CASE STUDY

ClearWELL
Continuous Scale Control

CLEARWELL ADDRESSES SEVERE SCALING IN A 17-WELL PAD WITH MULTIPLE EARTHING POINTS.

LOCATION: Alberta, Canada **APPLICATION:** Gas Lift **DEPTH:** Approx. 2,700m

BEFORE CLEARWELL™

An onshore multi-well pad of 12 gas lift wells in Alberta, Canada had been severely affected by calcite and barite scaling downhole. Scale was also forming on surface equipment including manual valves, actuated valves, meter run chambers, dump valves, pressure sensing points and the choke.

Individual well performance was poor, with regular shut-downs for chemical remediation operations every 1-3 months. Continuous but costly chemical injection was also implemented at the wellhead to treat the surface lines and equipment.

Due to the ongoing scaling problem, high remediation costs and lost production, plus plans to introduce additional wells to this facility, an alternative solution was sought by the operator.

The facility was treated by ClearWELL in two stages. The first installation very successfully addressed the scaling problems in the initial 12 wells and surface equipment, resulting in no further scale-related remediation operations, shut-downs or loss of production.

After five months of scale-free production, the operator added another five wells to the pad and requested ClearWELL's support to protect the new wells.

The facility had been developed with a complex architecture whereby each well was in very close proximity to the next and connected to each other through the surface system. The additional five wells were installed with metal support piles and an underground meshed system.

Site testing by ClearWELL concluded that the facility had multiple ground paths and loops which would affect the normal propagation of the electromagnetic field. Figure 1 below shows a representation of the piles and resulting ground loops.

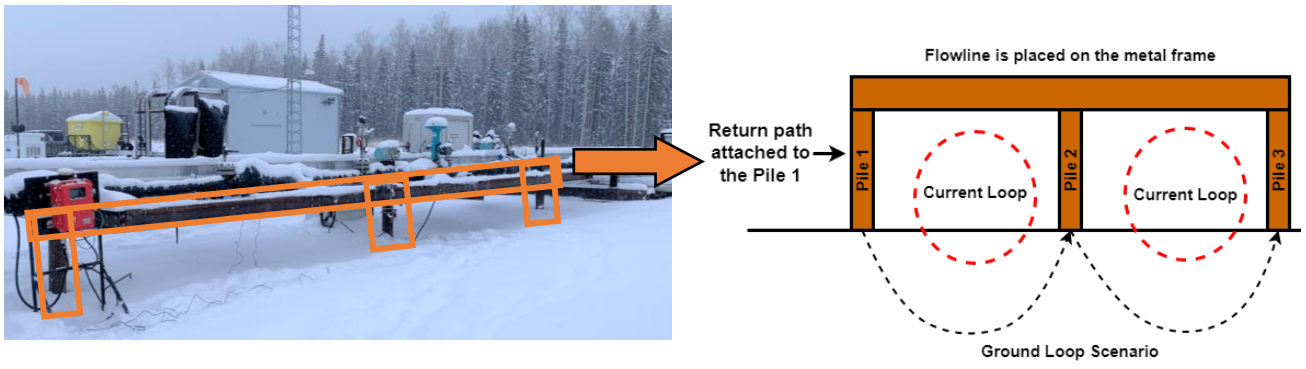

Figure 1

ClearWELL

Continuous Scale Control

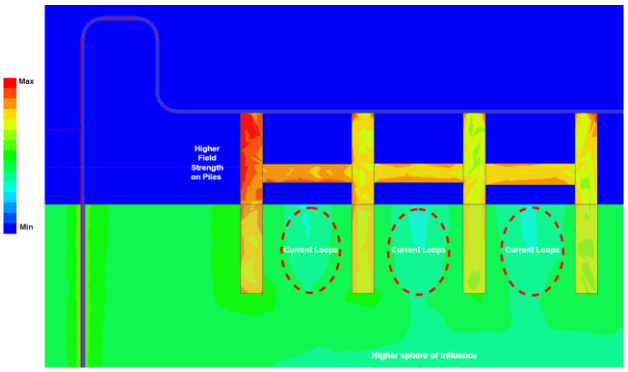

Figure 2: EM simulation demonstrating ground loop formation when the piles act as a return path.

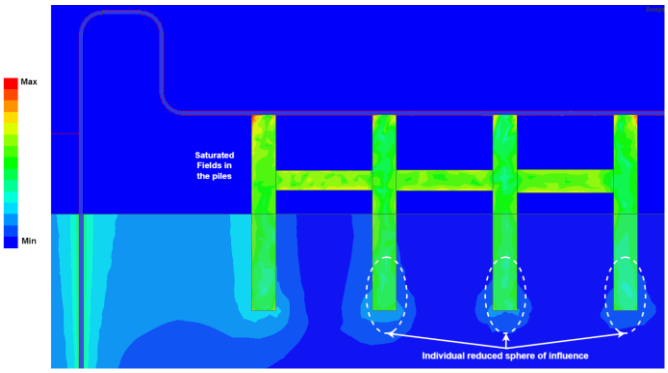

Figure 3: EM simulation demonstrating no current loop formation between the piles due to the addition of independent ground rods.

ClearWELL used its Ansys electromagnetic (EM) simulation software to model the effect of the piles which would act as earthing connections for the electromagnetic field (EMF). Figure 2 shows the initial low signal propagation downhole (blue), the high magnitude of the field (red and yellow) in the piles and the large ground loop phenomenon created between the connected piles (green and turquoise) due to the complex architecture of this facility.

To address the issue, ClearWELL added independent ground rods that acted as individual return paths for each unit's signal.

Figure 3 is a model of the EMF using the new rods and shows the elimination of the ground loops between the piles (blue). Also, it can be seen that the sphere of influence between the piles has significantly reduced and as a result, the ground loop is eradicated.

AFTER CLEARWELL™

Following EMF simulation modelling and site testing, independent ground rods were installed to provide dedicated return paths for each of the ClearWELL™ units.

The new wells have been operating for eight months with no requirement for intervention due to scale build-up. ClearWELL continues to monitor key performance indicators for all 17 wells remotely and the client has reported increased productivity and reduced costs associated with the elimination of previous remediation and intervention operations, chemicals, personnel, cleanout equipment and services.

Having demonstrated their value in inhibiting scale formation, further ClearWELL™ units have been added to other multi-well pads for this operator. All the units are still successfully in operation, delivering outstanding cost and performance benefits.

Whilst this facility's architecture is unusual, ClearWELL now routinely measures ground resistance and resistivity as part of its pre-installation surveys to ensure effective signal propagation and increase assurances for the operator.

QUICK FACTS

- Continuous chemical injection and regular remediation treatments could not prevent severe calcite scaling which stopped production every 1-3 months.
- Despite complex facility architecture, with multiple circuit ground paths, ClearWELL engineered an effective treatment solution.
- ClearWELL™ eliminated scaling and use of chemicals.
- The operator made significant OPEX savings and reversed their prior production revenue losses.
- The operator is now a repeat customer after experiencing ClearWELL™'s benefits first-hand.

THE PROCESS

- The ClearWELL™ unit is connected to production equipment at the surface wellhead – no intervention required, no loss of production.
- The unit transmits a pulsed radio frequency signal down into the wellbore or along flowlines and equipment. The pulsed signal delivers energy to the scaling ions, controlling precipitation, keeping the liquid below saturation and minimising scale growth on production equipment.
- ClearWELL use satellite monitoring to ensure optimum unit performance. Where required personnel perform regular non-intrusive equipment checks.
- ClearWELL systems are low power consumption and supplied as a certified Class 1, Zone 1. The AC signal system is corrosion neutral, no reported gauge signal interference.

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