Technical
Report

DRILLING & COMPLETION REPORT
REPUBLIC SERVICES – NEWTON COUNTY LANDFILL CLASS I FACILITY
NEWTON COUNTY LANDFILL IW-1
USEPA PERMIT: IN-111-1I-0001

Sec. 28-T29N-R8W

Class I Non-Hazardous Deepwell
Newton County, Indiana
Republic Services

February 2023

Volume 1 of 4

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1.0 EXECUTIVE SUMMARY

This report documents the installation and testing of the Republic Services (Republic), Newton County Landfill (NCL) Class I injection well IW-1 in Newton County, Indiana. Following location preparation and installation of conductor pipe in July of 2022, the well was drilled from October 19 to December 2, 2022. A majority of the initial testing and completion was conducted during December 2022 and January 2023. After well stimulation, additional mechanical integrity and reservoir testing was completed in January of 2023. Throughout this report, unless otherwise noted, drilling and completion depths are referenced to the drilling rig Kelly Bushing (KB) elevation (17 feet above ground surface).

The 20-inch diameter conductor casing was driven to a depth of 71 feet using a dual rotary rig, so no annulus was created, and no cement was required. During the subsequent drilling process, two strings of carbon steel casing were set and cemented to surface as follows: 16-inch surface casing at 1,512 feet (KB), and 9 5/8-inch protection casing set at 3,237 feet KB. Cement bond logs were run on the surface and protection casing strings to demonstrate isolation of the injection zone from identified or potential underground sources of drinking water (USDWs). Cement returns to surface were observed during each of the cement jobs.

After site preparation and conductor pipe had been installed, drilling the surface hole began on October 20, 2022. A total depth of 5,212 feet was reached on November 22, 2022, within the Mt. Simon Formation. A day versus depth curve is included as Figure 1. The well was installed as an openhole completion in the Mt. Simon injection interval from 3,237 feet (KB) to 5,212 feet (KB), in accordance with the EPA UIC permit. The rig down process began on November 26, 2022. All drilling equipment was demobilized from the site by December 2, 2022. Testing and completion activities were subsequently conducted using a workover rig and other required equipment.

Drilling activities were supervised by Ed Pollister, a consultant to Republic Services. Completion activities were supervised by Douglas Torr, a consultant to Republic.

The official annulus pressure test to establish Part I internal mechanical integrity was performed on January 5, 2023, and radioactive tracer (RAT) and temperature logging were conducted on January 6 - 7, 2023 to demonstrate Part II external mechanical integrity. Injection falloff testing to satisfy initial ambient reservoir monitoring requirements was conducted on January 10. Figure 2 presents a well schematic that represents the current well configuration. Figure 3 shows the current wellhead configuration. The well was successfully completed for service as an injector that meets permit and regulatory requirements. Applicable EPA notifications and forms are presented as Attachment 6.

2.0 SUMMARY OF DAILY DRILLING ACTIVITIES

The information that follows is a chronological summary of daily activities compiled from daily reports. Daily activity reports from October 19, 2022 through December 2, 2022 are 24-hour reports starting at 6:00 a.m. the previous day.

A plot of drilling days versus depth is shown in Figure 1. Table 1 lists formation tops encountered during the drilling process. Bit records and deviation surveys are included in Tables 2 and 3, respectively. Table 4 presents the casing and cementing details for the surface and protection casing.

Date	Activity	Depth/Group (ft, KB)
07/21/2022	Drive 20” conductor casing to 71 feet	Depth: 71’
10/19/2022	MIRU drilling rig, weld riser on conductor casing	Depth: 71’
10/20/2022	Finish rig-up, spud well, drill from 0’ to 110’	Depth: 110’
10/21/2022	Drill from 110’ to 333’.	Depth: 333’
10/22/2022	Drill from 333’ to 647’.	Depth: 647’
10/23/2022	Drill from 647’ to 926’.	Depth: 926’ Maquoketa
10/24/2022	Drill from 926’ to 1,088’.	Depth: 1,088’ Trenton
10/25/2022	Drill from 1,088’ to 1,308’.	Depth: 1,308’ Black River
10/26/2022	Drill from 1,308’ to 1,512’, wiper trip, wait on loggers.	Depth: 1,512’ St. Peter
10/27/2022	Clean hole, rig up loggers, run triple combo and GPIT, rig down wireline and rig up casing crew, run 37 joints 13 3/8” casing to TD.	Depth: 1,512’ St. Peter
10/28/2022	Rig up cementers, cement casing, 62 bbls of cement to surface, wait on cement, cut conductor casing and nipple up wellhead.	Depth: 1,512’ St. Peter
10/29/2022	WOC and nipple up BOPs, rig up wireline and run CBL on surface casing, test BOPs.	Depth: 1,512’ St. Peter
10/30/2022	Finish BOPs test, test casing to 1,500 psi, passed. PU BHA drill shoe, drill from 1,512’ to 1,746’.	Depth: 1,746’ Shakopee
10/31/2022	Drill from 1,746’ to 2,022’, POOH for drill pipe inspection.	Depth: 2,022’ Shakopee

Date	Activity	Depth/Group (ft, KB)
11/01/2022	Replace broken pipe, TIH, drill from 2,022' to 2,272'.	Depth: 2,272' Shakopee
11/02/2022	Drill from 2,272' to 2,458', POOH to replace drill pipe with hole, drill from 2,458' to 2,490'.	Depth: 2,490'' Ironton
11/03/2022	Drill from 2,490' to 2,802'.	Depth: 2,802'' Eau Claire
11/04/2022	Drill from 2,802' to 2,973'.	Depth: 2,973' Eau Claire
11/05/2022	Drill from 2,976' to 3,185'; top of Mt. Simon noted by mudlogger at 3,170'; subsequent wireline logs indicate top at 3,190'.	Depth: 3,185' Eau Claire
11/06/2022	Drill from 3,185' to 3,242'. POOH for hole in drill pipe, teledrift parted, begin fishing for lower assembly of BHA.	Depth: 3,242' Mt. Simon
11/07/2022	Fish out of hole, TIH and circulate, POOH, rig up wireline, run triple combo.	Depth: 3,242' Mt. Simon
11/08/2022	Run sonic, FMI, caliper logs, cut rotary sidewall cores, TIH, clean hole, POOH and lay down drill pipe for inspection.	Depth: 3,242' Mt. Simon
11/09/2022	Finish LD drill pipe, rig up casing crew, run 77 joints of 9 5/8" casing landed at 3,237', float collar at 3,153', rig up cementing crew, pump cement, 83 bbls to surface, wait on cement.	Depth: 3,242' Mt. Simon
11/10/2022	WOC, drop slips and cut off 9 5/8" casing, nipple down BOPs, and nipple up smaller BOPs, begin drill pipe inspection.	Depth: 3,242' Mt. Simon
11/11/2022	WOC, inspect drill pipe, test BOPs, wait on wireline.	Depth: 3,242' Mt. Simon
11/12/2022	Inspect drill pipe, rig up wireline and run CBL and USIT from 3,108' to surface.	Depth: 3,242' Mt. Simon
11/14/2022	Test casing to 1,000 psi, casing passed, drill cement, drill from 3,242' to 3,530'.	Depth: 3,530' Mt. Simon
11/15/2022	Drill from 3,530' to 3,630', condition hole, POOH, pick up core barrel, TIH and cut core from 3,630' to 3,657'.	Depth: 3,657' Mt. Simon
11/16/2022	Cut last core at 3,658', POOH, cut 28' of core and recovered 28', TIH, drill from 3,658' to 3,955'.	Depth: 3,955' Mt. Simon

Date	Activity	Depth/Group (ft, KB)
11/17/2022	Drill from 3,955' to 4,135', POOH to core, core from 4,135' to 4,151'.	Depth: 4,151' Mt. Simon
11/18/2022	Core from 4,151' to 4,163', POOH, cut 28' of core and recovered 28', TIH, drill from 4,163' to 4,318'.	Depth: 4,318' Mt. Simon
11/19/2022	Drill from 4,318' to 4,558'.	Depth: 4,558' Mt. Simon
11/20/2022	Drill from 4,558' to 4,839', POOH for new bit.	Depth: 4,839' Mt. Simon
11/21/2022	PU new bit, drill from 4,839' to 5,110'.	Depth: 5,110' Mt. Simon
11/22/2022	Dill from 5,110' to 5,212', circulate hole clean, POOH wait on wireline.	Depth: 5,212' Mt. Simon
11/23/2022	Wait on wireline.	Depth: 5,212' Mt. Simon
11/24/2022	Rig up wireline, run triple combo, CMR and FMI logs.	Depth 5,212' Mt. Simon
11/25/2022	Cut rotary sidewall cores, 100% recovery, rig down wireline, fill hole, TIH circulate hole with clean brine.	Depth: 5,212' Mt. Simon
11/26/2022	Finish displacing hole, nipple down, rig down.	Depth: 5,212' Mt. Simon
11/27/2022	Continue rig down.	Depth: 5,212' Mt. Simon
11/28/2022	Rig down in daylight only.	Depth: 5,212' Mt. Simon
11/29/2022	Continue rig down, move equipment over to IW-2 for completion	Depth: 5,212' Mt. Simon
11/30/2022	Continue rig down.	Depth: 5,212' Mt. Simon
12/01/2022	Continue rig down.	Depth: 5,212' Mt. Simon
12/02/2022	Completed rig down.	Depth: 5,212' Mt. Simon

3.0 GEOLOGIC SUMMARY

A summary of the formation tops (stratigraphic picks based on geophysical logs) from IW-1 are listed in Table 1. Ground surface elevation is 716 feet above mean sea level (AMSL). The kelly bushing (KB) elevation is 733 feet AMSL, which is 17 feet above ground surface. All depths are reported as measured depth from KB unless otherwise noted. Mud logging included use of a gas chromatograph to provide continuous gas monitoring. In addition, the wireline logs conducted in the IW-1 well are provided as Appendix A and include triple combo, combined magnetic resonance (CMR), and Fullbore Micro Imager (FMI) logs. Reported depths from the mud log were confirmed versus wireline logs and adjusted as necessary by Petrotek in Table 1. A summary of log runs is provided in Table 5 and discussed in Section 4.0. Sidewall core collection and whole core collection and analyses were also conducted and are discussed in Section 5.0.

The top of the Confining Zone defined as Eau Claire is contacted in IW-1 at 2,608 feet (1,875 feet below mean sea level (BMSL)). The base of the Eau Claire is reported at 3,190 feet (2,457 feet BMSL) for a total thickness of 582 feet at IW-1. The upper Eau Claire is described as a dark grey dolomite with interbedded gray shales and buff to clear sandstones. At approximately 2,830 feet, the Eau Claire transitions to predominantly gray to dark brown shales with minor sandstone interbeds. At 3,010 feet to approximately 3,100 feet, the formation is predominantly sandstone, with lessor shales and dolomites, becoming more shale-rich to 3,150 feet, and transitioning to predominantly sandstone to the top of the Mt. Simon.

The Mt. Simon Formation is contacted at 3,190 feet (2,457 feet BMSL) and is more than 2,000 feet thick at IW-2. The Mt. Simon is described as a mostly clear to somewhat milky colored fine to very fine-grained sandstone, becoming more arkosic and pink to red brown at approximately 5,000 feet. Trace granitic fragments are noted within the Mt. Simon from depths of approximately 4,880 to 4,910 feet, as well as from depths of approximately 5,110 to total depth.

Note that the mud log (Attachment 1) indicates the presence of a “granite wash” at approximately 4,880 feet to 4,910 feet, and from 5,112 feet to total depth. The presence of trace granitic fragments within these intervals of the Mt. Simon is not indicative of a “granite wash”. As shown on the mudlog, as well as on the Integrated Petrophysical Analysis processed log (Volume 3), the Mt. Simon is predominantly (~80-90%) quartz sandstone, noted as more arkosic and with trace granitic fragments in the lower ~100 feet of the openhole completion. A true “granite wash” is composed of predominantly fractured granitic material directly overlying the Precambrian basement. The observed granitic materials within the Mt. Simon are inferred to represent reworked granitic material within the lower several hundred feet of this formation, consistent with lower Mt. Simon identified elsewhere to the north in the Michigan Basin. The Precambrian basement or a fractured “granite wash” was not contacted based on the wireline log responses or cuttings report.

Fluid losses were reported in varying degrees from depths of approximately 3,600 to total depth in the Mt. Simon. The average porosity from density porosity of the Mt. Simon is

approximately 9%. Whole core collection and sidewall coring were conducted across multiple intervals and is summarized in Section 5.0. Available coring data is provided in this report, and additional coring analyses are in process and will be submitted to EPA upon completion at a later date.

4.0 LOGGING SUMMARY

A variety of geophysical well logs were collected to acquire information from both the open and cased-hole portions of the well. A copy of each log is included in Appendix A. Log vendor, type, date run, and depth interval covered are summarized in Table 5.

The logs run in the surface casing section of the well included a caliper, gamma ray, relative bearing, high resolution lithology density, high resolution neutron density, array induction, resistivity, digital sonic, variable density, and cement bond log. The protection casing logs included triple combo logs (SP, gamma ray, resistivity, caliper, bulk density, and density and neutron porosity), fullbore micro-imaging (FMI) log, shear anisotropy analysis, variable density, ultrasonic imager, casing integrity, cement evaluation and cement bond logs through the interval. The completed section of the injection zone was subjected to a triple combo log, an FMI log, and a combinable magnetic resonance log.

During completion activities a radioactive tracer log and temperature log were run to demonstrate Part II external mechanical integrity and are discussed further in Section 8.0. The radioactive tracer log and temperature log are included as Attachments 8 and 9, respectively.

5.0 SAMPLE COLLECTION SUMMARY

Drill cutting samples were collected at regular intervals during drilling operations to document the stratigraphy and lithology of the geologic section. A mudlog that provides descriptions of cuttings and formation tops is provided in Attachment 1. These data were used to confirm and assist with the analysis of the geophysical well logging data that were collected.

Rotary sidewall cores (1.5-inch diameter) were collected from the confining zone at depths of approximately 2,610 feet to 3,200 feet, as well as from the injection zone (0.92-inch diameter) from depths of 3,259 feet to 4,048 feet. Sidewall coring depth intervals from these two coring runs are summarized in Table 6. Coring logs are provided in Volumes 2 and 3 of this report, labelled as XL Rock and Mechanical Sidewall Coring Tool, respectively. Pulse decay permeability data from select confining zone intervals is provided in Attachment 2. Mercury injection capillary pressure and pore throat size evaluations on a select interval (3,630.15 – 3.630.35 feet) is also provided in Attachment 2.

Four-inch whole core was also collected from the Mt. Simon from 3,630 to 3,658 feet and from 4,135 to 4,163 feet, with 100% recovery in both intervals.

Additional core evaluations are currently in process and will be submitted to EPA upon completion at a later date.

A formation fluid sample was not collected from NCL IW-1. As the formation sample collected from NCL IW-2 was of good quality and located at a distance of approximately 4,500 feet from IW-1, Republic Services notified USEPA of their intent to not collect a sample from IW-1. Laboratory analysis from fluids produced after sufficient swabbing indicated that Mt. Simon formation fluids contain approximately 130,000 mg/L from the sample collected at NCL IW-2. Swabbing reports and laboratory reports for sampling were included in the 2023 Drilling and Completion Report for NCL IW-2, submitted to EPA on February 14, 2023.

6.0 CASING AND CEMENTING SUMMARY

As noted in Section 1.0, after the 20-inch conductor casing was set at 71 feet, rotary drilling was used to reach target depths and set a surface and protection string of casing and cement both strings to surface. The two strings of casing include a 13 3/8-inch surface casing, and 9 5/8-inch protection casing. Cement was circulated to surface during the surface and the protection casing cement jobs. A diagram of the IW-1 construction configuration is presented on Figure 2.

The 13 3/8-inch surface casing was installed on October 27, 2022, with the casing shoe set at a depth of 1,512 feet. The 13 3/8-inch casing is 54.5 pound per foot (lb/ft), J-55 grade with buttress threads. The surface casing was cemented using a lead of 570 sacks of 13.1 pounds per gallon (ppg) cement and a tail of 470 sacks of 15.6 ppg cement. The cement was circulated to surface with 62 barrels of cement returned to surface tanks. Details of the casing and cementing for the surface section are included in Table 4.

The 9 5/8-inch, 36 lb/ft protection casing was installed on November 9, 2022, with the casing shoe depth set at 3,237 feet. The protection casing consists of J-55 grade with LTC threads. The protection casing was cemented using a lead cement of 512 sacks of 13.1 ppg cement. The tail slurry included 840 sacks of 15.6 ppg cement. The cement was circulated to surface with 83 barrels of cement returned to surface. Details of the protection casing and cementing are included in Table 4.

Attachment 3 presents mill certifications for the new surface, and new protection casing strings installed in IW-1. For each casing string, full-length drift and visual thread inspection was performed at the mill prior to shipment and on location before running in the well.

The cementing reports and casing tallies for the surface and protection casing strings are presented as Attachments 4 and 5, respectively. Cement was observed at surface after the cement had cured (i.e., no fallback) in the surface, and protection casing string cement jobs.

7.0 SUMMARY OF COMPLETION ACTIVITIES

Completion activities commenced on December 28, 2022, and were finished on January 12, 2023. After rigging up a completion rig, a blowout preventer (BOP) was installed, and a safety inspection was performed.

Acid stimulation was conducted beginning on December 29, 2022, using a 2 3/8" coil tubing unit, with the coil spotted at 5,212 feet. Pumping of 5,000 gallons of 15% HCl was conducted at 2 bpm. The formation was flushed with 230 barrels of 2% KCl (pH 6). The well was swabbed on December 31, 2022 – January 3, 2023, recovering a total of 1,150 barrels. As detailed in Section 5.0, no formation fluid samples were collected.

After swabbing, injection tubing and packer were run in the well. The tubing is 3,131 feet of 4 ½-inch, J-55, LTC tubing with Pipeclad® 702NAR Internal pipe coating. The tubing/casing annulus was filled with185 bbls of inhibited brine. The AS1-X 36 lb packer was set in tension with the center element at 3,142 feet. A 100-gallon diesel blanket was then pumped and spotted below the packer between the injection tubing and protection casing and the wellhead was installed and tested. Figures 2 and 3 present the wellbore and wellhead diagrams, respectively. A wellbore schematic from the drilling supervisor is provided as Attachment 14.

After the injection string was installed, mechanical integrity and reservoir testing activities were conducted. Testing included an annulus pressure test to demonstrate Part I integrity, radioactive tracer and temperature logs to demonstrate Part II integrity, a static gradient survey, and a reservoir falloff test to collect initial ambient reservoir monitoring data. These tests are discussed in further detail in Sections 8 and 9. At the time of this report, surface, pumping, and control facilities are under construction.

The following is a chronological summary of daily activities completion from daily reports. Daily activity reports from December 28, 2022, through January 23, 2023, start the morning of the date listed.

Date	Activity
12/28/2022	Move in rig, install BOPs shut in for night (SIFN).
12/29/2022	TIH, pressure test tubing to 2,000 psi, spot 3,000 gallons of HCl from 5,212' to 4,225', spot 3,000 gallons 15% HCl from 4,225' to 3,237', SIFN.
12/30/2022	POOH with tubing, pick up packer, set packer at 3,159' and test to 500 psi, displace acid into formation, rig up to swab, SIFN.
12/31/2022	TIH with sinker bars, swab well and recover 362 BSW, SIFN.
01/01/2023	Swab, recover 450 BSW, SIFN.

Date	Activity
01/02/2023	Swab, recover 180 BSW, SIFN.
01/03/2023	Swab, recover 158 BSW, SIFN.
01/04/2023	Run 74 joints of tubing, set packer at 3,142', pulled 25,000 lbs into packer and landed with 20,000 lbs of compression, pumped 185 bbls of inhibited brine (9.1 ppg), and capped with 35 gallons diesel, SIFN.
01/05/2023	Pressure test packer to 1,000 psi, no bleed off, nipple up tree and test to API specs. Pressure test packer per EPA guidelines, initial pressure of 972.8 psia, final pressure of 973.7 psia over 1 hour, passed MIT, pumped 100 gallon down tubing and flushed with 50 BSW, spotted diesel blanket on packer tail pipe. Rig down moved off location.
01/06/2023	Rig up wireline, run temp log. Mix 2% KCl, wait 6 hours in between temp logs, SIFN.
01/07/2023	Rig up wireline, start RAT test, injection confined to Mt. Simon injection interval.
01/08/2022	Rig up well service, pump 5,000 gallons 15% HCl and flush with 230 bbls of 9.3 ppg brine and 2% KCl water, SIFN.
01/09/2023	Rig up slickline, pressure test lubricator, static gradient stops every 500', set gauges at 3,170', perform FOT.
01/10/2023	Perform FOT.
01/11/2023	POOH with equipment, static gradient stops every 500', rig down slickline.
01/12/2023	Rig down move out.

8.0 Mechanical Integrity Testing

The procedures followed to conduct integrity tests were approved in advance by EPA. A wellbore diagram illustrating the configuration during testing activities is presented as Figure 2. Procedures and a copy of the unwitnessed form documenting the testing are provided in Attachment 6. Gauge calibration certifications are provided in Attachment 7.

PART I: INTERNAL MECHANICAL INTEGRITY

A static annulus pressure test (APT) was performed on January 5, 2023, using a calibrated pressure gauge (Crystal Gauge, SN – 216483). The test was unwitnessed, as directed by EPA. The annulus was pressured to 972.8 psi and monitored for a period of one hour at 10-minute intervals, as shown in Table 7. During the test, the pressure increased by 0.9 psi, which is a 0.09% change. Since a change of +/- 3% of the starting test pressure (29 psi) was allowable, this test is within acceptable specifications.

TABLE 7
ANNULUS PRESSURE TEST MEASUREMENTS

Time, minutes	0	10	20	30	40	50	60
Pressure, psi	972.8	972.7	972.9	973.1	973.3	973.5	973.7

PART II: EXTERNAL MECHANICAL INTEGRITY

Radioactive Tracer Log

The primary purpose of a Radioactive Tracer (RAT) log is to verify the adequacy of the bottomhole cement surrounding the protection casing. The RAT log was conducted following the approved MIT testing procedures submitted to EPA before commencement of field activities and is consistent with applicable guidance documents for mechanical integrity testing of Class I UIC wells.

RAT Field Activities & Results

Field activities associated with the RAT log performed on January 7, 2023 are summarized below.

- Injection pressure, rate, and total fluid volume were monitored and recorded using the site injection equipment. Freshwater injection took place for RAT logging activities.

- The lubricator was opened, and the RAT tool was run in the hole. The RAT tool tagged bottom at 0807 hours, at which point the baseline log was run to establish background conditions.

- The initial gamma-ray (GR) base log (with casing collar locator [CCL] for depth synchronization) was run from approximately 5,216 feet BGL up to approximately 1,986 feet BGL.

- Two 5-minute statistical variation logs were conducted with the bottom detector positioned at 2,560 feet and 3,188 feet BGL.

- The tracer chase sequence was conducted with tracer ejected at 2,134 feet BGL. Fluid was injected at a constant rate of approximately 42 gallons per minute (gpm) at a wellhead pressure of approximately 190 psi. A total of seven overlapping passes were logged to follow the radioactive tracer into the openhole completion.

- A 30-minute time-drive was conducted with tracer ejected above the detectors and bottom detector set at 3,195 feet BGL. Fluid was injected at a rate of 28 gpm at a wellhead pressure of approximately 125 psi. Only downward movement of the slug through the tubing was detected.

- A post-test GR log was conducted from approximately 5,224 feet up to approximately 1,974 feet BGL.

The RAT logging was conducted utilizing a dual GR detector tool. The tool also included a CCL and a radioactive material ejector positioned above the top GR detector. A schematic of the RAT tool is included as part of the RAT log in both paper and digital form.

Unified analysis of the chase series, the time drive, and the similar nature of the base and final gamma-ray logs indicate that no tracer material was detected outside of the permitted injection interval thereby demonstrating external mechanical integrity. A copy of the RAT log in paper and digital form is included as Attachment 8.

Temperature Log Field Activities & Results

On January 6, 2023, prior to running the RAT log, two static temperature surveys were conducted in IW-1 from the surface to approximately 5,224 feet BGL. This logging took place after the well had been shut-in in for approximately 17 hours. The second logging passed was performed approximately 6 hours after the first. The temperature tool assembly also included a CCL and a gamma-ray tool. These data were collected to establish baseline conditions, to verify depth, and correlate lithologic changes with temperature variations. The log data were acquired at speeds of approximately 20 to 30 feet per minute.

Calibration information for the temperature tool is provided as part of the temperature log. Prior to performing the temperature logging activities, field verification of the tool readings was performed. In cold water, the tool read approximately 68.8 °F while a thermometer read an average of 69.0 °F. The tool and thermometer were then placed in a bucket of

warm water where the tool recorded a value of 109.0 °F and a thermometer value of 109.5 °F. These readings verified the tool calibration.

Based on the lack of any temperature anomalies consistent with upward flow it was determined that there is no evidence of flow above the injection zone and the logs indicate external mechanical integrity. The fluid injected during drilling and completion activities is clearly shown on the signature of the log as entering the permitted injection interval. A copy of the static temperature logs and digital log data are presented as Attachment 9. A letter of log interpretation supporting the interpretation offered in this report is included with the log.

Results Summary

The results of the MIT conducted, including the static APT, temperature, and RAT logs, satisfy the applicable EPA requirements for demonstrating the initial internal and external mechanical integrity of the well. Testing was conducted as detailed in the approved procedures. A casing inspection log was also conducted to establish baseline conditions of the new protection casing. A copy of this log is included as Attachment 13.

The APT, temperature, and RAT logs demonstrated that the casing, tubing, wellhead, packer, and annulus satisfy EPA internal integrity (Part I) and external integrity (Part II) requirements. Certified equipment was used to conduct these tests.

EPA was provided and accepted a copy of the certificate for the certified pressure gauge. Additionally, EPA field inspectors were notified of testing activities and were not present to witness the annulus pressure test.

All testing and logging were completed using standard industry methods. Analyses of the data completed by experienced log and test analysts at Petrotek and the logging service company indicate that the logging was successfully completed and NCL IW-1 is in a condition suitable for injection operations.

9.0 Reservoir Testing

This section summarizes the January 2023 reservoir testing activities performed at the Newton County Landfill IW-1 well. Pressure transient testing was conducted in accordance with procedures approved by EPA. Notifications and approvals are provided as Attachment 6. The primary objectives of this field mobilization included reservoir testing intended to allow completion of the well and establish baseline reservoir conditions and injection parameters for the well to obtain authorization to inject. The reservoir testing consisted of an injection falloff pressure transient test.

The NCL IW-1 Class I disposal well was completed in the Mt. Simon Formation during this testing and communicated to the injection interval via an 8 ½-inch openhole completion below 9 5/8-inch steel casing with a shoe at 3,237 feet KB. The top of the permitted injection interval is at a depth of 3,190 feet KB (top of the Mt. Simon Formation, based on well logs). The well is completed with a packer top at 3,142 feet KB and two joints of fiberglass tail pipe below the packer.

The rate data and downhole pressure data are of reasonable quality and are sufficient to allow estimation of certain reservoir characteristics. The field operations, test procedures, analytical methods, and results are presented in the following discussion.

Initial Pressure and Temperature of Injection Zone

To begin the testing process, dual memory gauges were run in the injection tubing to a depth of 3,170 feet KB (3,153 feet BGL) on slickline. Gradient stops were made on the way into the well. Stabilized static bottomhole pressure was recorded for approximately 4.1 hours before constant rate injection was started. The data acquired indicate that the original static bottomhole pressure of the injection formation currently in communication to the wellbore was approximately 1,331 psig at 3,170 feet KB (3,153 feet GL). This measurement implies a static formation reservoir pressure gradient of 0.422 psi/ft. Concurrent temperature measured near the top of the completion with the pressure transducer assembly prior to injection was approximately 82.9 °F. These values are in agreement with data collected from the offset well NCL IW-2.

Injection Build-up Falloff Pressure Transient Test

Specific Field Activities

Pressure transient testing in the form of an injection falloff test was conducted in the well. Raw bottom hole pressure data, injection rate data from the site injection pump, and bottomhole pressure reports from the field vendors are included as Attachments 10, 11, and 12, respectively. Noteworthy details summarizing the reservoir testing are summarized below:

- Constant rate injection began at 1504 hours on January 9, 2023 at a stabilized rate of approximately 21.8 gpm. During the build-up period, surface pressure and

injection rate were recorded at one-second intervals.

- The well was shut-in at 0915 hours on January 10 after approximately 18.2 hours of constant-rate injection.

- Pressure falloff data was collected at 5-second intervals for approximately 22 hours after shut-in using bottomhole gauges. Gauges were hung at a test depth of 3,153 feet BGL during all testing. Offset site well IW-2 was shut-in during the duration of this testing.

Data Collection

Although a more substantial gross thickness of injection zone exists in the vicinity of the well location, the analyses were performed using a net effective thickness of 421 feet with an average effective porosity of 10%. Using these values to represent the combined, net effective thickness of the injection interval is consistent with geologic evaluation of the geophysical well logs and cores and represent the portion of the gross interval most likely to accept fluid at this wellbore. Although additional thickness may accept fluids, the geophysical log analysis indicates that fluid flow and near well behavior is likely to be dominated by this net thickness. A net to gross thickness ratio of less than 50% is not uncommon for injection wells that are completed in the Mt. Simon Formation in Indiana.

The formation viscosity, fluid compressibility, and total compressibility were estimated using bottom hole temperature and pressure recorded in the well at the depth of the injection interval, in conjunction with industry standard correlations. These correlations are presented in *The Properties of Petroleum Fluids* (McCain, 1990) and the SPE textbook on Pressure Transient Testing which was published as part of the SPE Textbook Series as Volume 9.

The salinity of the native brine fluid from the injection zone was approximated as 13.0%, based on the 130,000 mg/L TDS brine concentration determined to be present in original formation fluid samples from the offset NCL IW-2 well. A bottom hole temperature of 82.9 °F has been used as representative of the formation for these correlations.

Fluid viscosity was estimated using multiple equations developed by McCain to initially estimate fluid viscosity at atmospheric conditions (equations B-72, 73, and 74), which is then converted to viscosity at bottom hole conditions (equation B-75) by using a correction factor. These equations can be found on page 527 of the McCain text. As a primary input for the correlation, pressure is required. The formation pressure at the gauge depth of 3,153 feet BGL was initially measured at 1,346 psia. At this pressure and a temperature of 82.9 °F, the following equations have been used to derive viscosity:

$$\mu_{w1} = AT^B \quad \text{(B-72)}$$

$$A = 109.574 - 8.40564 * S + 0.313314 * S^2 + 8.72213 * 10^{-3} * S^3 \quad \text{(B-73)}$$

$$B = -1.12166 + 2.63951 * 10^{-2} * S - 6.79461 * 10^{-4} * S^2 - 5.47119 * 10^{-5} * S^3$$

$$+ 1.55586 * 10^{-6} * S^4 \quad \text{(B-74)}$$

$$\frac{\mu_w}{\mu_{w1}} = 0.9994 + 4.0295 * 10^{-5} * P + 3.1062 * 10^{-9} * P^2 \quad \text{(B-75)}$$

Where,

μ_{w1} is the viscosity of the formation fluid at atmospheric conditions
T_F is the bottom hole temperature in °F
S is the percent of solids
P is the bottom hole pressure in psi
μ_w is the viscosity of the brine at bottom hole conditions

Using these equations, a value of 0.82 centipoise is calculated for the formation fluid viscosity.

Formation compressibility was estimated using equation L-89 in the SPE Textbook Series Volume 9 provided on page 337. This equation was developed for sandstone formations, consistent with the primary composition of the effective injection interval.

$$c_f = \frac{a}{(1+bc\Phi)^{\frac{1}{b}}} \quad \text{(L-89)}$$

Where,

a = 97.32 * 10^{-6}
b = 0.6999
c = 79.82
Φ = 0.10
C_f = Formation compressibility

Based on this equation, a value of 6.58E-6 psi^{-1} is derived for formation compressibility.

Fluid compressibility was estimated using figures L-30 and L-31 on page 338, with a bottom hole temperature of 82.9 °F, a bottom hole pressure of 1,346 psi, and a dissolved solids concentration of 13.0%. Using Figure L-31 to first estimate freshwater compressibility, a value of 3.12E-06 psi^{-1} is derived. Using Figure L-30, the coefficient of isothermal compressibility (ratio of brine compressibility over freshwater compressibility) was determined to be approximately 0.79. This results in a value of 2.46E-06 psi^{-1} for the formation fluid compressibility (c_w). By combining the formation and formation fluid compressibility, the total system compressibility is determined. The total system compressibility (c_t) is approximately 9.04E-06 psi^{-1}. Table 8 summarizes the reservoir and fluid input values used in the falloff test analysis.

After approximately 18.2 hours of stabilized 2% KCl brine injection, the well was shut-in by stopping the injection pump. The final flow rate recorded by the monitoring system was 747 bwpd (21.8 gpm) at a corresponding bottomhole flowing pressure of 1,501.3 psig. The pressure in the Mt. Simon injection interval was then recorded for approximately 22 hours after shut-in. Bottomhole pressure declined to 1,342.8 psig by the end of the test.

Data Analysis

There are several items critical to test analysis, including data regarding the well and formation, as well as data regarding the fluids involved in the testing process. Evaluation of these data was conducted using a value of 421 feet as the probable effective thickness. This is less than 30% of the gross injection zone thickness completed at the site. Rates were determined based on site pumping equipment. A value of 0.82 centipoise was assigned as a representative viscosity of the fluids through which the pressure transients analyzed in this test traveled. The rest of the values used to initialize the analysis are provided in Table 8.

TABLE 8
FALLOFF TEST ANALYSIS INPUT VALUES

Parameter	Value	Unit
Formation Thickness, h	421	feet
Porosity, Φ	10	percent
Viscosity, μ	0.82	centipoise
Formation Compressibility, c_f	6.58 E-06	1/psi
Total Compressibility, c_t	9.04 E-06	1/psi
Formation Volume Factor, B_w	1.01	bbl/stb
Wellbore Radius, r_w	0.354	feet
Final Well Flowing Pressure, p_{wf}	1,501.3	psig
Final Injection Rate, q_{final}	747 21.8	bwpd gpm

The following figures have been prepared to examine and analyze the pressure transient test data:

- Figure 4 - Cartesian Plot of Pressure, Temperature, and Rate vs. Time
- Figure 5 - Cartesian Plot of Pressure Falloff
- Figure 6 - Log-log Derivative Plot
- Figure 7 - Semi-log Horner Plot
- Figure 8 - Cartesian Plot of Pressure Falloff with Model Match
- Figure 9 - Log-log Derivative Plot with Model Match
- Figure 10 - Semi-log Horner Plot with Model Match

Figure 4 is a cartesian plot of pressure, temperature and rate data versus time. It is evident from the examination of the log-log plots (Figure 6 and 9) that early-time data are dominated by wellbore storage effects. Soon after, the slope of both the pressure and pressure derivative begin to decrease as the well transitions to radial flow. No square root pseudo-slopes are apparent in the test. At approximately 1.4 hours, the data is transitioning from early to middle-time and is approaching a probable radial flow period in the Mt. Simon. These data are suitable for classical analysis.

From approximately 0.008 to 1.4 hours, a slope is present in the data that may be representative of differential skin or crossflow within the large-thickness completion interval. Flow may be coming to equilibrium within layers of the injection interval reservoir rock through vertical near-wellbore communication. Soon after shut-in, the onset of what appears to be radial flow in the injection interval is shown on Figure 7 as a green line starting at approximately 1.4 hours. This radial flow period lasts until approximately 4.8 hours after shut-in, at which point the derivative begins to increase until the end of the test. This end of classic middle-time behavior and a transition into a late-time period after approximately 4.8 hours of shut-in may be due to several factors. The Mt. Simon Formation is known to be layered. This presents the potential for cross-flow after shut-in with possible heterogeneous properties and skin effects in different layers. There is also the potential for radial composite mobility effects due to variable viscosity with distance from the well that leads to noticeable late-time behavior during testing. Additionally, there is the potential for interference effects from testing conducted at NCL IW-2 that occurred approximately nine days prior to the testing at NCL IW-1. Well NCL IW-2 is located approximately 4,500 feet from NCL IW-1.

A straight-line Horner analysis was performed on the test data. This analysis is presented in Figures 5 through 7. The Semi-log Horner Plot (Figure 7) shows the period of possible radial flow consistent with the diagnostic plots. From this analysis, a permeability-thickness of approximately 8,595 md-ft and a P* value of 1,356.6 psia (3,153 feet BGL) are derived. For an effective reservoir thickness of 421 feet, an average permeability of 20.4 md is derived. A skin factor of 8.5 units is derived in this analysis.

In addition to this analysis, a simulation match was performed using an analytical model. This simulation analysis is presented in Figures 8 through 10. Modeling included the use of changing wellbore storage, limited entry, and radial composite tools to represent the pressure behavior. The simulation included the assumption that infinite acting radial flow exists in the reservoir. A permeability thickness of approximately 10,274 md-ft is derived from this model. Instead of P*, the simulator is used to output a value for the extrapolated initial pressure. The modeled initial pressure was 1,348.1 psia (3,153 feet BGL). For an effective reservoir thickness of 421 feet, an average permeability of 24.4 md is derived. A skin factor of -3.6 units is derived. These simulation values are reasonably consistent with the Horner analysis method results.

The objective of the reservoir testing was to identify initial reservoir properties and well injectivity behavior and to confirm that formation properties and pressures are consistent with those expected based on offset wells. These goals were successfully achieved. No concerns relevant to operation, safety or containment were identified. No boundaries are indicated at this time. The proposed site data acquisition and wellhead injection pressure monitoring practices will provide indications of injectivity changes and are sufficient to ensure operation at permitted injection pressures. This testing and analysis confirm that the Republic Services Newton County Landfill IW-1 well and the Mt. Simon disposal reservoir are suitable for disposal use.

TABLES

TABLE 1
FORMATION TOPS, NCL IW-1

KB Elevation (ft AMSL): 733
GL Elevation (ft AMSL): 716

Formation	IW-1 Formation Top (ft, KB)	IW-1 Subsurface Depth (ft, BGL)	IW-1 Top Elev. (ft, AMSL)
Glacial Sediments	17	0	716
New Albany Shale	150	133	583
Traverse Limestone	197	180	536
Wabash	236	219	497
Maquoketa	887	870	-154
Trenton	1,089	1,072	-356
Black River	1,279	1,262	-546
Glenwood	1,435	1,418	-702
St. Peter Sandstone	1,469	1,452	-736
Knox Group / Shakopee	1,531	1,514	-798
Franconia	2,404	2,387	-1,671
Ironton	2,440	2,423	-1,707
Galesville	2,558	2,541	-1,825
Eau Claire	2,608	2,591	-1,875
Mt Simon	3,190	3,173	-2,457
Total Depth	5,212	5,195	-4,479

TABLE 2
BIT RECORD

Bit Run #	Diameter (in.)	Make	Model	S/N:	Depth in (ft. KB)	Function
1	17.5	Reed	TH44A	D23142S	0	Surface Hole
2	12.25	Smith	GFI30BODVCPS	PW3291	1,512	Protection Hole
3	8.5	Smith	GF45Y	TY 7870	3,240	Open Hole
4	8.5	Core Smith	J466	CZ410	3,630	Open Hole Core
5	8.5	Smith	GF45Y	PY7700	3,658	Open Hole
6	8.5	Core Smith	J496	CZ410	4,135	Open Hole Core
7	8.5	Hughes	VM-66 EP7713	5246187	4,163	Open Hole
8	8.5	Hughes	WM-66	52426	4,839	Open Hole

TABLE 3
DEVIATION SURVEYS

Depth (ft. KB)	Inclination	Azimuth
75	0.1	334
165	0.1	300
206	0.3	308
301	0.5	320
369	0.5	356
437	0.7	356
525	1.5	10
616	2	14
678	2	12
712	2.1	16
743	2.1	15
773	2.1	13
804	2.1	17
835	2.4	12
867	2.5	13
930	2.7	11
1,025	2.8	10
1,090	2.7	10
1,189	2.6	7
1,248	2.8	11
1,321	3	15
1,340	3	19
1,375	2.8	78
1,496	3.6	19
1,521	3.5	16
1,586	3.3	18
1,680	3.1	17
1,712	3.2	16
1,839	2.5	18
1,900	2.5	17
2,026	2	9
2,116	1.6	6
2,245	1.1	357
2,307	1.1	332
2,398	1	332
2,497	0.8	343
2,592	0.5	330
2,622	0.5	330
2,738	0.5	337
2,738	0.5	337
2,807	0.6	337
2,807	0.6	5

Depth (ft. KB)	Inclination	Azimuth
2,865	0.1	11
2,865	0.1	11
3,066	0.1	64
3,477	0.8	345
3,601	1.1	354
3,720	1.3	357
3,852	1.7	5
4,004	2	352
4,107	2	350
4,260	2.1	352
4,381	2.1	352
4,571	2.7	345
4,630	2.8	345
4,764	3.2	341
4,953	3.2	346
5,182	3.9	349

TABLE 4
CASING AND CEMENTING INFORMATION, NCL IW-1

Cementing Summary - Surface Casing

Casing Size & Specifications	13 3/8”, 54.5 lb/ft / J-55, BTC
Date Cemented	10/28/2022
Casing Setting Depth	1512 ft KB
Hole Diameter	17 1/2”
Pre-flush	45 bbls
Lead Cement	570 sacks of 13.1 ppg, Class A, 1.84 yield
Tail Cement	470 sacks of 15.6 ppg, Class A, 1.20 yield
Cement Volume to Surface	62 bbls
Number of Centralizers	19

Cementing Summary - Protection Casing

Casing Size & Specifications	9 5/8”, 36 lb/ft, J-55, LTC
Date Cemented	11/9/2022
Casing Setting Depth	3,237 ft KB
Hole Diameter	12 1/4”
Pre-flush	40 bbls
Lead Cement	512 sacks of 13.1 ppg, Class A, 1.84 yield
Tail Cement	840 sacks of 15.6 ppg, Class A, 1.18 yield
Cement Volume to Surface	83 bbls
Number of Centralizers	28

TABLE 5
LOG SUMMARY, NCL IW-1

Log Vendor	Log Run Number	Log Title	Date Run	Depth Interval (MD ft. KB)
Schlumberger	1A	Power Position Caliper, 4 Arm Caliper, GR, Relative Bearing	10/27/22	86 - 1,510
Schlumberger	1A	Platform Express, HiRes Litholog-Density, HiRes Neutron, GR, Caliper	10/27/22	86 - 1,510
Schlumberger	1A	Platform Express, Array Induction, Resistivity, GR, Caliper	10/27/22	86 - 1,510
Schlumberger	1A	Platform Express, Triple Combo, Litho-Density, Neutron, Resistivity, GR	10/27/22	86 - 1,510
Schlumberger	1A	Directional Survey	10/27/22	86 - 1,510
Schlumberger	2A	Digital Sonic, Cement Bond, Variable Density, GR, CCL	10/30/22	19 - 1,460
Schlumberger	3A	Platform Express, HiRes Litho-Density, HiRes Neutron, GR, Caliper	11/4/22	1,510 - 3,233
Schlumberger	3A	Platform Express, Array Induction Tool, Resistivity, GR, Caliper	11/4/22	1,510 - 3,233
Schlumberger	3A	Platform Express, Triple Combo, Litho-Density, Neutron, Resistivity, GR, Caliper	11/4/22	1,510 - 3,233
Schlumberger	3A	Geomechanical Properties Advisor 2D MechPro Processing	11/7/22	1,510 - 3,190
Schlumberger	3A	Shear Anisotropy Analysis with DT Compressional	11/7/22	1,510 - 3,233
Schlumberger	3B	FMI Processed Images & Interpretation 1:240 Scale	11/8/22	1,510 - 3,242
Schlumberger	3B	FMI Processed Images & Interpretation 1:20 Scale	11/8/22	1,510 - 3,241
Schlumberger	3B	Power Position Caliper, 4 Arm Caliper, GR, Relative Bearing	11/8/22	1,510 - 3,241
Schlumberger	3B	Directional Survey	11/8/22	1,510 - 3,241
Schlumberger	3B	Full-bore Micro Imager, Log QC	11/8/22	1,510 - 3,241
Schlumberger	3C	XL Rock	11/8/22	2,610 - 3,200
Schlumberger	4D2	Digital Sonic, Cement Bond, Variable Density, GR, CCL	11/13/22	30 - 3,110
Schlumberger	4D2	Ultrasonic Imager, Casing Integrity, GR, CCL	11/13/22	30 - 3,110
Schlumberger	4D2	Ultrasonic Imager, Cement Evaluation, GR, CCL	11/13/22	30 - 3,110
Schlumberger	4D2	Ultrasonic Imager, Digital Sonic, Cement Eval, CBL, VDL, GR, CCL	11/13/22	30 3,110
Schlumberger	4D3	Digital Sonic, Cement Bond, Variable Density, GR, CCL	11/13/22	100 - 3,075
Schlumberger	4D3	Ultrasonic Imager, Casing Integrity, GR, CCL	11/13/22	100 - 3,075
Schlumberger	4D3	Ultrasonic Imager, Cement Evaluation, GR, CCL	11/13/22	100 - 3,075
Schlumberger	4D3	Ultrasonic Imager, Digital Sonic, Cement Eval, CBL, VDL, GR, CCL	11/13/22	100 - 3,075
Schlumberger	ONE	Platform Express, HiRes Laterolog, GR	11/24/22	3,242 - 5,210
Schlumberger	ONE	Platform Express, Triple Combo	11/24/22	3,242 - 5,210
Schlumberger	TWO	Combinable Magnetic Resonance, GR	11/24/22	3,242 - 5,210
Schlumberger	THREE	Formation Micro Imager, GR	11/25/22	3,424 - 5,210

Log Vendor	Log Run Number	Log Title	Date Run	Depth Interval (MD ft. KB)
Schlumberger	THREE	Borehole Profile, 4-Arm Caliper, Cement Volume	11/25/22	3,424 - 5,210
Schlumberger	FOUR	Cement Bond, Variable Density, GR, CCL	11/25/22	2,950 - 3,240
Schlumberger	FOUR	Ultrasonic Imager, Casing Integrity, GR, CCL	11/25/22	2,950 - 3,240
Schlumberger	FOUR	Ultrasonic Imager, Cement Evaluation, GR, CCL	11/25/22	2,950 - 3,240
Schlumberger	FOUR	Ultrasonic Imager, Cement Bond Log, GR, CCL	11/25/22	2,950 - 3,240
Schlumberger	FIVE	Mechanical Sidewall, Coring Tool, GR	11/25/22	3,261 - 4,084
Schlumberger	ONE	FMI Processed Images & Interpretation 1:240 Scale	11/24/22	3,242 - 5,210
Schlumberger	ONE	FMI Processed Images & Interpretation 1:20 Scale	11/24/22	3,242 - 5,210
Schlumberger	ONE	Integrated Petrophysical Analysis Quanti.Elan	11/24/22	3,242 - 5,210
Michigan Wireline	ONE / TWO	Differential Temperature Log	1/6/23	0 - 5,213
Michigan Wireline	THREE	Radioactive Tracer Log	1/7/23	0 - 5,213

TABLE 6
ROTARY SIDEWALL CORING INTERVALS

Confining Zone Sidewall Coring Intervals (1.5"; 11/8/2022)	
Sample ID	**Depth (ft KB)**
19	2610.07
16	2662.97
15	2755.02
14	2773.02
13	2813.01
12	2827.02
10	2855.11
24	2894.96
23	2908.01
22	2931.09
21	2959.99
20	2990.10
9	3020.09
8	3050.51
6	3084.88
5	3179.99
4	3200.08

Injection Interval Sidewall Coring Intervals (0.92"; 11/25/2022)	
Sample ID	**Depth (ft KB)**
18	3259.00
23	3261.01
17	3261.04
16	3265.99
15	3270.03
21	3275.04
14	3275.06
13	3280.03
20	3280.08
12	3293.03
19	3293.07
11	3352.07
10	3378.08
9	3442.06
8	3446.02
7	3514.07
6	3640.02
5	3645.07
4	3690.17
3	3695.18
2	4042.09
1	4048.03

FIGURES

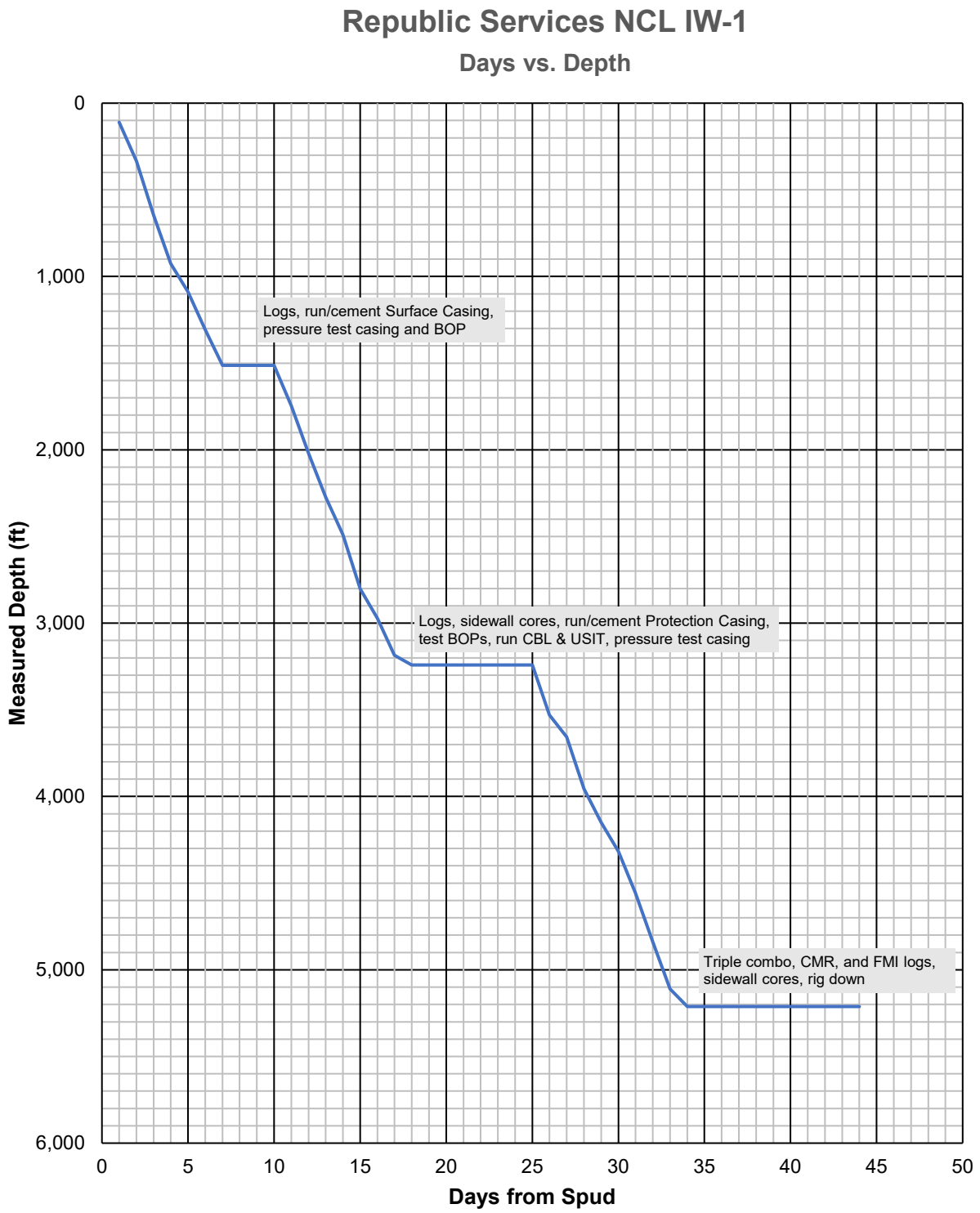
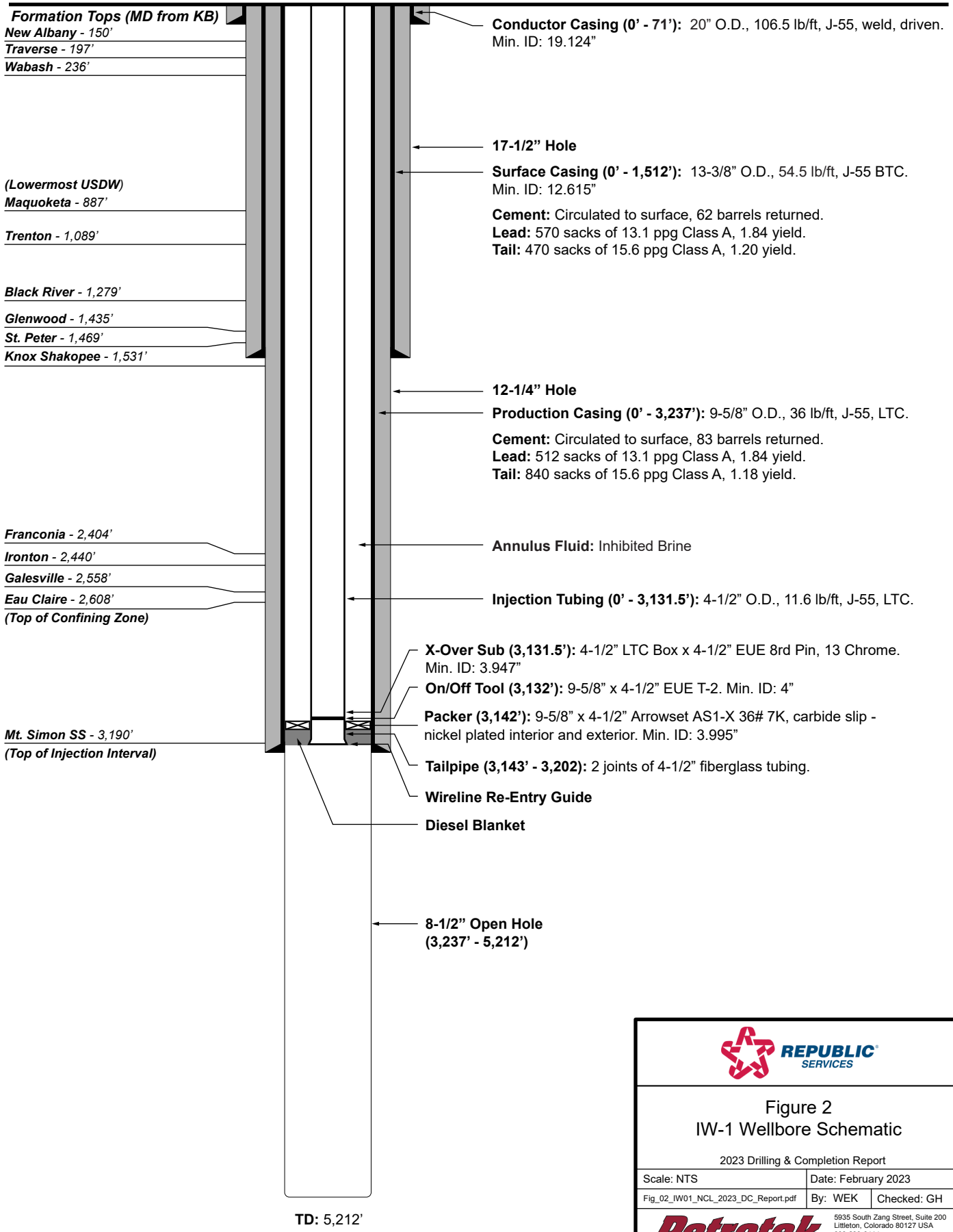


Figure 1. Days vs. Depth Drilling Curve, NCL IW-1

US EPA Permit: IN-111-1I-0001
Newton County, Indiana
NE, Sec. 28, T29N, R08W
Lat: 40.939767° / Long: -87.338797° (NAD 83)

Note: All measurements are TVD from Kelly Bushing (KB), 17 feet above ground surface.
KB Elevation: 733' AMSL
GL Elevation: 716' AMSL



NOT TO SCALE

REPUBLIC SERVICES

Figure 2
IW-1 Wellbore Schematic

2023 Drilling & Completion Report

Scale: NTS	Date: February 2023	
Fig_02_IW01_NCL_2023_DC_Report.pdf	By: WEK	Checked: GH

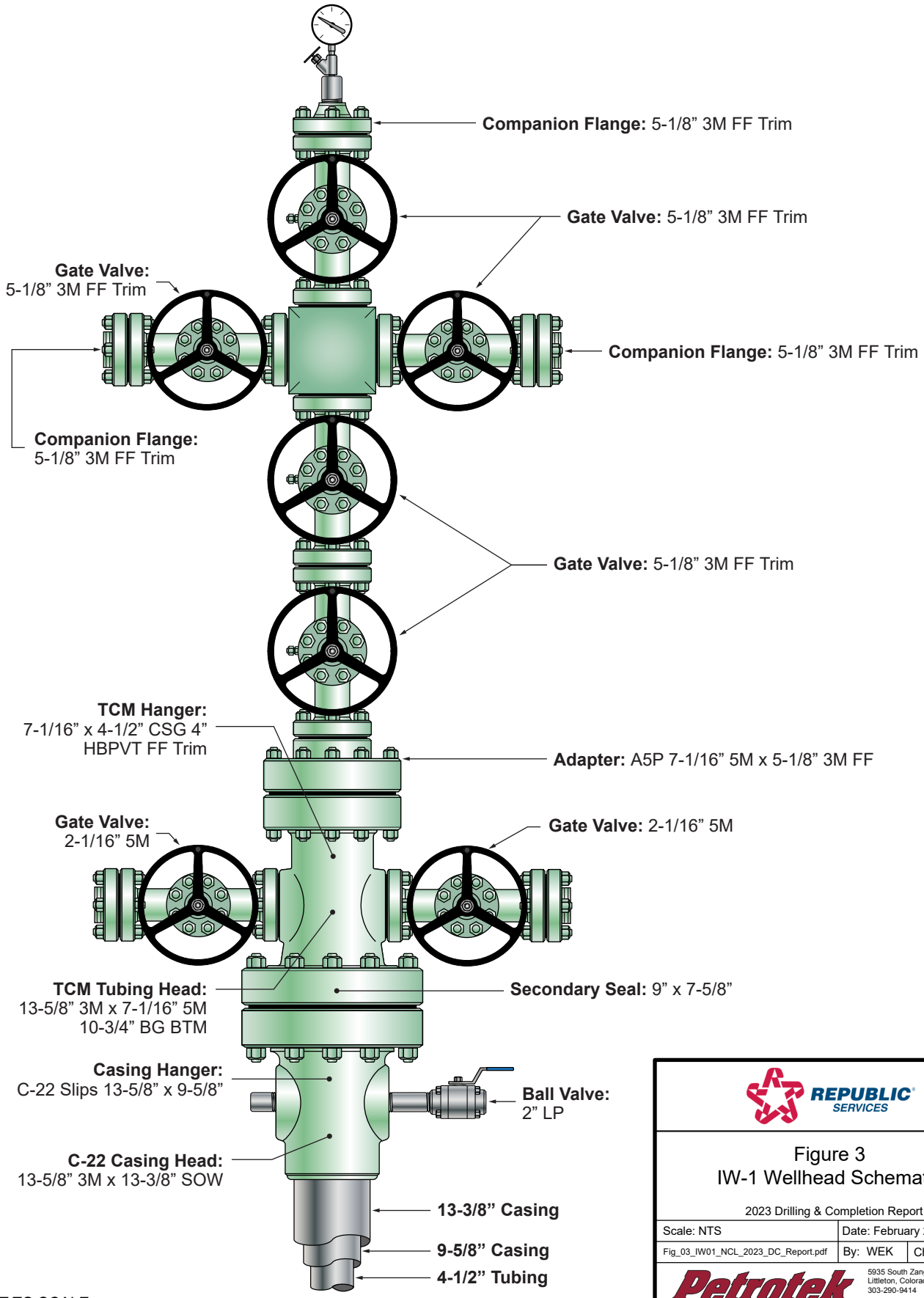
Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com

US EPA Permit: IN-111-1I-0001

Newton County, Indiana

NE, Sec. 28, T29N, R08W

Lat: 40.939767° / Long: -87.338797° (NAD 83)



NOT TO SCALE

REPUBLIC SERVICES

Figure 3
IW-1 Wellhead Schematic

2023 Drilling & Completion Report

Scale: NTS	Date: February 2023	
Fig_03_IW01_NCL_2023_DC_Report.pdf	By: WEK	Checked: GH

Petrotek

5935 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com

Pages 38 through 76 of this report have been redacted FOIA Exemption 9: Geological or geophysical information and data concerning wells; information of technical or scientific nature.

Attachment 3
Casing Mill Certifications

5691_GREENWICH EAGLE V-905E_4.5 11.36 J55 PE TENSION

TENSION STEEL INDUSTRIES CO., LTD.

MILL'S TEST CERTIFICATES

9F. NO. 127, SEC. 2 CHIEN KUO N. ROAD, TAIPEI 104 TAIWAN
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	20011001	ISSUE DATE	Jan.10.2020
COMMODITY	API SCT J55 ERW PIPE PSL1	ORDER NO.	D19120301A	SHIPPING DATE	Jan.18.2020
SPECIFICATION	API SCT J55 SPECIFICATION; ITEM 2	PO NO.	223190824-P-01	INVOICE NO.	TT20011001

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY		TENSILE ※1 Y.S. Rt0.5	TENSILE ※1 T.S. BODY	TENSILE ※1 T.S. WELD	TENSILE ※1 EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	REMARK
		SIZE x WALL THICKNESS x LENGTH	PCS/T		MPa			%	psi		x10²	x10²	x10²	x10³	x10³	x10²				x10³						
D191220023-001	JR132	4 1/2 INCH 0.250 INCH 42 FT	58	12.551	521	636	—	28.0	4900	GOOD	28	126	21	12	4	1	1	2	Tr	31	1	Tr	1			
											28	127	21	12	4	1	1	2	Tr	31	1	Tr	1			
D191220023-001	LB314	4 1/2 INCH 0.250 INCH 42 FT	598	129.407	521	638	—	29.4	4900	GOOD	27	129	19	12	2	1	1	2	Tr	36	1	Tr	1			
					536	651	—	28.2			27	128	19	12	2	1	1	2	Tr	36	1	Tr	1			
D191220023-001	LB315	4 1/2 INCH 0.250 INCH 42 FT	843	182.425	537	646	—	29.2	4900	GOOD	26	130	18	11	2	1	1	2	Tr	34	1	Tr	1			
					549	661	—	28.2			26	130	19	11	2	1	1	2	Tr	34	1	Tr	1			
					479	632	—	31.0																		
		TOTAL	1,499	324.383																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST (N5)	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD
Trident PO NO.: 5691

NOTES
HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT (560℃)
※1 TENSILE TEST – ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3—C.E. : CARBON EQUIVLENT ※4—F+P:F-FERRITE P-PEARLITE ※5—IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

BP01-F03-4

5691_GREENWICH EAGLE V-905E_4.5 11.36 J55 PE TENSION

TENSION STEEL INDUSTRIES CO., LTD.

MILL'S TEST CERTIFICATES

9F. NO. 127, SEC. 2 CHIEN KUO N. ROAD, TAIPEI 104 TAIWAN
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	20011001	ISSUE DATE	Jan.10.2020
COMMODITY	API 5CT J55 ERW PIPE PSL1	ORDER NO.	D19120301A	SHIPPING DATE	Jan.18.2020
SPECIFICATION	API 5CT J55 SPECIFICATION; ITEM 2	PO NO.	223190824-P-01	INVOICE NO.	TT20011001

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY		TENSILE ※1 Y.S. Rt0.5	T.S. BODY	T.S. WELD	EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	REMARK
		SIZE x WALL THICKNESS x LENGTH	PCS/T		MPa			%	psi		x10²	x10²	x10²	x10³	x10³	x10²					x10³					
D191220023-001	JR132	4 1/2 INCH 0.250 INCH 42 FT	58	12.551	521	636	—	28.0	4900	GOOD	28	126	21	12	4	1	1	2	Tr	31	1	Tr	1			
											28	127	21	12	4	1	1	2	Tr	31	1	Tr	1			
D191220023-001	LB314	4 1/2 INCH 0.250 INCH 42 FT	598	129.407	521	638	—	29.4	4900	GOOD	27	129	19	12	2	1	1	2	Tr	36	1	Tr	1			
					536	651	—	28.2			27	128	19	12	2	1	1	2	Tr	36	1	Tr	1			
D191220023-001	LB315	4 1/2 INCH 0.250 INCH 42 FT	843	182.425	537	646	—	29.2	4900	GOOD	26	130	18	11	2	1	1	2	Tr	34	1	Tr	1			
					549	661	—	28.2			26	130	19	11	2	1	1	2	Tr	34	1	Tr	1			
					479	632	—	31.0																		
		TOTAL	1,499	324.383																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST (N5)	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD

Trident PO NO.: 5691

NOTES
HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT (560℃)
※1 TENSILE TEST – ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3—C.E. : CARBON EQUIVLENT ※4—F+P:F-FERRITE P-PEARLITE ※5—IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

imin Tan

BP01-F03-4

中鴻鋼鐵 CHUNG HUNG STEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300001	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Test Freq.	Chemical Compositions (%) C (x100)	Si	Mn	P (x1000)	S	V (x100)	Al	Nb	Ti	Mo	Cu	Ni	Cr	C.E. (%) IIW <0.43	Pcm <0.25	Mechanical Properties: Tensile Test Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Impact Test Loc.	Individual Value (ft.lbs)			Ave. (ft.lbs)	S&T (%)	Temp. (°F)	Hardness HRC
4-1/2" x 0.250" x 42'	547.568MT (2530pcs)	18JJ572 (18.360MT) (85pcs)	OK	OK	4900	L	14	16	97	13	3	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	72	78	R	27	-	-	-	-	-	-	-	-
						P	15	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KD823 (9.072MT) (42pcs)				L	14	14	97	13	3	Tr	3	2	Tr	Tr	1	Tr	2	-	-	L90	69	77	R	28	-	-	-	-	-	-	-	-
						P	14	13	94	12	1	Tr	2	2	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	13	94	12	1	Tr	2	2	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KG792 (86.832MT) (402pcs)				L	13	14	96	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	74	81	R	26	-	-	-	-	-	-	-	-
						P	15	14	96	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	14	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						L	13	14	96	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
						P	15	14	96	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	14	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KG793 (42.552MT) (197pcs)				L	14	13	97	14	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	75	80	R	25	-	-	-	-	-	-	-	-
						P	16	12	96	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	16	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test; Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#);; DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.O.C.)

DAFA MILL
18 Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

中鴻鋼鐵 CHUNG HUNG STEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300002	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Test Freq.	Chemical Compositions (%) C (x100)	Si	Mn	P (x1000)	S	V (x100)	Al	Nb	Ti	Mo	Cu	Ni	Cr	C.E. (%) IIW <0.43	Pcm <0.25	Mechanical Properties: Tensile Test Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	El. %	Impact Test Loc.	Individual Value (ft.lbs)			Ave. (ft.lbs)	S&T (%)	Temp. (°F)	Hardness HRC
4-1/2" x 0.250" x 42'		18KG794 (105.192MT) (487pcs)				L	14	15	99	13	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	72	79	R	28	-	-	-	-	-	-	-	-
						P	15	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	16	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						L	14	15	99	13	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	74	81	R	26	-	-	-	-	-	-	-	-
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	13	96	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KG795 (32.616MT) (151pcs)				L	14	13	95	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	79	R	27	-	-	-	-	-	-	-	-
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KG796 (18.576MT) (86pcs)				L	14	12	99	13	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV075 (17.712MT) (82pcs)				L	15	13	100	12	2	Tr	2	2	Tr	Tr	1	1	2	-	-	L90	73	79	R	25	-	-	-	-	-	-	-	-
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test; Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.O.C.)

DAFA MILL
18, Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

中鴻鋼鐵 CHUNG HUNG STEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
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KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300003	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Test Freq.	Chemical Compositions (%) C (x100)	Si	Mn	P (x1000)	S	V (x100)	Al	Nb	Ti	Mo	Cu	Ni	Cr	C.E. (%) IIW <0.43	Pcm <0.25	Mechanical Properties: Tensile Test Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Impact Test Loc.	Individual Value (ft.lbs)			Ave. (ft.lbs)	S&T (%)	Temp. (°F)	Hardness HRC
4-1/2" x 0.250" x 42'		18PV090 (18.144MT) (84pcs)				L	15	14	98	17	2	Tr	2	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV615 (85.112MT) (389pcs)				L	14	14	100	16	3	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	74	79	R	25	-	-	-	-	-	-	-	-
						P	14	13	94	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV616 (17.712MT) (82pcs)				L	14	14	97	13	2	Tr	3	2	Tr	Tr	1	1	1	-	-	L90	71	79	R	28	-	-	-	-	-	-	-	-
						P	14	13	93	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV617 (35.424MT) (164pcs)				L	14	14	98	15	2	Tr	4	2	Tr	Tr	1	1	2	-	-	L90	71	78	R	26	-	-	-	-	-	-	-	-
						P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	Tr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV618 (17.496MT) (81pcs)				L	13	12	98	17	2	Tr	4	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	13	94	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.O.C.)

DAFA MILL
18, Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

中鴻鋼鐵 CHUNGHUNGSTEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300004	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Test Freq.	Chemical Compositions (%) C (x100)	Si	Mn	P (x1000)	S	V (x100)	Al	Nb	Ti	Mo	Cu	Ni	Cr	C.E. (%) IIW <0.43	Pcm <0.25	Mechanical Properties: Tensile Test Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Impact Test Loc.	Individual Value (ft.lbs)			Ave. (ft.lbs)	S&T (%)	Temp. (°F)	Hardness HRC
4-1/2" x 0.250" x 42'		4FS65				L	26	19	131	10	2	Tr	3	Tr	Tr	Tr	Tr	1	26	-	-	L90	64	78	R	26	-	-	-	-	-	-	-	-
		(16.416MT)				P	26	18	130	10	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		(76pcs)				P	26	18	129	9	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		5CR06				L	26	18	131	16	2	Tr	3	Tr	Tr	Tr	Tr	1	24	-	-	L90	66	80	R	27	-	-	-	-	-	-	-	-
		(11.448MT)				P	25	17	129	9	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		(53pcs)				P	26	17	130	10	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		5CR12				L	26	18	130	15	5	Tr	3	Tr	Tr	Tr	Tr	1	25	-	-	L90	64	78	R	26	-	-	-	-	-	-	-	-
		(14.904MT)				P	25	17	129	9	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		(69pcs)				P	26	17	130	10	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4-1/2" x 0.250" x 42'	1.299MT	18KG795	OK	OK	4900	L	14	13	95	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	79	R	27	-	-	-	-	-	-	-	-
	(6pcs)	(0.432MT)				P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		(2pcs)				P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV617				L	14	14	98	15	2	Tr	4	2	Tr	Tr	1	1	2	-	-	L90	71	78	R	26	-	-	-	-	-	-	-	-
		(0.867MT)				P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	Tr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		(4pcs)				P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test; Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.O.C.)

DAFA MILL
18, Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

CERTIFICATE NO(성적서 번호) : E204067
DATE OF ISSUE(발행일자) : 2020-02-27
CONTRACT(P/O) NO.(계약번호) : HSUOP-20004
PR NO.(주문서 번호) : E200200073
COMMODITY(제품명) : E.R.W. STEEL PIPE
SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec. Min. / Max.	※2	Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	CVN Impact Test ※2 ※3	CVN Impact Test(℃) Specimen size	Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000														
									Max.				80000							Criteria : In the case of 10×10)							
1	EB PE	13-3/8" X 0.380 " X 41.400 F	64	63,378	2,649.6	R16022	1900	5		L	86440		64530		32												
2	EB PE	13-3/8" X 0.380 " X 41.400 F	50	49,514	2,070	R16028	1900	5		L	86010		66540		33												
		TOTAL	114	112,892	4,719.6																						

No.	Heat No.	Spec.	※4	C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure	H.I.C Test CLR	CTR	CSR	S.S.C.C Test
				Chemical Composition(%) 2:×100 3:×1000 4:×10000													Zn-Coating Test			HC-Test	H.I.C Test			
				2	2	2	3	3	2	2	2	3	3	3	3	4				psi	%	%	%	
		Min.																						
		Max.					30	30																
1	R16022		H	24	20	138	12	1																
			P	23	17	138	10	TR	6	1	3	14	2	TR	7	TR								
			P	23	18	139	10	TR	6	1	3	14	3	TR	8	TR								
2	R16028		H	23	20	137	11	2																
			P	23	17	134	8	TR	4	1	2	14	2	TR	7	TR								
			P	23	17	135	8	TR	4	1	2	14	2	TR	8	TR								

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR - API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test
GOOD	GOOD	GOOD	GOOD	GOOD

본 제품은 관련 규격에 합격되었음을 보증합니다.
This material has been manufactured, sampled, tested and inspected in accordance with the specification and has been found to meet the requirements.
* 본 검사증명서에 명기된 규격용도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위.변조시 사문서 위조로 불이익을 당하실 수 있습니다.

SURVEYOR

H.K. CHOI
QA Manager

* 본 검사증명서는 원본인 전자문서(전자서명 정보 포함)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포탈에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
* This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) * QRcode scanner App : 'QReal'

CERTIFICATE NO(성적서 번호) : E204068

DATE OF ISSUE(발행일자) : 2020-02-27

CONTRACT(P/O) NO.(계약번호) : HSUOP-20004

PR NO.(주문서번호) : E200200073

COMMODITY(제품명) : E.R.W. STEEL PIPE

SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec.	※2	Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	CVN Impact Test ※2 ※3	CVN Impact Test Specimen size	CVN Impact Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000														
									Max.				80000							Criteria : In the case of 10×10							
1	EB PE	13-3/8" X 0.380 " X 41.400 F	84	83,184	3,477.6	R15655	1900	5		L	87020		67200		34												
2	EB PE	13-3/8" X 0.380 " X 41.400 F	26	25,747	1,076.4	R16028	1900	5		L	86010		66540		33												
		TOTAL	110	108,931	4,554																						

No.	Heat No.	Spec.	※4	C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure psi	H.I.C Test CLR %	CTR %	CSR %	S.S.C.C Test
				Chemical Composition(%) 2:×100 3:×1000 4:×10000													Zn-Coating Test			HC-Test	H.I.C Test			
				2	2	2	3	3	2	2	2	3	3	3	3	4								
		Min.																						
		Max.					30	30																
1	R15655		H	23	19	138	8	2																
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR								
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR								
2	R16028		H	23	20	137	11	2																
			P	23	17	134	8	TR	4	1	2	14	2	TR	7	TR								
			P	23	17	135	8	TR	4	1	2	14	2	TR	8	TR								

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test
GOOD	GOOD	GOOD	GOOD	GOOD

본 제품은 관련 규격에 합격되었음을 보증합니다.
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SURVEYOR

H.K. CHOI

QA Manager

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CERTIFICATE NO(성적서 번호) : E204333
DATE OF ISSUE(발행일자) : 2020-02-28
CONTRACT(P/O) NO.(계약번호) : HSUOP-20004
PR NO.(주문서번호) : E200200073
COMMODITY(제품명) : E.R.W. STEEL PIPE
SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	CVN Impact Test ※2 ※3	CVN Impact Test(℃) Absorbed Energy(Joule) Specimen size	1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000														
									Max.				80000							Criteria : In the case of 10×10							
1	EB PE	13-3/8" X 0.380 " X 41,400 F	55	54,466	2,277	R16005	1900	5		L	90940		72440		31												
2	EB PE	13-3/8" X 0.380 " X 41,400 F	5	4,951	207	R16022	1900	5		L	86440		64530		32												
3	EB PE	13-3/8" X 0.380 " X 41,400 F	22	21,786	910.8	R19057	1900	5		L	94560		76890		32												
		TOTAL	82	81,203	3,394.8																						

No.	Heat No.	Spec.	※4	Chemical Composition(%) C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	2:×100 3:×1000 4:×10000					Zn-Coating Test Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure	H.I.C Test CLR	CTR	CSR	S.S.C.C Test
				2	2	2	3	3	2	2	2	3	3	3	3	4									psi	%	%	%	
		Min.																											
		Max.					30	30																					
1	R16005		H	24	18	134	11	2																					
			P	24	18	137	18	7	1	1	2	38	3	13	19	6													
			P	24	19	137	19	8	1	1	3	38	3	13	20	6													
2	R16022		H	24	20	138	12	1																					
			P	23	17	138	10	TR	6	1	3	14	2	TR	7	TR													
			P	23	18	139	10	TR	6	1	3	14	3	TR	8	TR													
3	R19057		H	24	17	136	10	1																					
			P	24	16	137	18	8	TR	1	2	38	3	13	18	6													
			P	24	16	138	18	8	TR	1	2	38	3	13	18	7													

Remark
※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN),HYUNDAI STEEL(KOREA)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test
GOOD	GOOD	GOOD	GOOD	GOOD

본 제품은 관련 규격에 합격되었음을 보증합니다.
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SURVEYOR

H.K. CHOI
QA Manager

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CERTIFICATE NO(성적서 번호) : E204336
DATE OF ISSUE(발행일자) : 2020-02-28
CONTRACT(P/O) NO.(계약번호) : HSUOP-20004
PR NO.(주문서번호) : E200200073
COMMODITY(제품명) : E.R.W. STEEL PIPE
SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec. Min. / Max.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	※2 ※3	CVN Impact Test CVN Impact Test(℃) Absorbed Energy(Joule) Specimen size	1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000														
									Max.				80000							Criteria : In the case of 10×10							
1	EB PE	13-3/8" X 0.380 " X 41.400 F	84	83,184	3,477.6	R15655	1900	5		L	87020		67200		34												
2	EB PE	13-3/8" X 0.380 " X 41.400 F	50	49,514	2,070	R16005	1900	5		L	90940		72440		31												
3	EB PE	13-3/8" X 0.380 " X 41.400 F	140	138,640	5,796	R16022	1900	5		L	86440		64530		32												
4	EB PE	13-3/8" X 0.380 " X 41.400 F	26	25,747	1,076.4	R16028	1900	5		L	86010		66540		33												

No.	Heat No.	Spec.	※4	C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure psi	H.I.C Test CLR %	CTR %	CSR %	S.S.C.C Test
				Chemical Composition(%) 2:×100 3:×1000 4:×10000													Zn-Coating Test			HC-Test	H.I.C Test			
				2	2	2	3	3	2	2	2	3	3	3	3	4		Time	Result	psi	%	%	%	
		Min.																						
		Max.					30	30																
1	R15655		H	23	19	138	8	2																
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR								
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR								
2	R16005		H	24	18	134	11	2																
			P	24	18	137	18	7	1	1	2	38	3	13	19	6								
			P	24	19	137	19	8	1	1	3	38	3	13	20	6								
3	R16022		H	24	20	138	12	1																
			P	23	17	138	10	TR	6	1	3	14	2	TR	7	TR								
			P	23	18	139	10	TR	6	1	3	14	3	TR	8	TR								
4	R16028		H	23	20	137	11	2																
			P	23	17	134	8	TR	4	1	2	14	2	TR	7	TR								
			P	23	17	135	8	TR	4	1	2	14	2	TR	8	TR								

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test				
GOOD	GOOD	GOOD	GOOD	GOOD				

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

본 제품은 관련 규격에 합격되었음을 보증합니다.
This material has been manufactured, sampled, tested and inspected in accordance with the specification and has been found to meet the requirements.
* 본 검사증명서에 명기된 규격용도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위.변조시 사문서 위조로 불이익을 당하실 수 있습니다.

SURVEYOR

H.K. CHOI
QA Manager

* 본 검사증명서는 원본인 전자문서(전자서명 정보 포함)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포탈에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
* This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) * QRcode scanner App : 'QReal'

CERTIFICATE NO(성적서 번호) : E204336
DATE OF ISSUE(발행일자) : 2020-02-28
CONTRACT(P/O) NO.(계약번호) : HSUOP-20004
PR NO.(주문서번호) : E200200073
COMMODITY(제품명) : E.R.W. STEEL PIPE
SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure (PSI)	Hydrostatic Test Time (SEC)	Spec.	Tensile Properties(Gage Length : 2 inch) ※2 Tensile Strength Base (PSI)	Tensile Strength Weld (PSI)	Yield Strength (PSI)	Y/R Rate (%)	E.L (%)	Hardness Test ※3 Max. Value	CVN Impact Test ※2 ※3 Specimen size	CVN Impact Test(℃) Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.	75000		55000												
									Max.			80000					Criteria : In the case of 10×10							
		TOTAL	300	297,085	12,420																			

No.	Heat No.	Spec.	※4	C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B						Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure	H.I.C Test CLR	CTR	CSR	S.S.C.C Test
																	2:×100	3:×1000	4:×10000			Zn-Coating Test			HC-Test	H.I.C Test			
				2	2	2	3	3	2	2	2	3	3	3	3	4									psi	%	%	%	
		Min.																											
		Max.					30	30																					

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test					
GOOD	GOOD	GOOD	GOOD	GOOD					

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

SURVEYOR

본 제품은 관련 규격에 합격되었음을 보증합니다.
This material has been manufactured, sampled, tested and inspected in accordance with the specification and has been found to meet the requirements.
* 본 검사증명서에 명기된 규격용도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위.변조시 사문서 위조로 불이익을 당하실 수 있습니다.

H.K. CHOI
QA Manager

* 본 검사증명서는 원본인 전자문서(전자서명 정보 포함)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포탈에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
* This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) * QRcode scanner App : 'QReal'

TENSION STEEL INDUSTRIES CO., LTD.

MILL TEST REPORT

9F. NO. 127 SEC 2 CHIEN KUO N. ROAD,TAIPEI. TAIWAN, R.O.C.
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	19032502	ISSUE DATE	MAR.25.2019
COMMODITY	PRIME NEWLY PRODUCED ERW STEEL PIPE, BLACK, PLAIN END	ORDER NO.	D18120303S	SHIPPING DATE	MAR.31.2019
SPECIFICATION	API 5CT-9th J55 PSL1			INVOICE NO.	TPE2019041501

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY		TENSILE ※1 Y.S. Rt0.5	T.S. BODY	T.S. WELD	EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	REMARK
		O.D.×THICKNESS×LENGTH	PCS/T		MPa				psi		x10^2	x10^2	x10^2	x10^3	x10^3	x10^2				x10^3						
D190220001-001	JM921	9-5/8"×0.352"×42'	35	23.263	443	536	—	34.0	3200	GOOD	15	93	12	25	3											
											16	92	12	25	3											
D190220001-001	JM922	9-5/8"×0.352"×42'	180	119.640	490	565	—	35.0	3200	GOOD	15	96	14	21	3											
											15	97	14	21	3											
D190220001-001	JN070	9-5/8"×0.352"×42'	160	106.347	453	535	—	34.0	3200	GOOD	15	98	14	15	3											
											15	98	14	15	2											
		TOTAL	375	249.250																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD.

NOTES
HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST - ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3－C.E. : CARBON EQUIVLENT ※4－F+P:F-FERRITE P-PEARLITE ※5－IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

imin Jan

TENSION STEEL INDUSTRIES CO., LTD

MILL TEST CERTIFICATE

9/F., NO. 127, SEC. 2, CHIEN KUO N. ROAD, TAIPEI 104 TAIWAN
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	17051801	ISSUE DATE	MAY.18.2017
COMMODITY	PRODUCT: PRIME NEWLY PRODUCED ERW BPE CASING			SHIPPING DATE	MAY.29.2017
SPECIFICATION	MATERIAL PRODUCED ACCORDING TO API 5CT J55 PSL1. MATERIAL TO BE COATED WITH MILLS LACQUER (NO LACQUER / OIL ON THE ID OF THE MATERIAL). ITEM 2 /			INVOICE NO.	TT17051201

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION O.D.×THICKNESS×LENGTH	QUANTITY PCS	QUANTITY T	TENSILE ※1 Y.S. (MPa)	TENSILE T.S. BODY (MPa)	TENSILE T.S. WELD (MPa)	TENSILE EL. (MPa)	HYDROSTATIC TEST 6SEC (psi)	OTHER TEST ※2	C (x10²)	Mn (x10²)	Si (x10²)	P (x10³)	S (x10³)	Cu (x10²)	Ni (x10²)	Cr (x10²)	Mo (x10²)	Al (x10³)	Nb (x10³)	Ti (x10³)	V (x10³)		C.E. ※3	REMARK
D170414019-001	4DK63	9-5/8"×0.395"×42'	32	23.755	501	561	—	30.0	3600	GOOD	16	97	15	17	3	1	1	2	Tr	25	15	3	1			
											15	97	15	17	3	1	1	2	Tr	24	16	3	1			
D170414019-001	4DK65	9-5/8"×0.395"×42'	166	123.227	479	556	—	32.6	3600	GOOD	14	102	14	14	4	1	1	2	Tr	27	14	2	1			
											14	102	14	14	5	1	1	2	Tr	27	14	2	1			
D170414019-001	4DK72	9-5/8"×0.395"×42'	295	218.988	484	556	—	32.6	3600	GOOD	15	97	14	14	2	1	1	2	Tr	29	15	2	1			
					495	567	—	32.0			14	97	15	14	2	1	1	2	Tr	28	14	2	1			
D170414019-001	4DK73	9-5/8"×0.395"×42'	325	241.258	491	563	—	31.0	3600	GOOD	14	97	15	12	2	1	1	2	Tr	25	16	2	2			
					485	560	—	34.0			15	98	16	13	2	1	1	2	Tr	25	16	2	2			
D170414019-001	4DK74	9-5/8"×0.395"×42'	274	203.399	457	554	—	30.0	3600	GOOD	14	97	14	15	3	Tr	1	2	Tr	23	15	2	1			
					485	564	—	32.4			15	97	15	17	3	Tr	1	2	Tr	23	14	2	1			
D170414019-001	4DK48	9-5/8"×0.395"×42'	33	24.498	486	564	—	32.0	3600	GOOD	15	97	15	17	2	1	1	2	Tr	28	15	2	1			
											14	98	15	18	3	Tr	1	2	Tr	28	16	2	1			
		TOTAL	1125	835.125																						

※2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

ISSUED BY : TENSION STEEL INDUSTRIES CO., LTD, TAIWAN, R.O.C.
PURCHASE ORDER NUMBER: 71400
LETTER OF CREDIT NUMBER: IC5015233US

NOTES
HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST – ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM
※3 – C.E. : CARBON EQUIVLENT ※4 – F+P:F-FERRITE P-PEARLITE ※5 – IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55
Tr : TRACE ELEMENT WITH ITS CONTENT CONFORMING TO THE SPECIFICTION REQUIREMENTS.

TENSION STEEL INDUSTRIES CO., LTD.

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF API 5CT & ISO 10474

Pan Chien Chen

TENSION STEEL INDUSTRIES CO., LTD

MILL TEST REPORT

9F. NO. 127 SEC 2 CHINE KUO N. ROAD,TAIPEI. TAIWAN, R.O.C.
TEL:(02)2500-6206 FAX:(02)2508-0398

CERTIFICATE NO.	17041802	ISSUE DATE	APR.18.2017
ORDER NO.	TS105121502	SHIPPING DATE	APR.26.2017
CUSTOMER NO.	W0059	INVOICE NO.	TT17041901

COMMODITY: PRIME NEWLY PRODUCED ERW STEEL PIPE, BLACK, PLAIN END

SPECIFICATION: API 5CT-9th J55 PSL1

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION O.D.×THICKNESS×LENGTH	QUANTITY PCS/T		TENSILE ※1 Y.S. (MPa)	T.S. BODY (MPa)	T.S. WELD (MPa)	EL. (MPa)	HYDROSTATIC TEST 6SEC (psi)	OTHER TEST ※2	C (x10²)	Mn (x10²)	Si (x10²)	P (x10³)	S (x10³)	Cu (x10²)	Ni (x10²)	Cr (x10²)	Mo (x10²)	Al (x10³)	Nb (x10³)	Ti (x10³)	V (x10³)		C.E. ※3	REMARK
D170405003-001	2W556	9-5/8"×0.395"×42'	103	76.460	509	574	—	27.2	3600	GOOD	15	100	15	13	5	Tr	1	2	Tr	20	12	2	2			
											15	100	14	14	5	Tr	1	2	Tr	19	13	2	2			
D170405003-001	2W559	9-5/8"×0.395"×42'	32	23.755	475	543	—	28.4	3600	GOOD	17	105	16	12	2	Tr	1	2	Tr	20	14	1	2			
											17	105	16	12	3	Tr	1	2	Tr	20	14	1	2			
D170324030-001	4DE94	9-5/8"×0.395"×42'	293	217.504	465	544	—	32.4	3600	GOOD	15	108	15	14	4	1	1	3	Tr	23	14	2	2			
					497	564	—	30.4			16	107	15	14	4	1	1	3	Tr	23	15	2	2			
D170324030-001	4DE95	9-5/8"×0.395"×42'	64	47.509	524	579	—	29.8	3600	GOOD	15	103	15	18	3	1	1	2	Tr	34	15	2	2			
											14	104	16	18	2	1	1	2	Tr	36	15	2	2			
D170405003-001	4DF03	9-5/8"×0.395"×42'	64	47.509	485	538	—	28.4	3600	GOOD	14	97	14	13	2	Tr	1	1	Tr	39	16	3	1			
											14	97	15	13	3	Tr	1	1	Tr	39	15	3	1			
D170405003-001	4DF15	9-5/8"×0.395"×42'	98	72.749	475	540	—	31.0	3600	GOOD	13	99	14	12	2	1	1	2	Tr	22	13	1	1			
											14	99	14	12	3	1	1	2	Tr	22	14	1	1			
		TOTAL	654	485.486																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST 8.750"	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

NOTES
HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST - ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM
※3-C.E. : CARBON EQUIVLENT ※4-F+P:F-FERRITE P-PEARLITE ※5-IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF EN 10204 & ISO 10474.

QUALITY ASSURANCE DEP.

Amin Jan

TENSION STEEL INDUSTRIES CO., LTD

MILL TEST REPORT

9F. NO. 127 SEC 2 CHIEN KUO N. ROAD,TAIPEI. TAIWAN, R.O.C.
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	19032503	ISSUE DATE	MAR.25.2019
COMMODITY	PRIME NEWLY PRODUCED ERW STEEL PIPE, BLACK, PLAIN END	ORDER NO.	D18120303S	SHIPPING DATE	MAR.31.2019
SPECIFICATION	API 5CT-9th J55 PSL1			INVOICE NO.	TPE2019041501

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY		TENSILE ※1 Y.S. Rt0.5	T.S. BODY	T.S. WELD	EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	REMARK
		O.D.×THICKNESS×LENGTH	PCS/T		MPa				psi		x10²	x10²	x10²	x10³	x10³	x10²				x10³						
D190306001-001	4HW28	9-5/8"×0.395"×42'	95	70.522	480	559	—	33.6	3600	GOOD	15	99	13	20	2											
											14	99	13	20	2											
D190306001-001	4HW55	9-5/8"×0.395"×42'	165	122.485	471	558	—	33.6	3600	GOOD	15	101	15	10	2											
											15	100	15	10	2											
D190306001-001	6M295	9-5/8"×0.395"×42'	100	74.233	480	556	—	32.0	3600	GOOD	15	104	10	19	3											
											16	104	10	20	3											
		TOTAL	360	267.240																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD.

NOTES
HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST - ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3－C.E. : CARBON EQUIVLENT ※4－F+P:F-FERRITE P-PEARLITE ※5－IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55
Tr:TRACE ELEMENT WITH ITS CONTENT CONFORMING TO THE SPECIFICATION REQUIREMENTS,

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

imin Jan

鑫陽鋼鐵股份有限公司
SHIN YANG STEEL CO.,LTD.

82544高雄市橋頭區芋寮里芋寮路297號
No. 297, Yuliao Road, Qiaotou District,
Kaohsiung City 82544, Taiwan (R.O.C.)
TEL:+886-7-6125177,
FAX:+886-7-6126325

品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
		化學成分 CHEMICAL COMPOSITION wt% ①					2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	JN495	SDSTC1953087367	13.00	13.00	96.00	15.00	4.00	2.0	2.0	3.0	22.00	Tr.	19.00	2.00	1.00	H
					JN495	SDSTC1953087367	11.50	10.70	95.80	13.20	3.20	0.8	0.9	1.8	23.90	Tr.	17.10	2.10	Tr.	P
					JN495	SDSTC1953087367	11.80	12.70	95.70	13.60	3.10	0.8	1.0	1.8	23.90	Tr.	18.90	1.98	Tr.	P
					JQ584	SDSTC1953093539	13.00	12.00	93.00	16.00	3.00	1.0	1.0	2.0	23.00	Tr.	17.00	1.00	Tr.	H
					JQ584	SDSTC1953093539	11.60	11.30	94.30	18.00	2.70	1.3	0.7	2.0	29.80	Tr.	17.90	1.70	Tr.	P
					JQ584	SDSTC1953093539	11.20	13.90	93.60	17.50	3.00	1.3	0.7	2.0	22.10	Tr.	19.20	1.60	Tr.	P
					JQ585	SDSTC1953093706	13.00	14.00	93.00	14.00	3.00	2.0	1.0	2.0	24.00	Tr.	20.00	1.00	Tr.	H
					JQ585	SDSTC1953093706	11.50	13.00	92.70	13.20	1.50	1.4	0.6	1.9	23.90	Tr.	20.80	1.50	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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品質證明書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							化學成分 CHEMICAL COMPOSITION wt%①													
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	JQ585	SDSTC1953093706	11.70	12.30	92.10	12.80	1.40	1.4	0.6	1.9	25.90	Tr.	19.50	1.50	Tr.	P
					JQ586	SDSTC1963093716	13.00	12.00	96.00	15.00	2.00	1.0	1.0	2.0	20.00	Tr.	17.00	1.00	Tr.	H
					JQ586	SDSTC1963093716	11.80	10.60	96.30	15.30	2.30	1.4	0.6	2.0	19.00	0.18	17.80	1.60	0.23	P
					JQ586	SDSTC1963093716	11.90	11.70	97.10	15.50	2.50	1.4	0.7	2.0	18.00	0.19	18.80	1.60	0.24	P
					JQ886	SDSTC1963099402	14.00	14.00	97.00	16.00	4.00	2.0	1.0	3.0	24.00	Tr.	17.00	1.00	1.00	H
					JQ886	SDSTC1963099402	14.20	11.80	97.60	14.90	4.20	2.2	0.5	2.9	24.80	0.18	17.50	1.60	Tr.	P
					JQ886	SDSTC1963099402	14.30	12.60	97.50	14.70	3.90	2.2	0.5	2.8	24.40	0.20	18.00	1.30	Tr.	P
					KM885	SDSTC1963093753	13.00	13.00	94.00	14.00	3.00	2.0	1.0	2.0	20.00	Tr.	18.00	1.00	Tr.	H

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							化學成分 CHEMICAL COMPOSITION wt%①													
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	KM885	SDSTC1963093753	12.70	11.80	94.00	12.00	2.60	2.6	0.7	2.4	22.60	0.27	18.40	2.20	Tr.	P
					KM885	SDSTC1963093753	12.70	13.30	93.50	12.10	2.60	2.6	0.7	2.4	19.60	0.31	19.10	2.10	Tr.	P
					KM886	SDSTC1953093722	13.00	14.00	97.00	14.00	3.00	2.0	1.0	2.0	21.00	Tr.	21.00	2.00	1.00	H
					KM886	SDSTC1953093722	11.60	12.60	95.60	13.80	1.40	1.7	0.4	2.4	19.90	Tr.	18.50	1.90	0.14	P
					KM886	SDSTC1953093722	12.40	12.50	96.50	13.70	1.60	1.7	0.5	2.3	21.60	Tr.	19.20	1.80	0.13	P
					KM887	SDSTC1963094056	14.00	15.00	96.00	14.00	3.00	2.0	1.0	2.0	23.00	Tr.	20.00	2.00	Tr.	H
					KM887	SDSTC1963094056	13.20	13.40	94.20	12.50	2.80	2.0	0.7	2.3	20.00	0.33	19.50	2.00	Tr.	P
					KM887	SDSTC1963094056	13.10	13.90	96.50	12.60	2.60	2.0	0.7	2.3	21.20	0.26	20.40	2.00	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

注釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Wing Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ③
		化學成分 CHEMICAL COMPOSITION wt% ①					2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	KM888	SDSTC1953093552	14.00	15.00	96.00	14.00	3.00	2.0	1.0	3.0	19.00	Tr.	19.00	1.00	Tr.	H
					KM888	SDSTC1953093552	12.20	13.80	96.30	12.10	1.90	2.1	0.8	3.1	23.00	Tr.	17.50	2.30	0.25	P
					KM888	SDSTC1953093552	12.90	12.10	96.40	15.00	3.00	2.1	0.5	3.2	21.90	Tr.	14.70	2.10	0.36	P
					LA413	SDSTC1953092407	15.00	15.00	96.00	9.00	2.00	2.0	1.0	2.0	32.00	Tr.	20.00	1.00	1.00	H
					LA413	SDSTC1953092407	14.50	15.00	97.50	9.10	1.30	1.7	0.5	1.7	31.10	Tr.	22.10	1.00	Tr.	P
					LA413	SDSTC1953092407	14.60	14.90	97.90	9.80	1.40	1.7	0.5	1.7	30.90	Tr.	22.80	1.20	Tr.	P
					LA801	SDSTC1963094052	12.00	12.00	93.00	14.00	2.00	2.0	1.0	2.0	18.00	Tr.	19.00	1.00	Tr.	H
					LA801	SDSTC1963094052	11.30	10.70	94.80	13.30	2.50	1.8	0.8	2.2	18.40	0.23	19.50	2.10	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.②	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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		產品名稱 PRODUCT	熱軋平口鋅鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL I , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ③
							化學成分 CHEMICAL COMPOSITION wt% ①													
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LA801	SDSTC1963094052	12.40	10.50	95.30	14.60	2.60	1.8	0.8	2.3	18.40	0.25	19.50	1.90	Tr.	P
					LA802	SDSTC1963094061	13.00	14.00	92.00	14.00	2.00	1.0	Tr.	2.0	20.00	Tr.	18.00	1.00	Tr.	H
					LA802	SDSTC1963094061	13.00	12.60	94.10	13.80	1.90	1.0	0.3	2.1	19.80	Tr.	17.40	1.60	0.21	P
					LA802	SDSTC1963094061	12.80	11.80	93.50	13.70	1.60	1.0	0.4	2.1	18.70	Tr.	18.50	1.60	0.10	P
					LA803	SDSTC1953093580	13.00	14.00	94.00	14.00	2.00	1.0	1.0	3.0	21.00	Tr.	20.00	1.00	Tr.	H
					LA803	SDSTC1953093580	13.60	14.60	96.70	13.70	1.80	2.0	0.8	2.8	20.10	0.24	18.70	1.50	0.33	P
					LA803	SDSTC1953093580	13.30	14.50	95.30	13.00	2.10	1.9	0.8	2.8	19.60	0.24	17.70	1.20	0.33	P
					LA804	SDSTC1953094832	14.00	13.00	92.00	12.00	3.00	2.0	1.0	3.0	22.00	Tr.	19.00	1.00	Tr.	H

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

鑫陽鋼鐵股份有限公司
SHIN YANG STEEL CO.,LTD.

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品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LA804	SDSTC1953094832	12.40	11.80	93.10	11.90	2.20	1.5	0.6	3.2	20.90	0.40	21.00	1.00	Tr.	P
					LA804	SDSTC1953094832	14.10	13.00	93.40	11.50	2.70	1.5	0.6	3.2	23.00	0.39	21.30	1.40	Tr.	P
					LA805	SDSTC1953094824	13.00	14.00	93.00	13.00	2.00	1.0	1.0	2.0	19.00	Tr.	19.00	1.00	Tr.	H
					LA805	SDSTC1953094824	12.50	13.70	91.80	13.00	2.30	1.2	0.7	2.8	18.90	0.53	21.20	1.20	Tr.	P
					LA805	SDSTC1953094824	12.50	15.20	91.50	13.00	2.00	1.2	0.5	2.8	18.50	0.37	21.80	1.10	Tr.	P
					LA828	SDSTC1963093735	14.00	12.00	91.00	12.00	2.00	2.0	1.0	2.0	16.00	Tr.	19.00	1.00	Tr.	H
					LA828	SDSTC1963093735	13.20	12.70	92.00	12.30	1.90	1.3	0.7	2.1	19.40	Tr.	21.70	1.20	Tr.	P
					LA828	SDSTC1963093735	12.80	12.40	92.40	12.40	1.90	1.3	0.7	2.1	19.00	Tr.	22.20	1.30	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt%① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LA938	SDSTC1963099403	13.00	12.00	98.00	13.00	3.00	1.0	Tr.	1.0	31.00	Tr.	18.00	1.00	Tr.	H
					LA938	SDSTC1963099403	13.10	10.00	98.50	12.80	2.70	0.7	0.3	1.6	33.90	Tr.	16.70	1.50	Tr.	P
					LA938	SDSTC1963099403	13.50	8.98	98.60	15.40	4.80	0.7	0.1	1.6	31.50	Tr.	13.50	1.70	Tr.	P
					LA942	SDSTC1963098771	13.00	13.00	91.00	12.00	2.00	1.0	2.0	2.0	38.00	Tr.	18.00	1.00	Tr.	H
					LA942	SDSTC1963098771	11.70	12.10	92.70	12.20	1.50	1.1	1.2	2.3	36.80	0.22	17.30	1.80	Tr.	P
					LA942	SDSTC1963098771	12.20	11.70	92.80	13.20	2.20	1.1	1.0	2.3	36.50	0.12	15.60	1.90	Tr.	P
					LB088	SDSTC1963098770	15.00	15.00	102.00	11.00	3.00	1.0	Tr.	1.0	24.00	Tr.	15.00	2.00	Tr.	H
					LB088	SDSTC1963098770	15.20	12.70	103.00	12.60	2.40	1.0	0.1	1.7	22.60	Tr.	14.20	2.10	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT.= NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
		化學成分 CHEMICAL COMPOSITION wt%①					2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LB088	SDSTC1963098770	14.30	13.50	102.00	11.20	2.40	1.0	0.3	1.7	21.20	Tr.	15.60	1.60	Tr.	P
					LB283	SDSTC1963101337	13.00	13.00	92.00	10.00	2.00	2.0	1.0	2.0	18.00	Tr.	16.00	1.00	Tr.	H
					LB283	SDSTC1963101337	11.10	11.80	94.50	9.40	1.40	1.7	0.8	2.2	16.30	0.23	18.00	1.40	0.16	P
					LB283	SDSTC1963101337	11.20	11.20	94.40	9.20	1.60	1.7	0.7	2.2	15.60	0.21	16.80	1.50	0.20	P
					LB288	SDSTC1963101476	13.00	14.00	97.00	11.00	2.00	2.0	1.0	2.0	22.00	Tr.	19.00	1.00	Tr.	H
					LB288	SDSTC1963101476	11.60	11.70	96.30	10.10	6.40	2.2	0.7	2.4	19.40	0.16	18.40	1.70	0.28	P
					LB288	SDSTC1963101476	11.70	12.60	96.30	10.30	6.90	2.2	0.7	2.4	19.00	0.17	18.60	1.70	0.21	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	JK025	SDSTC1893021384	13.00	14.00	95.00	17.00	2.00	1.0	1.0	2.0	17.00	Tr.	20.00	1.00	1.00	H
					JK025	SDSTC1893021384	11.30	11.60	94.20	20.30	2.80	0.6	1.0	1.7	12.10	0.09	18.00	1.30	0.47	P
					JK025	SDSTC1893021384	11.40	11.50	94.00	20.10	2.70	0.6	1.0	1.7	12.10	0.09	18.80	1.20	0.59	P
					JK026	SDSTC1893021540	13.00	16.00	95.00	15.00	3.00	2.0	2.0	2.0	20.00	Tr.	19.00	2.00	1.00	H
					JK026	SDSTC1893021540	13.00	15.20	92.00	17.00	3.40	1.3	1.2	2.2	18.00	0.15	18.10	2.40	0.66	P
					JK026	SDSTC1893021540	12.80	15.60	91.60	16.40	3.10	1.2	1.2	2.1	18.50	0.18	18.80	2.40	0.36	P
					JK028	SDSTC1893021283	13.00	14.00	98.00	14.00	3.00	1.0	1.0	1.0	21.00	Tr.	18.00	2.00	1.00	H
					JK028	SDSTC1893021283	12.70	11.90	96.50	15.40	3.50	0.8	0.9	1.5	17.10	Tr.	19.40	2.30	0.67	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Jeng Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口鍍鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	JK028	SDSTC1893021283	12.90	11.50	96.80	15.40	3.20	0.9	1.0	1.5	17.40	Tr.	19.50	2.30	0.68	P
					JK032	SDSTC1893021495	13.00	14.00	97.00	15.00	2.00	1.0	1.0	2.0	15.00	Tr.	19.00	2.00	1.00	H
					JK032	SDSTC1893021495	12.20	12.00	95.40	17.00	2.40	0.7	0.9	1.9	12.60	1.00	18.50	2.20	0.35	P
					JK032	SDSTC1893021495	12.40	11.80	95.40	16.50	2.30	0.7	1.0	1.9	12.20	1.00	19.30	2.20	0.58	P
					JK033	SDSTC1893021543	13.00	13.00	97.00	11.00	2.00	1.0	1.0	4.0	17.00	1.00	18.00	1.00	Tr.	H
					JK033	SDSTC1893021543	11.90	11.80	92.80	12.50	3.00	0.9	0.9	3.4	15.20	0.72	17.70	1.80	Tr.	P
					JK033	SDSTC1893021543	11.80	11.50	93.10	12.60	3.20	0.9	0.9	3.4	15.30	0.68	17.40	1.80	Tr.	P
					JK034	SDSTC1893021545	15.00	12.00	98.00	13.00	2.00	1.0	1.0	4.0	15.00	1.00	20.00	1.00	Tr.	H

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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FAX:+886-7-6126325

品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							化學成分 CHEMICAL COMPOSITION wt% ①													
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	JK034	SDSTC1893021545	12.40	9.98	93.50	11.80	2.30	1.3	1.2	2.0	14.40	0.19	18.70	1.60	0.42	P
					JK034	SDSTC1893021545	12.30	9.77	92.60	12.00	2.30	1.3	1.1	2.0	14.80	0.22	17.30	1.30	0.24	P
					KG676	SDSTC1893021451	14.00	15.00	96.00	13.00	3.00	2.0	2.0	2.0	22.00	Tr.	19.00	2.00	1.00	H
					KG676	SDSTC1893021451	12.60	12.80	94.50	14.50	3.30	1.4	1.7	2.7	16.70	0.11	18.30	1.90	Tr.	P
					KG676	SDSTC1893021451	12.40	12.50	94.20	14.40	3.10	1.4	1.8	2.7	16.70	0.14	18.80	2.20	Tr.	P
					KG677	SDSTC1893021485	14.00	15.00	100.00	13.00	2.00	2.0	2.0	2.0	21.00	Tr.	20.00	2.00	1.00	H
					KG677	SDSTC1893021485	12.10	12.90	94.80	17.20	3.20	1.9	1.7	2.5	17.70	0.22	19.60	2.70	0.17	P
					KG677	SDSTC1893021485	12.40	12.50	96.70	17.40	2.90	1.9	1.6	2.6	18.10	0.17	19.30	3.10	0.41	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銹鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	KG678	SDSTC1893021381	12.00	14.00	94.00	14.00	2.00	1.0	2.0	2.0	20.00	Tr.	19.00	2.00	1.00	H
					KG678	SDSTC1893021381	12.30	12.60	91.20	16.50	3.30	1.2	1.5	2.5	18.60	0.15	20.00	2.30	0.26	P
					KG678	SDSTC1893021381	12.30	12.10	91.50	16.40	3.10	1.1	1.5	2.5	18.60	0.15	19.60	2.70	0.26	P
					KG696	SDSTC1893021437	13.00	15.00	96.00	13.00	2.00	1.0	1.0	2.0	22.00	Tr.	19.00	1.00	1.00	H
					KG696	SDSTC1893021437	12.60	13.40	96.00	14.20	3.40	0.6	0.6	2.2	12.50	0.20	18.90	1.40	0.14	P
					KG696	SDSTC1893021437	12.80	12.60	96.50	14.50	3.30	0.6	0.6	2.2	12.60	0.14	18.60	1.50	0.14	P
					KG697	SDSTC1893021446	13.00	15.00	99.00	14.00	2.00	1.0	1.0	2.0	22.00	Tr.	18.00	1.00	Tr.	H
					KG697	SDSTC1893021446	12.30	13.30	95.90	13.20	2.90	0.8	0.7	1.8	18.60	0.14	18.60	1.30	0.05	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Jung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口鋅鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	KG697	SDSTC1893021446	12.40	12.70	95.60	13.00	2.70	0.8	0.6	1.8	19.10	0.10	18.20	1.80	0.05	P
					PV510	SDSTC1893021450	12.00	12.00	94.00	15.00	3.00	2.0	2.0	3.0	22.00	Tr.	21.00	2.00	Tr.	H
					PV510	SDSTC1893021450	12.50	10.30	92.60	17.00	3.20	0.6	0.8	3.4	11.40	0.69	18.80	1.50	0.38	P
					PV510	SDSTC1893021450	12.30	10.60	92.50	16.80	2.80	0.6	0.8	3.5	10.80	0.78	19.60	1.40	0.22	P
					PV511	SDSTC1893021496	13.00	12.00	94.00	13.00	3.00	2.0	1.0	3.0	22.00	Tr.	19.00	2.00	Tr.	H
					PV511	SDSTC1893021496	12.50	11.80	91.20	13.20	3.00	1.8	1.1	2.8	23.50	0.23	19.00	2.10	0.30	P
					PV511	SDSTC1893021496	12.60	12.00	91.60	13.50	2.80	1.8	1.1	2.8	23.40	0.22	19.10	2.70	0.28	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口鋅鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	JL906	SDSTC18C3045867	13.00	13.00	96.00	12.00	3.00	2.0	1.0	2.0	19.00	Tr.	18.00	2.00	1.00	H
					JL906	SDSTC18C3045867	10.80	12.50	96.20	11.20	3.40	2.2	0.6	2.0	16.80	0.44	16.40	1.60	0.42	P
					JL906	SDSTC18C3045867	10.80	12.90	94.90	10.20	3.20	2.2	0.6	2.0	17.00	0.54	15.30	1.80	0.25	P
					JL907	SDSTC18C30457462	13.00	13.00	96.00	13.00	3.00	2.0	1.0	2.0	19.00	Tr.	18.00	2.00	1.00	H
					JL907	SDSTC18C30457462	12.40	12.80	96.40	13.30	3.20	2.0	0.4	2.2	17.20	0.46	15.40	1.80	Tr.	P
					JL907	SDSTC18C30457462	12.90	13.70	96.00	12.20	3.00	2.1	0.5	2.2	17.30	0.48	15.80	1.70	Tr.	P
					JM046	SDSTC18C3045889	13.00	12.00	93.00	16.00	3.00	1.0	1.0	2.0	21.00	Tr.	21.00	1.00	1.00	H
					JM046	SDSTC18C3045889	10.20	10.00	90.40	17.00	3.50	1.0	0.6	1.9	20.70	0.20	16.80	1.60	0.18	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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TEL:+886-7-6125177,
FAX:+886-7-6126325

品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt%① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	JM046	SDSTC18C3045889	10.40	11.20	90.20	16.40	2.70	0.9	0.7	1.9	17.20	0.20	17.50	1.40	0.18	P
					JM102	SDSTC18C3048528	14.00	12.00	96.00	17.00	4.00	1.0	1.0	1.0	16.00	Tr.	18.00	2.00	1.00	H
					JM102	SDSTC18C3048528	12.10	11.00	97.50	15.80	2.00	1.2	0.7	1.7	16.60	0.22	19.20	2.10	0.47	P
					JM102	SDSTC18C3048528	11.40	10.80	97.60	16.90	2.70	1.2	0.7	1.7	17.10	0.35	18.70	2.20	0.36	P
					JM215	SDSTC18C3047605	14.00	15.00	95.00	13.00	2.00	1.0	1.0	2.0	18.00	Tr.	17.00	1.00	Tr.	H
					JM215	SDSTC18C3047605	12.80	14.30	92.00	15.10	1.50	0.8	0.6	1.9	20.70	Tr.	15.40	2.00	Tr.	P
					JM215	SDSTC18C3047605	13.70	13.90	92.60	18.50	2.50	0.9	0.3	2.0	20.20	Tr.	14.40	2.00	Tr.	P
					JM313	SDSTC18C3047594	15.00	13.00	98.00	14.00	2.00	1.0	1.0	2.0	19.00	Tr.	16.00	1.00	Tr.	H

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							化學成分 CHEMICAL COMPOSITION wt% ①													
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	JM313	SDSTC18C3047594	13.00	12.80	94.40	14.80	2.80	0.6	0.6	1.7	15.90	Tr.	16.30	2.00	Tr.	P
					JM313	SDSTC18C3047594	13.20	13.30	93.70	13.70	2.60	0.6	0.5	1.7	16.60	Tr.	14.50	1.90	Tr.	P
					JM314	SDSTC18C3047610	14.00	12.00	96.00	17.00	2.00	1.0	1.0	2.0	18.00	Tr.	18.00	2.00	1.00	H
					JM314	SDSTC18C3047610	12.30	11.10	97.80	16.90	1.70	0.8	0.4	1.6	16.00	Tr.	14.70	1.40	0.79	P
					JM314	SDSTC18C3047610	12.30	10.00	98.00	17.30	1.70	0.8	0.5	1.6	17.00	Tr.	16.30	1.80	0.74	P
					JM315	SDSTC18C3047613	13.00	12.00	96.00	14.00	3.00	1.0	1.0	2.0	18.00	Tr.	17.00	1.00	Tr.	H
					JM315	SDSTC18C3047613	12.40	11.30	95.60	17.40	2.80	0.6	0.6	1.7	15.90	0.08	16.30	2.00	Tr.	P
					JM315	SDSTC18C3047613	12.40	10.40	95.70	18.10	2.60	0.6	0.5	1.7	16.60	0.08	14.50	1.90	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS		用途 APPLICATION	FOR CASING	
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	PX035	SDSTC18C3047597	13.00	12.00	94.00	11.00	2.00	1.0	1.0	2.0	17.00	Tr.	21.00	2.00	1.00	H
					PX035	SDSTC18C3047597	10.80	11.10	93.90	13.40	2.20	1.1	0.7	2.0	16.30	0.29	20.30	2.50	0.27	P
					PX035	SDSTC18C3047597	10.70	10.10	95.70	12.60	2.20	1.1	0.7	2.0	16.10	0.33	20.30	2.30	0.26	P
					PX037	SDSTC18C3047759	12.00	12.00	94.00	13.00	2.00	1.0	1.0	2.0	18.00	Tr.	21.00	2.00	1.00	H
					PX037	SDSTC18C3047759	10.80	11.10	93.90	13.40	2.20	1.1	0.7	2.0	16.30	0.29	20.30	2.50	0.27	P
					PX037	SDSTC18C3047759	10.70	11.00	95.70	12.60	2.20	1.1	0.7	2.0	16.10	0.33	20.30	2.30	0.26	P
					PX038	SDSTC18C3048527	13.00	12.00	96.00	14.00	2.00	1.0	1.0	2.0	17.00	Tr.	19.00	2.00	1.00	H
					PX038	SDSTC18C3048527	12.50	12.80	94.50	12.90	3.40	1.1	0.4	1.7	22.40	0.41	17.60	2.70	0.29	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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							化學成分 CHEMICAL COMPOSITION wt%①													
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	PX038	SDSTC18C3048527	12.60	12.20	94.40	12.70	7.40	1.1	0.3	1.7	19.30	0.32	18.80	2.40	0.37	P
					PX089	SDSTC18C3046340	13.00	15.00	94.00	15.00	2.00	2.0	1.0	2.0	20.00	Tr.	21.00	2.00	1.00	H
					PX089	SDSTC18C3046340	10.60	12.80	91.40	16.90	2.50	1.9	0.8	2.2	17.90	0.27	18.50	2.80	0.58	P
					PX089	SDSTC18C3046340	10.40	13.20	91.00	16.10	2.50	1.9	0.8	2.2	18.30	0.20	18.10	2.70	0.15	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

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INSPECTION CERTIFICATE

P/O No. : P10125
L/C No. : HU20110829001

ISSUED DATE : 2020.09.22

COMMODITY : E.R.W STEEL PIPE

SPECIFICATION : API 5CT J55 CASING PSL1

주식회사 휴스틸
HUSTEEL Co., Ltd.

HEAD OFFICE SHINAN B/D 15F, 943-19, DAECHI-DONG, KANGNAM-GU, SEOUL, KOREA
DANGJIN PLANT 131, BUGOKGONGDAN STREET, SONGAK-EUP, DANGJIN-SI, CHUNGCHEONGNAM-DO, KOREA

CERTIFICATE No. : 200922-0256

MANUFACTURED No. : 20-09-010-0

SUPPLIER : HUSTEEL CO., LTD.

CUSTOMER :

Original certificate can be verified through QReal Application.

NO.	HEAT_NO	QUAN-TITY	TYPE	NOMINAL SIZE	ORDER SIZE O.D	ORDER SIZE W.T	ORDER SIZE LENGTH	WEIGHT	TENSILE TEST DIR.	TS	YS	EL	YR	WTS
		PCS	*1		inch	inch	ft	lb/ft	TYPE *3	PSI *4		%	%	PSI
01	SP71300	295	BPE	9-5/8	9.625	0.352	45	34.89	L	80,057	61,203	37	76	
									L	88,324	70,340	33	80	
02	SP71302	323	BPE	9-5/8	9.625	0.352	45	34.89	L	86,439	71,501	36	83	
									L	83,103	67,440	35	81	
03	SP71304	322	BPE	9-5/8	9.625	0.352	45	34.89	L	81,653	64,249	34	79	
									L	83,828	64,684	37	77	
									L					

NO.	DIV *5	C -2	Si -2	Mn -2	P -3	S -3	Cu -3	Ni -3	Cr -3	Mo -4	V -4	Nb -4	Ti -4	B -5	CE IIW -3	CE Pcm -3
		*6														
01	H	24	17	137	12	2										
	P	22	16	137	8	1										
	P	23	16	136	10	2										
02	H	23	17	139	11	1										
	P	23	16	138	7	1										
	P	22	16	135	10	1										
03	H	23	17	140	11	1										
	P	22	15	135	11	2										
	P	21	15	136	11	2										

NO.	HYDROSTATIC TEST T.P	H.T	RESULT	HEAT TREATMENT	ZINC COATING TEST WZC	CST	THREADS TPI	ETL	HARDNESS TEST	IMPACT TEST (0) ℃ DIV	Energy (Ind, J)	SIZE
	PSI	sec		℃	g/㎡	TIMES		mm	HV	*7		*8
	*9			*10	*11		*12					
01	3200	5	GOOD	960								
02	3200	5	GOOD	960								
03	3200	5	GOOD	960								

*13 N · D · T (UT)	FLATTENING OR BEND TEST	VISUAL& DIMENSION	METALLOGRAPHIC TEST	RESIDUAL MAGNETISM
GOOD	GOOD	GOOD	GOOD	
FLANGE TEST	REVERSE FLATTENING TEST	CRUSH TEST	DRIFT TEST	
			GOOD	

- Latest edition per API 5CT(10,2018)
- Tensile specimen size : 1.5 inch width

NOTE

*1.Type of Pipe Ends

BPE	Black Plain Ends	GPE	Galvanized Plain Ends
BPEB	BPE Bevelled	GPEB	GPE Bevelled
BTE	Black Threaded Ends	GTE	Galvanized Threaded Ends
BTC	BlackThreaded &Coupled	GTC	Galvanized Threaded&Coupled

* 2. **O.D** : Outside Diameter, **W.T** : Wall Thickness * 3. Direction&Type **- L** : Longitudinal Strip, **T** : Transverse Strip, **F** : Full Size Longitudinal, Size - 38.1mm(O.D 170mm above), 25.4mm(O.D 60.3 ~ 170mm), 19.1mm(O.D 50mm and below), Full Size(O.D 27.2mm and below)
* 4. **Tensile Test -TS** : Tensile Strength, **YS** : Yield Strength, **YR** : Yield Ratio, **EL** : Elongation, **WTS** : Weld tensile strength, **Gauge Length** : 2 inch, **Y.P method** 0.5% Underload
* 5. **H** : Heat analysis, **P** : Product analysis * 6. **-2** : x1/100, **-3** : x1/1000, **-4** : x1/10000, **-5** : x1/100000, **Tr** :Trace * 7. **B** : Base Metal, **W** : Weld Line, **H** : Heat Affected Zone
* 8. **Specimen Size - A** :10x10mm, **B** :10x7.5mm, **C** :10x6.6mm, **D** :10x5.0mm, **E** :10x3.3mm, **Direction** : Longitudinal * 9. **T.P** : Testing Pressure, **H.T** : Holding Time * 10. **Heat Treatment** Seam Normalizing
* 11. **WZC** : Weight of Zinc Coating, **CST** : Copper Sulphate Test * 12. **TPI** : Threads per inch, **ETL** : Effective length of threads * 13. **NDT** : UT, **Reference Standard** 3.2¢ Drilled Hole

SURVEYOR

WE HEREBY CERTIFY THAT THE PRODUCT HAS BEEN MANUFACTURED, SAMPLED, TESTED OR INSPECTED, OR BOTH, IN ACCORDANCE WITH THIS STANDARD AND HAS BEEN FOUND TO MEET THE REQUIREMENTS.

S.G. Lee

MANAGER OF Q.A TEAM

INSPECTION CERTIFICATE

P/O No. : P10125
L/C No. : HU20110829001

ISSUED DATE : 2020.09.22

COMMODITY : E.R.W STEEL PIPE

SPECIFICATION : API 5CT J55 CASING PSL1

주식회사 휴스틸
HUSTEEL Co., Ltd.

HEAD OFFICE SHINAN B/D 15F, 943-19, DAECHI-DONG, KANGNAM-GU, SEOUL, KOREA
DANGJIN PLANT 131, BUGOKGONGDAN STREET, SONGAK-EUP, DANGJIN-SI, CHUNGCHEONGNAM-DO, KOREA

CERTIFICATE No. : 200922-0256

MANUFACTURED No. : 20-09-010-0

SUPPLIER : HUSTEEL CO., LTD.

CUSTOMER :

Original certificate can be verified through QReal Application.

NO.	HEAT_NO	QUAN-TITY	TYPE	NOMINAL SIZE	ORDER SIZE O.D	ORDER SIZE W.T	ORDER SIZE LENGTH	WEIGHT	TENSILE TEST DIR.	TS	YS	EL	YR	WTS	CHEMICAL COMPOSITION(%) DIV	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	B	CE IIW	CE Pcm
		PCS	*1		inch	inch	ft	lb/ft	TYPE *3	PSI *4		%	%	PSI	*5	-2 *6			-3 *6					-4 *6				-5 *6	-3 *6	
04	SP71307	340	BPE	9-5/8	9.625	0.352	45	34.89	L	83,683	64,249	36	77		H	23	17	138	13	1										
									L	89,339	72,951	33	82		P	22	16	135	11	1										
															P	22	16	138	9	1										
05	SP71310	36	BPE	9-5/8	9.625	0.352	45	34.89	L	82,523	65,409	35	79		H	24	18	139	11	1										
															P	22	16	135	11	2										
															P	22	16	137	12	1										

NO.	HYDROSTATIC TEST T.P	HYDROSTATIC TEST H.T	HYDROSTATIC TEST RESULT	HEAT TREATMENT	ZINC COATING TEST WZC	ZINC COATING TEST CST	THREADS TPI	THREADS ETL	HARDNESS TEST HV	IMPACT TEST DIV	IMPACT TEST Energy (Ind, J)	IMPACT TEST SIZE
	PSI *9	sec *9		℃ *10	g/㎡ *11	TIMES *11	*12	mm *12		*7		*8
04	3200	5	GOOD	960								
05	3200	5	GOOD	960								

*13 N · D · T (UT)	FLATTENING OR BEND TEST	VISUAL& DIMENSION	METALLOGRAPHIC TEST	RESIDUAL MAGNETISM
GOOD	GOOD	GOOD	GOOD	
FLANGE TEST	REVERSE FLATTENING TEST	CRUSH TEST	DRIFT TEST	
			GOOD	

- Latest edition per API 5CT(10,2018)
- Tensile specimen size : 1.5 inch width

NOTE

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BPE	Black Plain Ends	GPE	Galvanized Plain Ends
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* 4. **Tensile Test -TS** : Tensile Strength, **YS** : Yield Strength, **YR** : Yield Ratio, **EL** : Elongation, **WTS** : Weld tensile strength, **Gauge Length** : 2 inch, **Y.P method** 0.5% Underload
* 5. **H** : Heat analysis, **P** : Product analysis * 6. **-2** : x1/100, **-3** : x1/1000, **-4** : x1/10000, **-5** : x1/100000, **Tr** :Trace * 7. **B** : Base Metal, **W** : Weld Line, **H** : Heat Affected Zone
* 8. **Specimen Size - A** :10x10mm, **B** :10x7.5mm, **C** :10x6.6mm, **D** :10x5.0mm, **E** :10x3.3mm, **Direction** : Longitudinal * 9. **T.P** : Testing Pressure, **H.T** : Holding Time * 10. **Heat Treatment** Seam Normalizing
* 11. **WZC** : Weight of Zinc Coating, **CST** : Copper Sulphate Test * 12. **TPI** : Threads per inch, **ETL** : Effective length of threads * 13. **NDT** : UT, **Reference Standard** 3.2¢ Drilled Hole

SURVEYOR

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S.G. Lee

MANAGER OF Q.A TEAM

Attachment 4
Surface Casing Cementing Report & Pipe Tally

Petrotek

WellView Allez™

Casing

Well Name: Newton IW-1

Surface

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Wellbore

Wellbore Name: Original Hole

Wellbore Sections

Section Des	Size (in)	Act Top (ftKB)	Act Btm (ftKB)	Start Date	End Date
Surface	17 1/2			10/20/2022	

Wellbore Kick Offs & Key Depths

Date	Point or Interval	Type	Top Depth (ftKB)	Depth Top (TVD) (ftKB)	Bottom Depth (ftKB)	Depth Bottom (TVD) (ftKB)	Length (ft)

Wellhead

Type	Start Date	Service	Comment

Wellhead Components

Des	Make	Model	SN	WP Top (psi)

Casing

Casing Description	Set Depth (ftKB)	Run Date	Set Tension (kips)
Surface	1,512.0	10/27/2022	

Centralizers	Scratchers
Bow Spring	

Casing Components

Item Des	OD (in)	Wt (lb/ft)	Grade	Top Thread	Jts	Len (ft)	Top (ftKB)	Btm (ftKB)	Mk-up Tq (ft•lb)	Class	Max OD (in)	ID (in)
Casing Joints	13 3/8	54.50	J-55	Buttress Thread	36	1,470.87	-4.8	1,466.1				12.62
Float Collar	13 3/8	54.50	J-55	BTC	1	1.25	1,466.1	1,467.3				12.62
Casing Joints	13 3/8	54.50	J-55	BTC	1	42.91	1,467.3	1,510.2				12.62
Guide Shoe				BTC	1	1.77	1,510.2	1,512.0				

WellView Allez™

Casing Tally

Well Name: Newton IW-1 **Surface, Set Depth: 1,512.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
1		Guide Shoe				Yes	1.77	No		BTC	1,510.2	1.77
2		Casing Joints	13 3/8	54.50	J-55	Yes	42.91	Yes		BTC	1,467.3	44.68
3		Float Collar	13 3/8	54.50	J-55	Yes	1.25	No		BTC	1,466.1	45.93
4		Casing Joints	13 3/8	54.50	J-55	Yes	38.73	Yes		Buttress Thread	1,427.3	84.66
5		Casing Joints	13 3/8	54.50	J-55	Yes	41.51	No		Buttress Thread	1,385.8	126.17
6		Casing Joints	13 3/8	54.50	J-55	Yes	41.53	Yes		Buttress Thread	1,344.3	167.70
7		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	No		Buttress Thread	1,302.8	209.20
8		Casing Joints	13 3/8	54.50	J-55	Yes	41.52	Yes		Buttress Thread	1,261.3	250.72
9		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	No		Buttress Thread	1,219.8	292.22
10		Casing Joints	13 3/8	54.50	J-55	Yes	41.49	Yes		Buttress Thread	1,178.3	333.71
11		Casing Joints	13 3/8	54.50	J-55	Yes	41.14	No		Buttress Thread	1,137.2	374.85
12		Casing Joints	13 3/8	54.50	J-55	Yes	41.19	Yes		Buttress Thread	1,096.0	416.04
13		Casing Joints	13 3/8	54.50	J-55	Yes	37.63	No		Buttress Thread	1,058.3	453.67
14		Casing Joints	13 3/8	54.50	J-55	Yes	41.12	Yes		Buttress Thread	1,017.2	494.79
15		Casing Joints	13 3/8	54.50	J-55	Yes	41.19	No		Buttress Thread	976.0	535.98
16		Casing Joints	13 3/8	54.50	J-55	Yes	40.79	Yes		Buttress Thread	935.2	576.77
17		Casing Joints	13 3/8	54.50	J-55	Yes	41.08	No		Buttress Thread	894.2	617.85
18		Casing Joints	13 3/8	54.50	J-55	Yes	41.16	Yes		Buttress Thread	853.0	659.01
19		Casing Joints	13 3/8	54.50	J-55	Yes	41.12	No		Buttress Thread	811.9	700.13
20		Casing Joints	13 3/8	54.50	J-55	Yes	41.19	Yes		Buttress Thread	770.7	741.32
21		Casing Joints	13 3/8	54.50	J-55	Yes	41.16	No		Buttress Thread	729.5	782.48
22		Casing Joints	13 3/8	54.50	J-55	Yes	41.15	Yes		Buttress Thread	688.4	823.63
23		Casing Joints	13 3/8	54.50	J-55	Yes	41.11	No		Buttress Thread	647.3	864.74
24		Casing Joints	13 3/8	54.50	J-55	Yes	41.17	Yes		Buttress Thread	606.1	905.91
25		Casing Joints	13 3/8	54.50	J-55	Yes	41.15	No		Buttress Thread	564.9	947.06
26		Casing Joints	13 3/8	54.50	J-55	Yes	41.14	Yes		Buttress Thread	523.8	988.20
27		Casing Joints	13 3/8	54.50	J-55	Yes	41.14	No		Buttress Thread	482.7	1,029.34
28		Casing Joints	13 3/8	54.50	J-55	Yes	41.99	Yes		Buttress Thread	440.7	1,071.33
29		Casing Joints	13 3/8	54.50	J-55	Yes	40.12	No		Buttress Thread	400.6	1,111.45
30		Casing Joints	13 3/8	54.50	J-55	Yes	41.74	Yes		Buttress Thread	358.8	1,153.19
31		Casing Joints	13 3/8	54.50	J-55	Yes	41.17	No		Buttress Thread	317.6	1,194.36

Casing Tally

Well Name: Newton IW-1 **Surface, Set Depth: 1,512.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
32		Casing Joints	13 3/8	54.50	J-55	Yes	37.18	Yes		Buttress Thread	280.5	1,231.54
33		Casing Joints	13 3/8	54.50	J-55	Yes	41.15	No		Buttress Thread	239.3	1,272.69
34		Casing Joints	13 3/8	54.50	J-55	Yes	41.14	Yes		Buttress Thread	198.2	1,313.83
35		Casing Joints	13 3/8	54.50	J-55	Yes	41.58	No		Buttress Thread	156.6	1,355.41
36		Casing Joints	13 3/8	54.50	J-55	Yes	41.28	Yes		Buttress Thread	115.3	1,396.69
37		Casing Joints	13 3/8	54.50	J-55	Yes	37.09	No		Buttress Thread	78.2	1,433.78
38		Casing Joints	13 3/8	54.50	J-55	Yes	41.47	Yes		Buttress Thread	36.8	1,475.25
39		Casing Joints	13 3/8	54.50	J-55	Yes	41.55	No		Buttress Thread	-4.8	1,516.80

Cement

Surface Casing Cement

Well Name: Newton IW-1

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Surface Casing Cement, Casing, 10/28/2022 00:46

Type	Cementing Start Date	Cementing End Date	Wellbore	String
Casing	10/28/2022		Original Hole	Surface, 1,512.0ftKB

Cementing Company	Evaluation Method	Cement Evaluation Results
Halliburton Energy Services		

Comment

1, 0.0-1,512.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
0.0	1,512.0	No		No	No

Initial Pump Rate (bbl/min)	Final Pump Rate (bbl/min)	Avg Pump Rate (bbl/min)	Final Pump Pressure (psi)	Plug Bump Pressure (psi)

Pipe Reciprocated?	Reciprocation Stroke Length (ft)	Reciprocation Rate (spm)	Pipe Rotated?	Pipe RPM (rpm)
No			No	

Tagged Depth (ftKB)	Tag Method	Depth Plug Drilled Out To (ftKB)	Drill Out Diameter (in)	Drill Out Date

Preflush

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Preflush				
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

Preflush

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Preflush				
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

Lead

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Lead		570	A	187.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
0.0	1,010.0	17.1	1.84	
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	13.10			

Cement Stage Fluid Additives

Add	Type	Conc
Varicem	Trade Secret	

Tail

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Tail		470	A	99.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
1,010.0	1,512.0	46.0	1.20	
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	15.60			

Cement Stage Fluid Additives

Add	Type	Conc
Halcem	Trade Secret	

Displacement

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Displacement				222.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

HALLIBURTON

WILDCATTER CONSULTING LLC-EBUS

New County Landfill IW 1

County: Newton
State: Indiana
United States of America

SO#: 0908197720
VIDA ID: H084319
Rig: Work Over

Post Job Summary
13.625” SURFACE CASING

Date: 11/6/2022

Submitted by:
Derek Anderson
Sr. Technical Professional
Halliburton Energy Services

HALLIBURTON

HALLIBURTON

1.0 Job Information

1.1 Casing, Wellbore, and Tool Data

Job Tubulars/Tools											
Description	Size in	Weight lbm/ft	ID in	Thread	Grade	Top MD ft	Btm MD ft	Top TVD ft	Btm TVD ft	Shoe Jnt ft	% Excess
20" Conductor Casing	**20**	**94**	**19.124**			**0**	**200**				
17-1/2" Open Hole			**17.5**			**200**	**1511**				**50**
13-3/8" Surface Casing	**13.375**	**54.5**	**12.615**			**0**	**1510**		**1506**	**42**	

1.2 Fluids Pumped

Fluid #	Fluid Type	Fluid Name	Rqstd Del Qty	UOM	Density lbm/gal	Yield ft3/ sack	Water Req Gal/sack	Rate bbl/min
1	**Brine**				**9**			
2	**Spacer/Flush**	**Mud Flush**	**40**	**bbl**	**8.33**			**3.5**
3	**Spacer/Flush**	**FWCA Spacer**	**20**	**bbl**	**8.33**			**3.5**
4	**Cement**	**VariCem**	**570**	**sk**	**13.1**	**1.84**	**10.01**	**7**
5	**Cement**	**HalCem**	**470**	**sk**	**15.6**	**1.2**	**5.27**	**7**
	Top Plug/Start Displacement							
6	**Water**		**222**	**bbl**	**8.33**			**6**

2.0 Real-Time Job Summary

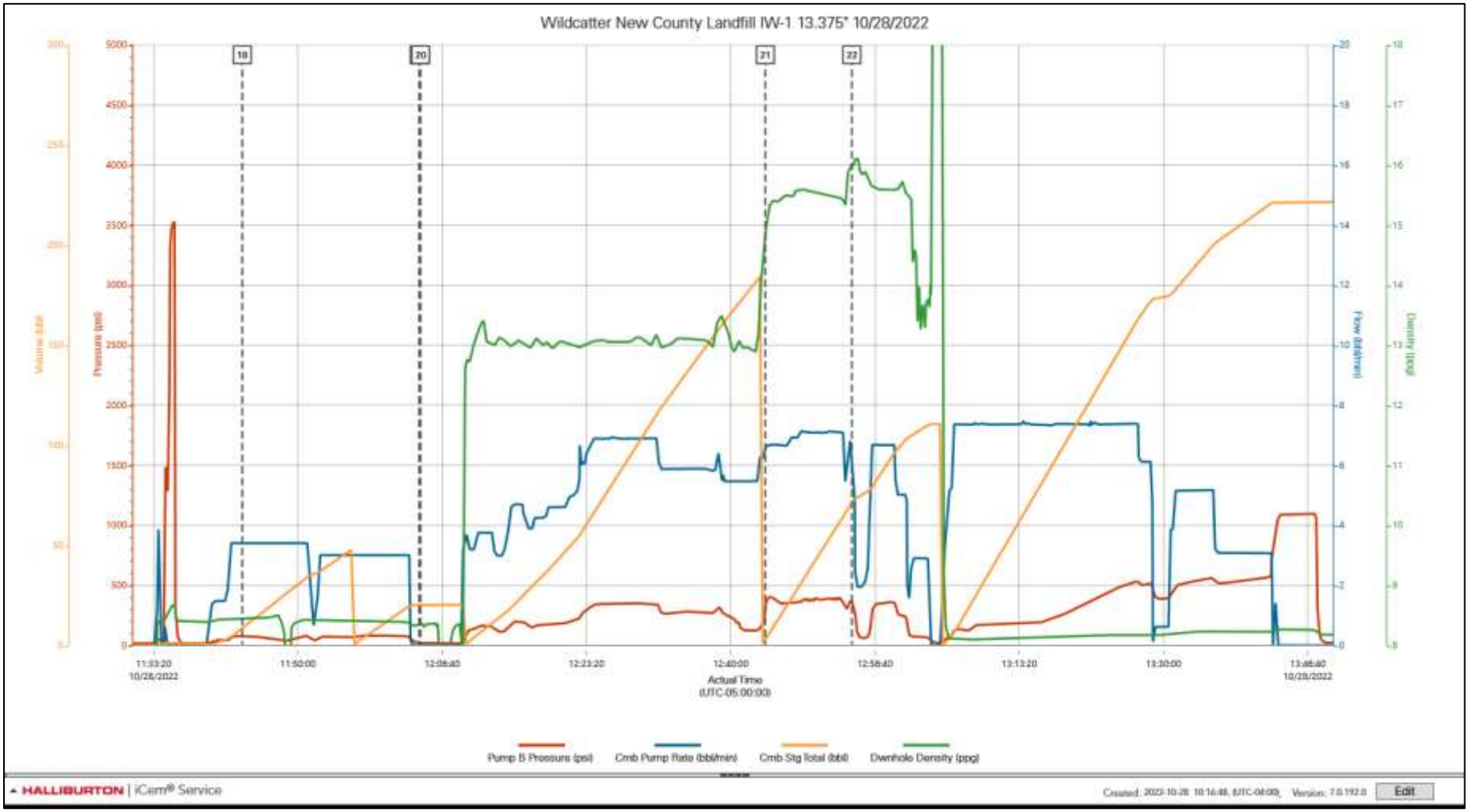
2.1 Job Event Log

Seq. No.	Activity	Date/Time	Comments
1	Call Out	27-Oct-2022 23:30	Call Out
2	Crew Arrive Shop	28-Oct-2022 00:30	Crew Arrive Shop
3	Pre-Rig Down Safety Meeting	28-Oct-2022 00:30	Review JSA with HES members. Rig down all lines plug container and hoses used on job.
4	Rig Down Lines	28-Oct-2022 01:00	Rig Down Lines
5	Depart Yard Safety Meeting	28-Oct-2022 01:15	Review journey managment and route with crew. Confirmed trucks were pre tripped and crew has all necessary PPE to complete job safely.
6	Crew Leave Shop	28-Oct-2022 01:30	Crew Leave Shop
7	Depart Location Safety Meeting	28-Oct-2022 01:30	Review journey managment and route with crew.
8	Crew Leave Location	28-Oct-2022 02:00	Crew Leave Location
9	Arrive At Loc	28-Oct-2022 07:00	Arrived At Location Signed in with rig. Confirmed all numbers with company representative. TD:1510 TVD: 1506 CC:20" #94 71 17.5" OH: 1511' CSG:13.375" #54.5 1510'WF: #9 Brine Rat Hole:1' Water Test: PH-7 chlorides-2000. We Cementing with a 6 foot rathole.
10	Pre-Rig Up Safety Meeting	28-Oct-2022 07:15	Review JSA with HES crew.
11	Rig-up Lines	28-Oct-2022 07:30	Rigged up all necessary iron bulk water and wash up lines for job.
12	Pre-Job Safety Meeting	28-Oct-2022 09:00	Review JSA with rig hands CO man and HES crew
13	Start Job	28-Oct-2022 09:30	Start Job
14	Test Lines	28-Oct-2022 09:34	Test Kickouts to 500 psi Tested lines to 3000 psi. Pressure held.
15	Pump Spacer 1	28-Oct-2022 09:39	Pumped 40 BBLS Mudflush Spacer 160 LBS Mudflush.
16	Pump Spacer 2	28-Oct-2022 09:56	Pumped 20 BBLS gel spacer with 50 LBS FWCA.
17	Pump Cement	28-Oct-2022 10:09	Pumped 570 SKS Lead Varicem at #13.1 yield:1.842 10.01 gal/sk CMT: 72F water temp: 64F Confirmed weight on scales. 62 BBLS back to surface
18	Pump Tail Cement	28-Oct-2022 10:43	Pumped 470 SKS Tail Halcem at #15.6 yield:1.197 5.26 gal/sk CMT: 74F water temp: 64F Confirmed weight on scales.
19	Drop Top Plug	28-Oct-2022 11:04	Dropped top plug CO man witnessed
20	Pump Displacement	28-Oct-2022 11:04	Pumped 222 BBLS fresh water. 62 BBLS Lead Cement back to surface.

21	Bump Plug	28-Oct-2022 11:44	Landed plug at 540 PSI. Took it to 1100 PSI. bled back 1.5 BBL floats held.
22	End Job	28-Oct-2022 11:54	End Job

3.0 Job Graphs

3.1 Entire Job



HALLIBURTON

North East, Zanesville

Lab Results- Primary

Job Information

Request/Slurry	2768282/1	**Rig Name**		**Date**	OCT/19/2022
Submitted By	Derek Anderson	**Job Type**	Surface Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	New County Landfill

Well Information

Casing/Liner Size	13.625 in	**Depth MD**	1510 ft	**BHST**	44°C / 112°F
Hole Size	17.5 in	**Depth TVD**	1510 ft	**BHCT**	32°C / 89°F
Pressure	1800 psi				

Cement Information - Primary Design

Conc	UOM	Cement/Additive
		VariCem Blend
10.01	gal/sack	Fresh Water

Cement Properties

Slurry Density	13.1	lbm/gal
Slurry Yield	1.84	ft3/sack
Water Requirement	10.01	gal/sack
Water Source	Fresh Water	
Water Chloride		

Operation Test Results Request ID 2768282/1

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39311759 — OCT/26/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

API Rheology, Request Test ID:39313811 — OCT/26/2022

300	200	100	60	30	6	3	Foam Quality (%)
51 (up)	44	37	33	30	25	22	0
51 (down)	43	35	30	28	25	22	0
51 (avg.)	44	36	32	29	25	22	0

API Fluid Loss, Request Test ID:39313812 — OCT/26/2022

Test Temp (degF)	Test Pressure (psi)	Test Time (min)	Meas. Vol.	Calculated FL (<30 min)	Conditioning time (min)	Conditioning Temp (degF)	Heat up Time
89	1000	4.25	80	425	65	89	35

Free Fluid API 10B-2, Request Test ID:39313813 — OCT/26/2022

Con. Temp (degF)	Heat Time (min)	Cond. Time (min)	Static time (min)	Incl. (deg)	% Fluid
89	35	65	120	90	0

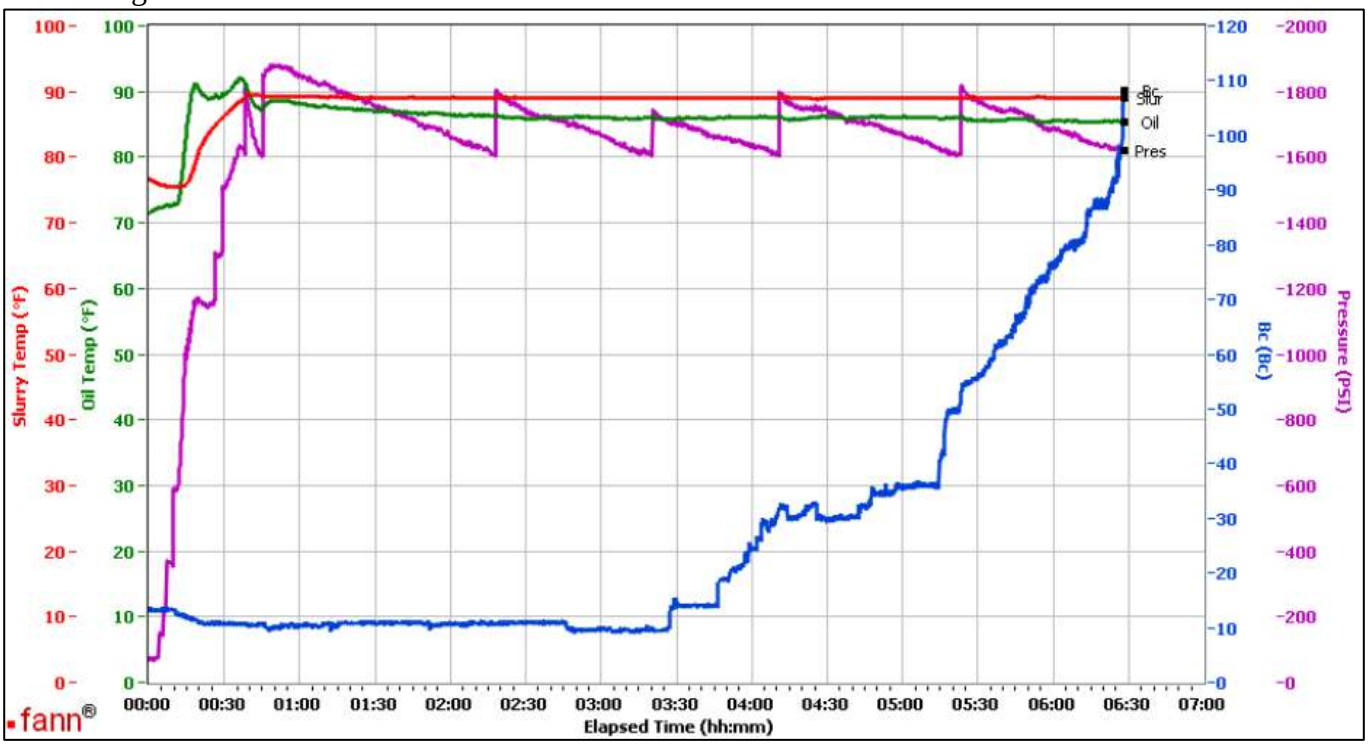
Thickening Time, Request Test ID:39311760 — OCT/26/2022

Temp (degF)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	40 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)
89	1800	35	13.7	4:09	5:14	5:18	5:49	6:27

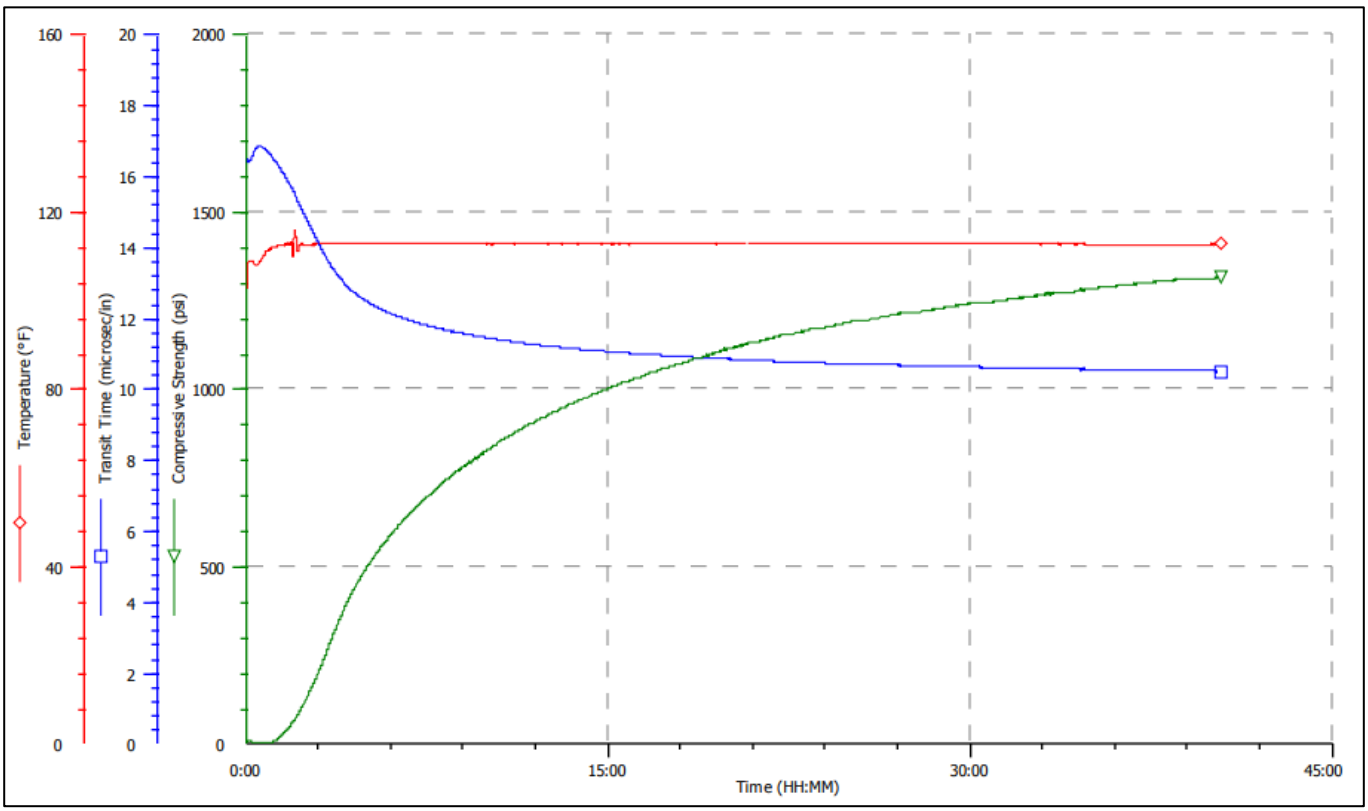
UCA Comp. Strength, Request Test ID:39311761 — OCT/28/2022

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
112	3000	1:53	2:20	5:05	15:09	721	902	1020	1167	1312	40.5

Thickening Time Chart



UCA chart



HALLIBURTON

North East, Zanesville

Lab Results- Primary

Job Information

Request/Slurry	2768281/1	**Rig Name**		**Date**	OCT/19/2022
Submitted By	Derek Anderson	**Job Type**	Surface Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	New County Landfill

Well Information

Casing/Liner Size	13.375 in	**Depth MD**	1535 ft	**BHST**	44°C / 112°F
Hole Size	17.25 in	**Depth TVD**	1535 ft	**BHCT**	32°C / 89°F
Pressure	1800 psi				

Drilling Fluid Information

Mud Supplier Name	**Mud Trade Name**	**Density**	9 lbm/gal

Cement Information - Primary Design

Conc	UOM	Cement/Additive
		HalCem Blend
5.27	gal/sack	Fresh Water

Cement Properties

Slurry Density	15.6	lbm/gal
Slurry Yield	1.2	ft3/sack
Water Requirement	5.27	gal/sack
Water Source	Fresh Water	
Water Chloride		

Operation Test Results Request ID 2768281/1

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39311756 — OCT/26/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

Thickening Time, Request Test ID:39311757 — OCT/26/2022

Temp (degF)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	40 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)
89	1800	35	17.7	1:57	1:57	2:10	2:30	2:48

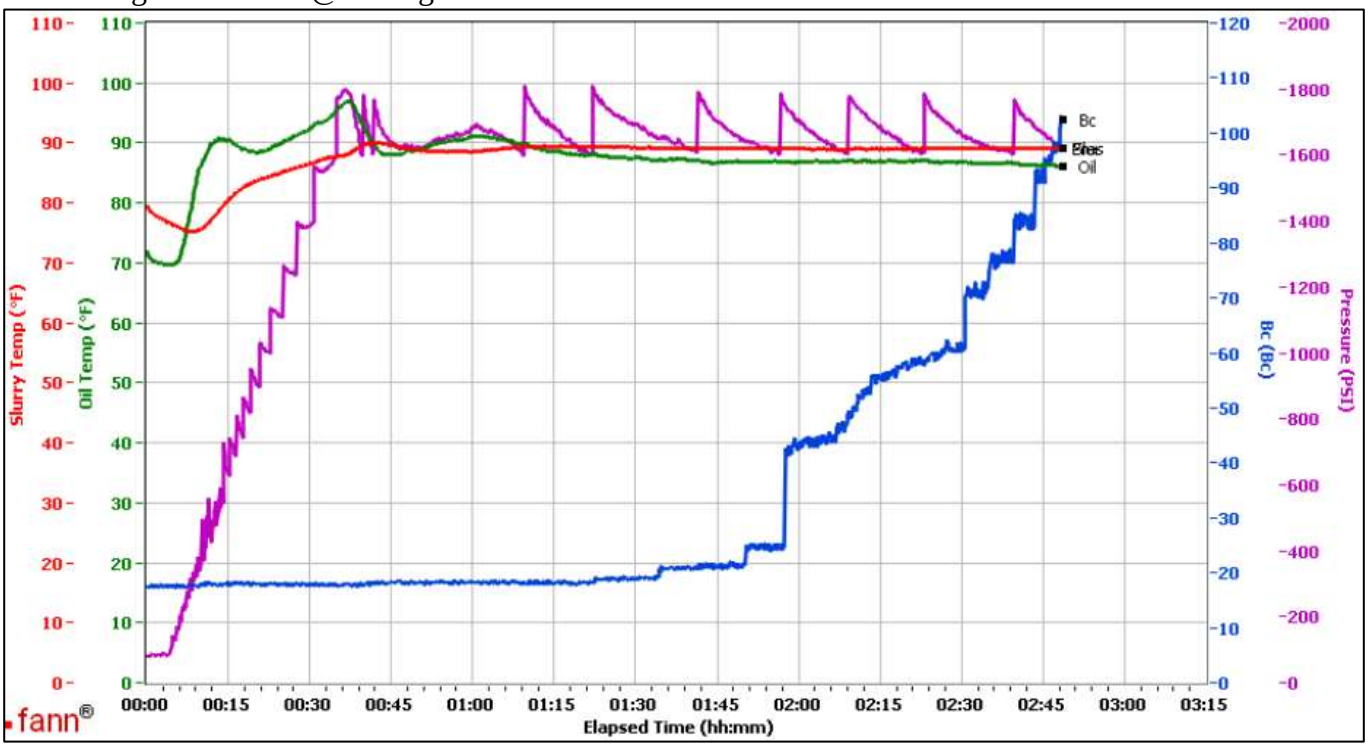
Thickening Time, Request Test ID:39313905 — OCT/26/2022

Temp (degF)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	40 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)
79	1800	35	16.3	1:40	1:56	2:10	2:37	3:02

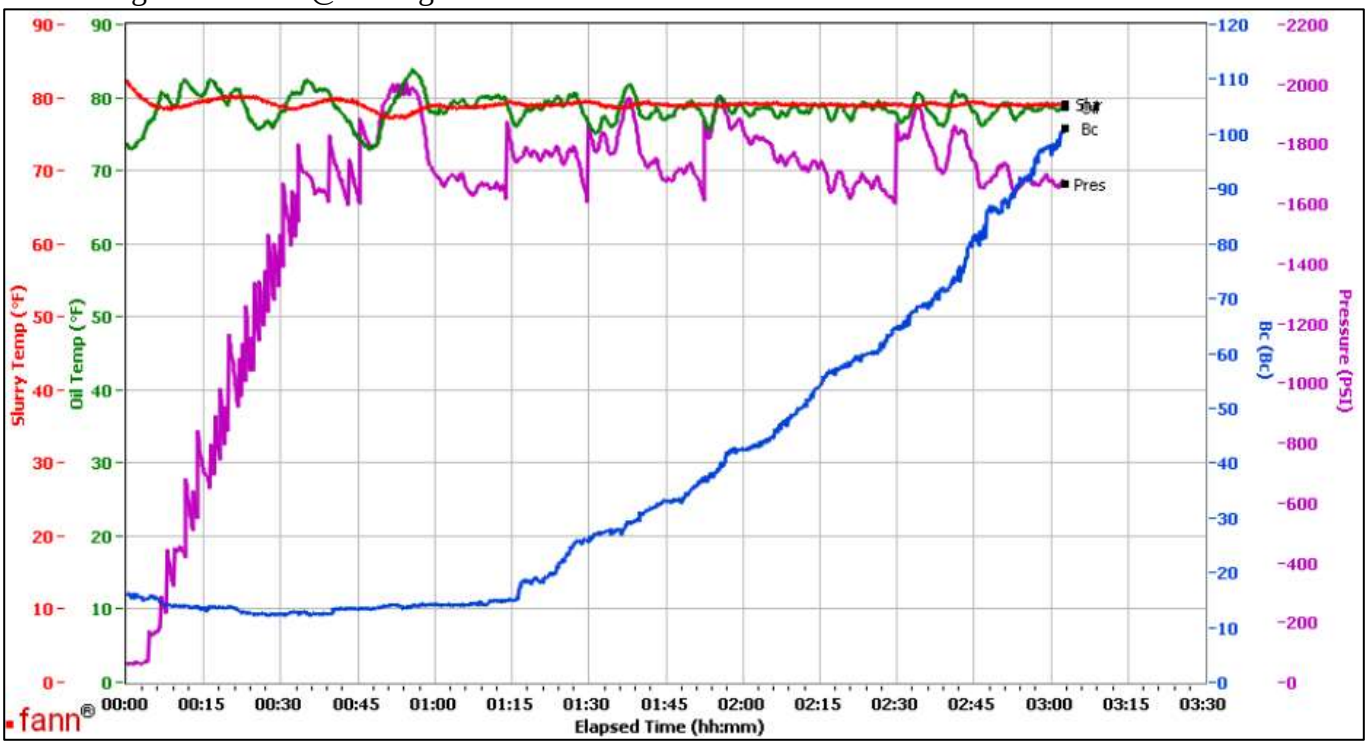
UCA Comp. Strength, Request Test ID:39311758 — OCT/28/2022

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
112	3000	0:48	1:07	3:39	7:02	1131	1579	1933	2460	3011	40

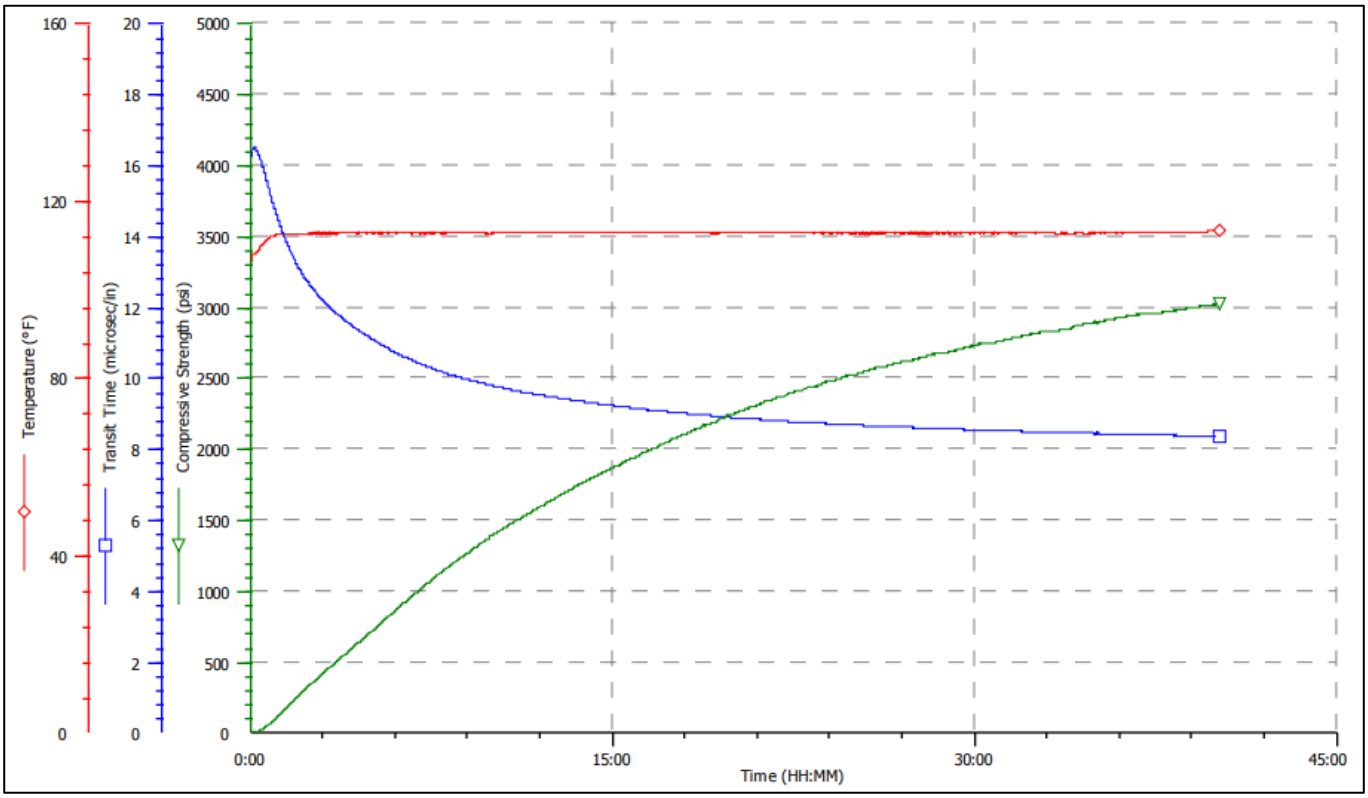
Thickening Time Chart @ 89 degrees



Thickening Time Chart @ 79 degrees



UCA Chart



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Attachment 5
Protection Casing Cementing Report & Pipe Tally

Petrotek

WellView Allez™

Casing

Well Name: Newton IW-1

Long String

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Wellbore

Wellbore Name: Original Hole

Wellbore Sections

Section Des	Size (in)	Act Top (ftKB)	Act Btm (ftKB)	Start Date	End Date
Surface	17 1/2			10/20/2022	

Wellbore Kick Offs & Key Depths

Date	Point or Interval	Type	Top Depth (ftKB)	Depth Top (TVD) (ftKB)	Bottom Depth (ftKB)	Depth Bottom (TVD) (ftKB)	Length (ft)

Wellhead

Type	Start Date	Service	Comment

Wellhead Components

Des	Make	Model	SN	WP Top (psi)

Casing

Casing Description	Set Depth (ftKB)	Run Date	Set Tension (kips)
Long String	3,237.0	11/9/2022	

Centralizers	Scratchers
Bow Spring	

Casing Components

Item Des	OD (in)	Wt (lb/ft)	Grade	Top Thread	Jts	Len (ft)	Top (ftKB)	Btm (ftKB)	Mk-up Tq (ft•lb)	Class	Max OD (in)	ID (in)
Casing Joints	9 5/8	36.00	J-55	LT&C	75	3,152.44	-2.8	3,149.7				8.92
Float Collar	9 5/8	36.00	J-55	LT&C	1	1.67	3,149.7	3,151.3				8.92
Casing Joints	9 5/8	36.00	J-55	LT&C	2	84.19	3,151.3	3,235.5				8.92
Float Shoe	9 5/8			LT&C	1	1.48	3,235.5	3,237.0				

WellView Allez™

Casing Tally

Well Name: Newton IW-1 **Long String, Set Depth: 3,237.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
1		Float Shoe	9 5/8			Yes	1.48	No		LT&C	3,235.5	1.48
2		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	Yes		LT&C	3,193.4	43.57
3		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	Yes		LT&C	3,151.3	85.67
4		Float Collar	9 5/8	36.00	J-55	Yes	1.67	No		LT&C	3,149.7	87.34
5		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	Yes		LT&C	3,107.6	129.41
6		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	3,065.5	171.49
7		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	3,023.4	213.59
8		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	Yes		LT&C	2,981.3	255.68
9		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	2,939.2	297.76
10		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	No		LT&C	2,897.2	339.85
11		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	Yes		LT&C	2,855.1	381.94
12		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	2,813.0	424.02
13		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	Yes		LT&C	2,770.9	466.09
14		Casing Joints	9 5/8	36.00	J-55	Yes	42.06	No		LT&C	2,728.9	508.15
15		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	2,686.8	550.23
16		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	Yes		LT&C	2,644.7	592.30
17		Casing Joints	9 5/8	36.00	J-55	Yes	42.05	No		LT&C	2,602.7	634.35
18		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	No		LT&C	2,560.6	676.44
19		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	Yes		LT&C	2,518.5	718.53
20		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	2,476.4	760.63
21		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	2,434.3	802.71
22		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	Yes		LT&C	2,392.2	844.79
23		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	2,350.1	886.87
24		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	2,308.1	928.95
25		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	Yes		LT&C	2,266.0	971.02
26		Casing Joints	9 5/8	36.00	J-55	Yes	42.06	No		LT&C	2,223.9	1,013.08
27		Casing Joints	9 5/8	36.00	J-55	Yes	41.36	No		LT&C	2,182.6	1,054.44
28		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	Yes		LT&C	2,140.5	1,096.54
29		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	No		LT&C	2,098.4	1,138.61
30		Casing Joints	9 5/8	36.00	J-55	Yes	45.20	No		LT&C	2,053.2	1,183.81
31		Casing Joints	9 5/8	36.00	J-55	Yes	45.20	Yes		LT&C	2,008.0	1,229.01

Casing Tally

Well Name: Newton IW-1 **Long String, Set Depth: 3,237.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
32		Casing Joints	9 5/8	36.00	J-55	Yes	45.18	No		LT&C	1,962.8	1,274.19
33		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	1,920.7	1,316.27
34		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	Yes		LT&C	1,878.7	1,358.35
35		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	1,836.6	1,400.45
36		Casing Joints	9 5/8	36.00	J-55	Yes	41.52	No		LT&C	1,795.0	1,441.97
37		Casing Joints	9 5/8	36.00	J-55	Yes	41.44	Yes		LT&C	1,753.6	1,483.41
38		Casing Joints	9 5/8	36.00	J-55	Yes	42.11	No		LT&C	1,711.5	1,525.52
39		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	1,669.4	1,567.62
40		Casing Joints	9 5/8	36.00	J-55	Yes	41.47	Yes		LT&C	1,627.9	1,609.09
41		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	1,585.8	1,651.17
42		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	1,543.7	1,693.27
43		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	Yes		LT&C	1,501.6	1,735.36
44		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	No		LT&C	1,459.6	1,777.43
45		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	No		LT&C	1,417.5	1,819.50
46		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	Yes		LT&C	1,375.4	1,861.59
47		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	No		LT&C	1,333.3	1,903.68
48		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	1,291.2	1,945.78
49		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	Yes		LT&C	1,249.1	1,987.88
50		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	1,207.0	2,029.96
51		Casing Joints	9 5/8	36.00	J-55	Yes	41.13	No		LT&C	1,165.9	2,071.09
52		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	Yes		LT&C	1,123.8	2,113.19
53		Casing Joints	9 5/8	36.00	J-55	Yes	42.12	No		LT&C	1,081.7	2,155.31
54		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	No		LT&C	1,039.6	2,197.41
55		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	Yes		LT&C	997.5	2,239.49
56		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	955.4	2,281.57
57		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	No		LT&C	913.3	2,323.66
58		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	Yes		LT&C	871.3	2,365.74
59		Casing Joints	9 5/8	36.00	J-55	Yes	40.84	No		LT&C	830.4	2,406.58
60		Casing Joints	9 5/8	36.00	J-55	Yes	41.50	No		LT&C	788.9	2,448.08
61		Casing Joints	9 5/8	36.00	J-55	Yes	41.49	Yes		LT&C	747.4	2,489.57

Casing Tally

Well Name: Newton IW-1 **Long String, Set Depth: 3,237.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
62		Casing Joints	9 5/8	36.00	J-55	Yes	41.70	No		LT&C	705.7	2,531.27
63		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	663.7	2,573.35
64		Casing Joints	9 5/8	36.00	J-55	Yes	42.07	Yes		LT&C	621.6	2,615.42
65		Casing Joints	9 5/8	36.00	J-55	Yes	42.02	No		LT&C	579.6	2,657.44
66		Casing Joints	9 5/8	36.00	J-55	Yes	42.09	No		LT&C	537.5	2,699.53
67		Casing Joints	9 5/8	36.00	J-55	Yes	42.10	Yes		LT&C	495.4	2,741.63
68		Casing Joints	9 5/8	36.00	J-55	Yes	42.08	No		LT&C	453.3	2,783.71
69		Casing Joints	9 5/8	36.00	J-55	Yes	42.03	No		LT&C	411.3	2,825.74
70		Casing Joints	9 5/8	36.00	J-55	Yes	41.32	Yes		LT&C	369.9	2,867.06
71		Casing Joints	9 5/8	36.00	J-55	Yes	42.06	No		LT&C	327.9	2,909.12
72		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	286.2	2,950.85
73		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	Yes		LT&C	244.4	2,992.58
74		Casing Joints	9 5/8	36.00	J-55	Yes	41.72	No		LT&C	202.7	3,034.30
75		Casing Joints	9 5/8	36.00	J-55	Yes	40.81	No		LT&C	161.9	3,075.11
76		Casing Joints	9 5/8	36.00	J-55	Yes	40.07	Yes		LT&C	121.8	3,115.18
77		Casing Joints	9 5/8	36.00	J-55	Yes	41.10	No		LT&C	80.7	3,156.28
78		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	39.0	3,198.03
79		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	Yes		LT&C	-2.8	3,239.78

Cement

Production Casing Cement

Well Name: Newton IW-1

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Production Casing Cement, Casing, 11/9/2022 22:29

Type	Cementing Start Date	Cementing End Date	Wellbore	String
Casing	11/9/2022		Original Hole	Long String, 3,237.0ftKB

Cementing Company	Evaluation Method	Cement Evaluation Results
Halliburton Energy Services		

Comment

1, <depthtop>-<depthbtm>ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
		Yes	20.0	No	No

Initial Pump Rate (bbl/min)	Final Pump Rate (bbl/min)	Avg Pump Rate (bbl/min)	Final Pump Pressure (psi)	Plug Bump Pressure (psi)
4	4			

Pipe Reciprocated?	Reciprocation Stroke Length (ft)	Reciprocation Rate (spm)	Pipe Rotated?	Pipe RPM (rpm)
Yes			No	

Tagged Depth (ftKB)	Tag Method	Depth Plug Drilled Out To (ftKB)	Drill Out Diameter (in)	Drill Out Date

<typ>

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)

Estimated Top (ftKB)	Estimated Bottom Depth (ftKB)	Percent Excess Pumped (%)	Yield (ft³/sack)	Mix H20 Ratio (gal/sack)

Free Water (%)	Density (lb/gal)	Plastic Viscosity (cP)	Thickening Time (hr)	1st Compressive Strength (psi)

Cement Stage Fluid Additives

Add	Type	Conc

2, <depthtop>-<depthbtm>ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
		Yes	40.0	No	No

Initial Pump Rate (bbl/min)	Final Pump Rate (bbl/min)	Avg Pump Rate (bbl/min)	Final Pump Pressure (psi)	Plug Bump Pressure (psi)
4	4			

Pipe Reciprocated?	Reciprocation Stroke Length (ft)	Reciprocation Rate (spm)	Pipe Rotated?	Pipe RPM (rpm)
Yes			No	

Tagged Depth (ftKB)	Tag Method	Depth Plug Drilled Out To (ftKB)	Drill Out Diameter (in)	Drill Out Date

<typ>

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)

Estimated Top (ftKB)	Estimated Bottom Depth (ftKB)	Percent Excess Pumped (%)	Yield (ft³/sack)	Mix H20 Ratio (gal/sack)

Free Water (%)	Density (lb/gal)	Plastic Viscosity (cP)	Thickening Time (hr)	1st Compressive Strength (psi)

Cement Stage Fluid Additives

Add	Type	Conc

3, 0.0-2,086.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
0.0	2,086.0	Yes	168.0	No	No

Initial Pump Rate (bbl/min)	Final Pump Rate (bbl/min)	Avg Pump Rate (bbl/min)	Final Pump Pressure (psi)	Plug Bump Pressure (psi)
6	6			

Pipe Reciprocated?	Reciprocation Stroke Length (ft)	Reciprocation Rate (spm)	Pipe Rotated?	Pipe RPM (rpm)
Yes			No	

Tagged Depth (ftKB)	Tag Method	Depth Plug Drilled Out To (ftKB)	Drill Out Diameter (in)	Drill Out Date

Spacer

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Spacer				

Estimated Top (ftKB)	Estimated Bottom Depth (ftKB)	Percent Excess Pumped (%)	Yield (ft³/sack)	Mix H20 Ratio (gal/sack)

Free Water (%)	Density (lb/gal)	Plastic Viscosity (cP)	Thickening Time (hr)	1st Compressive Strength (psi)

Cement Stage Fluid Additives

Add	Type	Conc

Spacer

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Spacer				

Estimated Top (ftKB)	Estimated Bottom Depth (ftKB)	Percent Excess Pumped (%)	Yield (ft³/sack)	Mix H20 Ratio (gal/sack)

Free Water (%)	Density (lb/gal)	Plastic Viscosity (cP)	Thickening Time (hr)	1st Compressive Strength (psi)

Cement

Production Casing Cement

Well Name: Newton IW-1

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-1	Sec 28 - T29N - R8W		IN-111-1I-0001	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
716.00		17.00		10/21/2022 22:00	11/28/2022 07:00

Cement Stage Fluid Additives

Add	Type	Conc

Lead

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Lead		512		168.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
0.0	2,086.0	30.0	1.84	
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	13.10			

Cement Stage Fluid Additives

Add	Type	Conc
Varicem	trade secret	

Tail

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Tail		840		177.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
2,086.0	3,237.0	50.0	1.18	
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	15.60			

Cement Stage Fluid Additives

Add	Type	Conc
Halcem	trade secret	

Displacement

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Displacement		243		
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
0.0	3,150.0			
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	9.00			

Cement Stage Fluid Additives

Add	Type	Conc

4, 2,086.0-3,237.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
2,086.0	3,237.0	Yes	177.0	Yes	No
Initial Pump Rate (bbl/min)	**Final Pump Rate (bbl/min)**	**Avg Pump Rate (bbl/min)**		**Final Pump Pressure (psi)**	**Plug Bump Pressure (psi)**
6	6			1,150.0	1,800.0
Pipe Reciprocated?	**Reciprocation Stroke Length (ft)**	**Reciprocation Rate (spm)**		**Pipe Rotated?**	**Pipe RPM (rpm)**
Yes				No	
Tagged Depth (ftKB)	**Tag Method**	**Depth Plug Drilled Out To (ftKB)**		**Drill Out Diameter (in)**	**Drill Out Date**

<typ>

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

5, 0.0-3,150.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
0.0	3,150.0	Yes	243.0	Yes	No
Initial Pump Rate (bbl/min)	**Final Pump Rate (bbl/min)**	**Avg Pump Rate (bbl/min)**		**Final Pump Pressure (psi)**	**Plug Bump Pressure (psi)**
5	7	6			1,800.0
Pipe Reciprocated?	**Reciprocation Stroke Length (ft)**	**Reciprocation Rate (spm)**		**Pipe Rotated?**	**Pipe RPM (rpm)**
No				No	
Tagged Depth (ftKB)	**Tag Method**	**Depth Plug Drilled Out To (ftKB)**		**Drill Out Diameter (in)**	**Drill Out Date**

<typ>

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

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WILDCATTER CONSULTING LLC-EBUS

New County Landfill IW 1

County: Newton
State: Indiana
United States of America

SO#: 0908223263
VIDA ID: H085141
Rig: Work Over

Post Job Summary
9.625” LONG STRING

Date: 11/14/2022

Submitted by:
Derek Anderson
Sr. Technical Professional
Halliburton Energy Services

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1.0 Job Information

1.1 Casing, Wellbore, and Tool Data

Description	Size in	Weight lbm/ft	ID in	Thread	Grade	Top MD ft	Btm MD ft	Top TVD ft	Btm TVD ft	Shoe Jnt ft	% Excess
13-3/8" Surface Casing	**13.375**	**54.5**	**12.615**			**0**	**1512**				
12-1/4" Open Hole			**12.25**			**1512**	**3237**				**30**
9-5/8" Production Casing	**9.625**	**36**	**8.921**			**0**	**3242**			**84**	

1.2 Fluids Pumped

Fluid #	Fluid Type	Fluid Name	Rqstd Del Qty	UOM	Density lbm/gal	Yield ft3/ sack	Water Req Gal/sack	Rate bbl/min
1	**Drilling Fluid (Mud)**				**9.3**			
2	**Spacer/Flush**	**Mud Flush**	**20**	**bbl**	**8.4**			**4.0**
3	**Spacer/Flush**	**Tuned Prime**	**40**	**bbl**	**10.0**	**9.8**	**65.95**	**4.5**
4	**Cement**	**VariCem**	**512**	**sk**	**13.1**	**1.84**	**9.99**	**5.8**
5	**Cement**	**HalCem**	**840**	**sk**	**15.6**	**1.18**	**5.19**	**6.0**
	Top Plug/Start Displacement							
6	**Mud**	**Brine**	**243.7**	**bbl**	**9**			**7 - 5**

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2.0 Real-Time Job Summary

2.1 Job Event Log

Seq. No.	Activity	Date/Time	Comments
1	Call Out	09-Nov-2022 10:00	WILDCATTER NEW COUNTY LAND FIELD #9132534 - 9 5/8" Production Casing - On location 11/09/22 @ 20:00
2	Safety Meeting - Service Center or other Site	09-Nov-2022 11:45	Review Journey Management And Route With Crew Members
3	Depart from Service Center or Other Site	09-Nov-2022 12:00	Depart From Yard
4	Arrive At Loc	09-Nov-2022 20:30	Talk To Company Man () : TD = 3 242' TP = 3 237' ST = 84' OH = 12 1/4" CSG = 9 5/8" 36# WF = WBM @ 9# Test Water = pH – 7 Chlorides - < 290 ppm 55 F
5	Safety Meeting - Assessment of Location	09-Nov-2022 20:40	Spot Equipment
6	Safety Meeting - Pre Rig-Up	09-Nov-2022 20:50	Review JSA With Crew Members
7	Rig-Up Equipment	09-Nov-2022 21:00	Rig Up Iron And Hoses Needed For Job
8	Rig-Up Completed	09-Nov-2022 22:30	Rigged Up All Iron And Hoses Needed For CMT Job With No Issues Or Incidents.
9	Safety Meeting - Pre Job	10-Nov-2022 00:10	Review Job Procedure And JSA With Rig Hands Co. Man And HES Members
10	Rig-Up Equipment	10-Nov-2022 00:20	Rig Up Plug Container And Rig Floor To Cmt Pump And Run Cmt Job.
11	Start Job	10-Nov-2022 00:33	Start Job
12	Test Lines	10-Nov-2022 00:39	Performed A Kick Out Test To 500 psi On Both Pumps Then Tested Lines To 5 000 psi good Test.
13	Pump Spacer 1	10-Nov-2022 00:45	Pumped Mud Flush III Spacer 20 bbls @ 4 BPM With 100 psi Good Returns.
14	Pump Spacer 2	10-Nov-2022 00:54	Pumped Tuned Spacer 40 bbls @ 10 PPG @ 4.5 BPM With 120 psi Good Returns.
15	Pump Lead Cement	10-Nov-2022 01:04	Pumped 167.4 bbls Of Lead Cement 512 Sacks 13.1 PPG With A Yield Of 1.836 And A Water Requirement Of 9.99 Gals/Sack. 5.8 BPM With 231 psi Good Returns. HOC=2 591' TOC=0'.
16	Pump Tail Cement	10-Nov-2022 01:39	Pumped 129 bbls Of Cement 840 Sacks 15.6 PPG With A Yield Of 1.181 And A Water Requirement Of 5.19 Gals/Sack. 6 BPM With 408 psi Good Returns. HOC=2 735' TOC=502'.
17	Drop Top Plug	10-Nov-2022 02:13	Drop Top Plug
18	Pump Displacement	10-Nov-2022 02:14	Pump Displacement 243.7 bbls Of 9# Brine Water
19	Pump Displacement	10-Nov-2022 02:29	100 bbls Into Displacement 7 BPM With 280 psi Good Returns
20	Pump Displacement	10-Nov-2022 02:43	200 bbls Into Displacement 5 BPM With 950 psi Good Returns
21	Cement Returns to Surface	10-Nov-2022 02:44	We Got All The Spacer And 83 bbls Of God Cement To Surface.

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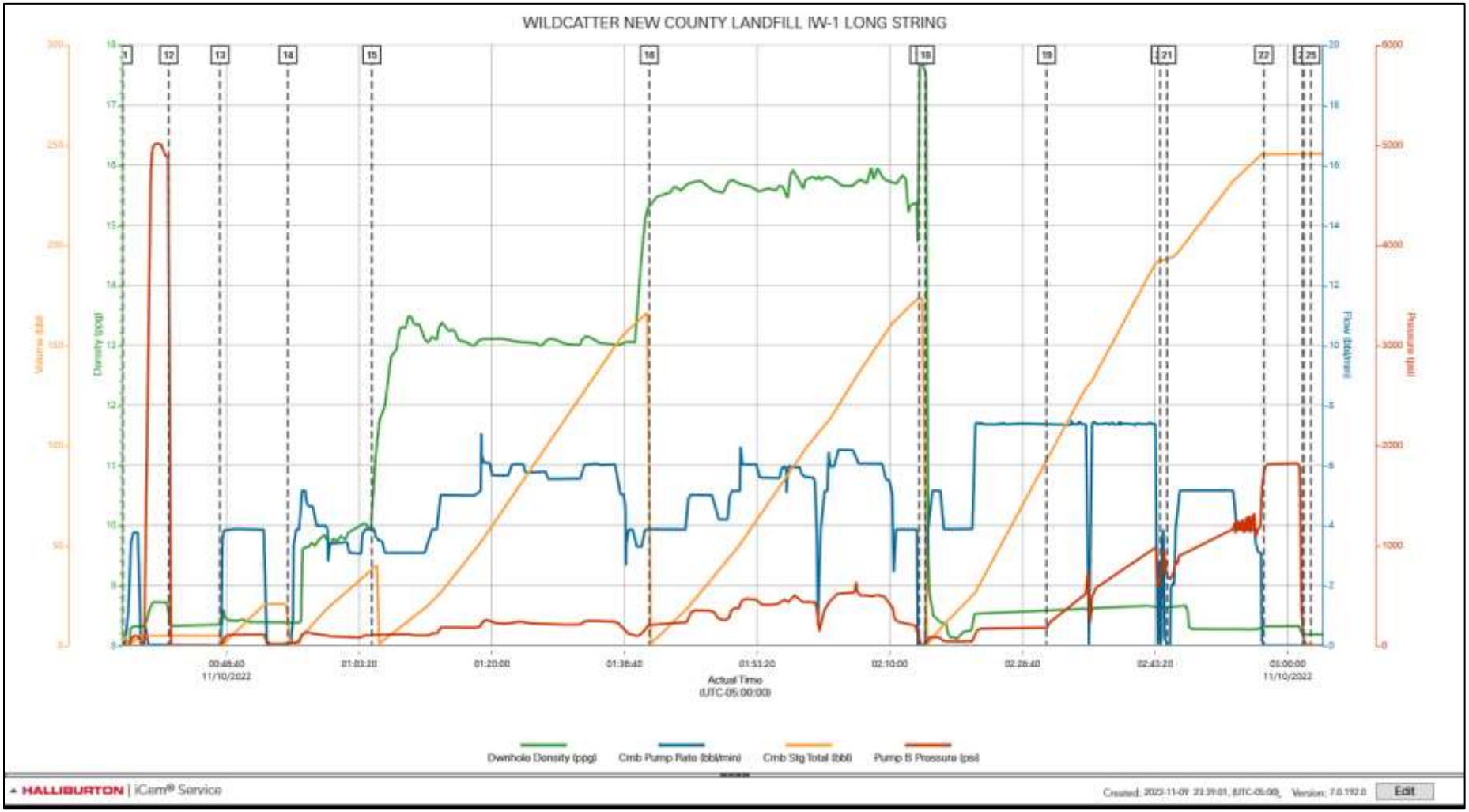
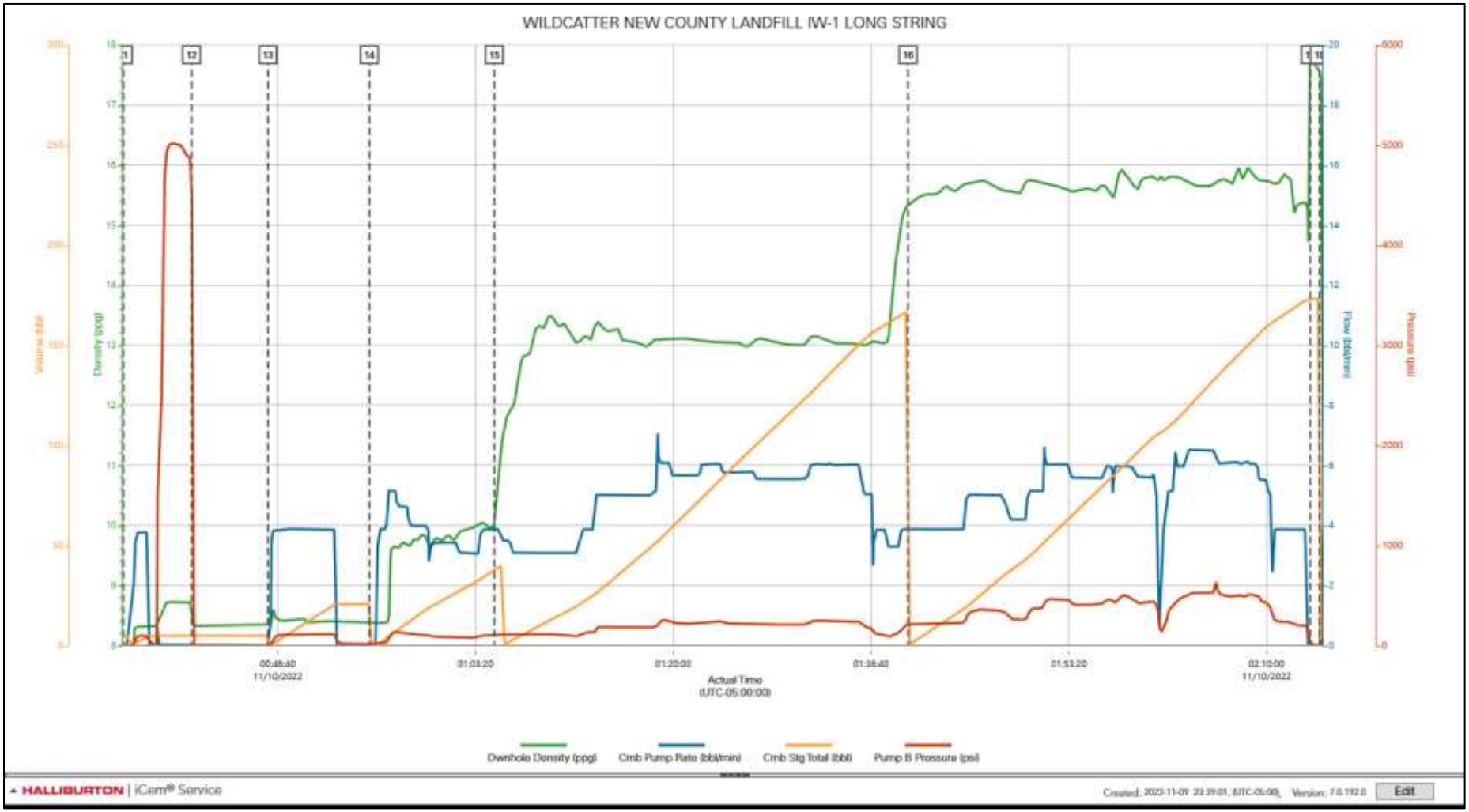
22	Bump Plug	10-Nov-2022 02:57	Bumped Plug With Calculated Displacement And Put 500 psi Over Final Circulating Pressure. Pressure Climbed From 1 180 To 1 800 psi.
23	Bleed Casing	10-Nov-2022 03:01	Bled Pressure Back To Zero And Got 1.5 bbls Back
24	Check Floats	10-Nov-2022 03:02	Floats Held Good.
25	End Job	10-Nov-2022 03:02	End Job.
26	Safety Meeting - Pre Rig-Down	10-Nov-2022 03:10	Review JSA With HES Crew Members
27	Rig-Down Equipment	10-Nov-2022 03:15	Rig Down Iron Plug Container And Hoses Used On Job
28	Rig-Down Completed	10-Nov-2022 03:50	All Equipment Rigged Down With No Issues Or Incidents
29	Safety Meeting - Departing Location	10-Nov-2022 03:55	Review Journey Management And Route With Crew Members
30	Depart Location	10-Nov-2022 04:00	Depart location

3.0 Job Graphs

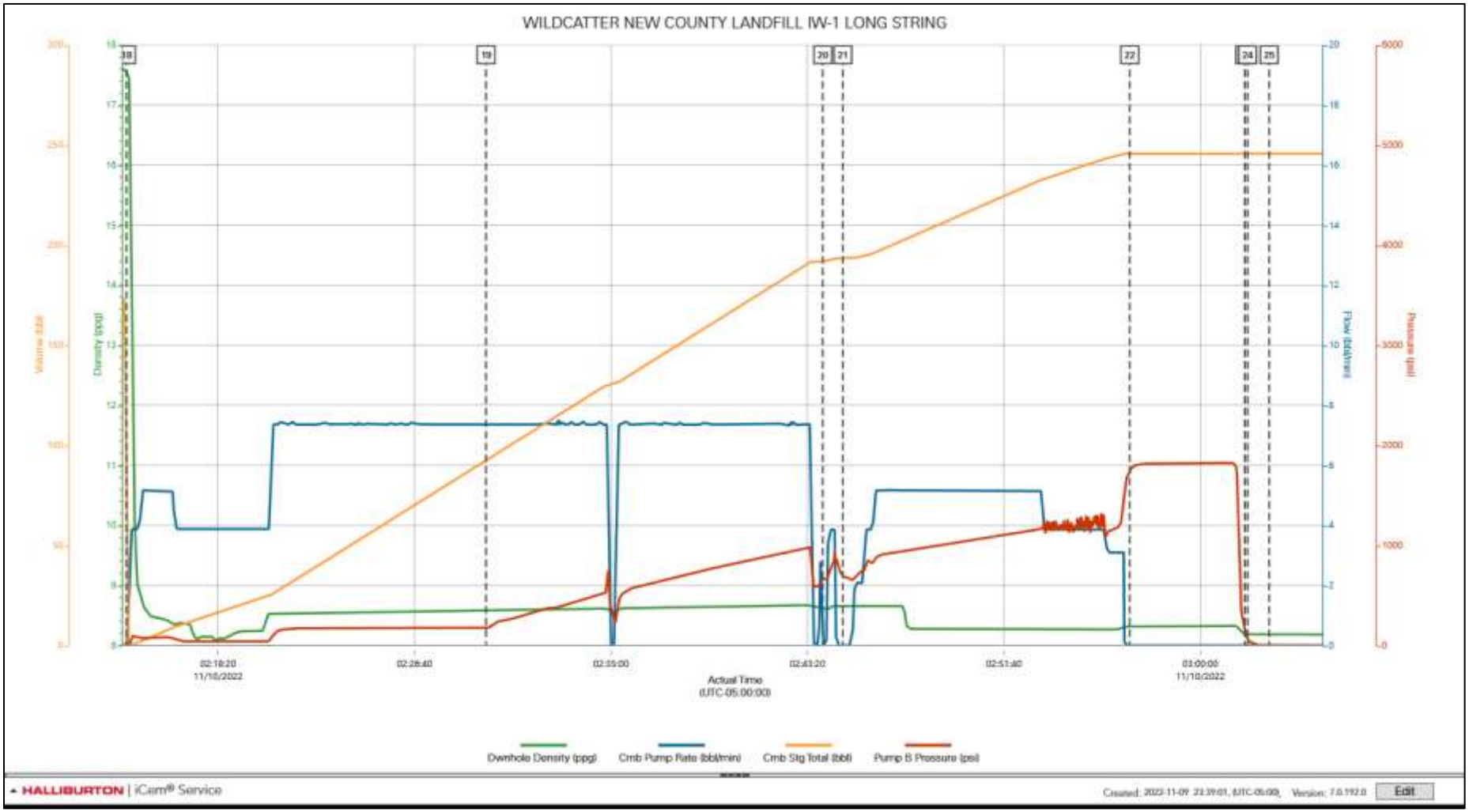
3.1 Entire Job



3.2 Weighted Fluids



3.3 Displacement



HALLIBURTON

North East, Zanesville

Lab Results- Spacer

Job Information

Request/Slurry	2771128/1	**Rig Name**		**Date**	NOV/07/2022
Submitted By	Derek Anderson	**Job Type**	Production Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	New County Landfill

Well Information

Casing/Liner Size	9.625 in	**Depth MD**	3277 ft	**BHST**	49°C / 120°F
Hole Size	12.25 in	**Depth TVD**	3277 ft	**BHCT**	36°C / 96°F
Pressure	3000 psi				

Spacer Information - Spacer Design

Conc	UOM	Cement/Additive
		Tuned Prime Spacer
37.79	gal/bbl	Fresh Water

Spacer Properties

Slurry Density	10	lbm/gal
Slurry Yield	9.8	ft3/sack
Water Requirement	65.95	gal/sack
Water Source	Fresh Water	
Water Chloride		

Pilot Test Results Request ID 2771128/1

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39351871 — NOV/07/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

API Rheology, Request Test ID:39351872 — NOV/07/2022

Temp (degF)	300	200	100	60	30	6	3	Foam Quality (%)
80 (up)	20	18	14	13	11	9	8	0
80 (down)	20	17	14	13	10	9	8	0
80 (avg.)	20	18	14	13	11	9	8	0

API Rheology, Request Test ID:39351873 — NOV/07/2022

Temp (degF)	300	200	100	60	30	6	3	Cond Time (min)	Cond Temp (degF)	Foam Quality (%)
96 (up)	23	20	17	16	15	12	11	70	96	0
96 (down)	23	19	16	15	14	11	10	70	96	0
96 (avg.)	23	20	17	16	15	12	11	70	96	0

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North East, Zanesville

Lab Results- Lead

Job Information

Request/Slurry	2770691/1	**Rig Name**		**Date**	04/NOV/2022
Submitted By	Derek Anderson	**Job Type**	Production Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	New County Landfill

Well Information

Casing/Liner Size	9.625 in	**Depth MD**	3277 ft	**BHST**	49°C / 120°F
Hole Size	12.25 in	**Depth TVD**	3277 ft	**BHCT**	36°C / 96°F
Pressure	3000 psi				

Cement Information - Lead Design

Conc	UOM	Cement/Additive
		VariCem
9.99	gal/sack	Fresh Water

Cement Properties

Slurry Density	13.1	lbm/gal
Slurry Yield	1.84	ft3/sack
Water Requirement	9.99	gal/sack
Water Source	Fresh Water	
Water Chloride		

Operation Test Results Request ID 2770691/1

Mixability (0 - 5) - 0 is not mixable — 05/NOV/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

Thickening Time - ON-OFF-ON — 05/NOV/2022

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)	Peak reading (BC)	Termination time (hh:min)	Termination Bc
96	3000	40	1:30	11.9	60	30	35.3	6:20	35.3

Thickening Time - ON-OFF-ON — 06/NOV/2022

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)
96	3000	40	3:47	5:47	7:03	8:13	9.3	60	30

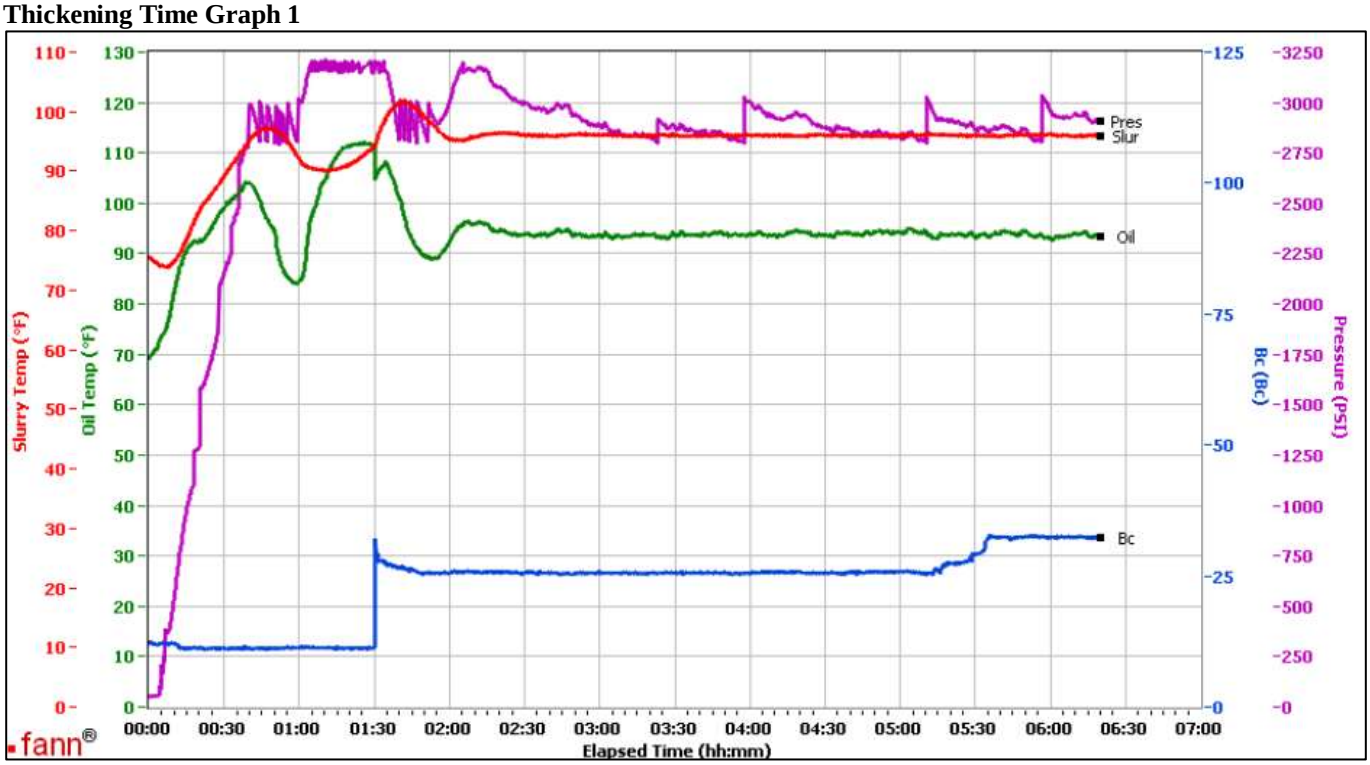
Thickening Time - ON-OFF-ON — 07/NOV/2022

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)
96	3000	40	4:35	5:55	6:33	7:17	12.4	60	30

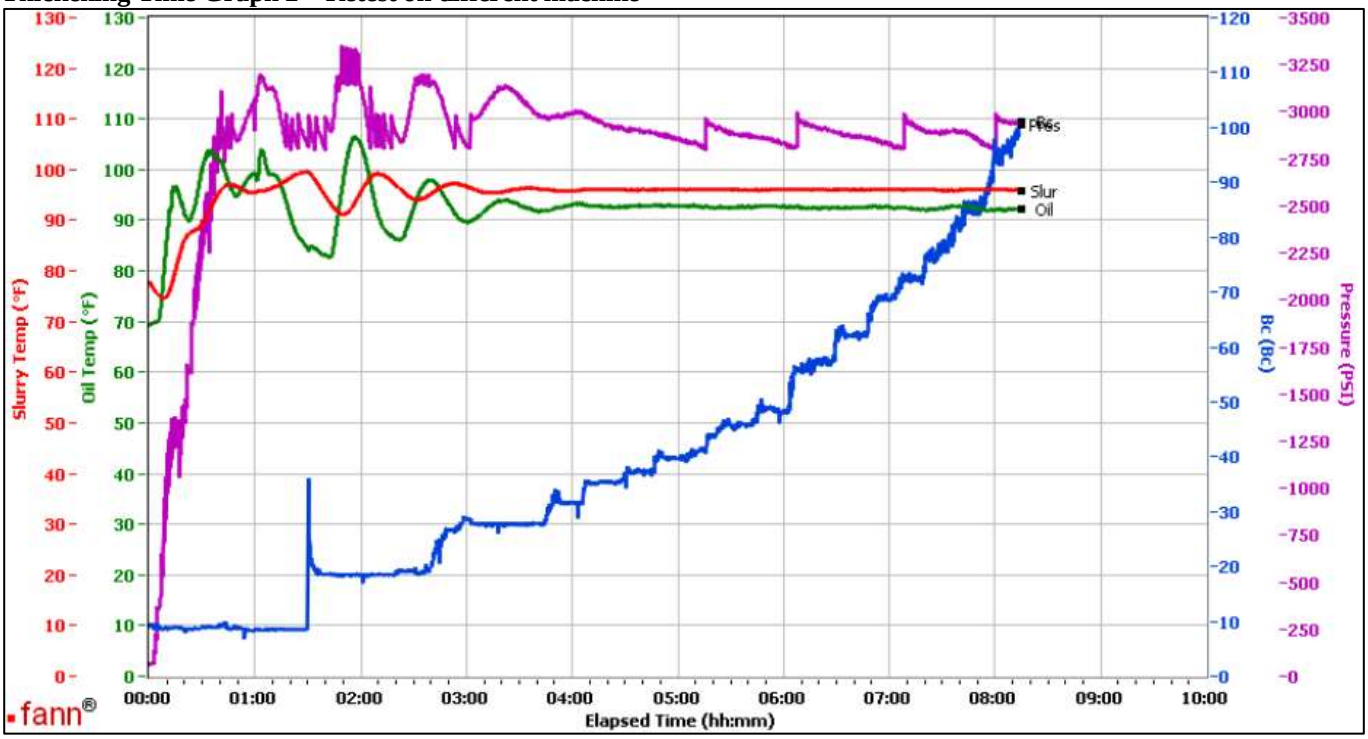
UCA Comp. Strength, Request Test ID:39345845 — NOV/07/2022

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
95	3000	6:06	7:24	27:01	126	270	354	467	614	41.29

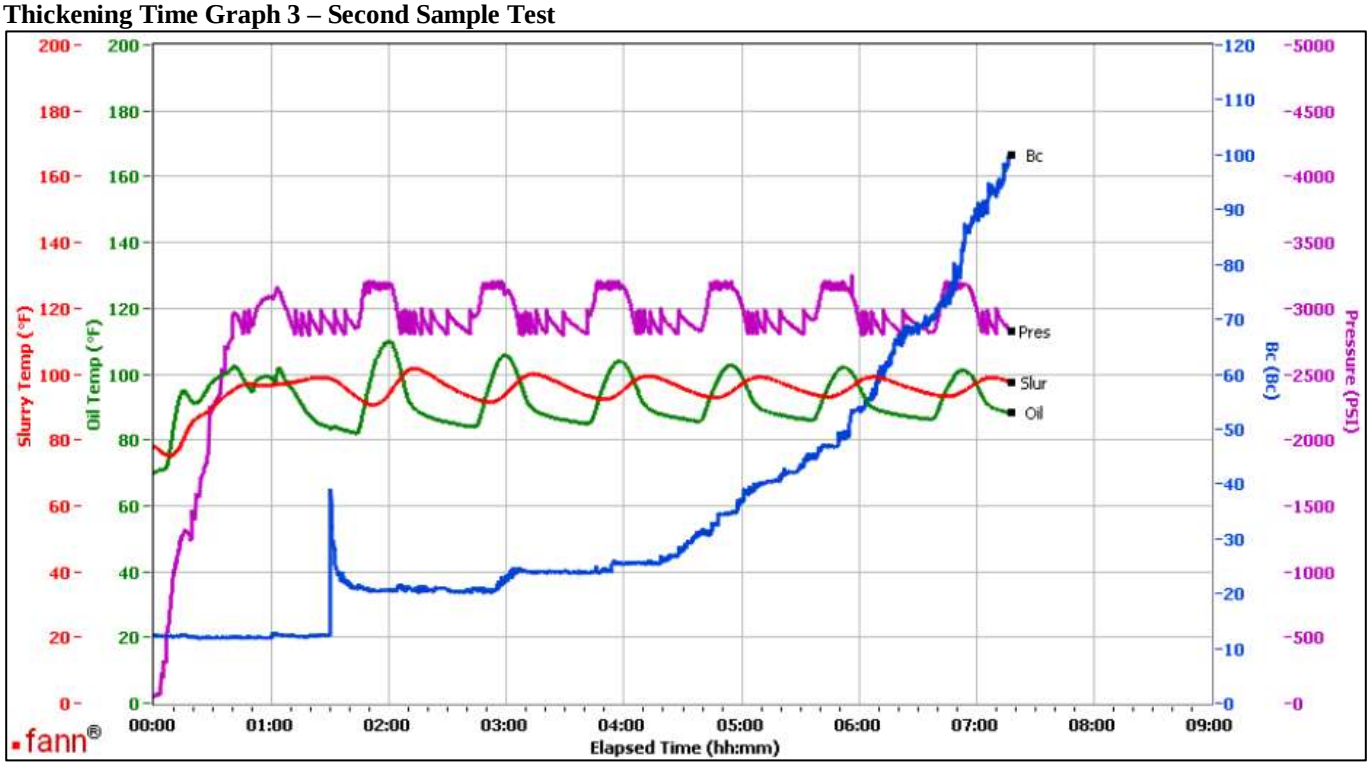
Thickening Time Graph 1



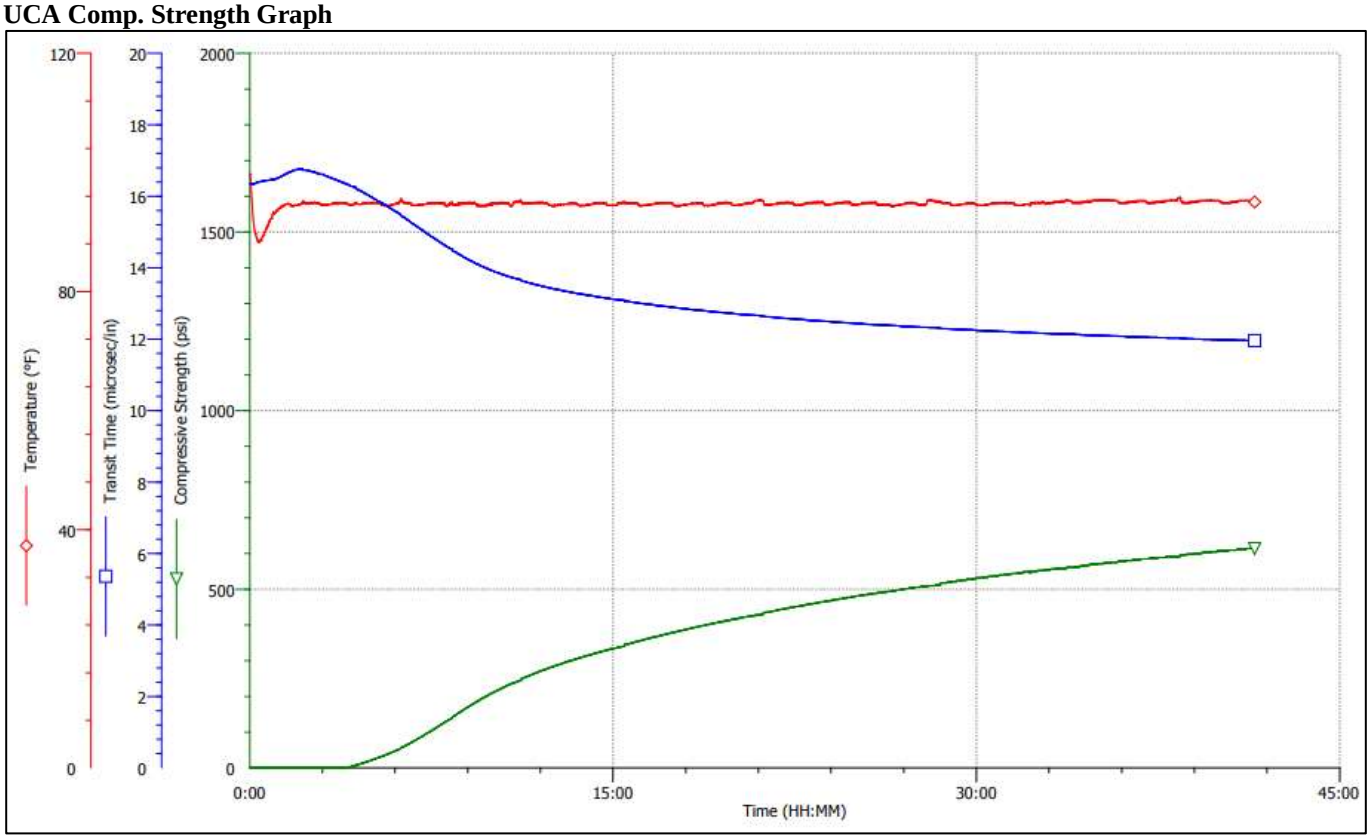
Thickening Time Graph 2 – Retest on different machine



Thickening Time Graph 3 – Second Sample Test



UCA Comp. Strength Graph



HALLIBURTON

North East, Zanesville

Lab Results- Tail

Job Information

Request/Slurry	2770690/1	**Rig Name**		**Date**	04/NOV/2022
Submitted By	Derek Anderson	**Job Type**	Production Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	New County Landfill

Well Information

Casing/Liner Size	9.625 in	**Depth MD**	3277 ft	**BHST**	49°C / 120°F
Hole Size	12.25 in	**Depth TVD**	3277 ft	**BHCT**	36°C / 96°F
Pressure	3000 psi				

Cement Information - Tail Design

Conc	UOM	Cement/Additive
		HalCem
5.19	gal/sack	Fresh Water

Cement Properties

Slurry Density	15.6	lbm/gal
Slurry Yield	1.18	ft3/sack
Water Requirement	5.19	gal/sack
Water Source	Fresh Water	
Water Chloride		

Operation Test Results Request ID 2770690/1

Mixability (0 - 5) - 0 is not mixable — 05/NOV/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

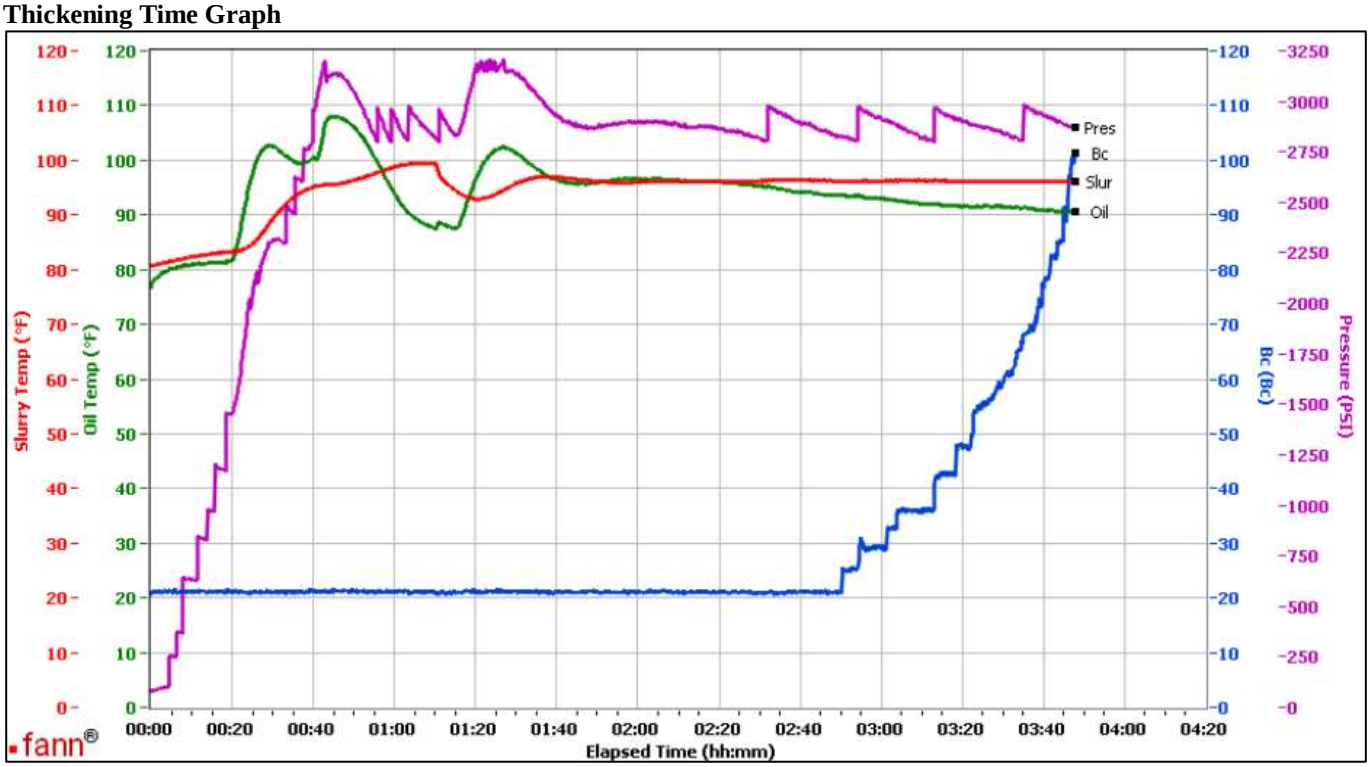
Thickening Time - ON-OFF-ON — 05/NOV/2022

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)
96	3000	40	2:54	3:22	3:36	3:47	20.9	40	30

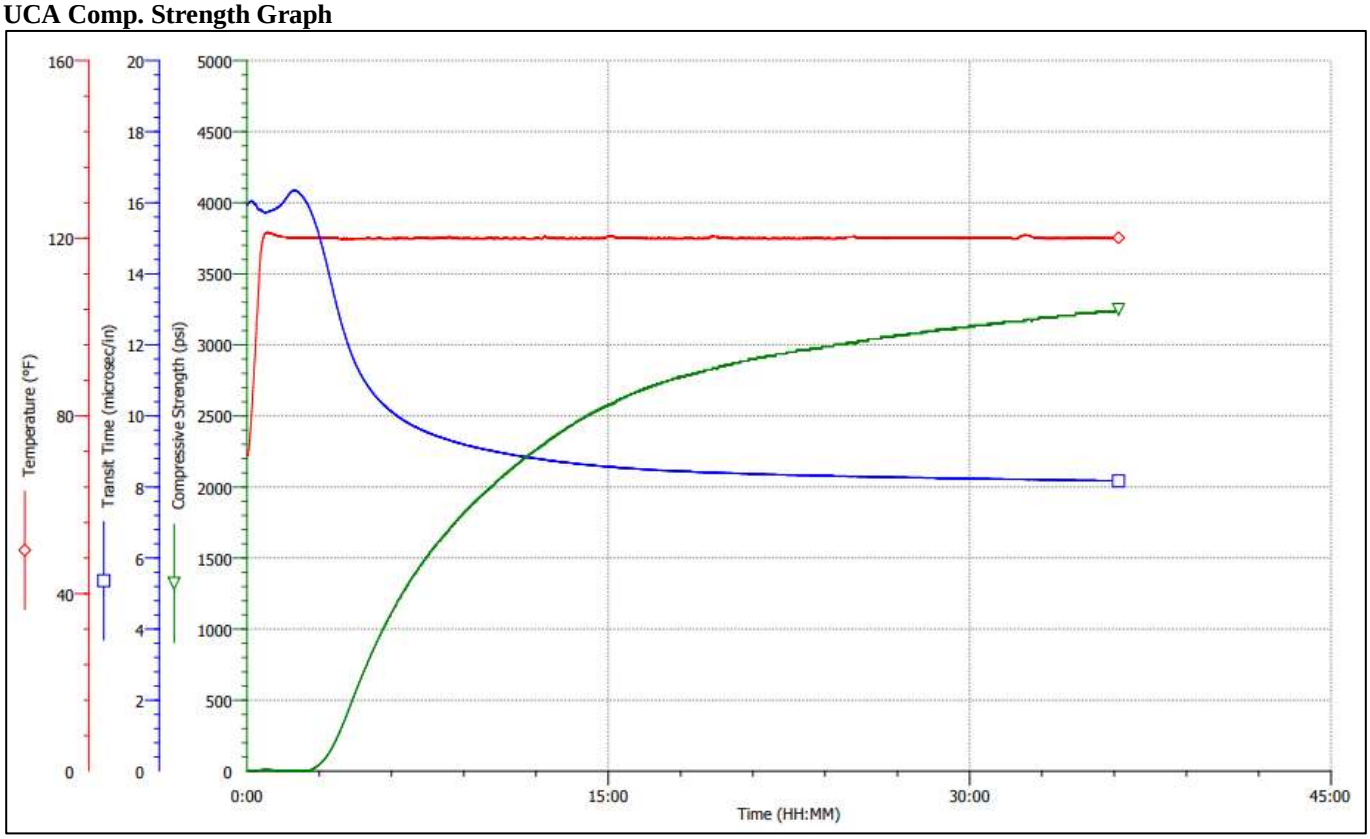
UCA Comp. Strength — 07/NOV/2022

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
120	3000	3:01	3:17	4:22	5:39	1626	2260	2657	2987	3248	36.25

Thickening Time Graph



UCA Comp. Strength Graph



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Attachment 6
Agency Test Notification, Approval of MIT Procedures & Drilling, RAT, Temp, & FOT Forms

Petrotek

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Tuesday, April 5, 2022 2:08 PM
To: fong.tera@epa.gov; Tong, William
Cc: McCuistion, Gary; Macaluso, Jim; Doug Torr; Rubin, Jason; Robinson, Tim; Frost, John; McGarry, Joshua; Smith, Steve
Subject: Newton County Landfill Injection Wells Drilling Notification
Attachments: Cover Letter Newton County Well 1 and 2 Drilling Notification - US EPA.pdf

Importance: High

Ms. Fong,

Please see the attached notification of our intent to construct the UIC Class 1 injection wells at Newton County Landfill in Brook, Indiana. This work will not commence sooner than thirty days from this notification.

Sincerely,

Tom Rodriquez
Director of Operations, US Industrial Wells
Republic Services Industrial and Energy Solutions, LLC.
M: 346-244-3671
E: trodriquez@republicservices.com

10613 West Sam Houston Pkwy North, Ste 300, Houston, TX 77064
o: 832-399-4750 republicservices.com

April 5th, 2022
RE: Newton County Landfill Underground Injection Wells

Ms. Tera Fong
Division Director, Water Division
U.S. Environmental Protection Agency, EPA Region 5
Underground Injection Control
77 W. Jackson Blvd.
Chicago, IL 60604

Ms. Fong,

Per UIC Permit Numbers IN-111-1I-0001 and IN-111-1I-002, I am writing this letter to notify you of our intention to begin well construction for both Class 1 injection wells. This construction will not begin sooner than thirty days of the date of this letter.

Please let me know if you require additional information.

Sincerely,

Rodriquez, Tom

Digitally signed by: Rodriquez, Tom
DN: CN = Rodriquez, Tom OU = *Regions, East, Users
Date: 2022.04.05 11:35:08 -05'00'

Tom Rodriquez
Director of Operations, US Industrial Wells
Republic Industrial and Energy Services, LLC
TRodriquez@RepublicServices.com

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Monday, November 7, 2022 3:19 PM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew
Subject: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

As a 30 day notification, Republic Services plans on finalizing the completion of the Newton County Injection Wells, #1 and #2 the second week of December. An exact date will be sent as soon as possible but not earlier than 30 days from today.

Our plan is to do an acid stimulation the last week of November, and do the MIT and fall off test in December.

Please let me know if you have any questions or issues.

Thanks,

Tom

Tom Rodriquez
Director, Deep Well Operations Support

10613 W Sam Houston Pkwy N, Suite 300
Houston, TX 77064
e TRodriquez@RepublicServices.com
o 832-399-4750
c 346-244-3671
w RepublicServices.com

Sustainability in Action

Odrowski, Brendan

From: Fong, Tera <Fong.Tera@epa.gov>
Sent: Monday, November 7, 2022 3:19 PM
To: Rodriquez, Tom
Subject: Automatic reply: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

This Message Is From an External Sender

This message came from outside your organization.

Report Suspicious

Thanks for your message. I will be out of the office on maternity leave from September 12 through early January 2023.

Scott Ireland will be Acting Water Division Director. He can be reached at ireland.scott@epa.gov, or 312-886-8121.

Many thanks,
Tera

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; vugrinovichr@michigan.gov; McCuistion, Gary; Brian Ault
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

As a follow up to my 30 day notification, our plan is to tube up both wells starting this week and perform the annular pressure test on Dec 12th and tracer and fall off test on Dec 19th.

If we have any changes, we will let you know. Timelines have been a little in flux due to the freezing conditions.

Please let me know if you have any questions or concerns.

Thanks,

Tom Rodriquez

From: Rodriquez, Tom
Sent: Monday, November 7, 2022 2:19 PM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>
Subject: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Thanks,

Tom

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Director, Deep Well Operations Support

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e TRodriquez@RepublicServices.com
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c 346-244-3671
w RepublicServices.com

Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Monday, December 19, 2022 10:56 AM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; McCuistion, Gary; Brian Ault
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

As a follow up to our previous 30 day notification and due to vendor scheduling issues and retrieving the formation fluid sample, we plan to perform IW #2's the SAPT on Dec 21st. We are still in the process of running the final completion for IW #1. Therefore the SAPT for IW #1 will be performed in January.

Please let me know if you have questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; Vugrinovich, Ray (EGLE) <VUGRINOVICHR@michigan.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Thanks,

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Sent: Monday, November 7, 2022 2:19 PM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>
Subject: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Tom Rodriquez
Director, Deep Well Operations Support

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Houston, TX 77064
e TRodriquez@RepublicServices.com
o 832-399-4750
c 346-244-3671
w RepublicServices.com

Sustainability in Action

Odrowski, Brendan

From: Chase, Felicia <chase.felicia@epa.gov>
Sent: Monday, December 19, 2022 11:02 AM
To: Rodriquez, Tom
Cc: Tong, William
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification
Attachments: unwitnessed_sapt_form.pdf; unwitnesed_mit_compliance_assistance_05-31-17.pdf

This Message Is From an External Sender
This message came from outside your organization.
Report Suspicious

Good Morning Tom,

Thank You for your notification. Please conduct your SAPT unwitnessed. You may invite the State Rep. to participate. Attached is a form and guidance for your use and reference.

Please forward to Bill Tong, your Permit Writer for your initial ATI.
Best,
Felicia Chase
Geologist/ Environmental Scientist
Permits Branch, UIC Section
U.S. EPA, Region 5
77 West Jackson Blvd., WP-16J
Chicago , IL 60604

Confidential: This transmission may contain deliberative, attorney-client, attorney work product or otherwise privileged material. Do not release under FOIA without appropriate review. If this message has been received by you in error, you are instructed to delete this message, together with any attachments, from your computer and all storage media, whether electronic or hard copy.

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Monday, December 19, 2022 9:56 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <chase.felicia@epa.gov>; Fong, Tera <Fong.Tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

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Please let me know if you have questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; Vugrinovich, Ray (EGLE) <VUGRINOVICHR@michigan.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Please let me know if you have any questions or concerns.

Thanks,

Tom Rodriquez

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Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>
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Please let me know if you have any questions or issues.

Thanks,

Tom

Tom Rodriquez
Director, Deep Well Operations Support

10613 W Sam Houston Pkwy N, Suite 300
Houston, TX 77064
e TRodriquez@RepublicServices.com
o 832-399-4750
c 346-244-3671
w RepublicServices.com

Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Tuesday, January 3, 2023 11:28 AM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; McCuistion, Gary; Brian Ault
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

As a follow up to my previous email with the notification for a January SAPT for IW #1, we will be ready to perform this work on Thursday January 5th 2023.

Please let me know if you have any questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom
Sent: Monday, December 19, 2022 9:56 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

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Please let me know if you have questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; Vugrinovich, Ray (EGLE) <VUGRINOVICHR@michigan.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Please let me know if you have any questions or concerns.

Thanks,

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Subject: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Our plan is to do an acid stimulation the last week of November, and do the MIT and fall off test in December.

Please let me know if you have any questions or issues.

Thanks,

Tom

Tom Rodriquez
Director, Deep Well Operations Support

10613 W Sam Houston Pkwy N, Suite 300
Houston, TX 77064
e TRodriquez@RepublicServices.com
o 832-399-4750
c 346-244-3671
w RepublicServices.com

Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Saturday, January 7, 2023 8:07 PM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; McCuistion, Gary; Brian Ault
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good evening,

As a follow up to the notification and our MIT/tracer survey, I wanted to notify you that we will be performing an acid stimulation prior to our injection fall/off test on the Newton County IW #1 well.

This is due to an increase in pressure while we were injecting for the tracer survey. As you know, our pressure limit is very low for this well, and we would like to be able to have a successful injection/fall off test. If we do not perform the acid stimulation, it would not be possible to gain enough rate and length of injection to be able to complete the injection/fall off test.

Our plan is to pump 5,000 gals of 15% HCl acid. The additives are as follows: 30 gals of corrosion inhibitor @ 6 gpt, 10 gals of iron reducing agent @ 2 gpt, and 10 gallons of non-emulsifier @ 2gpt. We will pump the acid tomorrow (1/7/23); and plan on performing the injection/fall off test on Monday (1/7/23).

Please let me know if you have any questions.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom
Sent: Monday, December 19, 2022 9:56 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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Please let me know if you have questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; Vugrinovich, Ray (EGLE) <VUGRINOVICHR@michigan.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
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Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>
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Please let me know if you have any questions or issues.

Thanks,

Tom

Tom Rodriquez
Director, Deep Well Operations Support

10613 W Sam Houston Pkwy N, Suite 300
Houston, TX 77064
e TRodriquez@RepublicServices.com
o 832-399-4750
c 346-244-3671
w RepublicServices.com

OMB No. 2040-0042 Approval Expires 4/30/2022

United States Environmental Protection Agency

COMPLETION REPORT FOR INJECTION WELLS

Name, Address, Phone Number and/or Email of Permittee

Newton County Landfill
2266 East 500 South Road, Brook, IN 47922
(219) 224-4225

State	County
Indiana	Newton

Permit (or EPA ID) Number IN-111-1I-0001 **API Number** **Full Well Name** IW - 1

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location

NW **1/4 of** NE **1/4 of** **Section** 28 **Township** 29N **Range** 8W

286 **ft. from (N/S)** N **Line of quarter section**

1354 **ft. from (E/W)** E **Line of quarter section.**

Latitude 40.923767

Longitude -87.338797

Anticipated Daily Injection Volume (Bbls)		Injection Interval (Perforated/Open Hole Interval)	
Average	Maximum	Feet	to Feet
		3,237	5,212

Depth to Bottom of Lowermost USDW (Feet) 790

Date Drilling Began

10/20/2022

Date Drilling Completed

11/22/2022

Date Well Completed

01/11/2023

Name of Injection Zone

Mt. Simon

Fracture Pressure of Injection Zone

Permeability of Injection Zone

9.6 md

Porosity of Injection Zone

8.4%

Complete Attachments; See Instructions.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR § 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed
Scott Binder, Area President	Scott Binder	02/13/2023

INSTRUCTIONS FOR FORM 7520-18

This form must be completed for each injection well. This form is appropriate for all injection well classes, and replaces the previous Form 7520-9 and Form 7520-10. While reports or other information developed by contractors or service companies may be attached, this form must be signed by a responsible entity as described at 40 CFR 144.32.

NAME, ADDRESS, PHONE AND/OR EMAIL OF PERMITTEE: Enter the name and street address, city/town, state, and ZIP code of the permittee. Also provide an email address (if available) and/or a phone number.

Enter the **STATE** and **COUNTY** where the well is located. For States that do not have counties, use the name of that State's equivalent jurisdiction at a more local level.

PERMIT OR EPA ID NUMBER: Enter the well identification number or permit number assigned to the injection well by the EPA or the permitting authority.

API NUMBER: Enter the number assigned by the local jurisdiction (usually a State Oil and Gas Agency) using the American Petroleum Institute standard numbering system.

FULL WELL NAME: Enter the full name of the well or project.

WELL LOCATION: Fill in the complete township, range, and section to the nearest quarter-quarter section. A township is north or south of the baseline, and a range is east or west of the principal meridian (e.g., T12N, R34W). Also include the distance, in feet, from the nearest north or south line and nearest east or west line of the quarter-section. Also, enter the **latitude** and **longitude** of the well in decimal degrees, to five or six places if possible; be sure to include a negative sign for the longitude of a well in the Western Hemisphere and a negative sign for the latitude of a well in the Southern Hemisphere.

ANTICIPATED DAILY INJECTION VOLUME: Enter the anticipated **average** and **maximum** daily volume of fluid to be injected, in barrels.

INJECTION INTERVAL: Enter the depths, in feet, to the top and bottom of the perforated hole/open interval of the well through which injected fluids will exit the well. (Note: this is different from the depth of the injection zone.) Provide information about how these were derived, e.g., by attaching a step-rate test or other test results. (See the description of attachments below.)

Enter the **DEPTH TO BOTTOM OF THE LOWERMOST USDW** (i.e., formation containing less than 10,000 mg/L total dissolved solids), in feet.

Enter the **DATE DRILLING BEGAN**, the **DATE DRILLING WAS COMPLETED**, and the **DATE THE WELL WAS COMPLETED** in the appropriate blanks.

Enter information about the permitted injection formation, including the **NAME OF THE INJECTION ZONE**, the calculated **FRACTURE PRESSURE**, and the **PERMEABILITY** and **POROSITY** of the injection zone in the appropriate blanks.

CERTIFICATION: This form must be signed and dated by either: a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency.

PAPERWORK REDUCTION ACT NOTICE: The public reporting and recordkeeping burden for this collection of information is estimated to average between 3.3 and 3.9 hours per response, depending on the injection well class. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

INSTRUCTIONS FOR COMPLETING ATTACHMENTS TO FORM 7520-18

Please attach the following information to the completion report. Reports prepared by contractors or service companies may be submitted, provided they are clear and legible and the requested information is accessible. Please be sure to specify units as needed, e.g., of depth, pressure, temperature, etc.

I. Geologic Information

1. Provide a geologic description of the rock units penetrated by name, age, depth, thickness, and lithology of each rock unit penetrated.

2. Provide information about the injection formation that supports the information provided on the form, for example: (1) name; (2) depth (drilled); (3) thickness; (4) formation fluid pressure; (5) age of unit; (6) bottom hole temperature; (7) lithology; and (8) bottom hole pressure.

3. Provide chemical characteristics of formation fluid, including a chemical analysis.

4. Provide a description of all USDWs, including: (1) depth below ground surface to base of fresh water (less than 10,000 mg/L TDS); and (2) a geologic description of aquifer units with name, age, depth, thickness, lithology, and average total dissolved solids.

II. Well Design and Construction

1. Provide information on the surface, intermediate, and long string casing and tubing. Describe: the materials used; outside diameter size; weight/foot, grade, and whether new or used; and the depth to which each casing string is set (include appropriate units, e.g., below ground surface, below Kelly bushing, etc.).

2. Provide data on the holes drilled for each casing string, including the bit diameter and depth of hole.

3. Provide data on the well cement for each casing string, such as type/class, additives, amount, method of emplacement, and depth to top of cement.

4. Describe the packer (if used) such as type, name and model, setting depth, and type of annular fluid used.

5. Provide data on centralizers, including number, type, and depth.

6. Provide data on bottom hole completions, including the depth and diameter of the hole.

III. Monitoring Systems. Describe the recording and nonrecording injection pressure gauges, casing-tubing annulus pressure gauges, injection rate meters, temperature meters, and other meters or gauges. Also provide information on constructed monitoring wells such as location, depth, casing diameter, method of cementing, etc.

IV. Logging and Testing Results. Provide a report describing the types of geophysical logs, cores, and other tests performed; date of the logs; the intervals logged; and interpretation of the results. Include a description and the results of deviation checks run during drilling. If requested, provide a final print of all geophysical logs run.

V. As-built Schematic. Provide a diagrammatic sketch of the surface and subsurface construction details of the injection well as-built, showing casing, cement, tubing, packer, etc., with proper setting depths. The sketch should include the well head and gauges.

VI. Mechanical Integrity Testing. Provide data demonstrating mechanical integrity pursuant to 40 CFR 146.08. Describe the method and results of mechanical integrity testing.

VII. Report on the compatibility of injected wastes with fluids and minerals in both the injection zone and the confining zone.

VIII. Report the status of corrective action on deficient wells in the area of review.

IX. Include the anticipated maximum pressure and flow rate at which injection will operate.

X. Stimulation. Describe any stimulation performed, including the interval treated and the materials and amounts used.

OMB No. 2040-0042 Approval Expires 4/30/2022

United States Environmental Protection Agency

WELL REWORK RECORD, PLUGGING AND ABANDONMENT PLAN, OR PLUGGING AND ABANDONMENT AFFIDAVIT

Name and Address, Phone Number and/or Email of Permittee

Newton County Landfill
2266 East 500 South Road, Brook IN 47922

Permit or EPA ID Number	API Number	Full Well Name
IN-111-1I-0001		IW-1

State	County
Indiana	Netwon

Locate well in two directions from nearest lines of quarter section and drilling unit

Latitude 40.939767

Surface Location

NW **1/4 of** NE **1/4 of Section** 28 **Township** 29N **Range** 8W

Longitude -87.338797

684 **ft. from (N/S)** S **Line of quarter section**

229 **ft. from (E/W)** E **Line of quarter section.**

Well Class	Timing of Action (pick one)	Type of Action (pick one)
✔ Class I	✔ Notice Prior to Work Date Expected to Commence N/A	☐ Well Rework
☐ Class II		✔ Plugging and Abandonment
☐ Class III	☐ Report After Work Date Work Ended	☐ Conversion to a Non-Injection Well
☐ Class V		

Provide a narrative description of the work planned to be performed, or that was performed. Use additional pages as necessary. See instructions.

NEWTON COUNTY LANDFILL IW-2 PLUGGING AND ABANDONMENT PLAN
1. Notify regulatory agencies a minimum of 30 days prior to commencement of plugging operations.
2. Prepare well and location for plugging. Move in and rig up well servicing rig, pipe racks and tanks.
3. Install a test gauge on the annulus to perform a static annulus pressure test. Ensure that the annulus is fluid filled and that the well has been shut-in for a minimum of 24 hours. Pressurize annulus and isolate from the annulus system. Monitor
annular pressure for one hour.
4. Displace tubing with kill brine as needed to control wellhead pressure. Dismantle wellhead and install blow-out preventer. Displace annulus with kill brine as needed to control pressure. Fluid compatibility with cement to be used will be verified.
5. Remove injection tubing and packer. If packer will not unseat, proceed with fishing operations as needed to remove packer from hole or obtain approval to set retainer above packer and pump cement through retainer and abandoned packer.
6. Make up mechanical retainer on work string and trip in hole. Set cement retainer at top of injection interval just above historical packer setting depth. Test cement retainer to 500 psig.
7. Move in cement and cementing equipment.
8. Displace hole below retainer with Class "L" cement or equivalent. Unsting from retainer and spot 50 additional sacks (sx) on top of retainer. Cement volume has been calculated based on the following volumes:
• 8-1/2" hole from 3,237 feet GL to 5,212 feet GL, at 0.3941 ft3/ft = 779 ft3
• 9-5/8" casing from surface to 3,237 feet GL, at 0.4341 ft3/ft = 1,405 ft3
• 50 additional sacks with a yield of 1.18 ft3/sack = 57 ft3
The total volume of the plugs is estimated to be 2,184 ft3, which is equivalent to 1,933 sx of Class "L" cement with a yield of 1.13 ft3/sack. If wellbore fill is present, this volume may have to be reduced or squeezed into the openhole of the injection interval or
approval obtained to reduce cement volume based on open hole conditions.
9. Once cement has been tagged on top of the retainer, spot successive, continuous balanced cement plugs in 500' intervals from top of cement retainer to surface (6 intervals required). Cement to be API Class 'L' or equivalent with not more than 4% bentonite.
If neat Class 'L' cement is pumped it will have the following slurry properties.
• Water ratio – 4.71 gallons per sack
• Slurry weight – 15.8 pounds per gallon
• Slurry volume – 1.13- ft3/sack
An estimated 1,218 sacks, or 1,376 cubic feet, of slurry will be required above retainer.
10. Remove BOP and wellhead equipment
11. Cut off wellhead approximately 4 feet BGL and weld cap with permanent marker on casing.
12. Rig down and move out all equipment.
13. Prepare and file USEPA Plugging Reports.
The steel plate will be inscribed with the disposal well identification information and the date of plugging. Federal representatives will have been invited to witness the plugging and sign the plug and abandonment form.

PLUGGING AND ABANDONMENT COST ESTIMATE
$255,000

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR § 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed
Scott Binder, Area President	Scott Binder	02/13/2023

INSTRUCTIONS FOR FORM 7520-19

This form replaces forms 7520-12 and 7520-14. Use this form only when work is planned or has occurred that affects the well's construction or operation as an injection well, including work on the casing, tubing or packer (or for shallow Class V wells, the subsurface fluid emplacement network). Use one form per injection well. While reports or other information developed by contractors or service companies may be attached, this form must be signed by a responsible entity as described at 40 CFR 144.32. Note: operators closing Class V wells should use Form 7520-17.

NAME, ADDRESS, PHONE AND/OR EMAIL OF PERMITTEE: Enter the name and street address, city/town, state, and ZIP code of the permittee. Also provide an email address (if available) and/or a phone number.

PERMIT OR EPA ID NUMBER: Enter the well identification number or permit number assigned to the well by the EPA or the permitting authority.

API NUMBER: Enter the number assigned by the local jurisdiction (usually a State Oil and Gas Agency) using the American Petroleum Institute standard numbering system.

FULL WELL NAME: Enter the full name of the well or project.

Enter the **STATE** and **COUNTY** where the well is located. For States that do not have counties, use the name of that State's equivalent jurisdiction at a more local level.

WELL LOCATION: Fill in the complete township, range, and section to the nearest quarter-quarter section. A township is north or south of the baseline, and a range is east or west of the principal meridian (e.g., T12N, R34W). Also include the distance, in feet, from the nearest north or south line and nearest east or west line of the quarter-section. Also, enter the **latitude** and **longitude** of the well in decimal degrees, to five or six places if possible; be sure to include a negative sign for the longitude of a well in the Western Hemisphere and a negative sign for the latitude of a well in the Southern Hemisphere.

Enter the **WELL CLASS,** i.e., the class of injection well as defined in 40 CFR 144.6.

TIMING OF THE ACTION: Check ***Notice prior to work*** if the activity has not yet occurred (i.e., is planned). Check ***Report after work*** if the activity described has already occurred. As appropriate, include the date the activity is expected to start or the date the activity was completed. (Note this may not be available, e.g., for a plugging plan submitted with a permit application.)

TYPE OF ACTION: Check the appropriate box to describe the kind of activity being reported. Check ***Well Rework*** for work that was/will be performed on the well after it has already been in operation as an injection well. Check ***Plugging and Abandonment*** to report on plans for or descriptions of final closure/plugging after use as an injection well. Check ***Conversion to a Non-Injection Well*** if the well is to be converted to something other than an injection well.

Provide a **NARRATIVE DESCRIPTION** of the work planned to be performed, or that was performed. The narrative should include a description of the main procedures planned or that occurred during the work activity. A service company report, daily report, or similar document may be attached if it includes all the requested information and is clear and legible.

For well reworks, include the following information: The reason for the well rework; depths of activity; type of activity; changes to injection well configuration, well casing, or cement behind casing; any plug added to the well and its depth; any newly drilled interval and its depth; method(s) to demonstrate that the well has mechanical integrity (as applicable); and any deviations from the approved rework plan (as applicable).

For a well plugging plan, include the following information: Reason for the well plugging; number of plugs placed, and their depths; materials used as plugs (e.g., cast iron bridge plug, cement, cement retainer); method to set plugs; and wait-on-cement times, if any. Also provide one or more cost estimates from an independent firm in the business of plugging and abandoning wells to plug the well as described in the plan.

For well plugging affidavit, include the following information: Reason for the well plugging; number of plugs placed, and their depths; materials used as plugs (e.g., cast iron bridge plug, cement, cement retainer); method to set plugs; wait-on-cement times, if any; and any deviations from the approved plugging plan (if applicable).

For conversion to a non-injection well, include the following information: Depths of activity; type of activity; changes to injection well configuration, well casing, or cement behind casing; any plug added to the well and its depth; any newly drilled interval and its depth; depths of new perforations; and method(s) to demonstrate that the well has mechanical integrity (as applicable).

For all of the above activities, include a well sketch depicting the work, results of well tests/logging performed, service company tickets, and any other available information demonstrating how the work was/is to be performed. Also, specify whether depths are below ground surface, relative to Kelly bushing, etc.

CERTIFICATION: This form must be signed and dated by either: a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency.

PAPERWORK REDUCTION ACT NOTICE: The public reporting and recordkeeping burden for this collection of information is estimated to average between 6.0 and 7.9 hours per response, depending on the injection well class. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW., Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

BACKGROUND INFORMATION FOR REVIEW OF TEMPERATURE LOGS

Facility Name Newton County Landfill		Operator Republic Services	
Well Name IW-1		USEPA Permit Number IN-111-1I-0001	State Permit Number
County, State Newton, IN	Test Date 1/6/2023	Depth Reference: Kelly Bushing ☐	Ground Level ☑

Well and Operational Information

Top of Open Interval, ft 3,237	Tubing Depth, ft 3,202	Date of Last Injection 1/5/2023	Is This a Multi-Zone Facility? No
Depth to Base of USDW, ft. 880	Name of lowermost USDW Wabash	Hour of Last Injection 1530	Other Zones Used at Facility N/A
Depth to Top of Permitted Int, ft 3,170	Name of Injection Interval Mt. Simon	Volume Injected in Past Year, gal N/A	Name of Shallower Injection Zone N/A
Plugged Back Depth, ft. 5,212	Total Depth, ft 5,212	Injectate Temperature Variance, ° F N/A	Depth to Shallower Injection Zone, ft N/A

Calibration Information		Logging Information	
Low Gauge Temperature, ° F 68.8	High Gauge Temperature, ° F 109	Time of Start of Logging 0850	
Low Thermometer Temperature, ° F 69	High Thermometer Temperature, ° F 109.5	Days Since Last Injection 2	Maximum Log Depth, ft. 5,224
Were Log Readings Adjusted? No	Gauge Calibration Date 12/14/2021	Multiple Log Runs? Yes - 6 hrs apart	Maximum Logging Speed, ft/min 30

REMEMBER

1. Please fill in the above cells.
2. The well should have been shut in for at least 36 hours or until temperatures have stabilized (based on previous logs).
3. If the well cannot be shut in for 36 hours, shut in as long as possible and run two logs at least six hours apart.
4. Calibrate the temperature tool at two different temperatures immediately prior to running the test.
5. Record log data at least once per foot.
6. Record natural gamma ray activity log with temperature.
7. Log top to bottom. Keep logging speed below 30 feet per minute.
8. Log quality in air-filled holes can be improved by logging at a slower speed. Please reduce logging speed to less than 20 feet per minute in the top 1000 feet of air-filled holes.
9. The report on the test must explain any anomalies shown on the log.
10. Submit digital logging data on a CD in .las or .asc format.
11. Submit an up-to-date well schematic.

BACKGROUND INFORMATION FOR REVIEW OF RADIOACTIVE TRACER SURVEYS FOR CEMENT INTEGRITY

Facility Name Newton County Landfill			Operator Republic Services		
Well Name IW-1			USEPA Permit Numbe IN-111-1I-0001	Witness	
State IN	Test Date 1/7/2023		Logging Company MI Wireline	Depth Reference: Kelly Bushing ☐	Ground Level ✓

Well and Operational Information

Long StringCsg Material J-55	Long String Casing OD, ins 9.625	Casing weight, #/ft 36	Casing ID, ins. 8.921	Long String Casing Length, ft 3,237	
Tubing Material J-55	Tubing OD, ins 4.5	Tubing weight, #/ft 11.6	Tubing ID, ins. 4.0	Tubing Length, ft 3,202	
Tail Pipe Material	Tail Pipe OD, ins	Tail Pipe, weight#/ft.	Tail Pipe ID, ins.	Tail Pipe Length, ft	Tail Pipe Depth
	OpenHole diameter, in 8.5	TD, ft 5,212	PBTD, ft 5,212	Top of Open Interval, ft 3,237	
Packer Model Arrowset	Packer Type Retrievable	Top of Packer, ft 3,143	Bottom of Packer, ft		

Geological Information

Lowermost USDW Name Wabash	Fms in Confining Zone Eau Claire	Fms in Injection Zone Mt. Simon
Base of USDW, ft 880	Depth to top of Confinement Zone 2,598	Injection Zone Top, ft 3,170

TOOL INFORMATION

Ejector, ft above BDET 10	TDET, ft above BDET 5	MDET, ft above BDET N/A			

CALIBRATION INFORMATION

Depth BDET, ft 3,188	Depth TDET, ft 3,181	BDET CPSPI 0-200	Lithology (Warm/Cool) warm	Maximum Reading, LD 18	Minimum Reading, LD 5
Depth BDET, ft 2,560	Depth TDET, ft 2,553	BDET CPSPI 0-200	Lithology (Warm/Cool) cool	Maximum Reading, LD 3	Minimum Reading, LD 0

FIRST SLUG TRACKING SEQUENCE

Flow Rate, gpm 42	Velocity in tubing, fps 1.1	Depth of deflection on 1st pass, ft 2,264	Deflection on 1st pass, LD 685	Deflection/Backgroun 0-10	Passes Through Slug 7
Slug Split? yes or no No	Depth of Split, ft N/A	Moved up, yes or no No	Minimum Slug Depth, ft 2,134	Distance above shoe, ft 1,103	Maximum Slug Depth, ft 3,740

FIRST STATIONARY TEST

Depth of BDET, ft 3,195	Depth of TDET, ft 3,188	BDET to open interval, ft 42	Time at station, mins 30	Injection Rate, gpm 28	Log Divisions per Minute 12
Depth at Injection, ft 2,212		BDET above end of tubing or casing, ft 7	Reached BDET up, LD N/A	Reach UDET up, LD N/A	Velocity Up, ft/min N/A
2nd Setting Depth, ft	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	
3rd Setting Depth	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	
4th setting depth, ft	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	Upper Limit of Movement, ft

REMEMBER

1. Please fill in the above cells.
2. Inject at highest practicable rate during the stationary test to maximize pressure difference that is the driving force for upward movement of fluid (if it occurs), but at low enough velocity during slug tracking so the slug can be followed effectively.
3. Leave the scaling at the same level for all phases. 40 counts per second per inch is usually effective. We need to be able to see evidence of variation due to lithology.
4. Use big slugs. The height of the deflection caused by the slug should be at least 50 times the difference of the high and low levels measured during logging the initial log.
5. If you record times of arrival, that should be the arrival of the leading edge.
6. The purpose is to determine the shallowest depth at which tracer material leaves the well.
7. When slug tracking, logging through the slug while the last part of the slug is leaving the deeper of the tailpipe or casing is the best way to identify a split. If there is a split, always follow the upper portion to determine the limit of its upward movement.
8. When running the stationary test, set the tool with the bottom detector five feet above the end of the deeper of the tail pipe or casing. If the slug reaches it, move it up in steps to find the shallowest extent of movement.
9. The stationary test must be run long enough to be able to detect upward motion of 2 ft/min.
10. Superimpose the traces of the initial and final base logs.
11. Please submit both the merged and unmerged slug chase records.
12. The test report must explain any anomalies in the results.
13. Please submit the digital logging data on a CD.
14. Submit an up-to-date well schematic.

BACKGROUND INFORMATION FOR ANALYSIS OF PRESSURE FALL-OFF TEST

FACILITY NAME Newton County Landfill		OPERATOR Republic Services	
WELL NAME IW-1		USEPA PERMIT NUMBER IN-111-1I-0001	STATE PERMIT NUMBER
TEST START DATE 1/9/2023	TEST END DATE 1/11/2023	Depth Reference: Kelly Bushing ☐	Ground Level ☑

GEOLOGICAL DATA

POROSITY, decimal .10	NET PERMEABLE THICKNESS, ft. 421	VISCOSITY, cp. 0.82	COMPRESSIBILITY, per psi 9.04E-6

WELL AND OPERATION DATA

LONGSTRING CASING DIAMETER, ins 9.625	FINAL PRETEST FLOW RATE, gpm 21.8	INJECTATE TEMPERATURE, deg.F 64.5 (BHT)	KB ELEVATION, ft 17
OPEN HOLE DIAMTER, ins 8.5	PRETEST FLOW TIME, hrs. **SEE BELOW** 18.2	SPECIFIC GRAVITY OF TEST FLUID 1.02	TEST DEPTH FOR COMPARISON, ft 3,153
GAUGE DEPTH, ft 3,153		CUMULATIVE VOLUME INJECTED SINCE LAST PRESSURE EQUALIZATION, 23,646	

TEST DATA

GAUGE CALIBRATION DATE 4/18/22			
FLOW RATE, gpm 21.8	PRESSURE AT BEGINNING OF FALL-OFF, p 1,501.3 psig	PRESSURE AT END OF FALL-OFF, ps 1,342.8 psig	TO SUPPORT FULL COLUMN, psi 1,393
TEST LENGTH, hrs. 22	INITIAL GRADIENT, psi/ft. 0.476	FINAL GRADIENT, psi/ft. 0.426	FINAL FLUID LEVEL, ft. 114

REMEMBER

"Pre-test flow time" is the time since the reservoir was last in equilibrium. This may be the time since the well was last shut-in but only if the well was shut-in long enough for the pressure in the reservoir to approach equilibrium pressure.

1. Please fill in the above cells.
2. Injection of normal injectate at normal rate is preferred.
3. Submit an up-to-date well schematic.
4. The well should be shut-in as quickly as possible.
5. Data should be collected at the maximum rate for at least the first five minutes; between five and thirty minutes at no less than one reading every 30 seconds. After thirty minutes, the operator can reduce frequency as required.
6. The pressure gauge should have been calibrated no more than a year prior to the test. Submit a copy of the calibration certificate for the gauge used for pressure measurements with your report.
7. The report on the test must explain any anomalies shown in the results.
8. Submit digital logging data on a CD in .las or .asc format.

Attachment 7
Annulus Pressure Gauge Certifications

Cal-scan Services Ltd.
4188-93 Street
Edmonton, Alberta, Canada
T6E 5P5
Phone: (780) 944-1377 Fax: (780) 944 - 1406

Calibration Certificate

Model :	Badger Low Temp	**Range :**	10,000.00 psi
Serial Number :	91874	**Last Cal. Date :**	18-April-2022

Specifications

Calibration Pressure Range:	0.00	10,000.00 psi
Calibration Temperature Range:	0.00	150.00 °C

Pressure:	Accuracy	±	2.4000 psi (0.024 %FS)
	Resolution	±	0.0300 psi (0.0003 %FS)
Temperature:	Accuracy	±	0.40 °C
	Resolution	±	0.001 °C

Calibration Summary

Pressure: Accuracy (maximum error)	0.70	psi
Temperature: Accuracy (maximum error)	0.13	°C

Traceability Statement

All working standards are traceable to national or internationally recognized standards.

Calibrated with Cal-Scan DWG # 6

Calibrated by:

Ryan Kryzanowski

Cal-scan Services Ltd.
4188-93 Street
Edmonton, Alberta, Canada
T6E 5P5
Phone: (780) 944-1377 Fax: (780) 944 - 1406

Calibration Certificate

Model : Badger Low Temp **Range :** 10,000.00 psi

Top **Serial Number :** 91873 **Last Cal. Date :** 18-April-2022

Specifications

Calibration Pressure Range:		0.00	10,000.00	psi
Calibration Temperature Range:		0.00	150.00	°C
Pressure:	Accuracy	±	2.4000 psi (0.024 %FS)	
	Resolution	±	0.0300 psi (0.0003 %FS)	
Temperature:	Accuracy	±	0.40 °C	
	Resolution	±	0.001 °C	

Calibration Summary

Pressure: Accuracy (maximum error)	0.67	psi
Temperature: Accuracy (maximum error)	0.13	°C

Traceability Statement

All working standards are traceable to national or internationally recognized standards.

Calibrated with Cal-Scan DWG # 6

Calibrated by:

Ryan Kryzanowski

APEX INSTRUMENTS
7200 E. Dry Creek Rd, STE C-102, Centennial, CO 80112
Ph. 303-804-0667 Cal.Lab@Apex-Instruments.com

Calibration Certificate

Certificate Number: 225131

Customer:
Impact Completions
Rensselaer, IN

Manufacturer:	Crystal Engineering	***Calibration Date:***	12/5/2022
Model Number:	XP2i 5000 psi	***Due Date:***	12/5/2023
Serial Number:	216483	***As Found:***	New
Description:	Digital Test Gauge	***As Left:***	In Tolerance
Procedure:	CI-001	***Temperature:***	71.4 F
Calibrated To:	Manufacturer's Specifications	***Humidity:***	22.6 %
Technician:	Ben Campbell	***Issue Date:***	12/5/2022

Tolerance Specs:
0 - 20%: +/- (0.02% of FS)
20% - 100%: +/- (0.1% of Rdg)

Technician Notes:

As Left Userspan: 1.00000

Approved Signatory: Ben Campbell

Apex Instruments certifies that the instrument listed above meets the specifications of the manufacturer at the completion of its calibration. The calibrations within the certificate are traceable through NIST or another National Metrology Institute to the International System of Units (SI).

Methods used are in accordance with the procedure listed above. This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

Unless otherwise contractually specified, a binary decision rule, utilizing simple acceptance, and simple rejection criteria will be used for the determination of compliance. When compliance statements are present, they are reported without factoring in the effects of uncertainty and the limits are defined by the manufacturer's stated accuracy.

This certificate does not guarantee the continued performance of the instrument listed above. Any modifications or services performed hereafter may void this certificate.

This certificate applies only to the item listed above and is not to be reproduced other than in full, except with prior written approval from Apex Instruments Inc.

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Pages 178 through 357 of this report have been redacted FOIA Exemption 9: Geological or geophysical information and data concerning wells; information of technical or scientific nature.