers to high summer time loading and power transfers from generation rich areas. "Full loop" refers to the fact that he model includes all of the major lines within the WECC including the Pacific AC 500 kV intertie and the major transmission running north to south through the eastern WECC area.

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2	Oregon Power Solution	80	Wind	Quinn River 115kV Substation	Feasibility Study

Table 1 – Harney Electric Interconnection Queue Projects Proposed at Quinn River[7]

Discussion of Fields

As discussed above, the HE electric system provides two exit points from their system, one to the north into Oregon, and the other to the South into Nevada. Fields substation connects to the northern part of the system into Oregon. The HE staff explained that under current conditions, the north part of the system was very constrained with approximately 1400 MW of wind power proposed for interconnection. The engineer at HE explained that there were no transmission upgrades planned in the northern part of the system and integrating all of this wind power under current conditions will require massive network upgrades of the whole northern network.

Queue Position	Interconnection Customer	Project Capacity (MW)	Technology	Interconnection Facility	Status
1	Unknown	400	Wind	North System of HEC	Feasibility Study
2	Unknown	80	Wind	North System of HEC	Feasibility Study
3	Unknown	150	Wind	North System of HEC	Feasibility Study

Table 2 – Harney Electric Interconnection Queue Project Proposed in the Northern System[8]

HE engineer also explained that an additional 800MW of wind has projects have expressed interest in interconnection to the northern system but have not made a formal interconnection requests nor been assigned to the queue.

General Comments from Harney Electric Engineer

Location is constrained with many segments of overhead line with small conductor size. Engineer estimated that there is about 80 MW of capacity remaining between Quinn River and Bottle Creek 115 kV stations. However, the two projects currently in the queue will utilize this spare capacity and likely trigger upgrades as well. As far as Fields Substation is concerned, there is no capacity available on their lines as 1400 MW of wind is to be integrated on to the northern network under current conditions as no transmission upgrades have been planned. HEC considers the 115 kV system as a distribution

[7] Queue listing based on discussion with Harney Electric staff. Harney Electric is not in the practice of posting a generation queue available to the general public.
[8] See Footnote 5.

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circuit because it is radial and not part of the bulk transmission system network. Conductor sizes are very small and interconnecting any generation may require substantial network upgrades.

Assessment of Quinn River Interconnection

The purpose of this high level analysis is to determine the maximum capacity that can be installed at Quinn River 115kV substation. It was found, referencing the WECC model, that a maximum of about 160 MW can be installed at this substation under present loading and capacity conditions. This available capacity, as reflected in the WECC power flow model, is in conflict with the information provided by HE, that indicated the available capacity was only ½ this amount or 80 MW. It is very likely, that the HE engineer is much closer to the accurate value due to intimate knowledge of the system and its true limitations. The data provided in the WECC power flow (i.e. line capacities) are quite often reflective of just the conductor rating and do not always include more restrictive / actual limits. This can be attributed to the fact that the limiting element may be a switch(s), buss segment, or protective equipment that is not included in the WECC model data.

McGee Mountain is proposed to be a 30 MW based loaded geothermal generator. If it is assumed that no other projects (specifically the two wind projects provided by HE staff) continue development and interconnection to Quinn River, then there are not expected to be any upgrades required to support a 30 MW interconnection. Moreover, using the more conservative value of 80 MW form HE, for available capacity, there are not expected to be upgrades for a project up to 80 MW. Additions above 80 MW will likely identify some level of upgrade.

Using the WECC model, with 160 MW injection at the Quinn River 115 kV bus, the loading on line segment between Quinn River and Bottle Creek was found to be 99.7% of the normal line rating (See Figure 4). The following table shows all lines that experienced a change in loading greater than 10%. As expected, all line segments between Quinn River and Winnemucca experienced significant increase in loading, with all segments in excess of 83% of the normal line rating.

As listed above, HE has indicated that there are two projects currently proposed for interconnection to Quinn River totaling 230 MW (150 MW horizon project and 80 MW Oregon Power project). If these projects actually move forward, there will be significant upgrades required to all line segments between Quinn River and Winnemucca. The total length of this transmission is approximately 80 miles (See Attachment A, single line diagram for individual segment lengths).

Additionally, the power flow analysis found 1 potential overload within the Nevada Energy area at the Tracy 120 kV substation. This is most likely a limit on the 120 kV bus within the Tracy substation (See Table 3, Tracy to Tracy E 120 kV). This resulting flow was found to be 91.7 % of the bus rating.

It should be anticipated that the Nevada Energy Power Co. will also identify network and reliability upgrades associated with any generation interconnected to Harney Electric. It is standard policy for neighboring utilities to coordinate impact studies to ensure identification of all potential issues.

Contingency Analysis

The 115kV system around the vicinity is on a radial feed with power being fed directly to the local loads around the area from a single source. If contingencies are to occur at the 115kV circuit, either an island will be created or load will be lost as studied in PSLF simulations using a 2012 WECC Heavy Summer Base case. Consequently, it is expected that for the HE system, upgrades will be based on normal line loading limits and not on N-1 contingency emergency limits.

Assuming Nevada Energy Power will also review the proposed injections and resulting impacts to their system, it is expected that they will run an exhaustive contingency analysis within their system. While this detail of analysis is beyond the scope of this document, it is very likely, based on line loading near and in excess of 60% at the Tracy substation, that upgrades will be required to protect against emergency overloads.

Potential Upgrade Costs

Scenario 1:

Recognizing the challenges with development of renewable projects, especially wind projects with relatively low capacity factors (30 to 40% annually) compared to base loaded geothermal with high capacity factors (90% and above), it is reasonable to assume that the two proposed wind projects may be delayed or canceled due to project economics. Under this assumption, there will be a minimum of approximately 80 MW of surplus capacity available for the McGee Mountain project. Consequently, for a project no larger than 80 MW, few if any upgrades are expected. For a more modest sized project of 30 MW, no upgrade costs are expected.

Worst case scenario is that all proposed projects continue to pursue development and interconnection to Quinn River. If we assume that Geothermal Tech proposes a project of roughly 30 MW and we factor in the existing 230 MW of proposed projects, the total line capacity must be near 260 MW. This will require increasing the existing capacity between Quinn River and Winnemucca. Following are two potential cost estimate scenarios:

Scenario 2:

Upgrade to double (i.e. bundled) conductor. Assuming that some poles and equipment will need to be replaced as well as adding the new conductor and all support insulators, a

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reasonable budgetary estimate is $700,000 per mile or $56 million. This cost would be assigned pro-rata to the proposed projects on a $/MW basis. The estimated cost per MW is $215,400, a rather large figure compared to other projects ZGlobal has analyzed in the WECC. The share for 30MW project is estimated to be approximately $6.5 million.

Under Scenario 2, the capacity will essentially be doubled due to the addition of a second (i.e. bundled conductor) . This is expected to increase the line capacity to approximately 300 MW. Given this capacity increase, plus local load of roughly 10 MW, the proposed McGee Mt. project can be increased to as much as 80 MW without triggering upgrades in excess of the $56 million. If the project size was increased to 80 MW (total proposed by all projects is 310 MW), the $/MW costs will reduce to $180,600/MW. The share for 80 MW project is estimated to be approximately $14.5 million.

Scenario 3:

If any additional MW's are proposed, beyond the 310 MW discussed above (i.e. if Geothermal Tech proposed 100 MW instead of 80 MW for a total of 330 MW for all proposed projects) the system will require upgrade to 230 kV. This will be a significant upgrade with an estimated cost of $2,000,000 per mile resulting in a total upgrade cost of $160 million or $485,000/MW. The cost assignment for a 100 MW plant under this scenario will be approximately $48.5 million.

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							Pre Flows			Post Flows			
FROM	FNAME	FKV	TO	TNAME	TKV	CK	MVA	AMPS	%RATE	MVA	AMPS	%RATE	DELTA
64211	BOTLE CR	115	64212	QUINN RV	115	1	7.3	33	4.3	149.4	760	99.7	142.10
64209	VAL SWT	115	64211	BOTLE CR	115	1	15.5	70.5	9.2	140.6	719.8	94.5	125.10
64208	DAVY TWN	115	64209	VAL SWT	115	1	28	127.5	16.7	129.2	657	86.3	101.20
64174	WINN BPA	115	64208	DAVY TWN	115	1	32.8	150.9	19.8	130.2	631.4	83.5	97.40
64138	WINN SUB	120	64174	WINN BPA	115	1	32.9	151.3	22.3	130.2	631	88	97.30
64114	TRACY	120	64116	TRACY E	120	1	156.1	725.6	60.1	236.5	1107.5	91.7	80.40
64115	TRACY	345	64130	VALMY	345	1	233.9	389.8	22	289.8	486.1	27.4	55.90
64114	TRACY	120	64119	TRACY G3	13.8	1	41.7	193.8	34	97.2	455.1	79.2	55.50
64115	TRACY	345	64130	VALMY	345	2	224.6	374.3	21.1	278.1	466.4	26.3	53.50
64115	TRACY	345	64207	TRACY E	50	1	124.5	207.5	44.5	166.3	278.9	59.4	41.80
64116	TRACY E	120	64207	TRACY E	50	1	123.2	572.6	44	164.4	769.6	58.7	41.20
64014	NGPP	120	64173	ONIONPLT	120	1	9.5	44.5	13	33	155.7	45.6	23.50
64036	DESRT TP	120	64173	ONIONPLT	120	1	9.5	44.3	13	32.9	155.1	45.5	23.40
64116	TRACY E	120	64463	DOVE	120	1	36.5	169.5	16.9	59.8	279.8	28	23.30
64077	MIRA LMA	345	64951	TRACY W	345	1	265.6	444.8	22.2	287.3	484.3	24.2	21.70
64036	DESRT TP	120	64039	EAGLE	120	1	35.8	166.7	48.8	57.3	270.1	79.1	21.50
64115	TRACY	345	64128	VAL ROAD	345	1	306.8	511.4	28.5	327.2	548.8	30.5	20.40
64125	VAL RD N	120	64127	VAL ROAD	120	1	158.8	743.5	61.6	179	843	69.8	20.20
64138	WINN SUB	120	64168	STAR PK	120	1	2.9	13.5	3.6	22.3	107.9	18.2	19.40
64115	TRACY	345	64512	EMMA	345	1	191.1	318.5	16.1	208.5	349.8	17.6	17.40
64885	ROBINSON	345	64895	ROBINSON	500	1	240.4	391.2	28.6	256.7	418.3	30.6	16.30
64099	SPAN SPG	120	64391	SULLIVAN	120	1	6.3	29.5	3.9	22.1	104.5	13.5	15.80
64099	SPAN SPG	120	64114	TRACY	120	1	78.3	367.4	47.4	62.1	293.2	37.9	-16.20
64076	MIRA LMA	120	64166	KAISERTP	120	1	27.7	129.7	16.7	10.9	51.5	6.6	-16.80
64114	TRACY	120	64166	KAISERTP	120	1	39.7	184.5	23.7	22.3	104.5	13.4	-17.40
64129	VALMY	120	64130	VALMY	345	1	89.8	414.3	32.2	43.4	204	15.8	-46.40
64129	VALMY	120	64130	VALMY	345	2	91.7	422.8	32.9	44.3	208.3	16.1	-47.40

Table 3: Pre and Post MVA Flow Effects of 160 MW added at Quinn River 115 kV

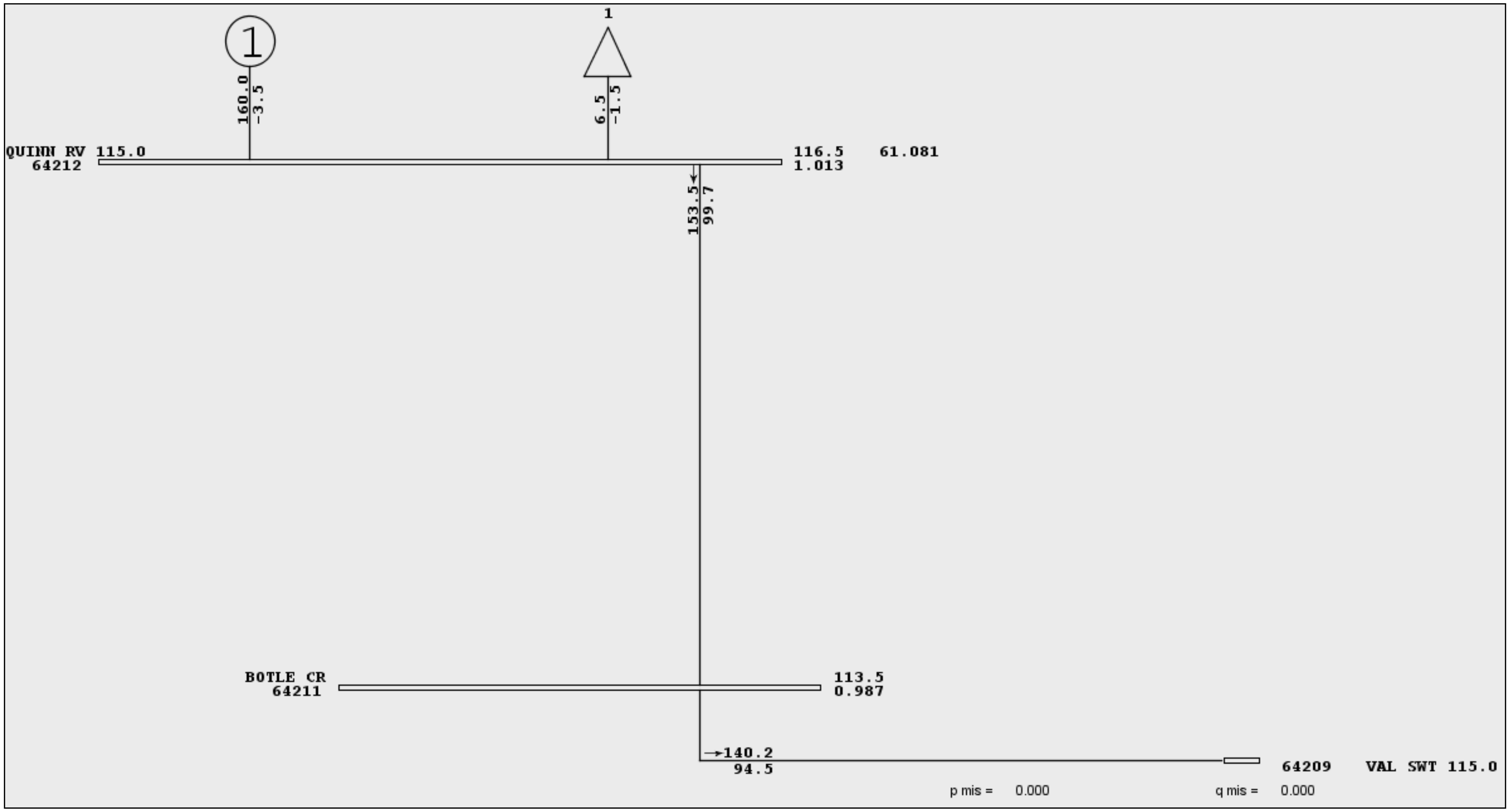

Figure 4: One Line Diagram with 160 MW at Quinn River 115kV Substation under Normal Operation (MW/% Rate)

Assessment of Fields Interconnection

The purpose of this high level analysis is to determine the maximum capacity that can be installed at Fields 115kV substation. It was found that a maximum of about 44 MW can be installed at this substation under present loading and capacity conditions. With 44 MW injection at the Fields 115 kV bus, the loading on the transformer bank at Hanley Lane was found to be 98.7% of the normal rating (See Figure 6). Table 4 shows all lines that experienced a change in loading greater than 10%. The limiting element under normal operation is the transformer bank between Hanly R1 120kV and Hanly R2 115kV is loaded to 98.7% of its line loading when a 44 MW source is connected to the Fields 115kV circuit.

If the transformer bank was upgraded then the limiting factor becomes the 115 kV transmission lines between Fields and Catlow substation, approximately a 30 mile distance (See figure 7 and 8). This line segment reaches 100% of its limit when 105 MW of generation is added at Fields. Although this system, as indicated in Attachment A single line diagram, utilizes similar conductor size (266 MCM ACSR) it has been explained to ZGlobal by Hanley Electric staff that the system is old has many point of reduced capacity, and requires general upgrades as well. The system capacity was verified with HE staff to be 95 MVA existing today with no upgrades. However, there is a limitation due to voltage issues with BPA that was explained to be 80 MW maximum.

Furthermore, as discussed above, the northern system connected to Redmond (Bonneville Power Administration) has approximately 1400 MW of wind generators proposed. The portion of the system between Fields and Redmond is roughly 135 miles in circuit length including 6 substations. Clearly, this level of development is beyond the capabilities of the local system and would be better suited to be included in the development of a jointly used generation tie line.

It should be anticipated that Bonneville Power Administration, will also identify network and reliability upgrades associated with any generation interconnected to Harney Electric. It is standard policy for neighboring utilities to coordinate impact studies to ensure identification of all potential issues.

<u>Contingency Analysis</u>

The 115kV system around the vicinity is on a radial feed with power being fed directly to the local loads around the area from a single source. If contingencies are to occur at the 115kV circuit, either an island will be created or load will be lost as studied in PSLF simulations using a 2012 WECC Heavy Summer Base case. Consequently, it is expected that for the HE system, upgrades will be based on normal line loading limits and not on N-1 contingency emergency limits.

Bonneville Power Administration will certainly require review and approval of the proposed injections and resulting impacts to their system, it is expected that they will run an exhaustive contingency analysis within their system. While this detail of analysis is beyond the scope of this document, very likely, that upgrades will be required to protect against emergency overloads.

Potential Upgrade Costs

It is impractical to estimate the "Worst Case" scenario costs if all proposed projects continue to pursue development and interconnection to Harney Electric 115kV system. And furthermore would not be a likely outcome due to economic justification or comparison to a more likely outcome. Other locations around the WECC with high concentrations of renewable development in "location constrained areas" are generally building large capacity multi user generation tie lines to interconnect multiple projects to the bulk transmission system. An example of this is the Tehachapi Renewable Transmission Project of Southern California Edison. Review of the local region, found two 345 kV potential interconnection points roughly 110 miles from the proposed project site that could possibly support such an interconnection. One is to the west in BPA at Hilltop substation, the other to the south in Sierra Pacific area at Oreana Substation.

Regardless of the projects proposed to the system between Fields and Redmond, there will be upgrades. Assuming the total projects proposed for interconnection are limited to just 90 MW (local load is very small and at mo more than 10 MW), then it is possible that upgrades may be limited to voltage support on both the HE and BPA systems. Such cost could range from $10 Million to $50 Million depending on the magnitude of compensation required by the utility.

							Pre Flows			Post Flows			
FROM	FNAME	FKV	TO	TNAME	TKV	CK	MVA	AMPS	%RATE	MVA	AMPS	%RATE	DELTA
47134	CATLOW	115	47160	FIELDS T	115	1	14.2	69.3	15.1	31.7	139.1	30.3	17.50
47134	CATLOW	115	47166	HANLY R2	115	1	15.7	76.3	19.2	30.1	132.3	30.3	14.40
47165	HANLY R1	115	47166	HANLY R2	115	1	18	89.5	60.2	29.6	140	98.7	11.60
60265	ONTARIO	230	60306	QUARTZ	230	1	96.8	242	20.8	104.9	262.1	22.3	8.10
40875	REDMOND	230	45239	PILOTBT	230	1	154.7	375	41.9	162.6	392.9	43.9	7.90
40233	CHIEF JO	500	40287	COULEE	500	1	167.1	178.7	4.7	174.5	186.5	4.9	7.40
60371	WEISR TP	138	61055	NELSN TP	138	1	5.9	24.8	5.7	11.2	46.6	9.2	5.30
60305	QUARTZ	138	61055	NELSN TP	138	1	17.6	73.4	12.4	22.9	94.9	16.1	5.30
41043	SUMMER L	500	45029	BURNS	500	1	140.9	150.3	8.9	145.8	155.5	9.2	4.90
45029	BURNS	500	60240	MIDPOINT	500	1	140.5	153.4	24.3	145.4	158.7	24.4	4.90
60260	ONTARIO	138	60371	WEISR TP	138	1	23	95.2	18.1	18.5	76.3	14.7	-4.50
40601	KEELER	500	40827	PEARL	500	1	1288	1388.4	53.6	1283.4	1382.9	53.4	-4.60
40699	MARION	500	40827	PEARL	500	1	408.3	437.3	17.2	403.6	432.2	17	-4.70
40621	LAGRANDE	230	40905	ROUNDUP	230	1	220.9	548.3	51.8	216.2	535.1	50.5	-4.70
40621	LAGRANDE	230	60310	QUARTZTP	230	1	148.5	368.6	40.5	143.7	355.6	39.1	-4.80
40905	ROUNDUP	230	41351	MCNRY S1	230	1	290.2	721.8	67.5	285.2	707.9	66.1	-5.00
40597	KEELER	115	41019	ST JOHNS	115	2	36.2	177.2	23.1	31.1	153	20	-5.10
40045	ALLSTON	500	40601	KEELER	500	1	1893.6	2057.4	58.8	1888.4	2051.4	58.6	-5.20
40091	BELL BPA	500	40288	COULE R1	500	6	89.2	94.9	3.3	83.9	89.3	3.3	-5.30
40821	PAUL	500	40869	RAVER	500	1	1112.9	1189.9	41.1	1107.4	1183.9	40.9	-5.50

Table 4 – Pre and Post MVA Flows Effects of 44 MW added at Fields 115kV

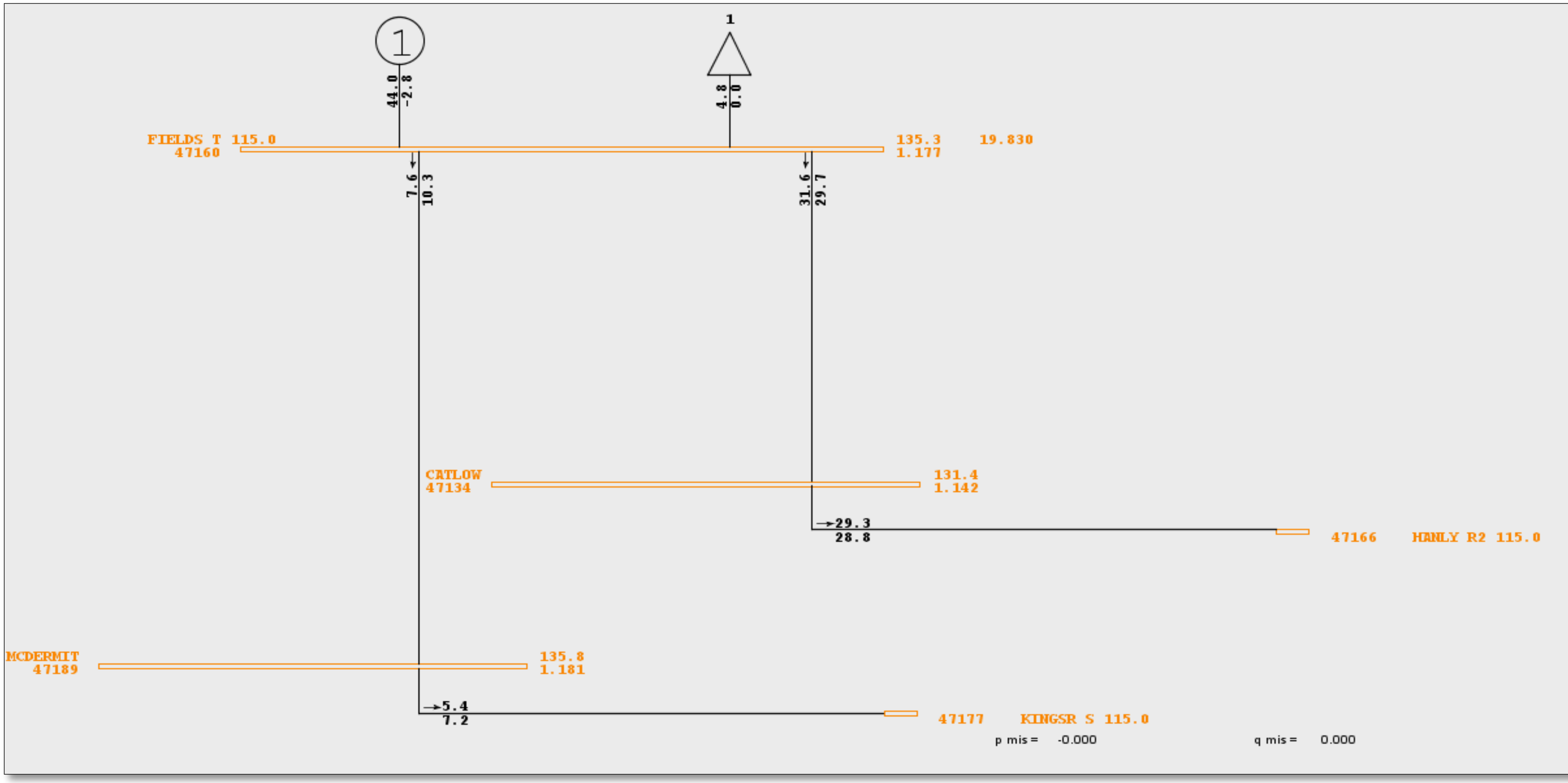

Figure 5: One Line Diagram with 44 MW at Fields 115kV Substation under Normal Operation (MW/% Rate)

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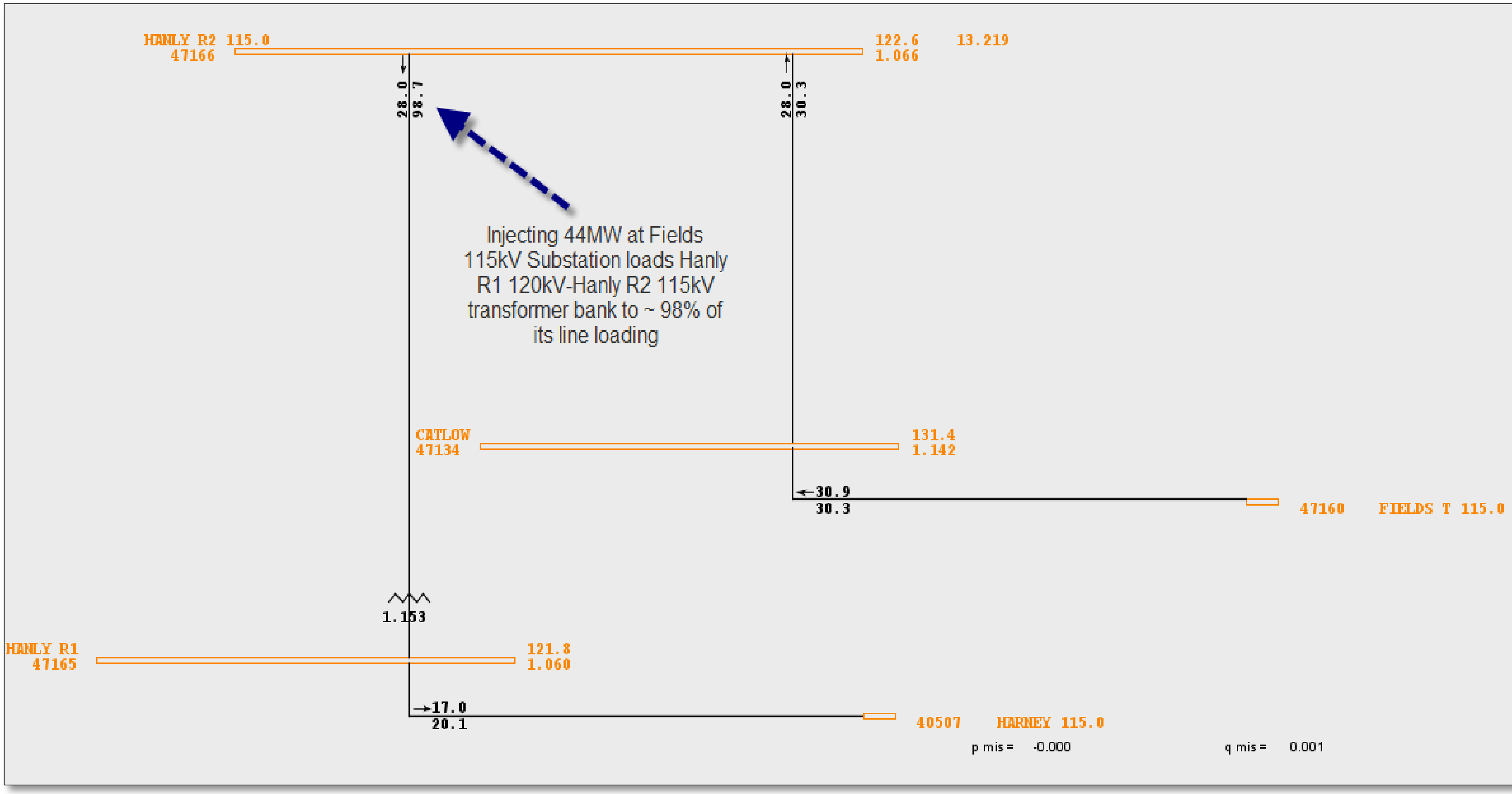


Figure 6: Loading of Hanly R1 120kV-Hanly R2 115kV transformer bank to ~ 98% of its line loading (MW/% Rate)

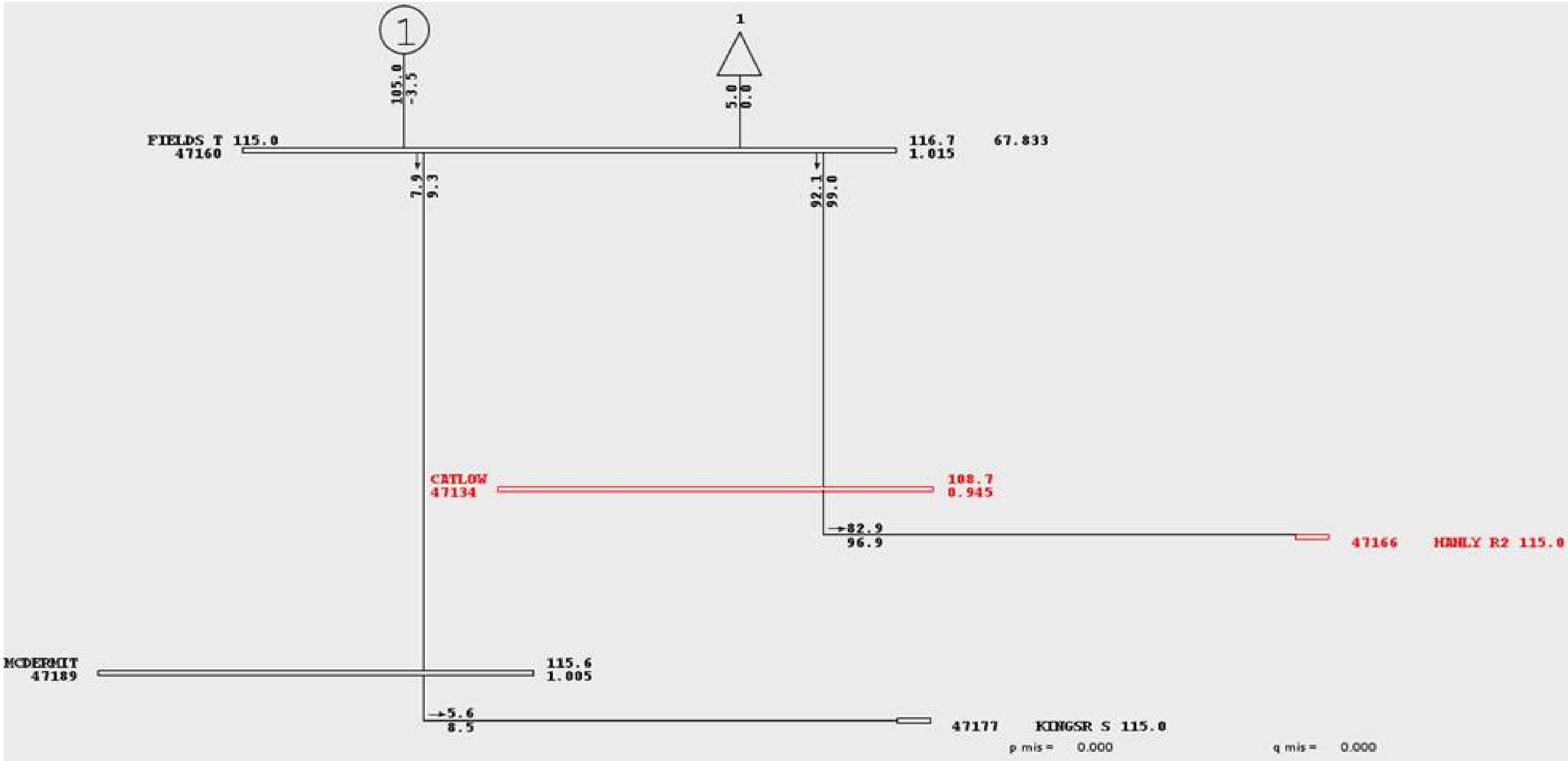


Figure 7: One Line Diagram with 105 MW at Fields 115kV Substation under Normal Operation (MW/% Rate)

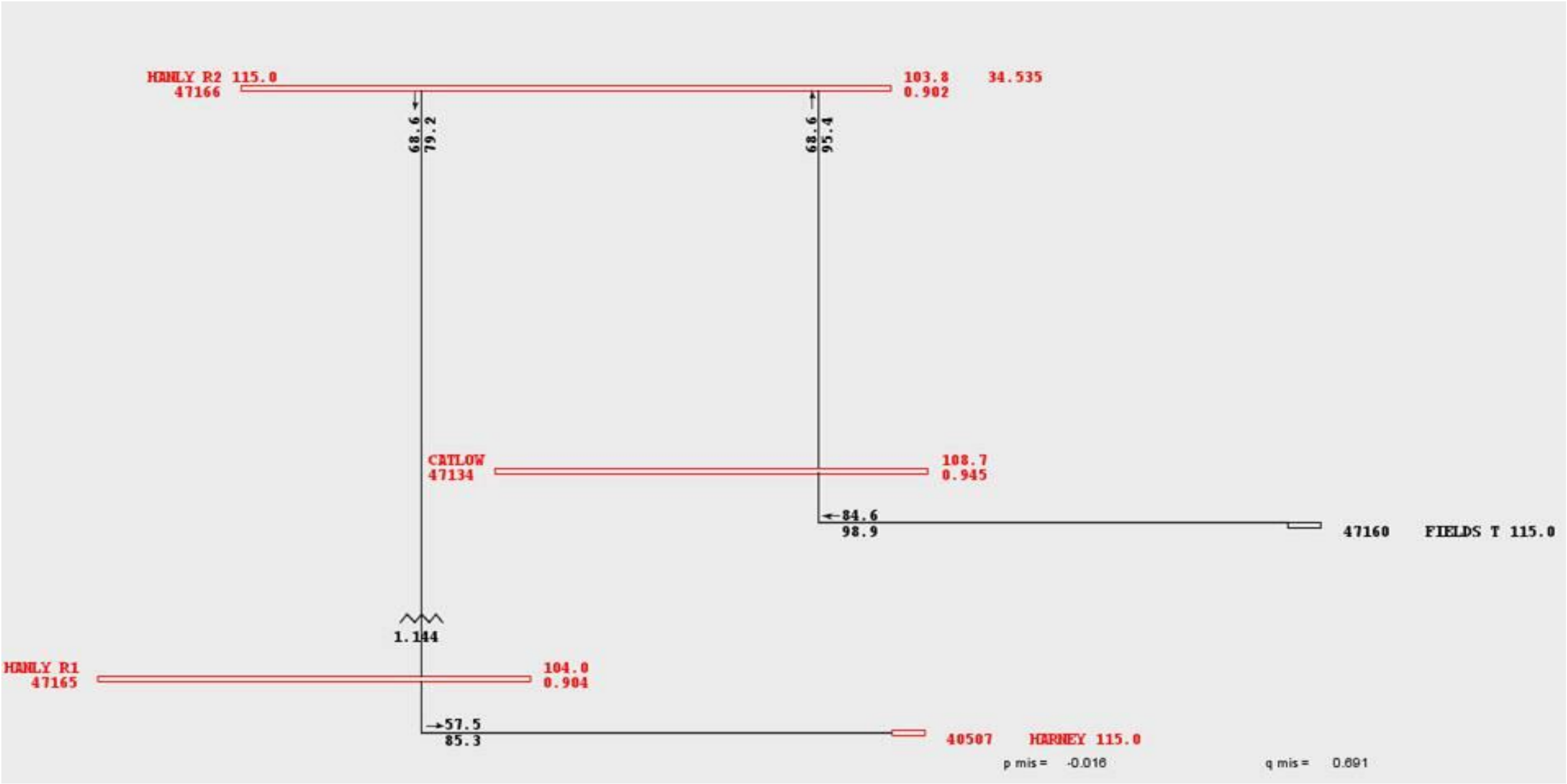
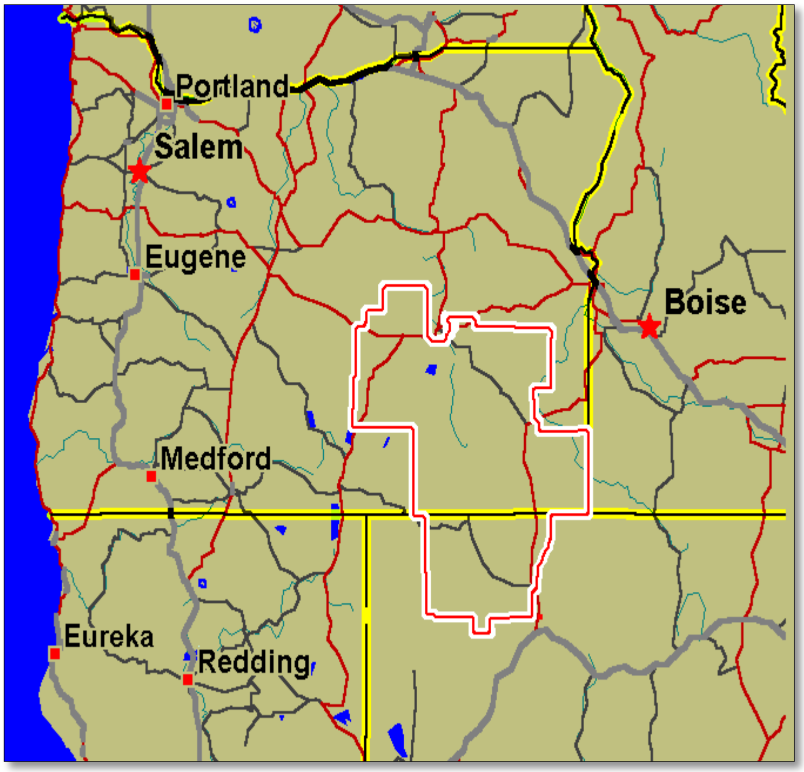


Figure 8: Loading of Fields – Catlow 115 kV ~ 99% of its line limit (MW/% Rate)
Note: power flow indicates significantly reduced voltage levels as well as line limitations.

Appendix A – Harney Electric SLD and Service Area Map

Harney Electric Service Area, as shown in red and white border.



Harney Electric Cooperative Power System