

Appendix A: Experimental Test Data of Temperature Responses

Table S1: Measured ΔT and sectional water injection rate data for the injection rate influence test.

No.	Actual Injection Rate, m ³ /d	Simulated Injection Rate, ml/min	Parameter	Simulated Reservoir Permeability, mD						
				1#	2#	3#	4#	5#	6#	7#
1	129	20	$\Delta T, ^\circ\text{C}$	2.941	2.797	2.724	2.318	2.238	2.149	1.946
			$q_f, \text{m}^3/\text{d}$	22.288	21.198	20.645	17.566	16.960	16.288	14.747
			$q_m, \text{ml/min}$	3.329	3.155	3.173	2.579	2.579	2.404	2.240
2	259	40	$\Delta T, ^\circ\text{C}$	3.120	3.058	2.924	2.572	2.385	2.183	2.004
			$q_f, \text{m}^3/\text{d}$	44.353	43.474	41.569	36.562	33.904	31.036	28.487
			$q_m, \text{ml/min}$	6.840	6.704	6.410	5.638	5.228	4.786	4.393
3	389	60	$\Delta T, ^\circ\text{C}$	3.385	3.323	3.183	2.798	2.420	2.247	2.018
			$q_f, \text{m}^3/\text{d}$	67.978	66.739	63.930	56.184	48.592	45.123	40.532
			$q_m, \text{ml/min}$	10.483	10.292	9.859	8.664	7.493	6.958	6.250
4	589	80	$\Delta T, ^\circ\text{C}$	3.751	3.587	3.521	2.948	2.592	2.307	2.049
			$q_f, \text{m}^3/\text{d}$	93.760	89.660	88.014	73.678	64.787	57.658	51.213
			$q_m, \text{ml/min}$	14.459	13.827	13.573	11.362	9.991	8.891	7.898
5	648	100	$\Delta T, ^\circ\text{C}$	3.992	3.891	3.720	3.182	2.690	2.388	2.077
			$q_f, \text{m}^3/\text{d}$	117.986	115.006	109.951	94.044	79.503	70.585	61.386
			$q_m, \text{ml/min}$	18.195	17.735	16.956	14.503	12.260	10.885	9.466

Note: q_f (m³/d) represents the field-equivalent sectional water injection rate, and q_m (mL/min) represents the laboratory simulated sectional water injection rate.

Table S2: Measured ΔT and sectional water injection data under different injection times.

No.	Simulated Injection Rate, ml/min	Injection Time, h	Parameter	Simulated Reservoir Permeability, mD						
				1#	2#	3#	4#	5#	6#	7#
1	20	0.1	$\Delta T, ^\circ\text{C}$	15.961	14.180	12.145	7.779	5.883	4.697	3.831
			$q_f, \text{m}^3/\text{d}$	24.755	23.292	20.236	16.065	15.725	14.284	13.943
			$q_m, \text{ml/min}$	4.9326	4.26	3.7488	2.4546	1.8066	1.3984	1.1702
2	20	0.5	$\Delta T, ^\circ\text{C}$	15.833	14.062	11.838	7.116	5.642	4.572	3.693
			$q_f, \text{m}^3/\text{d}$	24.955	23.407	20.564	16.339	15.959	14.285	13.885
			$q_m, \text{ml/min}$	5.039	4.4344	3.7658	2.2608	1.791	1.45	1.17
3	20	1	$\Delta T, ^\circ\text{C}$	15.739	13.928	11.696	7.071	5.558	4.483	3.537
			$q_f, \text{m}^3/\text{d}$	25.138	23.862	20.861	16.403	15.963	14.231	13.704
			$q_m, \text{ml/min}$	5.076	4.492	3.7722	2.2806	1.7926	1.446	1.1408

Note: q_f (m³/d) represents the field-equivalent sectional water injection rate, and q_m (mL/min) represents the laboratory simulated sectional water injection rate.

Table S3: Measured ΔT and sectional water injection data under different injection temperatures.

No.	Simulated Injection Rate, ml/min	Injection Temperature, °C	Parameter	Simulated Reservoir Permeability, mD						
				1#	2#	3#	4#	5#	6#	7#
1	20	35	$\Delta T, ^\circ\text{C}$	24.792	23.772	23.029	19.402	18.204	17.343	16.344
			$q_f, \text{m}^3/\text{d}$	22.503	21.577	20.902	17.61	16.523	15.742	14.834
			$q_m, \text{ml/min}$	3.1945	2.8515	2.9475	2.4405	2.2725	2.2525	2.0125
2	20	45	$\Delta T, ^\circ\text{C}$	13.687	12.737	11.758	9.267	8.475	7.881	7.577
			$q_f, \text{m}^3/\text{d}$	24.868	23.142	21.363	16.836	15.397	14.319	13.766
			$q_m, \text{ml/min}$	3.735	3.469	3.094	2.596	2.474	2.068	1.953
3	20	50	$\Delta T, ^\circ\text{C}$	9.655	9.032	8.32	6.259	5.759	5.369	5.003
			$q_f, \text{m}^3/\text{d}$	25.35	23.714	21.845	16.433	15.12	14.096	13.135
			$q_m, \text{ml/min}$	3.8824	3.6304	3.4824	2.7074	2.3054	2.1474	1.9794
4	20	55	$\Delta T, ^\circ\text{C}$	3.992	3.891	3.72	3.182	2.69	2.388	2.077
			$q_f, \text{m}^3/\text{d}$	23.597	23.001	21.99	18.809	15.901	14.117	12.277
			$q_m, \text{ml/min}$	3.7528	3.5208	3.4048	2.9148	2.6658	2.0908	1.9068

Note: q_f (m^3/d) represents the field-equivalent sectional water injection rate, and q_m (mL/min) represents the laboratory simulated sectional water injection rate.

Table S4: Measured ΔT data of each injection section under different injection locations.

No.	Simulated Injection Rate, ml/min	Injection Location	Parameter	Simulated Reservoir Permeability, mD						
				1#	2#	3#	4#	5#	6#	7#
1	20	Heel injection	$\Delta T, ^\circ\text{C}$	21.317	18.804	16.120	7.447	5.275	2.570	0.248
	40		$\Delta T, ^\circ\text{C}$	23.198	18.835	16.012	7.539	4.426	2.416	0.129
	60		$\Delta T, ^\circ\text{C}$	23.703	18.052	15.970	7.297	3.742	2.089	0.153
2	20	Toe injection	$\Delta T, ^\circ\text{C}$	21.528	20.447	19.568	15.955	14.760	13.537	0.343
	40		$\Delta T, ^\circ\text{C}$	23.602	22.066	20.762	16.778	15.374	13.854	0.116
	60		$\Delta T, ^\circ\text{C}$	24.828	23.947	23.068	20.055	18.860	17.637	0.481
3	20	Middle injection	$\Delta T, ^\circ\text{C}$	22.912	21.601	20.233	6.339	1.741	0.348	0.171
	40		$\Delta T, ^\circ\text{C}$	23.912	22.601	21.233	7.805	3.481	0.548	0.371
	60		$\Delta T, ^\circ\text{C}$	25.734	24.746	23.799	9.105	4.781	1.848	1.671
4	20	Both-end injection	$\Delta T, ^\circ\text{C}$	21.919	20.465	19.646	7.911	4.951	3.372	0.346
	40		$\Delta T, ^\circ\text{C}$	22.899	21.445	20.032	8.100	5.744	4.216	0.746
	60		$\Delta T, ^\circ\text{C}$	23.516	21.868	20.546	8.811	5.851	4.272	0.796

Note: ΔT represents the temperature variation of each injection section.