Exhibit No. _____
Issues: Disposition Agreement and Company Background
Witness: Josiah Cox
Type of Exhibit: Direct Testimony
Sponsoring Party: Elm Hills Utility Operating Company, Inc
File Nos.: WR-2020-0275
Date: October 22, 2020

Missouri Public Service Commission

Direct Testimony

of

Josiah Cox

On Behalf of

Elm Hills Utility Operating Company, Inc

October 22, 2020

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DIRECT TESTIMONY OF
JOSIAH COX
ELM HILLS UTILITY OPERATING COMPANY, INC.

WITNESS INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Josiah Cox. My business address is 1650 Des Peres Road, Suite 303, St. Louis Missouri, 63131.

Q. WHAT IS YOUR POSITION WITH ELM HILLS UTILITY OPERATING COMPANY?

A. I am President of Elm Hills Utility Operating Company, Inc. ("Elm Hills" or "Company"). I also am President of CSWR, LLC, ("CSWR") and Central States Water Resources, Inc., ("Central States"), each of which is Elm Hills affiliate. Elm Hills, CSWR, and Central States are part of an affiliated group of companies that provide water or wastewater utility services to more than 40,000 customers in Kentucky, Missouri, Arkansas, Texas, and Louisiana. We have applications pending in Kentucky, Missouri, Texas, Tennessee, North Carolina, Mississippi, and Louisiana seeking authorization from utility regulators in those states to acquire even more systems and customers.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL EXPERIENCE.

A. I received a Bachelor of Science with a major in Environmental Science from the University of Kansas. In 2007, I earned an MBA from Washington University in St. Louis.

Professionally, I have worked at the Kansas state biological survey, where I performed wildlife habitat studies. I then worked at a civil engineering firm where I was involved in various facets of the land development process including permitting, entitlement, civil design, project management, and construction management. I focused mainly on the water and wastewater side of the civil engineering business and participated in every part of that business from waste-load allocation studies (now known as the anti-degradation processes), design, permitting, project management, and construction management. I also ran the firm's environmental consulting division and was the second private consultant to submit a water quality impact study in the state of Missouri in 2003. I joined the engineering firm's executive leadership team and helped run all the firm's operations.

Beginning in 2005, I raised money from a group of investors and formed a full-service civil engineering, environmental consulting, general contracting, and construction management firm. I served the firm as the Chief Operating Officer, and finally Chief Executive Officer, and while there I obtained extensive experience with rural communities in every facet of the water and wastewater compliance process, including environmental assessment, permitting, design, construction, operation and community administration of the actual water and wastewater (sewerage) systems. The firm performed stream sampling and built waste-load allocation models to determine receiving water-body protective permit-able effluent pollutant loads. The firm did full engineering design of multiple whole community wastewater and water infrastructure systems including

wells, water distribution, water treatment, water storage, wastewater conveyance, and wastewater treatment plants and taken these designs through federal and state administered permitting processes in Missouri, and administered the construction of these water and wastewater systems from green field site selection all the way through system startup and final engineering sign off.

In addition to running a design/build firm, starting in 2008, I took over the operations of an existing rural sewer district. I still act as the administrator of this system, where I manage the system's functioning, testing, maintenance, performing all the billing, emergency response, accounts payable/accounts receivable, collections, budgeting, customer service, and public meetings required to service the community.

In late 2010, after working on several small, failing water and wastewater systems, I created a business plan to acquire and recapitalize failing systems as investor-owned regulated water and wastewater utility companies. In early 2011, I went to the capital markets to raise money to implement my plan. Over a period of approximately three years, I met with over fifty-two infrastructure investment groups trying to raise necessary financing. In February 2014, I achieved my goal, and I used the debt and equity capital I was able to raise to start CSWR. In 2018, I was able to attract an additional large institutional private equity investor, which allowed me to expand the scope of my business plan. Since its formation, CSWR has acquired, and currently is operating through various affiliates, 257 water and/or wastewater systems in Missouri, Kentucky, Louisiana and Arkansas. In Missouri, those systems are regulated by the Missouri Public

Service Commission, in Kentucky they are regulated by the Kentucky Public Service Commission, in Louisiana they are regulated by the Louisiana Public Service Commission and in Arkansas, the systems are outside the Arkansas Public Service Commission's jurisdiction due to annual revenue thresholds.

The Tennessee Public Utilities Commission voted to approve the application of CSWR's Tennessee affiliate to acquire a water and wastewater system, and we expect to file additional acquisition applications in Tennessee in the near future. The Texas Public Utilities Commission recently approved three acquisition applications by another CSWR affiliate to purchase water and wastewater systems in that state. CSWR affiliates currently have additional acquisition applications pending before this Commission as well as utility regulatory commissions in Kentucky, Louisiana, Texas, Mississippi, and North Carolina.

PURPOSE

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS CASE?

A. My direct testimony has three purposes. First, I want to formally express Elm Hills' support for the *Nonunanimous Disposition Agreement Regarding Disposition of Small Utility Revenue Increase Request* ("Disposition Agreement"), which the Commission Staff ("Staff") and the Company jointly filed September 9, 2020. Elm Hills adopts the findings and recommendations stated in that Disposition Agreement, including the recommendation the Company be allowed to increase rates for water service by $77,818 and for sewer service by $389,369

prior to recovery of rate case expense the Commission may authorize as a result of this hearing.

Second, I want to express Elm Hill's support for the direct testimony of Staff's witnesses Jim Busch, filed October 22, 2020, on the rate of return the Commission should use in this case. Elm Hills is willing to accept Staff's recommendations contained in the Disposition Agreement for purposes of setting rates in this case.

Finally, I my direct testimony will describe improvements Elm Hills has made to water and wastewater systems the Company currently owns in Pettis and Johnson Counties and explain how those improvements contribute to our objective of providing safe and reliable service to customers. This information also will help the Commission put our rate increase request in context and explain why the increase we seek is necessary and should be approved.

ELM HILLS

Q. PLEASE DESCRIBE ELM HILLS' OPERATIONS IN MISSOURI.

A. Elm Hills currently provides water utility service to approximately 127 Missouri customers and wastewater service to approximately 612 customers, however as I previously stated not all those customers are affected by the proposed rate increase.

The Company began operations in 2017 following the Commission's authorization (in File No. SM-2017-0150) of Elm Hills' acquisition of Pettis County water and wastewater systems previously owned by Missouri Utilities Company (but which were in receivership when the Company acquired them) and a

previously unregulated wastewater system serving the State Park Village subdivision in Johnson County. In September 2018, the Commission authorized Elm Hills (in File No. SA-2018-0313) to acquire assets previously owned and operated by two homeowner associations Oaktree Estates and Rainbow Acres. In April 2020, the Commission authorized Elm Hills (in File No. SM-2020-0146) to acquire assets previously owned and operated by Central Rivers Wastewater Utility, Inc., in Clay County. The Commission also granted the Company a certificate of convenience and necessity to provide wastewater service to the adjacent Prairie Fields Subdivision. Although Elm Hills currently operates all the systems I just described, because the Commission's final order in File No. SM-2020-0146 came after the Company initiated the current rate case, increased rates currently under consideration will not apply to customers served by our Clay County systems.

In addition to the testimony and photographs that follow, I recommend the Commission view materials posted at the following websites, which describe or depict the significant progress Elm Hills has made improving the systems it acquired, which helps ensure customers receive water and wastewater service that is safe and reliable and complies with all applicable laws and regulations:

- https://vimeo.com/453349867
- https://www.centralstateswaterresources.com/case-study-elm-hills/

Missouri Utilities Water System

Q. PLEASE DESCRIBE THE CONDITION OF THE FORMER MISSOURI UTILITIES WATER SYSTEM WHEN ACQUIRED BY ELM HILLS.

A. At purchase, the former Missouri Utilities water system consisted of a single well connected to a train tank car that had been converted to hydropneumatic storage for water supplied to a distribution system serving approximately 151 residential service connections. The existing infrastructure inside the well house was severely deteriorated, and equipment replacement or repair were required for all water production and storage components. Prior to acquisition, the well went out of service routinely, which left the community without water. And the lack of an emergency backup supply meant that water system could not continue service during emergency maintenance situations.

As I previously mentioned, hydropneumatic storage was an old rail tanker car that had been placed on blocks and equipped with a compressor to allow for hydro-tank functionality. Inspection stamps on the tank show it was originally built in 1929. Due to its age and lack of maintenance, the tank leaked in several places and was covered in rust. During initial system renovations, the tank was cut open and we discovered more than 6 inches of rust sludge in the bottom of the tank, which routinely was being released with the water provided to customers. This obviously was detrimental to water quality, was detrimental to the distribution system's functionality and also posed a potential public health risk for customers. The rust sludge regularly caused issues for customers ranging

from discolored and strange tasting water to staining of clothing washed in the water when turbidity increased in the tank during high usage hours.

The existing well had exposed wiring and showed signs of leaking at the well head which has the potential to expose consumers to health risks associated with pathogen contamination. The existing pump and motor were both reaching the end of their useful lives and needed replacement, with pump testing showing it was performing 37 percent below published pump curves for the unit. The exposed wiring was also a concern and should have been properly installed in conduit. The existing well house, which encloses both the hydropneumatic tank and the well head, was in poor condition, poorly lit, unpainted on the interior, and had exposed insulation and debris throughout the structure. Controls in the structure were out of date and not in compliance with current electrical code requirements, which represented a safety hazard and also a potential source of service interruptions. Furthermore, existing electrical service to the structure was unable to support any additional equipment, which meant it would need to be replaced when improvements were implemented. The following photographs show some of the conditions I just described.

Leaking and rust on hydropneumatic storage tank exterior

Rust sludge accumulation in tank interior

Outdated tank gauging and equipment

Damaged, poorly lit interior of well house

Exposed wiring on well head and signs of leaking from well head

Q. WHAT FACILITY UPGRADES WERE IMPLEMENTED BY ELM HILLS TO DEAL WITH THE CONDITIONS YOU DESCRIBED?

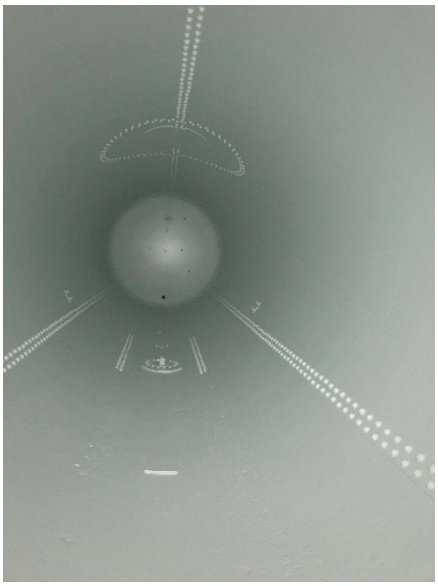
A. To ensure safe and reliable service from the former Missouri Utilities Water system, numerous improvements were implemented. One of the most essential improvements, needed both to provide a backup water supply and to allow the well and tank to be taken offline for improvements, was establishing a connection

to the City of Sedalia water system. This involved installing a master meter and meter pit, a significant length of water main, a valve vault with a pressure reducing valve ("PRV"), and valving and piping modifications to allow the well and tank to be isolated separately from the rest of the water system. Pressure reduction measures also were necessary to prevent distribution system damage from the higher pressures of the city water system.

With the backup connection completed, work could be performed on the well and tank without interrupting service to the community. After the tank and well were isolated, the well head was reworked and painted, the pump and pump motor replaced, and electrical supply and control panels were replaced. To repair the tank, it first was sand blasted. To complete this phase of the process, the building surrounding the tank and well had to be partially disassembled and removed. Sanding also showed the locations of significant leaks that were targeted for welding repairs. Additionally, a hatch was cut in the end of the tank and manway installed to allow evaluation of the tank interior.

As mentioned previously, it was discovered the entire interior of the tank was severely corroded, with flaking rust throughout and six inches of rust sludge accumulated in the bottom of the tank. Interior rust was broken off and shoveled out as much as possible, and then repeatedly flushed to prep the tank for sanding. The tank interior was then sanded and leaks, thin spots, and areas exhibiting significant section loss were identified on the interior and exterior and welded and patched to extend the tank's useful life. The tank was then coated inside and out with a new corrosion-resistant coating to prevent further corrosion

and ensure good water quality would be maintained in the future. Mission remote monitoring equipment was installed on the well and tank to allow for instantaneous operator response to any abnormal conditions on the water production and storage equipment. The following photographs show some of the repairs I just described.



Tank interior sanded, patched, and recoated

Tank exterior recoated and new tank monitoring equipment installed

Reworked well head and new monitoring equipment

New Control panels, power supply, and remote monitoring equipment in well house

Improved well house interior and lighting.

Valve vault with PRV with emergency supply from City of Sedalia

Q. HOW WOULD YOU DESCRIBE THE CURRENT PERFORMANCE OF THE FORMER MISSOURI UTILITIES WATER SYSTEM?

A. After upgrades were completed, the former Missouri Utilities water system has consistently supplied safe and reliable water service to the community it serves. Since acquisition, the facility has had no violations and has received no formal enforcement actions from the Missouri Department of Natural Resources ("DNR"). Under previous ownership, the facility regularly failed to complete required reporting and regularly failed bacteriological testing. Since Elm Hills acquired the system, all testing, public disclosures, and reporting has been completed on time. Improvements the Company implemented have brought this system into compliance, ensured no service interruptions will occur as a result of installing the backup connection to the city water supply, and have significantly

extended the useful life of all water equipment so the facility can continue to provide safe and reliable service into the future.

Missouri Utilities Wastewater Treatment

Q. PLEASE DESCRIBE THE CONDITION OF THE MISSOURI UTILITIES WASTEWATER SYSTEM WHEN ACQUIRED BY ELM HILLS.

A. The Missouri Utilities wastewater treatment facility consisted of a three-cell lagoon system fed by a vitrified clay pipe (VCP) gravity collection system. The facility serves approximately 151 residential service connections in Pettis County. The lagoon system was severely overgrown with trees growing on the berms throughout the system. The lagoon overflowed on a regular basis, allowing partially treated waste to flow onto the golf course. The facility struggled to meet Missouri Department of Natural Resources ("DNR") limits, and to further complicate compliance issues the new permit being implemented near the time of acquisition introduced ammonia limits the unaerated lagoon system could not meet.

One of the largest challenges facing the system is a large amount of inflow and infiltration ("I&I") caused by the VCP collection system. VCP can deteriorate over time and is prone to root infiltration at joints causing cracks and allowing groundwater to flow into the system. This means during rain events actual flows routinely exceed design flows and treatment capacity of the system. Between issues related to I&I flows and stricter effluent limits put into effect just prior to Elm Hills' acquisition, the facility requires improvements to meet biochemical

oxygen demand ("BOD"), total suspended solids ("TSS"), ammonia, and E. coli limits.

The following photographs illustrate some of the problems I just described:

Aerial photo of lagoon system with visible overgrowth

Example of vitrified clay pipe damaged by root infiltration allowing I&I flows

Q. WHAT FACILITY UPGRADES WERE IMPLEMENTED BY ELM HILLS TO DEAL WITH THE CONDITIONS YOU DESCRIBED?

A. The high I&I flows and stricter effluent limits required significant overhaul to allow effective treatment. An alternatives analysis was performed to determine the best

course of action for facility improvements. Alternatives considered included addition of a Moving Bed Biofilm Reactor ("MBBR") with drum filter and ultra-violet ("UV") disinfection to the existing treatment system; installation of a package, extended aeration plant to treat waste; connection to the City of Sedalia treatment system; and conversion to a non-discharging treatment system with pretreatment followed by irrigating the golf course. Early in the alternatives analysis, it became clear it would not be possible to obtain easements necessary to connect to the City of Sedalia system. Moreover, the City stated it was not interested in receiving flows from the Missouri Utilities community. Cost analysis, treatment analysis, site restrictions showed that the addition of the MBBR was the best alternative available.

To complete the project, various modifications of the existing plant were implemented, and new equipment installed. The lagoon berms were cleared and graded to prevent overflow events for recurring and allowing for continued maintenance of the lagoon system. The second two cells of the lagoon were removed from regular operation with the second cell retained for emergency flow equalization. A dual unit MBBR reactor was installed receiving flows from a lift station gravity fed from the first lagoon cell. Additionally, aeration was added to the first cell of the lagoon to aid in sludge breakdown. Flows from the MBBR system pass to a drum filter to remove fine solids and then through a UV disinfection unit and to the outfall.

In addition to treatment improvements, remote monitoring equipment was installed to allow immediate response to abnormal conditions from operators and

provide accurate flow data, and fencing was also installed to prevent the public from encountering untreated waste or wastewater equipment. The upgraded system was designed to handle the flows from customers with excessive flow equalization in the lagoon to handle I&I events.

The following photographs show some of the improvements made by Elm Hills that I just described:

MBBR units with covers in place

Drum Filter

UV Disinfection system

Fencing around lagoon and aeration visible in lagoon

Q. HOW WOULD YOU DESCRIBE THE CURRENT PERFORMANCE OF THE FORMER MISSOURI UTILITIES WASTEWATER TREATMENT SYSTEM?

A. Since upgrades were completed, the former Missouri Utilities wastewater treatment system has consistently met DNR permit limits. Treatment is much more reliable, and the facility can adequately handle the flows it receives. The table below compares typical DNR results after facility improvements were

completed compared to a typical DNR result under previous ownership for parameters tested on both the previous and current permits:

Missouri Utilities Effluent Quality Progression

Parameter	Limit	Unit	Pre Ownership	Post Triage	Percentage Improvement
Test Date	N/A	N/A	1/31/2018	8/31/2020	N/A
BOD, carbonaceous [5 day, 20 C]		MGD	17	4	425%
Nitrogen, ammonia total [as N]	45	mg/L	12	0.3	4000%
Solids, total suspended	30	mg/L	89	9.6	927%
pH	45	mg/L	7.9	8.1	N/A

It is noteworthy that all important effluent parameters show significant improvement. Most notably, BOD and ammonia levels are good indicators of the overall efficacy of the treatment process. The dramatic improvement in these indicators demonstrates extremely improved performance with upgrades in place. This improvement also represents significant improvement to the water quality in the receiving stream, thereby increasing the environmental health of the community the system serves. Additionally, with the added flow equalization, the system no longer overflows onto the golf course, which eliminates an illicit intermittent discharge and a health hazard to the community.

State Park Village

Q. PLEASE DESCRIBE THE CONDITION OF THE FORMER STATE PARK VILLAGE WASTEWATER SYSTEM WHEN ACQUIRED BY ELM HILLS.

A. The former State Park Village wastewater treatment facility consisted of an extended aeration treatment plant serving approximately 180 service connections. The treatment process consisted of an influent manual rake screen, extended aeration treatment basin, clarifier, and disinfection by chlorination and dechlorination, with sludge hauled by contract sludge hauler. Aeration was

provided by a single surface aerator in the aeration basin and facility piping was improper PVC. Additionally, the previous operator had dug a small, unpermitted lagoon cell behind the facility for sludge accumulation. While the facility may have been capable of some wastewater treatment, it was drastically undersized for the population it served and, as a result, was not in compliance with permitted limits. The plant regularly received flows averaging around 44,000 gallons per day ("GPD") but had a design flow of only 20,000 GPD. This overloading of the plant led to inadequate treatment time of waste and allowed a large amount of sludge to settle in the receiving creek for a considerable distance from the treatment facility (over a mile of creek showed sludge impact). This wastewater sludge had discharged into a stream inside Knob Noster State Park. The receiving water body inside the state park had a sludge blanket and blood worms. This state park village treatment plant receiving water way directly feeds another Knob Noster State park waterbody downstream that has public recreational access. This stream was cited by DNR and the Missouri Department of Conservation as posing a health risk to the state park. Essentially, all treatment components were undersized and could not hope to meet permitted limits.

In addition to being overloaded, the plant was not equipped to adequately treat ammonia, and the chlorine contact chamber was not in compliance with minimum DNR standards. There also was no remote monitoring to alert operators regarding site conditions or facility performance. The collection system had several issues as well. Lift stations were unfenced, had inadequate access,

and no remote monitoring. Smoke testing showed three locations where significant I&I was occurring, which added to the flows of the already overloaded plant. Additionally, the road along the dam over the plant had been washed out several years prior to acquisition, thereby exposing a section of force main that required both replacement and proper installation underground. The following photographs illustrate some of the problems I just described.

Aeration basin with single surface aerator, also PVC piping visible

Unpermitted lagoon added to treatment plant by previous operator

Sludge and blood worm accumulation in receiving waters, continuing for over 1 mile in stream inside Knob Noster State Park

Force main exposed by road washed out from dam

Q. WHAT FACILITY UPGRADES WERE IMPLEMENTED BY ELM HILLS TO DEAL WITH THE CONDITIONS YOU DESCRIBED?

A. The conditions at the plant showed significant overhaul was needed to allow adequate treatment capacity, effective ammonia treatment, and effective disinfection at the former State Park Village facility. An alternatives analysis was performed to determine whether to upgrade the existing facility to an Integrated Fixed Film Activated Sludge ("IFAS") treatment system, construct a new activated sludge treatment plant with adequate capacity, construct a new activated sludge treatment plant with tertiary filtration prior to disinfection, or convert to a membrane bio-reactor treatment facility. Evaluating initial capital cost, anticipated operations cost, equipment replacement over time, and the physical space available at the plant, the IFAS system was selected as the best option for effective treatment of waste at the plant. To complete the project,

various components of the existing plant were modified, and new equipment installed. The influent flow structure was upgraded, a new lift station with a mixing blower was added, and manually cleaned trash racks were replaced with a screw screen to ensure nuisance solids do not enter the facility. The existing aeration basin was cleaned, and existing equipment was removed and IFAS media and aeration equipment were installed in the existing basin. The existing clarifier was overhauled to allow adequate solids removal and sludge return to the activated sludge process. The existing sludge basin was retained and improved to allow continued service. Finally, the chlorine contact chamber was replaced with an ultraviolet disinfection system.

In addition to the plant overhaul, emergency backup power was installed at the plant to allow for continued operations in the event of power outages. The new plant provides adequate treatment for the correct flow and can handle high flow periods without exceeding treatment capacity. Facility piping was replaced with appropriate materials, new catwalks and handrails were installed, and all control panels were replaced. Mission remote monitoring was installed at the plant and at all lift stations to allow instantaneous response from operators for abnormal conditions and to provide accurate live flow data for the facility. The three locations where I&I were identified in the collection system were repaired to prevent stormwater flow to the facility. In addition to the physical upgrades to the plant and collection system, operations have drastically improved, bringing greater professionalism and expertise to the operation of the treatment system. The following photographs show some of the improvements I described.

IFAS media visible during construction

Aeration basin post upgrade

UV disinfection system

New blowers

Sludge holding basin

New screw screen and mixing blower

New influent lift station

Q. HOW WOULD YOU DESCRIBE THE CURRENT PERFORMANCE OF THE FORMER STATE PARK VILLAGE WASTEWATER TREATMENT SYSTEM?

A. Since upgrades were completed, the former State Park Village treatment system has consistently met limits. Treatment is much more reliable, and the facility can adequately handle the flows it receives. The table below compares typical DNR results after facility improvements were completed compared to a typical DNR result under previous ownership:

State Park Village Effluent Quality Progression					
Parameter	**Limit**	**Unit**	**Pre Ownership**	**Post Triage**	**Percentage Improvement**
Test Date	N/A	N/A	8/24/2015	9/30/2020	N/A
Flow, daily maximum		MGD	0.09	0.04	N/A
Flow, monthly average		MGD	0.01	0.04	N/A
BOD, carbonaceous [5 day, 20 C]	45	mg/L	23	4	575%
BOD, carbonaceous [5 day, 20 C]	30	mg/L	23	4	575%
Solids, total suspended	45	mg/L	50	15	333%
Solids, total suspended	30	mg/L	50	15	333%
pH (High)	9		7.41	7.9	N/A
pH (Low)	6		7.65	7.9	N/A
Nitrogen, ammonia total [as N]	10	mg/L	15.7	0.3	5233%
Nitrogen, ammonia total [as N]	15	mg/L	15.7	0.3	5233%
E. coli	130	MPN/100mL	60	1	6000%
E. coli	240	MPN/100mL	60	1	6000%
Chlorine, total residual	0.011	mg/L	0.01	0.01	N/A
Chlorine, total residual	0.019	mg/L	0.01	0.01	N/A
Oxygen, dissolved [DO]		mg/L	5.75	8	72%
Oxygen, dissolved [DO]		mg/L	5.55	8	69%

It is noteworthy that all important effluent parameters show significant improvement. Most notably, the indicated levels of BOD and ammonia are good indicators of the overall efficacy of the treatment process. The dramatic improvement demonstrates extremely improved performance with the upgrades in place, which also represents significant improvement to the water quality in the receiving stream which flows into Knob Noster State Park, increasing the environmental health of the community the system serves.

Twin Oaks

Q. PLEASE DESCRIBE THE CONDITION OF THE TWIN OAKS WASTEWATER SYSTEM WHEN ACQUIRED BY ELM HILLS.

A. The Twin Oaks wastewater treatment facility consisted of a recirculating sand filter treatment plant serving 38 residential service connections located in Johnson County near Knob Noster. The facility receives flows from a low-

pressure collection system and therefore is not subject to increased I&I flows typical of gravity collection systems. The primary issue with this facility was an inability to meet the ammonia limits and E.coli limits prescribed in the facility's permit, which requires the facility discharge below 12. mg/l in summer months and 2.4 mg/l in winter months. At the time of acquisition, no disinfection system was installed at the facility, and as a result there was no way that the facility could meet the E.coli limits prescribed by its permit. Additionally, an evaluation of the treatment capacity and expected flows from the community served showed the plant was permitted for flows in excess of treatment capacity and in excess of the needs of the community. Our evaluation showed the facility should be designed to treat 9,990 gpd based on DNR standards. Reviewing the compliance history of the Twin Oaks facility primarily showed enforcement actions related to failure to meet limits. As mentioned previously, this was caused by the facility's inability to properly treat for ammonia and E.coli limits.

Q. WHAT FACILITY UPGRADES WERE IMPLEMENTED BY ELM HILLS TO DEAL WITH THE CONDITIONS YOU DESCRIBED?

A. Many improvements were implemented at the Twin Oaks facility to allow it to meet permitted limits and bring it into compliance with environmental regulation. An alternatives analysis was performed to evaluate possible improvements that would allow the facility to meet limits. Alternatives considered were adding an MBBR treatment unit and chlorination/dechlorination equipment to the existing recirculating sand filter plant, replacing the existing recirculating sand filter plant with a package extended aeration treatment plant, and conversion to a no-

discharge treatment system with land application of waste. The no-discharge option proved impractical as there was not property available for land application. Comparing the MBBR process with replacement of the facility with a package plant showed that while both options would allow proper treatment the MBBR system would be much more affordable to build and operate than a package plant. As a result, the MBBR option was selected.

To add the MBBR treatment option to the plant, a new power supply and control systems were added to support the new equipment. A single MBBR treatment unit was installed with two blowers installed to supply aeration. Additionally, a chlorination and dechlorination tablet system was added to allow for proper disinfection and compliance with E.coli limits. In addition to the improvements described, some repairs were made to the sand filter to ensure proper function. The following photographs show some of the improvements Elm Hills has made to the Twin Oaks facilities:

New blowers and MBBR unit

New chlorine contact chamber

Interior of new MBBR unit

Q. HOW WOULD YOU DESCRIBE THE CURRENT PERFORMANCE OF THE TWIN OAKS WASTEWATER TREATMENT SYSTEM?

A. Since upgrades were completed, the Twin Oaks treatment system has consistently met its permit limits. The facility has adequately handled flows and reliably performs the wastewater treatment process.

The table below compares typical DNR results after facility improvements I described were completed compared to a typical DNR result under previous ownership:

Twin Oaks Effluent Quality Progression

Parameter	Limit	Unit	Pre Ownership	Post Triage	Percentage Improvement
Test Date	N/A	N/A	6/30/2018	5/19/2020	N/A
Flow, in conduit or thru treatment plant	N/A	MGD	0.0048	0.01	N/A
BOD, 5-day, 20 deg. C	30-45	mg/L	39	4	975%
Nitrogen, ammonia total (as N)	1.2	mg/L	3.6	0.42	857%
pH	6.5-9	SU	7.6	7.4	N/A
Total Suspended Solids (TSS)	30-45	mg/L	55	2	2750%
Escherichia coli (E. coli)	206	#/100ml	34	1	3400%

All parameters have shown significant improvement. Most notably, the ammonia and E.coli tests, which were where the facility struggled most in the past, show massive improvement. There has been an 857 percent improvement in ammonia levels and much greater improvement on E.coli. The sample used in the comparison actually showed E.coli below the detection limit of 1 so the improvement is even more significant than the 3,400 percent implied by the comparison. Improvement was also noted in TSS and BOD removal performance, showing that all treatment has improved since Elm Hills acquired and began operating the facility. This improvement not only represents drastic improvement with regard to compliance with environmental regulation, but also significant reduction in pollutants entering the receiving waters that flow through the community it serves. Elm Hills has brought safer more reliable sewer service to the Twin Oaks community.

Rainbow Acres

Q. PLEASE DESCRIBE THE CONDITION OF THE RAINBOW ACRES WASTEWATER SYSTEM WHEN ACQUIRED BY ELM HILLS.

A. The Rainbow Acres wastewater treatment facility consisted of a three-cell lagoon system that serves approximately 44 residential service connections located in Johnson County near Knob Noster. At acquisition, the system had no aeration system. The lagoon system was in poor condition with numerous areas of damage on the berms brought on by muskrats, and regularly was leaking wastewater from the south side of the first treatment cell into a creek, which constituted an unpermitted discharge of partially treated waste. The berm damaged posed a potential large environmental concern due to potential structural collapse. The leaking and overflowing of the berm of the first lagoon cell was exaggerated by the pipe connecting the first two cells being poorly adjusted, thus leading to higher than designed water levels in the first cell of the lagoon. A significant amount of sludge had accumulated in the receiving creek and was deposited on the banks leading to the creek along the path the overflowing waste regularly took.

The Rainbow Acres collection system gravity feeds into the lagoon system, and post-acquisition smoke testing showed three damaged manholes where stormwater was entering the system, two cleanouts with lids missing, and six locations with blockages or sagging locations in the sewer mains. The cleanouts and damaged manholes are sources of I&I and the blockages and low

spots in the collection system compromise regular flow of sewage and have caused backups for some customers.

In reviewing compliance history of the plant, it was clear pre-acquisition DNR test results greatly benefited from the illicit discharge over the southern edge of the first lagoon cell. The reported flow was generally around 0.004 MGD (4,000 gallons per day). Since the illicit discharge was eliminated, actual flow proved closer to 0.04 MGD (40,000 gallons per day). Even with the reduced loading through the second two cells of the lagoon, the system consistently failed to meet ammonia limits, as unaerated lagoons have very little ability to treat ammonia.

The following photographs show some of the conditions we found at Rainbow Acres at the time Elm Hills acquired those facilities.

Illicit discharge from first cell of lagoon structure with notable sludge accumulation

Muskrat damage throughout lagoon berms

Sludge accumulation in creek from illicit discharge upstream of proper discharge point

Q. WHAT FACILITY UPGRADES WERE IMPLEMENTED BY ELM HILLS TO DEAL WITH THE CONDITIONS YOU DESCRIBED?

A. Many improvements were implemented at the Rainbow Acres facility to bring it into compliance with environmental regulations. First, the pipe between the first two cells was adjusted to end the illicit discharge from the first lagoon cell. The berm around all three cells was regraded and repaired for additional freeboard on all lagoon cells and to repair the structural damage caused by muskrats.

Additionally, the piping leading to the outfall was replaced due to previous replacement with poor materials after damage to the pipe.

Even with repairs to the facility I just described, additional process improvement was required to allow compliance with ammonia limits. An MBBR treatments system and clarifier were installed at the facility. This involved bringing power to the site for blowers and equipment, installing tanks for lift station, and installing the MBBR unit, clarifier, and weir box. Blowers and a blower housing were installed to operate the MBBR system and flow monitoring equipment and panels were installed to provide accurate flow measurement and remote monitoring and a new chlorine disinfection equipment was installed. All identified issues in the collection system were repaired to prevent further backups and eliminate major sources of I&I. In addition to treatment and collection improvements, the entire site has been cleaned up and fenced to protect the public from exposure to wastewater and waste treatment equipment.

The following photographs show some of the improvements to the Rainbow Acres facilities I just described:

New tankage, power supply and lift station

Control panels for new equipment and remote monitoring

New blowers and blower housing

New clarifier

New MBBR at startup (note foaming lasted first few days)

New weir box and flow meter

New chlorine disinfection equipment

Q. HOW WOULD YOU DESCRIBE THE CURRENT PERFORMANCE OF THE RAINBOW ACRES WASTEWATER TREATMENT SYSTEM?

A. Since upgrades were completed, the Rain Acres treatment system has consistently met limits. Treatment is much more reliable, and the facility can adequately handle the flows it receives. The table below compares typical DNR results after facility improvements were completed compared to typical results under previous ownership:

Rainbow Acres Effluent Quality Progression

Parameter	Limit	Unit	Pre Ownership	Post Triage	Percentage Improvement
Test Date	N/A	N/A	6/30/2018	7/1/2020	N/A
Ammonia (as N) + unionized ammonia	3.6	mg/L	3.5	0.3	1167%
Nitrogen, ammonia total (as N)	1.4	mg/L	3.5	0.3	1167%
BOD, 5-day, 20 deg. C	45-65	MGD	39	4	975%
Escherichia coli (E. coli)	-	#/100ml	34	0.1	34000%
Flow, in conduit or thru treatment plant	-	MGD	0.0048	0.04	N/A
pH	6.5-9	SU	7.6	8.2	N/A

All effluent parameters have shown significant improvement compared to previous ownership. Additionally, comparison of the test results show the

elimination of the illicit discharge from the first cell of the lagoon produced a ten-fold increase in monitored flow. The illicit discharge of untreated waste was a serious violation and represented a real hazard to the communities along the creek that received the discharge. Elm Hills' system upgrades not only drastically improved effluent quality from the facility but stopped this additional pollution source. Additionally, by adding remote monitoring to the facility, operations staff now have immediate information concerning any abnormal conditions with facility equipment and can respond before things become an issue for customers. Overall, the system is in markedly better condition and performs much better than it had prior to the Company's reinvestment and the Rainbow Acres system now consistently provides excellent service and complies with all applicable environmental regulation.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

AFFIDAVIT

STATE OF MISSOURI)
) ss
COUNTY OF ST. LOUIS)

I, Josiah Cox, state I am the President of Elm Hills Utility Operating Company, Inc.; the attached Direct Testimony was prepared by me or under my direction and supervision; and, the answers to the questions posed in that testimony are true to the best of my knowledge, information and belief.

Subscribed and sworn to before me this 22nd day of October, 2020.

Notary Public

My Commission Expires:

6/14/22
(SEAL)

AMBER N. PIERCE
Notary Public - Notary Seal
St. Louis City - State of Missouri
Commission Number 14995340
My Commission Expires Jun 14, 2022