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Successful Discovery Drilling in Roseau Valley, Commonwealth of Dominica

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ABSTRACT

A study completed by the French geological survey, Bureau de Recherches Géologiques et Minières (BRGM), in 1984 suggested the existence of a large geothermal reservoir in the Wotten Waven and Laudat areas of the Roseau Valley (BRGM, 1984). Many surface manifestations are apparent, including hot and warm springs, solfatara, and fumaroles, which produce sodium-chloride water, and exhibit strong ^{18}O isotopic shifts and geothermometer temperatures exceeding 230°C. The possible extent of the system over an area of approximately 8 km^2 was delineated by complimentary resistivity and gravity surveys.

In 2012, the Geothermal Program Management Unit (GPMU) of the Commonwealth of Dominica successfully completed exploration drilling in the Roseau Valley Geothermal Field. Three slim holes were drilled to depths ranging from 1200 m to 1613 m. All of the wells completed in 2012 were productive, with the strongest exhibiting flow rates up to 29 kg/s at a wellhead pressure of 17.5 bar_g. Measured temperatures, as high as 246°C and in agreement with earlier BRGM exploration, are accompanied by neutral pH, low salinity fluids. ELC Electroconsult S.p.A (ELC) evaluated the results of the well tests and provided a preliminary volumetric reservoir assessment, using a Monte Carlo approach, estimating indicated and inferred potentials of 60 MW and 90 MW, with probabilities of 90% and 60%, respectively. Aside from providing technical assistance from 2009 to 2013, ELC also selected the well sites for WW-1, WW-2, and WW-3. Development of the Roseau Valley geothermal resource is continuing in 2014 with the drilling of full-size production and injection wells, and feasibility studies for the construction of a 10-15 MW power plant.

1. INTRODUCTION

The Commonwealth of Dominica is a Caribbean island nation located in the Lesser Antilles of the West Indies (Figure 1). Seeking alternative energy sources native to their island, the Commonwealth of Dominica is developing geothermal resources in the Roseau Valley. Two specific sites, Laudat and Wotten Waven, were selected for the exploratory drilling. Laudat is located in the northeast end of the valley, at an elevation of about 550 m, while Wotten Waven is further down the valley at an elevation of 235 m. These sites were chosen based on exploration studies conducted between 1951 and 2008 that led to the creation of the conceptual model, completion of the feasibility study, and the execution of the exploratory drilling and testing campaign discussed below.

2. PREVIOUS EXPLORATORY WORK

Between 1984 and1985, BRGM conducted field exploration studies including structural and hydrothermal alteration mapping, geochemical sampling of springs and fumaroles, and geophysical (MT and gravity) surveys in the Commonwealth of Dominica. These studies were subsequently complimented by others completed under the direction of the Organization of American States (OAS) by CFG Services in 2005. All of the studies contributed to development of an initial conceptual model of the potential geothermal resource area (Figure 2). The 2005 study by CFG included lithology and stratigraphic mapping at 1:10,000 scale, structural mapping, thermal feature mapping, and chemical sampling of the chloride-rich springs postulated by BRGM to be produced by the deep reservoir (CFG, 2005). CFG substantiated the BRGM assessment of deep fluid temperatures of 210-230°C to 250-300°C. Other results from the CFG study suggested possible sites for well locations as well as the preliminary geographic limits of the reservoir model. Their findings included evidence for the existence of a deep, high temperature reservoir.

3. PROGRAM MANAGEMENT

With the formation of the GPMU, the Commonwealth of Dominica established an oversight committee for all geothermal-related activities on the island. This allowed for a centralized approach to administrative issues and provides streamlined processes for logistics, procurement, and project execution. Throughout all phases of the drilling project, this approach from a supportive government administration was invaluable to the successful completion of the program objectives. For the 2011 to 2012 drilling campaign, Iceland Drilling Company (IDC) was the drilling contractor, Iceland GeoSurvey (ISOR) provided geologic and geochemical services, and performed the well testing, and Geothermal Resource Group (GRG) provided supervision of drilling and well testing activities. The wells will be presented in this paper in the order in which they were drilled: WW-2, WW-3, and WW-1.

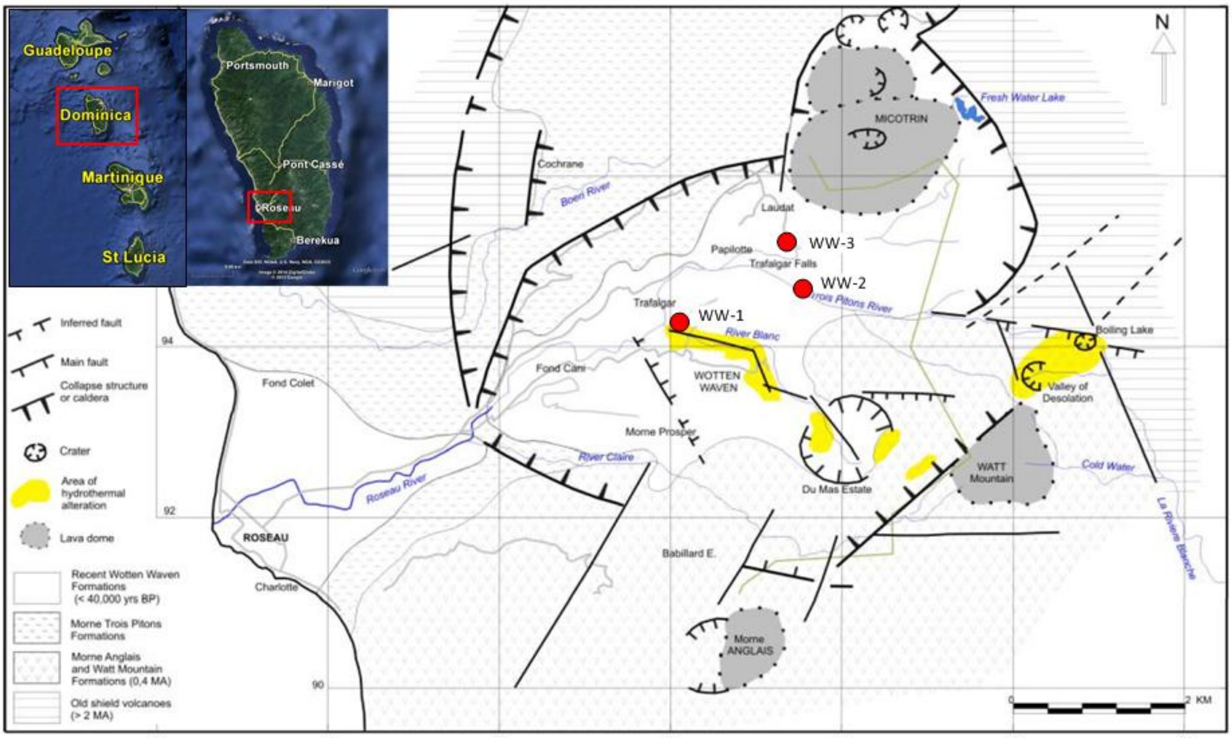

Figure 1. Discovery well locations shown on structural geology map of Roseau Valley (after BRGM, 1985).

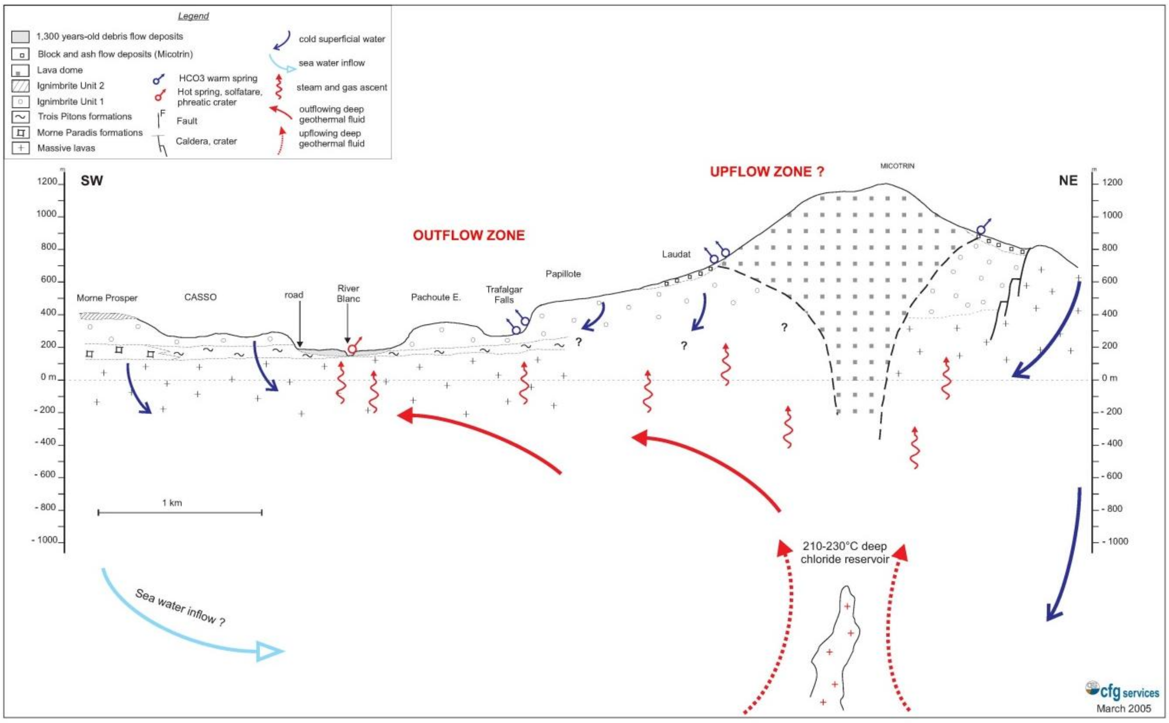

Figure 2. Northeast-southwest cross-section of conceptual model of Roseau Valley geothermal field, extending from the Micotrin dome in the northeast to Morne Prosper in the southwest (CFG Services, 2005).

4. EXPLORATORY WELL WW-2

4.1 Drilling and Completion

Well WW-2 was drilled vertically to a measured depth of 1469 m in 65 days. A 12-¼” hole was drilled to 80.7 m with intermittent, partial to full losses of circulation, and 9-5/8” casing was set at 79 m. An 8-½” hole was drilled, again with partial to complete losses of circulation, and 7” casing was run and cemented at 428 m. Due to persistent and severe losses, cement returns to surface were poor. The 6-1/8” hole section was drilled to 903 m. At this depth, the well began to flow, with indications of high gas concentration, requiring a series of well killing operations to maintain well control. Drilling continued, using water and polymer sweeps, without returns, to the final total depth (TD) at 1469 m (Figure 3). Again the well began to flow, but was controlled by pumping water through the annulus at 15 L/s. While running the 4-½” liner, an obstruction was encountered at 360 m. Several trips were required to ream and clear obstructions, which resulted in hole instability. Thus, when the 4-½” liner was installed, substantial fill was encountered. As a result the liner string was left sitting on fill at a depth of 1337 m. This covered up permeable entries 1393 m and 1425 m that might otherwise contribute to higher productivity. With the liner left sitting on bottom, subsequent remedial operation can be conducted to remove the fill and open the deep entries for additional production or injection capacity.

The lithology encountered during the drilling of WW-2 from surface to 140 m is predominantly pyroclastics intermixed with ash flow deposits. From approximately 140 m to 290 m, the lithology is primarily fine grained crystalline igneous rocks, with some evidence of slightly oxidized dacite. From 290 m to approximately 450 m, tuff and crystalline rock is dominant. Below 450 m, breccia is the dominant lithology to nearly 560 m, underlain by tuff and crystalline rock to 800 m. Due to severe circulation losses below 800 m, sample recovery was sparse, but observations indicated lithified breccia and tuff.

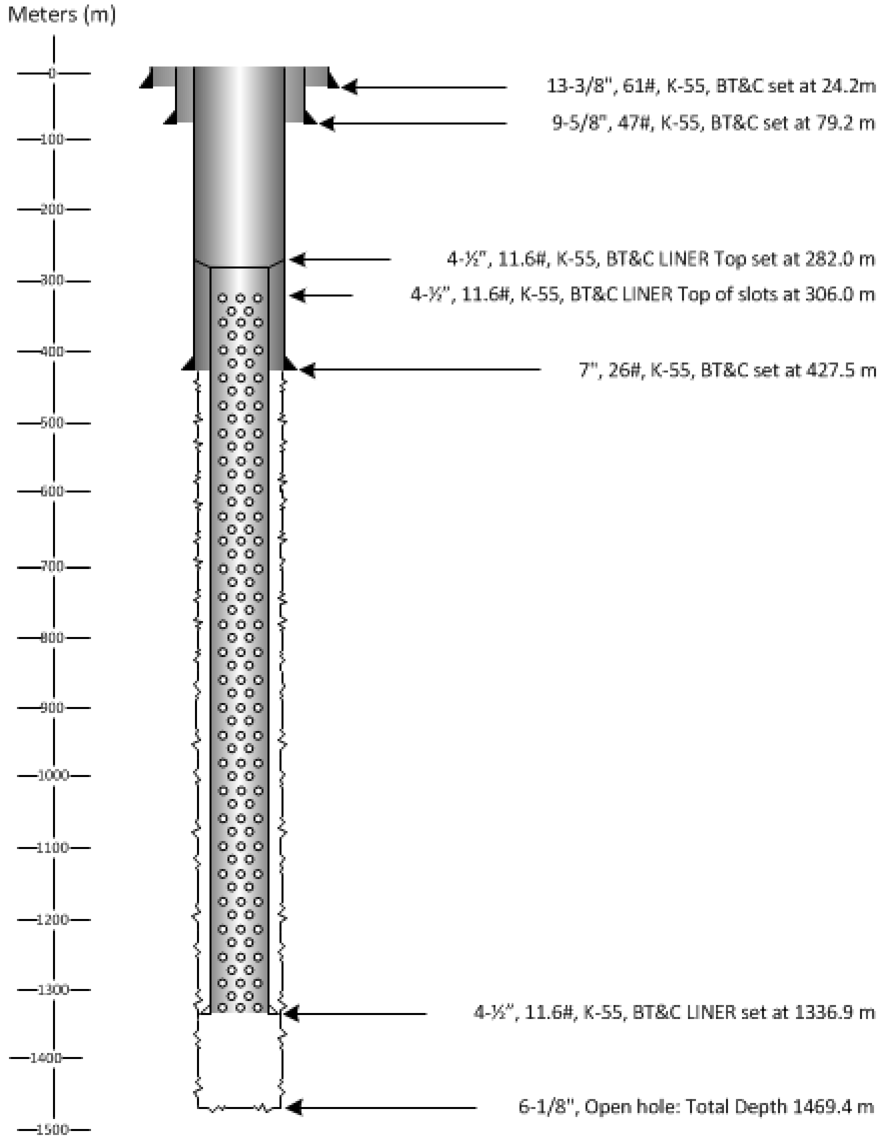

Figure 3. WW-2 as-built well profile.

4.2 Logging

The representative temperature logs of all three wells are shown in Figure 4. The maximum static temperature measured in WW-2 was 242°C at 1161 m (-601 mASL) after 50 days of thermal recovery subsequent to flow testing, and 88 days after drilling was completed. A temperature reversal of approximately 10°C is apparent from this depth to TD. The flowing survey shows major fluid entries at depths around 880 m (-300 mASL) and 1100 m (-520 mASL), and a maximum flowing temperature below the depth of first boiling at 660 m (-80 mASL) of 198°C. However, a cool fluid entry at 445 m and a gas-rich entry at 460 m severely impacted the flowing temperature. Subsequent well completions need to keep entries at this depth behind casing, allowing production of lower gas fluid from deeper, hotter formation.

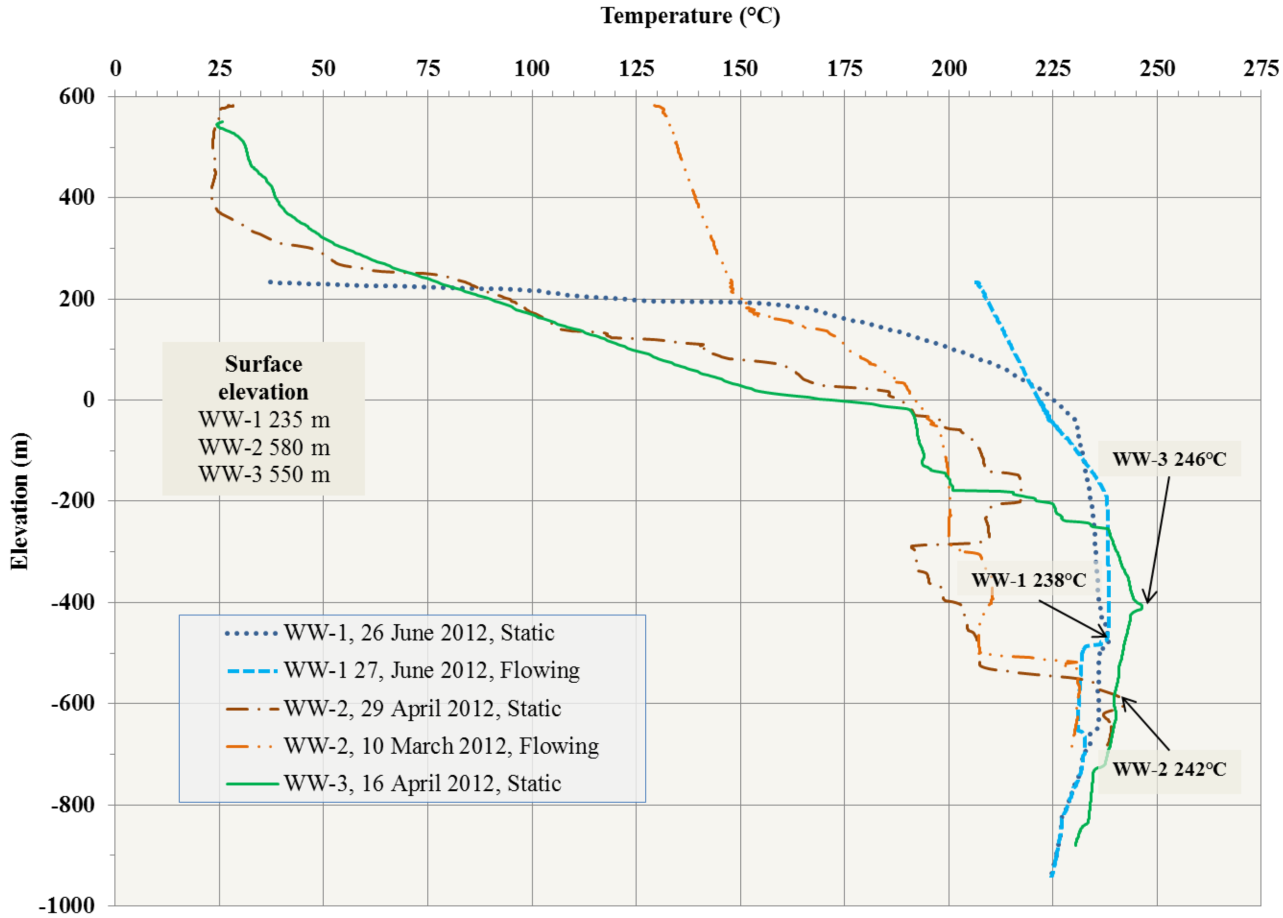

Figure 4. Representative static and flowing temperature data for WW-1, WW-2 and WW-3.

4.4 Flow Testing

The flow test equipment used for all three wells consisted of a flow tee, flow line, flow control valve, 3" (7.62 cm) James tube, atmospheric cyclone separator, and v-notch weir box. Typical data collection included wellhead pressure (WHP), flow line pressure, control valve position, line pressure, lip pressure and weir height. Enthalpy was determined using the method of James (1970). Flow tests for all three wells were short due to limited sump size for geofluid storage, and the lack of injection wells.

Flow testing of WW-2 was conducted 9-10 March 2012. Representative test data is shown in Table 1. The WHP immediately prior to the flow test was 32 bar_g. The wellhead gas cap was vented to atmosphere through the 3-1/8" top valve to induce flow and initiate the test. The maximum total mass flow rate of 6.6 kg/s occurred at a WHP of 3.8 bar_g and with an enthalpy of 940 kJ/kg. The test duration was only 31 hours due to limited storage capacity. Using several assumptions, this measured thermal output represents a power generation potential of approximately 0.5 MW_g.

Table 1. Representative data from WW-2 flow test on 9-10 March 2012.

Time	WHP (bar_g)	Flow (kg/s)	Water (L/s)	Steam (kg/s)	Enthalpy (kJ/kg)
11:35	2.2	5.4	4.4	1	830
11:55	2.3	5.5	4.2	1.3	950
12:30	2.1	5.2	4	1.2	940
14:10	2.2	6.4	5.3	1.1	790
14:35	2.2	6.4	5.3	1.1	800
14:55	2.2	6.4	5.3	1.1	810
15:30	2.3	6.4	5.3	1.1	820
16:15	2.7	6.5	5.3	1.2	830
8:30	3.7	6.5	5	1.5	960
10:45	3.8	6.6	4.9	1.7	980
15:10	3.8	6.6	5.1	1.5	940

4.5 Chemical Sampling and Analysis

Samples were extracted from the flow line using a Weber sampling separator, and then condensed and cooled through a stainless steel condenser coil immersed in a water bath. A variety of samples (neat, acidified, and diluted) were collected for field and laboratory analysis of liquid constituents. Fractions used for analysis of chlorine, boron, fluorine and total dissolved solids (TDS) were filtered through 0.2 µm cellulose acetate filter membrane. Fractions used for analysis of cations and trace elements were filtered through 0.2 µm cellulose acetate filters and acidified with nitric acid. Fractions used for sulfide analysis were filtered and preserved with addition of 0.2 M zinc acetate. Untreated fractions for determination of volatiles were collected in airtight amber glass bottles and were analyzed in the field laboratory. Evacuated glass flasks preserved with 10M sodium hydroxide were used for collection of gas samples. This sample collection method was the same for all three wells.

Representative liquid and gas analytical results for WW-2 are shown in Table 2. The produced liquid is a near-neutral pH and relatively low salinity Na-Cl water with a total dissolved solids (TDS) concentration in the surface liquid phase of 4160 mg/L. The steam fraction at sample conditions was close to16%, indicating a TDS concentration corrected to total mass flow of approximately 3500 mg/L. Gas concentrations were very high in the produced fluids, apparently due to the high pressure, gas-rich entry at 460 m just below the casing shoe. Measured gas concentrations were highly variable from 60-75 wt%. This equates to a concentration in total mass flow of approximately10 wt%. Comparison of enthalpy measured at the surface to the enthalpy measured with flowing temperature and pressure surveys indicated significant excess enthalpy, possibly also related to shallow, high gas entry. Subsequent well completions in this area using a deeper casing depth should mitigate this high gas concentration in production fluid.

Table 2. Representative liquid (left) and gas (right) chemistry data for WW-2.

Date/Time	10 Mar 2012 14:00
Sampling Temperature	140°C
pH (°C)	6.08 (24°C)
Conductivity (µs/cm, 20°C)	5,900
Total Inorganic Carbon as CO_2 (mg/L)	455
H_2S (mg/L)	1.4
Na (mg/L)	1,260
K (mg/L)	159
Ca (mg/L)	33.3
Cl (mg/L)	1,990
Mg (mg/L)	2.2
SiO_2 (mg/L)	428
B (mg/L)	24.0
F (mg/L)	0.5
Al (mg/L)	0.10
SO_4 (mg/L)	51.6
TDS (mg/L)	4,160

Date/Time	10 Mar 2012 11:30
CO_2 (mg/kg)	598,000
H_2S (mg/kg)	1,839
Ar (mg/kg)	141
N_2 (mg/kg)	13,053
CH_4 (mg/kg)	1,301
H_2 (mg/kg)	147
Total (mg/kg)	614,000

5. EXPLORATORY WELL WW-3

5.1 Drilling and Completion

Well WW-3 was drilled vertically to a measured depth of 1613 m in 34 days. A 17-½” hole was drilled to 30.7 m, and 13-3/8” casing was set and cemented in place. A 12-¼” hole was drilled to 158 m with full returns, and 9-5/8” casing was run to 155 m and cemented in place. An 8-½” hole was drilled from 158 m to593 m with full returns, and 7” casing was set and cemented at 590 m. Subsequently, 6-1/8” hole was drilled with full returns until encountering total loss of circulation (TLC) at 1082 m. The hole was drilled without returns to 1085 m, at which depth partial circulation was regained. The hole was then drilled to 1173 m, losing drilling fluid at an average of 12 L/s, where TLC was again encountered. The hole was then drilled without returns to TD at 1613m, and a 4-½” liner was set on bottom at 1611 m (Figure 5). After the completion of the well, attempts to conduct flowing wireline surveys during the flow test revealed that a casing collapse had occurred at a depth of about 27 m. This very likely occurred due to the presence of water trapped between casings. This casing damage will be repaired in a subsequent remedial repair operation as a part of the ongoing drilling and workover campaign.

The initial lithology encountered from surface to 200 m is predominantly pyroclastic igneous rock and ash flow deposits. Lithology from 200 m to 580 m is breccia with altered dacite/andesite, and from 580 m to 920 m the lithology is oxidized breccia mixed with highly altered tuff. From 920 m to 1040 m, lithology is mostly tuff with evidence of pyrite mineralization, along with glass-rich, light green tuff. From 1040 m to TD at 1613 m, sparse lithic fragments suggest a mixture of breccia and pyroclastic material.

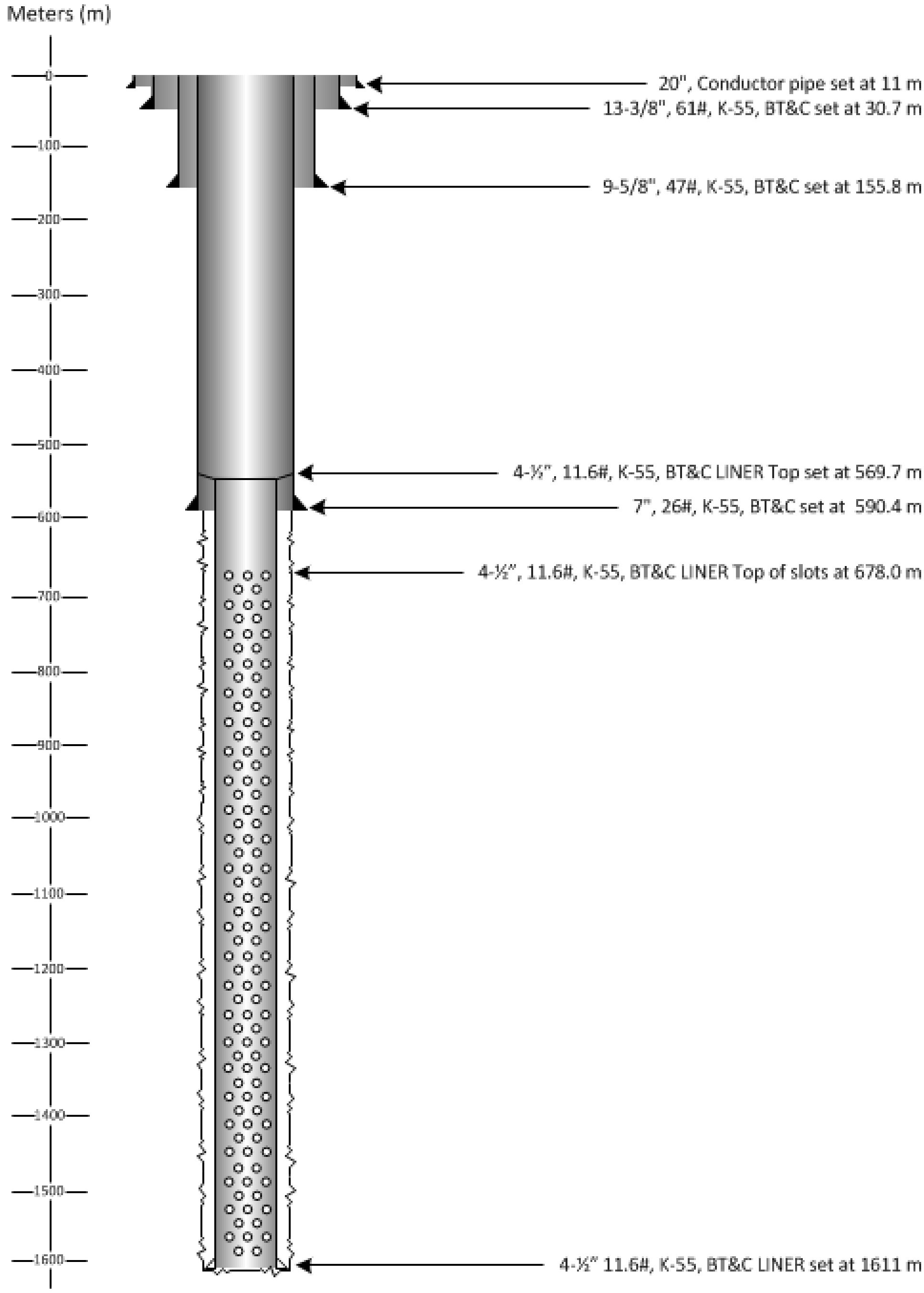

Figure 5. WW-3 as-built well profile.

5.2 Logging

After the drilling of WW-3 was completed 16 March 2012, the well was left shut in until a static pressure and temperature survey was conducted immediately prior to the flow test on 16 April 2012 (Figure 3). This allowed 31 days for thermal recovery after drilling was completed. The maximum measured static temperature was 246°C at 958 m (-408 mASL), with a temperature reversal of about 15°C from this depth to TD. Flow surveys were not possible due to the obstruction at 27 m. The static temperature log shows isothermal conditions, with a slight indication of a temperature reversal within the bottom interval of the well.

5.3 Flow Testing

On 17 April 2012, the wellhead crown valve was opened to vent the gas cap to atmosphere and initiate flow. Prior to opening the well, the shut-in WHP was 36 bar_g. After venting the gas cap, two-phase flow was then diverted to the atmospheric separator. The initial flowing wellhead pressure of 11 bar_g quickly increased and stabilized at 13 bar_g (Table 3). The measured enthalpy was 980 kJ/kg with a total mass flow rate of 25 kg/s (96 ton/hr) at 13 bar_g WHP. Applying several assumptions, this well output suggests a power generation potential of approximately 2.9 MWg. However, the flow test duration was limited to 8 hours due to limited sump volume, and flow was restricted by the shallow casing obstruction discussed above. Productivity might be significantly higher following the repair of the shallow casing obstruction. Therefore, a longer flow test will be conducted following casing repair to better characterize well output and fluid composition.

Table 3. Representative flow test data for WW-3 on 17 April 2012.

Time	WHP	Flow	Water	Steam	Enthalpy
	(bar_g)	(kg/s)	(L/s)	(kg/s)	(kJ/kg)
14:00	11 - 13	24.9	18.8	6.1	980
14:30	12 - 14	26.6	20.4	6.2	950
16:15	12 - 14	32.2	25.3	6.9	900
16:30	12 - 14	11.5	8.4	3.2	1030

5.4 Chemical Sampling and Analysis

Chemical sampling was conducted with the method described above for WW-2. Representative liquid and gas sample chemistry is shown in Table 4. The TDS in the liquid phase was approximately 5,300 mg/kg. Total gas concentrations were approximately 39,000 mg/kg, with H_2S concentrations of about 1600 mg/kg. At the flowing WHP of 13 bar_g and measured enthalpy of 943 kJ/kg, the steam fraction at the sample location was close to 6.6%. Correction to total mass flow conditions indicates a TDS of 4900 mg/kg, total gas concentration of 2900 mg/kg, and H_2S of 106 mg/kg. The measured enthalpy agrees with the likely reservoir liquid enthalpy calculated from the downhole temperature survey, thus indicating no excess enthalpy. Therefore, these fluid compositions should provide the best representation of reservoir fluid composition from the three wells sampled.

Table 4. Representative liquid (left) and gas (right) chemistry data for WW-3.

Date/Time	17 Apr 2012 14:00
Sampling Temperature	180°C
pH (°C)	6.27 (24.6°C)
Conductivity (µs/cm 20°C)	8,800
Total Inorganic Carbon as CO_2 (mg/L)	95.2
H_2S (mg/L)	17
Na (mg/L)	1,550
K (mg/L)	237
Ca (mg/L)	67
Cl (mg/L)	2,770
Mg (mg/L)	0.2
SiO_2 (mg/L)	513
B (mg/L)	35
F (mg/L)	1.2
Al (mg/L)	0.34
SO_4 (mg/L)	26.4
TDS (mg/L)	5,330

Date/Time	17 Apr 2012 13:00
CO_2 (mg/kg)	36,330
H_2S (mg/kg)	1,640
Ar (mg/kg)	10.4
N_2 (mg/kg)	626
CH_4 (mg/kg)	5.7
H_2 (mg/kg)	9.0
Total (mg/kg)	38,600

6. EXPLORATORY WELL WW-1

6.1 Drilling and Completion

WW-1 was drilled vertically to a measured depth of 1200 m in 40 days. A 20" conductor was installed at 13 m. A 17-½" hole was drilled with full returns, and 13-3/8" casing was set and cemented at 53 m. A 12-¼" hole was drilled to 161 m with full returns, and 9-5/8" casing string cemented at 161 m. An 8-½" hole was drilled to 303 m with full returns, and 7" casing was cemented at 301 m. The 6-1/8" hole was drilled with full returns to 419 m, where TLC occurred. Drilling continued to 1200 m, with only intermittent partial returns, while pumping 20 L/s water with polymer sweeps through the drill string and 15 L/s through the annulus. A 4-½" liner was set on bottom at 1200 m (Figure 6).

The lithology encountered during the drilling of the first 310 m consisted of mostly andesite with alteration in the intermediate sections. Hydrothermal alteration of andesite increased with depth, as evidenced by quartz-filled veins. A homogeneous formation of breccia with calcite and abundant pyrite was logged from approximately 310 m to 410 m. A massive andesite that showed oxidation and increasing alteration with depth was logged from 410 m to 880 m. Epidote is apparent, but scarce, below 750 m. No sample cuttings were available below 880 m due to TLC.

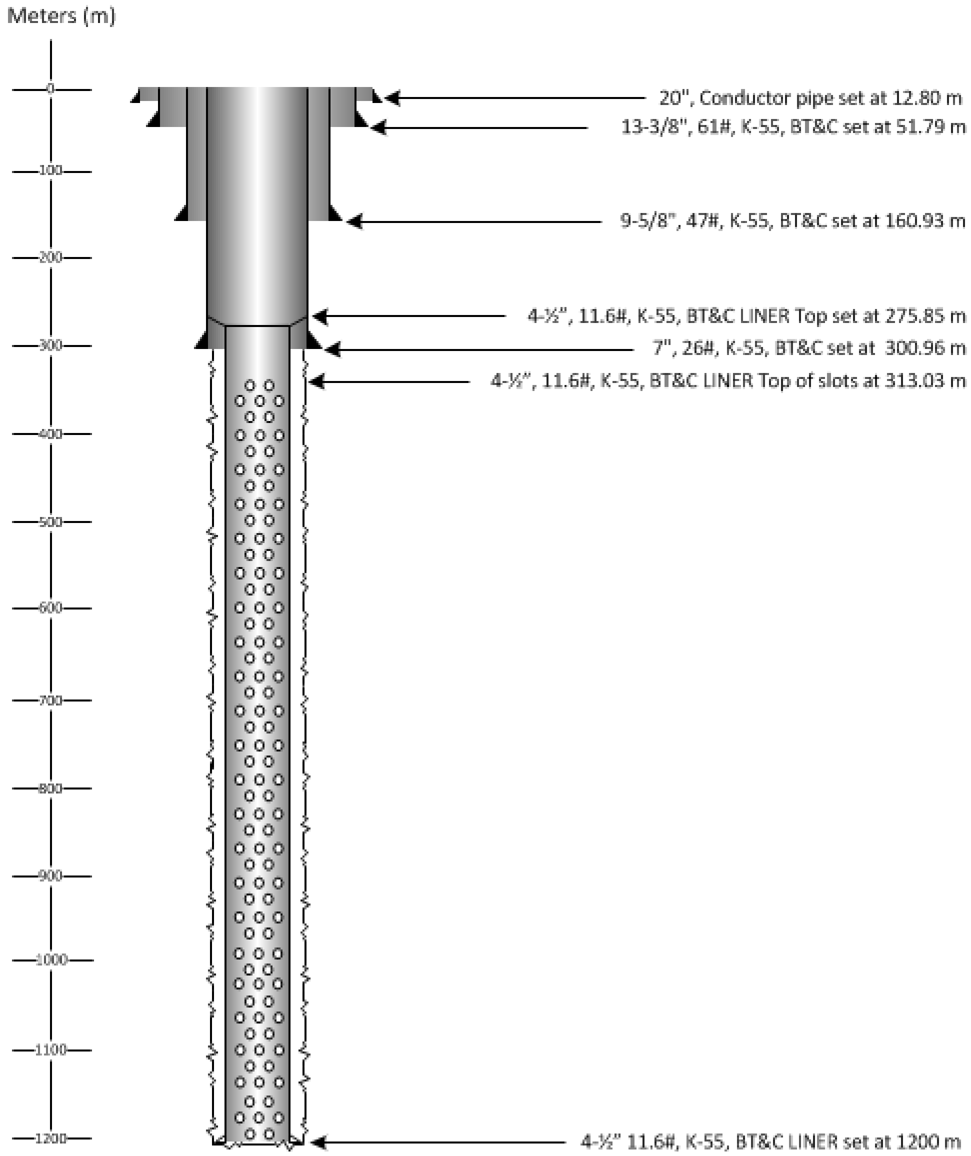

Figure 6. WW-1 as-built well profile.

6.2 Logging

A static pressure and temperature survey was conducted on 26 June 2012, after allowing 59 days of thermal recovery in the wellbore (Figure 3). Logs indicate a maximum temperature of 238°C at -460 mASL. The well appears relatively isothermal from 320-700 m (-85 to -465 mASL), with a reversal of approximately 15°C to TD, similar to both other wells. A flowing survey conducted during the short flow test on 27 June recorded the maximum measured flowing temperature at 238°C, which suggests a reservoir liquid enthalpy of 1028 kJ/kg.

6.3 Flow Testing

The flow test of WW-1 was conducted on 27 June 2012. Due to the high productivity and limited water storage capacity, the test was terminated after only 9 hours. The wellhead pressure immediately prior to testing was 5 bar_g, but rapidly increased and stabilized at 18 bar_g immediately after opening. A maximum total mass flow rate of 29 kg/s (104 ton/hr) was measured at 17.5 bar_g WHP. Using the same assumptions as in the previous analysis, this indicates a thermal output equivalent to 3.9 MW_g. The measured enthalpy at these conditions was 1163 kJ/kg. This enthalpy is significantly higher than the enthalpy indicated by the flowing temperature survey, suggesting some preferential production of steam from the reservoir relative to liquid.

Table 5. Representative flow test data for WW-1 on 27 June 2012.

Time	WHP	Flow	Water	Steam	Enthalpy
	(bar_g)	(kg/s)	(L/s)	(kg/s)	(kJ/kg)
9:14	18.0	26.9	18.5	8.4	1125
10:00	17.9	24.5	15.8	8.7	1223
10:15	17.9	22.7	15.1	7.5	1170
12:45	17.5	28.7	19.3	9.5	1163
13:15	17.9	27.1	18.0	9.1	1178
13:50	17.8	28.6	19.3	9.3	1156
14:15	17.7	27.1	18.3	8.8	1155
14:45	19.4	16.8	11.4	5.4	1148
14:55	20.2	17.3	12.2	5.2	1095
15:45	20.3	17.2	12.0	5.2	1105
16:30	20.8	8.0	5.3	2.7	1184

6.4 Chemical Sampling and Analysis

Complete sample sets of steam, condensate and liquid were collected during the test. Samples were also collected from the weir box once every hour and analyzed for pH and conductivity. Representative liquid and gas analyses are shown in Table 5. The TDS in the liquid phase was 5,340 mg/kg. The total gas concentration was 23,600 mg/kg, with an H_2S concentration of 590 mg/kg. At the flowing WHP of 17.5 bar_g and measured enthalpy of 1163 kJ/kg, the steam fraction at the sample location was close to 14.6%. Correction to total mass flow conditions indicates a TDS of 4600 mg/kg, total gas concentration of 3400 mg/kg, and H_2S of 86 mg/kg. If the enthalpy measured calculated from the flowing temperature survey is used, the steam fraction for correction is approximately 7.5% and the total mass flow TDS is 4900 mg/kg, and total gas concentration is 1700 mg/kg.

Table 6. Representative liquid (left) and gas chemistry (right) data for WW-1.

Date/Time	27 Jun 2012 10:20
Sampling Temperature	213°C
pH (°C)	5.9 (23.6°C)
Conductivity (µs/cm 20°C)	8,610
Total Inorganic Carbon as CO_2 (mg/L)	134.3
H_2S (mg/L)	3.3
Na (mg/L)	1,640
K (mg/L)	228
Ca (mg/L)	61.5
Cl (mg/L)	2,720
Mg (mg/L)	<0.09
SiO_2 (mg/L)	450
B (mg/L)	35
F (mg/L)	64.2
Al (mg/L)	0.13
SO_4 (mg/L)	16.3
TDS (mg/L)	5,340

Date/Time	27 Jun 2012 14:20
CO_2 (mg/kg)	22,900
H_2S (mg/kg)	590
Ar (mg/kg)	1.4
N_2 (mg/kg)	67.6
CH_4 (mg/kg)	1.1
H_2 (mg/kg)	0.7
Total (mg/kg)	23,600

7. DISCUSSION

Three wells have been successfully completed and tested in the Roseau Valley geothermal field. All wells were productive. WW-1 was exceptionally productive for a 4-1/2" slim hole completion, with output up to 107 ton/hr at 18 bar_g wellhead pressure. The productivity of WW-2, the discovery well, may be substantially limited due to drill cuttings covering permeable entries near TD, and production of high pressure, gas-rich steam just below the casing shoe. These shallow entries were cased off in WW-3 and WW-1, eliminating this undesirable production. Likewise, the productivity of WW-3, although very strong, was restricted by a shallow casing obstruction that will be repaired as part of ongoing drilling and workover activities. The flow tests were very short due to limited produced liquid storage capacity and lack of injection wells. Longer flow tests are planned in the future, using nearby wells for injection of produced water.

All three wells exhibit a very high shallow thermal gradient to an elevation of near 0 mASL, near isothermal conditions at 235°-245°C to approximately -600 mASL, and then a temperature reversal of 10°-15°C to -900 mASL. The productive depths in all three wells are quite similar when corrected for elevation. All three wells show maximum temperatures near 240°C, in good agreement with early BRGM and CFG exploration and feasibility studies. The well chemistries, after consideration of some excess enthalpy and high gas concentration from shallow entries, especially in WW-2, suggest very similar reservoir chemistry across the drilled area. The wells produce near-neutral pH, Na-Cl fluids with total mass flow salinities of 3500-5000 mg/kg. Gas concentrations, after corrections for excess enthalpy and shallow gas entries, suggest concentrations in total mass flow of 3000-3500 mg/kg. Geothermometry, evaluated using equations for silica and cation geothermometry (Fournier and Potter, 1982b, and Fournier, 1983; Table 7), yields quartz and Na-K-Ca temperatures that are in good agreement with temperatures measured by wireline survey.

The consistency in temperature and fluid compositions between the three wells substantiates the conceptual model that the Wotten Waven area in the southwest surrounding WW-1, and the Laudat area in the northeast around WW-2 and WW-3represent a single, liquid-dominated reservoir of about 8 km^2 in aerial extent. With the limited data available, there is no indication of substantial cooling or dilution from Laudat to Wotten Waven, as expected by the outflow conceptual model.

Table 7. Geothermometry and total mass flow chemistry results for WW-1, WW-2 and WW-3.

Well	T_{Qtz} (°C)[1]	T_{NaK} (°C)[2]	Maximum Measured Temperature (°C)	TMF TDS (mg/kg)	TMF Gas (wt. %)
WW-1	246	247	238	4600	0.34
WW-2	242	238	242	3500	10
WW-3	261	256	246	4900	0.29

[1]Fournier and Potter, 1982b

[2]Fournier, 1983

8. CONCLUSIONS

Three exploratory wells were successfully drilled and completed in the Roseau Valley Geothermal Field of the Commonwealth of Dominica. These discovery wells proved geothermal reserves and estimated a field potential of 65 MW, with a 90% Monte Carlo Method probability. The successful drilling and completion of three exploratory wells in the Commonwealth of Dominica serves as a milestone for geothermal development in the country and for the entire Caribbean region. Development continues with operations currently underway on the island, including production and injection well drilling.

9. ACKNOWLEDGEMENTS

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